Environmental Impact Assessment Report – Volume 3 Appendices

Proposed Development
SDCC Ref. SD21A/0186
at DB8,
Plot 100,
Profile Park,
Nangor Road,
Clondalkin,
Dublin 22

On behalf of
Equinix (Ireland) Ltd

April 2023

Brock McClure
PLANNING & DEVELOPMENT CONSULTANTS

Planning & Development
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63 York Road,
Dun Laoghaire
Co. Dublin
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June 2021

DB080-MOR-LS-XX-RP-V-XXXX-8060

Bat Survey Report

Proposed Development (Equinix DB8)

RKD

On behalf of

RKD Architects Ltd.

Profile Park, Co. Dublin

MALONE O'REGAN ENVIRONMENTAL

QUALITY
I.S. EN ISO 9001:2015
NSAI Certified

MALONE O'REGAN

Form ES - 04

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Title: Bat Survey Report, Proposed Development (Equinix DB8), RKD Architects Ltd., Profile Park, Co. Dublin

Job Number: E1739

Prepared By: Allison Flaherty **Signed:**

Checked By: Dyfrig Hubble **Signed:**

Approved By: Dyfrig Hubble **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	24/06/21	Bat Survey Report	Final	AF	DH	DH

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Bat Survey Report

Proposed Development (Equinix DB8)

RKD Architects Ltd.

Profile Park, Co. Dublin

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1 INTRODUCTION

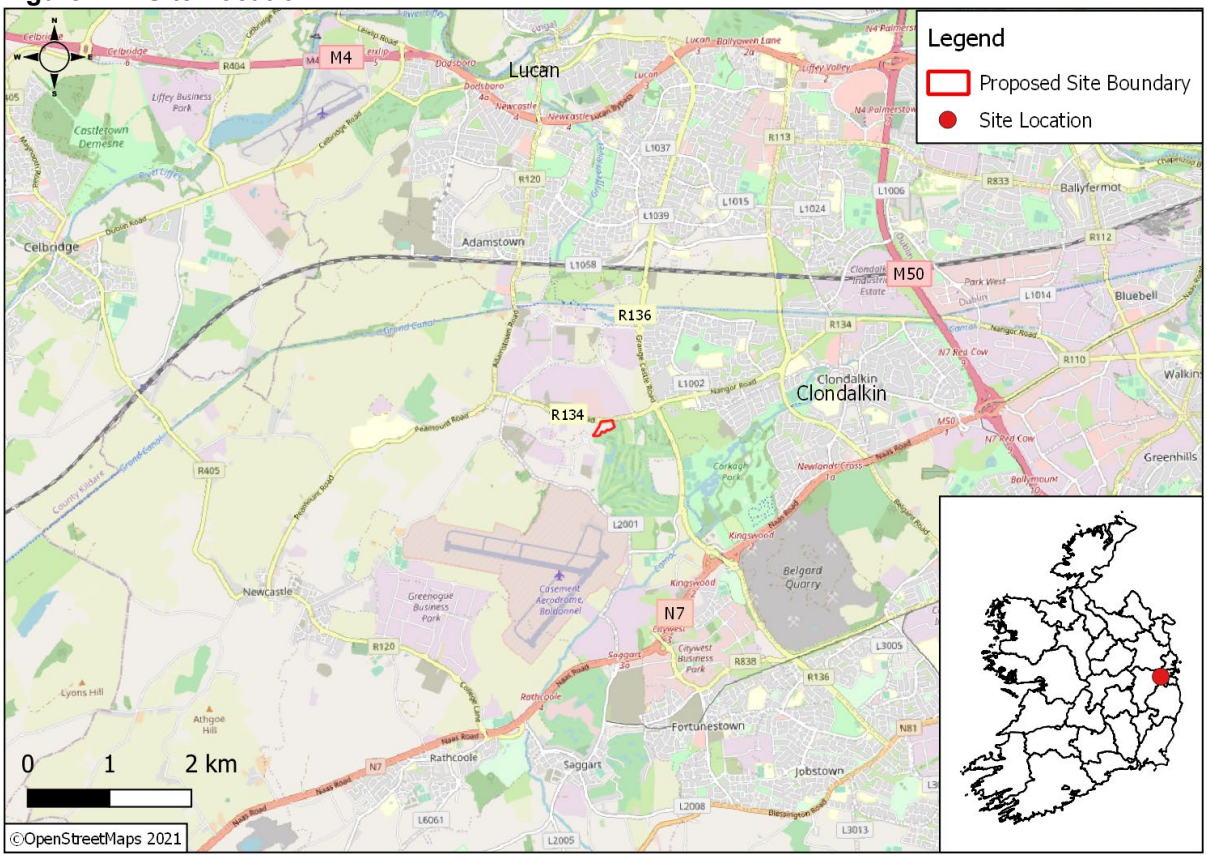
1.1 Background

Malone O'Regan Environmental (MOR) were commissioned by RKD Architects Ltd on behalf of Equinix (Ireland) Ltd to undertake a Bat Survey Report for the construction and operation of a proposed data centre and all ancillary works (the 'Proposed Development'), at Profile Park, Kilcarbery, Dublin, Co. Dublin (OS Reference O 04052 30807).

The baseline ecological survey of the Site highlighted the potential for bats to commute and forage along the boundaries of the Site and the potential for bats to roost within some of the mature trees on Site. It was therefore deemed necessary for further survey work to be carried out in order to determine the level of bat activity at the Site and whether or not any bat roosts occur within the mature trees along the boundaries of the Site.

The location of the proposed development ('the Site') is shown in Figure 1-1.

Figure 1-1: Site Location



1.2 Relevant Legislation

All Irish bat species are protected by law under the Wildlife Act 1976 and its subsequent amendments. They are afforded full protection under this act, which makes it a criminal offence for anyone without a licence to:

- Kill, injure or handle a bat;
- Possess a bat (whether alive or dead);
- Disturb a roosting bat; and,

- Damage, destroy or obstruct access to any place used by bats for shelter, whether they are present or not.

In addition to domestic legislation, bats are also protected under the EU Habitats Directive (92/43/EEC). All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat is further listed under Annex II, which make it an offence to:

- Deliberately capture, injure or kill any bat; or,
- Deliberately disturb a bat, in particular any disturbance which is likely;
    (a) To impair their ability:
        (i) To survive, to breed or reproduce, or to rear or nurture their young; or,
        (ii) To hibernate or migrate.
    (b) To affect significantly the local distribution or abundance of the bat species; or,
- Damage or destroy a breeding site or resting place of a bat.

Therefore, the destruction, alteration or evacuation of a known bat roost is a notifiable action under current legislation and a derogation license must be obtained from the National Parks and Wildlife Service (NPWS) before works can commence.

Furthermore, it should also be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a license to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS.

1.3 Statement of Authority

The bat surveys and subsequent survey report were undertaken and prepared by the following MOR personnel, Mr. Dyfrig Hubble and Ms. Allison Flaherty.

Dyfrig Hubble, Principal Ecologist, has a B.Sc. (Hons) in Tropical Environmental Science and an M.Sc. Environmental Forestry. Dyfrig is a full member of the Chartered Institute of Ecology and Environmental Management. Dyfrig has over 15 years' experience working in the ecological consultancy sector including habitat appraisals and specialist species specific surveys. Dyfrig has extensive experience in undertaking surveys for bats and in the preparation of survey reports for various projects within both the UK and Ireland.

Allison Flaherty, Environmental Consultant, has a B.A. Biology, a M.Sc. Biodiversity and Conservation and over 2.5 years' working experience in the ecological consultancy sector. Allison is a qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and has a specialist interest in bats. Allison has gained extensive experience in undertaking bat surveys and assessments within her role at MOR. Allison has also taken part in specialist bat trainings including; *Introduction to Bat Ecology and Bat Surveys; Bats: Impact Assessment of Development, Mitigation and Enhancements; Bats for Building Professionals; Patterns of Bat Activity at Upland Windfarms: Implications for Sampling and Mitigation;* and *Designing Biodiversity Net Gain for Bats*, all provided by CIEEM course instructors.

1.4 Purpose of Survey Work

The implication of these legislative policies is that the proposed development needs to take account of the potential effects on bats. Survey work is necessary to establish whether the species are currently present in areas where suitable habitat exists and in areas where bats have previously been recorded. Survey work also enables appropriate mitigation measures to

be incorporated into the design of the project and ensures that there are no adverse effects on the conservation status of the species.

Survey work was deemed necessary based on desktop surveys and suitable habitat being identified during the initial walkover of the Site.

2 METHODOLOGY

The methodologies used to establish the presence / potential presence of bats are summarised below.

2.1 Desk-Based Studies

A desk-based study was undertaken to identify records of bats within the Site. The following sources of information were reviewed:

- The National Parks and Wildlife Service (NPWS) website was consulted to obtain the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment (National Parks and Wildlife Service, 2021); and,
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to bat species distributions and bat habitat suitability index (National Biodiveristy Data Centre, 2021).

2.2 Field Based Studies

All surveys conducted followed methodology outlined in the Bat Mitigation Guidelines for Ireland (DoEHLG, 2006), Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2006) and Bat Surveys for Professional Ecologists Good Practice Guidelines (Collins, 2016).

2.2.1 Dusk Emergence Survey / Transect Surveys

Two dusk emergence surveys were undertaken on May 24th and June 8th 2021 by two (2no.) qualified MOR Ecologists. The surveys commenced 15 minutes before sunset and ended 2 hours after sunset, therefore encompassing the typical emergence times of Irish bat species.

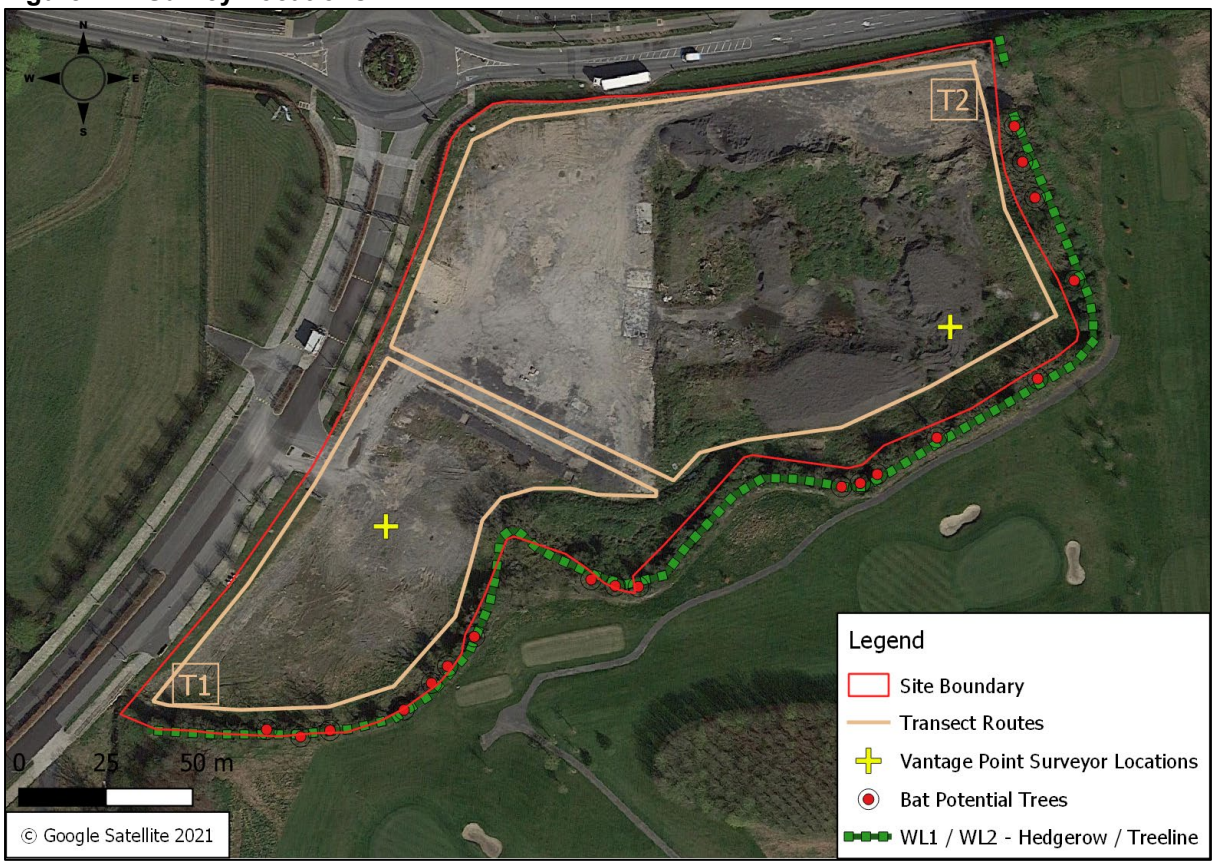
The surveys were designed to cover all vegetated areas within the Site and to determine if any bats were emerging from the stands of mature trees along the southern and eastern boundary of the Site and to identify the levels of commuting and foraging within the Site and immediate vicinity.

MOR Ecologists surveyed the stands of mature Ash trees along southern and eastern boundaries of the Site for 15 minutes before sunset and 1 hour after sunset for each survey. The stands of mature ash trees were surveyed at pre-determined vantage points so that they could be monitored for bat emergence (See Figure 2-2).

For the last hour of the survey, the two surveyors walked the Site in pre-determined transect routes (T1 and T2 in Figure 2-1), noting the time, behaviour (foraging or commuting), location and bat species encountered. The GPS mapping function was used on the Echo Meter Touch2 Pro (Apple IOS) connected to Apple iPhone-7, this is mapped using Google Earth with a KLM file produced for mapping purposes.

A combination of visual observation and listening to ultrasonic bat calls using frequency division bat detector (Batbox Duet) and Echo Meter Touch2 Pro (Apple IOS) were used throughout the emergence surveys. Bat calls were recorded digitally using Edirol Roland R-05 recorder and Echo Meter Tough2 Pro and analysed using appropriate software (KaleidoscopePro) to aid the identification of bat species present.

Figure 2-1: Survey Locations



2.3 Survey Limitations

All survey work was conducted in accordance with current best practice guidelines. All of the surveys were undertaken when there was no rain or wind, and the temperature was above 10°C. In these weather conditions, bats will not have been deterred from flying and no survey limitations were encountered.

3 RESULTS

3.1 Desk-Based Results

Prior to conducting the field surveys, a desk-based review of information sources was completed.

Table 1 provides details of the habitat suitability index for the study area (National Biodiveristy Data Centre, 2021). The habitat suitability index identifies the geographical areas that are suitable for individual species. The index ranges from 0 to 100, with 100 being the most favourable to bats. The index presented is for all species combined, in addition to the individual species indices within the study area.

From the indices, it can be established that the study area has an overall moderate habitat suitability index range of 21– 28. The Irish bat species with moderate or moderate-high habitat suitability index for the area include common pipistrelle, brown long-eared bat, soprano pipistrelle and lesser noctule.

However, ca.150m south of the Site is an area of high suitability for bats, ranging from 36.4-58.5 (NBDC, 2021).

Table 1: Habitat Suitability Index

Bat Species	Suitability Index Range	Suitability Index Level
All Bat Species	21– 28	Moderate
Soprano Pipistrelle *(Pipistrellus pygmaeus)*	31 - 38	Moderate
Brown Long-eared Bat (*Plecotus auritus)*	39 - 49	Moderate - High
Common Pipistrelle (*Pipistrellus pipistrellus)*	39 - 47	Moderate - High
Lesser Horseshoe Bat (*Rhinolophus hipposideros)*	0 - 4	Very Low
Whiskered Bat *(Myotis mystacinus)*	10 - 20	Low
Daubenton's Bat *(Myotis daubentonii)*	13 - 21	Low
Lesser Noctule *(Nyctalus leisleri)*	38 - 46	Moderate - High
Nathusius' Pipistrelle *(Pipistrellus nathusii)*	16 - 29	Low - Moderate
Natterer's Bat *(Myotis nattereri)*	14 - 26	Low - Moderate

Table 2 provides a summary of records of bat species that occur within a 2km grid square of the Site boundary (NBDC, 2021).

Table 2: NBDC Bat Species within 2km of the Site

Bat Species			
Daubenton's Bat	*Myotis daubentonii*	19/08/2013	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Pipistrelle	*Pipistrellus pipistrellus sensu lato*	17/07/2011	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Soprano Pipistrelle	*Pipistrellus pygmaeus*	19/08/2013	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV

3.2 Field Based Results

3.2.1 Dusk Emergence Survey / Transect Results

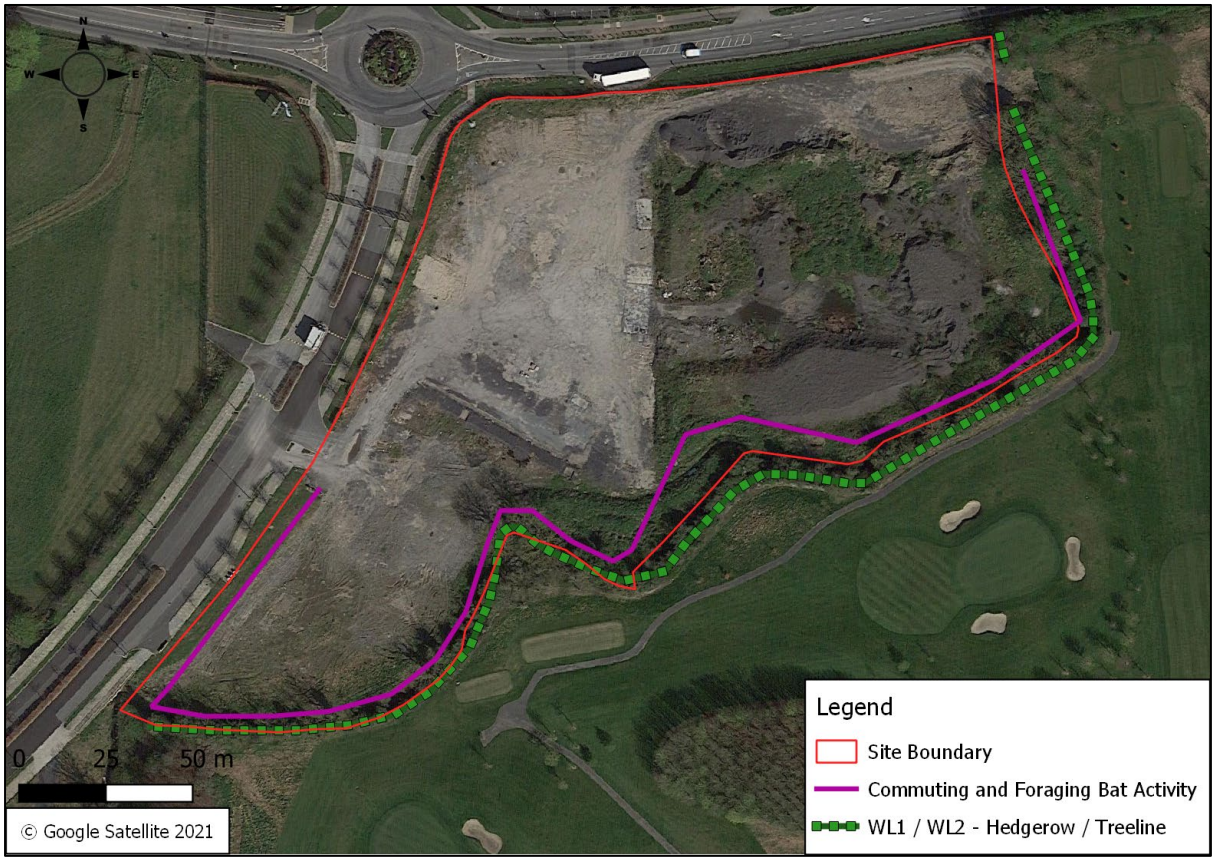
No bats were observed emerging from or re-entering any of the trees surveyed during the vantage point portion of the surveys. The surveys did identify bats commuting along treeline / scrub area to the south and east of the Site that border the Grange Castle golf course to the south (See Figure 3-3). Low levels of bat activity were recorded within the Site during both surveys.

The following bats were recorded as a result of the dusk emergence surveys:

- Common pipistrelle, soprano pipistrelle and lesser noctule bats were recorded commuting along the treelines to south and east of the Site which border the adjacent Grange Castle golf course. The most frequently encountered species of these were common pipistrelle and lesser noctules. These species are relatively wide-spread and the most commonly encountered species within Ireland;
- No bats were identified to be roosting within the mature ash trees along the southern and eastern boundaries of the Site; and,
- As very few bats were recorded soon after dusk during the emergence surveys, this indicates that bat roosts are not likely to be present within the immediate local area.

Based on the levels of activity and movement of the bats recorded during the surveys, it is considered that the Site is of little value to bats. During the surveys it was noted that the Site is partially illuminated by street lighting posts from the adjacent R134 regional road to the north and private road to the west, as well as flood lights from buildings and the car park building directly north across the R134. As bats are typically adverse to lighting, very little commuting and foraging activity was noted within the illuminated areas.

Figure 3-1: Bat Activity Map within the Site



4 IMPACT ASSESSMENT AND MITIGATION

The following bat species have been recorded during the bat surveys: common pipistrelle, soprano pipistrelle and lesser noctule. This represents three of the nine residence bat species known to Ireland, all of which are common Irish bat species. All bat species recorded during the bat surveys are Annex IV species under the EU Habitats Directive and all have a favourable status in Ireland.

Bat species within the Site will be affected by both the construction phase and operational phase of the proposed development. The impact assessment and mitigation will be undertaken in relation to the three bat species recorded within the Site and the surrounding area: common pipistrelle, soprano pipistrelle and lesser noctules.

4.1 Potential Impacts on Bats

Principal impacts of the proposed development, in general, on bat fauna may be summarised as follows:

4.1.1 Loss of Habitat

None of the mature treelines along the southern and eastern boundaries of the Site will be removed due to the proposed development. These treelines will be retained and protected throughout the lifetime of the proposed development.

The surveys did not identify any bat roosts within the Site. However, there is potential commuting and foraging habitats to the south and east of the Site and within the wider area. Therefore, it is considered that without the appropriate consideration of foraging and commuting bats in close vicinity to the Site, that the proposed development could have a Negative Impact on bat species.

4.1.2 Lighting of the General Area (street lighting, security lighting etc.)

Lighting for the proposed development will potentially impact on bat species in relation to commuting and foraging potential within the wider area which is used by lesser noctules and pipistrelles. Common pipistrelles and soprano pipistrelles will tolerate low levels of lighting, however excess lighting is likely to have an impact on bats.

In the absence of an appropriate lighting scheme, it is considered that the proposed development could have a Negative Impact on foraging and commuting bats.

4.2 Mitigation Measures

The following mitigation measures are recommended to reduce the potential impact of the proposed development on local bat populations:

4.2.1 Landscape Plan

The proposed Landscape Plan has been developed to replace *at the least*, any vegetation removed due to the proposed development and details the planting of a significant number of new native broadleaf trees within the Site. The landscape plan also includes an 8m biodiversity ‘protection area’ along the southern and eastern boundaries of the Site.

The following landscape recommendations are also advised:

- Avoid the use of chemicals (weed killers, etc.) within the development zone; and,
- The plantings should comprise a mix of native woody shrubs and trees, including fruit-bearing species, which will provide cover and potential foraging opportunities for wildlife including bats.

4.2.2 Lighting Plan

Bats are adverse to excessive lighting, subsequently, impacts could occur as a result of an inappropriate lighting strategy. Therefore, it is important that lighting installed for the proposed development will be completed with sensitivity for local wildlife while still providing the necessary lighting for human usage.

The lighting strategy has been designed to mitigate against any potential impacts on nocturnal species in line with the Bat Conservation Trust (BCT) Guidelines on '*Bats and Artificial Lighting in the UK'* (BCT, 2018). The lighting strategy involves avoiding excessive lighting. The following measures have been taken into consideration during the lighting layout design:

- Construction should be limited to daylight hours in order to minimise adverse effects on nocturnal fauna;
- Avoidance of excessive lighting;
- Light Emitting Diodes (LED's) will be used and the brightness will be set as low as possible;
- Lighting will be aimed only where it is needed, with no upward lighting;
- Lighting will be directed away from landscaped areas and retained sections of hedgerows and trees; and,
- Lighting will be turned down / off when not required.

4.2.3 Monitoring

In order to ensure that the works in relation to the proposed development do not have significant impacts on bats, the following construction procedures and mitigation measures should be implemented. These measures are in line with the BCT Guidelines '*Bats and Artificial Lighting in the UK'* (BCT, 2018):

- Following the installation of the lighting for the proposed development, a suitably qualified Ecologist should undertake a further site inspection in order to check the lighting patterns and lux levels along the site boundaries to ensure there are no impacts to bats or other nocturnal species.

4.2.4 Recommendations

The tree survey report carried out for the proposed development suggested the monitoring and cut back of some mature ash trees along the south-eastern boundary which were diseased with ash die back.

It is therefore recommended that any mature trees that are to be removed from this area should be subject to tree inspections by a suitably qualified ecologist, and if deemed necessary, presence absence surveys may be required if the tree possesses potential roost features for bats. It should however be noted that this will not form part of this development.

5 CONCLUSIONS

The bat surveys undertaken for the proposed development included a walkover of the lands within the Site.

The survey works included two (2no.) dusk emergence / transect surveys. The walkover identified a stand of mature ash trees along the southern and eastern boundaries that could be suitable for roosting bats. These trees will not be removed as part of the proposed development. These trees were subject to dusk emergence surveys; however, no bats were observed emerging from these trees.

Based on the low levels of bat activity within the Site shortly after sunset and right before sunrise, it is considered unlikely that there are bats roosting within the immediate locality of the proposed development. The surveys did identify bats commuting and foraging along sections of the treelines / scrub areas, to the south and east of the Site and within the golf course area to the south.

Overall, the Site is considered to be of Low importance for roosting, commuting and foraging bats within the local area as the Site is partially illuminated at night and the Site is located within a built-up environment. Provided that the mitigation measures presented within this report are followed, it is considered that potential impacts on bats from the proposed development will be Negligible.

6 REFERENCES

BCT. (2018). *Bats and artificial lighting in the UK Bats and the Built Environment Series.* Bat Conservation Truct & Institute of Lighting Professionals.

Collins, J. (2016). *Bat Surveys for Professional Ecologists - Good Practice Guidelines (3rd ed.).* London: The Bat Conservation Trust.

DoEHLG. (2006). *Bat Mitigation Guidlines for Ireland. Irish Wildlife Manuals, No. 25.* Dublin: Department of Environment, Hertiage and Local Government.

National Biodiveristy Data Centre. (2021). *National Biodiveristy Live Maps*. Retrieved from National Biodiveristy Data Centre: http://maps.biodiversityireland.ie/

National Parks and Wildlife Service. (2021). *National Parks and Wildlife Service*. Retrieved from National Parks and Wildlife Service: https://www.npws.ie

National Roads Authority. (2006). *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.*

NBDC. (2021). *National Biodiversity Live Maps*. Retrieved from National Biodiveristy Data Centre: http://maps.biodiversityireland.ie/

Appendix 5.2 Updated Lighting Report

EXISTING OFFICES

GARAGE

N

NEW NANGOR ROAD (R134)

EXISTING RAILING

SECURE FENCE

GATES

SECURITY HUT

ESTATE ROAD

PATH

SECURE FENCE

ACOUSTIC SCREENING

P1 STP

METAL RAILINGS

GRANGE CASTLE GOLF COURSE

ISOLINES
- 5.0 lx
- 10.0 lx
- 20.0 lx
- 30.0 lx
- 50.0 lx
- 100.0 lx
- 150.0 lx
- 200.0 lx
- 300.0 lx
- 500.0 lx

Equinix DB8 - Externals

REF B2-B	TRILUX 7116540; OleveonF 1200 2300-840 PC ET
REF B3	TRILUX Skeo Curv 1800 lumen
REF C1	TRILUX Amatris G3 C04 WR 1400-840 01
REF EXT1	TRILUX 6900240; LnStar 40-AM2L/3200-740 4G1S ET
REF EXT2	TRILUX 7076540; Combial 30-AM9R/7500-740 1G1W ET
REF EXT4	TRILUX Jovie 70-AB7L/10000-740 8G1
REF EXT4-A	TRILUX 7243140; Jovie 50-AB2L-LR/3200-740 4G1 ET
REF EXT5	TRILUX 8841 RB/800-730 (1060 mm) ETDD
REF EXT5-A	TRILUX 8841 AB14L/850-740 2G1S (660 mm)

Client:

EQUINIX

HAZARD IDENTIFICATION LEGEND:

HAZARD IDENTIFICATION (if none state 'none relevant')	CONTROL AND MITIGATION MEASURES

NOTE:
Hazards listed above are only those considered significant risks and:

a) not likely to be obvious to a competent contractor or other designers;
b) unusual; or
c) likely to be difficult to manage effectively

Figured dimensions only are to be taken from this drawing. All dimensions are to be checked on site before any work is put in hand.

NOTES

- The installation and design shall comply with the Occupational Health and Safety Act, and all Regulations.
- All dimensions shown in millimeters.
- This drawing shall be read in conjunction with all associated equipment schedules and mechanical, electrical, structural and architectural drawings.

LEGEND

- SITE BOUNDARY
  SITE AREA = 6,545 acres
- AREA IN OWNERSHIP OF CLIENT - AS PER OS MAP
  AREA = 7,360 acres
- PROPOSED BUILDINGS
- INTERNAL ROADS
- PAINTED WALKWAYS 1.8/2M WIDE
- CONCRETE PATHS
- GRAVEL
- GRASS-CRETE
- EXISTING LANDSCAPED AREA
- PROPOSED LANDSCAPED AREA
- PROPOSED ATTENUATION POND
- SECURITY FENCE
- TIMBER RAIL FENCE
- EXISITNG METAL RAILING
- AREA OF BIODIVERSITY LOST

REV	DATE	DESCRIPTION	DWN	CHK	APP
P02	2022-05-20	ISSUED FOR PLANNING	LMC	CT	CT
P01	2021-06-18	ISSUED FOR PLANNING	LMC	CT	CT

Key:

Project:
EQUINIX DB080

Drawing Title:
EXTERNAL LIGHTING LAYOUT - PHASE 1 ISOLINES

Drawing Number:
DB080-RED-ZZ-0G-DR-LITE-1023

Scale:	Paper Size:	Purpose:	Revision:
1:300	A0	D2	P02

RED
A company of ENGIE impact

Appendix 6.1 '*Phase I Environmental Site Assessment*' IER Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.01) dated, February 2021



Phase I Environmental Site Assessment

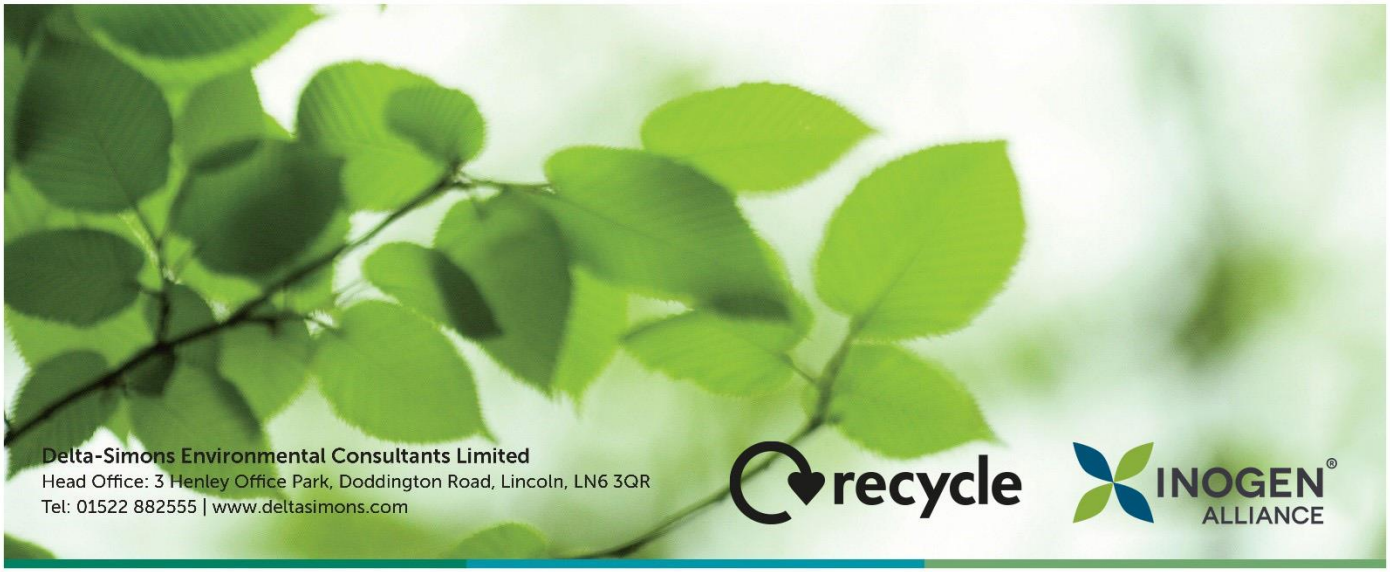
IER Grange Castle, Dublin

Presented to **Pinnacle Consulting Engineers**

Issued: February 2021

Delta-Simons Project No. 20-2018.01

deltasimons



Delta-Simons Environmental Consultants Limited
Head Office: 3 Henley Office Park, Doddington Road, Lincoln, LN6 3QR
Tel: 01522 882555 | www.deltasimons.com

recycle

INOGEN® ALLIANCE

Report Details

Client	Pinnacle Consulting Engineers
Report Title	Phase I Environmental Site Assessment
Site Address	Land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin
Project No.	20-2018.01
Delta-Simons Contact	Alan Crossfield (alan.crossfield@deltasimons.com)

Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
02	Final	24/02/2021	Update to include Phase I Questionnaire Response -			
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About us

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Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from ten locations - Lincoln, Birmingham, Bristol, Dublin, Leeds, London, Manchester, Newcastle, Norwich and Nottingham - we employ over 100 environmental professionals, bringing experience from across the private consultancy and public sector markets.

Delta-Simons is proud to be a founder member of the Inogen® Environmental Alliance, a global corporation providing multinational organisations with consistent, high quality and cost effective environmental, health, safety, energy and sustainability solutions. Inogen assists multinational clients by resolving liabilities from the past, addressing today's requirements and delivering solutions for the future. With more than 200 offices located on every continent, more than 6,430 staff worldwide, and projects completed in more than 120 countries, Inogen provides a single point of contact for diverse markets as Automotive, Chemical, Consumer Products & Retail, Financial, Food & Beverage, Healthcare, Insurance, Manufacturing, Non Profit Organisations, Oil & Gas, Real Estate, Services Firms, Technology and Transportation, among others.

Executive Summary

Introduction	Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Pinnacle Consulting Engineers (the "Client") to carry out a Phase I Environmental Site Assessment (ESA) of Land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin (the "Site"). Delta-Simons performed the ESA in general conformance with the proposed scope of work and the provisions of the American Society for Testing and Materials (ASTM) International E1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process within the regulatory structure and limitations of locally available information.
Subject Property and Current Use	The subject property, identified as Land at Castle Grange, is located at the Profile Park development area, located to the south of New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin. It is located in South Dublin County approximately 12 km east of Dublin City Centre. The subject property is c3.0 hectares in size and is currently vacant and undeveloped, having been used in the recent past as a contractor's compound. Stockpiles of excavated material and building rubble are located in the eastern portion of the Site.
Historical Use	Based on a review of the compilation of historical sources presented above dating back to 1837, it appears that the subject property was in agricultural use until the construction of the Profile Park access road on the Site's western boundary in around 2007-2009. Although a retail and office development were proposed for the Site and planning consent granted, it was not implemented, and the Site has been used intermittently as a construction compound and for stockpiling excavated soil and builder's rubble up to the present day. A strip of land along the northern edge contains a wayleave for a trunk water main and high voltage electricity cables. Potentially contaminative land uses identified in the surrounding area include a petrol filling station to the north, dating from the late 1990s. The office and warehouse development to the north-west of the roundabout is of recent construction and is considered unlikely to be a source of contamination likely to affect the Site.
Summary of Findings	Delta-Simons has performed a Phase I ESA in general conformance with the process, scope and limitations of ASTM Practice E1527-13 of Land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin and determined the following: **Recognized Environmental Conditions (RECs)** ▲ The Site has been used as a construction compound and excavated material/ building rubble stockpiling area since c.2000. Of note is around 18,000 m^3 of stockpiled excavated material/building rubble on the eastern half of the Site. Elevated concentrations of a range of contaminants may be present. Given the post-2000 date of the developments in the area with which the Site has been associated, the possible presence of asbestos-containing materials in the building rubble is less likely but cannot altogether be excluded. The previous environmental impact statement report reviewed above predated this use and therefore may not represent the current state of the Site. ▲ A petrol filling station is located 10 m north of the Site, on the opposite side of New Nangor Road. There is evidence of past site investigation at the property. There is no other current evidence visible above ground to suggest the presence of an environmental condition, however the potential for below ground leaks from storage tanks exists and any contaminant migration from such leaks, if occurring, has the potential to impact the Site.

	Controlled Recognized Environmental Conditions (CRECs) ▲ No CRECs have been identified associated with the property. **Historical Recognized Environmental Conditions (HRECs)** ▲ No HRECs have been identified associated with the property. **De Minimis Conditions** ▲ Industrial and commercial activities in developed areas to the north, west and south-west of the current Site, including pharmaceutical/biotechnology manufacture, distribution depots and data centre operation are of recent construction and generally distant from the current Site and are considered to be sites with a low potential for contamination likely to affect the Site.
Business Environmental Risks/ Conditions of Interest	The following BERs have been identified: ▲ A wayleave for a trunk water main and electricity cables along the northern edge of the Site will constrain the development area available and will need to be taken account of in construction and health and safety planning for future development; ▲ The Site lies within an area where between 5% and 10% of homes are above the EPA Reference Level for homes of 200 bequerel per cubic metre (Bq/m^3) for radon. The EPA website indicates that radon protective measures may be necessary in the construction of new buildings at the Site; ▲ Flood Risk: although no areas identified as at risk from flooding have been identified from the Office of Public Works mapping, there is a potential for localized flooding alongside the stream that forms the south-eastern boundary of the Site; and ▲ Stands of Common Hogweed are located in the south near the bordering stream. Evidence of the invasive Giant Hogweed was not visible however the Site walkover was completed in the winter and the potential presence of the invasive plant cannot altogether be excluded.
Data Gaps	The following data gaps were identified during the completion of this Phase I ESA: ▲ Information was requested from the Environmental Protection Agency in relation to data held with the potential to affect the at the Site, but a response was not received in the timeframe of the report; ▲ Information was requested from the Local Authority in relation to data held with the potential to affect the at the Site, but a response was not received in the timeframe of the report..
Flood Risk	The Site is not located within an area considered to be at risk of flooding based on Office for Public Works mapping, however there is a potential for localized flooding alongside the stream that forms the south-eastern boundary of the Site according to Client information.
This is intended as a summary only. Further detail and limitations of the assessment is provided within the main body of the Report.	

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1.0 Introduction

1.1 Authorisation

Delta-Simons Environmental Consultants (Delta-Simons) was authorised by Pinnacle Consulting Engineers (the "Client") to prepare a Phase I Environmental Site Assessment (ESA) associated with the property located at Land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin (the "Site").

1.2 Purpose

The purpose of this ESA is to identify, to the extent feasible pursuant to the ASTM Practice E1527-13 and all appropriate inquiries, recognized environmental conditions (RECs), historical RECs (HRECs), controlled RECs (CRECs), de minimis conditions and Business Environmental Risks (BER) in connection with the Site.

The ASTM Standard was created "in an effort to define good commercial and customary practice in the United States of America [and Worldwide] for conducting an environmental site assessment."

A REC is defined in ASTM E1527-13 as "*the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.*"

An HREC is defined in ASTM E1527-13 as "*a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (e.g., property use restrictions, activity and use limitations (AUL), institutional controls, or engineering controls). Before calling the past release an HREC, the Environmental Professional (EP) must determine whether the past release is a REC at the time the Phase I ESA is conducted (e.g., if there has been a change in the regulatory criteria).*"

A CREC is defined in ASTM E1527-13 as "*a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (e.g., as evidenced by the issuance of a no further action (NFA) letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (e.g., property use restrictions, AULs, institutional controls, or engineering controls)*."

A de minimis condition is defined in ASTM E1527-13 as *"a condition that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis conditions are not recognized environmental conditions nor controlled recognized environmental conditions."*

A BER is defined by ASTM E1527-13 as *"a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues required to be investigated in this practice. Consideration of business environmental risk issues may involve addressing one or more non-scope considerations."*

1.3 Scope of Services

The scope of services takes into account the requirements of the ASTM E1527-13 process and the Client's specific research and reporting requirements, to the extent applicable in the Republic of Ireland.

The Phase I ESA process was divided into the following four parts:

Task 1 – Records/Documents Review

Delta-Simons records review included records from standard sources that are publicly available, obtainable from their source within reasonable time and cost constraints and are practically reviewable. Records were

reviewed for properties within the approximate minimum search distances (determined at the discretion of the Environmental Professional) unless adjusted at the discretion of the Environmental Professional. Record sources included the following:

- Readily available public environmental databases maintained by the Environmental Protection Agency, the Geological Survey of Ireland, Ordnance Survey of Ireland, the Office of Public Works, The Heritage Council, Minerals Ireland and South Dublin County Council to identify relevant permits, licences, contamination incidents and other environmental records relating to the Site and the surrounding area;
- Regulatory information from Environmental Regulator consultation relating to the Site;
- Any relevant permits, licences and consents provided by the current Site user;
- Available published geology, hydrogeology and hydrology of the Site and surrounding area;
- Available Site-specific geology and hydrogeology from representative site investigation data made publicly available or from third-party reports;
- Available historical documents (including mapping and historical aerial photographs of the Site and the adjacent land parcels) in order to develop a history of the subject property and adjoining properties. This task involved discretionary review of as many of the historical sources as necessary and reasonably ascertainable to meet this objective; and
- Third-party reports relating to the Site or neighbouring properties (where obtained or provided to Delta-Simons).

Task 2 – Site Reconnaissance

A Site reconnaissance conducted in a systematic manner to visually characterize on-Site conditions and identify potential environmental conditions on neighbouring properties. Prior to conducting a Site visit, the Client arranged permission and access for Delta-Simons personnel to enter and view the Site. The Site reconnaissance was planned by a Delta-Simons Environmental Professional and performed by personnel possessing sufficient training and experience necessary to conduct the Site reconnaissance and having the ability to identify relevant issues in connection with the subject property.

The Site reconnaissance included the following activities:

- Visual observation and description of the general setting of the subject property. The Site reconnaissance was performed on areas of the subject property that could be readily accessed safely;
- Identification and documentation of current property uses that use, treat, store, dispose of, or generate hazardous substances or petroleum, along with the quantities and description of storage or use conditions. Past property use, to the extent visually or physically observed, was also identified and documented;
- Visual and/or physical observation and documentation of conditions that suggest a past or potential release of hazardous substances or petroleum products (i.e., stressed vegetation or soil staining);
- Visual identification and documentation of equipment and structures that are commonly known to contain polychlorinated biphenyls (PCBs), including electrical and hydraulic equipment;
- Observation and documentation of building interiors, including identification of the means of heating and cooling of building, and waste disposal;
- Visual observation and documentation of exterior property conditions including exterior waste disposal, surface water drainage (i.e. presence of oil-water interceptors), groundwater wells, surface staining, and stressed vegetation;
- Visual observation and description of current land uses on adjoining properties for evidence of current and/or past uses that may contribute to environmental risks to the adjoining properties or the subject property. Adjoining land use was viewed from the subject property or a publicly accessible vantage point; and
- Photographic documentation of current subject property setting and activities (as allowed).

Task 3 – Interviews

Interviews intended to gather information about current and past uses and conditions of the subject property that may be relevant in identifying potential environmental risks associated with the subject property were not able to be carried out. As an alternative to an interview, a questionnaire was submitted for completion by the landlord or appropriate representative.

A reasonable attempt was made to contact the Environmental Protection Agency and relevant Local Authority. Content of the questions was formulated at the discretion of the Environmental Professional to obtain information indicating potential environmental risks in connection with the subject property.

Task 4 – Phase I ESA Report

Following the completion of the records review, site reconnaissance, and interviews, Delta-Simons prepared this Phase I ESA report in general accordance with Section 12 of ASTM E1527-13. An Environmental Professional with qualifications similar to those as defined in Section 312.10 of 40 Code of Federal Regulations (CFR) 312 but based on experience in the country and/or region of the subject property, completed the review and interpretation of information upon which this report is based. This report contains the following items:

- Summary of services performed, and the information obtained during the course of the Phase I ESA;
- Discussion of the Site reconnaissance;
- Identification of RECs, HRECs, CRECs, de minimis conditions and BERs based on the data and information reviewed; and
- Discussion of data gaps and limiting factors.

1.4 Limitations and Exceptions

This assessment has been conducted in accordance with the ASTM E1527-13 process, as far as is applicable and with the data available in the Republic of Ireland, and taking into account in-country standards, guidance and best practice.

The intent of this investigation was to reduce uncertainty within reasonable limits of time and cost. No Phase I ESA can completely eliminate uncertainty regarding the potential for RECs in connection with a subject property.

Observations were based upon conditions on the specific date and time of the Site reconnaissance. These observations are typically unable to address conditions of subsurface soil, groundwater, USTs, neighbouring properties, and the like, unless specifically mentioned. It is not the purpose of this Phase I ESA to determine the actual presence, or degree or extent of contamination (if any) at the subject property. Unless specifically noted within this report, this Phase I ESA does not include testing, coring, or sampling and laboratory analysis to address groundwater, soil, or extraneous materials contamination in or on the subject property.

Whenever possible, Delta-Simons has provided copies of supporting documentation in the appendices. Section 8.0 lists the data sources relied upon (*includes references to the published, Internet, User-provided, and database or other sources*) during the preparation of this Phase I ESA report.

The standard limitations associated with this assessment are presented in Appendix A.

1.5 User Reliance

The “User” as defined in this assessment is Pinnacle Consulting Engineers. This report is intended only for the use and benefit of, and may be relied upon by, Pinnacle Consulting Engineers and any other party specifically identified in writing by Delta-Simons as a User of this report. Delta-Simons cannot and will not be liable for unauthorized reliance by any other third party.

Pinnacle Consulting Engineers understands and agrees that the information contained in this report describes facts and Delta-Simons opinions regarding conditions related to the property as of the date of this report and does not purport to describe facts or conditions subsequent to the date of the report. Please also note that the

scope of the work performed was negotiated by Delta-Simons and Pinnacle Consulting Engineers and is noted in the contract and this report.

2.0 Site and Surrounding Area Description

2.1 Site Description

The following information was obtained from a review of the current aerial photography and the Site reconnaissance.

Co-ordinates	The geographical co-ordinates for the Site are 53°19'02.4"N 6°26'20.1"W Google Maps Link to Site.	**Elevation**	73 – 75 m ASL
		Area	c. 3.0 Ha
Site Address & Location	Land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin. The Site is located at the Profile Park development area, located to the south of New Nangor Road and to the east of Profile Park, Kilcarbery, Co. Dublin. It is located in South Dublin County approximately 12 km east of Dublin City Centre. A Site location map is included as Figure 1.		
Site Owner	Not known.		
Site Occupant(s)	The Site is currently vacant and undeveloped. Until recently it has been used as a construction site compound and stockpiling area for excavated material and building rubble.		
Brief Site Description	The Site is largely vacant having most recently been used as an Electric Supply Board (ESB) construction compound occupying 40% of the Site in the north-west. . The construction compound contained prefabricated cabins and storage containers and open storage of construction related materials. Ground cover now comprises a mixture of gravel hardstanding in the north-west with stockpiles of aggregate and soil in the north-east. The south of the Site is dominated by undulating grass cover and scrub vegetation.. The Land Registry plan provided by the Client indicates that the northern and western boundaries of the plot run along the centre line of New Nangor Road and Profile Park approach road respectively and therefore include parts of the above-named highways.		
Description of Site Operations	The Site is now vacant with no operations.. A selection of Site photographs is presented as Appendix B.		

2.2 Surrounding Area Description

The surrounding area and adjacent properties have been identified from a desk-based review of current satellite imagery and mapping only. Observations from the Site reconnaissance are included in Section 4.4 of this report.

Description of Adjacent and Surrounding Land Uses	The Site is located within an area zoned for enterprise and employment related uses, extending to the north, west and south-west of the Site and including Profile Park, under development to the south-west and Grange Castle Business Park to the north and west. Current occupants of premises on Profile Park include web/technology company data centres. Occupants of Grange Castle business park on the north side of New Nangor Road include food distribution depots, IT companies, office buildings and a hotel.

	Opposite the Site on the north side of New Nangor Road is a petrol filling station operated by Circle K. 400 m west along New Nangor Road is a garage and crash repair business. Land immediately to the west on the far side of the Profile Park access road, although zoned for development, currently remains in agricultural use. The land to the south-east consists of Grange Castle golf course, an area zoned for open space and recreational amenities.
Nearby Sites of Environmental Concern	In the wider surrounding area, within Grange Castle business park around 200 m to 400 m to the north are located several pharmaceutical companies including a large biotechnology facility operated by Pfizer, several data centre facilities and offices. Approximately 500 m south of the Site is located Baldonnell military aerodrome.

2.3 Physical Setting

The physical setting of the subject property can influence the susceptibility to, and relative magnitude of, environmental impacts and liabilities associated with on- and off-site sources of contamination. The following table provides physical setting information for the subject property and surrounding area.

2.3.1 Geology and Hydrogeology

Published Geology	From Geological Survey of Ireland (GSI) mapping data, the Site is indicated to be underlain by superficial deposits of Till derived from limestones. The underlying bedrock is described as dark limestone and shale of the Lucan Formation, also locally known as Calp. A geological map is included as Appendix C.
Site-Specific Geology	There are no Geological Survey of Ireland (GSI) recorded boreholes on the Site or in the immediate vicinity of the Site. However, from the previous investigation conducted on the wider Profile Park site by WYG in 2006, the following general sequence was encountered: ▲ Quaternary deposits consisting of sandy gravelly clays to gravelly clays, recorded to a depth of between 1.5 m below ground level (bgl) to 3.5 m bgl; overlying ▲ Fractured limestone, becoming competent limestone with depth, thickness not proven. Although Made Ground was recorded 100 m south of the current Site, it was not recorded on the Site itself.
Hydrogeology	From GSI mapping data, the bedrock underlying the Site is classified as a locally important aquifer which is moderately productive only in local zones. It is considered to be in an area of high vulnerability but low subsoil permeability. It is part of the Dublin WFD groundwater body. It is not within a drinking water protection area and there are no proximate abstractions recorded. During the 2006 WYG ground investigations, groundwater was encountered between 1 m and 3 m bgl.
Site Topography	The construction compound is relatively flat, with a slight grade to the south. The vacant land area is undulating due to the stockpiles of excavated materials and builder's rubble located thereon. Regional topography slopes gently to the north.

2.3.2 Hydrology

The main watercourses in the vicinity of the Site are:

- The Baldonnel Stream, abutting the south-west corner of the Site and fed by a tributary stream running alongside the southern Site boundary, and flowing north-west to join the Griffeen River, around 1 km from the Site. The Baldonnel Stream water framework directive status (2013-18) is recorded as good;
- The Griffeen River, 1 km north-west of the Site, flowing north to join the River Liffey at Lucan, c. 4 km north of the Site; and
- The River Liffey, c.4 km north of the Site, flowing east to Dublin Bay.

In addition, The Grand Canal is located approximately 1.4 km to the north of the Site flowing east. This is not in hydraulic continuity with the groundwater and waterways in the area; the Griffeen River intersects the canal to the north-west of the Site on its path to the River Liffey.

2.3.3 Seismicity

No seismicity data is available from GSI online resources however the Republic of Ireland is not an area considered to be of high seismic risk.

2.3.4 Flooding

Based on the Office of Public Works flood mapping information reviewed, the Site is not located within an area considered to be at significantly elevated risk of fluvial flooding. The fluvial flood risk is considered to be very low (more than 1 in 1000 year flood return period (<0.1 % annual probability)).

3.0 Records Review

The purpose of the records review was to obtain and review records that may contain information indicating RECs or BERs associated with the subject property and surrounding land. The records contained in this Phase I ESA were publicly available, obtainable within reasonable time and cost constraints, and practically reviewable.

3.1 Regulatory Review Findings

3.1.1 Subject Property

Publicly available database sources, available regulatory information and other information sources (e.g. third-party reports) have been reviewed to identify any issues of potential concern at the subject property.

Environmental Database	There are no records on publicly available database sources (e.g. Environmental Protection Agency) pertaining to the Site.
Online Planning Review	In the 2016-2022 South Dublin County Council Development Plan the Site is part of an area zoned for enterprise and employment uses. Several applications have been identified for the Site and wider Profile Park area on the South Dublin County Council online planning register. The applications pertinent to this assessment are summarised below: ▲ SD06A/0568 - Provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on these lands. The development included the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also included surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary works, on a site of 39.84 hectares. The application was accompanied by an Environmental Impact Statement (including a section on geology and soils - refer to Section 3.3 below). The application, which relates to the wider Profile Park area including the current Site and also extending further west and south-west, was granted consent in January 2007. No contaminated land or flood risk related conditions were set; ▲ SD07A/1059 - Phase 1 of a services and retail centre and will consist of 3 no. office blocks as follows: (1) Block A comprises a five storey office building of 3,019.6 sq.m. gross floor area which fronts onto the Nangor Road and which will accommodate 18 no. own door office units and 1 no. ESB substation; (2) Block B comprises a five storey office building of 2,905.1 sq.m gross floor area which fronts onto the Nangor Road and is located adjacent to the boundary with Grange Castle Golf Course - this block will accommodate 26 no. own door office units; (3) Block C comprises a four storey office building of 2,684.8 sq. m. gross floor area located adjacent to the boundary with Grange Castle Golf Course which will accommodate 24 no. own door office units. The application, which relates to the eastern half and southern edge of the current Site area, was granted consent in April 2008 but has not been implemented and may have expired. No contaminated land related conditions were set. A condition requiring any buildings to be completed with floor levels at least 500 mm above highest known flood levels (probably a standard form of condition) was included; ▲ SD12A/0150 - Erection of a 2.4 m high perimeter fence along Nangor Road boundary (approximately 250 m long) with separate entrance gates for vehicular, bicycle and pedestrian access; construction of a single storey security hut with security barriers. The application, which relates to the current Site area, was granted consent in October 2012. No contaminated land or flood risk conditions were set; and

	▲ The Site is not listed on the registers of derelict and vacant land held by South Dublin County Council. Copies of the consents are reproduced as Appendix D.
Relevant Environmental Authority	A request for information has been made from the Environmental Protection Agency but no response has yet been received.

3.1.2 Adjacent and Surrounding Properties

Publicly available database sources, available regulatory information and other information sources (e.g. third-party reports) have been reviewed to identify any properties of potential concern adjacent to the Site.

Environmental Database	There are no records on publicly available database sources (eg Environmental Protection Agency) pertaining to the adjacent or surrounding properties.
Relevant Environmental Authority	It is noted on the area zoning plans that the surrounding area to the north, west and south-west is zoned for enterprise and employment uses. The area to the south-east, comprising the Grange Castle golf course, is zoned for an area zoned for open space and recreational amenities. Planning consent reference SD06A/0568 described above covered the remainder of the Profile Park development, adjoining the current Site to the south-west. A number of other planning consent records for adjacent and surrounding properties have been identified on the South Dublin County Council planning website, however no information of relevance to land contamination is contained in the consent notices or supporting documents.

3.1.3 Area-Wide Contamination or Properties of Potential Concern

Publicly available database sources, available regulatory information and other information sources (e.g. third-party reports) have been reviewed to identify any area-wide contamination or properties of potential concern in the surrounding area.

Environmental Database	The south-eastern half of the Grange Castle golf course, c.600 m south-east of the Site, is recorded on the EPA online database as within a waste boundary record, reference W0306-01. No information on dates of deposition or waste types is provided. The Pfizer Biotech Campus site, 300 m north-east of the current Site, is recorded as a licensed Integrated Pollution Prevention and Control (IPPC) site, and an Industrial Emissions Licensing (IEL) site, engaged in pharmaceuticals manufacture. Further IPPC and IEL sites records are identified for the Takeda pharmaceuticals site, over 1 km north-west of the current Site. A Section 4 discharge licence to surface water is located at a Google Ireland facility 250 m south-east of the current Site.
Relevant Regulatory Agencies	A request for information has been made from the Environmental Protection Agency but no response has yet been received.

3.1.4 Radon

The Site lies within an area where between 5% and 10% of homes are above the EPA Reference Level for homes of 200 bequerel per cubic metre (Bq/m^3) for radon. The EPA website indicates that radon protective measures may be necessary in the construction of new buildings at the Site.

3.1.5 Unexploded Ordnance (UXO)

Not considered applicable to the Site.

3.2 Historical Use Information

3.2.1 Approach

The historical development of the Site and surrounding area has been assessed through a review of available historical maps, aerial photographs and Google Earth historical satellite imagery. A summary of the key historical Site uses and developments in the surrounding area is presented below. Copies of pertinent historical reference material is included as Appendix E.

3.2.2 Historical Map and Aerial Photography Review

The following table provides a detailed review of the available historical mapping and aerial photography for the subject, adjacent and surrounding properties.

Date of Map	Source	Subject Property Description	Surrounding Area (c.100 m radius)
1837 to 1913	Ordnance Survey of Ireland	The subject property appears to be undeveloped vacant land.	The surrounding areas appear to be undeveloped, rural and in assumed agricultural use.
1995	OSI aerial photograph	The subject property appears to be undeveloped vacant land.	The R134 (New Nangor Road) runs along the northern boundary of the Site. A building, possibly a farmhouse, is present on north side of road. Further buildings, possibly farmhouse/barns, are present 60 m west. The remainder of the surrounding area comprises fields.
2000	OSI aerial photograph	The subject property appears to be undeveloped vacant land. Bare ground is adjacent to the new roundabout at north-west corner of Site.	The Petrol filling station forecourt and adjoining buildings are present on north side of the road. New commercial development comprising offices and warehouses are under construction to north-west of the roundabout. The golf course is now present abutting the Site to the south-east.
2005	OSI aerial photograph	The Site appears unused, covered in rough grass.	Commercial development to the north-west of the roundabout is now complete, with three large warehouse/depots and a row of office buildings. Further office buildings are present to the north of the Site, north-east of the roundabout abutting the petrol filling station.
May 2009	Google Earth	The Site appears to have been in use as a construction yard. Blocks and other materials are stocked on the western half. The eastern half contains dark grey material (possibly locally excavated spoil) in heaps.	A new dual carriageway, Profile Park access road, forms the western boundary of the Site.

Date of Map	Source	Subject Property Description	Surrounding Area (c.100 m radius)
June 2014	Google Earth	Materials have been cleared from the western side of the Site. The eastern side still contains spoil materials.	Development of data centres to the north of the commercial development/filling station is now underway. 100 m south, a new facility (probable data centre) is under construction on Profile Park.
January 2017	Google Earth	No significant changes.	The construction of the data centre now extends to the east of the filling station (30 m north-east of Site).
June 2019	Google Earth	The western half of Site is in use as a construction compound, with vehicles and construction materials visible.	Data centres to the north and north-east appear complete. The assumed data centre facility 100 m to the south extended further to the south.
January 2020	Google Earth	No significant changes.	No significant changes.

3.2.3 Other Information Sources

According to recent information provided by Pinnacle Consulting Engineers, the northern edge of the Site (alongside New Nangor Road) has a wayleave for a trunk water main and two buried 220kV high voltage electrical cables. The western half of the Site was in use by the Electricity Supply Board as a subcontractor compound, including material and machinery storage. The eastern half of the Site contained 3-4 m high construction rubble mounds amounting to c.18,000 m^3 in volume, placed above original topographic levels. Pinnacle have identified a potential for localized flooding alongside the stream that forms the south-eastern boundary of the Site.

A questionnaire was completed by the current land owner, which did not provide any additional information pertinent to this report.

3.2.4 Historical Use Summary

Based on a review of the compilation of historical sources presented above dating back to 1837, it appears that the subject property was in agricultural use until the construction of the Profile Park access road on the Site's western boundary in around 2007-2009. Although a retail and office development was proposed for the Site and planning consent granted, it was not implemented and the Site has been used intermittently as a construction compound and for stockpiling excavated soil and builders rubble up to the present day. A strip of land along the northern edge contains a wayleave for a trunk water main and high voltage electricity cables.

Potentially contaminative land uses identified in the surrounding area include a petrol filling station to the north, dating from the late 1990s. The office and warehouse development to the north-west of the roundabout is of recent construction and is considered unlikely to be a source of contamination likely to affect the Site.

3.3 Previous Environmental Assessments

Previous environmental assessments were used to identify historical Site conditions that could have resulted in RECs and BERs, and these are summarised below. However, it should be noted that these date from 2006, while the Site was still in agricultural use, and therefore may not represent the Site in its current condition.

3.3.1 List of Reports Provided

Delta-Simons has been provided with the following reports relating to the Site:

- RPS Planning and Environment - Environmental Impact Assessment for Profile Park Roads and Services Application dated July 2006. Chapter 6 and Appendix B – Soils, Geology and Hydrogeology (including waste), including trial pit logs by WYG.

Copies of the reports are provided in Appendix F.

3.3.2 RPS Environmental Impact Statement, July 2006, Chapter 6 and Appendix B.

The Environmental Impact Statement was prepared in support of the application for roads and servicing for the Profile Park development, including the Site and a larger area to the south-west. A range of potential environmental impacts of the development were considered, of which Chapter 6, concerning soils, geology, hydrogeology and waste, and the supporting Appendix B, are considered relevant to the current assessment and have been reviewed. Although the EIS was authored by RPS, Chapter 6 was based on a desktop study, Site walkover and trial pit investigation by a WYG hydrogeologist.

The geological and hydrogeological findings have been referenced in Section 2.3.

The site investigation comprised twenty-nine trial pits in total, or which four, TP12 to 15, were located on the current Site. The soils encountered in these four trial pits were of natural origin, although an area of Made Ground incorporating waste materials was identified c. 100 m south of the Site. Soil chemical analysis samples were taken from the trial pits and were also analysed for "*soil gases*". Detailed monitoring data and laboratory analysis certificates were not appended to the report.

According to Chapter 6, concentrations of metals in soils recovered from "agricultural land" areas (including the current Site at the time) were low in comparison with assessment criteria used by WYG [Delta-Simons notes that this conclusion appears to remain valid when compared with current assessment criteria]. Diesel range organics and mineral oils, were below or at the limit of detection and not in exceedance of assessment criteria. No VOCs were detected. Soil leachate analyses did not indicate that a risk of contamination of groundwater was present from trial pits on the current Site, although some anomalously high leachate results were recorded elsewhere on the Profile Park site.

Low levels of ground gas were recorded in the area of Made Ground identified 100 m south of the Site however ground gas was not reported in areas of Profile Park, including the current Site, not containing Made Ground.

It should be reiterated that the 2006 investigation predated later use of the current Site as a construction compound and excavated material/building rubble stockpile area and therefore may not be representative of current conditions.

3.4 User-Provided Information

Pursuant to the User's responsibilities as described in Section 6 of ASTM E1527-13, the User does not hold any additional information pertinent to this assessment.

4.0 Site Reconnaissance

4.1 Overview

The Site reconnaissance was planned or conducted by an Environmental Professional with experience in the country and/or region of the subject property. Selected photographs from the reconnaissance are provided in Appendix B. Information presented in the following Section is based on visual observations during the Site reconnaissance. The Site reconnaissance consisted of visual observations during a walking tour of the property and a review of the subject properties permits and records (where available). A site layout plan is provided in Figure 2.

Field Personnel	David Kerr (WYG contracted to Delta-Simons).
Reconnaissance Date	19th November 2020.
Weather	10°C, overcast, with mild wind.
Escort	None
Scope of Reconnaissance	▲ Walking the perimeter of the property; ▲ Walking the interior of the property boundary; and ▲ Evaluate ground conditions and identify potential on- and off-Site contamination sources.
Areas not Accessed	Construction compound in the north-west of the Site.

4.2 General Site Information

Current Use(s) of the Property	The majority (c. 60%) of the Site is vacant land where ground cover is dominated by stockpiles of construction and demolition materials and coarse infill. Ground cover in peripheral areas comprises scrub-type vegetation. A construction compound occupies the north-west covering c. 40% of the Site.
Past Uses(s) of the Property	Refer to Section 3.2.
General Description of Structures	No permanent structures have been developed. A construction site compound is located in the west of the Site comprising pre-fabricated cabins and converted storage containers.
Roads	There are no permanent roads in the Site's footprint. (However, refer to Section 2.1 concerning Land Registry boundaries).
Potable Water Supply	The construction site compound is serviced by a potable water supply.
Sewage Disposal System (including septic systems and drain fields)	No septic systems or field drains were identified. It is assumed that the construction compound is either serviced by above ground septic storage or a temporary connection to mains sewerage on the New Nangor Road.

	A small 'shuck' (surface watercourse) borders the Site to the east and south. It is assumed some pluvial drainage occurs to this.

4.3 Site Observations

Feature	Observed		Description
	Yes	No	
Hazardous Substances/ Petroleum Products		X	Whist not observed, it is assumed that some small quantities of fuels, oils and lubricants will be stored in the construction site compound for vehicle and service building maintenance.
Storage Tanks	X		A single above ground storage tank was observed in the site compound adjacent to the female toilets. It was not labelled to contain any petroleum oils.
Strong, Pungent or Noxious Odours		X	No odours were noted during the Site reconnaissance.
Pools of Liquid and Standing Surface Water	X		Pools of standing water were observed between material stockpiles in the east of the Site, and in compacted gravel hardstanding in the south.
Drums and Containers	X		Intermediate bulk containers (IBCs) were observed in the construction site compound, the contents of which were not confirmed due to access constraints.
Electrical or Hydraulic Equipment that May Contain PCBs		X	No electrical or hydraulic equipment were observed during the Site reconnaissance.
Heating/Cooling System		X	No oil or gas fired heating systems were identified. It is assumed that the site compound is serviced by electric heating.
Staining or Corrosion		X	No staining or corrosion was noted during the Site reconnaissance.
Drains and Sumps		X	No drains or sumps were noted during the Site reconnaissance.
Utility Providers	X		A high-voltage electrical cable was identified entering the south-west of the site.
Pits, Ponds or Lagoons		X	No pits, ponds or lagoons were noted during the Site reconnaissance.
Stressed Vegetation	X		A buddleia infestation was observed in the south-east of the Site. Common Hogweed was noted bordering the stream and although the invasive Giant Hogweed was not evident, as the walkover was carried out in the winter the potential presence of this invasive species cannot be excluded.
Solid Waste / Dumping	X		Some stockpiles of construction and demolition waste were identified in the centre/east of the Site. No evidence of asbestos containing materials was visible, but presence of ACM cannot be discounted.

Waste (foul) and Storm Water (surface water) Interceptors/sumps		X	No interceptors or sumps were observed during the Site reconnaissance.
Wells		X	No wells were noted during the Site reconnaissance.
Septic Systems	X		As outlined above, it is assumed that the construction compound is either serviced by temporary above ground septic storage or a temporary connection to mains sewerage on the New Nangor Road.

4.3.2 Updated Site Reconnaissance (17th Feb. 2021)

Delta-Simons attended the Site to observe the advancing of trial pits across the Site. These will be reported on in a subsequent report. Further to the above Site Observation table, the following changes were noted:

- The ESB compound had been removed with only the limited hard standing associated with the line of prefabricated cabins remaining.
- Some limited ground scarring from the storing of materials in the north-west of the site was observed.
- There was no evidence of gross contamination associated with the former compound or its removal.

No other significant changes were observed.

4.4 Adjacent Property Observations

The following information has been obtained from both the Site and surrounding area reconnaissance and aims to identify obvious visual indications of present or past activities that have or could have contaminated the subject property. The area reconnaissance was conducted by automobile, and/or on foot, unless otherwise noted.

General Observations	The Site is located in a commercial and recreation development area dominated by commercial and warehouse buildings, a golf course and areas of undeveloped greenfield land.	
Adjoining Property Use	**North**	The Kilcarbery Park industrial and commercial estate comprising commercial premises and office space, and a petrol filling station to the east of the estate.
	East	Grange Castle Golf Course
	South	Grange Castle Golf Course
	West	Undeveloped lands possibly used for agriculture.
Past Use(s) of Adjoining Properties	The majority of the lands that adjoin the property were undeveloped and unoccupied until at least c. 2000 when development of the Kilcarbery complex is shown.	
Evidence of Contamination	Evidence of past site investigations were identified at the petrol station directly north of the Site, comprising surface scarring indicative of boreholes. The boreholes had not been installed as monitoring wells.	

4.5 Out-of-Scope Considerations

It was indicated that the following out-of-scope considerations may be requested by the User. Comments regarding the relevance and inclusion in the report have been made for each.

- Asbestos-Containing Building Materials:
  - No permanent buildings were present on Site. The potential for asbestos in stockpiles of building rubble and demolition waste was noted in Section 4.3 of this report.
- Indoor air quality unrelated to releases of hazardous substances or petroleum products into the environment:
  - No permanent buildings were present on Site; therefore, indoor air quality was not considered relevant to the assessment.
- Lead-Based Paint:
  - No permanent buildings were present on Site; therefore, lead based paint was not considered relevant to the assessment.
- Lead in Drinking water:
  - The construction site compound is serviced by a potable water supply; however, it was considered beyond the scope of this report to collect and analyse drinking water samples for lead.
- Mold:
  - No permanent buildings were present on Site; therefore, mold was not considered relevant to the assessment.
- Radon:
  - Radon is discussed in Section 3.1.4 of this report.
- Regulatory compliance:
  - Regulatory compliance was considered outside the scope of this report.

5.0 Interviews

Interviews were planned by a Delta-Simons Environmental Professional and performed by personnel possessing sufficient training and experience and having the ability to identify issues relevant to RECs in connection with the property. The following interviews were arranged and conducted as part of this assessment:

Person/Agency Interviewed	**Date of Interview**	**Findings**
Key Person/ Site Manager		A questionnaire was submitted for completion by the owner or other appropriate person; the questionnaire had not been returned at the time of issue of this report.
Occupants		No interviews with occupants were possible.
Past Owners, Operators and Occupants	N/A	No interviews with past owners, operators or occupants were possible.
Regulatory Agencies		Enquiries were submitted to the Environmental Protection Agency and Local Authority requesting any information pertinent to the Site. Responses had not been received at the time of issue of this report.
Land Owner	Feb. 2021	As outlined above, the current land owner completed an ASTM Phase 1 ESA Questionnaire (Appendix H). No additional significant environmental information was contained therein.

6.0 Findings

Delta-Simons has performed a Phase I ESA in conformance with the process and limitations of ASTM Practice E1527 of the Site (as defined in Section 1 of this report). Exceptions to, or deletions from, this practice are described in Section 1.4 of this report.

6.1 Conclusions

This assessment did not reveal evidence of CRECs or HRECs. This assessment has revealed evidence of two RECs, a de minimis conditions and two BERs. These identified conditions are described below:

RECs	▲ The Site was last used as a construction compound until February 2021. Whilst the pre-fabricated buildings have been removed, stockpiles of excavated material/ building rubble stockpiling that have been present since c.2000 remain. Of note is around 18,000 m^3 of stockpiled excavated material/building rubble on the eastern half of the Site. Elevated concentrations of a range of contaminants may be present. Given the post-2000 date of the developments in the area with which the Site has been associated, the possible presence of asbestos-containing materials in the building rubble is less likely but cannot altogether be excluded. The previous environmental impact statement report reviewed above predated this use and therefore may not represent the current state of the Site. ▲ A petrol filling station is located 10 m north of the Site, on the opposite side of New Nangor Road. There is evidence of past site investigation at the property. There is no other current evidence visible above ground to suggest the presence of an environmental condition, however the potential for below ground leaks from storage tanks / distribution pipework exists and any contaminant migration from such leaks, if occurring, has the potential to impact the Site.
De Minimis Conditions	▲ Industrial and commercial activities in developed areas to the north, west and south-west of the current Site, including pharmaceutical/biotechnology manufacture, distribution depots and data centre operation are of recent construction and generally distant from the current Site and are considered to be sites with a low potential for contamination likely to affect the Site.
Business Environmental Risks / Conditions of Interest	▲ A wayleave for a trunk water main and electricity cables along the northern edge of the Site will constrain the development area available and will need to be taken account of in construction and health and safety planning for future development. ▲ The Site lies within an area where between 5% and 10% of homes are above the EPA Reference Level for homes of 200 bequerel per cubic metre (Bq/m^3) for radon. The EPA website indicates that radon protective measures may be necessary in the construction of new buildings at the Site. ▲ Flood Risk: although no areas identified as at risk from flooding have been identified from the Office of Public Works mapping, there is a potential for localized flooding alongside the stream that forms the south-eastern boundary of the Site. ▲ Stands of Common Hogweed are located in the south near the bordering stream. Evidence of the invasive Giant Hogweed was not visible, however the Site walkover was completed in the winter and the potential presence of the invasive plant can not altogether be excluded.

6.2 Significant Data Gaps

ASTM E1527-13 directs that the Phase I ESA identify and comment on significant data gaps that affect the ability of the Environmental Professional to identify RECs. A data gap is defined as a lack of or inability to obtain information required despite good-faith efforts to gather information. Data gaps may result from incompleteness

in any of the activities required by this practice. Data failure, or failure to achieve the historical research objectives even after reviewing the standard historical sources that are reasonably ascertainable and likely to be useful, is one type of data gap. A data gap is only significant if other information and/or professional experience raises reasonable concerns involving the data gap.

- Information was requested from the Environmental Protection Agency in relation to data held with the potential to affect the at the Site, but a response was not received in the timeframe of the report.
- Information was requested from the Local Authority in relation to data held with the potential to affect the at the Site, but a response was not received in the timeframe of the report.

7.0 Environmental Professional Declaration

Delta-Simons declares that, to the best of its professional knowledge and belief, that the personnel who performed this Phase I ESA meet the definition of Environmental Professional with qualifications similar to those defined in Subsection 312.10 of 40 Code of Federal Regulations (CFR) 312 and that they have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Site.

These professionals have developed and performed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

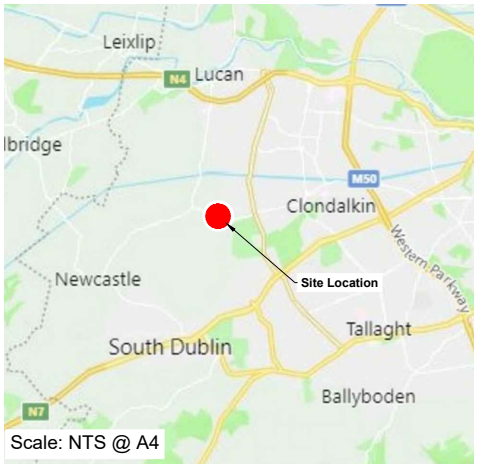
This Phase I ESA was prepared by Frank Westcott, Consultant, and reviewed by Rachel Gregory, Senior. Professional profiles of the project team members are presented in Appendix G.

8.0 References

The following data sources were reviewed as part of this assessment:

- Website http://map.geohive.ie/mapviewer.html (Viewing Historical Maps; Bedrock Aquifer classifications; Groundwater Vulnerability; and Limited Mining);
- Website https://store.osi.ie/index.php/historic-map.html (Purchasing historical maps);
- Website https://gis.epa.ie/EPAMaps/ (Superficial Deposits Aquifer Classification; Groundwater Vulnerability; Coal Mining; Regulatory Information; Ecological Sensitive Receptors; and Radon Maps);
- Website http://www.epa.ie/radiation/radonmap/ (Radon Maps);
- Website http://www.floodinfo.ie/ (Flood plans and maps);
- Website https://heritagemaps.ie/WebApps/HeritageMaps/index.html (Heritage areas);
- Website http://spatial.dcenr.gov.ie/ExplorationAndMining/SpatialViewer/index.html (Coal Mining);
- Website http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GSI_Simple (Groundwater vulnerability (SPZ's & aquifer designations); Borehole information/Geotechnical Sites).

Figure 1 – Site Location Map



Scale: NTS @ A4

LEGEND

Site Boundary

Scale: 1 / NTS @ A4

Bing maps

deltasimons
Environment - Health & Safety - Sustainability

TITLE:
Site Location Map
IER Grange Castle
Dublin

DRAWN BY: KE	SCALE: To Scale@A4
CHECKED BY: JB	REVISION: 1
DATE: 13 November 2020	

PROJECT NO: 20-2018.01

FIGURE NO: 1

Figure 2 – Site Layout Plan



LEGEND

- Approximate Site boundary
- Baldonnel Stream
- Contractors compound (not accessed)
- Approximate location of stockpiles of construction waste
- Approximate location of Common Hogweed

Bing maps

deltasimons
Environment - Health & Safety - Sustainability

TITLE:
Site Layout Plan
IER Grange Castle, Dublin

DRAWN BY: RG	SCALE: NTS	PROJECT NO: 20-2018.01
CHECKED BY: KH	REVISION: -	FIGURE NO: 2
DATE: 20th November 2020		

Appendix A – Standard Limitations

Standard Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B – Site Photographs

Site Photographs



Photograph 1 - The Site is located off the Profile Park access road.



Photograph 2 - The south of the Site is bound by a ‘shuck’ watercourse.



Photograph 3 - The shuck flow west to east below the Profile Park access road.



Photograph 4 - A high voltage cable is shown entering the south of the Site.



Photograph 5 - The southwest of the Site is covered by compacted gravel.



Photograph 6 - A construction compound was located in the northwest.



Photograph 7 - Numerous stockpiles are located in the south covered by scrub-type vegetation.



Photograph 8 - Unlabelled IBCs were identified in the previous site compound (now removed). These could not be inspected due to access constraints.



Photograph 9 - Large stockpiles of gravel and construction and demolition materials are located in the east of the Site.



Photograph 10 - Localised stockpiles of construction and demolition materials are located in the east of the Site.



Photograph 11 - A petrol station is located north of the Site beyond the New Nangor Road.



Photograph 12 - A commercial / industrial estate is located north of the Site.



Photograph 13 - Localised construction and demolition materials in the centre of the Site.



Photograph 14 - Localised construction and demolition materials in the centre of the Site.



Photograph 15 - (February 2021) The Site compound has since been removed with only limited associated hard standing remaining.



Photograph 16 - The material stockpiles remain present in the north east of the site.

Appendix C – Geological Mapping

Bedrock Geological Map of Ireland

1:500,000 scale

Derived from the Geological Survey of Ireland 1:100,000 Bedrock Map Series
and the Geological Survey of Northern Ireland 1:250,000 Geological Map of Northern Ireland

© Geological Survey of Ireland 2006

Compiled by B. McConnell and S. Gatley
For data sources see GSI 1:100,000 Bedrock Map Series
and GSNI 1:250,000 Geological Map of Northern Ireland

Published by the Geological Survey of Ireland under authority of the Director, Dr P. McArdle
Geological Survey of Ireland, Beggars Bush, Haddington Road, Dublin 4, Ireland

Basemap derived from 1:600,000 mapping
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Geological Survey of Northern Ireland

N

0 5 10 15 20 25 30 kilometres

13 GSI 1:100,000 Sheets
GSNI 1:250,000 Sheet

A	B	C	D	E
F	G	H	J	K
L	M	N	O	P
Q	R	S	T	U
V	W	X	Y	Z

The National Grid
The grid is divided into lettered Sub-zones as shown by the diagram. A grid reference consists of the appropriate Sub-zone letter, followed by the Easting co-ordinate and the Northing co-ordinate of the position in that sequence.

Ma=millions of years before present
not to scale

CENOZOIC
- QUATERNARY
- NEOGENE
- PALAEOGENE: Oligocene, Eocene, Palaeocene

MESOZOIC
- CRETACEOUS
- JURASSIC
- TRIASSIC

PALAEOZOIC
- PERMIAN
- CARBONIFEROUS: Pennsylvanian (Westphalian, Namurian); Mississippian (Arundian, Chadian, Courceyan)
- DEVONIAN: Upper, Middle, Lower
- SILURIAN
- ORDOVICIAN: Upper, Middle, Lower
- CAMBRIAN

NEOPROTEROZOIC
- Dalradian Super Group: Southern Highland Group; Appin Group; Argyll Group; Grampian Group
- Rosslare Complex
- Annagh Gneiss Complex

MESO-PROTEROZOIC

PALAEO-PROTEROZOIC

IGNEOUS INTRUSIONS
- Palaeogene
- Caledonian (Silurian - Devonian)
- Lower Palaeozoic
- Neoproterozoic

83 Lacustrine clay, sand & lignite
82 Upper Basalt Formation — Olivine basalt lava
81 Causeway Tholeiite Member — Columnar tholeiitic basalt lava
80 Interbasaltic Formation — Laterite, bauxite & lithomarge
79 Lower Basalt Formation — Olivine basalt lava
78 Undifferentiated minor volcanic rocks
77 Shallow marine (Upper Cretaceous) — Chalk, flint, glauconitic sandstone & chalk breccia
76 Shallow marine (Lias) — Mudstone & limestone
75 Continental redbed facies, lagoonal & shallow marine — Sandstone & mudstone with evaporite
74 Continental redbed facies (Permo-Triassic, Wexford) — Sandstone, conglomerate & siltstone
73 Continental redbeds facies & shallow marine — Sandstone, conglomerate, magnesian limestone, marl, evaporite
72 Fluvio-deltaic & shallow marine — Shale, sandstone & siltstone with coal
71 Fluvio-deltaic & basinal marine (turbiditic) — Shale, sandstone, siltstone & coal
70 Continental redbed facies (late Visean to early Westphalian) — Sandstone, conglomerate & mudstone
69 Fluvio-deltaic & minor marine (late Visean to Namurian; Ballycastle) — Sandstone, mudstone, thin limestone & coal
68 Marginal marine (Meenymore Formation) — Mudstone, sandstone & evaporite
67 Shallow water marine (Armagh Group) — Limestone, limestone conglomerate, palaeokarst with red palaeosols
66 Marginal marine (Mullaghmore, Downpatrick & Clogher Valley Fms) — Sandstone, mudstone & evaporite
65 Marine basinal facies (Tobercolleen & Lucan Fms - "Calp") — Dark-grey argillaceous & cherty limestone & shale
64 Marine shelf facies — Limestone & calcareous shale
63 Shallow marine & coastal plain (Basal Clastics) — Sandstone, mudstone & conglomerate
62 Waulsortian mudbank — Pale-grey massive limestone
61 Marine shelf & ramp facies — Argillaceous dark-grey bioclastic limestone, subsidiary shale
60 Shallow & marginal marine (Navan Group) — Dark-grey limestone, mudstone, sandstone, minor evaporite
59 Shallow marine & coastal plain (basal clastics) — Sandstone, mudstone & conglomerate
58 Shallow marine ("Lower Limestone Shales") — Shale, sandstone & thin limestone
57 Marine (Cork Group) (extends into the Visean) — Mudstone, sandstone & thin limestone
56 Basalt, trachyte, syenite & tuff
55 Shallow marine (Cork Group, Old Head Sandstone Fm) — Sandstone & mudstone
54 Continental redbed facies — Sandstone, conglomerate & siltstone (in places extends into the Carboniferous)
53 Continental redbeds facies — Sandstone, siltstone & mudstone
52 Continental redbeds facies — Sandstone, siltstone & mudstone (base of Dingle Group is in the Upper Silurian)
51 Rhyolite & rhyolitic tuff
50 Basalt, andesite, basaltic & andesitic tuff
49 Deep marine turbidite sequence — Mudstone, greywacke & conglomerate
48 Transgression - regression sequence (Killary Hbr - Joyces Country Succ.) — Sandstone, conglomerate, greywacke, mudstone, tuff
47 Alluvial - playa (Louisburgh - Clare Island Succession) — Sandstone, siltstone, conglomerate
46 Quartzite (in Croagh Patrick Succession)
45 Shallow marine (Croagh Patrick Succession) — Sandstone, siltstone, conglomerate
44 Rhyolitic tuff, basalt & andesite (in Dunquin Gp)
43 Shallow marine (Dunquin Group, Dingle) — Siltstone, sandstone, tuff, limestone
42 "Moffat Shale" facies (Ordovician-Silurian) — Shale & greywacke
41 Melange (Ordovician or Silurian) — Greywacke, sandstone & conglomerate
40 Marine to fluvial — Greywacke, shale, sandstone & conglomerate
39 Deep marine — Slate, shale, minor sandstone & siltstone
38 Rhyolite, rhyolitic tuff & slate
37 Basalt - andesite, tuff, slate & mudstone
36 Deep marine — Greywacke, shale, sandstone & conglomerate
35 Deep marine — Slate, schist & minor greywacke
34 Rhyolite & rhyolitic tuff
33 Basalt - andesite, tuff & shale
32 Marine — Greywacke & shale
31 Marine — Slate
30 Marine — Quartzite & minor slate
29 Pelitic & psammitic schist, phyllite & marble
28 (Epidote-)amphibolitic schist & tuff
27 Psammitic & pelitic schist, marble, amphibolite, diamictite
26 Quartzite
25 Amphibolite & amphibolitic schist
24 Paragneiss & migmatite
23 Psammitic & pelitic schist & marble
22 Quartzite
21 Psammitic & pelitic schist
20 Inishkea Division (possibly Dalradian) — Psammitic & pelitic schist
19 Slishwood Division — Quartzo-feldspathic paragneiss
18 Tyrone Central Inlier — Quartzo-feldspathic paragneiss & schist
17 Greenore Point Group — Schistose amphibolite
16 Kilmore Quay Group — Paragneiss, schist
15 Doolough Gneiss & Granite — Granitic orthogneiss & granite
14 Cross Point Gneiss — Granitic orthogneiss
13 Mullet Gneiss — Granitic orthogneiss
12 Rhinns Complex (Inishtrahull) — Syenitic orthogneiss, minor metagabbro
11 Dolerite & gabbro
10 Rhyolite
9 Granite, granophyre
8 Granite, granodiorite
7 Appinite Suite
6 Microgranite & porphyry
5 Gabbro, dolerite & diorite
4 Granodiorite, tonalite, dacite, granite
3 Orthogneiss suite, mainly quartz diorite (Connemara)
2 Serpentinite — Neoproterozoic (NE Ox Mts) & Lower Ordovician (Clew Bay, Carnew)
1 Meta-dolerite, meta-gabbro

stratigraphical or igneous contact
fault
Palaeogene dolerite dyke

A

B

Diagrammatic space-time legend for Precambrian and Lower Palaeozoic rocks. See legend column for explanation of colour and number scheme.
Not a cross-section, but rock units and terranes depicted approximate to a NW - SE transect.
Duration of Precambrian units not to scale. Numerous minor intrusions omitted. Dominant rock types indicated; significant other rock types shown in places.
Terrane subdivisions follow Murphy et al. (1991). Timescale from International Commission on Stratigraphy (Gradstein et al. 2004).

359Ma Devonian
416Ma Silurian
444Ma Ordovician
488Ma Cambrian
542Ma Neoproterozoic
1000Ma Mesoproterozoic
1600Ma Palaeoproterozoic

Donegal Batholith 408 ± 7 Ma; Ox Mtns 407 ± 7 Ma; Clew Bay - S Mayo; Galway Batholith 408 ± 8 Ma; Newry 408 ± 8 Ma; Longford - Down - Slieve Aughty; Southern Belt & N. Midland Inlier; Grangegeeth; Kerrstown Stud 408 ± 6 Ma; S. Midland Inlier; Leinster Batholith 408 ± 8 Ma; Wicklow - Waterford; Saltees - Carnsore 408 ± 6 Ma

Central Belt; Northern Belt; Pomeroy; Connemara/ Tyrone; Delaney Dome; N Connemara; Bellewstown Stud 408 ± 6 Ma; Ballyboggan - Kildare; Tagoat

Donegal - N Mayo - Ox - Sperrins Dalradian; Slishwood Division; Annagh Gneiss Complex not to scale; Rhinns Complex not to scale; Tyrone; Connemara Dalradian

Main Faults: Main Thrust; Fair Head - Clew Bay Line; Donn Rock Shear Zone; Main Thrust; Skerd Rocks Fault (S Uganda Fault); Orlock Bridge Fault; Navan - Skerries Fault; Tinure Fault; Lowther Lodge Fault; Welsh Road Fault; Ballycogly Mylonite Zone; Rosslare Complex not to scale

Volcanic intervals

① Emerging evidence for possible tectonic unconformity within Argyll Group in Donegal.
② Extent, age and relationship of Slishwood Division and Tyrone Central Inlier uncertain.
③ Melange either Ordovician (based on structural evidence) or Silurian (based on fossil evidence).
④ Ophiolite complexes, mafic and ultramafic rocks.

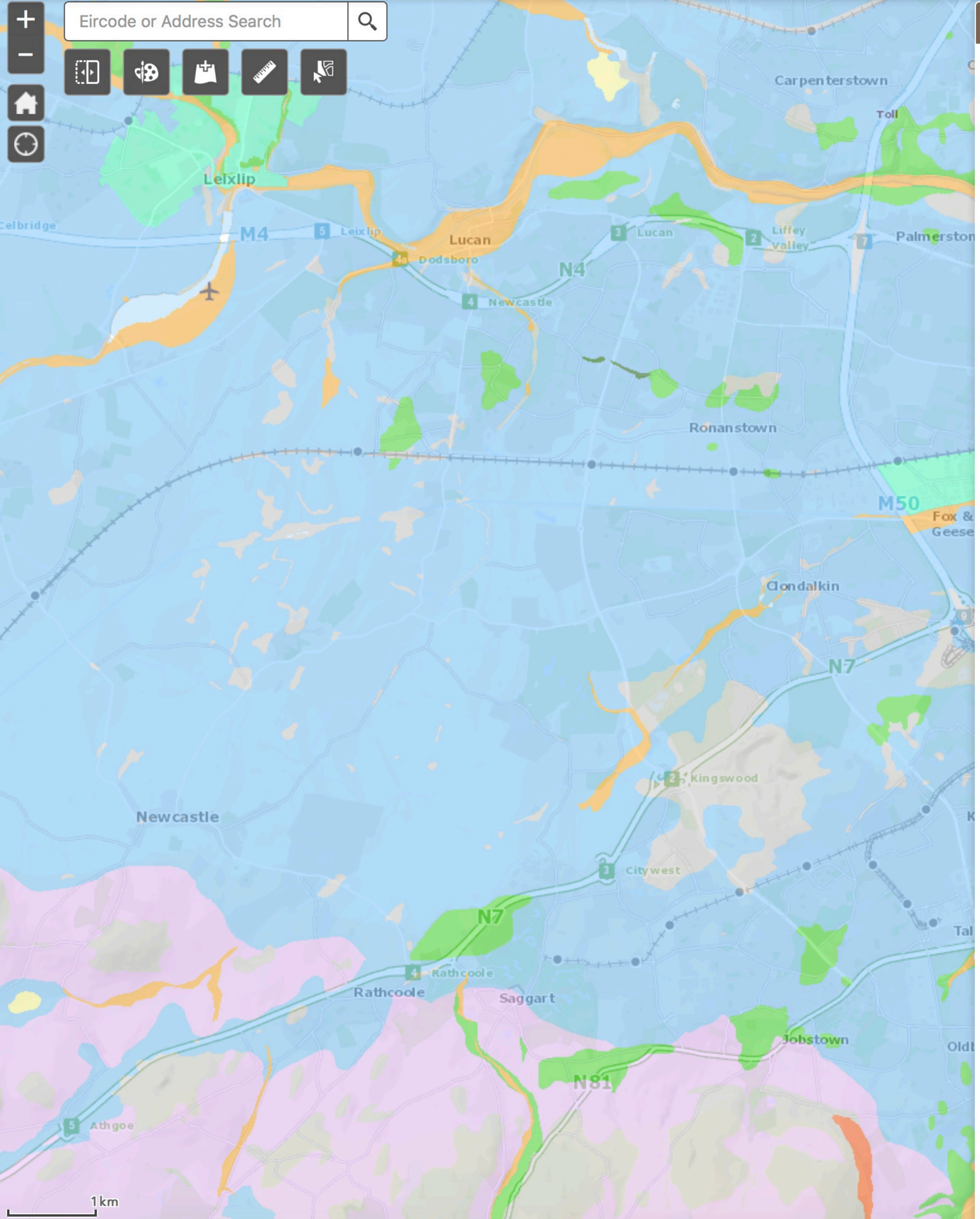
Grampian Terrane | Northwestern Terrane | Grampian Terrane | Central Terrane | Grangegeeth Terrane | Bellewstown Terrane | Leinster Terrane | Rosslare Terrane

Cross-section from Benwee Head, NW Mayo to Carnsore Point, SE Wexford
Units numbered as on map. Combined or diagrammatic units explained in separate legend.
Horizontal scale 1:500,000. Vertical scale 1:250,000
unconformity

A — Benwee Head; L. Conn; R. Shannon; Slieve Bloom Mtns; R. Barrow; Blackstairs Mtns; Carnsore Point — B

b Dalradian metasedimentary rocks, undivided
a Palaeoproterozoic - Mesoproterozoic orthogneiss (Annagh Gneiss Complex), undivided
d Middle - Upper Ordovician metasedimentary rocks, undivided
c Proterozoic metamorphic rocks ("Midland Valley Terrane")
f Mississippian (Carboniferous) sedimentary rocks, undivided
e Devonian sedimentary rocks, undivided
h Cambrian metasedimentary rocks, undivided
g Neoproterozoic gneiss & schist (Rosslare Complex), undivided

0 30000 60000 90000 120000 150000 180000 210000 240000 270000 300000 330000 360000



Geology Legend

- MGs, Marine gravel and sands (often raised)
- Mbs, Marine beach sands
- Mesc, Esturine silts and clays
- Mrl, Lake marl
- Pier
- Rck, Bedrock outcrop or subcrop
- RsPt, Raised Peat (intact)
- Scree, Scree
- Spoil Heap, Spoil Heap
- TAv, Till derived from acidic volcanic rocks
- TBi, Till derived from basic igneous rocks
- TCSs, Till derived from Carboniferous sandstones
- TCSsCh, Till derived from Carboniferous sandstones and cherts
- TCSsS, Till derived from Cambrian sandstones and shales
- TCh, Till derived from cherts
- TDCSs, Till derived from Devonian and Carboniferous sandstones
- TDCSsS, Till derived from Devonian and Carboniferous sandstones and shales
- TDSs, Till derived from Devonian sandstones
- TGr, Till derived from granites
- TLCSsS, Till derived from lower Carboniferous sandstones and shales
- TLPCSsS, Till derived from Lower Palaeozoic and Carboniferous sandstones and shales
- TLPDSs, Till derived from Lower Palaeozoic and Devonian sandstones
- TLPS, Till derived from Lower Palaeozoic shales
- TLPSs, Till derived from Lower Palaeozoic sandstones
- TLPSsS, Till derived from Lower Palaeozoic sandstones and shales
- TLSCh, Till derived from Silicified Limestone and cherts
- TLs, Till derived from limestones
- TMp, Till derived from Metamorphic rocks
- TNCSSs, Till derived from Namurian and Carboniferous sandstones and shales
- TNSSs, Till derived from Namurian sandstones and shales
- TQz, Till derived from quartzites
- Tailings Pond
- TdlMr, Tidal Marsh
- Urban
- Water
- Ws, Windblown sands
- Wsd, Windblown sands and dunes

Eircode or Address Search

Geology Legend

- Knockseefin Volcanic Formation
- Knockseefin Lava Flow Member
- Knockseefin Lithic Tuff Member
- Knockseefin Vitric Tuff Member
- Kilsheelan Formation
- Lane Formation
- Lagganstown Formation
- Lough Gur Formation
- Loughshinny Formation
- Mattock Member
- Lismaline Micrite Formation
- Little Island Formation
- Lower Limestone Shale
- Loughbeg Formation
- Lispatrick Formation
- Lisgorman Shale Formation
- Leitrim Group
- Lucan Formation
- Boulder Conglomerate
- Maam Formation
- Malahide Formation
- Meenymore Formation
- Carnmore Sandstone Member
- Glen Member
- Quarry Sandstone Member
- Mellon House Formation
- Mornington Formation
- Milford Formation
- in Milford Formation
- Milverton Group (undifferentiated)
- Moy Sandstone Formation
- Mooretown Formation
- Muckros Sandstone Formation
- Mullaghfin Formation
- Killala Oolite Member
- Mullaghmore Sandstone Formation
- Maydown Limestone Formation
- Naul Formation
- Navan Beds
- Rockfield Sandstone Member
- Oakport Limestone Formation
- Burrishoole Member
- Creagh Member

1 km

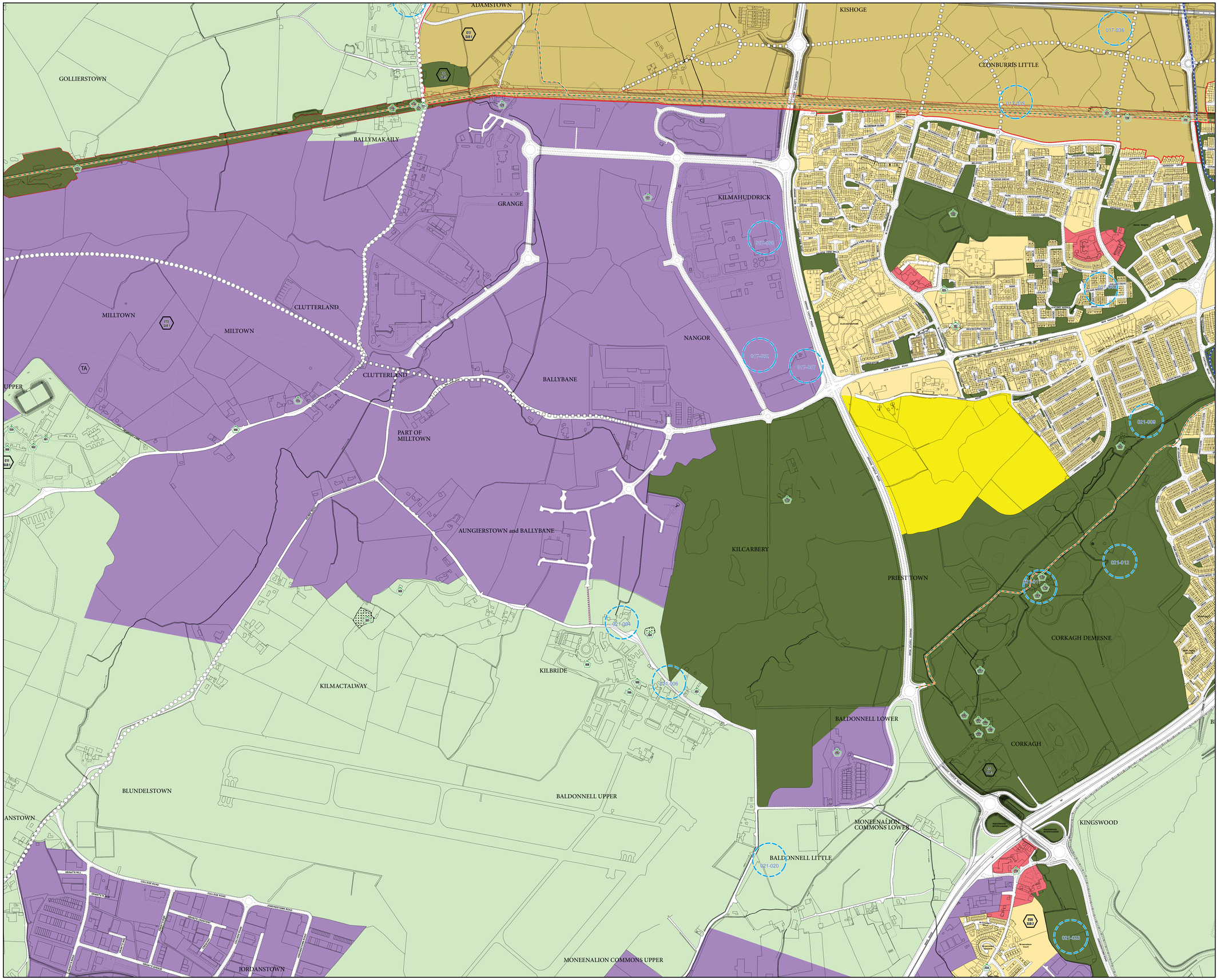
Appendix D – Planning Information

South Dublin County Council

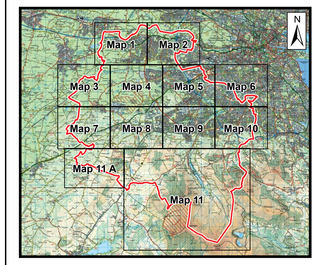
Development Plan 2016 - 2022

Map includes Variations 1 & 2

Map 4



South Dublin County Council
Development Plan
2016 – 2022



Use Zoning Objectives

Objective RES	To protect and/or improve residential amenity
Objective RES-N	To provide for new residential communities in accordance with approved area plans
Objective SDZ	To provide for strategic development in accordance with approved planning schemes
Objective REGEN	To facilitate enterprise and/or residential-led regeneration
Objective TC	To protect, improve and provide for the future development of Town Centres
Objective MRC	To protect, improve and provide for the future development of a Major Retail Centre
Objective DC	To protect, improve and provide for the future development of District Centres
Objective VC	To protect, improve and provide for the future development of Village Centres
Objective LC	To protect, improve and provide for the future development of Local Centres
Objective RW	To provide for and consolidate retail warehousing
Objective EE	To provide for enterprise and employment related uses
Objective OS	To preserve and provide for open space and recreational amenities
Objective HA (LV, DV, DM)	To protect and enhance the outstanding natural character and amenity of the Liffey Valley, Dodder Valley and Dublin Mountains areas
Objective RU	To protect and improve rural amenity and to provide for the development of agriculture

Specific Objectives:

- PPS — Proposed Post Primary School
- PS — Proposed Primary School
- Seveso Sites
- SLO 1 — Specific Local Objectives (See Written Statement for Details)
- TA — To provide for Traveller Accomodation Sites to be Selected
- TA — To provide for Traveller Accommodation
- To protect and / or provide for a Burial Ground
- Contour Lines
- SDZ Planning Scheme Boundaries
- County Boundary

Transport

- Junction Proposals
- Road Proposals - Long Term
- Road Proposals - 6 Year
- Long Term High Capacity Public Transport (RPA Preferred Route)
- NTA Greater Dublin Cycle Network Plan
- Proposed Local Cycle / Pedestrian Link

Conservation

- To Preserve Prospects
- TPO — Tree Preservation Order (See Written Statement For Details)
- 397 — Record of Protected Structures (See Written Statement for Details)
- 017-021 — Record of Monuments and Places (See Written Statement for Details) (For Areas of Archaeological Potential see Index Map)
- Protect and Preserve Significant Views
- Geological Sites for Protection
- Bohernabreena Reservoir Catchment
- Architectural Conservation Areas (ACA)
- Proposed Natural Heritage Areas (pNHA)
- Special Protection Areas (SPA)
- Liffey Valley Special Area Amenity Order 1990 (SAAO)
- Special Area of Conservation (SAC)

Note:
See Index map for details of approach areas and height control zones for Casement Aerodrome, Baldonnell and Backweston Aerodrome, Backweston Park.

The lines of the Transport Proposals shown on this map are diagrammatic only and are subject to change during the detailed design process

Ordnance Survey Ireland Licence No. 2016/23/CCMA/South Dublin County Council

SCALE 1:5,000

0 75 150 300 450 600 metres

Land Use Planning and Transportation Department

Laura Leonard
BA MBA
A/Director

Brian Keaney
MIPI MRTPI
Senior Planner

4

Search and View

View Application SD06A/0568

Back to Search

Date Received:	05/07/2006
Last Action:	03/11/2006, Additional Information
Application Type:	Permission
Submission Type:	Additional Information
Closing Date for Submissions:	Closed
Applicant:	(IASNDC Limited,
Location:	Nangor Road, Ballyfane, Clondalkin, Dublin 22
Proposed Development:	Provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on these lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 357 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary works, on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park. This application is accompanied by an Environmental Impact Statement.
Decision Due:	30/11/2006

Decision Details

Decision Date:	30/11/2006
Decision:	GRANT PERMISSION
Final Grant Date:	13/01/2007


Dunboyne
Blanchardstown
Lucan
Dublin
Clondalkin
Tallaght
Dundrum
Bray
Greystones
Wicklow
Arklow
Malahide
Howth
Dublin Port
Dublin Airport
Port Tunnel
Poolbeg
Dublin Bay
South Dublin Bay and River Tolka Estuary
Baldoyle
Howth Head
Ireland's Eye
Lambay Island
Rockabill
Skerries
Balbriggan
Ashbourne
Kells
Navan
Trim
Maynooth
Leixlip
Celbridge
Naas
Newbridge
Kilcullen
Blessington
Rathcoole
Saggart
Brittas
Enfield
Edenderry
Tullamore
Portlaoise
Portarlington
Athy
Carlow
Kildare
Meath
Offaly
Laois
Wicklow
Wexford
Kilkenny
Louth
Monaghan
Cavan
Westmeath
Longford
Roscommon
Galway
Offaly
Laois
Kildare
Wicklow
Wexford
Carlow
Kilkenny
Tipperary
Waterford
Cork
Kerry
Limerick
Clare
Galway
Mayo
Roscommon
Sligo
Leitrim
Longford
Westmeath
Cavan
Monaghan
Louth
Meath
Kildare
Offaly
Laois

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County

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On-line: www.s

RPS Planning & Environment
Block E
Fifth Floor
Iveagh Court
Harcourt Road
Dublin 2

NOTIFICATION TO GRANT PERMISSION
PLANNING & DEVELOPMENT ACT, 2000 AND PLANNING REGULATIONS THEREUNDER

Final Grant Order No.:	**0107**	Date of Final Grant:	**19-Jan-2007**
Decision Order No.:	**2637**	Date of Decision:	**30-Nov-2006**
Register Reference:	**SD06A/0568**	Date:	**03-Nov-2006**

Applicant: DASNOC Limited,

Development: Provision of roads and services infrastructure to facilitate the futu development of a business park, to be known as 'Profile Park' on lands. The development includes the provision of 1,675 metres c internal distributor roads consisting of 267 metres to dual carriag standard (at the main entrance) with a further 1,408 metres to sin carriageway standard and one internal roundabout. The develop also includes surface water drainage, foul drainage and water sup infrastructure, associated landscaping and all ancillary works, on of 39.84 hectares. Access to the site will be provided at the nort boundary off the existing roundabout to Kilcarbery Business Par This application is accompanied by an Environmental Impact Statement.

Location: Nangor Road, Ballybane, Clondalkin, Dublin 22.

Time extension(s) up to and including
Additional Information Requested/Received 28-Aug-2006 / 03-Nov-2006

A Permission has been granted for the development described above, subject to the followi conditions.

Conditions and Reasons:

1. The development shall be carried out in its entirety in accordance with the plans, particu and specifications lodged with the application and additional information received on 3/11/2006, save as may be required by the other conditions attached hereto.
   REASON: To ensure that the development shall be in accordance with the permission,and that effective control be maintained.

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2. a) The water supply and drainage infrastructure, including the disposal of surface water, comply with the technical requirements of the Planning Authority.
b) There shall be complete separation of the foul and surface water drainage systems.
c) Adequate provision shall be made for future connections to foul drainage system from adjacent lands which may be developed in the future.
d) All foul and surface water sewers with the potential to be taken in charge shall be a minimum of 225mm in diameter, not closer than 3m to the nearest building and be locate roads, footpaths or public open space.
e) The minimum pipe size for any proposed piping/culverting of ditches/ watercourses sl be 1050mm and details shall be submitted to the Drainage Area Engineer (Deansrath Dep 457 0784) for agreement prior to the commencement of development. The flow in the watercourse shall not be constricted or reduced as a result of this work.
f) All surface water runoff from proposed roads shall be routed via a silt trap and petrol/oil/diesel interceptor before discharging to the public surface water drainage syste
g) Prior to commencement of development, foul and surface water drainage details and a water details shall be submitted to the Area Drainage Engineer, Deansrath Depot (Ph 01-784) for agreement.
REASON: In the interests of public health and in order to ensure adequate drainage prov

3. a) Footpath/cycle ways shall be constructed of maintenance free materials (concrete, imprinted concrete/asphalt, dense bitumen macadam) or with alternate materials the type form of which shall be agreed in writing by the Planning Authority prior to the commenc of development.
b) A 1.5m wide cycleway shall be constructed on both sides of Roads number 1 and 2.
REASON: In the interest of road safety and to ensure the provision of adequate road infrastructure.

4. a) All trees within the site, other than those indicated for removal as part of the developn shall be protected in accordance with BS 5837:2005 'Trees in relation to construction' ar detailed in the Arboricultural Method Statement submitted. Protection measures for all within the site shall be implemented prior to the commencement of any works associate the proposed development.
b) Details of landscape screening proposals for eastern boundary along Grange Castle G Course shall be agreed with Parks & Landscape Department and shall be submitted for t written agreement of the Planning Authority prior to commencement of development.
REASON: In the interest of amenity and the proper planning and sustainable developme the area.

5. Road number 1 shall be constructed as shown on drawing number 04173/100 revision A the area between the western side of the hammerhead/ turning area and the site boundary free from development in accordance with submitted Masterplan
REASON: In the interest of the proper planning and sustainable development of the are

6. All public services to the proposed development, including electrical, telephone cables a equipment shall be located underground throughout the entire site.
REASON: In the interest of amenity.

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7. No advertising sign(s) or structure(s) shall be erected except those, which are, exempted development, without the prior approval of the Planning Authority or An Bord Pleanála o appeal.
REASON: In the interest of the proper planning and development of the area.

8. (a) Suitable facilities for vehicle cleansing and wheel washing, to the satisfaction of the A Engineer shall be provided on site prior to commencing of earthworks.
(b) Adequate on-site car parking facilities, to the satisfaction of South Dublin County Cou shall be made available for site workers during the course of construction.
REASON: In the interest of the amenity, safety and maintenance of adjoining roads and footpaths.

9. During the construction phase of the development, Best Practicable Means shall be emplo to minimise air blown dust being emitted from the site. This shall include covering skips slack-heaps, netting of scaffolding, daily washing down of pavements or other public are and any other precautions necessary to prevent dust nuisances.
REASON: To contain dust arising from construction/demolition in the interests of public health and to prevent nuisance being caused to occupiers of buildings in the vicinity.

10. No heavy construction equipment/machinery (to include pneumatic drills, construction vehicles, generators, etc.) shall be operated on or adjacent to the construction site before hours on weekdays and 9.00 hours on Saturdays nor after 18.00 hours on weekdays and hours on Saturdays, nor at any time on Sundays, Bank Holidays or Public Holidays. The applicant/developer shall comply with British Standard B.S. 5228 Noise Control on Construction and Open sites and British Standard B.S. 6187 Code of Practice for demoli
REASON: In the interest of public health.

Note 1: The applicant is advised that under the provisions of Section 34(13) of the Plann and Development Act 2000 a person shall not be entitled solely by reason of a permissio carry out any development.

(1) All buildings must be designed and constructed in accordance with the Building Regul 1997.
(2) Building Control Regulations require a Commencement Notice. A copy of the Commencement Notice is attached.
(3) A Fire Safety Certificate must be obtained from the Building Control Authority, where applicable.
(4) Free Standing Walls must be designed and constructed in accordance with IS 325: Co Practice for use of Masonry Part 1 : Structural use of reinforced Masonry. The Owne also ensure that the construction of all walls is supervised by a competent person.

Signed on behalf of South Dublin County Council.

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Make a Planning Application
Exempted Development
Observations - Submissions - Objections
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Enforcement
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Tallaght Town Centre LAP
Strategic Development Zones
Change of Use
Transport Planning
Heritage and Conservation
Guidelines and Legislation
Domestic Extensions
European Projects
Derelict Sites
Vacant Sites

View Application SD07A/1059

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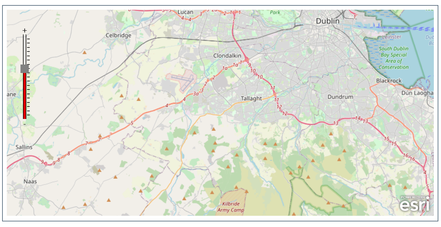
Date Received:	21/12/2007
Last Action:	21/12/2007
Application Type:	Permission
Submission Type:	New Application
Closing Date for Submissions:	Closed
Applicant:	Dasnoc Limited
Location:	'Profile Park', Nangor Road, Ballybane, Dublin 22.
Proposed Development:	Phase 1 of a services and retail centre and will consist of 3 no. office blocks as follows: (1) Block A comprises a five storey office building of 3,019.6 sq.m. gross floor area which fronts onto the Nangor Road and which will accommodate 18 no. own door office units and 1 no. ESB substation; (2) Block B comprises a five storey office building of 2,905.1 sq.m gross floor area which fronts onto the Nangor Road and is located adjacent to the boundary with Grange Castle Golf Course - this block will accommodate 26 no. own door office units; (3) Block C comprises a four storey office building of 2,684.8 sq. m. gross floor area located adjacent to the boundary with Grange Castle Golf Course which will accommodate 24 no. own door office units. The proposed blocks are arranged in a u-shaped configuration around a central landscaped square. Vehicular access to the site is proposed via a left-turning entry and exit slip lane from the Nangor Road and also via the internal Spine Road permitted under application Reg. Ref. SD06A/0568. The proposed development includes 30 no. surface level car parking spaces and one level of underground car parking which will accommodate 200 no. car spaces. The development also includes all ancillary services, landscaping and site works on a site of 1.3163 hectares. This application is being lodged pursuant to application Reg. Ref. SD06A/0568 under which planning permission was granted for the development of roads and services to facilitate the 'Profile Park' Business Park.
Decision Due:	22/02/2008

Decision Details

Decision Date:	22/02/2008
Decision:	GRANT PERMISSION
Final Grant Date:	01/04/2008



Documents

Please note: Most documents are in Adobe Acrobat pdf format which is free to download and install. If you have any problems displaying the document in your browser then right-click the link below and save the file to your computer.

File	Type
Acknowledgement SDCC ack letter	Adobe PDF
Application(Form/Letter)	Adobe PDF
Site Notice	Adobe PDF
Site Location Map	Adobe PDF
Layout/Block Plans x3 existing and proposed	Adobe PDF
Layout/Block Plans x3 existing and proposed	Adobe PDF
Layout/Block Plans x3 existing and proposed	Adobe PDF
Floor Plans x7	Adobe PDF
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Elevations presentation	Adobe PDF
Water/Drainage Drawings x8	Adobe PDF
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Water/Drainage Drawings x8	Adobe PDF
Other Plans/Drawings site visibility	Adobe PDF
Landscape Plans x5	Adobe PDF
Landscape Plans x5	Adobe PDF
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Landscape Plans x5	Adobe PDF
Application(Letter) agents letter	Adobe PDF
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Application(Letter) sch of areas	Adobe PDF
Application(Reports/Spec) signage	Adobe PDF
Application(Reports/Spec) engineering services report x2	Adobe PDF
Application(Reports/Spec) engineering services report x2	Adobe PDF
Application(Reports/Spec) traffic impact x3	Adobe PDF
Application(Reports/Spec) traffic impact x3	Adobe PDF
Application(Reports/Spec) traffic impact x3	Adobe PDF
Site Notice Inspection, Fee Sheet, Validation Forms	Adobe PDF
Manager's Orders grant permission	Adobe PDF
Notification of Decision grant permission	Adobe PDF
Consultee Reports (Internal/External) Roads Dept.	Adobe PDF
Consultee Reports (Internal/External) Envir. Services dept.	Adobe PDF
Consultee Reports (Internal/External) E. H. O.	Adobe PDF
Consultee Reports (Internal/External) Enviro Serv	Adobe PDF
Final Grant	Adobe PDF
Fee Check Sheet	Adobe PDF
Consultee Reports (Internal/External) environmental services	Adobe PDF

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NOTIFICATION TO GRANT PERMISSION
PLANNING & DEVELOPMENT ACT, 2000 AND PLANNING REGULATIONS THEREUNDER

Final Grant Order No.:	**0617**	Date of Final Grant:	**01-Apr-2008**
Decision Order No.:	**0384**	Date of Decision:	**22-Feb-2008**
Register Reference:	**SD07A/1059**	Date:	**21-Dec-2007**

Applicant: Dasnoc Limited

Development: Phase 1 of a services and retail centre and will consist of 3 no. office blocks as follows: (1) Block A comprises a five storey office building of 3,019.6 sq.m. gross floor area which fronts onto the Nangor Road and which will accommodate 18 no. own door office units and 1 no. ESB substation; (2) Block B comprises a five storey office building of 2,905.1 sq.m gross floor area which fronts onto the Nangor Road and is located adjacent to the boundary with Grange Castle Golf Course - this block will accommodate 26 no. own door office units; (3) Block C comprises a four storey office building of 2,684.8 sq. m. gross floor area located adjacent to the boundary with Grange Castle Golf Course which will accommodate 24 no. own door office units. The proposed blocks are arranged in a u-shaped configuration around a central landscaped square. Vehicular access to the site is proposed via a left-turning entry and exit slip lane from the Nangor Road and also via the internal Spine Road permitted under application Reg. Ref. SD06A/0568. The proposed development includes 30 no. surface level car parking spaces and one level of underground car parking which will accommodate 200 no. car spaces. The development also includes all ancillary services, landscaping and site works on a site of 1.3163 hectares. This application is being lodged pursuant to application Reg. Ref: SD06A/0568 under which planning permission

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Baile Átha Cliath 24.
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Facs: 01-414 9104
For SMS queries text "counter" &
your message *to 086 1731707*

SOUTH DUBLIN COUNTY COUNCIL
COMHAIRLE CONTAE ÁTHA CLIATH THEAS

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Dublin 24.
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Email: *cccounter@sdublincoco.ie*
On-line: www.southdublin.ie

was granted for the development of roads and services to facilitate the 'Profile Park' Business Park.

Location: 'Profile Park', Nangor Road, Ballybane, Dublin 22.

Time extension(s) up to and including
Additional Information Requested/Received 11-Jan-2008 / 24-Jan-2008

A Permission has been granted for the development described above, subject to the following (20) conditions.

Conditions and Reasons:

1. The development shall be carried out in its entirety in accordance with the plans, particulars and specifications lodged with the application, save as may be required by the other conditions attached hereto.
   REASON: To ensure that the development shall be in accordance with the permission, and that effective control be maintained.
2. The proposed left in / left out vehicular access off the Nangor Road shall be omitted. Prior to the commencement of any development on site, the developer of these lands shall submit revised drawings showing this access omitted from the proposal. Vehicular access to the proposed development shall be from the internal Profile Park spine road only, as approved under Planning Register Reference SD06A/0568.
   REASON: In the interests of traffic safety and the proper planning and sustainable development of the area.
3. No intensification of the proposed office uses on site, change of use within the units nor the amalgamation of same, shall take place, without the prior approval of the Planning Authority, or An Bord Pleanala on appeal.
   REASON: In the interests of clarity, and the proper planning and sustainable development of the area.
4. a) The water supply and drainage infrastructure, including the disposal of surface water, shall comply with the technical requirements of the Planning Authority.
   b) There shall be complete separation of the foul and surface water drainage systems.
   c) All drainage works for this development shall comply with the Greater Dublin Regional Code of Practice for Drainage Works which can be viewed/downloaded from http://environment.southdublin.ie (click-publications then specifications).
   d) No unit in this development shall be occupied until the foul sewers under Planning Reg. Ref

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SD06A/0568 are fully operational.
e) No unit in this development shall be occupied until the surface water sewers under Planning Reg. Ref SD06A/0568 are fully operational.
f) All surface water runoff from car parking areas shall be routed via a petrol/oil/diesel interceptor before discharging to the surface water sewer.
g) Each unit shall be fitted with South Dublin County Council specification water meter fitted at developer's expense.
h) No unit in this development shall be occupied until the watermains under Planning Reg. Ref SD06A/0568 are fully operational
i) The development shall have its own individual connection to the public watermain and 24 hour storage.
j) The developer shall install stopcock valve, within a boundary box, at the curtilage of the premises (not more than 9'/225mm from boundary wall).
k) Buildings of 3 storeys or more shall require balancing tanks and booster pumps on rising main to top storey units to ensure adequate pressure to top storey units.
REASON: In the interests of public health and in order to ensure adequate drainage provision.

5. Finished floor levels shall be at least 500mm above highest known flood levels.
REASON: In the interests of public health and in order to ensure adequate drainage provision.

6. a) The development shall be landscaped in accordance with a detailed Landscape Plan, which shall be agreed with South Dublin County Council Parks and Landscape Services Department prior to the commencement of the proposed development, and approved in writing by the Planning Authority. This plan shall include detailed specifications relating to paths, drainage, boundary treatment, planting, hard surfaces and street trees planting where necessary. In particular, the landscape plan shall show a strip of continuous planting along the eastern boundary with Grange Castle Golf Course no less than 8 metres in width. Details regarding the type, size, location and number of plants proposed should be clearly indicated on a Planting Plan to accompany the Landscape Master Plan. The developer of these lands shall consult with the Parks and Landscape Services Department prior to the submission of same.
b) The developer of these lands shall submit a certificate of effective completion for the landscape scheme, such certificate to be prepared by the Landscape Architect for the project.
c) Detailed proposals for the future maintenance/management of all landscaped areas shall be submitted for the written agreement of the Planning Authority prior to the commencement of development, in order to ensure proper establishment of proposed planting and grassed areas. Any tree / plant which fails in the first planting season shall be replaced.
REASON: In the interests of visual amenity and the proper planning and sustainable development of the area.

7. a) Details of all proposed external finishes shall be submitted for the agreement of the

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Planning Authority
b) Details (height, material etc) of all walls, fences and other means of enclosure shall be submitted for the agreement of the Planning Authority
REASON: In the interest of the proper planning and sustainable development of the area

8. Prior to the commencement of any development on site, the developer of these lands shall submit and agree revised drawings showing the detailed design of the proposed lightwells to Cores A and B.
REASON: In the interests of visual amenity.

9. a) Any external lighting system shall be designed to minimise potential glare and light spillage.
b) All lighting should be of a type that ensures deflection of lighting downwards.
REASON: To prevent light pollution in the interests of the proper planning and sustainable development of the area.

10. The kerbs at the vehicular entrance shall be dished to the requirements of the Planning Authority at the developer's expense.
REASON: In the interests of the proper planning and development of the area.

11. Sheltered and secure cycle parking facilities shall be provided. Details of bicycle parking facilities for the unit shall be submitted to the Planning Authority for agreement in writing prior to commencement of development.
REASON: To promote sustainable forms of transport and in the interests of permeability and proper planning and sustainable development.

12. Prior to the commencement of the development a street naming and numbering scheme shall be submitted for the written agreement of the Planning Authority that reflects the local and historical context of the approved development, complies with the guidelines on naming and numbering of the Department of the Environment, Heritage and Local Government and preferably makes reference to the use of the Irish language and have regard to the Guidelines issued by the Placenames Commission (An Coimisiún Logainmneachta).
REASON: In the interest of the proper planning and development of the area.

13. Prior to commencement of development, the developer shall submit, and obtain the written agreement of the Planning Authority, a plan containing details for the management of waste (and in particular, recyclable materials) within the development, including the provision of facilities for the storage, separation and collection of the waste and, in particular, recyclable materials, and for the ongoing operation of these facilities.
REASON: To provide for the appropriate management of waste and, in particular recyclable materials, in the interests of protecting the environment and in the interests of the amenities of

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the area.

14. a) No advertising sign(s) or structure(s) shall be erected except those, which are exempted development, without the prior approval of the Planning Authority or An Bord Pleanala on appeal.
b) Any proposed signage shall not be internally illuminated.
REASON: In the interest of visual amenity and the proper planning and development of the area.

15. All requirements of the Environmental Health Officer shall be ascertained prior to the commencement of the proposed development.
REASON: In the interests of public health.

16. During the construction/demolition phase of the development, Best Practicable Means shall be employed to minimise air blown dust being emitted from the site. This shall include covering skips and slack-heaps, netting of scaffolding, daily washing down of pavements or other public areas, and any other precautions necessary to prevent dust nuisances.
REASON: To contain dust arising from construction / demolition in the interests of public health and to prevent nuisance being caused to occupiers of buildings in the vicinty.

17. a) All necessary measures shall be taken by the developer of these lands to prevent the spillage or deposit of clay, rubble or other debris on adjoining roads during the course of the works.
b) All footpaths and roads affected by the development works shall be maintained in a safe and tidy condition.
REASON: In the interest of the amenity, safety and maintenance of adjoining roads and footpaths.

18. The developer of these lands shall comply with British Standard B.S 5228 Noise Control on Construction and Open sites.
REASON: In the interest of public health.

19. The developer shall pay the sum of € 771,796.85(seven hundred and seventy one thousand seven hundred and ninety six euro and eigty five cent) (updated to the appropriate rate at the date of commencement of development in accordance with changes in the Tender Price Index) to South Dublin County Council as a contribution towards expenditure in respect of public infrastructure and facilities benefiting development in the area of the planning authority and that is provided, or that it is intended will be provided, by or on behalf of the County Council as provided for in the Contribution Scheme for the County made by the Council. This

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contribution to be paid before the commencement of development on the site.

REASON: The provision of such facilities will facilitate the proposed development. It is considered reasonable that the payment of a contribution be required, in respect of public infrastructure and facilities benefiting development in the area of the planning authority and that is provided, or that is intended will be provided, by or on behalf of the Local Authority.

20. Before the development is commenced, the developer shall lodge with the South Dublin County Council a cash deposit of € 45, 524.69 (forty five thousand five hundred and twenty four euro and sixty nine cent) (updated to the appropriate rate at the date of commencement of development in accordance with changes in the Tender Price Index) , or a bond of an Insurance Company of € 75,873.07 (seventy five thousand eight hundred and seventy three euro and seven cent) (updated to the appropriate rate at the date of commencement of development in accordance with changes in the Tender Price Index) , or other security to secure the provision and satisfactory completion and maintenance to taking-in-charge standard of roads, footpaths, sewers, watermains, drains, public lighting and other services required in connection with the development.
REASON: To ensure the satisfactory completion of the development.

Note 1: The applicant/developer is advised that under the provisions of Section 34 (13) of the Planning and Development Act 2000 a person shall not be entitled solely by reason of a permission to carry out any development.

(1) All buildings must be designed and constructed in accordance with the Building Regulations 1997.
(2) Building Control Regulations require a Commencement Notice. A copy of the Commencement Notice is attached.
(3) A Fire Safety Certificate must be obtained from the Building Control Authority, where applicable.
(4) Free Standing Walls must be designed and constructed in accordance with IS 325: Code of Practice for use of Masonry Part 1 : Structural use of reinforced Masonry. The Owner must also ensure that the construction of all walls is supervised by a competent person.

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Signed on behalf of South Dublin County Council.

..... Marcin Dolan 02-Apr-2008

for SENIOR EXECUTIVE OFFICER.

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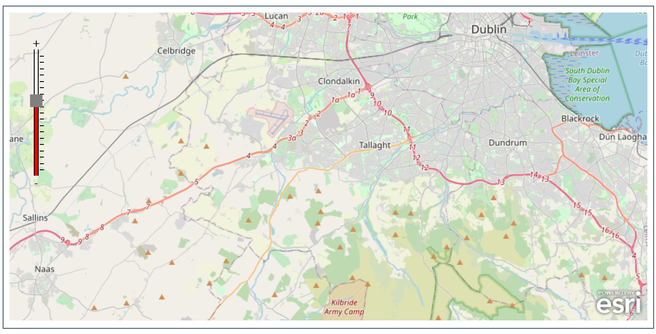
Date Received:	23/07/2012
Last Action:	02/10/2012, Additional Information
Application Type:	Permission
Submission Type:	Additional Information
Closing Date for Submissions:	Closed
Applicant:	Crowe Howarth
Location:	Profile Park, Nangor Road, Clondalkin, Dublin 22
Proposed Development:	Erection of a 2.4m high perimeter fence along Nangor Road boundary (approximately 250m long) with separate entrance gates for vehicular, bicycle and pedestrian access; construction of a single storey security hut with security barriers.
Decision Due:	26/10/2012

Decision Details

Decision Date:	22/10/2012
Decision:	GRANT PERMISSION
Final Grant Date:	N/A



Documents

Please note: Most documents are in Adobe Acrobat pdf format which is free to download and install. If you have any problems displaying the document in your browser then right-click the link below and save the file to your computer.

File	Type
Acknowledgement	Adobe PDF
Application(Form/Letter)	Adobe PDF
Site Notice	Adobe PDF
Site Location Map	Adobe PDF
Plans Elevations & Sections	Adobe PDF
Plans Security Fencing	Adobe PDF
Correspondence Schedule of Documents	Adobe PDF
Fee Check Sheet	Adobe PDF
Consultee Reports (Internal/External) Envir. Services	Adobe PDF
Manager's Orders A.I. requested	Adobe PDF
Notification of Decision A.I. requested	Adobe PDF
Consultee Reports (Internal/External) Roads	Adobe PDF
Further Information Acknowledgemnet Letter	Adobe PDF
Further Information Correspondance from Architect	Adobe PDF
Further Information Method statement	Adobe PDF
Further Information Security Hut elevations & Sections	Adobe PDF
Further Information Security Fencing	Adobe PDF
Further Information Site Location Map	Adobe PDF
Site Notice Inspection, Fee Sheet, Validation Forms	Adobe PDF
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Notification of Decision Re : Grant permission	Adobe PDF
Consultee Reports (Internal/External) Environment	Adobe PDF
Consultee Reports (Internal/External) Roads A. I.	Adobe PDF
Final Grant	Adobe PDF

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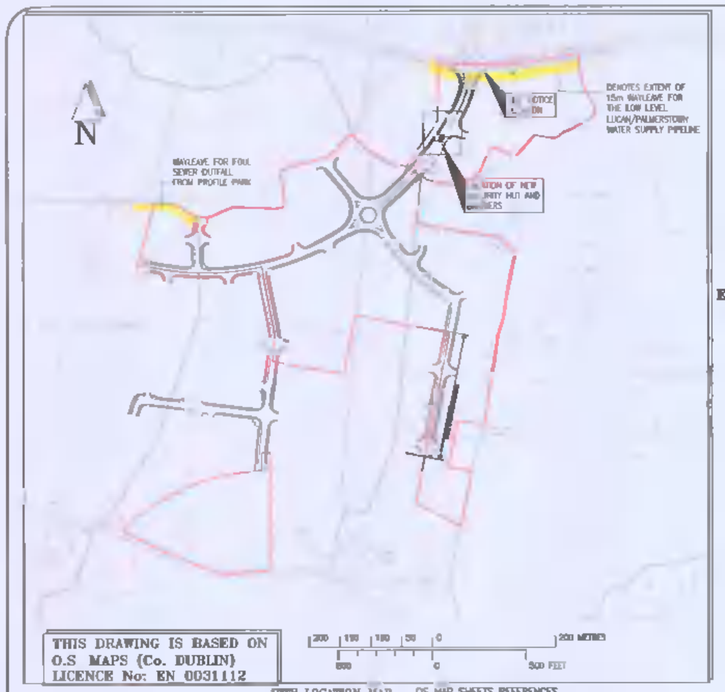

SITE LOCATION MAP
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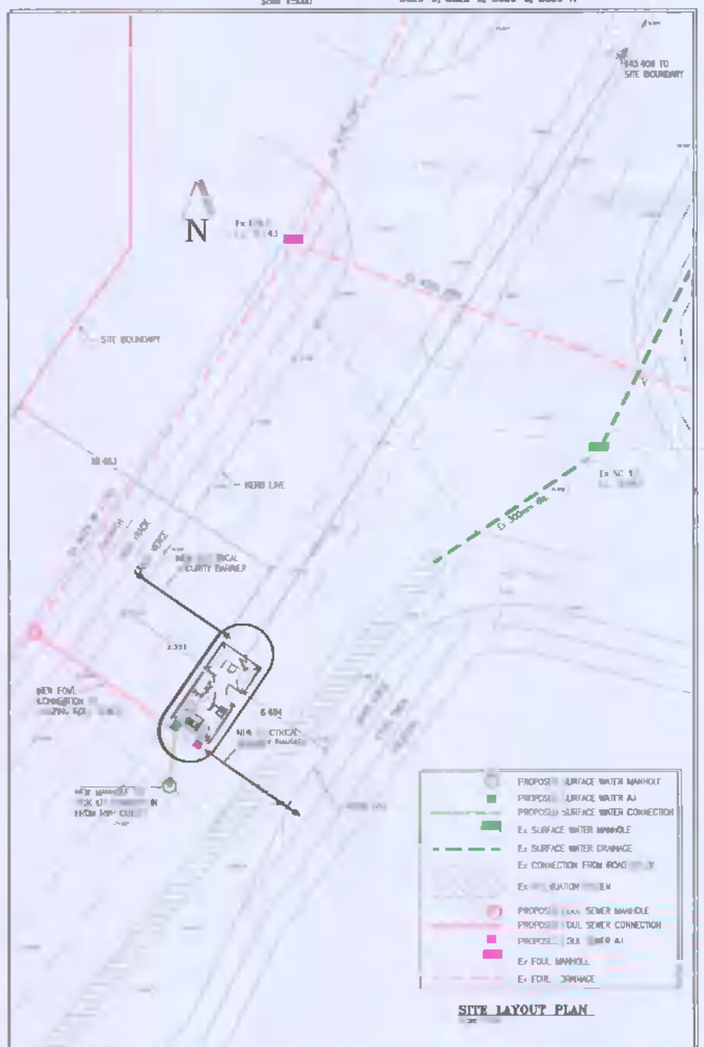
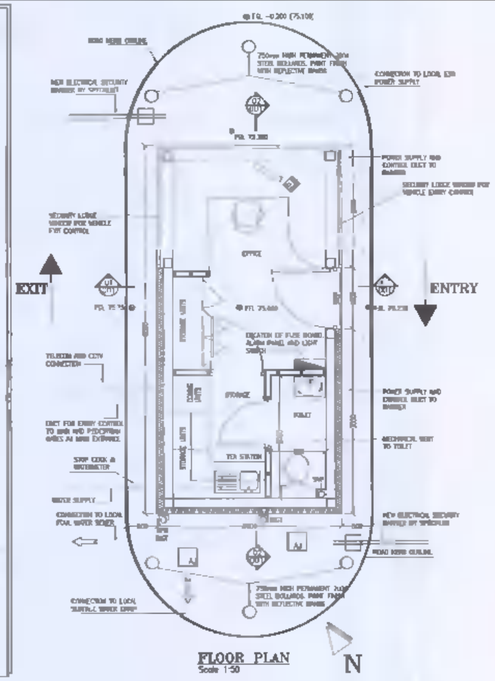
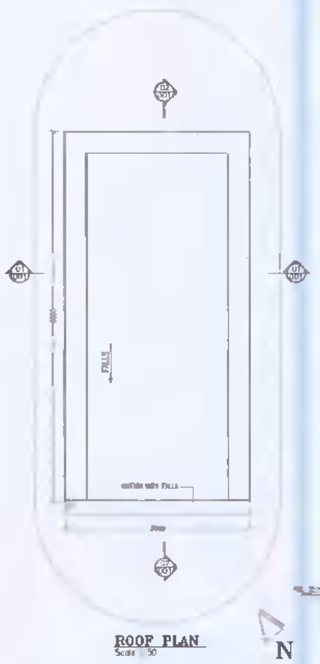
OS MAP SHEETS REFERENCES
3325-D, 3325-B, 3326-C, 3326-A



SITE LAYOUT PLAN



FLOOR PLAN
Scale 1:50



ROOF PLAN
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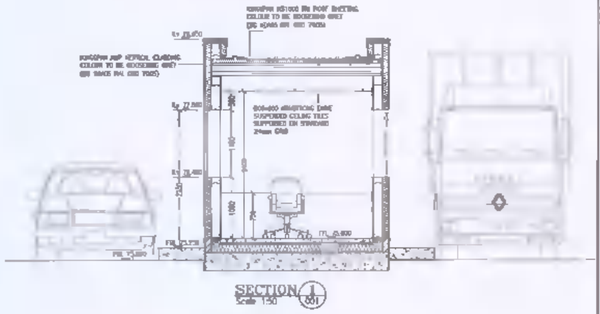

SECTION 1
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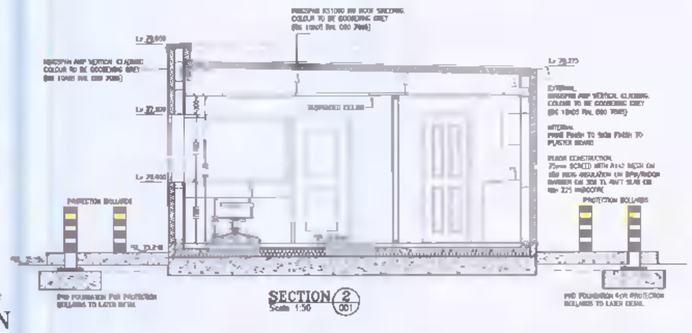


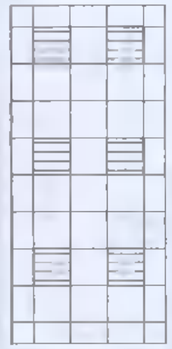
SECTION 2
Scale 1:50

CEILING AREA:
- PAINTED FINISH TO STUD WALL CONSTRUCTION
- 600 SLP FLOOR TILES TO FLOOR SPEC
- PLASTER NEW TOP WITH SINGLE DESK STORAGE CABINETS
- CONTROL PANEL FOR SECURITY BARRIER AND EMERGENCY DOORS
- SECURITY MONITOR WITH CONNECTION TO PANEL CCTV
- TWIN POWER POINTS AT 3 LOCATION TO BE AGREED
- PHONE AND INTERNET POINT (LOCATION TO BE AGREED)

KITCHEN AREA:
- STAINLESS STEEL SINK AND DRAINER C/W WITH TAPS
- CERAMIC SPLASH BACK TILE FINISH TO WALL
- 600 SLP FLOOR TILES TO CLIENT SPEC
- FORMICA WORK TOP WITH HIGH GLOSS FLUSHED CUPBOARDS/UNITS UNDER C/W WITH HANDLES
- HIGH LEVEL WHITE GLOSS LAMINATED CUPBOARDS/UNITS FOR STORAGE
- TWIN POWER POINT

TOILETS AREA:
- PORCELAIN SHOWER HAND WASH BASIN C/W WITH TAPS
- PORCELAIN SHOWER TRAY AND ENCLOSURE C/W WITH SLIDING DOORS
- CERAMIC WALL AND ANTI SLIP FLOOR TILES TO CLIENT SPEC
- EXTRACTOR FAN

CEILING GRID



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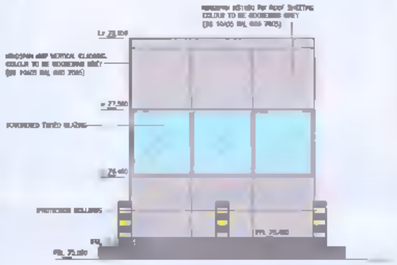

NORTH ELEVATION
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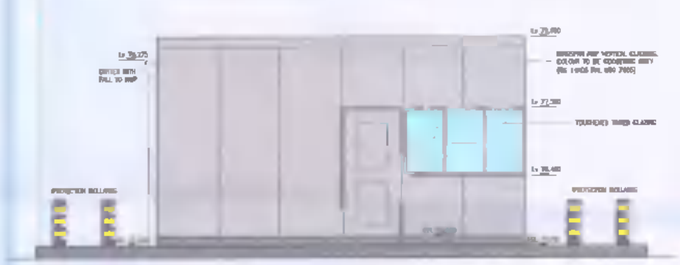
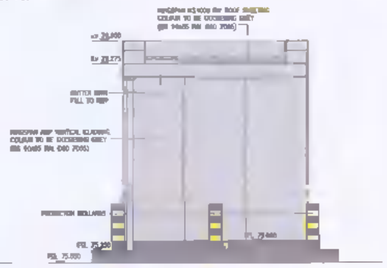


EAST ELEVATION
Scale 1:50



WEST ELEVATION
Scale 1:50



SOUTH ELEVATION
Scale 1:50

NOTES A1

NOTES:-
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING. DIMENSIONS TO BE CHECKED ON SITE.
2. THIS DRAWING TO BE READ IN CONJUCTION WITH ALL OTHER ARCHITECTURAL & ENGINEERING DRAWINGS & ALL OTHER RELEVANT DRAWINGS & SPECIFICATIONS
3. ALL LEVELS RELATE TO O.S. DATUM AT MALIN HEAD UNLESS NOTED OTHERWISE

Rev	Note	Drawn By	Checked By	Date
A	DRAFT PLANNING	KeB	FD	08.05.12
B	CLIENT COMMENTS	KeB	FD	17.05.12
C	PLANNING SUBMISSION	KeB	FD	23.05.12

Status: FOR PLANNING

Client: AIDEN MURPHY, STATUTORY RECEIVER FOR DASNOC LTD

Project: NEW ENTRANCE SECURITY HUT AND BOUNDARY FENCING ALONG NANGOR ROAD

Drg.Title: SECURITY HUT- PLANS ELEVATION AND SECTION

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Tel: 01 8301852 Fax: (01) 8602265
Mail: mail@dfk.ie

Drawn By	Scale
KeB	AS SHOWN
Checked By	Date
FD	08 May '12
Drg.No. 12008/001	Rev. B

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Comhairle Contae
Átha Cliath Theas
South Dublin County Council

Land Use, Economic and Transport Planning Department.
County Hall, Tallaght, Dublin 24.
Telephone: 01 414 9000 : *Fax: 01 414 9104* *Email:* **planning.dept@sdublincoco.ie**

Doherty Finegan Kelly
Botanic Court
30-32, Botanic Road
Glasnevin
Dublin 9

NOTIFICATION TO GRANT PERMISSION
PLANNING & DEVELOPMENT ACT, 2000 (as amended) AND PLANNING REGULATIONS THEREUNDER

Final Grant Order No.:	**1033**	Date of Final Grant:	**03-Dec-2012**
Decision Order No.:	**0922**	Date of Decision:	**22-Oct-2012**
Register Reference:	**SD12A/0150**	Date:	**02-Oct-2012**

Applicant: A. Murphy, Receiver for Dasnoc Ltd., Crowe Howarth
Development: Erection of a 2.4m high perimeter fence along Nangor Road boundary (approximately 250m long) with separate entrance gates for vehicular, bicycle and pedestrian access; construction of a single storey security hut with security barriers.
Location: Profile Park, Nangor Road, Clondalkin, Dublin 22

Time extension(s) up to and including
Additional Information Requested/Received 08-Aug-2012, 11-Sep-2012 / , 02-Oct-2012

A Permission has been granted for the development described above, subject to the following () conditions.

Conditions and Reasons:

1. The development shall be carried out in its entirety in accordance with the plans, particulars and specifications lodged with the application, as amended by Further Information received on 02/10/2012, save as may be required by the other conditions attached hereto.
   REASON: To ensure that the development shall be in accordance with the permission and that effective control be maintained.

2. (a) The water supply and drainage infrastructure, including the disposal of surface water, shall comply with the technical requirements of the Planning Authority.
   (b) There shall be complete separation of the foul and surface water drainage systems.
   (c) All drainage works for this development shall comply with the Greater Dublin Regional Code of Practice for Drainage Works which can be viewed/downloaded from http://environment.southdublin.ie (click-publications then specifications).
   (d) Prior to the commencement of development a method statement for locating and protecting the 700mm public watermain at the site entrance shall be submitted to and approved in writing by the Planning Authority.
   REASON: In the interests of public health and in order to ensure adequate drainage provision.

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Land Use, Economic and Transport Planning Department.
County Hall, Tallaght, Dublin 24.
Telephone: 01 414 9000 : ***Fax: 01 414 9104*** ***Email:*** **planning.dept@sdublincoco.ie**

3. No advertisement signs, advertisement structures, banners, canopies, flags, or other projecting elements shall be displayed or erected on the railings or gates unless authorised by a further grant of planning permission.
   REASON: To protect the visual amenities of the area.
4. All necessary measures shall be taken by the contractor to prevent the spillage or deposit of clay, rubble or other debris on adjoining roads and footpaths during the course of the works.
   REASON: To protect the amenities of the area.

Note 1: The developer is advised that under the provisions of Section 34 (13) of the Planning and Development Act 2000 a person shall not be entitled solely by reason of a permission to carry out any development.

Note 2. The excavation of the proposed trial holes where the new fence crosses over the watermain at the site entrance shall be witnessed by Water Maintenance personnel. Personnel at Deansrath Depot, (Phone 4138500) shall be contacted prior to the excavation of the proposed trial holes in order to arrange for site inspection.

Note 3. A T3 licence shall be secured from South Dublin County Council, Roads Maintenance Department prior to commencement of any works in the public domain, in order to comply with The Roads Act 1993 Section 13 Paragraph 10.

(1) All buildings must be designed and constructed in accordance with the Building Regulations 1997.
(2) Building Control Regulations require a Commencement Notice. A copy of the Commencement Notice is attached.
(3) A Fire Safety Certificate must be obtained from the Building Control Authority, where applicable.
(4) Free Standing Walls must be designed and constructed in accordance with IS 325: Code of Practice for use of Masonry Part 1 : Structural use of reinforced Masonry. The Owner must also ensure that the construction of all walls is supervised by a competent person.

Signed on behalf of South Dublin County Council.

..... 04-Dec-2012
for Senior Planner

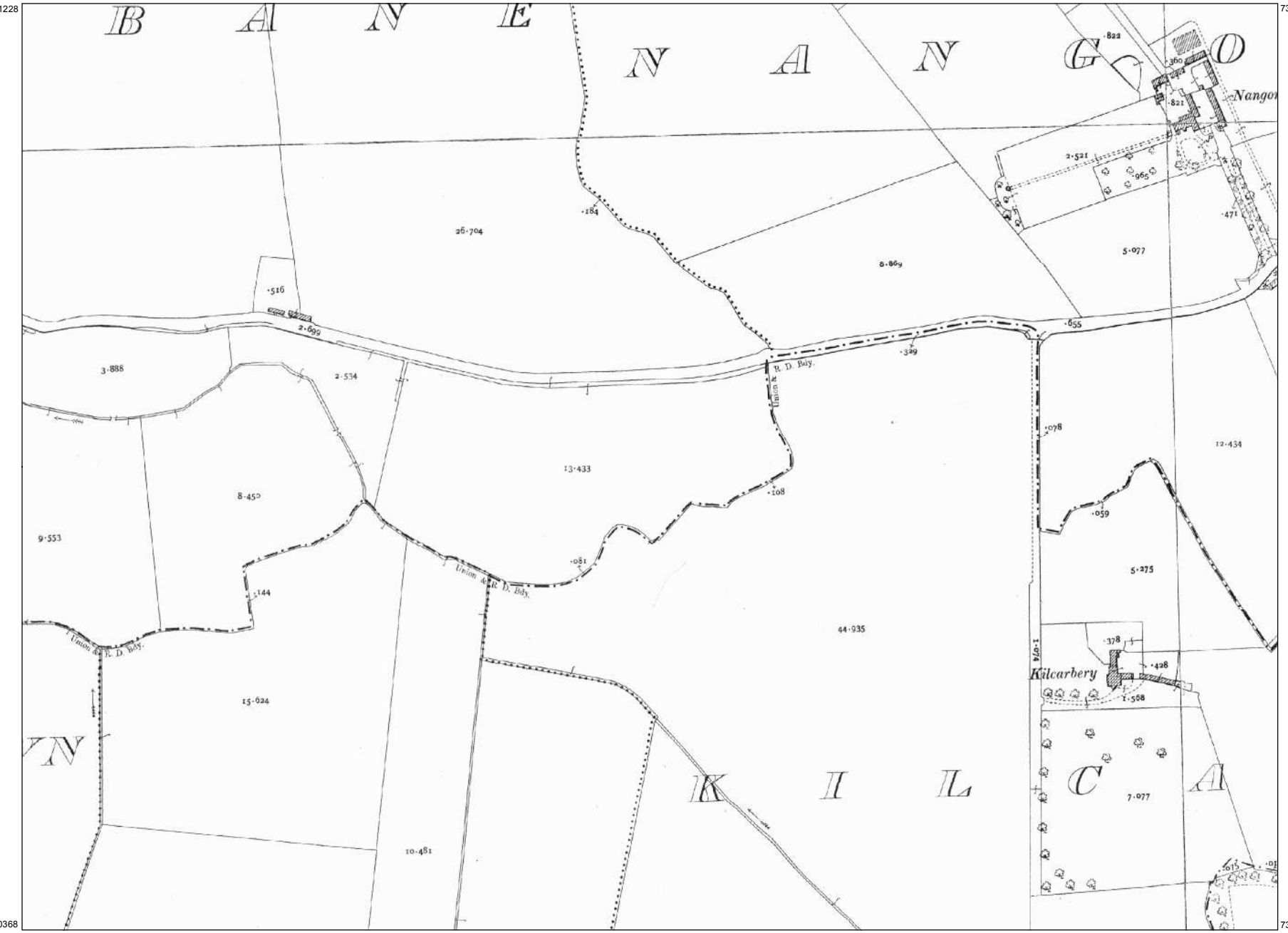
DS Ref	Reg No	Address of Property	Owner	Address of Owner	Occupier	Electoral Area	Section 8(2) Notice Intention to Register	Section 11 Notice Works Required	Section 8(7)Entered on to Register	Valuation	Valuation Date	Levy applied from	Annual value of Levy to date 31/12/19	Annual Value of Levy 2020
1595X	19	Sites at No,3 Ballymount Road Lower, Walkinstown, Dublin 12	Mr. Yung Yiu Ronnie Tang & Miss Sokam Wong	c/o 65 Middle Abbey Street, Dublin 1	Unoccupied	Templeogue Terenure	21/02/2014	14/03/2014	26/06/2014	€300,000	20/03/2020	2016	€15,000	€21,000
1734	20	Capri' Bungalow, Whitechurch Road, Rathfarnham, Dublin 16	Cashwood Poles Ltd	Cashwood Poles Ltd. Ballycrystal, Bunclody, Co. Wexford	Unoccupied	Rathfarnham	03/03/2014	26/01/2015	29/07/2014	€750,000	18/03/2020	2016	€16,500	€52,500
1317A	22	Ballyroan House Lodge, Ballyboden Road, Rathfarnham, Dublin 16	Ballycragh Developments Ltd	4 Inver Mews, Old Chapel Ground, Arklow, Co. Wicklow	Unoccupied	Rathfarnham	14/11/2013	05/02/2013	04/11/2014	€300,000	20/03/2020	2018	€7,500	€21,000
1726	27	38 Russell Crescent, Jobstown, Tallaght, Dublin 24	Sean McGowan	38 Russell Crescent, Jobstown, Tallaght, Dublin 24	Unoccupied	Tallaght South	08/12/2014	21/01/2014	16/02/2015	€70,000	30/03/2016	2018	€2,100	€4,900
1759	30	Land Between New Hall & Deselby, N81 opp Topaz,Tallaght, Dublin 24	David McCreevey & Kevin O'Hare	2 Saggart Lakes, Citywest. Saggart, Co. Dublin & River Lodge, Firhouse, Dublin 24	Unoccupied	Tallaght South	29/05/2015	18/09/2014	26/08/2015	€65,000	14/04/2016	2018	€1,950	€4,550
1701	34	35 Wheatfield Road, Palmerstown, D.20	Della Moynihan	3/4 Ushers Quay, D.8	Unoccupied	Clondalkin	10/06/2016	08/07/2014	15/08/2016	€275,000	24/01/2017	2018	€8,250	€19,250
1783	39	37a Suncroft Park, Tallaght, Dublin 24	Connect Serviced Offices Ltd	Maple House, South County Business Park, Dublin 18, D18 F863	Unoccupied	Tallaght	15/11/2016	12/09/2016	07/12/2016	€100,000	07/02/2017	2018	€3,000	€7,000
1817	40	Lynch's Lane, Newcastle, Co Dublin	Anthony Mc Dermott	36 Cloona Crescent, Dunmurray, Belfast BT17 OHG, Northern Ireland	Unoccupied	Clondalkin	30/11/2016	16/09/2016	02/02/2017	€160,000	20/07/2017	2018	€4,800	€11,200
1825	45	61 Swiftbrook Park, Tallaght, Dublin 24	Permanent TSB	56-59 St Stephen's Green, Dublin 2	Unoccupied	Tallaght South	29/03/2017	n/a to date	16/03/2018	€180,000	16/10/2018	2019	€5,400	€12,600
1865	48	Chetwynd's Cottage, Greenhills Road, Dublin 12	Walkinstown Capital Development Ltd	29, Fitzwilliam Place, Dublin 2 D02Y Y38	Unoccupied	Templeogue Terenure	11/12/2018	n/a	27/02/2019	€290,000	01/11/2019	2020	------	€20,300

Register No.	Address of Property	Folio Reference	Owner	Address of Owner	Address of Owner	Date Site Entered onto Register	Valuation €	Date Valuation Entered onto Register
SD/VS304	Junction of Hazelhatch Road and Newcastle Main Street, Newcastle, Co. Dublin (Formerly McEvoys Pub)	DN4316N	Ms.Aislinn Van Lonkhuyzen	Moate Lodge,	Newcastle, Co. Dublin	19th May 2017	€270,000	11 October 2018
SD/VS157	Site located at Alymer Heath; accessed off Alymer Green and Alymer Grove, Newcastle, Co. Dublin	DN193101F	Dunkirk Properties Limited	62 Hayfield,	Maynooth, Co. Kildare	11th August 2017	€2,750,000	11 October 2018
SD/VS64	Lands at the junction of Grange Road, Nutgrove Avenue and Loreto College, Rathfarnham, Dublin 14	Memorial No. 2006-119-203	Mr. Karl Reid	39 Waterloo Road	Ballsbridge, Dublin 4	15th March 2018	€2,000,000	12 December 2018
			Mr. Stuart Reid	39 Waterloo Road	Ballsbridge, Dublin 4			
SD/VS367	Blessington Road, Tallaght, Dublin 24	DN187625F	Mr Kevin O'Hare	River Lodge,	Firhouse Road, Dublin 24	15th March 2018	€180,000	12 December 2018
			Mr. David McCreevy	2 Saggart Lawns,	Citywest, Saggart			
SD/VS079	Site located along Peamount Road, Newcastlem, Co. Dublin	DN13077N	Swords and Fitzgerald Ltd	c/o Conway, Conway & Co, 11 Basin Street,	Naas, Co. Kildare, W91 X290	18th December 2018	€175,000	16 October 2019
SD/VS248	Site at junction of Main Street & Boherboy, Saggart, Co. Dublin	DN11211F DN2357F	Maxol Ltd	3 Custom House Plaza,	4th Floor, IFSC, Dublin 1.	18th December 2018	€1,400,000	16 October 2019
			Thomas McMullan	3 Custom House Plaza,	4th Floor, IFSC, Dublin 1.			

Register No.	Address of Property	Folio Reference	Owner	Address of Owner	Address of Owner	Date Site Entered onto Register	Valuation €	Date Valuation Entered onto Register
SD/VS315	Ardeevin Avenue, Lucan, Co. Dublin	DN199741F	Phoenix Croft Ltd	Gardenia,	Tandy's Lane, Lucan, Co. Dublin	18th December 2018	€1,600,000	16 October 2019
SD/VS365	Site located at Mill Road, Saggart, Co. Dublin	DN10805	Jackie Cosgrave	The Sheldon Park Hotel,	Kylemore Road, Dublin 12.	18th December 2018	€1,800,000	16 October 2019
SD/VS216	Site located at the junction of the Belgard Road and Blessington Road, Belgard Square East, Tallaght, Dublin 24.	DN216605F DN92077F	SDI (Tallaght) Limited	c/o Heatons, IDA Business Park,	Whitestown Road, Tallaght, Dublin 24, D24 E932.	5th July 2019	€4,750,000	16 October 2019
SD/VS368	Site located at Mill Bridge, Saggart, County Dublin	DN7185F	Crekav Trading GP Limited	Heritage House,	23 St. Stephen's Green, Dublin 2.	5th July 2019	€5,900,000	16 October 2019
SD/VS370	Site at Parson's Court bounded by Burgage Green to the west, Newcastle, Co. Dublin	DN8033	Vincent Buggy	12 The Crescent,	Temple Manor, Celbridge, Co. Kildare.	5th July 2019	€220,000	18 December 2019
			Dermot P Coyne	Ards, Westmanstown,	Lucan, County Dublin.	5th July 2019		
SD/VS097	Site at junction of Nangor Road and Fonthill Road, Clondalkin, Dublin 22	DN4922 DN6259F	South Dublin County Council	County Hall,	Tallaght, Dublin 24. D24 YNN5	16th October 2019	€1,800,000	18 December 2019
SD/VS098	Site located off the Bawnogue Road, adjacent to 151 & 208 Alpine Heights, Dublin 22	DN18643	South Dublin County Council	County Hall,	Tallaght, Dublin 24. D24 YNN5	16th October 2019	€500,000	18 December 2019

Appendix E – Historical Mapping

1st Edition 25 Inch Historic Map



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0 50 100 150 200 metres

0 100 200 300 400 500 Feet

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PUBLISHED: 18/11/2020

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Aerial Imagery Map

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730372 730372

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731232 731232



730372 730372

703398 704563

0 50 100 150 200 metres

0 100 200 300 400 500 Feet

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Appendix F – Third Party Reports

PLANNING AND DEVELOPMENT ACT, 2000,
PLANNING & DEVELOPMENT (AMENDMENT) ACT, 2002
EUROPEAN COMMUNITIES (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 1989 TO 1999,
PLANNING AND DEVELOPMENT REGULATIONS, 2001 & 2002

South Dublin County Council
Planning Department - Registry

05. JUL 2006 SD06A 0568

Date Received	Register Reference

Planning permission is sought by Dasnoc Limited for development consisting of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Ballybane, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

ENVIRONMENTAL IMPACT STATEMENT

Prepared for

DASNOC LIMITED

By

RPS Planning & Environment

Ordnance Survey Licence No. SU 0001006

July 2006

PROFILE PARK – ROADS AND SERVICES APPLICATION
ENVIRONMENTAL IMPACT STATEMENT
STRUCTURE AND CONTENTS

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1.0 INTRODUCTION

1.1 NATURE AND EXTENT OF PROPOSED DEVELOPMENT

Planning permission is sought by Dasnoc Limited for development consisting of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

This business park forms part of a larger overall area of approximately 200 acres for which a Masterplan has already been prepared in line with the requirements of the South Dublin County Development Plan 2004-2010 (See figure 1.1).

1.2 REASON FOR THIS ENVIRONMENTAL IMPACT STATEMENT

The roads and services development which is the subject of this planning application is sub-threshold in terms of the requirement to carry out an Environmental Impact Assessment. Notwithstanding this, these roads and services will facilitate a business park development of 39.84 hectares and in this regard, it is a requirement under Schedule 5, Part 2, 10 (a) of the Planning and Development Regulations 2001, that infrastructure projects consisting of industrial estate development projects, where the area would exceed 15 hectares, require the undertaking of an Environmental Impact Assessment. Thus having carried out a scoping exercise at the outset of the project it was decided that an Environmental Impact Assessment of the proposed roads and services development should be undertaken in light of the size of the overall development of which the current application forms part, and in light of the potential for significant or cumulative environmental impacts.

1.3 EIS STRUCTURE AND CONTENT

The information contained in this EIS has been completed in accordance with the relevant provisions set out in Article 94 of the Planning and Development Regulations, and detailed in Schedule 6 as follows:

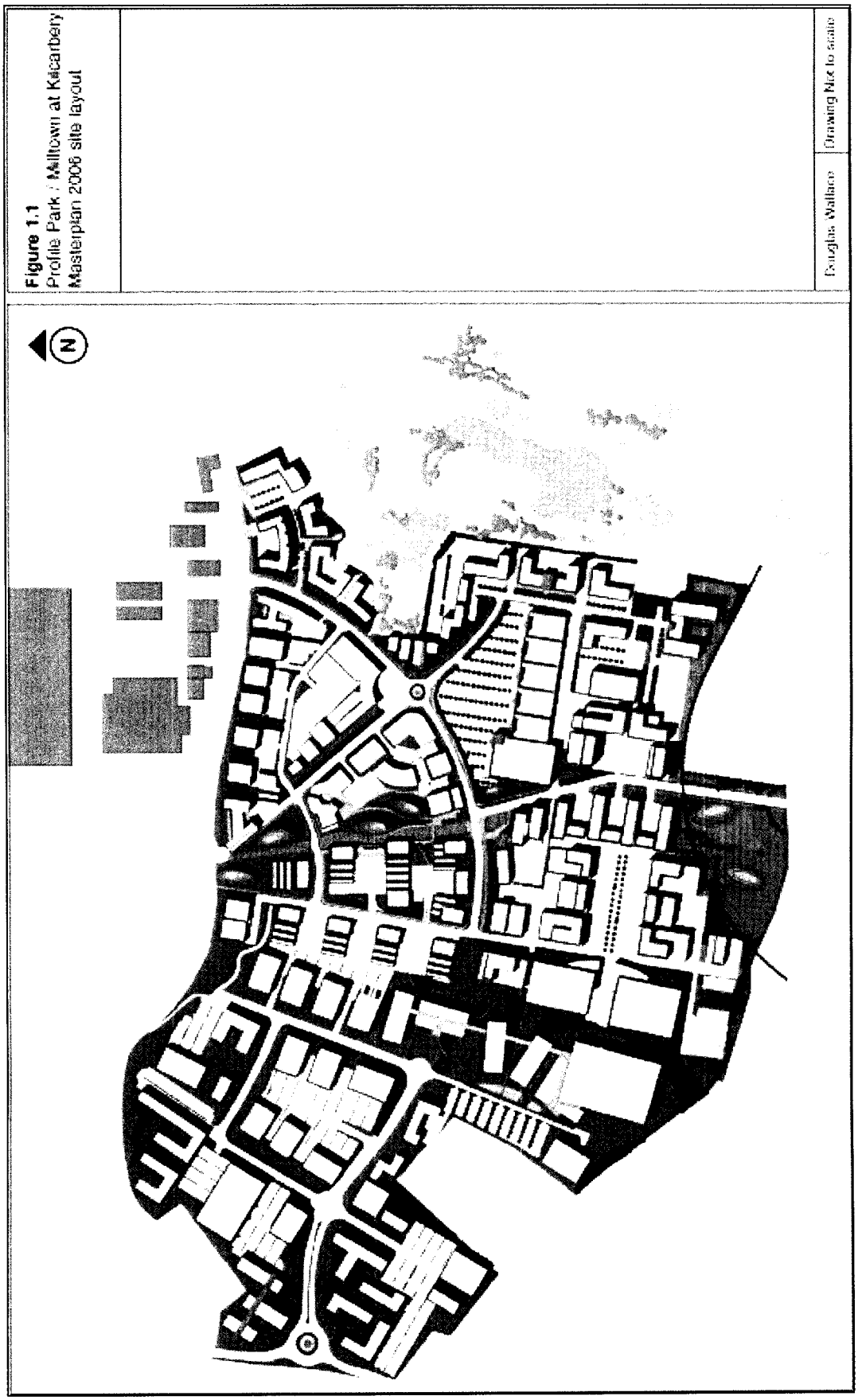
1. (a) A description of the proposed development comprising information on the site, design and size of the proposed development.

(b) A description of the measures envisaged in order to avoid, reduce and if possible, remedy significant adverse effects.

(c) The data required to identify and assess the main effects which the proposed development is likely to have on the environment.

(d) An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment.

Figure 1.1: Profile Park/Milltown at Kilcarbery Masterplan 2006 – Site layout



2. Further information by way of explanation or amplification of the information referred to in paragraph 1, on the following matters:

(a)(i) a description of the physical characteristics of the whole proposed development and the land-use requirements during the constructional and operational phase;

(ii) a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;

(iii) an estimate, by type and quantity, of expected residues and emissions (including water, air, and soil pollution, noise, vibration, light, heat and radiation) resulting from the operation of the proposed development;

(b) a description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular:

- human beings, fauna and flora
- soil, water, air, climatic factors and the landscape
- material assets, including the architectural and archaeological heritage and the cultural heritage.
- The inter-relationship between the above factors;

(c) a description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from:

- the existence of the proposed development,
- the use of natural resources,
- the emission of pollutants, the creation of nuisances and the elimination of waste,

and a description of the forecasting methods used to assess the effects on the environment;

(d) an indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.

The preparation of an EIS requires the co-ordination and synthesis of associated yet diverse elements of the overall assessment. To facilitate this process, a schematic structure was used in order to provide a coherent documentation of the varied aspects of the environment considered. Specifically, this Environmental Impact Statement follows the "grouped format structure" as referred to in Section 1.7.2 of the EPA document – "*Guidelines on the Information to be contained in Environmental Impact Statements*". The grouped format structure used for the purposes of this EIS is detailed below.

(1) The Receiving Environment (Baseline Situation)

This section contains a description of the existing environment in which the proposed development is located. The particular aspects of the environment are discussed in terms of their context, character, significance and sensitivity.

(2) The Characteristics of the Proposal

This section provides a projection of the specific "load" on the particular aspects of the environment, specific to a particular topic, which the proposal would be likely to generate. This includes a summary of the principal aspects of the scheme that have the potential to impact on the environment.

(3) The Potential Impact of the Proposal

This section comprises a general description of the possible types of impacts which proposals of this kind would be likely to produce. This includes a consideration of the "Do Nothing" scenario which describes the environment as it would be in the future if there was no development.

(4) Remedial or Reductive Measures

This section contains a description of any specific remedial or reductive measures considered necessary and practicable resulting from the assessment of potential impacts described in (3) above.

(5) The Predicted Impact of the Proposal

(a) An assessment of the specific direct and indirect impacts of the proposal arrived at by adding to the receiving environment (as in (1) above), the loading of the proposal (as in (2) above) and the remedial or reductive measures (as in (4) above) is provided. The predicted impacts are discussed having regard to their character, magnitude, duration, consequences and significance.

(b) This includes a consideration of a "Worst Case" scenario which would arise where a development, or its mitigation measures, substantially fails.

(6) Monitoring

A description of any post development monitoring of effects on the environment which might be necessary, covering the monitoring methods, and the Agencies responsible for their implementation is provided in this sub-section.

(7) Reinstatement

Where required, a description of reinstatement measures and the Agencies responsible for their implementation is provided.

This EIS has also been prepared having regard to the "*Guidelines on the Information to be contained in Environmental Impact Statements*" and also "*Advice Notes on Current Practice in the preparation of Environmental Impact Statements*", which were published by the Environmental Protection Agency in 2002 and 2003 respectively.

1.4 EIS STUDY TEAM

This EIS was prepared by a study team led by RPS Planning and Environment, who were responsible for the overall management and co-ordination of the study. RPS Planning and Environment were also responsible for the preparation of various sections of the EIS including the introduction, the non-technical summary, the description of the proposed development, the planning and development context and the sections in relation to human beings and interactions. The members of the study team and their respective inputs into this EIS are outlined in Table 1.1 below.

Table 1.1 – EIS Study Team

EIS Consultant	EIS Section
RPS Planning and Environment	• Introduction • Non technical summary • Description of Proposed Development • Planning and Development Context • Human Beings • Interactions
Scott Cawley	• Flora and Fauna
White Young Green	• Soils, Geology and Hydrogeology including Waste
Doherty Finnegan Kelly Consulting Engineers	• Water – including water supply, surface water and foul sewerage
Roughan O'Donovan Consulting Engineers	• Traffic
RPS Consulting Engineers	• Air – including noise and vibration • Climate – air quality
Murray and Associates	• Landscape and Visual Appraisal
Byrne Mullins	• Archaeology • Architectural Heritage • Cultural Heritage

2.0 NON-TECHNICAL SUMMARY

2.1 INTRODUCTION

This non-technical summary follows the format outlined in Articles 2 and 3 of the Second Schedule of the European Communities (Environmental Impact Assessment), Regulations 1989 (S.I. No. 349 of 1989), as amended by the European Communities (Environmental Impact Assessment) Regulations, 1999 and the Planning & Development Regulations, 2001.

This Environmental Impact Statement has also been prepared having regard to the "*Guidelines on the Information to be contained in Environmental Impact Statements*" and also "*Advice Notes on Current Practice in the preparation of Environmental Impact Statements*" both of which were prepared by the Environmental Protection Agency and published in 2002 and 2003 respectively.

2.2 DESCRIPTION OF THE SUBJECT SITE

The site to which this EIS relate is located in the central western area of County Dublin, to the north of Baldonnell (Military) Aerodrome and approximately 2.5km to the west of Clondalkin village. The site is bound to the north by the R134 (the Nangor or Clondalkin-Milltown Road), the Grange Castle Business Park and Kilcarbery Business Park and to the south by a minor road which runs from the R134 to the N7, and Baldonnell Aerodrome. The eastern edge of the subject lands is bordered by Grange Castle Golf Club. The lands to the west are currently in agricultural use. The subject site itself consists of vacant agricultural fields which collectively comprise an area of 39.84 hectares.

2.3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The development which is the subject of this planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park on the subject site, which will be known as 'Profile Park'. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

2.4 ALTERNATIVES CONSIDERED

The subject site is zoned for enterprise, employment and relates uses under the South Dublin Development Plan 2004-2010, thus the consideration of alternative sites to accommodate the proposed development was not deemed necessary in this instance.

The undertaking of a scoping exercise in the preparation of the Masterplan for the subject lands allowed an examination of alternative land uses on the site to be undertaken and a final masterplanning approach to be decided upon.

The consideration of alternative road layouts on the subject site reflects the constraints of the site itself, the requirements of the Roads Department of South

Dublin County Council and inputs received from the other EIS specialists with regard to potential impacts arising from the proposed development.

2.5 ASPECTS OF THE ENVIRONMENT CONSIDERED

Human Beings

The results of the 2002 Census of Population were used to establish the baseline environment of the site and it surroundings with regard to population, employment and community aspects.

Flora and Fauna

A constraints assessment was carried out on 3rd November 2005 followed by a more detailed site survey on 31st March 2006. Bat foraging surveys were undertaken on 1st May 2006. These surveys allowed an assessment of the ecological status of the site, identification of any ecological constraints, and an assessment of any likely significant impacts of the proposed development on the ecology of the site and its surroundings. During the site visits a detailed account of the floral and faunal composition encountered during the survey was recorded.

Soils, Geology and Hydrogeology (including waste)

A desktop study, site walkover and trial pit investigations were undertaken in order to determine the nature of the existing soils and geology of the site and to assess the impact of construction and operation of the proposed development at the site on the underlying soils and geology. Information relating to the hydrogeological setting at the site was derived from trial pit information and a desk-based study using the Geological Survey of Ireland (GSI) database.

Water

The effects of the development on water was examined under three headings – Surface Water Drainage, Water Supply and Foul Drainage.

Surface water run-off from all individual sites within the business park will be attenuated within the curtilage of each site and that the surface water run-off from the estate roads etc. will be attenuated before discharge to the Griffeen River, the attenuated water being stored in oversized pipes.

Water Supply to the site will be provided from the 700mm diameter trunk main (the Low Level Lucan/Palmerstown Water Supply Scheme) which passes across the northern edge of the site. This watermain is connected to the Belgard reservoir and has sufficient pressure to service this development.

With regard to Foul Drainage, the effluent from this site will be discharged to a pumping station within Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend. All wastewater from the area is treated at the Ringsend Wastewater Treatment Plan (WWTP), which has the capacity to treat a population equivalent of 1.7 million.

Air

Six sample locations were chosen to represent the baseline air quality in the vicinity of the proposed development. As a result of existing site conditions and the potential for traffic derived pollution, the following parameters were measured: nitrogen dioxide (NO_2), sulphur dioxide (SO_2), Benzene, Carbon monoxide (CO) and Particulate Matter PM_{10}. Information regarding the climate at the location of the subject site was obtained from meteorological data from the nearest meteorological station at Baldonnell Aerodrome.

Noise

A baseline noise survey was carried out on the 29th and 30th of March 2006 at four noise sensitive locations in the area of the proposed development. Measurements were made for a period of 15 minutes during the survey. All measurements were carried out in accordance with ISO 1996: '*Acoustics-Description and Measurement of Environmental Noise*'.

Landscape and Visual Assessment

An assessment of the impact of the proposed development on the visual character of the site was undertaken. The methodology employed included a site survey to determine the character of the site and its surrounding area, an assessment of the proposed development using layout plans and sections to determine the impacting features and evaluating the impacts on the landscape in accordance with EPA guidelines.

Traffic and Transportation

The transportation impact of the proposed development was assessed using widely acceptable methods including the T.R.I.C.S. database, which is widely used for trip estimation in Ireland. Consideration was given to access to/from and within the site for all users (cars, pedestrians, cyclists and public transport users). The parking requirements on the site were considered with reference to the South Dublin Development Plan 2004-2010.

Cultural Heritage

The cultural heritage of the area of the proposed development was examined through an archaeological, architectural and historical study. The archaeological and architectural studies involved a documentary/cartographic search and field inspection of the area, while the historical study involved a documentary search.

2.6 LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS AND THE MEASURES ENVISAGED TO AVOID, REDUCE OR REMEDY THEM.

The proposed development was assessed under various environmental headings. The likely predicted impacts of the development on each of these environmental aspects are outlined below.

Human Beings

Population

The development which is the subject of this planning application and the development of the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their construction and operational phases. Thus no remedial measures are required in this regard.

Employment

The construction and operation of the roads and services which are the subject of this planning application will not have a significant impact on employment levels having regard to the nature and scale of the development proposed.

The development of the remainder of the business park has the potential to have a temporary positive impact on employment levels in the locality. In addition, it is estimated that the operational phase of the business park has the potential to increase the workforce of the area by some where in the range of 5,000 - 10,000 persons.

As the impacts on employment levels are expected to be either insignificant or positive, no remedial measures are proposed in this regard.

Community Aspects

There will be no significant negative impact on the resident, working or visiting community at this location during the construction phase of the proposed development. Some short-term localised impacts may be experienced by the adjoining residential units as a result of noise during construction and increased traffic levels. The hours of operation of construction machinery on the subject site will be limited in order to limit any such potential impacts. A construction management plan will also be prepared where construction traffic will be programmed to avoid peak traffic conditions on the surrounding road network. Thus these impacts are not predicted to be significant.

There will be no significant impacts on the resident, working or visiting community at this location during the operational phase of the proposed development thus no mitigation measures are required in this regard.

Some potential adverse localised impacts may be expected to occur during the construction phase of the business park. Many of these would be of a nuisance nature such as an increase in daytime noise levels in the locality. Construction traffic has the potential to pose impacts to the neighbourhood community depending on its frequency, overall numbers and routing. In order to limit any potential short-term noise impact on adjacent residential properties during the construction phase of the business park, the hours of operation of construction machinery on the subject site will be limited. As stated previously a construction management plan will also be prepared in order that construction traffic avoids peak conditions on the surrounding road network.

Potential impacts that may arise during the operational phase of the business park include increased traffic levels, both pedestrian and vehicular in the area, impacts on the existing natural landscape, increased employment opportunities in the area and impact on local services and commercial facilities.

Mitigation measures proposed in this regard include the planting of the boundaries of the subject site with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings. In addition, the heights of any buildings proposed will be reduced adjacent to existing housing at the site boundaries in order to reduce the visual bulk of the buildings. A mobility management plan will also be implemented to reduce the reliance on private car usage.

Flora and Fauna

Replanting or relocation of hedgerows will compensate the loss of hedgerow habitat during the construction phase so that there is no net loss of hedgerow habitat. The ecological functions of the hedgerow will be diminished, as the disturbance of habitats will push otters, badgers and bats away from the site. The residual impacts of this disturbance are likely to be temporary but monitoring of bat, badger and otter activity will help to determine the level of impact prior to any further development of the site. Careful control of the construction works will reduce any potential indirect construction related impacts on off-site areas.

It is not anticipated that there will be any significant impacts to flora and fauna during the operational phase of the proposed development. In order to identify any unforeseen effects during construction and operation of the proposed development, the following mitigation measures are proposed: water quality monitoring of any off-site discharges, monitoring of use of wildlife underpasses, monitoring for otter, bat and badger activity and annual monitoring of condition of planted or relocated hedgerow vegetation.

Soils, Geology and Hydrogeology (including waste)

The soils present across much of the site are of good quality. There were isolated elevated concentrations of lead, diesel range organics, and mineral oil in the leachate analyses at 2 of the 29 trial pit locations. These are not considered to be significant due to the localised extent of the contamination and can easily be resolved by removal of the source material to a licensed facility for disposal.

The area of the site that has received waste in the past comprises mainly inert fill material. While the concentrations of metals were higher in this area they do not pose a risk to the environment or to human health. The presence of wood material within this area may lead to methane generation. Removal of the main area of the wood source would be required in order to reduce further gas generation.

The development of the roads and services infrastructure which is the subject of the current planning application and the associated development of "Profile Park" will involve the disturbance and the removal of soils from the site. This will be mitigated against by keeping earth movements to a minimum. This will result in no residual impacts on the environment.

The removal of the two localised areas containing wood and hydrocarbon compounds will improve the conditions of the site prior to development.

Depending on the specific industries which locate within the business park, some monitoring of groundwater quality may be required.

Water

As noted in Section 2.5, the effects of the development on water are examined under three headings – Surface Water Drainage, Water Supply and Foul Drainage.

Surface Water

With regard to surface water drainage, during the construction phase, there is potential for some silt loads to enter the existing watercourses during rainy periods.

Silltation and groundwater control ponds and underground structures will be utilised at construction stage in order to minimise any potential impact, as well as oil interceptors and post-construction re-instatement. If these measures are put in place, minimal effect is anticipated on stream flows downstream of the subject development.

During the operational phase of the development, due to the increase in the hard surface area, there will be an increase in surface water run-off from the subject lands. Oil spillages are also a possibility.

However, due to the implementation of attenuation measures and petrol interceptors, there should be no appreciable impact on surface water volumes from the proposed development.

Water Supply

The water supply for this proposed development has been designed to cater for the entire Masterplan development. Potential impacts on the existing watermain include construction stage impacts when installing new pipelines and additional demand on the local water supply. During the operational phase, the development will result in an increase in the water demand on the existing watermain network.

In order to limit the possibility of unclean pipework and to limit the likelihood of leaks, all connections to the existing network will be carried out under Local Authority supervision. During the operational phase water usage will be monitored by water meters. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

The impact on water supply during the construction phase will be minimised due to the remedial measures put in place. During the operational phase the development will cause an increase in water usage. However, there is adequate capacity available with the existing network for the Masterplan development.

Foul Drainage

Due to the nature of the proposed development on site, the effluent to be discharged from the site will generally be domestic standard wastewater.

During the construction phase, the significant numbers of workers on the overall subject lands will lead to the generation of foul sewage associated with temporary showers, toilets, canteen and washing facilities. There is also the

possibility of debris and building rubble falling into the existing sewer, as well as health and safety issues resulting from working in close proximity to a live foul sewer. The construction of the sewer network could result in the discharge of silt to existing watercourses.

During the operational phase, there will be an increase in the hydraulic loading within the existing sewer network and a reduction in the capacities of the existing sewer system and there is a possibility of untreated effluent discharging to the water table if pipes are broken or not laid properly during construction.

A number of remedial measures will be put in place in order to minimise potential impacts on the existing sewer system. Temporary, chemical or waterborne facilities will be provided by contractors for the duration of the construction phase.

Siltation and groundwater control ponds and underground structures will be utilised during the construction of the sewer network in order to minimise the potential of silt discharging to water courses.

Mitigation measures during the operational phase include the inspection of sewers by C.C.T.V. cameras and testing in accordance with Local Authority requirements, prior to the discharge of foul effluent to the public sewer system.

There will be no significant impacts on the foul drainage network as a result of foul drainage during the construction phases due to the remedial measures being put in place.

During the operational phase, the increase in the quantity of effluent within the Local Authority sewer network will result in a slight impact on this network.

Air

The main environmental nuisance associated with construction activities is dust. However, if the construction contractor adheres to good working practices and dust mitigation measures the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.

A modelling assessment was carried out to determine the potential increase in ambient pollutant concentrations as a result of the traffic volumes onto the current road network. The modelling approach took a number of conservative approaches to the input data to allow a margin of tolerance in the results and ensure a worst-case scenario of predicted results. The results for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality. The existing backgrounds are relatively low and the increased pollution as a result of the evening peaks of traffic from the proposed development is not predicted to lead to breaches of the relevant air quality limits.

With regard to the potential impact of the proposed development on the climate of the environs of the subject site, it is anticipated that once significant consideration is given to the environmental impact of greenhouse gas emissions at the design stage and that heating and energy systems are operated in accordance with principles of best practice or within consent conditions, the effect of a domestic heating system and energy supply are not considered to be significant. Furthermore the use of natural gas will significantly reduce the

potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Noise

Noise during the operational phase of the development is predicted to be minor with road traffic being the largest contributor. Noise resulting from development related traffic is not predicted to lead to any significant impact at the nearest noise sensitive locations to the proposed site.

With regard to construction activities, all plant items used during the construction phase should comply with standards outlined in 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1998. During the construction phase the following noise control measures are proposed: (i) selection of plant with low inherent potential for generation of noise and/or vibration (ii) siting of plant away from sensitive noise receptors where possible (iii) erection of temporary screens around noisy items of plant where possible and/or at the site boundary (iv) erection of temporary screens around noisy items of plant and around the site perimeter.

Predicted noise levels for the construction phase of the development are within recommended limits. The Local Authority will set down permissible construction times. Hence the noise and vibration impact of this phase of the development should be kept to a minimum.

Landscape and Visual Assessment

The removal of existing hedgerows and trees from the interior of the site in the initial stages of construction will result in a slight, permanent landscape impact. However, following additional planting on the site the overall effect on landscape vegetation will be positive.

In the operational stage the landscape measures and planting proposed on the site will mature changing the landscape character from agricultural to infrastructural/commercial. Additional distinct landscape features such as water features, tree and shrub plantings, sculptures etc, will have a positive impact on the landscape amenity value of the site and the overall amount of significant tree cover will be increased.

The subject site is not particularly visible in the wider landscape area and consequently, the effects on views during the construction phase will be generally slight.

During the operational phase, the effect on views from dwellings along the Nangor Road will be moderately negative, as views of the Dublin Mountains from these dwellings will be partially blocked. Views from Kilbride House to the north will have a moderate negative impact due to a reduction in the visual quality of the landscape.

With regard to views from within the site, the proposed development will generate a moderate change to the character of the existing views during its operational phase. New landscape features will create a distinct, visually interesting landscape setting. However, removal of the agricultural landscape will result in a slight negative impact overall.

The impact on views of the site from Grange Castle Golf Course is predicted to be slight as the proposed development will be screened from the course.

During the construction phase, all mature trees, hedgerows and bushes to be retained should be appropriately fenced for protection. The landscape works during the construction stage will entail the monitoring of the topsoil stripping and the establishment of the main structural planting on the street areas. Following completion of the works there will be an ongoing programme of landscape management for the site, which will be overseen by a Landscape Manager or Landscape Architect.

Traffic and Transportation

During the construction phase, the primary access point to the site will be via the existing roundabout junction on the Nangor Road. A construction management plan will be prepared where construction traffic will be managed to avoid peak traffic conditions on the surrounding road network. Where possible, excavated material and material will be recycled / reused on site. During excavation and removal of this material from the site, road cleaning and wheel washing at vehicular accesses from the site will be carried out.

During construction it is considered that there will be adequate land within the curtilage of the site to accommodate temporary car and truck parking for construction staff and operations at the early stage of the programme, and at later stages there will be adequate car parking space available in the basement of the development.

With regard to the operational phase of the development, the analysis undertaken for the roundabout junction on the Nangor Road indicates that this junction will operate satisfactorily in the year 2007 with approximately 70% of the traffic from the overall development. Any additional traffic from the proposed development will result in excessive queuing. Consequently it is proposed to phase the completion of the completion of the development to 70% until such a time as the Baldonnell Road access junction is provided at the southern site boundary.

The analysis further indicates that the Baldonnell Road priority junction will perform well within capacity during the 2020 post development scenario when 30% of the development traffic will access the site via Baldonnell Road.

It is proposed to provide parking on the site generally in accordance with the county development plan standards. The exact details with regard to the quantity of parking provided will be decided at planning application stage when applications for individual buildings within the business park are submitted.

A mobility management plan has been prepared in order to provide direction to the developer, the Local Authority and public transport agencies on ways to best achieve an improved modal split for the journey to work, and minimise the traffic impact as a result of encouraging greater use of public transport, cycling and walking.

Cultural Heritage

Local History

An assessment of the receiving environment in terms of local history indicated that there are no historic events associated with the subject site that require consideration in the undertaking of the overall design and boundaries of the development. Consequently no remedial measures are deemed necessary with respect to local history.

Archaeology

There are no previously identified monuments or features of archaeological interest and/or potential located within the proposed development lands. Consequently no remedial measures are required with respect to existing archaeological monuments.

There is a possibility that undocumented sub-surface archaeological features and material might exist within the boundaries of the overall development lands. Mitigation measures in this regard include the presence of an archaeologist on site to monitor all programmes of topsoil stripping/general ground surface reduction works.

The development of the subject lands will not cause any impacts with respect to structures of architectural heritage. Consequently, no pre-development remedial or reductive measures are required in this regard.

2.7 INTERACTIONS

There are a number of interactions of effects regarding aspects of the environment. There are no significant long-term adverse impacts arising from this proposed development. There will be short-term adverse impacts, and there will there be positive and beneficial impacts arising from the development.

2.8 ESTIMATED TYPE AND QUANTITY OF EXPECTED RESIDUES AND EMISSIONS RESULTING WHEN DEVELOPMENT IS OPERATIONAL

These are detailed elsewhere in this non-technical summary in Section 2.6 entitled – *'Likely Significant Environmental Effects and the Measures Envisaged to Avoid, Reduce or Remedy them'*. It is not considered necessary to reiterate them at this point.

2.9 DIRECT AND INDIRECT EFFECTS ON THE ENVIRONMENT RESULTING FROM THE USE OF NATURAL RESOURCES

The likely significant direct and indirect effects on the environment of the proposed development which may result from the use of natural resources, in this case the natural resources being the land encompassed within the subject site, have been comprehensively assessed in this Environmental Impact Statement.

2.10 LIKELY SIGNIFICANT DIRECT AND INDIRECT EFFECTS RESULTING FROM EMISSION OF POLLUTANTS, CREATION OF NUISANCES AND ELIMINATION OF WASTE

Details of emissions arising from the development together with any direct and indirect effects resulting from same have been comprehensively addressed and are outlined in greater detail in the relevant sub-sections of Section 5.0 – 'Aspects of the Environment Considered'. There will be no significant direct or indirect effects on the environment arising from these sources.

2.11 METHODS USED TO FORECAST IMPACTS ON THE ENVIRONMENT

The methods employed to forecast the effects on the various aspects of the environment are standard techniques used by each of the particular individual disciplines. The general format followed was to identify the receiving environment, to add to that a projection of the 'loading' placed on the various aspects of the environment by the development, to put forward mitigation measures to lessen or remove an impact and thus arrive at a net predicted impact.

2.12 DIFFICULTIES IN COMPILING ANY SPECIFIED INFORMATION

No specific difficulties were encountered in obtaining baseline information. Wherever necessary, surveys were carried out to supplement existing available data. Generally speaking, the best available methods were employed to forecast environmental effects.

3.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 INTRODUCTION

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of approximately 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

3.2 INFORMATION ON THE SITE OF THE PROPOSED DEVELOPMENT

The site to which this EIS relates is located in the central western area of County Dublin, to the north of Baldonnell (Military) Aerodrome and approximately 2.5km to the west of Clondalkin village. The site is bound to the north by the R134 (the Nangor or Clondalkin-Milltown Road), Grange Castle Business Park and Kilcarbery Business Park and to the south by a minor road which runs from the R134 to the N7, and Baldonnell Aerodrome. The eastern edge of the subject lands is bordered by Grange Castle Golf Club. The lands to the west of the subject site are currently in agricultural use.

The subject site currently consists of vacant agricultural fields which collectively comprise an area of 39.84 hectares. The site is zoned for enterprise, employment and related uses under the South County Dublin Development Plan 2004-2010. In this regard the development plan contains an objective in relation to this area requiring the production of a Masterplan for the *"lands at Baldonnell, Greenogue and west of Grange Castle Golf Course, zoned in this Development Plan for Enterprise and Employment purposes".*

The Development Plan further stipulates in relation to these lands that *"Masterplans shall be prepared and agreed with the Council for their overall development and the control of new development shall be carried out in accordance with the terms of these Masterplans".*

In this regard a Masterplan has now been prepared for the subject site together with the existing agricultural land immediately to the west of the subject site at Milltown, which collectively comprise an area of approximately 200 acres. A copy of this Masterplan is included with this planning application.

The objective of the Masterplan is to guide the development of the lands at Milltown and Kilcarbery in a coherent, transparent and rational manner. It is intended that each of these sites will be developed as two distinct business parks. The vision for the area is to carefully control development to attract the right balance of enterprise/financial and clean industry employers that will increase the value and profile of the area. The provision of roads and services to facilitate the future development of Profile Park is the subject of this planning application.

3.3 INFORMATION ON THE DESIGN AND SIZE OF THE PROPOSED DEVELOPMENT

Road Network

The spine road in Profile Park will connect to the Nangor Road at the location of the existing roundabout providing access to Kilcabery Business Park. This roundabout will be changed to a traffic signal controlled junction, if a QBC is installed on the Nangor Road. A spur connection off the spine road in Profile Park will connect onto the Baldonnell Road at the southern perimeter of the site. This spur connection will be the subject of a subsequent planning application. The spine roads in Profile Park and the adjacent business park at Milltown will not be connected in order to prevent through-traffic movements.

The first section of spine road leading into the business park will be a dual carriageway from the entrance to the first internal roundabout. The dual carriageway generally consists of two 6.5 metre wide carriageways with a 2 metre wide central median. On either side of the carriageway there are 4.5 metre wide zones containing grass verges, footpaths and on one side only, a cycle path. Outside these zones there are two, five metre wide landscaped mounds.

Inside the first roundabout after the entrance, the central median is omitted and the spine rod becomes a 9 metre wide single carriageway. The 4.5 metre wide verge/footpath/cycle path and the 5 metre wide landscaped mounds are retained for the full length of the spine road. Car parking will not be permitted on the spine road, which will be achieved by having a painted median in the centre of the road with the lane widths kept to a minimum to discourage parking. The painted median will be omitted at junctions, etc, where right turning lanes are required.

The remainder of the estate roads will have a 7.5 metre wide carriageway with the same 4.5 metre wide verge/footpath/cycle path zones on either side. The future link road connecting onto the Baldonnell Road will be 9 metres wide. The width of the landscaped mounds on either side of these roads will be 5 metres.

The cycle path will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority for cyclists.

Services

The infrastructure within the Grange Castle Business Park to the north of the site was designed to cater for the lands for which a Masterplan has been prepared and of which the subject site forms part. Thus in general, each of the business parks will be served via the Grange Castle Business Park.

Services within the subject site including drainage, water mains, telecommunication ducting, ESB ducting, gas main, etc are generally located under the grass verges, footpaths and cycle paths.

The service connections for the foul drainage, telecommunications and IT, gas main and ESB will all be provided as part of the road construction comprising the realignment of the Nangor Road and the construction of a new entrance into Grange Castle Business Park. The connection point for the services feeding into Profile Park will be located in a services wayleave to the south of the realigned section of the Nangor Road. The services for Profile Park will pass through a

wayleave on the Milltown park site, to reach the connection point on the Nangor Road.

The surface water run-off from the site will be discharged to the tributary of the Griffeen River which flows from south to north through the site to Grange Castle Business Park. This tributary will be upgraded to cater for this surface water run-off. The run-off from each of the business park sites will be attenuated on site to give a maximum discharge of 4.2 litres/second/hectare, and any run-off from the roads, car parks, etc within each site will be passed through a petrol inceptor before being discharged to the main drainage system.

The watermain connection for each business park will be taken from a 700 mm diameter trunk water main (the 'Low Level Lucan/Palmerstown Water Supply Scheme'), which runs along the southern edge of the Nangor Road. Each of the business parks will have two connections to this watermain, and a ring main will be provided within each park. In order to reduce water requirements on the site some rainwater run-off will be stored on site in several water features and water from this source will be used for the irrigation of soft landscaped areas. In addition each business within the park will have a metered water connection and shall be liable for water charges.

The foul effluent from the business park will discharge by gravity to a new foul sewer, which is being installed as part of the road construction works comprising the realignment of the Nangor Road and the construction of the new entrance to the Grange Castle Business Park. The effluent from Profile Park will discharge to a new manhole on the realigned Nangor Road and will then fall by gravity to an existing pumping station in the Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend in Dublin City, via the Grand Canal Sewer.

The effluent from each business shall be treated to at least domestic standard before being discharged to the Council's sewer.

Telecommunications and IT ducting is being provided to cater for four different telecoms providers, each of which will have their one dedicated set of ducting and chambers.

The electricity supply to Profile Park will be taken from a 110 kV National Grid substation, which was constructed within the Grange Castle Business Park. This substation serves the existing Wyeth and Takeda developments, and has the capacity to cater for the foreseeable future demand in the area.

Profile Park will be supplied with natural gas from Bord Gais via a new pressure reducing station which has been installed within the Grange Castle Business Park. Where individual users within the site decide to use oil or LPG for heating etc, this will be stored on their own site and no significant lengths of distribution pipe work will be required.

3.4 CONSTRUCTION PROGRAMME, PHASING AND LAND USE REQUIREMENTS DURING CONSTRUCTION

It is anticipated that the development which is the subject of this planning application will be constructed in two phases. The first phase comprises the majority of the road network except the secondary road which runs parallel to the

boundary with Grange Castle Golf Club. The estimated completion timeframe for phase 1 is 6 months. It is estimated that construction of Phase 2 may commence approximately one year later subject to demand for individual sites within the business park.

The development of the remainder of the business park will be subject to market forces and as such will be developed on a site by site basis as required.

3.5 EMISSIONS AND WASTES

Drainage

Foul effluent arising from Profile Park will discharge to a new manhole on the realigned Nangor Road and will then fall by gravity to an existing pumping station in the Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend in Dublin City, via the Grand Canal Sewer.

Emissions

The main environmental nuisance associated with construction activities is dust emissions. If good working practices and dust mitigation measures are adhered to the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.

With regard to traffic derived pollution resulting from the business park development, the results of the traffic modelling for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality.

The impact of the business park on the climate of the area is not considered to be significant. The use of natural gas to fuel individual buildings will significantly reduce the potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Solid Waste Disposal

It is intended to minimise the volume of material removed from the site. Topsoil will be retained on site for re-use in the landscaped mounds. The material to be removed from the site will generally be subsoil with an estimated volume of approximately 14,000 m^3. This equates to approximately 11-12 truck movements per day over a 6 month period. This material will be transported to a normal landfill facility.

A policy of waste recycling will be adopted in the management of Profile Park which will be incorporated into tenancy agreements etc. Paper, plastic and glass waste will be stored and collected separately.

4.0 PLANNING AND DEVELOPMENT CONTEXT

4.1 INTRODUCTION

This chapter sets out the strategic and statutory development context for the subject lands. This analysis refers to a number of Guidelines and Statutory documents as well as to the South County Dublin Development Plan 2004-2010. Reference is also made to other Masterplan documents which have been prepared for lands within the immediate vicinity of the subject site.

In addition this Chapter examines issues of accessibility in respect of the subject lands as well as providing an analysis of the alternatives considered with respect to the proposed development.

4.2 STRATEGIC PLANNING CONTEXT

Sustainable Development: A Strategy for Ireland (1997)

The Department of the Environment document *'Sustainable Development; A Strategy for Ireland'* recognises that land use planning can support sustainable development in a number of ways.

The principle of sustainable development underpins Ireland's industrial policy, the key objective of which is to promote a strong, internationally competitive enterprise sector, comprising both indigenous and non-national companies, which will make the maximum contribution to self-sustaining employment growth.

Dublin Transportation Office: A Platform for Change (2000-2016)

This Government backed strategy has two interdependent elements:

- Improvements in infrastructure and services to increase the supply of transport, including a substantial expansion of the public transport network, some strategic road construction and traffic management.

- Demand management, to reduce the growth in travel through the application of land use and other policies while maintaining economic progress, and which is designed to encourage a transfer of trips, especially at peak periods, from the private car to sustainable modes of transport (such as public transport, cycling and walking).

As this is an integrated strategy, it is recognised that it will only be effective when both elements are implemented together in a coherent manner. Developing the infrastructure element alone will not be enough. It must be accompanied by the demand management element and the complementary policies if the strategy is to achieve its overall objectives.

With regard to the lands which are the subject of this planning application, the strategy indicates proposals for both the expansion of the strategic road network as well as improved public transport within close proximity of the subject site.

These proposals have been integrated into overall proposals for the Masterplan study area. The more recent "Transport 21" investment programme (November 2005) has solidified those proposals for public transport in the Clondalkin area.

For example, proposals for both Dart/Suburban Rail and Metro serving the Clondalkin area have been reconfirmed, while the 'Outer Ring Road' section to the immediate east of the site was recently completed. These transport infrastructure developments will beneficially serve the future development of the subject site and the remainder of the Masterplan lands. The consolidation of public transport already serving the adjoining Business Parks will comply with demand management strategies without hindering economic progress.

National Spatial Strategy (2002-2020)

The Government's *"National Spatial Strategy"* (NSS) is intended to set a national context for spatial planning which will inform Regional Planning Guidelines and strategies, as well as County and City Development Plans and strategies.

The NSS advocates that, "*policy must recognise the different locational requirements of enterprise activity in various parts of the country. Targeted strategies must seek to strengthen a wider range of areas, without damaging areas that are already performing strongly. The inherent advantages of the South and East (S&E) region in its overall contribution to national economic development must be consolidated and, at the same time, the relative deficit of demographic, settlement and productive resources which is limiting the development potential of the Border, Midlands and West (BMW) region must be addressed.*"

It is envisaged that the proposed Masterplan area will develop in tandem with the existing International Business Park at Grange Castle, immediately to the north of the study area. Thus, the policies of the NSS for the South and East region relating to the consolidation of established development areas which contribute to national economic development are consistent with the principle of development at the subject site.

Regional Planning Guidelines for the Greater Dublin Area (2004 – 2016)

The Regional Planning Guidelines for the Greater Dublin Area (RPGGDA) were prepared for the four Dublin Local Authorities (Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire-Rathdown County Council) together with Meath, Wicklow and Kildare County Councils. These Guidelines provide a long term planning framework for the development of the Greater Dublin Area in the 12-year period up to 2016 and within the vision of the National Spatial Strategy for 2020. The Guidelines have statutory force under the Planning and Development Act 2000 and must be taken into account by local authorities in the preparation of development plans and the assessment of planning applications.

The Guidelines embrace the principles of sustainable development, as set out in the National Sustainable Development Strategy and conform to the direction of emerging policy in Europe, emanating from the European Spatial Development Perspective. The main aim of the RPGGDA is the consolidation of future growth as a response to the unsustainable urban sprawl that has characterised the Greater Dublin Area in recent decades.

The key to future development of the Metropolitan Area is the realisation of a sustainable and integrated public transportation system that will reduce dependency on the private car. This will allow for the consolidation of significant

levels of additional development into the area and allow for higher development densities than traditionally applied.

The principal implications of the Guidelines for the development of Profile Park, which is located within the Metropolitan Area, include:

- The incorporation of the principles of sustainable development.
- The inclusion of adequate provision for appropriate public transport, which should have precedence over the requirements of the private car.
- The close integration of new and existing development with the public transport system.

The Guidelines state that within the economy there are a number of distinct trends that are predicted to continue, including the tendency towards spatial concentrations of technology intensive companies in electronics, chemicals and pharmaceuticals, medical products and software. The Guidelines also add that the key centres for future economic development in the Greater Dublin Area are Arklow, City West, *Grange Castle*, Media Lab-Liberties, Naas, Navan and Park West. Four sectors are considered to offer the best potential to contribute to the future development of the region; they are Life Sciences, International Services (including Financial Services (IFSC) and e-commerce, ICT/ Software development and e-learning/ Digital Media).

Having regard to the '*Location of Industrial and Commercial Development*', the Guidelines state that the least restrictive enterprise land use approach to zoning of land, consistent with good planning, should be taken and a sufficient amount of serviced land should be available to meet demands from enterprise. A high quality built and natural environment that is attractive to industry is to be promoted and the speedy implementation of key infrastructural projects, including a coherent solid waste management strategy, should be supported. The Guidelines add that the location of developments that attract a large numbers of people, such as employment uses or major recreational facilitates, should be encouraged on transportation corridors offering access to a number of transport modes.

The proposed development of the Masterplan study area, which is a suitably zoned and serviced subject site, located adjacent to an already successful International Business Park at Grange Castle, is clearly consistent with the policies and objectives of the RPGGDA to consolidate and expand the development of enterprise within an already developed enterprise area.

4.3 COUNTY AND LOCAL CONTEXT

South Dublin County Development Plan

Land use in the study area is subject to the objectives and polices of the South Dublin County Development Plan 2004-2010, which came into effect on 8th December 2004.

The most significant land-use planning issues affecting the study area include:

- The application of the principles of sustainable development.

- The close integration of development with existing and future public transportation.

- The balanced development of the area for a range of appropriate uses, including small, medium and large scale businesses, together with ancillary services.

- Conformance with the planning polices and standards relating to Baldonnell Aerodrome. It should be noted that the Masterplan which has been prepared for the subject lands conforms with the Development Plan policies relating to development in the vicinity of Baldonnell Aerodrome, with specific reference to Schedule 4 of the current County Development Plan, where the use, height and type of development are controlled within the envelope of the aerodrome cordon as illustrated in the County Development Plan Index Map.

The following Development Plan zoning objective covers the entire Masterplan area (see figure 4.1 below):

'Objective E: To provide for Enterprise, Employment and Related Uses'

Uses which are '*permitted in principle*' in this zone include:

Abattoir, advertisements and advertising structures, carpark, cash & carry/ wholesale outlet, crèche / nursery school, enterprise centre, halting sites / group housing, heavy vehicle park, household fuel depot, industry – general, industry – light, industry – special, motor sales outlet, office less than 100 sqm, offices 100 sqm – 1,000 sqm, offices over 1,000 sqm, office based industry, open space. Petrol station, public services, refuse transfer station, science and technology based enterprise, scrap yard, service garage, shop – local, transport depot, warehousing.

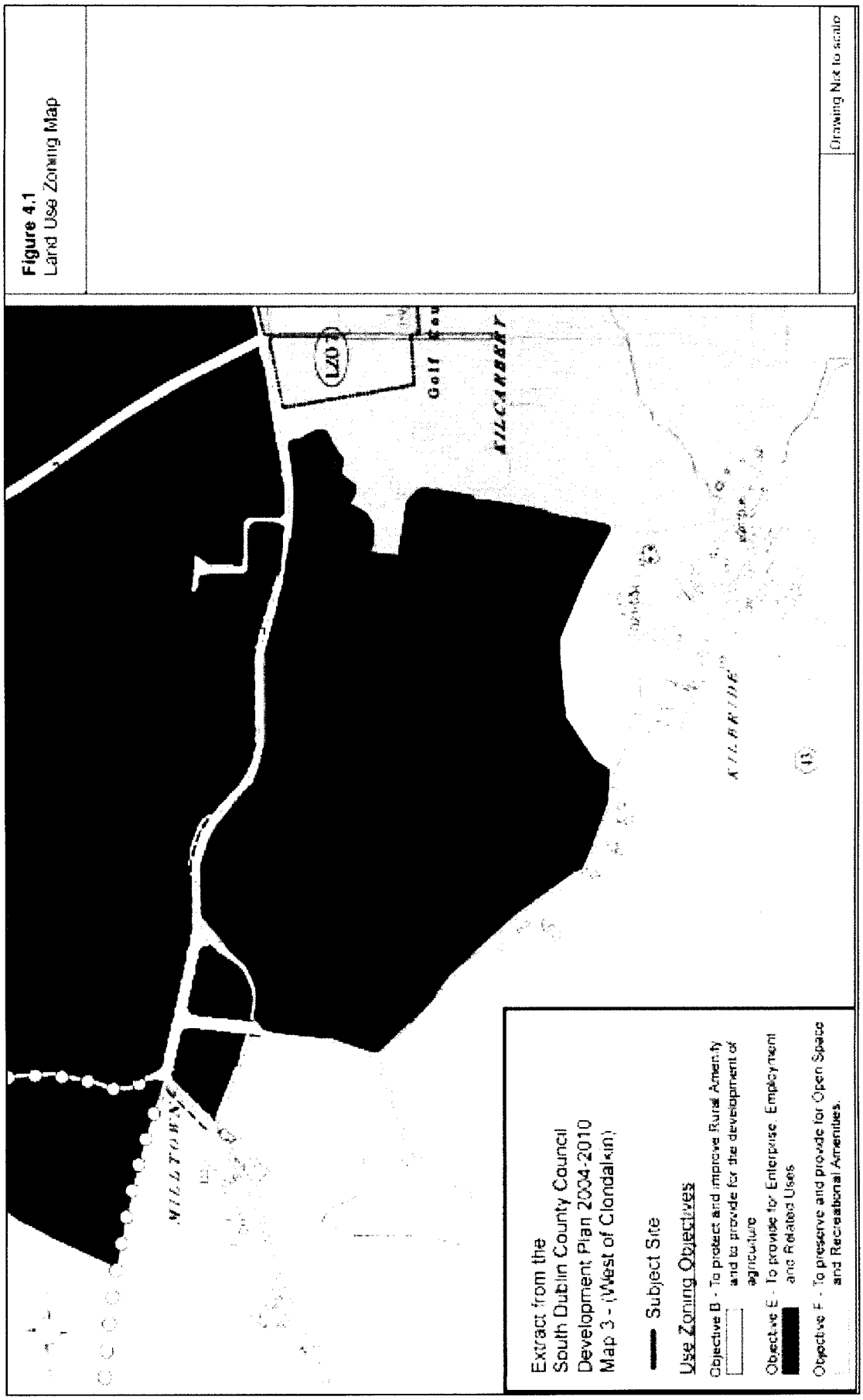
Uses which are '*open for consideration*' include:

Agricultural buildings, bed & breakfast barding kennels, church, community centre, concrete/asphalt (etc.) plant in or adjacent to a quarry, cultural use, dance hall / discotheque, doctor / dentist, education, funeral home, garden centre, health centre, home based economic activities, hotel / motel, industry – extractive, public house, recreational buildings (commercial), recreational facility / sports club, refuse landfill / tip, restaurant, retail warehouse, shop – discount food store, shop – neighbourhood, veterinary surgeon.

Uses which are '*not permitted*' include:

Aerodrome / airfield, betting office, caravan park / holiday, caravan park – residential, cemetery, guest house, hospital, nursing home, residential, residential institution, retirement home, rural industry – cottage, rural industry – food, shops – major sales outlet.

Figure 4.1: Land Use Zoning Map



Objectives/Policies Pertinent to the Subject Site

The County Development Plan makes reference to a number of specific local objectives in regard to development of the subject lands:

- Specific Local Objective No. 49

Prior to the commencement of any development on the lands at Baldonnell, Greenogue and West of Grange Castle Golf Course, zoned in the Development Plan for Enterprise and Employment purposes, Masterplans shall be prepared and agreed with the Council for their overall development and the control of new development shall be carried out in accordance with the terms of these Masterplans. Any office floorspace which is ancillary to industrial or warehousing uses shall not exceed 20% of the total floor area of any such developments. (South Dublin Development Plan; Ch.14)

A Masterplan for the subject lands has now been prepared and is included as part of this planning application.

- Specific Local Objective No. 51

Development on the eastern boundary of lands adjoining Grange Castle Golf Course shall be of high quality siting, design and finish, and shall have regard to the location of the Golf Course. (South Dublin Development Plan; Ch.14)

Further Development Plan policies, which are of relevance to the subject lands, include the following:

- Policy EE7

Office developments with a high level of employment should normally be located in areas where there is convenient access to a good public transport network (i.e. QBC, LUAS or heavy rail. (Ch. 2.3.7.ii)

- Policy EE8

On lands zoned for enterprise and employment (objective 'E'), it will be an objective to consider whether there is a need to require that suitable provision should be made for small and medium scale enterprises within the overall development scheme, in order to ensure that an appropriate mix of commercial / industrial uses is accommodated within the area. (Ch. 2.3.8.ii)

- Policy EE10

It is the policy of the Council to facilitate the provision of local service centres in enterprise and employment zones to cater for the local retail, crèche and other daily services needs of those working in these employment areas as appropriate. (Ch. 2.3.10.i)

Grange Castle/Corkagh Masterplan and Framework Study 2000

This Masterplan, as adopted by South Dublin County Council relates to approximately 783 hectares of land, with a core area of approximately 442 hectares located immediately to the north and east of the site which is the subject

of this planning application. The County Council owns the principal development areas within the Framework/Masterplan area.

The area incorporates the Grange Castle International Business Park, which is the world's largest integrated biotechnology campus, together with wide-ranging amenities including Corkagh Regional Park, Grange Castle Golf Course and a section of the Grand Canal.

The plan for the Business Park element proposed a flexible response to the needs of incoming biotechnology, information and communication technology, pharmaceutical and electronics investors.

The Framework/Masterplan also proposed an extension to the Grange Castle Golf course to include a 27-hole course, a 100 bedroom hotel with conference and leisure facilities, 40 apartments and 60 houses. The Framework/Masterplan further proposed to extend the Corkagh Regional Park along the Outer Ring Road, to enhance the Grand Canal corridor, and to develop an area of residential land to the south of the Nangor Road, including the possible neighbourhood centre and further development of the existing school, with links to the existing residential area to the north of the Nangor Road to be improved.

At this point in time, the Wyeth and Takeda plants, located within this Business Park, are operational, and the majority of the primary infrastructural work within that Business Park has been completed. In addition a planning application lodged by the IDA for a single large 'circuit manufacturing campus' at the end of January 2006, which will occupy much of the remaining land within this business park, was recently granted permission by South Dublin County Council.

Grange Castle Masterplan (updated) 2005

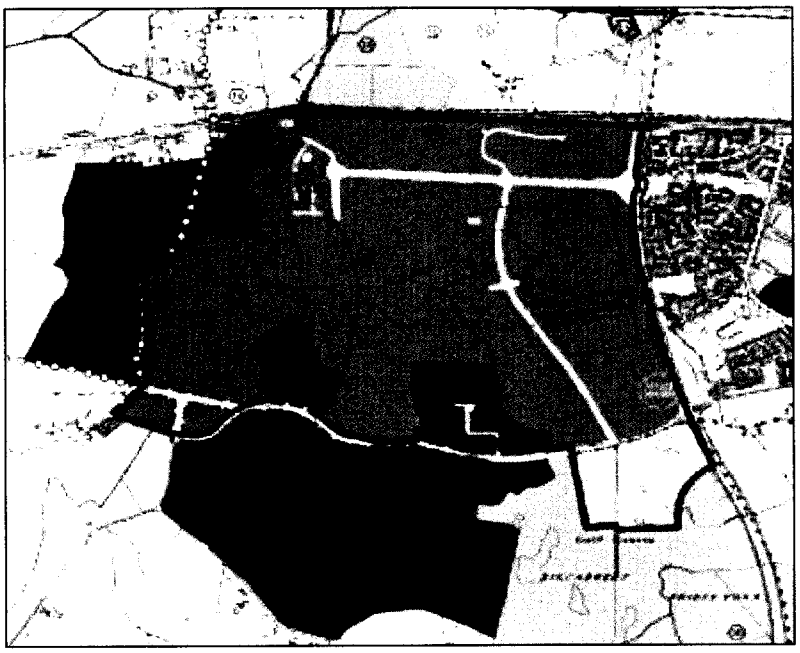
The updated Masterplan for Grange Castle focuses primarily on the Grange Castle Business Park element of the previous Framework/Masterplan. This smaller area now covers approximately 200 hectares (see figure 4.2 below). As per the 2000 Masterplan, it is being developed as a high-tech industrial environment with sites of up to 40 hectares in size. It has been designed in a low density campus style format "*so that the rural benefits of the location are preserved for all to enjoy*". Having regard to the proposed roads network, it is notable that the "Stables Greenway" from the 2000 plan has been realigned to connect with the Nangor Road further to the west near the Griffeen River. Furthermore, prior proposals in the 2000 plan for a central connector road between the "Stables Greenway" and the "Fairways Greenway" have been omitted.

The 2005 Plan includes a non-statutory zoning diagram of the study area that identifies the preferred land use in the various potential development sites. This concept was developed in the original zoning study in the 2000 Plan. The 2005 Plan also examines the issues associated with the implementation of a large Masterplanning project. It proposes an ongoing review of design guidelines and a maintenance structure including a pivotal role for site management in the Park.

The establishment of a marketing plan with IDA Ireland for the Business Park land and also the golf course site is stated to be of critical importance to achieve full development of the study area. The Business Park's Marketing Plan will be an important tool in attracting potential clients to the site, as public awareness of the identity of Grange Castle area needs to be increased. To this end, the

document is published on the internet as a live webpage that will be maintained and updated in line with the growth and development of the Business Park.

Figure 4.2: Grange Castle Masterplan 2005



Profile Park/Milltown at Grange Castle Masterplan 2006

This Masterplan relates to an area of approximately 200 acres located to the south of Grange Castle in South County Dublin. The site which is the subject of the current application accounts for approximately 100 acres of this area. This Masterplan has been prepared in accordance with the requirements of the South County Dublin Development Pan 2004-2010 which has zoned this area for *'Enterprise, Employment and Related Uses'* and which has identified the area as one for which a Masterplan must be prepared. The Development Plan also states that control of new development shall be carried out in accordance with the terms of this Masterplan.

The stated objective of the Masterplan is to guide the development of these lands in a coherent, transparent and rational manner. It is proposed that the Masterplan area will be developed as two distinct business parks. The site which is the subject of this planning application shall be known as *'Profile Park'*, while the site to the west will be known as *'Milltown Business Park'*. Pedestrian links are proposed between the two parks however, the internal road network on the Masterplan lands will reflect the separation of the business parks as both will have separate vehicular entrances.

As the Masterplan area comprises a single Development Plan zoning objective, it is proposed that the distribution of uses through this area will be more a function of form than zoning with specific building uses laid out in a logical and coherent pattern. High profile enterprise, services and office uses shall address the primary internal road network and public areas, while larger unit uses will generally occupy discreet sites.

The Masterplan proposes the creation of five 'Character Areas' within the Masterplan lands. In each of these areas a vocabulary of the landscape treatment of public spaces is suggested, with objectives for green spaces, squares, courtyards and spaces for cars.

The landscape design concept for the Masterplan area aims to create a unique visual image for the park. This involves enhancing the entrance spaces, roadways, building frontages and incidental spaces with a select landscape treatment with high quality materials proposed throughout. The landscape design concept also aims to create a network of open spaces for the site, forming a hierarchy of pedestrian spaces which can be used to provide pedestrian-friendly access.

4.4 ACCESSIBILITY

Existing Road Network

The Grange Castle area is strategically located on the western fringe of Dublin approximately 16 km southwest of Dublin International Airport, 10 km west of Dublin City Centre and approximately 2.5 km from Clondalkin village. Nearby towns and villages within the administrative area of South Dublin County Council include Lucan 2.5 km to the north, Tallaght 3 km to the southeast, Saggart 4 km to the southwest, Newcastle 3 km to the west. Leixlip is located 6 km to the northwest within Co. Kildare.

The subject site is located between the N4 and N7 National Primary Routes and approximately 5 km west of the M50 Motorway, the orbital ring road around Dublin City. The recently completed Grange Castle Road (R136) (Outer Ring Road – Phase 1) links the subject site with the N7 National Primary Route from Dublin to the south and southwest of the country. The subject site is 2.5 km south of the N4/M4 National primary road from Dublin to the Midlands, West and Northwest, which is proposed to be linked directly in Phase 2 of the Outer Ring Road.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has been improved over recent years and consists of a single side carriageway with dedicated bus lanes in each direction extending as far out as the Outer Ring Road. The Nangor Road along the northern site boundary and to the west is of lower standard in terms of alignment and cross-sections, but is due to be upgraded shortly. The Outer Ring Road Phase 1 opened from the N7 as far as Grange Castle International Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction.

Existing Public Transport

The No. 68 Dublin Bus Route operates along the Nangor Road at the northern boundary of the subject site. Approximately 1.5 km east of the site, the No. 51B, 51X and 210 Dublin Bus Routes operate along the Nangor Road. Clondalkin Village is served by the No. 69, 76, 76A and 76B Dublin Bus Routes. The Quality Bus Network in the area is expanding with dedicated bus lanes on the Nangor Road east of the Outer Ring Road and the Outer Ring Road itself.

The main intercity rail line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, is located north of the subject site. Intercity services are mainly to Cork and Limerick/Shannon, with a commuter service to Kildare. The nearest station is at Clondalkin approximately 3 km northeast of the subject site which is served by 15 commuter trains in each direction during weekdays.

Proposed Transport Improvements

'Transport 21' is a transportation strategy commitment by the Government to significantly improve the country's transport network within a 10-year timeframe up to 2015. The Strategy will include major investment in both public transport and road infrastructure in the Greater Dublin Area.

Proposed Road Improvements

Phase 2 of the Outer Ring Road, which will see a local link road from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road, is due for completion in 2006. Following completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and N7. Phase 3 of the Outer Ring Road, continuing south from the N7 to the N81 Blessington Road is scheduled to open late 2006/early 2007.

The upgrading of the N7 to dual three-way standard from Dublin to Naas is underway and is anticipated to be completed by the end of 2006. Improvements are also planned to the N4 to bring it to dual three-lane standard as far as the Leixlip Interchange from the M50/N4 Interchange within three years.

The Nangor Road west of the subject site and extending as far as the R120 is also being realigned and will consist of approximately 2.03 km of a two-way, single carriageway road. The land acquisition process for this realignment commenced in January 2006.

The following road infrastructure identified in Transport 21 will have a positive impact on the road network in the area:

- Dublin Port Tunnel (completion date - 2006)
- M50 upgrade Phase 1 (completion date - 2007)
- M50 upgrade Phase 2 (completion date - 2010)

Proposed Public Transport Improvements

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme – 2004/5) within the vicinity of the site including the following:

- South Clondalkin QBC – Grange Castle roundabout to Bawnogue Road – Work completed.
- South Clondalkin QBC – Ninth Lock to Naas Road – Completed March 2006
- Outer Ring Road QBC – Completed January 2005

- Naas Road QBC – Kingswood to Bluebell Q3 –Phase 1 completed April 2005, Phases 2 and 3 60% and 98% complete respectively as of April 2006.

These objectives form part of the extensive QBN that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 – 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, better pedestrian and cycle facilities encouraging commuters to use alternate mode of transport to private cars.

Proposed public transport infrastructure identified in Transport 21 which will have a positive impact on the public transport infrastructure network in the area include the following:

- Dublin City Centre rail resignalling (completion date 2009)
- Opening of new Dublin City Centre railway station (2010)
- Kildare rail upgrade
- Metro West Phase 1 Tallaght - Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)
- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extended electrification to Hazelhatch (2015)
- Rail interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015)

In addition the development at Adamstown, north of the subject site, includes a new railway station which will be approximately 2 km from the subject site.

4.5 ALTERNATIVES CONSIDERED

The subject site is zoned for enterprise, employment and related uses under the South Dublin Development Plan 2004-2010. The development of a business park on these lands was deemed appropriate having regard to the relevant policies contained in the development plan and to the land uses which are *'permitted in principle'* and *'open for consideration'* under the use zoning. Furthermore the subject site is located in an area which has already seen considerable development of a similar nature at Kilcarbery and Grange Castle Business Parks which are located immediately north of the subject site. Consequently the consideration of alternative sites to accommodate the proposed development was not deemed necessary in this instance.

In line with the requirements of the South Dublin Development Plan 2004-2010, a Masterplan has been prepared for the subject lands. The initial step in the preparation of this Masterplan was to undertake a scoping exercise for the lands. This exercise allowed alternative development options to be assessed and a final masterplanning approach to be decided upon.

A number of alternatives were considered during the design process of the roads layout which is the subject of the current planning application. The final road layout proposed reflects the requirements of the Roads Engineering Department of South Dublin County Council and also the future land uses proposed on the site in terms of plot size and arrangement.

The final road layout proposed within the site also reflects input received from the other EIS specialists with regard to potential impacts arising from the proposed development.

The option of providing road access to the site from the southern site boundary was also considered as part of this planning application. However, an analysis of the traffic levels which will be generated on site as a result of the completed business park development indicate that a 70% build out of the site can be accommodated by the northern access alone. As a result it was decided during the road design process that the southern access to the site will be provided at a later stage and as such will be the subject of a separate future planning application.

5.0 ASPECTS OF THE ENVIRONMENT CONSIDERED

5.1 HUMAN BEINGS

General

Human beings form one of the most important aspects of the environment which must be given consideration as part of this EIS. Any likely significant impact on human beings therefore must be comprehensively addressed. The principal concern in this regard is that human beings experience no significant unacceptable diminution in any aspect of *'quality of life'* as a consequence of the construction or operation of the proposed development. This section of the Environmental Impact Statement considers the human environment in the vicinity of the subject site, in terms of population profile and trends, employment and community aspects.

The site which is the subject of the current planning application is a vacant greenfield site and as such, does not have any resident population. Thus the proposed development will have no negative impact on any existing population nor will it result in the severance of any existing community. The site is located within the Electoral Division of Clondalkin Village. Census data for this Electoral Division has been used as the best available source to identify trends with respect to the population of the wider area of which the site forms part.

5.1.1 POPULATION

5.1.1.1 RECEIVING ENVIRONMENT

The most recent census of population was undertaken on 23rd April 2006. The results of this census were not available at the time of the writing of this EIS therefore the results of the 2002 Census of Population have been used for the purposes of this assessment. The smallest geographical units distinguished by the Central Statistics Office are Electoral Divisions. In this regard the subject site is located within the Electoral Division (ED) of Clondalkin Village.

This section of the Environmental Impact Statement examines recent demographic trends at Electoral Division, Local, County and State level. For the purposes of this assessment, the figures for County level relate to South County Dublin only, while the local level has been defined as those electoral divisions which are located immediately adjacent to the Electoral Division of Clondalkin Village as follows:

- Clondalkin-Ballymount
- Clondalkin-Dunawley
- Clondalkin-Monastery
- Tallaght-Belgard
- Tallaght-Fettercairn
- Newcastle

Figure 5.1.1 illustrates the location of the Electoral Divisions which have been defined as being at the 'Local Level' for the purposes of this assessment.

Figure 5.1.1: Electoral Divisions (ED) Map



Table 5.1.1 below indicates the population increase experienced in these areas between 1996 and 2002. It is noted that the population increase experienced in South Dublin exceeded that in the State as a whole between 1996 and 2002. The population growth at local level (as defined in Section 5.2.2 above) for the same period also exceeded that at State level. However the population growth in the Electoral Division of Clondalkin Village was notably lower than that experienced at Local, County and State level.

Table 5.1.1: Total Population 1996 – 2002

Area	1996	2002	Change in Population 1996-2002 (%)
Clondalkin Village ED	8,123	8,595	5.8
Local	29,688	32,897	10.8
County	218,728	238,835	9.2
State	3,626,087	3,917,203	8.0

Source: Census of Population 1996, 2002

Section 1.3.1(ix) of the South Dublin Development Plan 2004-2010 outlines population projections for South Dublin in 2010 based on the projections contained in the Regional Planning Guidelines. In this regard the projected population for South Dublin in 2010 is 253,292. This represents a 6% increase on the 2002 Census figure.

Age Profile

Table 5.1.2 below contains information on population according to age group for South Dublin, the whole of the Dublin Area and for the State.

Table 5.1.2: Population Classified by Age Profile

Age Group (years)	South Dublin (persons)	%	Dublin Area (persons)	%	State (persons)	%
0-14	53,671	22.5	215,192	19.2	827,428	21.1
15-24	44,248	18.5	199,267	17.8	641,522	16.4
25-44	76,808	32.2	367,138	32.7	1,180,259	30.1
45-64	49,147	20.5	227,252	20.2	831,993	21.2
65+	14,961	6.3	113,972	10.2	436,001	11.1
Total	**238,835**	**100**	**1,122,821**	**100**	**3,917,203**	**100**

Source: Census of Population 1996, 2002

From an analysis of the figures above it is noted that a high proportion of the population of South Dublin is less than 25 years of age, accounting for 41% of the total population. This figure is higher than that for the Dublin Area (37%) and for the State (37%). The County also has a low proportion of people aged 65 and over accounting for just 6%. The corresponding figures for the whole of the Dublin Area and the State are 10% and 11% respectively.

It is further noted from the figures outlined in Table 5.2 above that those persons in the working age cohort (15-64 years) account for 71% of the total population of South Dublin. This figure corresponds generally to those figures for the Dublin Area and the State which are 71% and 68% respectively.

Household Size

The results of the 2002 Census of Population indicate that the average household size in Ireland is decreasing over time. Between 1991 and 2002 the average number of persons per private household in the State decreased from 3.34 to 2.95. The figures for South Dublin over the same period showed a similar pattern, decreasing from 3.77 to 3.21.

The total number of private households in South Dublin in 2002 was 73,516. The corresponding figures for the whole of Dublin and for the State are 379,372 and 1,287,958 respectively. The Regional Planning Guidelines projected number of households in South Dublin in 2010, (as outlined in Section 1.1.3 (ix) of the South Dublin Development Plan 2004-2010), is 91,815. This represents a 25% increase over the 2002 figure.

Population Catchment

The Masterplan for Profile Park, a copy of which has been submitted as part of this planning application, includes an analysis of the population catchment of the Masterplan lands according to 15, 30 and 45 minute drive times. The 15 minute drive time extends from north of Lucan to Saggart in the south and to the east of Clondalkin. The 30 minute drive time includes Finglas and Mulhuddart in the north, Celbridge, Leixlip and Maynooth in the west, Kill and Brittas in the south and Santry and Dundrum in the east. The 45 minute drive time extends beyond the Greater Dublin Area and extends northwards as far as the main M1 exit for Skerries including Ashbourne and Dunboyne. The 45 minute drive time catchment also includes most of the east coast from Rush to Bray, Blessington in the south and Naas and Kilcock in the west.

An analysis of the relevant 2002 Census data for each drive time is summarised below in Table 5.1.3.

Table 5.1.3: Drive Time Population Catchments

Drive Time	Population	Households
15 minute	95,646	29,220
30 minute	734,869	249,857
45 minute	1,135,258	381,171

Source: Jones Lang Lasalle (2005) & Gamma, CSO 2002 Census of Population

The Masterplan also highlights the potential catchment at the new urban district of Adamstown which consists of approximately 10,000 additional household units which will be provided on a phased basis with a potential population of between 20,000 and 25,000 people.

5.1.1.2 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.1.1.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

It is anticipated that the construction phase of the proposed development will not have any direct impact on the population of the immediate environs of the site. Given the nature and extent of the proposed development and the anticipated construction timeframe, it is expected that the work force employed on the site will travel from existing places of residence to the construction site rather than reside temporarily in the immediate environs of the site.

It is anticipated that the construction phase of the future business park scheme will increase the temporary working population of the area but is not expected to permanently increase population figures for the area.

Operational Phase

There will be no increase in the population of the area during the operational phase of the proposed development.

The operational phase of the business park will result in an increase in the temporary working population of the area. However, as no residential development is proposed as part of the overall scheme it is considered unlikely that there would be any permanent increase in population figures for the area as a result of this development.

Do-Nothing Impact

If the proposed development did not proceed there would be no impact on the population of the area.

5.1.1.4 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

The development which is the subject of this planning application and the development of the remainder of the business park scheme will not result in any adverse potential impacts on population during the course of construction. Consequently no remedial or reductive measures are required in this regard.

Operational Phase

The development which is the subject of this planning application and the completion of the business park scheme will not result in any adverse potential impacts on population during the operational phase. Therefore no remedial or reductive measures are required in this regard.

5.1.1.5 PREDICTED IMPACT OF THE PROPOSAL

The development which is the subject of this application and the development of the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their construction phases.

Operational Phase

The proposed development and the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their operational phases.

Worst Case Scenario

If the development which is the subject of this planning application did not proceed, there would be no significant impact on the population of the area.

If the business park scheme which the proposed development will facilitate did not proceed, there would be no significant impact on the population of the area.

5.1.1.6 MONITORING

No monitoring measures are required in relation to population as a result of the proposed development.

5.1.1.7 REINSTATEMENT

No reinstatement measures are required in relation to population as a result of the proposed development.

5.1.2 EMPLOYMENT

5.1.2.1 RECEIVING ENVIRONMENT

In 2002 the total number of persons aged 15 years and over at work in the State was 1,641,587. Of this total, 110,101 were at work in South Dublin. By comparison, a total of 138,199 persons were unemployed in the State in 2002 of which 8,148 were accounted for in South Dublin.

It is stated in Section 2.1(i) of the South Dublin Development Plan 2004-2010 that South Dublin has a variety of employment types with large employment centres including sixteen major industrial estates and two international business parks at Grange Castle and Citywest. It is estimated in the plan that there are over 3,500 businesses in operation with 11 of Ireland's top 100 companies located in the county. The growth sectors in the county are identified as chemical industries, biotechnology, information technology, communications, electronics, hospitality, transport, internationally traded services and prepared food.

This area of the County is envisaged to become the premier location for enterprise and employment generation. A Masterplan has previously been prepared for the lands to the north and east (The Grange Castle Masterplan), and South Dublin County Council has recently published an updated version of this document. A number of large-scale developments have been implemented following the adoption of this Masterplan, including the Wyeth Medica campus and the Takeda Pharma pharmaceutical plant (Profile Park Masterplan, 2006). South Dublin County Council have also recently granted planning permission for an Integrated Circuit Manufacturing Facility on a 145 acre site at Grange Castle Business Park.

5.1.2.2 CHARACTERISTICS OF THE PROPOSAL

The roads and services which are the subject of this planning application will not have a significant impact on employment numbers having regard to the nature and scale of the development involved.

However the Masterplan for Profile Park envisages that the business park itself, which these roads and services will facilitate, will consist of a *'vibrant mixed use area, with enterprise, service, employment and office activities'* (Profile Park Masterplan, 2006). Indicative building layouts and land uses have been identified in the Masterplan. The design and size of the buildings proposed on the site will be addressed at planning application stage when detailed plans for each building type and land use have been decided.

Although the final details regarding the nature and scale of the buildings proposed within the business park have not yet been decided, it is possible at this stage to make an approximate 'best estimate' of the level of employment that may potentially be generated at Profile Park. Having regard to the land uses proposed on the site, it is considered that somewhere in the range of 5,000 – 10,000 jobs may be generated as a result of the future business park development. It is evident therefore that the proposed business park has the potential to have a moderate positive impact on employment levels in the locality.

5.1.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

The construction of the roads and services which are the subject of this planning application will not have a significant impact on employment levels having regard to the nature and scale of the development proposed.

The development of the remainder of the business park will have a temporary positive impact on employment levels in the locality. Temporary construction employment will be directly created on the site. Indirect employment will also be created through the provision of building supplies, local goods and services to the site and its employees. Overall a moderate positive impact will result an employment levels as a result of the business park development.

Operational Phase

The operational phase of the proposed development will have no impact on employment levels in the locality.

The development of the remaining area of the business park lands has the potential to a moderate positive impact on employment levels in the locality.

Do Nothing Impact

If the development which is the subject of the current planning application does not proceed there would be no significant impact on employment levels in the locality.

If the business park development did not proceed the opportunity for the creation of additional jobs in the locality would not be realised.

5.1.2.4 REMEDIAL OR REDUCTIVE MEASURES

No remedial or reductive measures are required in relation to employment.

5.1.2.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

The predicted impact would be the same as the potential impact.

Operational Phase

The predicted impact would be the same as the potential impact.

Worst Case Scenario

The predicted impact would be the same as the potential impact.

5.1.2.6 MONITORING

No monitoring measures are required in relation to employment.

5.1.2.7 REINSTATEMENT

No reinstatement measures are required in relation to employment.

5.1.3 COMMUNITY ASPECTS

5.1.3.1 RECEIVING ENVIRONMENT

There are three principal components of the community within the vicinity of the subject site which are considered in this section: the resident, working and visitor communities.

The Resident Community

The subject site consists of a rural greenfield site which was previously used for agricultural purposes. There is some dispersed housing along the site boundaries. Consequently there will be no severance of any existing community as a result of the proposed development. The nearest existing resident community is located approximately 2.5 km to the east of the subject site at Clondalkin Village. There are a small number of residential units and a car sales operation located west of the subject site along the Nangor Road. There are also a number of residential units located in the vicinity of the southern boundary of the site.

The Working Community

The major employers at this location are located immediately to the north of the subject site at Kilcarbery Business Park, which is now fully developed and occupied and Grange Castle Business Park, which contains two large bio-technology facilities – Wyeth Medica Ireland and Takeda Pharma Ireland. Wyeth Medica Ireland has 1,100 staff in direct employment with an additional 600 in indirect employment. When fully operational the Takeda plant will create approximately 80 high quality jobs. Baldonnell Aerodrome to the south of the subject site is another employment generator in the locality.

The Visiting Community

The primary attractions for visitors to this area consist of Grange Castle Golf Course which borders the subject site to the east and Corkagh Regional Park, including Camac Valley Tourist Caravan and Camping Park to the east of the golf course. Ballybane Pitch and Putt course is also located along the Nangor Road to the northwest of the subject site.

5.1.3.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.1.3.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

Given the nature and scale of the proposed development it is considered that there will be no significant negative impact on the resident, working or visiting community at this location during the construction phase. Some short-term localised impacts may result on the adjoining residential units as a result of noise during construction.

Having regard to the scale of the overall business park development, which the proposed development will facilitate, some potential adverse localised impacts may be expected to occur during the construction phase of the business park. It is expected that the resident, working and visiting communities would experience these short-term localised impacts. Many of these would be of a nuisance nature such as an increase in daytime noise levels in the locality. Construction traffic has the potential to pose impacts to the neighbourhood community depending on its frequency, overall numbers and routing. These impacts are more fully addressed in the relevant specialist sections of this EIS.

Operational Phase

The proposed development will have no significant negative impact on the existing community during its operational phase. Additional planting will be provided along site boundaries adjacent to existing housing to mitigate any potential negative visual impact.

It is considered that the following potential impacts may arise as a result of the operation of the completed business park development:

- Increased traffic levels, both pedestrian and vehicular in the area.
- Impact on the existing natural landscape.
- Increased employment opportunities in the area.
- Impact on local services and commercial facilities.

Do Nothing Impact

If the proposed development did not proceed, it is likely that there would be no significant impact on the existing community.

If the business park which the proposed development will facilitate did not proceed, the potential benefits associated with the business park development, such as increased employment opportunities in the locality, would not be available to the community.

5.1.3.4 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

The hours of operation of construction machinery on the subject site will be limited in order to limit any potential short-term noise impact on adjacent residential properties associated with the development of roads and services infrastructure at this location. No further remedial or reductive measures are considered necessary during the construction phase of the proposed development.

Similarly the hours of operation of construction on site will be limited during the construction of the business park in order to limit any potential short-term noise impact on adjacent residential properties. These measures are discussed in greater detail in the specialist chapters of this EIS.

Operational Phase

No remedial or reductive measures are considered necessary during the operational phase of the proposed development.

A number of reductive measures are proposed during the operational phase of the business park scheme. It is proposed that the boundaries of the subject site be planted with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings. In addition, the heights of any buildings proposed will be reduced adjacent to existing housing at the site boundaries in order to reduce the visual bulk of the buildings.

5.1.3.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

Having regard to the remedial and reductive measures proposed during the construction period, the impact of the proposed development on the community will not be significant and any impact will be temporary in nature.

Having regard to the remedial and reductive measures proposed during the construction phase of the overall business park scheme it is considered that there be no significant negative impact on the community as result of the proposed development and any impact will be temporary in nature.

Operational Phase

The operational phase of the development which is the subject of this application will have no significant impact on the existing community.

Having regard to the remedial and reductive measures proposed during the operational phase of the overall business park scheme it is considered that there be no significant negative impact on the community as result of the proposed development.

Worst Case Scenario

The predicted impact will be the same as the potential impact.

5.1.3.6 MONITORING

No monitoring measures are required in this regard.

5.1.3.7 REINSTATEMENT

No reinstatement measures are required in this regard.

5.2 FLORA AND FAUNA

5.2.1 INTRODUCTION

This flora and fauna impact assessment has been prepared by Scott Cawley. It qualitatively assesses the development of lands in Grange Castle, County Dublin, within the context of the potential direct, indirect and cumulative impacts upon the flora and fauna presently existing on-site, and in the immediate environs.

The proposed development area is located within Grange Castle to the south-west of the Dublin conurbation. It is composed of agricultural grassland divided by hedgerows and wet ditches.

Methodology

The assessment comprised a constraints assessment on the 3rd November 2005 and a more detailed site survey on 31st March 2006. Bat foraging surveys were undertaken on 1st May 2006.

During the site visits a detailed account of the floral and faunal composition encountered during the survey was recorded. These, combined with desktop consultations of the following resources, produced the finalised baseline report as presented.

- O.S. maps for Co. Dublin;
- Site layout plans;
- EIS of proposed Integrated Circuit Manufacturing Facility in Grangecastle, Co. Dublin (2006);
- National Parks and Wildlife Service Database, The Department of the Environment, Heritage and Local Government.

The proposed development site was surveyed using the methodology outlined in the Heritage Council Habitat Survey Guidelines (Draft April 2005). The principal habitats present within the site were identified and classified using the Heritage Council's A Guide to Habitats in Ireland (Fossitt, 2000).

Floral nomenclature follows *An Irish Flora* (Webb, Parnell & Doogue, 1996) for Latin names and the *Census Catalogue of the Flora of Ireland* (Scannell & Synnott, 1987) for common names. Nomenclature for horticultural species follows the Royal Horticultural Society's *Encyclopaedia of Garden Plants* (Brickell, 1998).

Faunal identifications were confirmed using the following sources:

- *The Macmillan Guide to Birds of Britain & Europe*, Macmillan 1998,
- *The Complete Guide to Ireland's Birds* (2002), Dempsey E. & O'Cleary. M. Gill & Macmillan.
- *Exploring Irish Mammals*, Dúchas The Heritage Service 2001.

As opposed to floral investigations, the surveying of faunal usage of subject lands cannot be based upon direct sightings alone. The presence of fauna is substantiated through the detection of field signs such as tracks, habitats, markings, feeding signs, and droppings, as well as by direct observation. Likewise, bird species present on site are recorded along with any notable

avifauna habitats, droppings, or tracks. The likely species were assessed in relation to the habitats present within the site.

Ecological evaluation of the site and the assessment of significance of impacts follows guidance provided by the Institute for Ecology and Environmental Assessment and the Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000).

Designated areas and protected species

The nearest ecologically designated site is at the Grand Canal which is a proposed Natural Heritage Area. Proposed NHAs (pNHAs) are designated for their natural heritage value and are considered to be of conservation importance at a national level. pNHA's are offered legal protection under the Wildlife (Amendment) Act 2000, once their boundaries have been finalised and they have been formally adopted. This process of formal adoption for pNHAs is still on-going, however until such time pNHAs are offered protection under planning legislation, Planning Authorities are required to take these designated areas into consideration in planning decisions.

The Grand Canal pNHA is located approximately 1.6km north of the site. The site does appear to be hydraulically-linked to the Canal. The designation has been made on the basis of the presence of several important habitats including calcareous grassland, reedswamp, scrub and woodland as well as protected species such as otters. None of these habitats will be affected by the development at the proposed site.

5.2.2 RECEIVING ENVIRONMENT

The study area is almost entirely made up of agricultural grassland that was previously used for grazing livestock (cattle recorded grazing on site in 2005 but not in early 2006). This habitat type is generally of little or low ecological value, aside from the certain aspects and ecological functions identified below as being of ecological interest.

Whilst there are a few residential buildings surrounding the site of various ages, sizes and designs, their ecological importance is limited to being a potential roost and breeding sites for bats and birds.

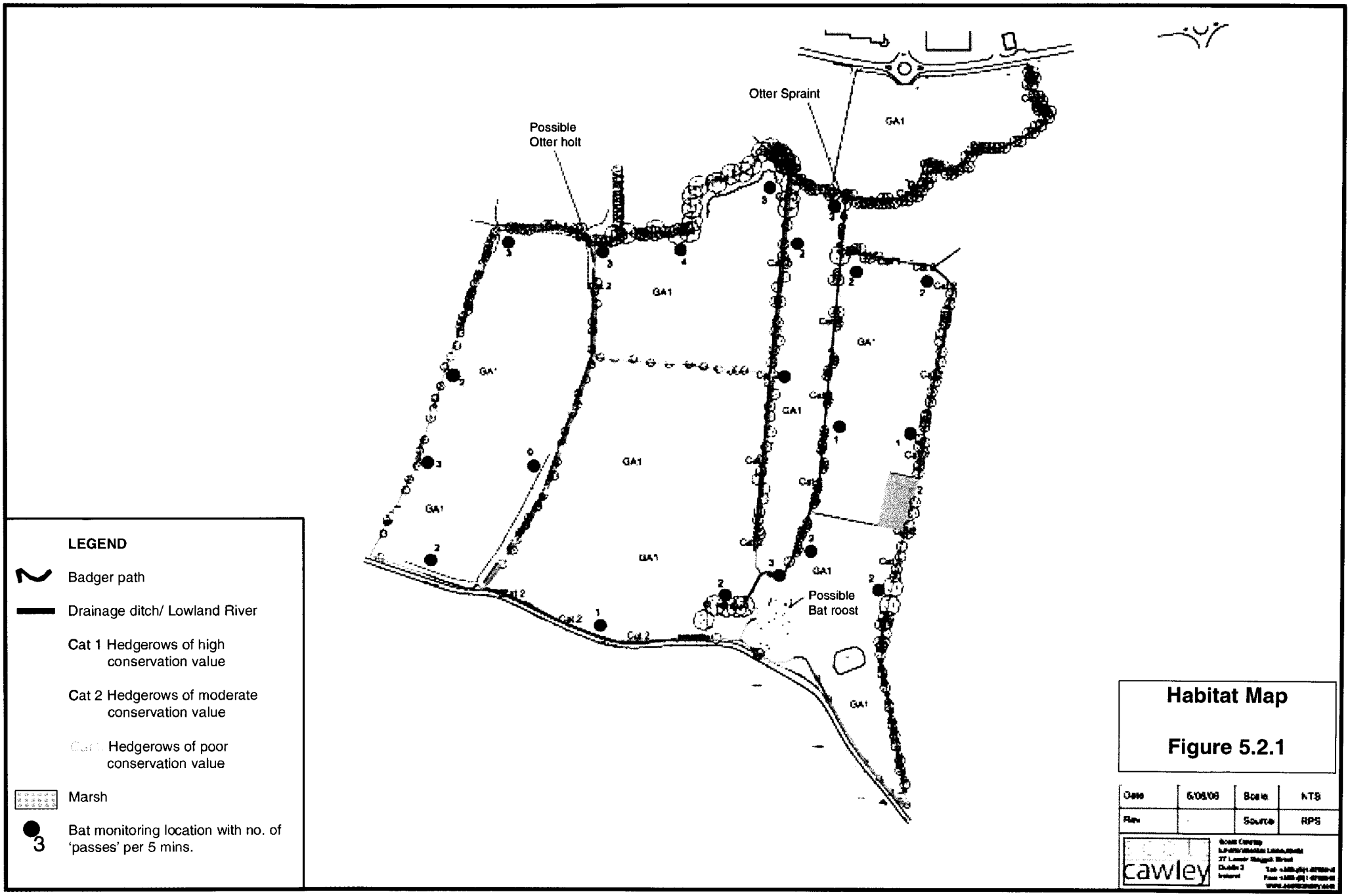
Field boundaries throughout the study area are formed by hedgerows that are of varying ecological quality, ranging from severely degraded and species-poor hedgerows to moderately species-rich mature hedgerows.

Habitats

This section describes the habitats that have been recorded in the study area. There is a relatively low diversity of habitats within the study area. The habitat types identified during the survey include the following categories:

- Grassland and Marsh Habitat;
- Woodland habitat;
- Freshwater habitat.

Figure 5.2.1 illustrates all habitat types present within the study area.


Otter Spraint
Possible
Otter holt
GA1
Possible
Bat roost
LEGEND
Badger path
Drainage ditch/ Lowland River
Cat 1 Hedgerows of high conservation value
Cat 2 Hedgerows of moderate conservation value
Hedgerows of poor conservation value
Marsh
Bat monitoring location with no. of 'passes' per 5 mins.
Habitat Map
Figure 5.2.1
Date
Scale
NTS
Rev
Source
RPS
cawley

Grassland and Marsh Habitat

Improved agricultural grassland (GA1)

Grassland habitat takes up the vast majority of the areas surveyed, in the form of typical improved agricultural grassland (GA1). This habitat occurs across the majority of the study area and has been used for cattle grazing. This type of grassland is characterised by open fields that contain a range of grass and broad-leaved species. Key species include meadow grasses (*Poa pratensis, P. annua*), ryegrass (*Lolium perenne*), crested dog's tail (*Cynosurus cristatus*), cock's foot (*Dactylus glomerata*) and broad-leaved species such as dandelion (*Taraxacum officinale*), creeping thistle (*Cirsium arvense*), spear thistle (*C. vulgare*), common nettle (*Urtica dioica*), ribwort plantain (*Plantago lanceolata*), broad-leaved dock (*Rumex obtusifolius*), creeping buttercup (*Ranunculus repens*), greater willowherb (*Epilobium hirsutum*) and common knapweed (*Centaurea nigra*).

All of these species are typical of agricultural grassland which experiences human influence in the form of grazing, mowing, fertilisation, planting and tilling. They offer a food source to birds (particularly crow (*Corvidae*) species) and to a range of invertebrates that feed on cattle dung. Overall, this habitat is of moderate ecological value and is well represented in the locality and throughout Ireland.

Woodland Habitat

There are no significant areas of woodland within the site, as is normally understood by the term "woodland". However, hedgerows (WL1) fall under this type of land-use. For the purposes of describing their importance in ecological terms, the hedgerows are rated from 1-3 with 1 = high conservation value, 2 = moderate conservation value and 3 =low conservation value. The criteria used for the classification system is reproduced below from the National Road Authority's *Guidelines for the Assessment of Ecological Impacts of National Road Schemes.*

Category 1: High Value, Local Importance

- Average shrub canopy height over 5m (note: a continuous line of mature trees over 5m is normally referred to as a treeline)
- Average width at ground level over 4m
- Dense ground cover
- Mature standard trees more than 5 per 50m length
- Gaps less than 10% per 50m length
- End connections to greater than 4 other hedges
- Dominant tree and shrub species mainly native
- Diversity of greater than 8 tree and shrub species
- Typical diverse woodland ground flora present
- Associated stream or drain with permanent water

Category 2: Moderate Value, Local Importance

- Average canopy height 2 to 5m
- Average width at ground 2 to 4m
- Patchy ground cover
- Mature standard trees 1 to 5 per 50m length
- Gaps between 10-30% per 50m length
- End connections to 2 to 4 other hedges
- Dominant tree and shrub species mixed native and non-native
- Diversity of 5 to 8 tree and shrub species
- Some woodland ground flora species present
- Parallel stream or drain with seasonal water only

Category 3: Low Value, Local Importance

- Average canopy height less than 2m
- Average width at ground less than 2m
- Little or no ground cover
- No mature standard trees
- Gaps more than 30% per 50m length
- End connections to less than 2 other hedges
- Dominant tree and shrub species mainly non-native
- Diversity of less than 5 tree and shrub species
- No woodland ground flora species present
- No parallel stream or drain

The hedgerows encountered in the site survey are described below.

Hedgerows (WL1) of high conservation value (Category 1)

Hedgerows bounding the watercourses in the northern half of the site and along the eastern boundary fall under this category. These are of high conservation value due to the relatively high species diversity, vertical composition, thickness and age. They generally comprise of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus agg.*) with some larger ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*). Large mature trees offer good nesting and refuge habitat for birds and bat species as well as providing fruit and insects that are preyed upon by these fauna. The hedgerows to the north and east have an established ground flora at its edge and include lords and ladies (*Arum maculatum),* lesser cellandine (*Ranunculus ficaria*), germander speedwell (*Veronica chamaedrys*) and dog violet (*Viola riviana*) and primrose (*Primula vulgaris*). See photograph 5.2.1 below.



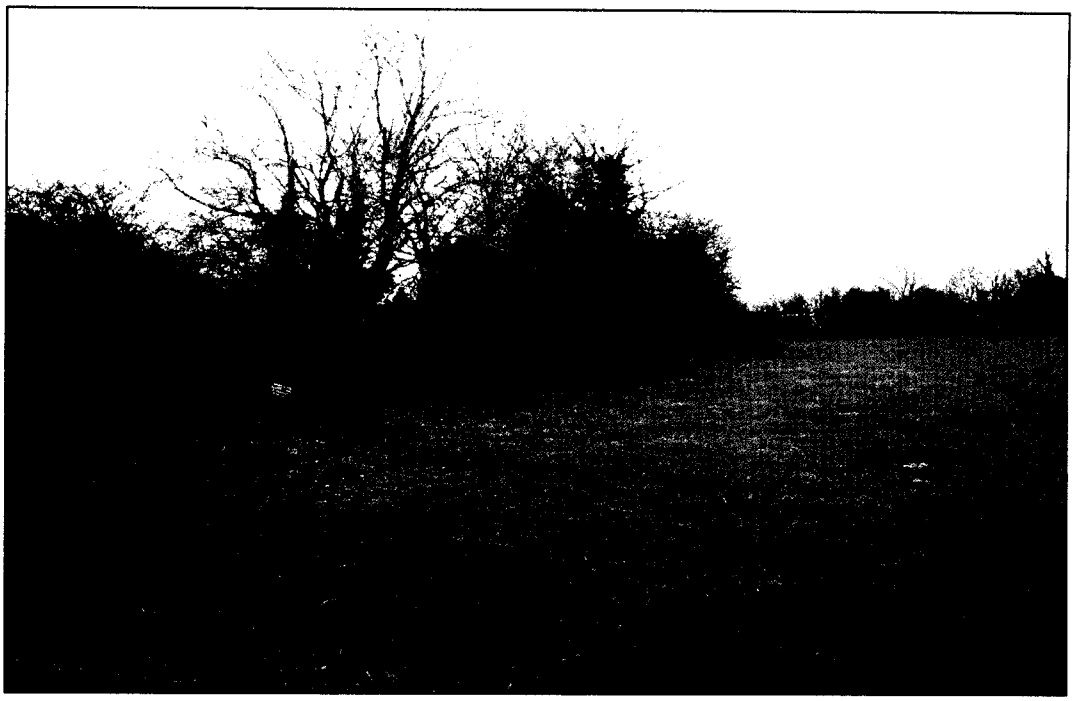
Photograph 5.2.1: Category 1 hedgerow on the left with mature trees in north east corner of site.

Baseline data collected for a neighbouring site also includes hogweed (*Brachypodium sylvaticum*), herb robert (*Geranium robertanium*), wood avens (*Geum urbanum*), bush vetch (*Vicia sepium*), hart's tongue fern (*Phylitis scolopendium*) and meadowsweet (*Filipendula ulmaria*).

Hedgerows (WL1) of moderate conservation value (Category 2)

There are several hedgerows of this category in the study area, principally in the western and mid to south portion of the site. These are of moderate conservation value due to the relatively high species diversity, vertical composition, thickness and age. They generally comprise of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus agg.*) with some ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*). They offer good nesting habitat for birds as well as providing fruit and supporting insects.

These differ from the category 1 hedgerow in that they are generally more 'gappy' and thinner in nature and are less species diverse. They are composed almost entirely of hawthorn, blackthorn and bramble with elder or ash found in low frequency of occurrence. Despite their sub-optimal structure they still perform valuable ecological functions as food sources and wildlife corridors and are found occupied by a broad range of bird species and alongside rabbits. See photograph 5.2.2.



Photograph 5.2.2: Example of Category 2 hedgerow.

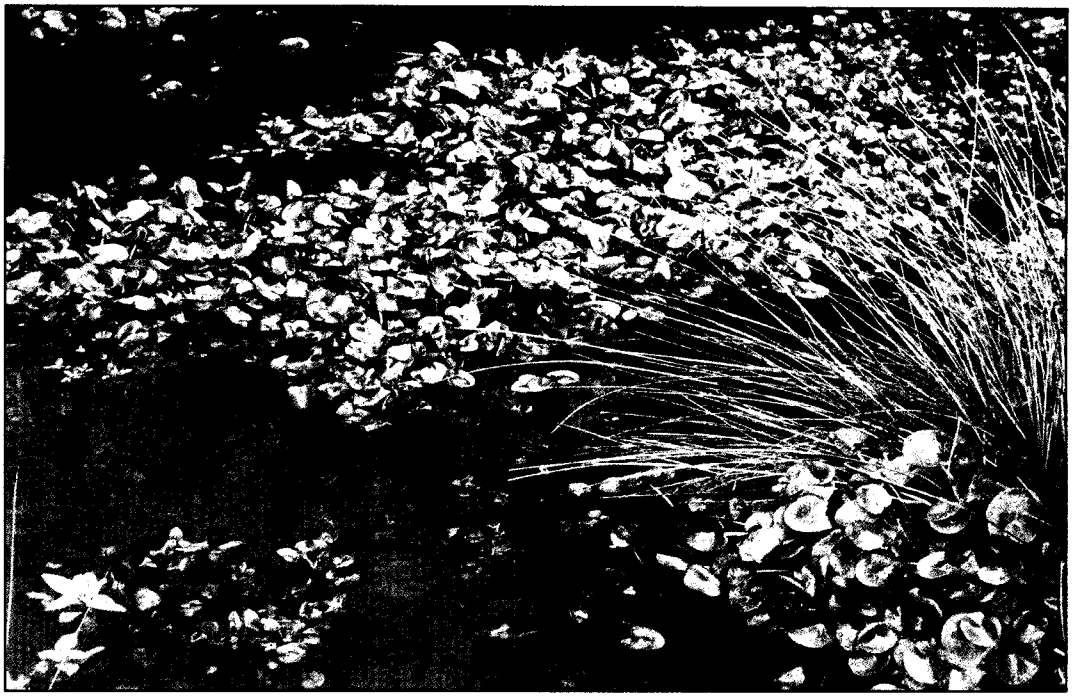
Hedgerows (WL1) of poor conservation value (Category 3)

These types of hedgerows are often broken lines of hawthorn or heavily managed hedgerows that have little ecological value. Such a hedgerow is found bisecting a field from east to west in the middle of the site.

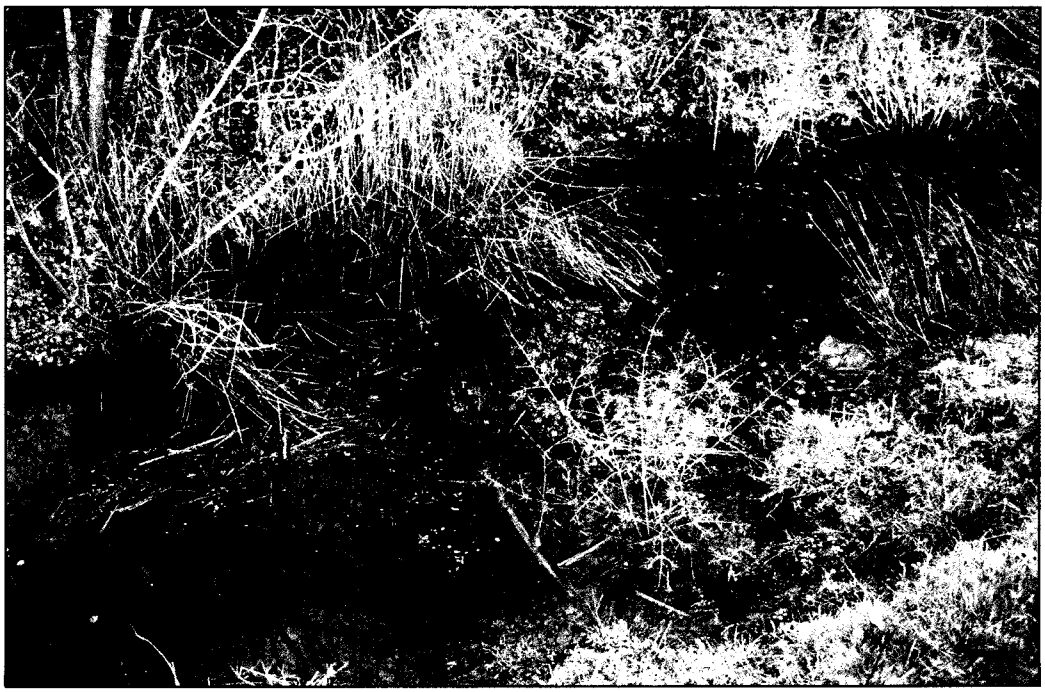
Freshwater

There are a series of connected drainage ditches/small streams that flow from south to north across the site in association with the hedgerows. These are of moderate ecological value and in places are heavily shaded by overhanging hedgerows. There was no noticeable in-stream vegetation where there were sections in shade. However, other drainage ditches were filled with Fool's watercress (*Apium nodiflorum*) and other emergent aquatic macrophytes such as flag iris (*Iris pseudacorus*).

A larger watercourse, a tributary of the Griffeen River, runs east-west through the northern portion of the site and is joined by another smaller watercourse that flows in from the west near the scrapyard. The stream is approximately 3m wide and up to 60cm deep in places and in some places is swift flowing. The substrate appears to be muddy with occasional patches of sand and gravel. Most of the watercourses in the northern portion of the site are shaded by hawthorn, ash and blackthorn riparian vegetation. Macrophytes were found to be growing in the stream where the wooded corridor opens up to allow light to penetrate. Aquatic macrophytes included soft rush (*Juncus effesus*), mare's tail (*Hippurus vulgaris*), fool's watercress, water mint (*Mentha aquatica*) and marsh marigold (*Caltha palustris*). See photographs 5.2.3 and 5.2.4 below.



Photograph 5.2.3: Marsh Marigold in the north-east corner of the site.



Photograph 5.2.4: Drainage ditch containing Mare's Tail

The semi-natural and undisturbed sections of this watercourse are ecologically important at a local level. The Griffeen River flows in the Liffey near Lucan and is an important sea trout spawning area according to the Eastern Regional Fisheries Board.

The site survey undertaken on 31st March 2006 noted the contamination of the river flowing from Baldonnell Aerodrome northward through the site. The

contaminant which was hydrocarbon-based, did not appear to be having any toxic effects on the watercourse fauna or flora but emitted a strong petroleum odour along its course.

Fauna

Detailed fauna assessments were carried out as part of this ecological assessment and specifically addressed use of the site by badgers, otters and bats.

Mammals

Badgers *(Meles meles)*
Evidence of badgers was present in terms of occasional feeding signs and well-used paths crossing the site in various locations as shown in Figure 5.2.1. It had previously been suspected that there may be a sett in the northern part of the site, in the location of the scrap yard. Dense vegetation prevented thorough survey of this area during the site visit. Two possible setts were identified close to the larger watercourse although the lack of other field signs evidence that they may be setts (no fresh digging, bedding or latrines nearby) and their waterside location may suggest more active use by otters (see later). No obvious badger setts were located within the site.

There are also old badger setts outside of the site boundary to the south, that have since been taken over by rabbits. Rabbits are abundant throughout the site.

Badgers, their breeding and resting sites are protected under the Wildlife Act (1976 as amended in 2000).

Otters (*Lutra lutra*)
There is evidence that otters are using the site for resting and commuting. Evidence on site includes an otter spraint (dropping) on a corrugated iron sheet in the water course in the north east corner of the site and a suspected otter holt on the northern site boundary adjacent to the watercourse near the scrapyard. The holt has a single entrance that is 2.5m above the stream level. There were no spraints around the site entrance that would usually suggest occupancy and no prints or other field signs nearby. However, detecting use of otter holts is often difficult and can only be confirmed by regular monitoring. Otters are thought to be using the drainage ditches as corridors to allow movements to the golf course and to other areas where they may be feeding.

Otters, their breeding and resting sites are protected under the EC Habitats Directive and under the Wildlife (Amendment) Act 2000. They are particularly sensitive to human disturbance and development pressures.

Bats
The stone farm buildings to the south of the site are regarded as potential bat roosts. The timing of the earlier surveys (Winter-early spring) prevented any bat surveys being carried out and this was remediated by undertaking a survey in early May 2006.

The methodology used to assess use of the site by bats involved bat surveyors measuring the frequency of encounters with bats over a five minute period in various locations around the site. Figure 5.2.1 shows these locations and the numbers of encounters or "passes". Two bat surveyors were used to cover the

site, each using heterodyne ultrasonic bat detectors to record the numbers and species of bats using the site.

The species of bats encountered included common and soprano pipistrelle bats (*Pipistrellus pipistrellus* and *P. pygmaeus*) and Leisler's bat (*Nyctalus leislerei*). Both pipistrelle species were noted commuting along the Category 2 and Category 3 hedgerows from south to north along the hedgerows aligned in this direction. They were also feeding along the Category 1 hedgerows near the watercourse and generally there were more "passes" encountered along these denser hedgerows.

Leisler's bats usually feed much higher and are the only bat to feed over open fields and parkland away from cover. They were recorded flying across the site in the southern portion near the farm buildings and also in the north west corner but could not be recorded visually.

Monitoring of the farm buildings during the emergence period did not conclusively reveal use of the building by bats although there were numerous possible access/exit points and coverage of all of the building could not be achieved. Pipistrelle bats were recorded in the vicinity of the buildings during this time.

The bat surveys were regarded to provide a crude indication of the use of the site for feeding and commuting. However, they were carried out early in the year and during cool conditions that are not optimum for bat feeding surveys. Therefore the results of the surveys should be treated with a degree of caution.

Currently there are nine species of bat known to breed in Ireland. All nine species and their roost sites are strictly protected under both European and national legislation as described below.

Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna 1992 (Council Directive 92/43/EEC)

The Habitats Directive offers legal protection to all nine bat species that occur in Ireland and lists them under Annex IV of the directive as species of community interest, in need of strict protection.

Wildlife (Amendment) Act, 2000 (S.I. No. 38 of 2000)

All bat species occurring in Ireland are listed in Schedule V of the Wildlife Act 1976 (amended by the 2000 Act) as protected species. This legislation makes it illegal to kill or injure bats in the wild and makes it an offence to wilfully interfere with or to destroy their breeding and resting places.

European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997)

These regulations give effect to the above two strands of European and national legislation. All bat species occurring in Ireland are listed in the First Schedule of these regulations. This legislation makes it an offence to deliberately capture or kill bats in the wild, to deliberately disturb them particularly during the breeding, rearing, hibernation and migration seasons, or to cause the deterioration or destruction of their breeding and resting sites.

Furthermore as a signatory to the European Bats Agreement (Agreement on the Conservation of Bats in Europe) 1993, Ireland is required to protect their habitats, requiring the identification and protection from damage or disturbance, of important feeding areas. All Irish bat species are listed in Appendix II of the Bern Convention, as species requiring strict protection. Finally, all but two bat species in Ireland are listed as internationally important in the Irish Red Data Book (1993). Natterer's and the whiskered bat are both listed as indeterminate. Given the site's geographic location, nature of the habitats of the site and knowledge of the area it is likely that the site is being used by at least five out of the nine species known to breed in Ireland.

Other species

Other species commonly found this agricultural setting include fox (*Vulpes vulpes*), rabbit, hedgehog (*Erinaceus europaeus*), pygmy shrew, (*Sorex minutus*), wood mouse (*Apodemus sylvaticus*) and brown rat (*Rattus norvegicus*). It is highly likely that these species would make use of the grassland, woodland and freshwater habitats present within the study area. Hedgehog and pygmy shrew are protected under the *Wildlife (Amendment) Act 2000.*

Avifauna

The habitats within the study area support a range of commonly found passerine bird species including magpie (*Pica pica*), hooded crow (*Corvus corone*), blackbird (*Turdus merula*), song thrush (*T. philomelos*) robin (*Erithacus rubecula*), wren (*Troglodytes troglodytes*), blue tit (*Parus caeruleus*) and a range of other species frequently encountered in agricultural fields and hedgerows. Other species also seen on site include goldfinch (*Carduelis carduelis*) and snipe (*Gallinago gallinago*). A buzzard (*Buteo buteo*) was also seen hunting over the site and rested on an ash tree in the middle of the site for a period of 15 minutes. Buzzards are slowly spreading their range further south and along the east coast and are now frequently recorded in Co. Dublin and Wicklow.

Barn owls (Tyto alba) are known to be present in areas to the west of the site (*Doherty, pers, comm.*). The proposed development site would represent good hunting habitat but there are no suitable roosting structures within the site boundary. A possible barn owl pellet was recorded under a mature ash tree on the western boundary. However the pellet was in poor condition and could not be confirmed as being from an owl. No owl sightings were recorded in this area during the site surveys.

Aquatic Fauna

The drainage ditches did not appear to contain any macroinvertebrates or fish although no specific intrusive surveys were undertaken. The ditch would be expected to support a degree of macroinvertebrate life although on-site observations indicated that the water quality is threatened by upstream pollution by hydrocarbons.

Habitats in the Surrounding Area

The habitats surrounding the proposed development site include built environments and grassland. The surrounding habitats are of similarly low ecological value to those found within the proposed development site.

Evaluation of Habitats

Evaluation of habitats follows the *Heritage Council's Draft Habitat Survey Guidelines* (2005) and the *Institute for Ecology and Environmental Management's Draft Guidelines for Ecological Impact Assessment* (2005). The former criteria are set out below:

Table 5.2.1:Scheme for Ecological Evaluation of Sites (after Nairn and Fossitt, 2004)

Rating	Qualifying Criteria
A	Internationally important • Sites designated (or qualifying for designation) as SAC or SPA under the EU Habitats or Birds Directives. • Undesignated sites containing good examples of Annex I priority habitats under the EU Habitats Directive. • Major salmon river fisheries. • Major salmonid (salmon, trout or char) lake fisheries.
B	Nationally important • Sites or waters designated or proposed as an NHA or statutory Nature Reserves. • Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). • Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000. • Major trout river fisheries. • Water bodies with major amenity fishery value. • Commercially important coarse fisheries.
C	High value, locally important • Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. • Small water bodies with known salmonid populations or with good potential salmonid habitat. • Sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. • Large water bodies with some coarse fisheries value.
D	Moderate value, locally important • Sites containing some semi-natural habitat or locally important for wildlife. • Small water bodies with some coarse fisheries value or some potential salmonid habitat. • Any water body with unpolluted water (Q-value rating 4-5).
E	Low value, locally important • Artificial or highly modified habitats with low species diversity and low wildlife value. • Water bodies with no current fisheries value and no significant potential fisheries value.

The development site itself is not under any conservation designation and there are no designated areas immediately adjacent to the proposed development site which could be impacted upon by the proposed development.

The majority of the proposed development site is characterised by agricultural grassland with hedgerows of varying quality. The Category 1 hedgerows that are associated with the watercourse in the northern part of the site are the most important ecological feature on the site and provide feeding and refuge for bats and for otters. This habitat is therefore regarded to be of high value with local importance as protected species (otters and bats) are present. Hedgehog and pygmy shrew which could also be present within these are protected under the *Wildlife (Amendment) Act 2000.*

5.2.3 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park on the subject site which will be known as *'Profile Park'*. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.2.4 POTENTIAL IMPACT OF THE PROPOSAL

Impacts significance terminology follows nomenclature provided in the NRA Guidelines referred to earlier. See Table 5.2.2 below.

Table 5.2.2: NRA Impacts Significance Terminology

Impact	Site Category				
	A sites Internationally important	**B Nationally important**	**C High value, locally important**	**D Moderate value, locally important**	**E Low value, locally important**
Severe negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent beneficial impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor positive				Permanent impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

Construction Phase

The potential negative impacts associated with the construction phase of this proposed roads and infrastructure development will involve the physical and direct disturbance of most of the habitats within the proposed development site. Aspects of the construction phase that are likely to be *potential* sources of significant ecological impacts include:

- Vegetation Removal
- Topsoil stripping
- Use and storage of chemicals and fuels on site
- Culverting of watercourses
- Security lighting, noise and vibration.

Direct Impact
For the purposes of this assessment it is assumed that site clearance will involve removal of the hedgerows and grassland habitat within the entire site boundary. The loss of these hedgerows is regarded to be of major negative significance in the absence of any mitigation. It will remove feeding areas and cover for bats, otters and other fauna that currently use the hedgerows within the site.

Topsoil stripping will follow vegetation removal. In the absence of any controls in place, there is a potential risk of wind-blown soil and dust reaching the watercourses and causing adverse impacts downstream. Such impacts are usually temporary and intermittent unless soils are stored close to watercourses when such impacts can be more prolonged.

Materials, including fuels, concrete, cement, biocides etc when stored incorrectly or at inappropriate locations often pose a risk to watercourses. Abnormal events such as spillages and leaks may also give rise to pollution of water bodies.

The tributary of the Griffeen River that flows into the site from the east will require culverting as a result of the proposed roads and infrastructure development. This has the potential to adversely impact upon the aquatic fauna within and downstream of the culverted sections as well as the fauna that use the watercourse as a refuge and for feeding. The proposed works will require the removal of the possible otter holt. This will require derogation from the EC Habitats Directive as such works have to potential to constrain the territorial range of otters in this area. In the absence of any mitigation this impact is regarded to be moderately negative as the impact is localised upon the watercourses.

Indirect Impact
The accumulation of water on site during the construction works has the potential to lead to sediment being allowed to flow into the nearby watercourses unless controlled. This could have potential significant adverse effects upon aquatic fauna and flora both in the Griffeen River and downstream into the Liffey, although the effects will diminish with increasing distance as the dilution factor also increases.

Security lighting at the site perimeter and within the site, as well as machinery noise and vibration have the potential to disturb breeding birds and fauna within and off-site. Whilst insects are often attracted to lights, most bat species will not feed near bright lights and will not use commuting routes that are illuminated.

Cumulative Impact
The significance of the cumulative loss of hedgerows and grassland habitat in south west Dublin needs to be taken into account in this assessment. Whilst it is difficult to obtain quantitative data on the rate of habitat loss, the following ecological issues are deemed to be pertinent with regard to the proposed development.

Reduction of semi-natural habitat

- The cumulative loss of grassland and hedgerow habitat is regarded to be significant at a local level (ie southwest County Dublin) but not significant when assessed at a regional or national scale.
- The cumulative impacts upon protected species are manifested in the reduction.

Reduction of habitat for protected fauna

- Cumulative loss of feeding and refuge areas for bats, barn owls, badger and otters is regarded to be significant at a local level (i.e. SW Co. Dublin) and moderately significant when assessed at a regional or national scale. There is evidence locally that otters can tolerate well-designed business park environments but there is little research undertaken to inform how such developments affect their territorial ranges.

Operational Phase

The potential negative impacts associated with the operational phase of this proposed roads and infrastructure development are primarily associated with noise and disturbance issues. Aspects of the operational phase that are likely to be *potential* sources of significant ecological impacts include:

- Lighting of car park and environs
- Traffic and machinery noise
- Discharges of surface water

Direct Impact
There are no potential direct impacts within the site anticipated from the operation of the development. This assessment does not address future land-uses that may arise as a result of permitting access into this site.

Impacts caused by the site design may affect movements of otters and other fauna across the site. Otters usually follow watercourses and will prefer to travel over land than travel through culverted sections. This puts them at risk of collision with vehicles.

Indirect Impact
Potential indirect impacts could result from untreated surface water or spillages of contaminants entering the Griffeen River off-site unless suitably treated or controlled.

Vehicular movement and lighting around the site perimeter have a similar potential to cause off-site impacts such as those described earlier.

Cumulative Impact
There are no predicted cumulative impacts as a result of the operation of the proposed development.

5.2.5 REMEDIAL OR REDUCTIVE MEASURES

Mitigation by Reduction

Taking measures to limit the working area during the construction phase will reduce the impacts of the development on hedgerows and grassland that do not require removal. The construction area will be clearly delimited and machinery will operate only within the allocated area. This will result in seven hedgerows being affected within the site.

The length of watercourses to be culverted have been minimised by careful site design. Wherever possible within the site design, the existing watercourses and the riparian vegetation will be left untouched.

During dry windy days in the construction period dust preventative measures as outlined in Section 5.6 of this EIS will be implemented to prevent any dust blow to areas outside the delimited construction areas.

Any fuels which it is necessary to store on-site will be contained within specially constructed bunds to ensure that fuel spillages whether accidental or otherwise are fully contained. Such bund areas shall be roofed to exclude rainwater. A spill tray will be used when re-fuelling vehicles and machinery on-site.

An emergency spill response kit will be held on site with an absorbent material to deal with any accidental oil or petrol spills. This absorbent material will be properly disposed of after use.

Mitigation by Avoidance

The hedgerow and mature trees should not be cut or removed between the beginning of March through to the end of August to avoid negative impacts to nesting birds and mammals species.

There are no additional practical measures which can be implemented for the further avoidance of impacts on hedgehogs and pygmy shrew which are protected mammal species.

Mitigation by Remedy

In order to compensate for the loss of riparian vegetation, additional ash and hawthorn hedging will be planted to abut the riparian corridor. Relocation of hedgerow vegetation to suitable areas is a viable option and will be agreed with the contractor.

If it is proposed to landscape the area in association with the proposed design, then landscaping plans should have an emphasis on the use of native species as far as possible. Suggested landscaping planting in this regard is as follows:

Suggested Species for Planting

• Oak	*Quercus robur & Q. petrea*
• Ash	*Fraxinus excelsior*
• Silver Birch	*Betula pendula*
• Field Maple	*Acer campestre*
• Hawthorn	*Crataegus monogyna*
• Alder	*Alnus glutinosa*
• Goat Willow	*Salix caprea*
• Guelder Rose	*Viburnum opulus*
• Hazel	*Coryllus avellana*
• Blackthorn	*Prunus spinosa*
• Elder	*Sambucus nigra*
• Yew	*Taxus baccata*
• Buddleja	*Buddleja davidii*
• Holly	*Ilex aquifolium*
• Honeysuckle	*Lonicera periclymenum*
• Dogrose	*Rosa canina*
• Fieldrose	*Rosa arvensis*
• Ivy	*Hedera helix*

Non-native exotic species will not be included within the landscaping and in particular invasive species such as rhododendron, Japanese knotweed and cherry laurel will not be used.

Where roads pass over the larger watercourses in the northern portion of the site, separate dry 600mm diameter culverts will be provided to allow safe passage for wildlife under the roads. The invert level underpasses will be raised above the high water level to ensure that they remain dry.

5.2.6 PREDICTED IMPACT OF THE PROPOSAL

Taking the above mitigation measures into account, the following predicted impacts will apply.

Construction Phase

Direct Impact
The loss of hedgerow habitat may be compensated by replanting or relocation of hedgerows so that there is no net loss of hedgerow habitat. However, the ecological functions of the hedgerow will be diminished as the disturbance of habitats during construction will push otters, badgers and bats away from the site. The residual impacts of this disturbance is likely to be temporary but monitoring of bat, badger and otter activity will help to determine the level of impact prior to any further development of the site.

Indirect Impact
The careful control of the construction works (i.e. confining works to within the site boundary, clearly delimiting the boundary, the use of fuel bunds, spill trays and emergency response kits, dust preventative measures) will reduce any potential indirect construction related impacts on off-site areas.

Operational Phase

Direct Impact
It is possible following reinstatement of the site that flora and fauna will recolonise the area. This will be monitored by further surveys of bats, badger and otter activity to provide further information on the effects of such developments on these species.

There are not anticipated to be any significant impacts from the operation from the development.

Indirect Impact
Off-site impacts on the Griffeen will be effectively mitigated by proposed surface water attenuation and interception systems and are not deemed to be significant.

5.2.7 MONITORING

In order to identify any unforeseen effects during construction and operation of the proposed development, the following monitoring measures are proposed:

- Water Quality monitoring of any off-site discharges
- Monitoring of use of wildlife underpasses (quarterly for two years following completion)
- Monitoring for otter, bat and badger activity (twice per year in appropriate seasons)
- Annual monitoring of condition of planted or relocated hedgerow vegetation.

5.2.8 REINSTATEMENT

Reinstatement measures that would restore the site to pre-development conditions are not possible in this type of development. All proposed works are permanent and irreversible.

5.3 GEOLOGY, SOILS AND HYDROGEOLOGY

5.3.1 INTRODUCTION

This chapter describes the bedrock geology and soils at the proposed development site. The information is based on a desktop study, site walkover and trial pit investigation by a WYG hydrogeologist. This assessment of geology and soils has been undertaken in accordance with the *Draft Guidelines on the Information to be contained in Environmental Impact Statements* (EPA, 2002), the Institute of Geologists of Ireland guidelines for *Geology in Environmental Impact Statements* and also *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* (EPA, 2003).

Desk study information was attained from a number of sources including:

- Geological Survey of Ireland's Sheet 16 – Geology of Kildare - Wicklow (GSI, 1999).
- Geological Survey of Ireland's National Draft Bedrock Aquifer Map.
- Existing White Young Green (WYG) database.
- Ordnance Survey of Ireland (OSI) Discovery Series Map 50, 1:50,000.

The impact of construction and operation of the proposed development at the site on the underlying soils and geology is discussed and evaluated. Potential impacts are noted and mitigation measures are proposed.

5.3.2 RECEIVING ENVIRONMENT

Bedrock Geology

Regional Geology

The Geological Survey of Ireland's Sheet 16 – Wicklow - Kildare (GSI, 1999) provided an illustration of geology of this area of Co. Dublin. The bedrock of the Dublin City region is mainly composed of Calp Limestone and Shale. To the south-east of Dublin city lie the Leinster Granite plutons, while the southwest is dominated by siltstones, muddy limestones, greywackes and shales. Directly north and west of the city there are areas comprising of Waulsortian limestones around Lucan and Blanchardstown. The regional geology is shown on figure 5.3.1.

Local Geology

The bedrock geology of the site location is Calp which reportedly consists of dark grey to black limestones and shales. The bedrock in this area is shallow, ranging from 3 – 5m below ground level.

Quaternary Geology

Twenty-nine trial pits were excavated across the site in March 2006 to depths ranging from 1.5m below ground level (bgl) to 3.75m bgl. For the majority of the site quaternary deposits overlie the limestone bedrock. These deposits range from sandy gravely clays to gravely clays and in general are termed Glacial drift deposits. The depth of these deposits varied from 1.5m bgl to 3.5m bgl. Below this, a layer of fractured limestone was encountered becoming competent limestone with depth.

On the eastern side of the site an area of land was known to have received fill material in the past. There is a water treatment facility managed by Baldonnel

Aerodrome in this area. This infilled area was investigated more comprehensively than the other areas of the site in order to determine the content and extent of the waste material. The material consisted largely of construction and demolition wastes and was found to persist to at least 3.5m bgl in many of the excavations. This area has been identified separately on the site layout plan (see figure 5.3.2). Full details of the trial pit logs are presented in Appendix B.

Figure 5.3.1: Regional Geology

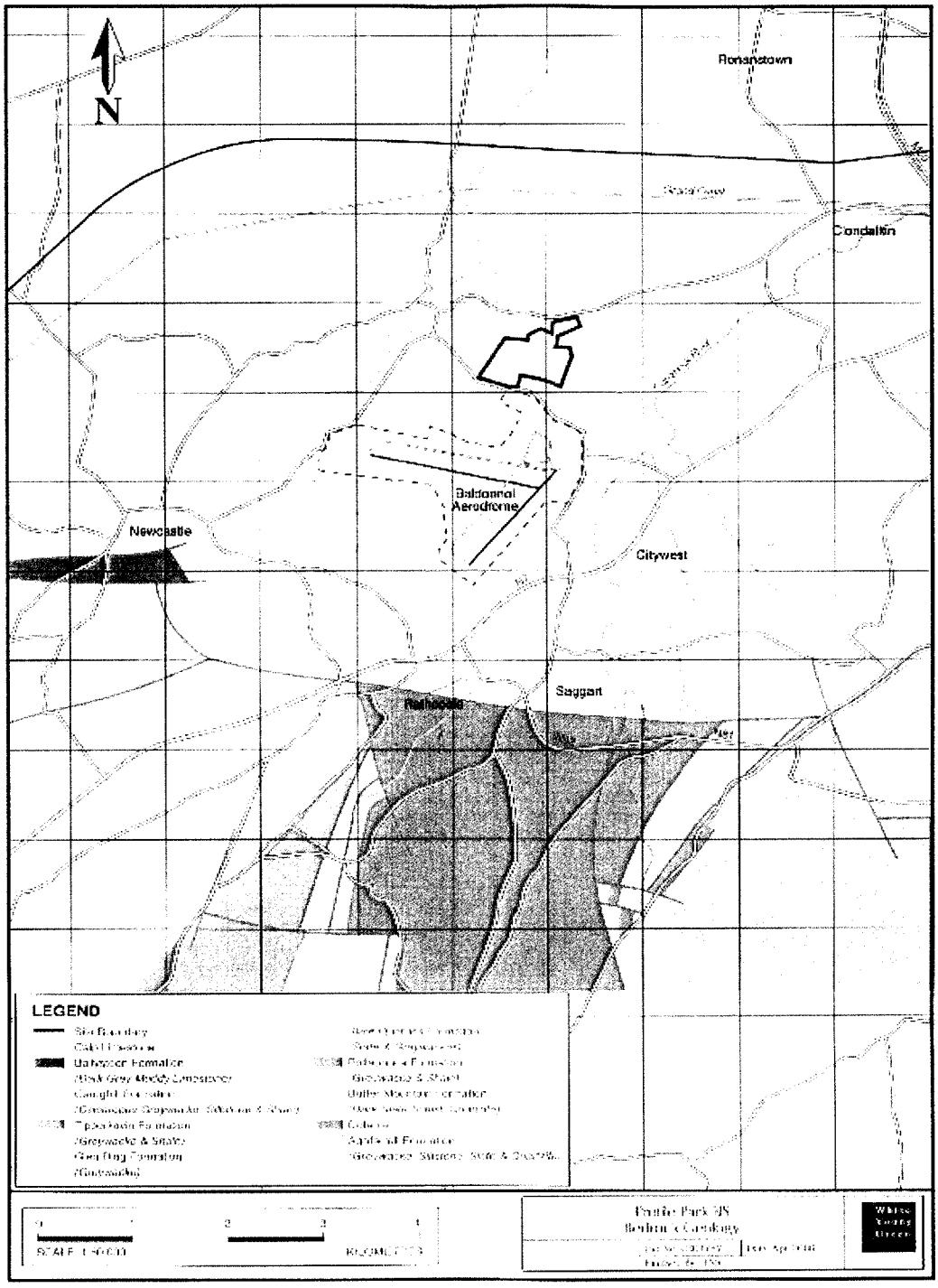
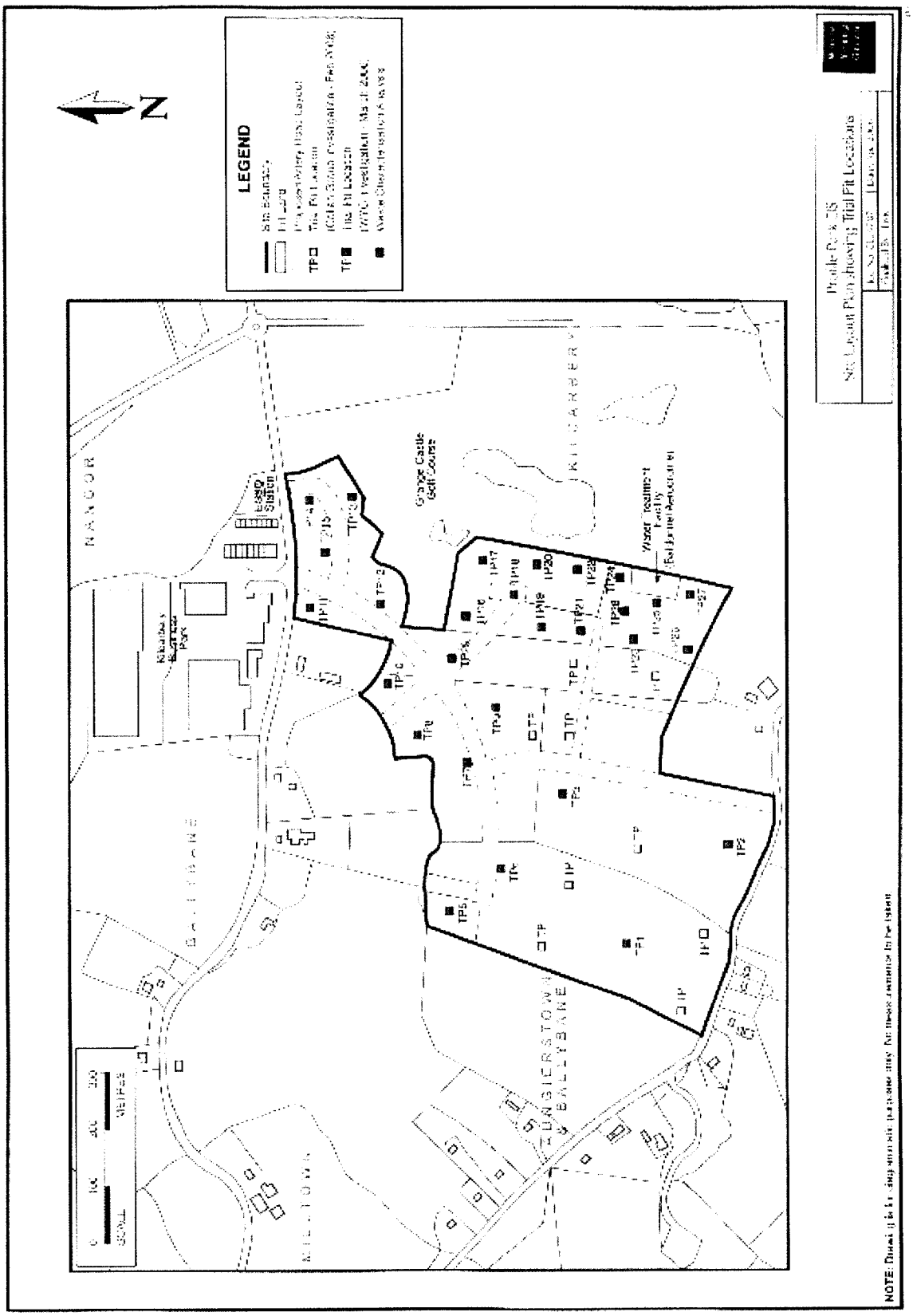


Figure 5.3.2: Site Layout Plan Showing Trial Pit Locations



Hydrogeology

There was no borehole drilling undertaken during the investigation. The information relating to the hydrogeological setting at the site is derived from trial pit information and a desk based study using the Geological Survey of Ireland (GSI) database.

Previous studies carried out in the area surrounding the site has indicated that the groundwater table is within the weathered limestone bedrock 1m to 2m bgl. The recent trial pit investigation carried out on the site encountered groundwater inflows between 1m and 3.5m bgl.

The Griffeen River drains parts of the site and the River Liffey lies approximately 4.5km to the north of the site. Groundwater flow on the site will be influenced by topographic gradient and regional groundwater flows would be expected to flow to the north or northeast either towards these rivers or sub-parallel to the river flow direction.

Aquifer Classification

The Geological Survey of Ireland has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification depends on a number of parameters including, the areal extent (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater throughput (Mm^3/d). There are 3 main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

Information from the GSI's National Draft Bedrock Aquifer Map which is shown on Figure 5.3.3 indicates that the site lies on an area which is classified as Locally Important Aquifer (Lm), i.e. bedrock which is moderately productive only in local zones.

Aquifer Vulnerability

The vulnerability of an aquifer to contamination is determined by the nature and thickness of the overburden material overlying it. The classification guidelines, as published by the GSI, are given in Table 5.3.1 below. The groundwater protection scheme for Co. Dublin is not yet completed. As such the vulnerability of the site has been determined from Table 5.3.1.

Figure 5.3.3: Bedrock Aquifer Map

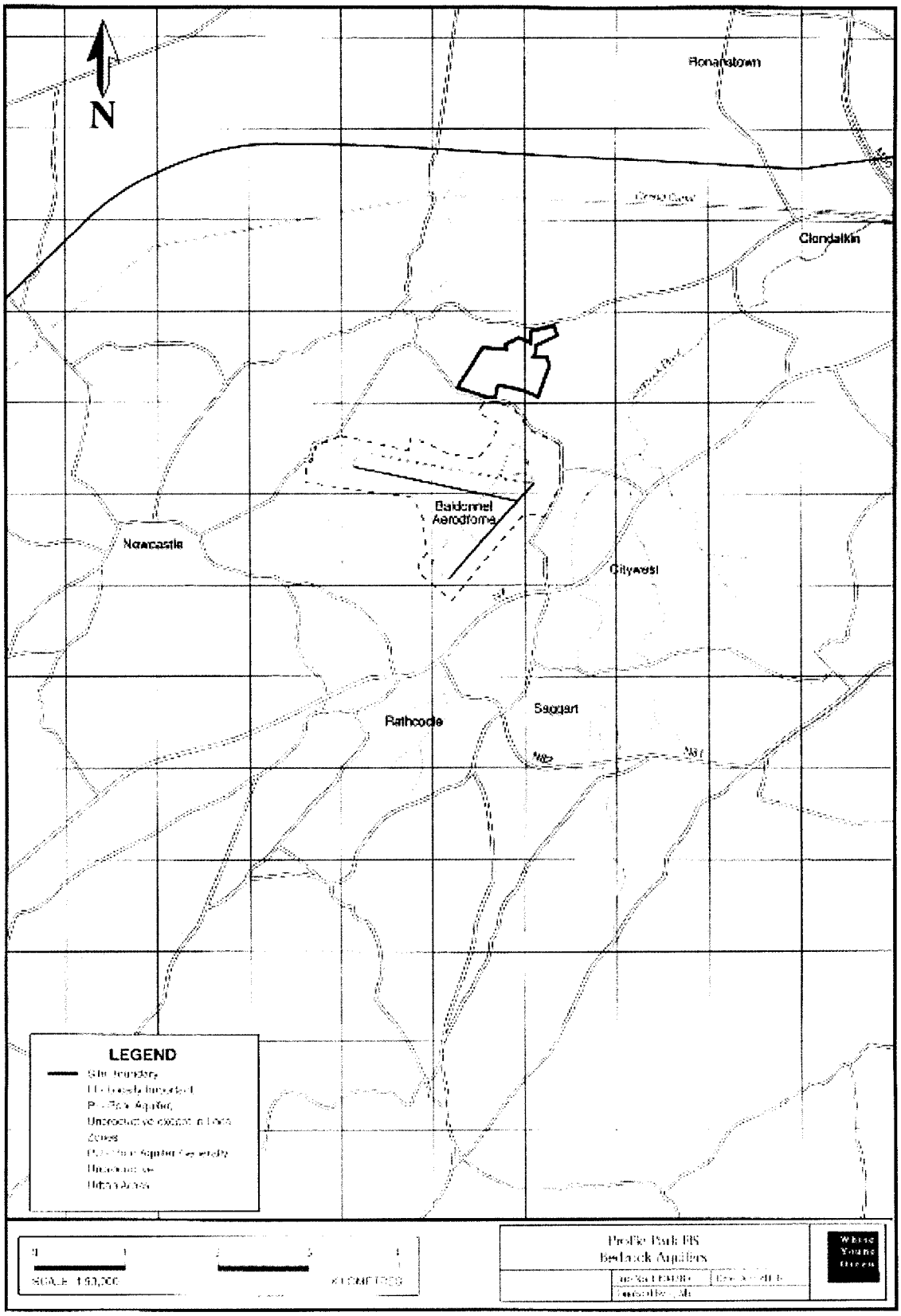


Table 5.3.1:GSI Vulnerability Mapping Guidelines (from Daly & Warren 1997)

Vulnerability Rating	Hydrogeological Requirements				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Recharge Type
	high permeability (sand/gravel)	moderate permeability (sandy till)	low permeability (clayey till, clay, peat)	(sand & gravel aquifers only)	
Extreme	0-3.0m	0-3.0 m	0-3.0m	0-3.0m	point (>30 m radius)
High	>3.0	3.0-10.0m	3.0-5.0m	>3.0m	diffuse
Moderate	N/A	>10m	5.0-10.0m	N/A	diffuse
Low	N/A	N/A	>10.0m	N/A	diffuse
Notes: i)N/A =not applicable ii) Precise permeability values cannot be given at present iii) Release point of contaminants is assumed to be 1-2 m below ground surface					

As the table above indicates, the less permeable and thicker the overburden overlying an aquifer is, the lower the vulnerability of the aquifer to contamination.

The GSI Groundwater Protection Scheme indicates therefore that the vulnerability across the development area is likely to range from high (H) to extreme (E).

Composition and Extent of Waste Material

Waste material was encountered in the eastern area of the map (see figure 5.3.2) which extended from the north as far as the water treatment facility. The depth of this material ranged from 2.50m to 3.75m in thickness and comprised gravely clays with cobbles and boulders of limestone and concrete. Wood was encountered in many of the trial pits in this area, in particular TP23 which had a layer of wood and branches approximately 0.5m in thickness. Bricks, plastics and some metals (wiring, hub cap etc.) were occasionally encountered. It is clear that this waste is derived from construction and demolition operations. At no point was any domestic type refuse encountered.

Three Waste Characterisation analyses were performed on arisings from three trial pits excavated in this area (TP16, TP22, and TP23). This analysis was carried out in line with the EPA guidance for Waste Characterisation. The form used in this analysis is presented in Appendix B. The overall results from this analysis indicate that the following materials make up the majority of waste in this part of the site.

- Unclassified Incombustibles (Stones, concrete, soil clasts) 79.7%
- Fine elements smaller than 20mm round mesh 16.8%
- Other unclassified combustibles (Wood, branches) 3.4%
- Other metal waste 0.04%
- Other glass waste 0.02%
- Other plastic waste 0.01%

As a general rule, land which contains more than 3% wood material is considered to pose a risk in terms of methane generation. The average wood component of the three waste characterisations was just above this value and therefore requires action.

Gas Monitoring

Soil samples obtained from the trial pits were analysed for the following gases: carbon monoxide, oxygen, VOCs (volatile organic compounds), hydrogen sulphide (H_2S) and methane (expressed as LEL, lower explosive limit). The results of this monitoring are presented in Appendix B.

In summary, the only area of land investigated which returned gas levels outside the ambient levels was the area of land which infilled. These gas levels correspond to the areas in which wood, wood derivatives and plastic materials were encountered. The degradation of these compounds leads to the generation of gases. Background levels of oxygen were measured at 20.9%. Oxygen levels were slightly reduced in many of the trial pits in the infilled area, the lowest being 18.2% in TP19. The reduced oxygen values reflect the presence of CO and methane. Although methane was detected, these were at very low levels and did not exceed the EPA recommended guideline of 1% LEL methane in any sample.

Soil Chemical Analysis

Soil samples were taken from various depths in trial pits across the site. The soils were analysed in ALcontol Laboratories, Dublin for metals, diesel range organics, mineral oils, volatile organic compounds and leachability. The full results from these analyses are presented in Appendix B.

In order to assess the soil analyses results with regard to potential human health risks, WYG have derived Threshold Screening Values (TSVs) in accordance with the UK framework outlined by the UK Environment Agency (EA) and the Department for Environment, Food and Rural Affairs (DEFRA). The most recent CLR (Contaminated Land Report) documents CLR7-10 (EA/DEFRA, 2002) set out the basis for this assessment.

Research by the EA is ongoing to produce toxicology reports (TOX series) for each of the contaminants identified within the CLR framework with the aim of producing published Soil Guideline Values (SGVs) using the Contaminated Land Exposure Assessment (CLEA) Model. To date, SGVs have been published for only a limited suite of contaminants, with current SGVs derived for four different land use scenarios namely:

- residential with plant uptake;
- residential without plant uptake;
- allotments; and
- commercial/industrial.

Since a retail/commercial development is proposed for the site, WYG TSVs (Issue 6f) applicable to commercial/industrial end use have been used for assessment of the risk for the site. Where SGVs have been published by the EA, these are adopted as the TSVs. For all other contaminants, TSVs for different land use scenarios have been derived by WYG in accordance with the CLR framework.

In the absence of SGVs or the TSVs derived by WYG, the Dutch Intervention Values (DIVs) have been quoted as guidance.

Metals

There were no exceedances of the respective TSVs for any of the metals analysed in this investigation. The area of land which received waste in the past returned higher concentrations in general but still fell within acceptable levels based on the commercial/industrial nature of the end use of the development. The results are displayed in Table 5.3.2 below.

Table 5.3.2: Soil Metal, DRO and Mineral Oil Concentrations, April 2006

Determinand	Units	Agricultural Land		Infilled Land		WYGE TSV*
		Min	Max	Min	Max	
Arsenic	mg/kg	<0.5	<0.5	<05	156	500
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	1400
Chromium	mg/kg	13	28	15	35	5000
Copper	mg/kg	21	41	7	89	8600
Lead	mg/kg	8	46	8	105	750
Mercury	mg/kg	<0.3	<0.3	<0.3	<0.3	480
Nickel	mg/kg	28	85	17	79	5000
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	8000
Zinc	mg/kg	50	134	58	996	46100
Boron	mg/kg	<1	<1	<1	<1	-
DRO	mg/kg	<1	<1	<1	<1	
Mineral Oil	mg/kg	<1	<1	<1	1	

* White Young Green Threshold Screening Values based on CLEA and Dutch Human Health Values

Diesel Range Organics

There were no detections of any diesel range organics in any of the standard soil analyses. There was one detection of trace concentrations of mineral oil (1 mg/kg) in TP22 which is located in the infilled area. The industry standard remediation guideline value for mineral oil is typically 100mg/kg and as such the detection in TP22 is insignificant.

Leachates

Leachate analysis on soil samples provides information on the maximum potential for a given sample of soil to contaminate groundwater. It should be noted that leachate analysis does not necessarily indicate that contamination is occurring. The EPA has derived Interim Guideline Values (IGVs) for the protection of groundwater. Leachate results have been compared to these EPA guideline values to give further indication of the soil quality at the site.

The leachate analysis was performed on 10 samples from 5 trial pits, 3 of which were located in the infilled area (TP19, TP22, and TP23). This analysis was performed to ascertain the potential for the material to contaminate groundwater. The results of the leachate analysis are displayed in Table 5.3.3 below.

Table 5.3.3: Soil Leachate Concentrations, April 2006

Determinand	Units	Agricultural Land		Infilled Land		IGV*
		Min	Max	Min	Max	
Dissolved Arsenic	mg/l	<0.001	0.012	0.002	0.006	0.01
Dissolved Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	0.005
Dissolved Chromium	mg/l	0.002	0.003	0.003	0.005	0.03
Dissolved Copper	mg/l	0.005	0.009	0.006	0.020	0.03
Dissolved Lead	mg/l	0.004	0.174	<0.001	0.007	0.01
Dissolved Mercury	mg/l	<0.00005	0.00012	<0.00005	0.00012	0.001
Dissolved Nickel	mg/l	0.001	0.002	0.003	0.009	0.02
Dissolved Selenium	mg/l	0.001	0.003	0.002	0.006	-
Dissolved Zinc	mg/l	0.029	0.037	0.020	0.035	0.1
Dissolved Boron	mg/l	0.008	0.088	0.007	0.061	1
Dissolved DRO	mg/l	<0.01	<0.01	<0.01	4.87	0.01
Dissolved Mineral Oil	mg/l	<0.01	<0.01	<0.01	0.97	0.01

*Interim Guideline Values for groundwater, EPA.

The results of the leachate analyses on the soils at the site indicate that for the most part, there is no risk of contamination of groundwater from the overburden. There were however two trial pits which were an exception to this, TP9 and TP19. The leachate results for lead in TP9 (0.174mg/l) exceeded the IGV of 0.01mg/l. This result is surprising given the visual observation of the sample, the absence of any obvious source, and the soil quality of the surrounding agricultural land. As such this value is considered anomalous. The leachate results for TP19 (4.87mg/l) for DRO and mineral oil (0.97mg/l) exceeded the respective IGV of 0.01mg/l and indicate an isolated pocket of hydrocarbon related contamination in the infilled land.

Volatile Organic Compounds

There were no detections of any volatile organic compounds in the soil samples sent for analysis.

Conclusions of Site Investigation

From a quality point of view, the soils present across much of the site are good. There are isolated elevated concentrations of lead, DRO, and mineral oil in the leachate analyses at 2 of the 29 locations. These are not considered to be significant due to the localised extent of the contamination and can easily be resolved by removal of the source material to a licensed facility for disposal.

The area of the site which has received waste in the past comprises mainly inert fill material and as such the results reflect this. While the concentrations of metals were higher in this area they were below the respective TSVs and as such do not pose a risk to the environment or human health.

The presence of wood material within this area may lead to methane generation. The gas monitoring undertaken indicated that there were some areas where there was some low level methane generation. Removal of the main area of the wood source (TP23, ~6% wood material) would be required in order to reduce further gas generation. This would reduce the average percentage of wood calculated at the site to below 3% which is the recommended industry standard action level.

5.3.3 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park, to be known as *'Profile Park'*, on the subject lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout, all on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.3.4 POTENTIAL IMPACTS OF THE PROPOSAL

Construction Phase

The construction phase will involve the disturbance and removal of topsoil and overburden. Site preparation works will involve site clearance, excavation and construction of roads and service lines. This will have a direct impact on the soils present at the site. However, as the soils are of no conservation value, this impact is not considered to be significant.

There is an increased risk of groundwater contamination resulting from spills or leaks from machinery or storage areas due to bedrock being exposed during overburden removal.

An area of the site has received infill waste in the past. This material largely consisted of construction and demolition waste with some wood. The majority of the wood encountered during the investigation was found in TP23. Results to date suggest that this material is producing low levels of methane.

The trial pit investigation across the rest of the site has proven that the overburden is glacial till and free from contamination. However, in the event of excavation operations discovering material which appears contaminated, this material should be stockpiled, analysed and disposed of if necessary to a licensed facility under the supervision of a qualified scientist.

There is the potential for dust generation during the construction phase of the development.

Operational Phase

The operational phase of the development will not involve unlicensed direct emissions to the soil or groundwater environment. Any discharges to groundwater of surface waters will require a permit or licence from the local authority or EPA.

There will be increased volumes of traffic on the site as a result of the development which will lead to increased risk of leakage of fuels from vehicles which have the potential to impact on the underlying aquifer.

5.3.5 REMEDIAL OR REDUCTIVE MEASURES

The remedial (or mitigation) measures proposed are put forward to address the potential impacts on the soils and groundwater at the site resulting from the construction and operation of the roads and services which will facilitate the future business park development.

It is advisable to remove the areas containing wood material in order to reduce methane gas generation. The area at TP23 should be excavated and screened for wood materials. This area can be extended during the removal works depending on visual observations of wood content.

In order to provide further assurance that there will be negligible methane generation from the fill material, a network of up to 6 gas monitoring wells could be installed across the infilled area in order to monitor during the construction phase.

Removal of the soils found in TP19 should be carried out in order to remove the isolated hydrocarbon contamination.

The construction works will involve the disturbance of soils at the site. This disturbance should be kept to a minimum. Where disturbance is unavoidable, the material should either be stored in stockpiles prior to reuse at the site or removed from the site. These stockpiles should be managed in a way to prevent negative impacts to the surrounding environment. The investigation across the site has indicated areas where fill material exists. However, should fill material that is not suitable for reuse be encountered during the construction phase, it should be transported offsite to be dealt with in an appropriate facility.

The excavation of soils during the initial stage of the development will be limited to the installation of services at the site and as such will not be deeper than 2-3m below ground level. Foundations for buildings are likely to extend deeper.

Dust generation should be mitigated against by dampening down construction areas during dry and windy weather conditions.

Any fuels or chemicals stored on the site during the construction or operation phases should be stored in appropriately bunded areas. Drainage from hardstanding areas on the site should incorporate interceptors to prevent contamination of surface water bodies in the event of leaks or spillages.

Facilities to store sewage during the construction phase should be provided and maintained appropriately. There should be no discharge to ground.

Good management practices in accordance with the CIRIA guide for environmental good practice on site during the construction and operation phases will mitigate against any spillages or leakages from vehicles or machinery.

5.3.6 PREDICTED IMPACT OF THE PROPOSAL

The proposal for the development of roads and services and the associated development of Profile Park will involve the disturbance and the removal of soils from the site. This will be mitigated against by keeping earth movements to a minimum and following the proposed mitigation measures listed above. This will result in no residual impacts on the environment.

The removal of the two localised areas containing wood and hydrocarbon compounds will improve the condition of the site prior to development.

5.3.7 MONITORING

There is no requirement for future monitoring of soil or groundwater quality for this stage of the development.

Information to date suggests that very low level methane is being generated in the infilled area. As such, it may be deemed necessary to install up to 6 gas monitoring boreholes across the infilled area in order to confirm that the material is not producing significant levels of methane.

Depending on the specific industries located at the development, some monitoring of groundwater quality may be required. This will be outlined within IPPC licenses or County Council requirements for any facilities which have gained permission to discharge to ground.

5.3.8 REINSTATEMENT

There are no re-instatement requirements envisaged for the construction of the roads and services and the associated business park development.

5.4 WATER – SUPPLY, SURFACE & EFFLUENT

Introduction

This section of the EIS was completed by Doherty Finegan Kelly Consulting Engineers. It assesses the impact of the proposed Business Park on the receiving wastewater infrastructure and the water supply environment. The lands which are the subject of this EIS are located in the townland of Ballybane.

The effects of the development on water are examined under the following headings:

5.4.1 Surface Water Drainage
5.4.2 Water Supply
5.4.3 Foul Drainage

The assessment of the potential impact of the proposed development, for both the construction and operational phases, on the receiving wastewater infrastructure and the water environment was carried out according to the methodology specified by the Environmental Protection Agency (EPA)[1, 2].

5.4.1 SURFACE WATER DRAINAGE

5.4.1.1 RECEIVING ENVIRONMENT

The site is currently greenfield. A tributary of the Griffeen River flows through the subject site and then joins the Griffeen within Grange Castle Business Park. The Griffeen eventually joins the River Liffey in Lucan, Co. Dublin.

There are additional smaller ditches and watercourses within the subject lands, which all ultimately discharge to the stream.

The section of the stream immediately downstream of the site has been upgraded in the recent past to alleviate any local restrictions on capacity.

5.4.1.2 CHARACTERISTICS OF THE PROPOSAL

The site storm water systems are shown on Doherty Finegan Kelly drawings 04173/200-204. The system shall be designed in conformance with the requirements of South Dublin County Council (SDCC) and the Greater Dublin Strategic Drainage Study (GDSDS).

The main tributary of the Griffeen River runs along the boundary of these lands, and will not be disturbed by the development. It is proposed to culvert the other existing ditches on the site, where they pass under the road network.

The proposed surface water drainage system will consist of gravity sewers, which will drain to the north of the site, where they will discharge to the stream. Due to the topography of the lands it is necessary that three surface sewer networks be provided for the development with three separate outfalls to the stream.

It is proposed that the surface water run-off from all individual sites within the business park will be attenuated within the curtilage of each site. The surface water run-off from the estate roads etc will be attenuated before discharge to the Griffeen River, the attenuated water being stored in oversized pipes.

Within the individual sites permeable paving etc. will be used, where appropriate, to allow the surface water to percolate into the ground, thus reducing the total volume being discharged to the surface water drainage system.

The details of the three network catchments and sub-catchments are outlined in Table 5.4.1. The allowable runoff (permissible outflows) from the development has been calculated for the various catchments and sub catchments using the GDSDS document. The catchments have been designed using the Qbar equation

$$Qbar = 0.00108 \times (AREA)^{0.89} (SAAR)^{1.17} (SOIL)^{2.17}$$

Table 5.4.1 –Surface Water Catchment Details

Network	Catchment Area (Ha)	Attenuated Sites (Ha)	Roads and Footpaths (Ha)	Landscaped Areas (Ha)	Runoff (ltrs/sec)	Attenuation *
Network A (discharging at MH 14.0)	22.78	20.57	1.13	1.08	96	375
Network B (discharging at MH 25.0)	13.25	10.76	1.27	1.22	56	422
Network C (discharging at MH 30.0)	3.81	3.21	.3	.3	16	104

* The attenuation volume covers the run-off from roads and footpaths only. The run-off from the individual sites is stored within the site curtailage.

Peak flows will be routed through storage structures, both within individual sites and on the roads network, to control the final outflow rate. The storage structures and their outlet controls are sized to ensure that future peak flow rates to the natural watercourses do not exceed the figures within the GDSDS document.

Pipelines will be designed to provide self-cleansing velocities in accordance with BS EN 752. Pipelines will generally consist of pre-cast concrete flexibly jointed pipes. Pre-cast concrete manholes and trapped gully chambers will be used throughout the site. Manhole covers and gully gratings shall be installed to suit loading requirements in accordance with BS EN 124. The gravity drainage systems proposed will be laid in accordance with IS 6 and more particularly, with the Building Regulations Section H. All works within public areas will be constructed to the requirements of the Local Authority.

At each discharge location a Class 1 Bypass Petrol Interceptor will be provided. This petrol interceptor will be sized and selected in accordance with IS EN 858 Parts 1 and 2.

Network A consists of two catchment areas and drains the western section of the business park. This network will outfall to the existing stream at the north of the site at MH14.0. in a 375 mm diameter pipe laid at a gradient of 1:160. The main

catchment drains Road 6 within the business park, as well as the individual sites located off this road. It is envisaged that this road will eventually connect to the Baldonnell Road at the southern boundary of the site. The secondary catchment will drain a future road running parallel to and to the West of Road 6. This road is not part of this planning application. Network A will be constructed under phase 1 of the development.

Network B consists of a main catchment and a secondary catchment and drains the main eastern section of the business park. This network will outfall to the existing stream at the north of the site at MH25.0 in a 300 mm diameter pipe laid at a gradient of 1:160. The main catchment drains Roads 5 and 7 within the business park, as well as the individual sites located off these roads. The smaller sub catchment drains Road 4 to the north of the internal roundabout, as well as the individual sites located off this road. It is envisaged that Road 4 will eventually be connected to a road network within the lands to the north of this site, but this road network will have its own surface water drainage network. Network B will be constructed under phase 1 of the development.

Network C consists of a single catchment and drains the north eastern section of the site, which is located to the north of the Griffeen tributary. This network will outfall to the existing stream at MH30.0 in a 225 mm diameter pipe laid at a gradient of 1:200. The catchment drains Road 2, which is the main entrance dual carriageway to the business park, as well as the sites located off this road. Network C will be constructed under phase 1 of the development.

Silt storage is provided prior to the outflow point from the attenuation storage pipes under the roadway and the oil storage volume within the interceptor unit, to ensure that best practices to remove any traces of hydrocarbon contamination (from vehicular or fuel storage/loading areas) are applied prior to discharge off-site.

A summary of the design criteria and design assumptions are as follows:

The drainage system has been designed for the current phase of development only, which includes a total area of 39.84 Ha (398,400m^2) approximately.

Rainfall data utilised for calculation purposes is that obtained from Met Éireann (The Irish Meteorological Service) for Baldonnel (Military) Areodrome. A 10% increase factor for climate change has been included in calculations as recommended by the Greater Dublin Strategic Drainage Study. This provides for the following:

- Annual rainfall = 801mm
- RP5 60 min = 18.7mm
- RP5 2d = 65.3mm
- System variables selected:
- Global time of entry (Te) = 2 minutes;
- Volumetric runoff coefficient, Cv = 1.0 for all paved or roofed areas;
- Linear measure of effective roughness, ks = 0.6mm for all gravity pipelines.

Allowable outflow rates, following attenuation, have been assessed based on an outflow of 2 l/s per hectare with growth factors of 2.1 and 2.6 for the 30 year and 100 year return periods respectively; in accordance with the Greater Dublin Strategic Drainage Study.

Attenuation volumes have been estimated on a quantitative basis for the critical storm at both the 30 year and 100 year return periods. The 30 year storage volume will be contained within oversized surface water pipes and the 100 year volume will be allowed to cause flooding of the manholes (and the internal estate roads adjacent to the outfall where necessary).

5.4.1.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

As a result of the construction works, some silt loads might be anticipated on the existing watercourses in rainy periods at construction stage.

Operational Phase

The increased area of roads, footpaths etc proposed for the Phase 1 development will result in an increase in surface water run-off from the subject lands. There is potential for disturbance to the watercourse due to uncontrolled run-off discharge. This could change the character of the river and have adverse impacts on flora and fauna associated with it.

There is a possibility for oil spillages both during construction and following completion of the Phase 1 development. Such spillages could pollute the existing watercourses.

'Do-Nothing' Impact

If the development does not proceed, there would be no change to the existing situation on the currently undeveloped lands, vis-à-vis surface water run-off.

5.4.1.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Siltation and groundwater control ponds and underground structures will be utilised at construction stage in order to minimise the impact of the construction operations on the receiving environment.

Normal post-construction reinstatement will take place. In the case of works in public areas this will be to the specification and approval of the relevant Local Authority.

Oil interceptors which will be provided as part of the development will be utilised at the construction stage to prevent contamination of the watercourses.

Operational Phase

In order to mitigate against any impact of development of the lands on the stream, it is proposed to design the surface drainage system in line with current best management practice (i.e. the GDSDS). These measures will include as follows:

- Attenuation of storm water discharging from each phase of development to reduce peak flows and mitigate against possible down stream flooding. Attenuation will be controlled by hydro brakes or other approved systems.

- Provision of petrol interceptors within the site to reduce the possible effects of oil spillage's, siltation and "first flush" pollution of the outfall watercourse.

The storage structures, outflow control systems and oil interceptors will require periodic maintenance. Telemetry systems will also be installed within these structures to warn of oil spillages and possible flooding. The monitoring of this telemetry along with the maintenance of the structures will be carried out, as required, by the development management company.

5.4.1.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

Pipeline and drainage element construction will be carried out simultaneously with the earthworks/access roads construction. Both sets of works will be phased to suit the overall development programme. As retention structures form an integral part of the scheme design, minimal effect is anticipated on stream flows downstream of the subject development.

Operational Phase

Because of the use of attenuation and petrol interceptors, there should be no appreciable impact on the stream from the operation of the completed development.

'Worst Case' Impact

If the remedial and reductive measures set out above failed, uncontrolled storm discharges from the proposed significantly increased hardstanding area of the roads infrastructure would result in short pulses of high water volumes down the existing stream, which could eventually change the character of the stream and impact upon the adjacent lands in the Lucan area. However, the full implementation of proposed remedial and reductive measures will ensure that such a scenario will not arise.

5.4.1.6 MONITORING

Monitoring measures, where required, are outlined in Section 5.4.1.4 above.

5.4.1.7 REINSTATEMENT

Normal post-construction reinstatement will take place. In the case of works in public areas this will be to the specification and approval of the relevant Local Authority.

5.4.2 WATER SUPPLY

5.4.2.1 RECEIVING ENVIRONMENT

The water supply to the site will be provided from the 700mm diameter trunk main [the Low Level Lucan/Palmerstown Water Supply Scheme] which passes across the northern edge of the site within a 15m wide wayleave. This watermain is connected to the Belgard reservoir and has sufficient pressure to service this development.

5.4.2.2 CHARACTERISTICS OF THE PROPOSAL

The water supply network for this proposed development is shown on Doherty Finegan Kelly drawings 04173/300-304.

The water supply system proposed to be constructed as part of this development has been designed to cater for the entire Masterplan development. Table 5.4.2 contains preliminary estimates of the anticipated water supply demand for the Masterplan development.

It should be noted that the land uses indicated in the table below are preliminary estimates of land use only. All future uses proposed on the lands will be subject to planning approval.

Table 5.4.2 – Masterplan Water Supply Demand

Use Category	Total Floor Area (m^2)	Total Occupancy (persons)	Total Daily Flow (ltrs/pers/day)	Total Daily Demand (ltrs/day)	Average Flow (8 hour day) (ltrs/sec)
Neighbourhood Service Centre/SME's	19,365	645	45	29,025	1.01
Offices	20,640	1,376	45	61,920	2.15
Retail Warehouse	29,685	990	45	44,550	1.55
Showrooms	17,423	581	45	26,145	0.91
General Industry	28,329	944	45	42,480	1.48
Logistics	70,823	2,361	45	106,425	3.69
Retained lands *	14,590	486	45	21,870	0.76
Existing house site *	30,280	1,009	45	45,405	1.58
Other lands to the north of the site *	46,257	3,084	45	138,780	4.82
Total	277,392	11,476	45	516,600	17.95

* These areas are not covered by this planning application, but they are covered by the Masterplan and the water supply network has to be designed to cater for these flows.

The full Masterplan water demand of approx 517 m^3 per day will not occur until completion of the Masterplan development. As a consequence, a "growing demand" profile will be experienced during development of the Masterplan. The full water demand is confirmed to be within the capacity of the local system. The peak flow from the Masterplan development is anticipated as 3 times the average flow and equates to 53.85 litres per second.

The occupancy rates for the individual units are based on the values in Table 5.4.3 The daily flow rates for each of the unit types are again extracted from Table 3 of the Wastewater Treatment Manuals - Treatment Systems for Small Communities, Business, Leisure Centres and Hotels published by the Environmental Protection Agency 1999.

Table 5.4.3– Unit Occupancy Rates

Use Category	Occupancy Rate
Neighbourhood Service Centre/SME's	1/30 m^2
Offices	1/15 m^2
Retail Warehouse	1/30 m^2
Showroom	1/30 m^2
General Industry	1/30 m^2
Logistics	1/30 m^2
Retained lands	1/30 m^2
Existing house site	1/30 m^2
Other lands to the north of the site	1/15 m^2

Water pipeline construction will take place as part of the general earthworks/site infrastructure works. Such works will therefore be phased to suit the overall phased building programme.

5.4.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

Possible effects that can be expected on the existing watermain network include:

- Construction stage impacts when installing new pipelines.
- Additional demand on the local water supply.

The proposed development will not affect the existing network until a connection is made. At this stage there is the possibility of contamination of the existing water supply caused by the construction work.

Operational Phase

Once occupied, the development will result in an increase in the water demand on the existing watermain network. It is proposed to provide a minimum of 24 hours storage within each unit

'Do-Nothing' Impact

If the development on the subject lands does not proceed, there would be no change to the existing situation vis-à-vis water supply.

5.4.2.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

All pipe work will be cleaned and tested in accordance with the requirements of the Local Authorities, prior to connection to the existing watermain network. All connections to the existing network will be carried out under Local Authority supervision. This should limit the possibility of contamination from unclean pipe work and should also limit the likelihood of leaks.

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

Operational Phase

Water usage will be monitored by bulk water meters to be installed on the supply pipes to the individual sites in the business park. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

5.4.2.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

If the remedial measures detailed above are implemented, there would be no significant adverse direct or indirect impacts as a result of water supply connections during the construction phase of the development.

Operational Phase

The operation of the overall Masterplan development is likely to result in the increase in the quantity of water being used within the existing Local Authority watermain network by a peak rate of 53.85 litres per second. This equates to the daily demand of 517 m^3. Adequate capacity is available within the existing network for the Masterplan development. The demand on the existing network will also experience a growing profile as outlined above.

'Worst Case' Impact

The worst case scenario is that a previously installed section of the watermain might be damaged during later excavation works, leading to the escape of water from the main and the possible contamination of the fresh water supply. There are sufficient valves provided on the watermain, however, to permit any damaged section of main to be isolated and repaired.

5.4.2.6 MONITORING

Water usage will be monitored by bulk water meters to be installed on the supply pipes to the individual sites in the business park. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

5.4.2.7 REINSTATEMENT

Normal post construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

5.4.3 FOUL DRAINAGE

5.4.3.1 RECEIVING ENVIRONMENT

All wastewater from the area is treated at the Ringsend Wastewater Treatment Plant (WWTP) which has the capacity to treat a population equivalent of 1.7 million. This equates to a volumetric treatment capacity of 382,500 m^3/day and a BOD mass treatment capacity of 110,500 kg/day.

5.4.3.2 CHARACTERISTICS OF THE PROPOSAL

The site foul sewer network is shown on Doherty Finegan Kelly drawings 04173/250-255.

The effluent from this site will discharge to a pumping station within Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend.

The proposed development is likely to comprise a mixture of building uses, i.e. retail, office, retail warehouse, logistics, showrooms and general industry. The effluent to be discharged from the site will, therefore, generally be domestic standard wastewater. Any effluent produced on the site, which is lower than this standard, will be treated to bring it up to domestic standard.

The drainage scheme serving the different elements of the development is proposed to be constructed to Local Authority requirements for taking in charge; however, the scheme is intended to remain in private ownership under the maintenance and control of a management company.

The effluent from the site will discharge to a manhole located at the north western corner of the site (FSMH16.0). It will be conveyed from there to the pumping station along a 15m wide wayleave passing through the proposed new Milltown Business Park (in the ownership of SDCC), and then along the line of the new entrance road into Grange Castle Business Park.

The gravity drainage system proposed will be constructed with uPVC or concrete pipes laid in accordance with IS 6 and, more particularly, the Building Regulations, Section H. All works within public areas will be constructed in accordance to the requirements of the Local Authority.

In order to design the sewers that will be constructed as part of the application it is necessary to estimate the likely possible occupancy rates for the full Masterplan development with resulting effluent. Table 5.4.4 contains a summary of the predicted occupancy, average and peak flow rates resulting from the entire Masterplan development. The peak flow from the Masterplan development is anticipated as 4 times the average flow and equates to 71.8 litres per second.

Table 5.4.4 – Masterplan Effluent Generation

Use Category	Total Floor Area (m^2)	Total Occupancy (persons)	Total Daily Flow (ltrs/pers/day)	Total Daily Demand (ltrs/day)	Average Flow (8 hour day) (ltrs/sec)	Design Flow (4 x DWF) (ltrs/sec)
Neighbourhood Service Centre/SME's	19,365	645	45	29,025	1.01	4.04
Offices	20,640	1,376	45	61,920	2.15	8.6
Retail Warehouse	29,685	990	45	44,550	1.55	6.2
Showrooms	17,423	581	45	26,145	0.91	3.64
General Industry	28,329	944	45	42,480	1.48	5.92
Logistics	70,823	2,361	45	106,425	3.69	14.76
Retained lands *	14,590	486	45	21,870	0.76	3.04
Existing house site *	30,280	1,009	45	45,405	1.58	6.32
Other lands to the north of the site *	46,257	3,084	45	138,780	4.82	19.28
Total	277,392	11,476	45	516,600	17.95	71.8

* These areas are not covered by this planning application, but they are covered by the Masterplan and the foul sewer has to be designed to cater for these flows.

The occupancy rates for the individual units are based on the values in Table 5.4.5. The daily flow rates for each of the unit types are again extracted from Table 3 of the Wastewater Treatment Manuals - Treatment Systems for Small Communities, Business, Leisure Centres and Hotels published by the Environmental Protection Agency 1999.

Table 5.4.5 – Unit Occupancy Rates

Use Category	Occupancy Rate
Neighbourhood service centre/SME's	1/30 m^2
Offices	1/15 m^2
Retail Warehouse	1/30 m^2
Showroom	1/30 m^2
General Industry	1/30 m^2
Logistics	1/30 m^2
Retained lands	1/30 m^2
Existing house site	1/30 m^2
Other lands to the north of the site	1/15 m^2

Following the estimation of flows from each building, the sewer networks were designed in accordance with BS8301 and South Dublin County Council requirements.

5.4.3.3 POTENTIAL IMPACT OF THE PROPOSAL

There are three potential impacts that require consideration in regard to the provision of a foul sewerage system to serve the proposed development:

- Pipeline construction activity.
- Additional demands on the existing pipe network.
- Possible pollution of ground water from pipe breakages or leaks.

Construction Phase

The construction of the proposed sewer network should not affect the existing network until the final connection is made. At this point, there is the possibility of debris and building rubble falling into the existing sewer. There are also the inherent safety and health problems associated with construction works occurring in close proximity to a live foul sewer.

The presence of significant numbers of workers on the overall subject lands over the phased construction period will lead to the generation of foul sewage associated with temporary showers, toilets, canteen and washing facilities.

Operational Phase

Once effluent is discharged from the completed and operational development it will result in an increase in the hydraulic loading within the existing sewer network and a reduction in the capacities of the existing sewer system.

There is a possibility of untreated effluent discharging to the water table if pipes are broken or not laid properly during construction.

'Do-Nothing' Impact

If the development were not to proceed, there would be no change to the existing situation on the site vis-à-vis foul drainage.

5.4.3.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Temporary, chemical or waterborne facilities will be provided by the contractors for the duration of the construction phase, involving off-site disposal or temporary connection to the public sewer.

The construction of the sewer network within the subject lands will be carried out as part of the overall earthworks, roads and infrastructure development, which will be carried out in a phased manner to match the overall phased development of the subject lands. This could result in the discharge of silt to existing watercourses. Mitigation measures, as detailed in section 5.4.2, concerning surface water will be carried out to minimise this potential impact.

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

Fauna investigations of the site have revealed that otters traverse the site along the watercourse which runs in an east west direction across the northen portion of the site. See section 5.2 for details. In order to mitigate any potential negative impact to otters as a result of the proposed development, a dry culvert will be provided where the road network crosses this watercourse to faciliate the movement of otters across the site. The design of the culvert is in accordance with the Ecologists advice.

Operational Phase

In order to mitigate against the possibility of leakage of effluent into the ground water, all sewers will be inspected by C.C.T.V. camera and tested in accordance with Local Authority requirements, prior to the discharge of foul effluent to the public sewer system. Connections made to the public sewer will also be carried out in the presence of Local Authority Representatives.

As this is a significant project, with a phased construction period of some 5 - 10 years for the Masterplan development, the demand being placed on existing and proposed drainage facilities will grow to the maximum anticipated over a relatively long period. Thus, any network improvements required can be considered and provided for in stages.

No specific monitoring of the type of effluent discharged is anticipated at this point; however, some future occupiers of the proposed development scheme may require discharge licences for specific processes in due course.

5.4.3.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

If the remedial measures detailed above are implemented, there would be no significant adverse direct or indirect impacts as a result of foul drainage during the construction phase of the development.

Operational Phase

The operation of the overall Masterplan development is likely to result in the increase in the quantity of effluent within the existing Local Authority sewer network. Recently completed upgrading works of the Municipal network will ensure adequate capacity is available for the development.

As a consequence, the predicted impact of the proposed development, in terms of Foul Drainage is assessed as being slight.

'Worst Case' Impact

The worst case scenario would be a sewer blockage or spillage giving rise to contamination. However, the design, installation and inspection of the scheme will be to such a standard as to guarantee that this is not a realistic scenario.

5.4.3.6 MONITORING

No monitoring is proposed in this instance.

5.4.3.7 REINSTATMENT

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

5.5 AIR

5.5.1 NOISE

Introduction

This section of the EIS will assess and describe the noise impacts associated with the proposed Profile Park Business Park development on its surrounding environment. The noise assessment has been made using the following methodologies:

- A baseline survey at the noise sensitive locations at the proposed development has been conducted. The survey was carried out in accordance with ISO 1996: Acoustics: 'Description and measurement of environmental noise'.
- Construction noise impacts have been assessed in accordance with BS5228 'Noise and Vibration Control of Construction and Open Sites' (1997).
- Guidance relating to the operation of the site has been made with reference to the EPA: Guidance note for noise in relation to scheduled activities and W.H.O guidelines.

Particular attention is focused on sensitive receptors, such as residential properties adjacent to the site, and to the extent of the exposure of these receptors to noise derived as a result of the proposed development.

5.5.2 RECEIVING ENVIRONMENT

The proposed development is situated midway between the N4 and the N7 national roads and in West County Dublin. The receiving environment is semi-rural in nature in a satellite area of West County Dublin. The existing acoustic environment is dominated by traffic along local roads and by air traffic from Baldonnel Aerodrome. In the absence of passing traffic, noise from the N7 makes up the background noise.

Baseline Survey

A baseline noise survey was carried out on the 29th and 30th of March 2006 at 4 noise sensitive locations in the area of the proposed development. Measurements were made for a period of 15 minutes during the survey.

All measurements were carried out in accordance with ISO 1996: 'Acoustics-Description and measurement of environmental noise'. Measurements were made at a height of 1.5m above ground level. All measurements were free field, and were positioned 1-2m from reflecting surfaces.

The equipment used during this survey was a Type 1, Brüel and Kjaer 2250 sound level meter. Before and after the survey the measurement apparatus was checked and calibrated to an accuracy of +/- 0.3dB using a Brüel and Kjaer 4231 calibrator.

The weather conditions were dry and mild with overcast conditions. Wind speeds were below 5m/s during all measurements.

Five environmental noise parameters were measured which are defined below.

LAeq is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value.

LAmax is the maximum A-weighted sound level measured during the sample period.

LAmin is the minimum A-weighted sound level measured during the sample period.

LA10 is the A-weighted sound level that is exceeded for 10% of the sample period and is used to quantify traffic noise.

LA90 is the A-weighted sound level that is exceeded for 90% of the sample period and is used to quantify background noise.

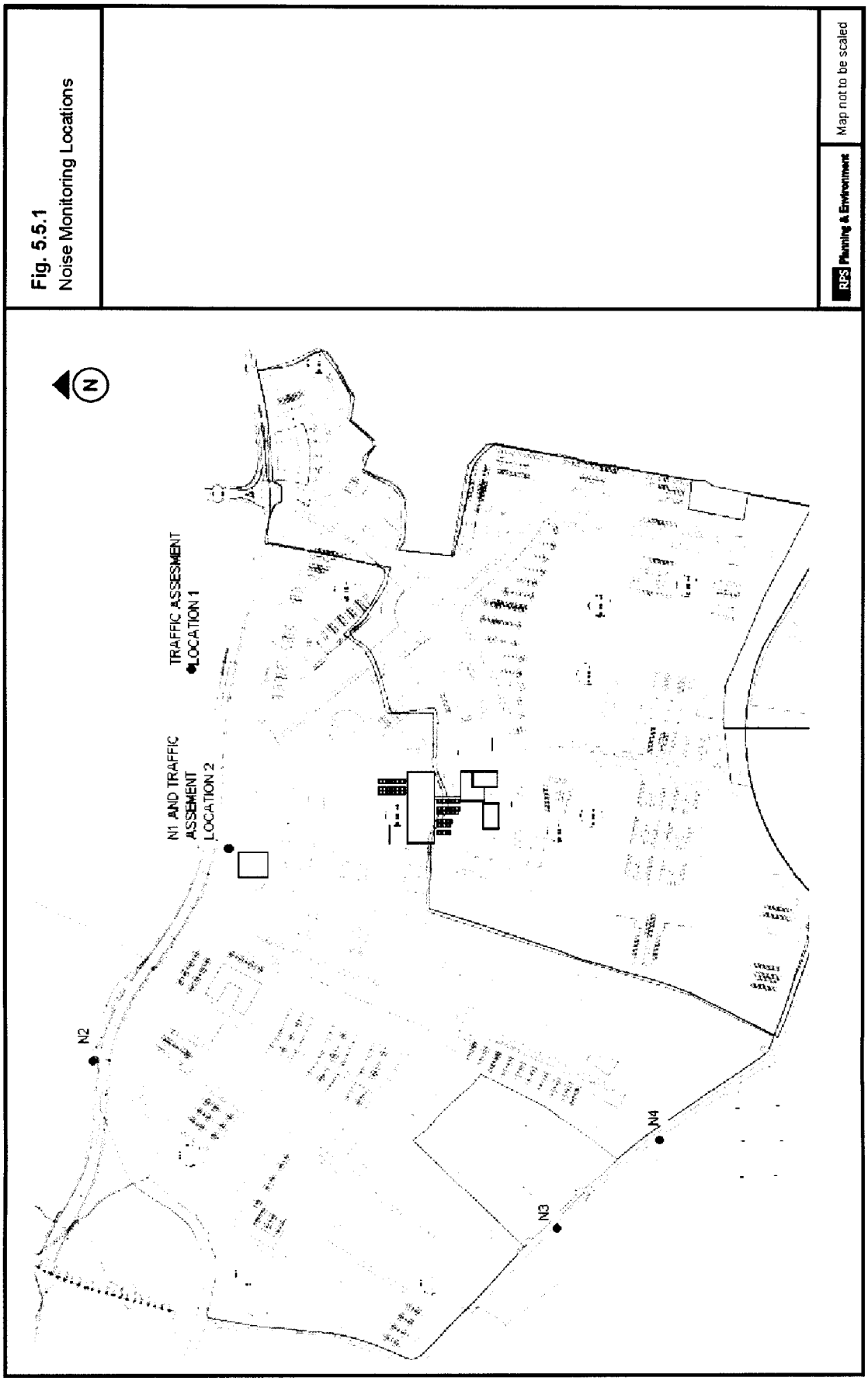
A-weighting is the process by which noise levels are corrected to account for the non-linearity of human hearing. All noise levels quoted are relative to a sound pressure of 2x10-5 Pa.

A description of the noise monitoring locations is presented in Table 5.5.1 below and their locations are shown on Figure 5.5.1.

Table 5.5.1: Noise monitoring locations

Position No.	Description
N1	Residential property north of site, opposite Ballygowan facility
N2	Residential property north of site, opposite side of Road
N3	Timber gated House, west of site, on road to Baldonnel
N4	Residential Property adjacent to Baldonnel Aerodrome, Southwest of site.

Figure 5.5.1: Noise Monitoring Location Map



Survey Results

The results of the noise surveys carried out are included in Table 5.5.2 below. The locations of these sites can be seen in figure 5.5.1.

Table 5.5.2: Summary of baseline noise measurements made on 29th and 30th March 2006

Location	Time	LAeq	LAmax	LAmin	LA10	LA90
N1	11:20	68.1	83.4	44.6	72.7	50.3
	11:36	67.7	83.5	42.1	72.4	48.7
	14:55	68	84.3	42.1	72.4	48.7
	23:00	61.6	78.7	35.5	64.4	39.7
N2	11:53	71.4	58.9	41.3	75.6	50.4
	12:14	72.7	89.9	38.3	76.8	47.0
	14:35	67.8	85.1	40.8	72.0	47.5
	22:43	63.3	78.6	37.8	68.7	41.6
N3	12:33	68.9	88.9	38.6	69.7	42.2
	12:55	68.3	89.2	35.0	67.9	38.2
	13:49	68.9	88.7	36.2	70.3	40.1
	22:02	62.8	86.6	40.3	57.7	42.3
N4	13:13	67.7	88.0	35.0	66.3	38.8
	13:32	66.8	86.5	35.6	65.5	38.9
	14:12	67.2	90.5	36.3	64.8	39.8
	22:20	61.0	87.4	40.0	48.8	41.7

Location N1

Daytime noise levels at this location were dominated by very heavy passing road traffic and frequent over-light by low level aircraft and helicopters from Baldonnel. Very busy traffic using Kilcarbery Business Park formed the majority of the road traffic.

Night time noise was dominated by infrequent passing road traffic, foliage noise, and once again, aircraft passing overhead from Baldonnel.

Location N2

Daytime noise levels in this area were dominated by heavy passing traffic. Guard dogs in the property barked continuously during all daytime surveys. Frequent air traffic from Baldonnel once again contributed to the noise climate at this location.

During the night time period, road traffic and air traffic were less frequent but remained the dominant noise sources, foliage noise contributed to a lesser degree.

Location N3

Sustained frequent road traffic dominated the noise climate in this area during the day. The impact from air traffic was proportionally higher in this location as it is on a direct flight path to Baldonnel.

During the night period, a barking guard dog was noted, as were infrequent passing traffic and decreased air traffic. In quiet periods background road traffic noise was audible from the surrounding busier roads.

Location N4

This location is adjacent to Baldonnel and as such, the daytime noise climate was largely affected by aircraft noise. Frequent passing road traffic remained the most dominant noise source at this receptor none the less.

The night period showed less air traffic and less road traffic, while these remained the principle noise sources in the area. Foliage noise and background road traffic noise from the surrounding busier roads was audible in lull periods.

Noise criteria

In order to assess the operating levels of the site, the following criteria and regulatory bodies have been referenced which may be considered applicable to the operation of the facility in question:

Environmental Protection Agency EPA: Guidance note for noise in relation to scheduled activities

This document states that ideally, if the total noise level from all noise sources is taken into account, the noise level at the sensitive locations should be kept below an LAeq value of 55dB (A) by daytime. At night, to avoid disturbance, the noise level at noise sensitive locations should not exceed an LA eqT value of 45dB (A). Audible tones and impulsive noise at sensitive locations at night should be avoided. In some particularly quiet areas, such as pastoral, rural settings, where background noise levels are very low, lower noise limits may be more appropriate.

Environmental Protection Agency (EPA): Guidance notes for noise

This document suggests the usual range of values allowed for industrial activities is 45dBLAeq at night, and 55dBLAeq during the day. These values relate to noise levels at the nearest noise sensitive locations or at the boundary of the premises.

World Health Organisation (WHO) Guidelines for Community Noise 1999

This document recommends that to protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. At night time, outside sound levels about 1m from facades of living spaces should not exceed 45dB LAeq so that people may sleep with bedroom windows open.

In summary, operational noise levels for the facility should be limited to 55dB LAeq during day time hours and 45dB LAeq during night time hours in line with the above guidance documents.

5.5.2 POTENTIAL IMPACT OF THE PROPOSAL

The proposed site is located on lands midway between N7 and the N4, near Clondalkin in northwest Dublin. The development comprises the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

"Do Nothing" Impact

If the proposal were not to go ahead there would be no noise impact from this proposed facility. However as this area has seen considerable development over the last number of years it is likely that noise from traffic will increase in the future. Baseline noise surveys have indicated quite heavy road traffic and aviation traffic noise in the area at present.

Predicted Impact

The predicted noise impact of this development will occur during both the construction and operational phases of the project.

Construction phase

The construction phase of the proposed development has the potential to increase noise levels at noise sensitive locations surrounding the development site. Impact from the construction phase will depend on the number and type of equipment used during the development. The construction stage of the project will include the construction of the internal roads as outlined above. It is envisaged that construction works associated with the site development will involve some if not all of the following pieces of machinery during site preparation and construction works;

- Dozer
- Tracked Excavator
- Dump Trucks
- Standby Generator
- Road Sweeper
- Road Lorries
- Rock crusher

Predicted noise levels have been estimated using the methodology described in BS: 5228: Noise and Vibration on construction and open sites. Predictions are based on a LAeq1hour value with all machinery listed below operating for a continual period of 1 hour. This may be considered a worst-case scenario as machinery may not work simultaneously. Additionally, calculations are based on

minimum distances between site activities and the nearest noise sensitive locations.

In Ireland, there are no statutory guidelines relating to noise limits for construction activities. These are generally controlled by local authorities and commonly refer to limiting working hours to prevent a noise nuisance. A publication from the National Road Authority (NRA) 'Guidelines for the treatment of noise and vibration in national road schemes' 2004, has outlined recommended noise levels for construction noise.

Although these refer to road projects, they have been developed in line with typical construction noise limits on general construction projects used previously in Ireland. The limits outlined represent a reasonable compromise between the practical limitations during a construction project and the need to ensure an acceptable ambient noise level for local residents. As a result, these limits have become the most acceptable standard for construction noise limits for EIS assessments to date. Considering the high baseline noise levels measured at this site, these values are considered a reasonable target. Table 5.5.3 below details these recommended limits.

Table 5.5.3: Maximum permissible noise levels at the façade of dwellings during construction

Days and Times LAeg (1hr)	LAeq (1Hr) dB	LpA (max) slow dB
Monday to Friday 07:00 to 19:00hrs	70	80[2]
Monday to Friday 19:00 to 22:00hrs	60[2]	65[2]
Saturday 08:00 to 16:30hrs	65	75
Sundays and Bank Holidays 08:00 to 16:30hrs	60[2]	65[2]

[2]Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority

The National Roads Authority considers that the noise levels in Table 5.5.3 above are typically deemed acceptable. However the NRA stipulates that: "these values are indicative only, it may be appropriate to apply more stringent limits in areas where pre-existing noise levels are low". As stated above, the baseline levels obtained during the survey are not low and hence Table 5.5.3 is considered appropriate.

Table 5.5.4 below summarises the calculated noise levels, which would be expected at the noise sensitive locations as described in Table 5.5.1.

The nature of the construction period and the variety of machinery used should ensure that no construction activity is operational for long periods in a single area. This will therefore result in short term impacts, as construction will migrate in natural progression ensuring noise receptors are not subject to constant stationary noise sources during the construction phase. The noise impact of the plant used during the construction phase has been assessed in Table 5.5.4

below for distances of 150m, 250m and 350m, to assess the effect on properties within these distance bands.

Table 5.5.4: Construction noise level predictions

BS5228 Calculations		Estimated Construction noise levels at varying distances LAeq 1 hour	
Plant	**150m**	**250m**	**350m**
2 x road sweeper	48	42	38
2 x Dozer	58	52	48
2 x Dumper truck	54	48	44
2 x road lorry	58	52	48
2 x Asphalt spreader	48	42	38
2 x JCB	48	42	38
2 x Tracked Excavator	55	53	49
2x standby generator	38	35	31
Combined Level LAeq 1hour	64	59	55

The result of the construction noise predictions in table 5.5.4 above, indicate that noise levels during this phase of the development will be well within the guidance levels detailed in Table 5.5.3 and are also similar to existing baseline levels, therefore resulting in a moderate short term impact.

Operational Phase

The operational phase of the proposed development has the potential to increase noise levels at noise sensitive locations surrounding the development site. A number of noise sensitive locations (houses) are distributed around the site.

Impact from the operation of the site will depend on the road traffic numbers using the development, and the nature of the industry carried out in the business park.

Traffic Noise

The potential noise impacts from this proposed development during its operational phase will primarily be as a result of increased traffic flows along existing routes within and surrounding the development as a result of the operation of the various businesses operating within the facility. The greatest potential increase in traffic noise will be along the entrance road to the site. Traffic flow predictions have been provided by the traffic consultants in order to assess the impact of traffic flows on noise levels in the surrounding environment. From the projected flow analysis resulting from the development, the majority of site traffic (90%) will enter and exit the site from the eastern Nangor Road side, while the remaining 10% will enter and exit the site from the west of the site entrance along the Nangor Road.

No noise sensitive locations are distributed along the Nangor Road to the east of the site entrance in the surrounding vicinity of the development site. Traffic noise levels are predicted to increase by 3 to 4dB between the 'do nothing' and 'do something' scenarios along this section of the road.

The nearest noise sensitive properties to the site entrance are located along the Nangor Road to the west of the site entrance. Two of the nearest properties to the site entrance have been assessed as part of the traffic noise (TN) impact with reference to the Calculation of Road Traffic Noise 1998 (CRTN) prediction methodology based on the traffic flow information provided by the traffic consultants.

TN 1: Is a noise sensitive property located along the western side of the site entrance along the Nangor Road approximately 30m from the road edge.

TN 2: Is a noise sensitive property located along the western side of the site entrance along the Nangor Road approximately 11m from the road edge.

Table 5.5.6: Results of Road Noise Traffic Study in L_{A10} 1 Hour Values

	2007 Do Nothing	2007 Do Something	Increase in Noise Levels	2020 Do Nothing	2020 Do Something	Increase in Noise Levels
Location TN1 L_{A10} 1 hour dB values						
Am Peak	73	76	+2 dB	75	76	+1 dB
Pm Peak	73	75	+2 dB	74	76	+2 dB
Location TN2 L_{A10} 1 hour dB values						
Am Peak	78	80	+2 dB	79	80	+1 dB
Pm Peak	77	80	+2 dB	79	80	+2 dB

From the table above, traffic noise levels are predicted to be 73 dB LA10 1 hour at the nearest property to the site entrance (TN1) at a distance of 30m from the road during the 'Do Nothing' scenario in 2007, i.e. without the development in place. During the operation of the proposed site, the 'do something' scenario, these values will increase to 75 - 76dB LA10 1 hour resulting in an overall noise level increase of 2dB. In terms of significance, this is considered to be of minor significance. During the year 2020 noise levels are predicted to increase by 1 to 2 dB between the 'do nothing' and 'do something' scenarios at this location.

At the TN2 property, noise levels are similarly predicted to increase by the same margin.

Increases in noise levels is dependant on subjective responses by individuals, however based on acoustic principles and environmental studies, the Institute of Environmental Management and Assessment (IEMA) and the Institute of Acoustics (IOA) have summarised guidelines for categorising noise level changes. Table 5.5.7 below summarises related impacts to changes in noise levels.

Table 5.5.7: Recommended Impact Categories for Changes in Noise Levels

Noise Change dB	Category
0	No Impact
0.1-2.9	Slight Impact
3.0-4.9	Moderate Impact
5.0-4.9	Substantial Impact
10+	Severe Impact

From Table 5.5.7 above, the change in noise levels associated with the increased development traffic at properties along the Nangor Road will be of slight impact to the west and of moderate impact to the east of the site entrance.

Building Services Plant

With the construction of a high number of large buildings there is potential for noise disturbance due to air conditioning units, fans, etc. There is also a provision for an admin/office buildings and associated car parking and building services and amenities, which will also harbour noise sources such as air conditioning units, fans etc. The semi-rural, sparsely populated nature of the area means that these sources could hold potential nuisance for pre-existing properties, particularly in the case of night time operations.

As discussed in the section entitled "noise criteria" the usual range of values allowed for Industrial activities is 45dB LAeq at night and 55dB LAeq during the day at the nearest residence or at the boundary of the site. The operation of all building services plant will be required to maintain noise levels below the above-mentioned criteria. It is not envisaged that there will be any significant noise impact from building services plant. The operation of all building services plant should be designed such that the total noise from all such plant will not exceed the 45-55dB limits at the nearest noise sensitive locations to the site. As the baseline noise climate is in excess of this in the Do Nothing scenario, it is not expected that this aspect of the facility will cause any noise nuisance.

5.5.3 REMEDIAL OR REDUCTIVE MEASURES

Noise from the construction phase of the project will result in increased noise levels at the nearest noise sensitive properties during this stage of the development. Noise during the operational phase of the development is predicted to be minor with road traffic being the largest contributor.

Construction Phase

With regard to construction activities, all plant items used during the construction phase should comply with standards outlined in 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1998. Reference should be made to BS5228: Noise control on construction and open sites, which offers guidance on the control of noise from construction activities.

It is proposed that various practices be adopted during construction, including:

- Limiting the hours during which site activities, which may give rise to a noise nuisance are permitted by the local authority.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These will include:

- Selection of plant with low inherent potential for generation of noise and/or vibration.
- Siting of plant away from sensitive receptors where possible.
- Erection of temporary screens around noisy items of plant where possible and or at the site boundary.
- Erection of temporary screens around noisy items of plant and around the site perimeter.

Operational Phase

Building services plant

The operational phase of the development is not anticipated to significantly increase noise on its surrounding environment. With regards to noise from possible services plant there are various practicable measures, which may be taken to ensure noise will not cause any disturbance to nearby residences:

- Siting of extraction fans at roof level to reduce ground level noise disturbance
- Duct Mounted attenuators on the atmosphere end of all acoustically offending air moving plant
- Splitter attenuators or acoustic louvres providing free ventilation to internal plant areas

5.5.4 PREDICTED IMPACTS OF THE PROPOSAL

Construction Phase

Due to the nature of the activities undertaken on a large construction site, there is potential for generation of high levels of noise, if noise control measures above are not adhered to. Therefore, it is usual to limit the times during which it is permissible to carry out noisy construction work in order to minimise the impact on nearby noise sensitive locations.

Predicted noise levels for this phase of the development are within recommended limits. Permissible construction times and durations will be set down by the Local Authority. Hence the noise and vibration impact of this phase of the development should be kept to a minimum.

Operational Phase

Noise impacts as a result of the operational stage of the development are not anticipated to be significant if control measures as described in this document are adhered to. In this setting, building services plant noise, when managed as described above will not cause significant noise disturbance and will be within the limits outlined in the section entitled "noise criteria" above.

Noise resulting from development related traffic is not predicted to lead to any significant impact at the nearest noise sensitive locations to the proposed site.

5.5.5 MONITORING

In the event of a perceived noise nuisance during the construction or operation of this facility, noise assessments should be carried out in accordance with:

ISO 1996: Acoustics: 'Description and measurement of environmental noise'.

BS5228 'Noise and Vibration Control of Construction and Open Sites' (1997).

EPA: Guidance note for noise in relation to scheduled activities and W.H.O guidelines.

These assessments should be carried out by an Acoustic Engineer.

5.5.6 REINSTATEMENT

Reinstatement measures are not applicable in this instance.

5.6 CLIMATE

5.6.1 Introduction

This section of the EIS describes the impact to air quality associated with the proposed Profile Park business park development at Grange Castle, Dublin 22. This section should be read in conjunction with the site layout plans and project description sections of this EIS. This assessment was prepared in accordance with the "Guidelines on the information to be contained in Environmental Impact Statements" (EPA 2002) and the "Advice Notes on Current Practice" Project Type 28 - Urban development.

This study will identify, describe and assess the impact of the development in terms of its impact on air quality. Particular attention will be focused on sensitive receptors, such as residential areas adjacent to the site, and to the extent of the exposure of these receptors to both airborne pollutants derived as a result of the development.

5.6.2 RECEIVING ENVIRONMENT

The proposed site of the development is located in Grange Castle, Dublin 22, and is situated less than 15km from Dublin City Centre and approximately 2.5 km west of Clondalkin village. The site is approximately 4km west of the M50, approximately 2km north of the N7 and 3.5km south of the N4. It is adjacent to Dublin's new Outer Ring Road, Phase 1 of which is now complete and links the area directly to the N7, and will shortly reach the N4.

The area also has existing business parks in the vicinity, including Grange Castle Business Park and Kilcarbery Park. These parks contain a number of industries that may have an impact on existing air quality. The main potential source is a large pharmaceutical plant to the north of the site, however, this facility is regulated by the EPA to ensure emissions to atmosphere do not have an impact to atmosphere.

The M50 to the west, the N7 to the south and the N4 to the north of Grange Castle are busy with traffic and frequently congested. In addition, there is some traffic congestion on the other regional and third class roads in the area. The level of traffic on the roads is likely to generate traffic derived pollutants nitrogen oxides and benzene from vehicle exhausts.

There is a railway line approximately 2km to the north of the development which runs from Dublin to the south and west as well as serving suburban trains, which carry diesel-powered engines and this may affect local air quality.

As part of the Framework Directive 96/62/EC on air quality monitoring, assessment and management, with particular reference on air quality standards laid down by the directive, four air quality zones have been defined for Ireland. These zones are as follows:

- Zone A - Dublin City and Environs
- Zone B - Cork City and Environs
- Zone C - 16 Urban areas with populations greater than 15,000 (includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee and Dundalk)
- Zone D – the remainder of the country

These zones have been defined to meet criteria for air quality monitoring and management as described by directive 96/62/EC and its "daughter directives". The proposed development lies in Zone A so background air quality is referenced from the Air Quality Monitoring Report 2004 results for Ballyfermot (Public Library) and Phoenix Park (Ordnance Survey buildings), which are the closest Zone A stations to the proposed development. Where results for these stations are unavailable, Dublin City Centre data is employed. All results are compared to the limit values defined in the National Air Quality Standards Regulations 2002 (S.I No. 271 of 2002).

Baseline Air Quality

A total of six sample locations were chosen to represent the baseline air quality in the vicinity of the proposed development. These locations are listed in Table 5.6.1.

Table 5.6.1: Description of Air Monitoring Locations

Reference	Description
A1	Northern Boundary of site on Nangor Road
A2	NW corner of site at Nangor Road Junction
A3	SW corner of site
A4	Southern Boundary of site
A5	SE corner of site
A6	NE corner of site on Nangor Road at boundary to Golf Club

As a result of the existing site conditions and the potential for traffic derived pollution, the following parameters were monitored:

NO_2 (Nitrogen Dioxide)

Nitrogen dioxide is classed as both a primary pollutant and a secondary pollutant. As a primary pollutant NO_2 is emitted from all combustion processes (such as a gas/oil fired boiler or a car engine). Potentially the main sources of primary NO_2 for the proposed development will be from heating-related emissions and vehicle exhausts.

As a secondary pollutant NO_2 is derived from atmospheric reactions of pollutants that are themselves, derived mainly from traffic sources (e.g. volatile organic compounds). Secondary pollution is usually derived from regional sources and may be used as an indicator of general air quality in the region. Nitrogen Dioxide has been shown to reduce the pulmonary function of the lungs. Long-term exposure to high concentrations of NO_2 can cause a range of effects, primarily in the lungs, but also in the liver and blood.

At each of the sites, levels of NO_2 were measured using diffusion tubes, which were left on site for a 14-day period. The tubes were then analysed using UV spectrophotometry, at a UKAS accredited laboratory (Gradko International, Winchester), giving an average concentration over the period. The results are presented in Table 5.6.2.

Table 5.6.2: Average NO_2 concentrations at each location as measured by passive diffusion tubes.

Location	Sampling Period	Average NO_2 ($\mu g/m^3$)
A1	23/03/06 – 04/04/06	13.57
A2	23/03/06 – 04/04/06	19.05
A3	23/03/06 – 04/04/06	14.80
A4	23/03/06 – 04/04/06	13.43
A5	23/03/06 – 04/04/06	16.17
A6	23/03/06 – 04/04/06	16.17
Limit Value	-	40(1)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)

The results of the NO_2 monitoring indicate similar concentrations at each location indicating a uniform air quality. The concentrations are typical of those experienced adjacent to relatively busy roadways and are all below the EU limit value. The results suggest that the main source of NO_2 in the area is from road traffic. The levels detected for 2004 in the national monitoring network are presented in Table 5.6.3 below. The annual average for Ballyfermot is slightly higher than the levels determined in the site baseline survey. This is probably due to increased vehicle numbers and congestion in the suburban area compared to the more rural site area.

Table 5.6.3: National NO_2 monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA)

Station	Annual Average NO_2 ($\mu g/m^3$)	Maximum 1-hour Average NO_2 ($\mu g/m^3$)
Ballyfermot	23	138
Limit	40	200

SO_2 (Sulphur Dioxide)

Sulphur dioxide is classed as a primary pollutant principally emitted from the combustion of fossil fuels (diesel, coal, oil, etc.) SO_2 is emitted from boilers and heating units. As traffic based pollutant, SO_2 is mainly emitted from vehicles running on diesel fuel, which will include most light goods vehicles (LGVs) and heavy goods vehicles (HGVs). SO_2 emissions from domestic heating may be significant as SO_2 is a major constituent of sulphurous smog. However, in recent years the government has significantly reduced the importance of SO_2 as an air pollutant with the introduction of smokeless fuel.

In addition, future EU legislation will attempt to minimise and eliminate the sulphur content in motor fuels. Consequently, concentrations of SO_2 in major urban areas are typically low and this is likely to decrease in future years with the broadening of the ban on non-smokeless fuels and the introduction of new EU fuel directives. Sulphur Dioxide is a known contributor to respiratory illness and respiratory symptoms. People with asthma are the most susceptible in the community to elevated SO_2 levels.

At each of the sites, the air was monitored for sulphur dioxide over a 14-day period, using SO_2 diffusion tubes. The sample tubes were analysed for SO_2 at a

UKAS accredited laboratory (Gradko International, Winchester). The results are presented in Table 5.6.4.

Table 5.6.4: Average SO_2 concentrations at each location as measured by passive diffusion tubes.

Location	Sampling Period	Average $SO_2(\mu g/m^3)$
A1	23/03/06 – 04/04/06	2.58
A2	23/03/06 – 04/04/06	5.16
A3	23/03/06 – 04/04/06	4.30
A4	23/03/06 – 04/04/06	1.72
A5	23/03/06 – 04/04/06	1.72
A6	23/03/06 – 04/04/06	1.72
Limit Value	-	20(1)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)

The results from the SO_2 monitoring indicate low levels of SO_2 in the area and all levels are within the EU limit. This is typical of areas in the Dublin conurbation where there is currently a ban on smokeless fuel – the major source of SO_2. The levels detected at Ballyfermot in 2004 are presented in Table 5.6.5 and indicate an annual average similar to that determined in the site baseline survey.

Table 5.6.5: National SO_2 monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average SO_2 ($\mu g/m^3$)	Maximum 1-hour Average SO_2 ($\mu g/m^3$)
Ballyfermot	3	97
Limit	20	350

Benzene

The sources associated with individual volatile organic compounds (VOC's) tend to be dependent on the land use and nature of any industries in the sample region. Benzene and other aromatic compounds and alkanes are most likely derived from petrol driven vehicle exhausts. Benzene is a known carcinogen, poisonous by inhalation and a severe eye and moderate skin irritant.

The EPA monitoring station in Winetavern Street in Dublin City Centre is the only Zone A reference in the network for benzene. The 2004 results for Winetavern Street are presented in Table 5.6.6. The results indicate benzene levels in Dublin City Centre are lower than the appropriate limit. The levels of benzene at the site of the proposed development would be expected to be lower than those determined in the city centre.

Table 5.6.6: National Benzene monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average ($\mu g/m^3$)
Winetavern Street	1.3
Limit	5(1)

Note: (1) EU Ambient Air Standard (2000/69/EC) (as an annual average)

Carbon Monoxide

Carbon Monoxide is a primary pollutant that is a by-product of any combustion of carbon-based fuels such as from vehicular exhausts. Carbon monoxide is the product of incomplete combustion of the fuel. Carbon Monoxide is an intense poison on inhalation. No site specific CO monitoring was carried out but data is referenced from the Winetavern Street monitoring station in Dublin City Centre for 2004 in Table 5.6.7. The results indicate that levels of Carbon Monoxide in this Zone A area are relatively low and do not exceed the ambient air quality limit.

Table 5.6.7: National CO monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Mean 8-Hour (mg/m^3)	Max 8-Hour (mg/m^3)
Winetavern Street	0.3	4.2
Limit	-	10(1)

Note: (1) EU Ambient Air Standard (2000/69/EC) (as an 8-hour rolling average)

Particulate Matter PM_{10}

PM_{10} may be emitted as a primary pollutant from road vehicle exhausts, which is the main source in urban areas. Point sources such as combustion, i.e. domestic fires, industrial boilers etc. are also primary sources of PM_{10}. PM_{10} may also be formed as secondary pollutants from the condensation or reaction of chemical vapours in the atmosphere. Health effects associated with PM_{10} in the long term include chronic effects such as increased rates of bronchitis and reduced lung function.

No site specific PM_{10} monitoring was carried out but data is referenced from the Phoenix Park and Ballyfermot monitoring stations for 2004 in Table 5.6.8. The results indicate a low annual average but show that there are some exceedences of the daily limit. In the Phoenix Park there were 2 days in 2004 that exceeded the limit and in Ballyfermot there were 5 days. The PM_{10} levels at the site of the proposed development would be expected to be similar or lower than those outlined in Table 5.6.8.

Table 5.6.8: National PM_{10} monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average PM_{10} ($\mu g/m^3$)	Maximum 24-hour Average PM_{10} ($\mu g/m^3$)
Phoenix Park	12	71
Ballyfermot	14	112
Limit	40(1)	50(2)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)
(2) EU Ambient Air Standard (1999/30/EC) (as a 24-hour average)

Assessment Criteria

The EU has introduced several measures to address the issue of air quality management. In 1996 Environmental Ministers agreed a Framework Directive on ambient air quality assessment and management (Council Directive 96/62/EC). As part of the measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, 1999/30/EC, has set limit values for sulphur dioxide, lead, PM_{10} and nitrogen dioxide and is detailed in Table 5.6.9. EU Council Directive 2000/69/EC defines limit values for both carbon monoxide and benzene in ambient air and is presented in Table 5.6.10.

The National Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) transpose those parts of the "Framework" Directive 92/30/EC on ambient air quality assessment and management not transposed by Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 2002 Regulations also transpose, in full, the 1st two "Daughter" Directives 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air and 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.

Table 5.6.9: EU Ambient Air Standard 1999/30/EC.

Pollutant	Regulation	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	1999/30/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	50% until 2001 reducing linearly to 0% by 2010	200 $\mu g/m^3$ NO_2
		Annual limit for protection of human health	50% until 2001 reducing linearly to 0% by 2010	40 $\mu g/m^3$ NO_2
		Annual limit for protection of vegetation	None	30 $\mu g/m^3$ NO + NO_2
Lead	1999/30/EC	Annual limit for protection of human health	100% until 2001 reducing linearly to 0% by 2005	0.5 $\mu g/m^3$
Sulphur Dioxide	1999/30/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	43% until 2001 reducing linearly until 0% by 2005	350 $\mu g/m^3$
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	None	125 $\mu g/m^3$
		Annual & Winter limit for the protection of ecosystems	None	20 $\mu g/m^3$
Particulate Matter Stage 1	1999/30/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50% until 2001 reducing linearly to 0% by 2005	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health	20% until 2001 reducing linearly to 0% by 2005	40 $\mu g/m^3$ PM_{10}
Particulate Matter Stage 2	1999/30/EC	24-hour limit for protection of human health - not to be exceeded more than 7 times/year	To be derived from data and to be equivalent to Stage 1 limit value	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health	50% until 2005 reducing linearly to 0% by 2010	20 $\mu g/m^3$ PM_{10}

Table 5.6.10: EU Ambient Air Standard – 2000/69/EC

Pollutant	Regulation	Limit Type	Margin of Tolerance	Value
Benzene	2000/69/EC	Annual limit for protection of human health	100% until 2003 reducing linearly to 0% by 2010	5 $\mu g/m^3$
Carbon Monoxide	2000/69/EC	8-hour limit (on a rolling basis) for protection of human health	50% until 2003 reducing linearly to 0% by 2005	10 mg/m^3

Climate

The 30-year average meteorological data from the nearest meteorological station at Baldonnell Aerodrome. Located immediately south of the site are listed in Table 5.6.11 below.

Table 5.6.11: 30-year Average Meteorological Data from Casement Aerodrome (Annual Values).

Parameter	30-year Average
Mean Temperature (^{0}C)	9.3
Mean Relative Humidity at 0900UTC (%)	83
Mean Daily Sunshine Duration (hours)	3.64
Mean Monthly Total Rainfall (mm)	711.4
Mean Wind Speed (knots)	11.0

The prevailing wind in Ireland is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain. Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

The site of the proposed development would have similar climate patterns to those determined from Baldonnell Aerodrome listed above, due to the proximity of locations.

5.6.3 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of the current planning application consists of the provision of roads and services infrastructure to facilitate the future development of a business park, which will be known as '*Profile Park*' on the site. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.6.4 POTENTIAL IMPACTS OF THE PROPOSAL

Construction Phase

Construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction.

The potential impact from dust also depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and as such any impacts from dust deposition will typically be close to the source.

Operation Phase

There are no details of specific operations that will be located in the park but an assessment has been carried out based on the scheduled land uses. Regarding operations at the proposed development, the activities to be located in the development are planned for commercial, retail and light industrial uses. As a result, there are no major scheduled emissions (i.e. through stacks, vents, etc.) planned for the development and site activities are unlikely to cause any deterioration in local air quality.

There are relatively high volumes of traffic on the adjoining roads currently in the area of the proposed development. This is shown in the levels of traffic derived pollutants determined in the baseline period (nitrogen dioxide). However, it should be noted that these levels of pollutants are within the relevant limits. Any alterations to the existing traffic scenario, i.e. traffic volumes and/or a significant drop in vehicle speed (to gridlock speeds) may cause a significant variation in the pollutant concentrations.

Climate

There is a potential for impacts to climate as a result of any development that requires fuel and energy. These impacts are the generation of greenhouse gas emissions (principally carbon dioxide) from the on-site heating systems and the energy source, which may be located a considerable distance from the site.

The space heating for the development may be natural gas, fuel oils or solid fuel (fuel oils are regarded as the worst polluters where natural gas is considered the "cleanest" fossil fuel). The domestic heating system may effect emissions to atmosphere of carbon monoxide, sulphur dioxide, oxides of nitrogen and particulates.

Do-nothing Scenario

The baseline survey results suggest that air quality in the vicinity of the proposed development is good and shows typical levels for a rural/suburban interface area with all pollutants within the relevant EU limits at all locations. The air quality may improve slightly in future years due to improvements in engine technology and greater controls on petrol, diesel, coal and gas composition and purity.

If the proposed development were not to take place, the current air pollutant concentrations will remain unchanged followed by potential decreases in future years for the reasons outlined above.

5.6.5 AVOIDANCE REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction.

The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and as such any impacts from dust deposition will typically be within several hundred metres of the construction area.

In order to ensure that no dust nuisance occurs, a series of measures will be implemented. Site roads will be regularly cleaned and maintained as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface. Any un-surfaced roads will be restricted to essential site traffic only. Furthermore, any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.

Vehicles using site roads shall have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road and on hard surfaced roads that site management dictates speed will be restricted to 20 km per hour.

It is recommended that vehicles exiting the site shall make use of a wheel wash facility, preferably automatic, prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.

Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

As part of the construction strategy a "Construction Dust Minimisation Plan" will be formulated as part of the construction contract. The UK British Research Establishment (BRE) document "Control of Dust from Construction and Demolition Activities" (February 2003) is a best practice guidance document for such plans.

Operational phase

For the majority of vehicle-generated pollutants, emissions rise as speed drops. Emissions are also higher under stop-start conditions when compared with steady speed driving. The free flow of the traffic in the vicinity of proposed development is essential in order to minimise the generation of traffic related pollutants.

Climate

All space heating and energy requirements for the proposed development should be designed in accordance with best practice. The Building Regulations 2002 "Technical Guidance Document Part L – Conservation of Fuel and Energy Dwellings" should be used as a reference for best practice in order to reduce the impact of the proposed development on greenhouse gas emissions.

5.6.7 PREDICTED IMPACTS OF THE PROPOSAL

Construction Phase

If a satisfactory environmental impact minimisation plan is implemented, the effect of construction on air quality will not be significant. The main environmental nuisance associated with construction activities is dust. However, if the construction contractor adheres to good working practices and dust mitigation measures the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance. A series of such good working practices and mitigation measures are outlined in this chapter.

Operational Phase

Summary traffic flow information was obtained from the traffic section of the Statement and has been used to assess whether any significant impact on sensitive receptors may occur as a result of traffic alterations in the area. The traffic section of the report has generated AM (morning) and PM (evening) peak traffic counts as a result of the proposed development. The traffic section predicts total morning peak two way trips of 1,505 and total evening peak two way trips of 2,039 in 2020 as a result of the traffic for the proposed development. A modelling assessment has been carried out to determine the potential increase in ambient pollutant concentrations as a result of these traffic volumes onto the current road network.

A prediction of the increased ground level concentrations of traffic-derived pollutants was carried out using US EPA approved refined air quality modelling software, CAL3QHCR (CALINE dispersion model). The CAL3QHCR model which incorporates the Industrial Source Complex (ISC) mixing height algorithm and it also has the additional enhancement where it incorporates the Discrete Parcel Method to account for NO to NO_2 conversion. Tier I approach of the CAL3QHCR model was used where a full year of hourly meteorological data and one hour of emissions traffic volume is required. Using this approach is considered to be a worst-case situation for predicting daily and annual average concentrations of the individual pollutants because peak hour traffic conditions are assumed for the entire modelling period.

The emission factors used for NO_2, PM_{10}, VOC, CO, and Benzene for the modelling scenario were derived from the speed dependent emission equations formulated in the 2003 EFT2e. The Emission Factor Toolkit allows the calculation of emission rates in grams/vehicle per kilometre. It incorporates national fleet composition data for motorways, urban and rural roads, fleet composition based on European emission standards from pre-Euro I to Euro IV, speed related emission functions and scaling factors for reductions in emissions in future years. Traffic speeds have been assumed at worst case, i.e. 50km/hr to represent slow moving traffic conditions in 2006. Emissions are higher under

slower traffic conditions so these emission factors are considered a worst case estimation.

The most important parameters governing dispersion in the atmosphere are wind speed, wind-direction and the stability or turbulence of the atmosphere. These parameters along with the ambient temperature and inferred mixing heights for each hour were included in the modelling using data from the nearest met station (Dublin Airport). Five years worth of hourly sequential meteorology data representative of the area (2001 to 2005 for Dublin Airport) was used for the operation of the atmospheric dispersion model. The 2002 meteorological data was determined as the worst case year and was employed in the model to generate highest levels of pollutant concentrations.

The modelling approach has taken a number of conservative approaches to the input data to allow a margin of tolerance in the results and ensure a worst-case scenario of predicted results. These approaches include the use of the evening peak hour traffic flows and the emission factors are calculated for lower speeds where emissions are greater. As such, it can be assumed, with some confidence, that if the model predicts that there will be no significant impact on air quality, there will be no significant actual impact on air quality from traffic derived pollution.

The results of the modelling are presented in Table 5.6.12. The results for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality. The existing backgrounds (taken from Ballyfermot and the city centre) are relatively low and the increased pollution as a result of the evening peaks of traffic from the proposed development does not lead to breaches of the relevant air quality limits.

Table 5.6.12: Predicted increases in traffic derived pollution as a result of traffic from the proposed development in the evening peak hour.

Parameter	Averaging Value	Predicted Increase	Background	Increase and Background	Limit
CO (mg/m^3)	8-hour Average	0.14	0.3	0.44	10
Benzene ($\mu g/m^3$)	Annual Average	0.06	1.3	1.36	5
NO_2 ($\mu g/m^3$)	Annual Average	3.65	23	26.65	40
	Max 1-hour Average	19	138	157	200
PM_{10} ($\mu g/m^3$)	Annual Average	0.77	14	14.77	40
	Max 24-hour Average	3.18	14	17.18	50

Once significant consideration is given to the environmental impact of greenhouse gas emissions at the design stage and the heating and energy system are operated in accordance with principles of best practice or within consent conditions, the effect of a domestic heating system and energy supply are not considered to be significant. The use of natural gas will significantly

reduce the potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Worst Case Scenario

For traffic-derived pollutants, the "worst-case" scenario consists of gridlock conditions in the vicinity of the development as presented in Table 5.6.12 above. The refined predictive model employed has been set up to generate worst-case scenario predictions for air quality. If this model indicates that pollutant levels will not breach the EU limits, then it can be assumed with some confidence that a project will not produce air pollution problems if none are identified by this method. There are no predicted breaches of EU legislation from the proposed traffic increase on top of the existing backgrounds. As a result of these model predictions it may be concluded that the worst-case impact of the traffic alterations associated with the proposed development are predicted to be insignificant.

5.6.8 MONITORING

In the event that dust from the proposed development is creating an environmental nuisance during the construction phase of the development, an ambient dust deposition survey is recommended. This survey should be carried out by qualified consultants using EPA approved Bergerhoff gauges. The requisite number of gauges should be placed at the nearest sensitive receptors to the construction works and at key locations along the proposed haul routes. Monitoring should be carried out at monthly intervals for the duration of the construction phase.

The TA Luft (German Government "Technical Instructions on Air Quality") states a guideline of 350 $mg/m^2/day$ for the deposition of non-hazardous dusts. This value should be used to determine the impact of construction dust as an environmental nuisance should the need arise.

5.6.9 REINSTATEMENT

Resinstatement measures are not applicable in this instance.

5.7 LANDSCAPE AND VISUAL APPRAISAL

5.7.1 INTRODUCTION

The landscape and visual impact assessment of the proposed development will examine the existing landscape in terms of its visibility and scenic quality. The impact of the proposed development in general terms on that character is assessed, including views into and out from the site. Further consideration will be given to the effects of the proposed development on existing vegetation.

In determining the impact, consideration is given to reducing any significant impact associated with the development proposal and accordingly mitigation measures are considered.

Landscape and Visual Assessment Methodology

The assessment of the impact on the visual character of the site as a result of the proposed development is based on the guidelines laid down by the Environmental Protection Agency (EPA) in the Advice Notes on Current Practice in the preparation of Environmental Impact Statements (2003).

The assessment was conducted as follows:
1. Site survey to determine the character of the site and its surrounding area.
2. Assessing the proposed development through layout plans and sections to determine the impacting features.
3. Evaluating these impacts on the landscape in accordance with EPA guidelines.

The following definitions are used in the visual assessment:

Extent of visual impact

No Impact:	There is no change to views in the visual landscape.
Imperceptible Impact:	In this situation the proposal is adequately screened due to the existing landform, vegetation or constructed features.
Slight Impact:	In this situation the affected view forms only a small element in the overall visual composition, or changes the view in a marginal manner.
Moderate Impact:	In this situation the proposal affects an appreciable segment of the overall visual composition, or where there is an intrusion into the foreground of a view.
Significant Impact:	In this situation the proposal affects a significant segment of the overall visual composition, or where views are so affected that they form a new element in the physical landscape.
Profound Impact:	Is one where the view is entirely altered, obscured or affected.

Quality of visual impact

Neutral Impact:	Will neither detract nor enhance the landscape character or viewpoint.
Positive Impact:	Will improve or enhance the landscape character or viewing.
Negative Impact:	Will disimprove or detract the quality of the landscape.

Duration of visual impact

Temporary:	Impacts lasting one year or less.
Short-term:	Impacts lasting one to seven years.
Medium-term:	Impacts lasting seven to twenty years.
Long-term:	Impacts lasting twenty to fifty years.
Permanent:	Impacts lasting over fifty years.

5.7.2 THE RECEIVING ENVIRONMENT

Landscape Character/Context

The landscape in the site area is composed of medium sized agricultural fields which are bounded by hedgerows. The landscape character of the area is one of open, large scale, rural setting at present, but on the fringe of development, as indicated by the presence nearby of Grange Castle International Business Park and Kilcarbery Business Park to the north and large scale residential housing to the east. One is conscious of development taking place to the landscape setting in the environs of the site.

The eastern boundary of the site is defined by the presence of the local authority golf club and grounds, Grange Castle Golf Club. The northern and north-western boundary is indicated by the meandering profile of the Old Nangor Road. The remaining boundaries, to the south and west, are defined by fringe hedgerows and trees and the local roads serving the village of Newcastle and Baldonnell Aerodrome. Internal field boundaries are formed by open drainage ditches with associated trees and hedgerows.

The landscape character of the site is essentially agricultural. The existing pattern of field hedgerows with some mature trees is the main defining feature of the landscape area. The area is one which has undergone considerable change in recent times. The recently constructed surroundings have changed and are constantly changing the landscape character to one of a commercial suburban setting. It can therefore be considered in transition between agriculture and industrial/commercial uses.

Development Plan Context

There are no particular landscape designations associated with the subject site. There are no listed views in the environs of the site. The relevant Development Plan provisions pertaining to the site are as follows:

1. The inclusion of the subject site and Grange Castle to the north in the South County Development Plan 2004 as an area which has the zoning objective E to provide "enterprise and employment related uses" by means of commercial development;
2. The key strategic position of the site to the south of the existing Grange Castle International Business Park;
3. The proximity of the site to a large residential catchment area;
4. The proximity of the site to existing (and permitted) high quality commercial and leisure facilities.

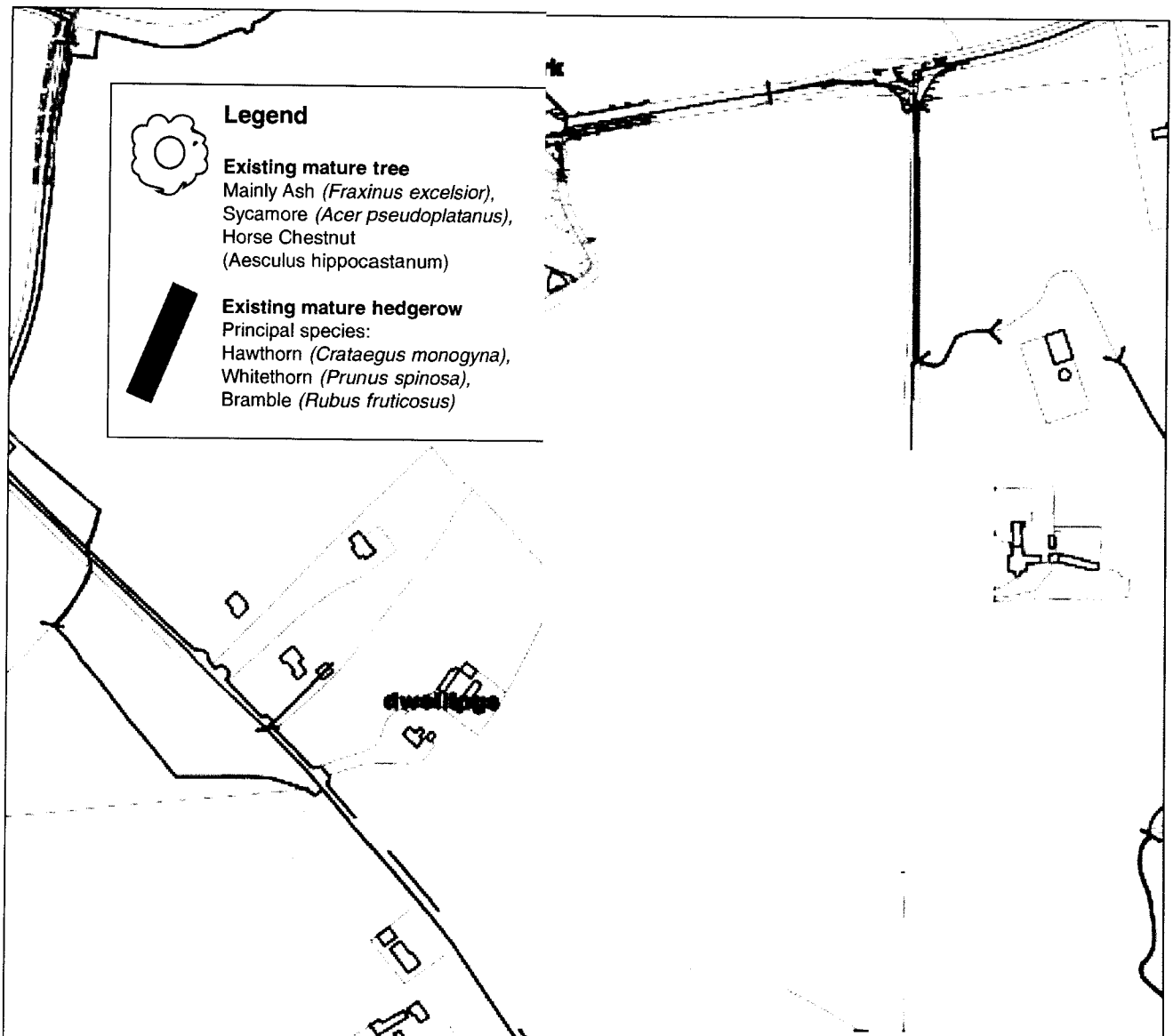
Existing Landscape Features and Vegetation

The site is situated in a landscape characterised by even flat landforms with elevations between 72.5 and 83.5m OD. The local topography falls gradually south to north. There are no exceptional or unique landscape features on the site.

The existing mature hedgerows and trees within the site and particularly on the northern and southern boundaries contribute to a sense of landscape maturity within the overall development area. These hedgerows form and frame the site of the proposed business park. They are native hedgerows consisting, in the main, of ash, hawthorn (*Crataegus monogyna*), Whitethorn (*Prunus spinosa*), bramble and briar (*Rubus* spp.). Internally, there are five large sized fields laid out in a north-south orientation. These fields are themselves bounded by hedgerows of a similar composition which have been managed over the years and there is evidence of coppice management. Some mature trees, principally ash, punctuate this hedgerow pattern.

The principal mature trees on the site are on the southern boundary and primarily comprise Ash (*Fraxinus excelsior*), Horse Chestnut (*Aesculus hippocastanum*) and Sycamore (*Acer pseudoplatanus*).

See figure 5.7.1 for plan of Existing Vegetation and Topography.



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Project Title:

PROFILE PARK
LANDSCAPE AND VISUAL ASSESSMENT

Client:
DASNOC Ltd

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Figure 5.7.1 Existing Vegetation and Topography Plan

Project Planner:
RPS Planning & Environment Ltd

Scale:	**NTS**	Revision
Date:	May 2006	**0**

Existing Views

This section of the report assesses the visibility of the site from within the overall business park area and from surrounding areas. The main views within the site are confined to the general site area and are composed of views of agricultural pasture and new development.

The key viewing areas into the site are classified as follows:
1. Views from roadways and adjoining dwellings.
2. Views from within the site.
3. Views from local amenities.

Views from roadways and adjoining dwellings

The site is occasionally visible from the Old Nangor Road to the north due to the fragmented hedgerow flanking the southern roadside verge. This view is across farmland. This visibility into the site is divided due to the alignment of the hedgerows within the site, running in a north-south direction, thereby providing uninterrupted views across most of the site.

The main landscape feature is the presence of the Dublin Mountains in the background, approximately 10 kilometres in the distance. This landscape element is significant as it provides topographical relief to a relatively flat domain.

There is also some visibility into the site from the local road serving Baldonnell Aerodrome, which bounds the southern side of the site. These views are restricted, however, due to presence of uniform mature hedgerows along the roadside verges, which vary in height from 4-7 metres.

There are also a number of dwellings located along the main roadways, which are interspersed with commercial developments. Ten dwellings are likely to be affected; five are located along each of the Nangor Road and the road to the south of the development. These dwellings have potential visibility to the subject site, limited only by garden and boundary planting.

Views within the site

The views from within the site may be categorised into two distinct aspects: views to the north consisting of commercial elements and views to the south composed of a rural landscape.

The views to the north are defined by a skyline consisting primarily of the commercial components of the Wyeth and Takeda buildings and the lower, but closer, industrial / warehouse buildings in Kilcarbery Business Park. These are two substantial building masses which are easily identifiable on the distant horizon.

The views to the south are more pastoral in content. There are sweeping areas of grassland framed by hedgerows and backdropped by the Dublin Mountains. Dwellings and buildings are scarce in the views due to the screening effects of existing vegetation and topography. The view is characterised by the rural landscape of South County Dublin.

Views from local amenities

The principal amenity in the vicinity of the development site is the public golf course which borders the site to the east. Views from the golf course are currently restricted by existing mature tree and hedgerow and by additional boundary planting on the golf course lands.

Significance of Local and Site Landscape Amenities

There are no existing landscape features on the site or in the environs of any particular note.

5.7.3 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, which will be known as 'Profile Park' on the subject lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

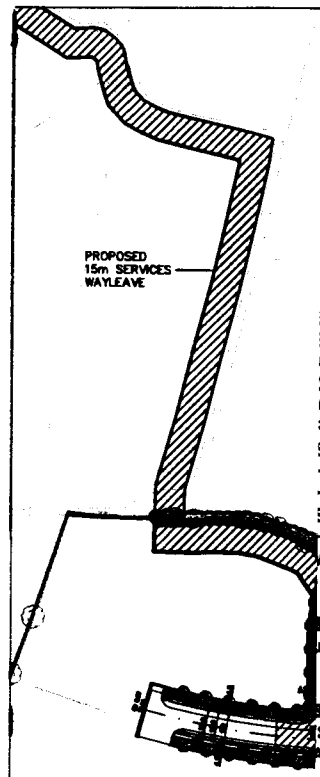
It is proposed that there will be high quality streetscapes within the site to accommodate future commercial development. All streetscapes have been designed to a high landscape standard (see figure 5.7.2).

The layout of the scheme has been designed to provide a variety of elevations to the streets. The soft landscape treatment to the proposed streets is a combination of semi-mature street trees, grass verges, mounding and groundcover shrub planting. This treatment will create a structure within the site and reinforce the hierarchy of the streets with size and intensity of planting typologies.

Throughout the site, there is a landscape buffer strip to the road reservation edge of 5 metres on the main avenues and 3 metres on secondary roads. This allows for tree and shrub planting and earth mounding to create screening to the sites to the rear, as well as form a structure to the business park. There are four proposed typologies of planting, as follows:

1. **Entrance Area and Entrance Road**: Large avenue trees (Norway Maple – *Acer platanoides* 'Emerald Queen') will be planted in the 5-metre strip to define the entrance area and street, with groundcover shrub planting to a maximum of 1.5 metres and asymmetrical earth mounding. A second, smaller tree (Upright Rowan – *Sorbus aucuparia* 'Asplenifolia') would be planted in the central median (see Sections A-A/B-B – figure 5.7.3);

2. **Main Avenue:** The main roads through the site will be defined with a double avenue of trees planted in a 5-metre wide landscape reservation strip, composed of an outer line of Norway Maple and an inner line of Upright Rowan (see Section C-C – figure 5.7.3). The groundcover and mounding detail will also be continued;



legend

Primary Avenue Tree
Acer platanoides 'Emerald Queen'
Norway Maple

Secondary Avenue Tree
Sorbus aucuparia 'Asplenifolia'
Upright Mountain Ash

Woodland screen planting
Scots Pine (*Pinus sylvestris* 15%)
European Larch (*Larix decidua* 10%)
Ash (*Fraxinus excelsior* 10%)
Common Oak (*Quercus robur* 10%)
Alder (*Alnus glutinosa* 5%)
Rowan (*Sorbus aucuparia* 5%)
Silver Birch (*Betula pendula* 5%)
Holly (*Ilex aquifolium* 20%)
Hawthorn (*Crataegus monogyna* 10%)
Blackthorn (*Prunus spinosa* 5%)
Hazel (*Corylus avellana* 5%)
Wild rose (*Rosa canina, R. rugosa* 5%)

Shrub planting
Under Avenue Trees

Specific Landscape Measure
Subject to approval of Planning Authority. See text of report for details

Existing Hedgerow / Trees

Existing Hedgerow / Trees to be removed due to development.
All other trees / hedgerows retained

Existing Contour

Existing Ditch

Site Boundary

Road details see engineer's drawings

Revision

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5.7.2 Landscape Masterplan

Planner:
ning & Environment Ltd.

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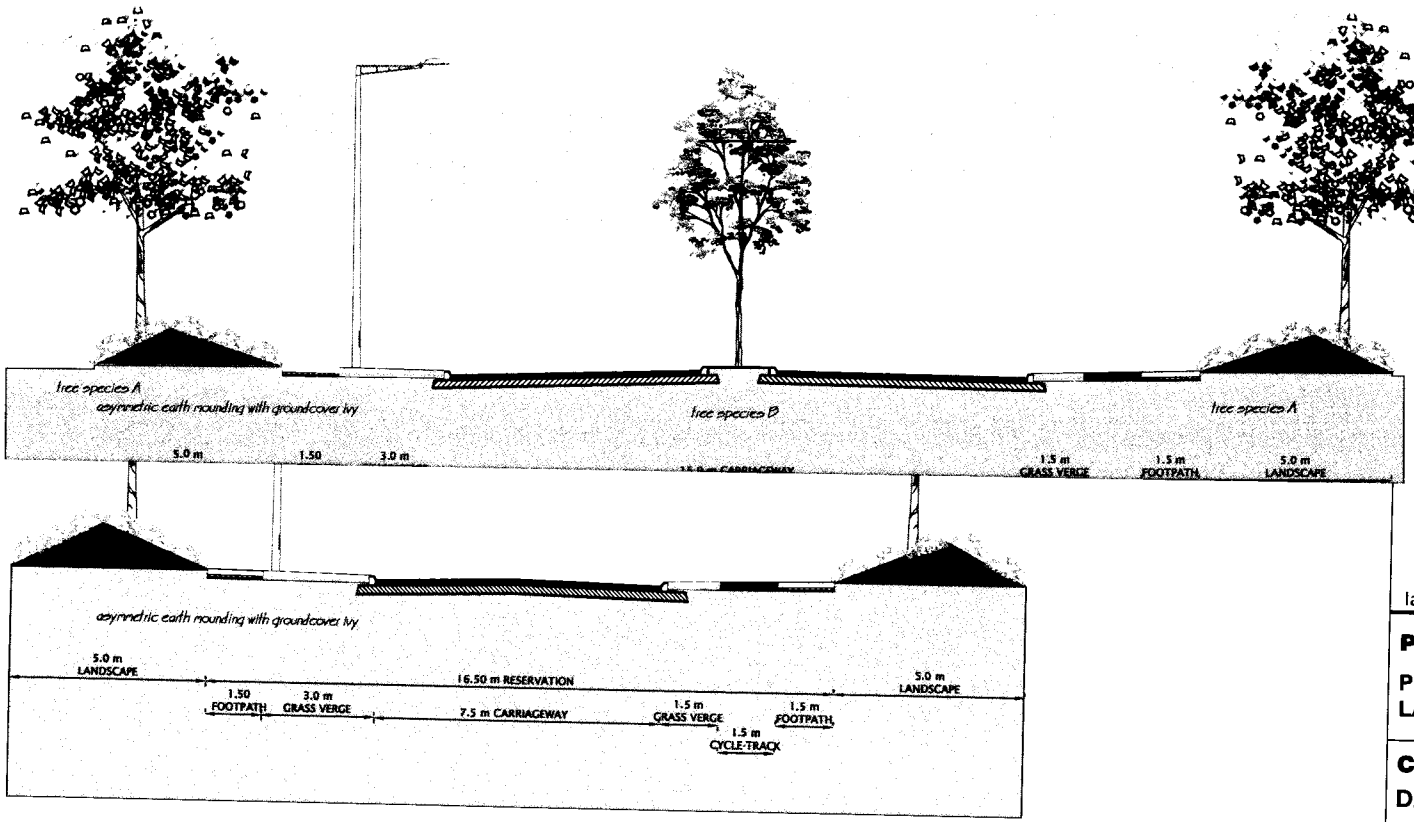
SECTION A-A - ENTRANCE AVENUE



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landscape architecture

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Landscape Sections

Figure 5.7.3

Project Planner:

RPS Planning & Environment Ltd.

Scale:	Paper Size:	Revision:
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Date: **July 2006**		

3. **Typical Secondary Road:** The majority of secondary roads will be more open in character, with future buildings set back within sites and the 3-metre wide, mounded landscape strip planted with Norway Maple trees to form an avenue and groundcover shrubs;

4. **Service/Neighbourhood Centre Cluster:** In the later design of the site, the secondary streets could have two separate urban design characters. The second of these would form an urban street, with future retail buildings close to the path edge. In this case, planting of Norway Maple trees would form a single avenue in predominantly paved environs;

5.7.4 POTENTIAL IMPACT OF THE PROPOSAL

The potential landscape and visual effects are discussed in this section in terms of the effects which may arise. The potential effects allow for the important effects to be identified, and described in detail in order to determine the degree of effects which will be mitigated by landscape works.

This section assesses the impacts likely to be caused by the proposed roads and services development only. It is recognised that future build out of the site will occur, but the nature and form of this development has not been designed in detail, and therefore cannot be assessed at this time.

It is assumed that the traffic using these roads will be a mix of vehicles, including HGVs. The largest vehicles using the site will be 4-5 metres in height, and the visual assessment will be based on this height.

Existing Landscape Features and Existing Vegetation

The primary landscape features on the subject site are the existing mature hedgerows and trees. The proposed development will essentially change the agricultural pattern of the subject site to a commercial development. The proposed development will entail the construction of roads and services on the subject site which will result in the removal of 400 metres of existing hedgerows and trees within the site. Future development within the site may also result in the removal of existing site vegetation. Boundary hedgerows and trees can be largely retained. All existing drains and watercourses will be retained, except for a 25-metre section of a watercourse in the north of the site which will be culverted. This generates a slight negative landscape impact as this represents a small percentage (<10%) of the entire site vegetation and these features are not unique or valuable from an amenity or landscape point of view.

Views

The proposed development of roads and services with tree planting to either side of each road would have a relatively low visual weight, compared with the extent of the site. Traffic would be partially screened by the proposed trees, but the movement of traffic increases its visibility.

Views from roadways and adjoining dwellings

At the nearest point, the proposed roads are located 200-300 metres to the south or south-east of the existing dwellings along the Nangor Road. The effect on views from these dwellings would be moderately negative as the proposed development would contrast with the existing landscape and result in reducing the quality of the views of the Dublin Mountains from these dwellings. The effect

of the development on the visual quality of the agricultural landscape in the fore- and middle-ground of the views would be slightly negative.

At the nearest point, the proposed roads are located 175 metres north-west of Kilbride House in the south-east of the site and between 340 metres and 770 metres from dwelling to the west of the site. Views from Kilbride House to the north of the agricultural landscape in the fore and middle ground would be moderately negatively affected. Impacts to views from other dwellings would be slight and negative, due to the distance from the proposed roads and the existing mature boundary vegetation. Long distance views to the industrial buildings to the north-east of the site would be partially blocked although this would not counter-balance the negative effects.

Views from the roadway to the west of the site would also be slightly negatively affected.

Views from within the site
The views from the site are views across agricultural fields to the south, and the view to the north towards Grange Castle International Business Park and Kilcarbery Business Park. The site development will generate a moderate change to the character of the existing views. Given the existing quality of the views in this location, there will be moderate visual effects to the existing views in this area, particularly to the south.

Views from local amenities
Views from the public golf course east of the site are currently partially restricted by existing mature trees and hedgerows and by additional boundary planting on the golf course lands. The potential impact to views from the course is slight in extent due to the nature of the proposed development and its likely relatively low visibility from the course.

5.7.5 REMEDIAL OR REDUCTIVE MEASURES

The scheme of landscape works for the proposed development can be defined in the following areas:

1. Main roadways and entrance spaces
2. Boundary treatments

The details of the landscape scheme are illustrated on figure 5.7.2.

The planting scheme for the site takes account of the native species already in the area as these would be the most useful for local wildlife. In the detailed design phase, preference should be given to the planting of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*) and willow (*Salix* spp.) as these are the principal native species in this part of County Dublin. Other occasional species include oak (*Quercus robur*), alder (*Alnus glutinosa*), birch (*Betula* spp.), rowan (*Sorbus aucuparia*), holly (*Ilex aquifolium*), crab apple (*Malus sylvestris*) and wild roses (*e.g.* dog rose, *Rosa canina*).

Roadways and Entrance Spaces

The main roadways will be developed for cycling and pedestrian access, and are proposed to be defined by strong lines of semi mature standard trees, as described in Section 5.7.3. It is envisaged that the footpaths will be developed with a high quality pavement. The ancillary roadways have been developed using street trees, with a species composition that relates to each individual roadway.

At the entrances to the proposed development and at junctions within the site, it is proposed to implement Specific Landscape Measures (SLMs). It is intended that these spaces would create a visual break in the external environment and therefore give visual interest. These spaces could then be further aesthetically enhanced by tree and shrub planting, lighting, site furniture, water features and/or sculptural features. These would enhance the amenity value of the site and would be designed in detail at a later stage, as part of the urban design process for the future business park.

Boundary Treatments

The boundaries of the proposed development site are proposed to be planted with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings.

The following species mix is proposed, as follows:

Native Tree and Shrub Screen Planting mix

Scots Pine (*Pinus sylvestris* 15%), European Larch (*Larix decidua* 10%), Ash (*Fraxinus excelsior* 10%), Common Oak (*Quercus robur* 10%), Alder (*Alnus glutinosa* 5%), Rowan (*Sorbus aucuparia* 5%), Silver Birch (*Betula pendula* 5%), Holly (*Ilex aquifolium* 20%), Hawthorn (*Crataegus monogyna* 10%), Blackthorn (*Prunus spinosa* 5%), Hazel (*Corylus avellana* 5%) and wild rose (*Rosa canina, R. rugosa* 5%).

The screening mix will be planted along the boundaries with existing dwellings in a 5m band and in an 8m band along the golf course boundary to ensure that the proposed development is screened in views. This will have the effect of enhancing the screening and aesthetic value of the existing hedgerows by introducing additional native deciduous and evergreen trees. It will not be planted along the southern boundary of the site to the north of Kilbride House, due to external constraints. Massed plantings will be planted as bare root whips / transplants, with container-grown evergreen trees/shrubs.

5.7.6 PREDICTED IMPACT OF THE PROPOSAL

The predicted landscape and visual effects are the residual effects of the proposed development on the landscape and visual environment, after consideration of mitigation measures.

Existing Landscape Features and Existing Vegetation

Construction stage

Site clearance works would result in the removal of 400m of existing hedgerows and trees from the interior of the site in the initial stages of construction. This would result in a slight, permanent landscape impact. However, following planting of streets and boundaries as described in section 5.7.5, the overall effect on landscape vegetation would be positive.

Operational Stage

In the operational stage the landscape measures and planting proposed in section 5.7.5 for the site will establish and mature. This will result in a change to the landscape character from agricultural to infrastructural/commercial. In the wider landscape context, this is a continuation of an established pattern on adjacent lands. Additional distinct landscape features such as water features, tree and shrub plantings, sculpture, etc. would have a positive impact on the landscape amenity value of the site and the overall amount of significant tree cover would be increased.

Views

Construction stage

There may be some slight visibility of the construction works in the wider landscape, and the completed infrastructure during the establishment stage of the scheme. The subject site is not particularly visible in the wider landscape area and these effects will be generally slight. Views from adjacent dwellings will be primarily negatively affected to a slight extent.

Operational stage

Views from roadways and adjoining dwellings

The predicted effect on views from dwellings along the Nangor Road would be moderately negative as the proposed commercial development cannot be screened from view with screen planting within the site but the views of the Dublin Mountains from these dwellings would be partially blocked and the visual quality and context of the landscape is reduced.

Views from Kilbride House to the north would be moderately negatively affected as the proposed roads would be visible in the landscape and the visual quality of the landscape is reduced. Impacts to views from other dwellings to the west of the site would be negligible, due to the distance from the proposed development and the existing mature boundary vegetation, augmented with screen planting.

Views from the roadway to the west of the site would also be slightly negatively affected.

Views from within the site

The views from the site are views across agricultural fields to the south, and the view to the north towards Grangecastle International Business Park and Kilcarbery Business Park. The site development will generate a moderate change to the character of the existing views. New landscape features will create a distinct, visually interesting landscape setting. However, removal of the agricultural landscape will result in slight negative impact overall.

Views from local amenities
The predicted impact to views from the Grange Castle Golf Course is slight in extent as the proposed development will be screened from the course and will have only a slight effect on approaches to the course and the landscape setting.

5.7.7 MONITORING

The landscape development of the site will be carried out as follows:

Construction stage

All mature trees, hedgerows or bushes to be retained should be appropriately fenced for protection. Where trees will be interfered with by construction works, an Arborist should monitor the site works.

For the retention of all other landscape qualities, including topsoil stripping and storage, instructions should be submitted to all contractors to maintain good practice while manoeuvring vehicles or materials within the vicinity of, or on, the site. Monitoring should occur by site inspections from an appointed Landscape Architect.

The landscape works construction stage will entail the monitoring of the topsoil stripping and the establishment of the main structural planting on the street areas.

Operation stage

Following completion of the works, there will be an ongoing programme of landscape management for the site, which will be overseen by a Landscape Manager or Landscape Architect.

5.7.8 REINSTATEMENT

The proposed landscape development works in the form of contouring, shrub and tree planting will form the reinstatement of the site following the completion of the main building works. These works will be carried out by a landscape contractor and will be supervised by the appointed Landscape Architect.

5.8 MATERIAL ASSETS

5.8.1 TRAFFIC AND TRANSPORTATION

5.8.2 INTRODUCTION

The development that is the subject of the current planning application consists of the provision of roads and services infrastructure, which will accommodate the future development of a business park on the subject site. The future land uses proposed on the site include industrial, office, retail, and neighbourhood centre uses including shops, cafes, crèche etc. Vehicular access to the site is proposed via the Nangor Road Regional Road R134, which has access to the Outer Ring Road R136. When completed, the Outer Ring Road will connect the N4 to the N7 and N81. Pedestrian and cycle access will be provided throughout the site and will connect with the Nangor Road which is to be upgraded to provide for these modes of travel.

This section of the EIS addresses the existing transportation environment in the vicinity of the proposed development, the traffic generation, parking and public transportation requirements of the development and the transportation impact on the surrounding road network.

The transportation impact of the proposed development has been assessed using widely accepted methods including the T.R.I.C.S. database (based on surveys in the UK and Ireland, which is widely used for trip estimation in Ireland). Consideration has been given to access to/from and within the site for all users (cars, pedestrians, cyclists and public transport users).

The parking requirements for the development have been considered with reference to the South Dublin County Council Development Plan 2004 – 2010.

5.8.3 RECEIVING ENVIRONMENT

Site Description and Location

The Kilcarbery area is strategically located from a transportation point of view on the western fringe of the Greater Dublin Area, approximately 13km west of Dublin City Centre and 2.5 km west of Clondalkin Village.

The subject site is located on the southern side of the Nangor Road, west of the Outer Ring Road. The site is currently agricultural / undeveloped lands.

To the north is Grange Castle Business Park, to the east of the site is a golf course and further east is the established residential area of Clondalkin. To the south is Baldonnell Military Aerodrome and to the west are primarily agricultural lands. Refer to Figure 5.8.1 Site Location - Regional Context and Figure 5.8.2 Site Location - Local Context.

Figure 5.8.1: Site Location – Regional Context

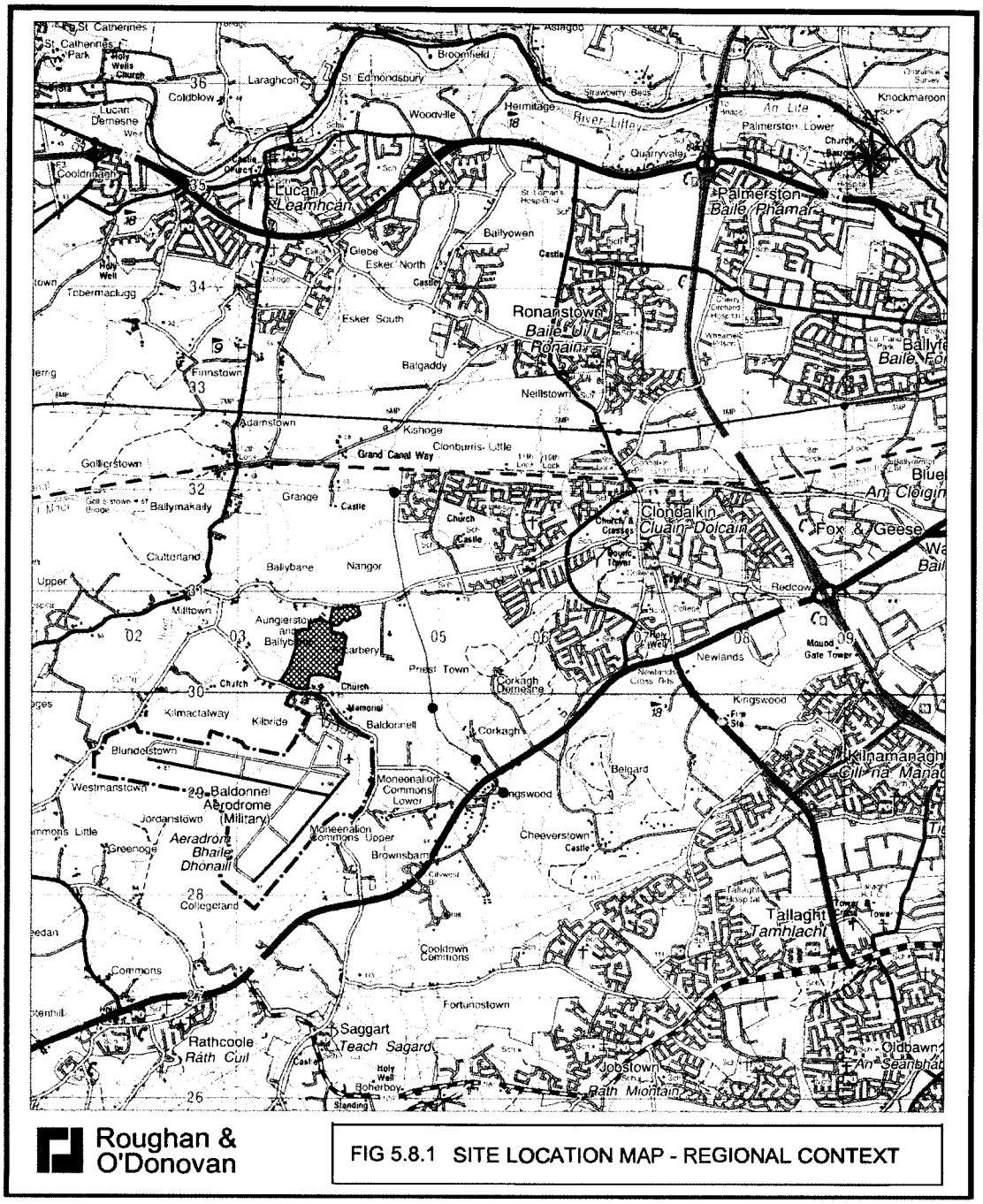
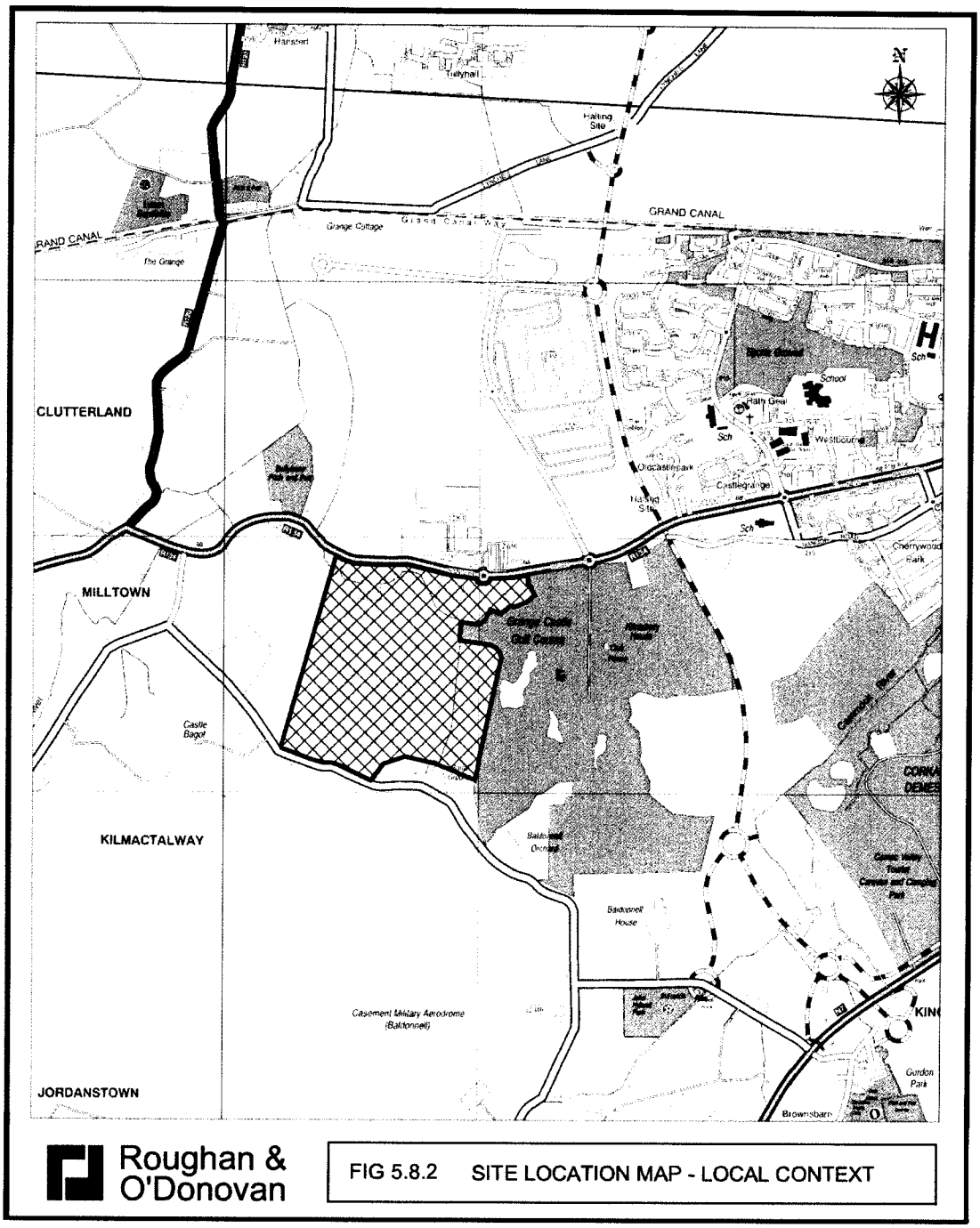


Figure 5.8.2: Site Location – Local Context



Transportation Policies

The transportation strategies 'Transport 21' and 'A Platform for Change, 2000-2016, prepared by the Dublin Transportation Office (DTO) and approved by the Government, contain proposals for a high-capacity public transport network throughout Dublin. The aim is to achieve a substantial share of the transport market in Dublin for public transport services. The land use and development control policies of the local authorities are expected to be coordinated with the transport policy through an emphasis on development of sites that are easily accessible by public transport.

It is an objective of South Dublin County Council to *'promote ease of movement within, and access to South Dublin, by integrating land use planning with a high quality, sustainable and integrated transport system for people and goods within the County.'*

The proximity of the site to the future QBC along the northern boundary of the site on the Nangor Road will encourage travel to the site by bus. In addition the orbital bus priority on the Outer Ring Road will also encourage travel by bus.

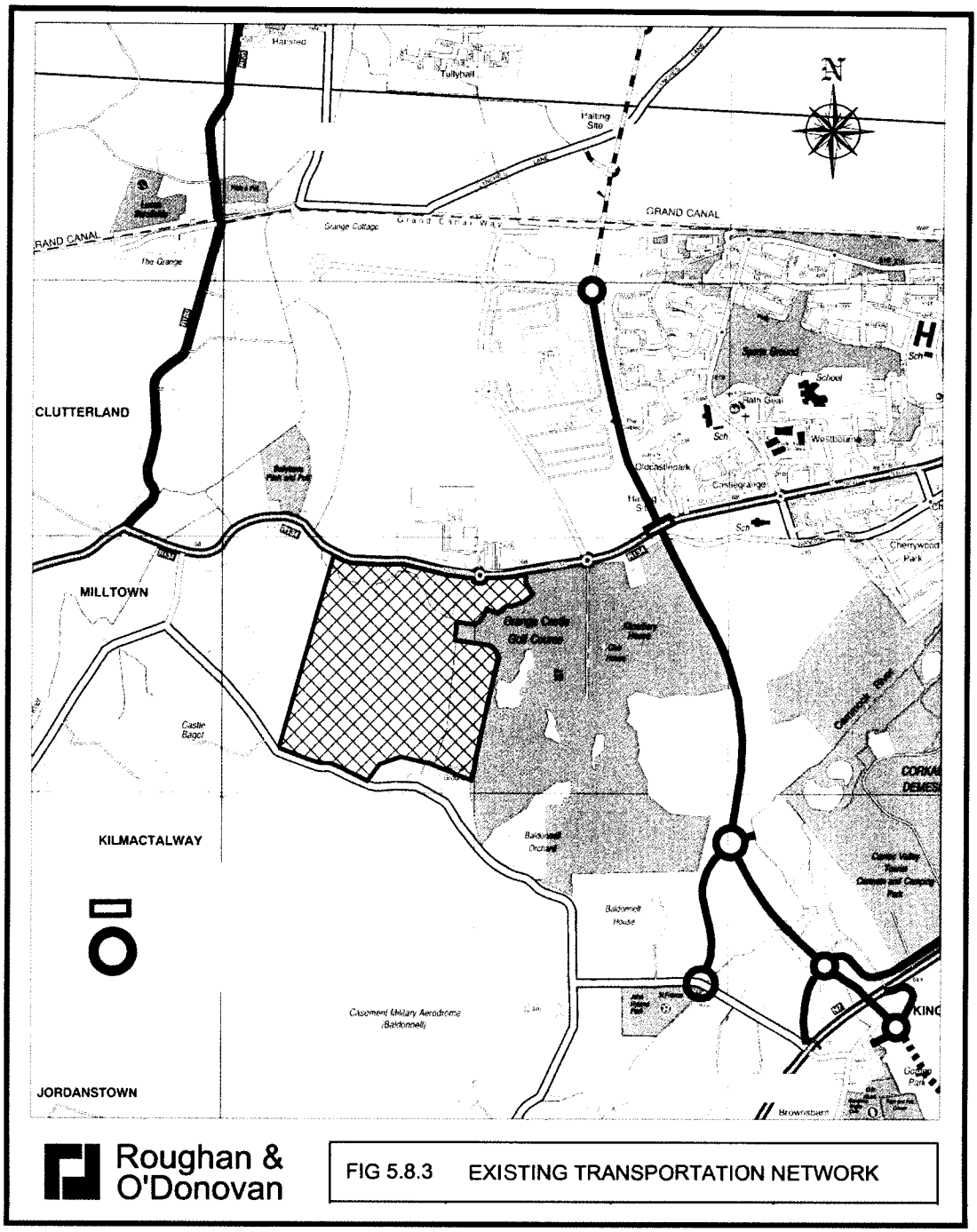
Existing Road Network

The site is situated between the N4 and N7 National Primary Routes and approximately 5km west of the M50 Motorway. The M50 is an orbital ring road around Dublin City with interchanges at all radiating National Primary Roads from the N1 to the North and the M11 to the South.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has seen steady improvements over recent years, and is a wide single carriageway with dedicated bus lanes in each direction extending as far out as the Kilcarbery Park roundabout. The Nangor Road along the northern boundary of the site and to the west is of lower standard in terms of alignment and cross-sections, but will soon be upgraded and widened to include bus lanes in each direction.

The Outer Ring Road Phase 1 was opened from the N7 as far as Grange Castle Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction. Refer to Figure 5.8.3 Existing Transportation Network.

Figure 5.8.3: Existing Transportation Network



Proposed Road Improvements

Phase 2 of the Outer Ring Road, which will see a local road link from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road, which commenced construction in 2005 and is due to be completed by mid 2007. With completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and the N7. Phase 3 of the Outer Ring Road, continuing south from the N7 to the N81 Blessington Road is progressing through the planning and design process and construction is expected to commence this year.

The upgrading of the N7 to dual three-lane standard from Dublin to Naas has commenced and is anticipated to be complete by the end of 2006. Improvements are also planned to the N4 to bring it to dual three-lane standard as far as the Leixlip Interchange from the M50 / N4 Interchange within three years.

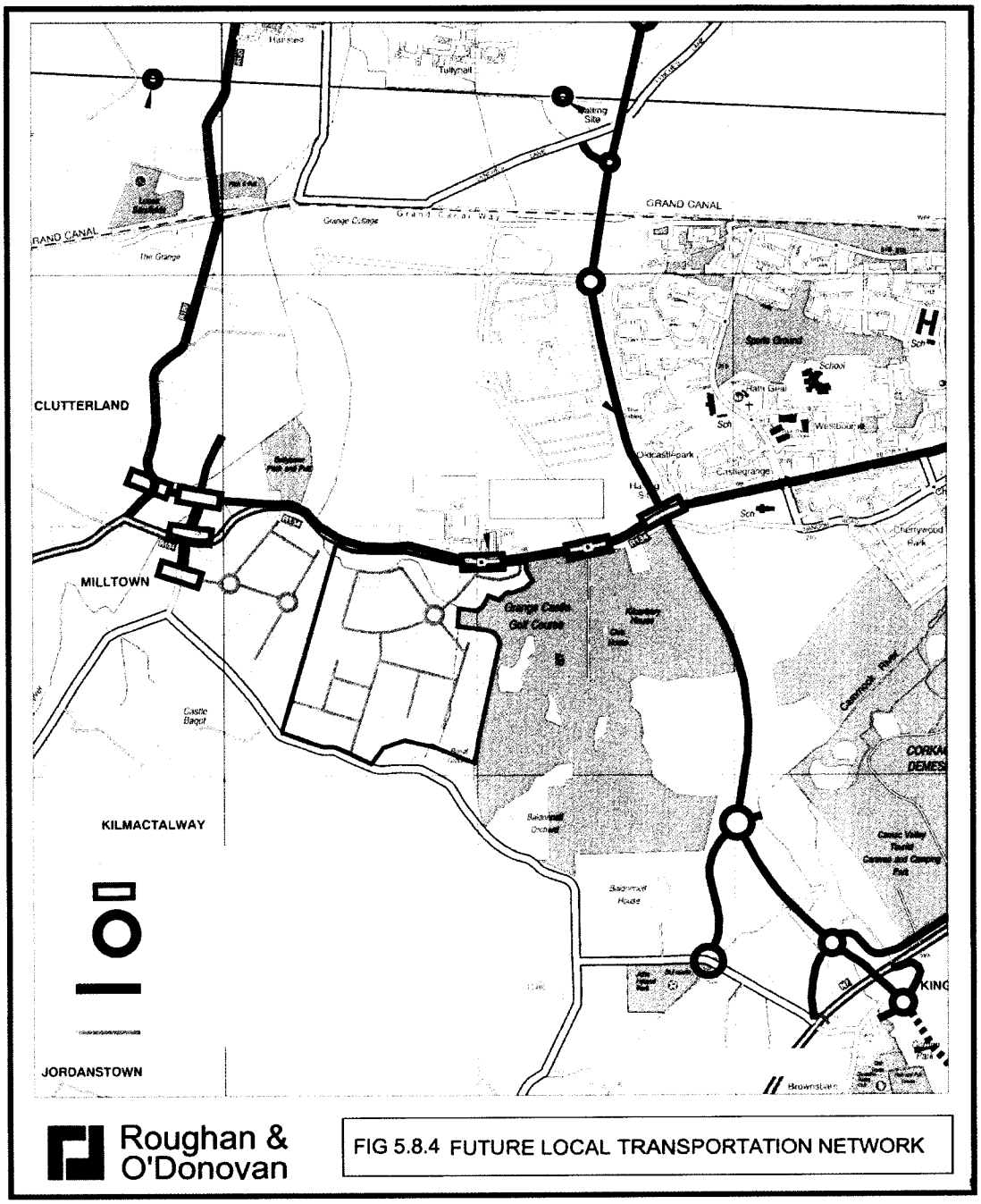
The Nangor Road west of the Outer Ring Road will be upgraded and widened to include bus lanes in each direction. Two of the existing roundabout junctions will be upgraded to traffic signal control to facilitate the Quality Bus Corridor (QBC) along this route.

Proposed road infrastructure identified in Transport 21, which will have a positive impact on the road network in the area include the following (completion dates):

- Dublin Port Tunnel (2006)
- M50 upgrade phase 1. These upgrades will provide essentially 'free flow' interchanges at the N4 and N7 (2008).
- M50 upgrade phase 2 Upgrading remainder of the M50 including the interchanges and widening to 3 lanes between the M1 interchange and Scholarstown interchange (2010)

Refer to Figure 5.8.4 Future Transportation Network.

Figure 5.8.4: Future Transportation Network



Existing Traffic Conditions

The existing road network adjacent the subject site is operating well within its capacity, however no traffic surveys have been undertaken on the surrounding road network as traffic conditions are expected to change significantly as a result of extensive development within the area and the completion of the Outer Ring Road. Instead, the estimated future traffic flows on the surrounding road network were obtained from South Dublin County Council, which were undertaken as part of the Nangor Road Improvement Scheme. These traffic flows take account of proposed transportation Infrastructural improvements and development of zoned lands. This traffic data was used for base years 2007 and 2020 to assess the

impacts of the proposed development on the surrounding road network. Refer to Figures 5.8.5 and 5.8.6 2007 Base Year Traffic Flows – Weekday AM & PM Peak Hour Traffic.

Figure 5.8.5: Base Year Traffic Flows Weekday AM Peak Hour

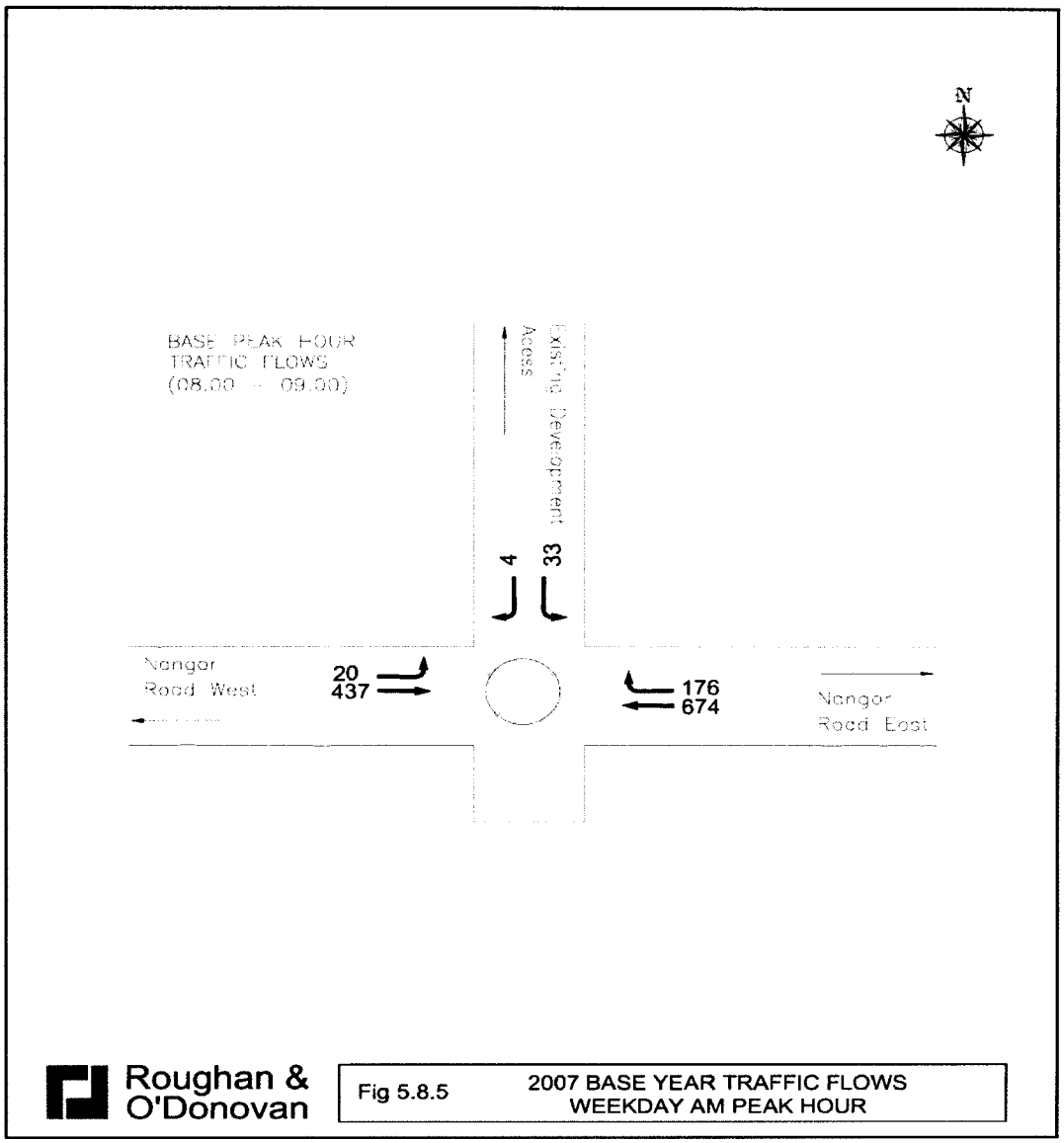
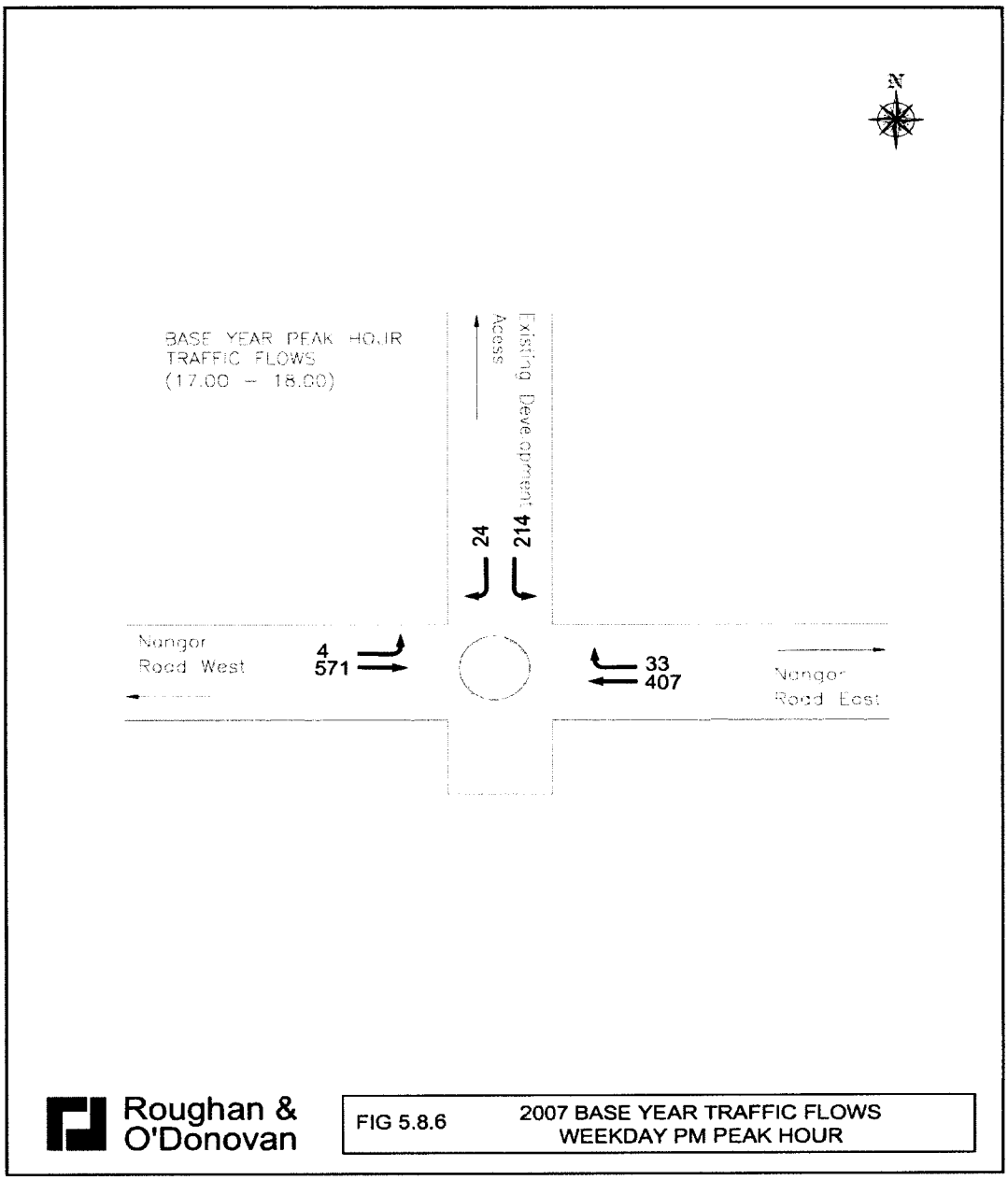


Figure 5.8.6: 2007 Base Year Traffic Flows Weekday PM Peak Hour



Public Transport Accessibility

Currently the Dublin Bus Route No. 68 operates along the Nangor Road at the northern boundary of the subject site. Approximately 1.5km east of the site the Dublin Bus Route Nos. 51B, 51X and 210 operate along the Nangor Road. Clondalkin Village 3km east of the site is served by the Dublin Bus Route Nos. 69, 76, 76A and 76B.

The Quality Bus Network (QBN) in the area continues to expand with dedicated bus lanes on the Nangor Road east of the Kilcarbery Park Roundabout and the Outer Ring Road. It is noted that these Quality Bus Corridors are not yet operational but they are likely to be operational by the time the subject site is developed.

The main intercity railway line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, runs to the north of the subject site. Intercity services are mainly to Cork and Limerick / Shannon, with the commuter service to Kildare. The nearest station is Clondalkin Station which is located approximately 3km northeast of the site and is served by 15 suburban commuter trains in each direction during weekdays.

Proposed Public Transport Infrastructure

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme within the vicinity of the site including:

- Outer Ring Road QBC – Phase 1 N7 to Adamstown Roundabout complete Phase 2 connecting to the N4 under construction
- Nangor Road QBC West of Outer Ring Road currently at design stage
- Naas Road QBC Kingswood to Bluebell - under construction.

These objectives form part of the extensive QBN that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 - 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, with better pedestrian and cycle facilities thereby encouraging commuters to use alternate modes of transport to private cars.

The Kildare Route Project is a railway improvement project for part of the Dublin to Hazelhatch railway line, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site, and additional railway tracks to allow for the separation of suburban, regional and intercity trains and the introduction of a new high capacity suburban service, which is expected to be complete by 2010.

Proposed public transport infrastructure identified in Transport 21, which will have a positive impact on the public transport infrastructure network in the area, include the following (completion dates):

- Dublin City Centre rail resignalling (2008)
- Opening of the new Dublin City Centre railway station (2009)
- Kildare rail upgrade (2010)
- Metro West Phase 1 Tallaght to Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)
- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extend Electrification to Hazelhatch (2015)
- Rail Interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015).

Refer to Figure 5.8.4 Future Local Transportation Network.

5.8.4 CHARACTERISTICS OF THE PROPOSAL

Introduction

The development which is the subject of the current planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park on the subject lands.

Broad assumptions, which can be made regarding likely future land uses within the buiness park at this time, are as follows:

General industry/logistics	39.00 acres,	78,914 sq.m gross floor area;
General Industry/enterprise	32.86 acres,	66,490 sq.m gross floor area;
Office	17.38 acres,	35,167 sq.m gross floor area;
Retail park	14.67 acres,	29,684 sq.m gross floor area;
Showroom	8.61 acres,	17,422 sq.m gross floor area;
Neighbourhood Centre	2.39 acres,	5,000 sq.m gross floor area.

Physical Infrastructure

The Spine Road within the proposed development will join the Nangor Road at the location of the existing roundabout providing access to the Kilcarbery Business Park. This junction will be modified to traffic signal control as part of the Nangor Road improvement scheme and will include a left-in slip lane to the site that will extend along the site frontage of the Nangor Road.

The Spine Road will be a dual carriageway road between Nangor Road and the roundabout within the site; with each carriageway to be 6.5m wide with two-lanes, separated by a 2.0m median. In addition the Spine Road will include a 1.5m wide cycle path on one side, and a 1.5m footpath on each side, plus verges for services and landscaping. The cycle path will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority to cyclists at the junctions.

Beyond the roundabout the Spine Road will reduce to be a 9.0m wide single carriageway with sufficient width to accommodate right turning vehicles. The cycle path and footpath conditions will be the same as those described above.

Vehicular access to the future proposed service / neighbourhood centre will be via a 6.0m wide carriageway with a 1.5m wide cycle path on one side and 1.5m wide footpaths on both sides. This road will be between the Nangor Road and will meet the Spine Road at a priority junction on the dual carriageway section of the Spine Road between the Nangor Road and the internal roundabout.

The remaining side roads will include 7.5m road carriageways, and a 1.5m cycle path on one side plus a 1.5m footpath on both sides. These roads will meet the Spine Road at the roundabout or at priority junctions in the single carriageway section of the Spine Road.

A second access will be provided at a later date by way of a priority junction onto Baldonnell Road half way along the southern site boundary following the realignment of the section of Baldonnell Road along the site boundary.

Pedestrian and cycle access to the site will be available at the northeastern corner via the site access roundabout or the neighbourhood centre link and northwestern corners via a pedestrian / cycle link only to Nangor Road. A north-south link road will connect the main access road to Baldonnell Road, with the adjoining development lands to the west of the site connected by a pedestrian and cycle only link.

Trip Generation

Trip generation is calculated by the number of trips per 100m^2 floor area (or other appropriate measure, such as number of residential apartments) based on surveys at similar sites, or by using the T.R.I.C.S. database from the UK and Ireland, which is widely used in Ireland for trip estimation for commercial uses (see TRICS Data and Trip Generation Rates attached in Appendix D).

Traffic Generation

Based on the preceding parameters, the predicted traffic flows in and out of the site are shown in Table 5.8.1 below.

As stated elsewhere in this Environmental Impact Statement, the land uses indicated in the table below are general assumptions only which have been used by the relevant specialists to undertake calculations to assess the impact of the proposed development. All future uses proposed on the site will be subject to planning approval.

Table 5.8.1: Predicted Traffic Generation of the Proposed Development

Use	AM Peak			PM Peak		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
General Industry / Logistics	234	44	278	44	284	328
General Industry / Enterprise	110	52	162	65	110	175
Office	329	38	367	51	267	319
Retail Warehousing	126	62	188	285	311	596
Showrooms	146	52	198	56	124	180
Neighbourhood Centre	52	35	88	126	126	252
Total	997	282	1,279	626	1.223	1.849

Based on the preceding parameters, the predicted HGV traffic flows in and out of the site are shown in Table 5.8.2 below.

Table 5.8.2: Predicted HGV Traffic Generation of the Proposed Development

Use	AM Peak			PM Peak		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
General Industry / Logistics	16	16	32	8	8	16
General Industry / Enterprise	40	32	72	32	32	64
Office	0	0	0	0	0	0
Retail Warehousing	3	3	6	0	3	3
Showrooms	3	5	8	0	0	0
Neighbourhood Centre	1	1	2	0	1	1
Total	63	57	120	40	44	84

Traffic Distribution

Considering the likely origins and destination of traffic to / from the subject site in the future and the capacity of the surrounding road network, vehicular traffic accessing the development has been split into:

- 60% to and from Nangor Road (the east);
- 10% to and from the Nangor Road (the west): and
- 30% to and from Baldonnell Road (to south).

These traffic flows are summarised on Figures 5.8.7 to 5.8.10 for the 2007 and 2020 post development scenarios.

Figure 5.8.7: 2007 Post Development Traffic Flows Weekday Am Peak Hour

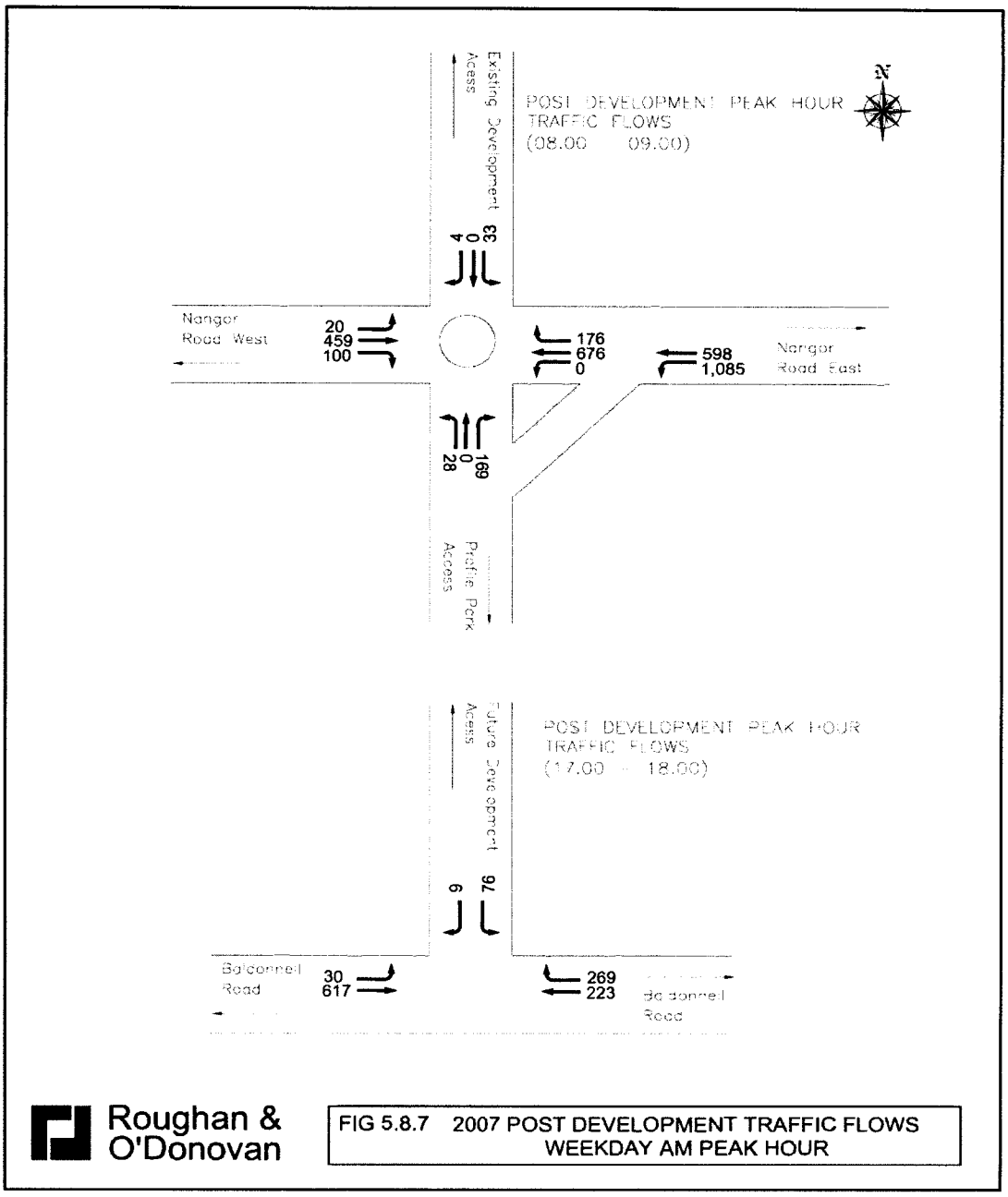


Figure 5.8.8: 2007 Post Development Traffic Flows Weekday PM Peak Hour

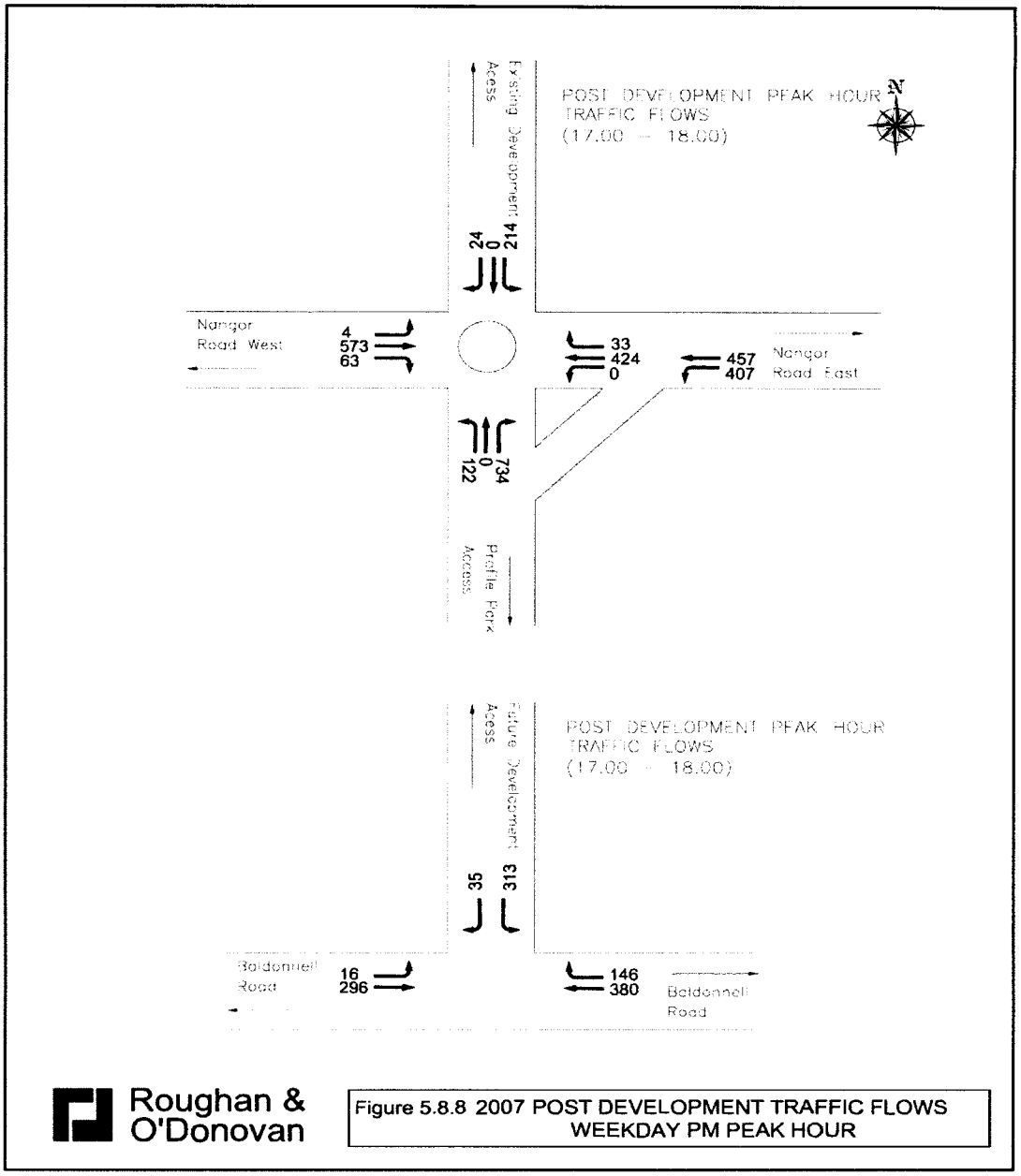


Figure 5.8.9: 2020 Post Development Traffic Flows Weekday AM Peak Hour

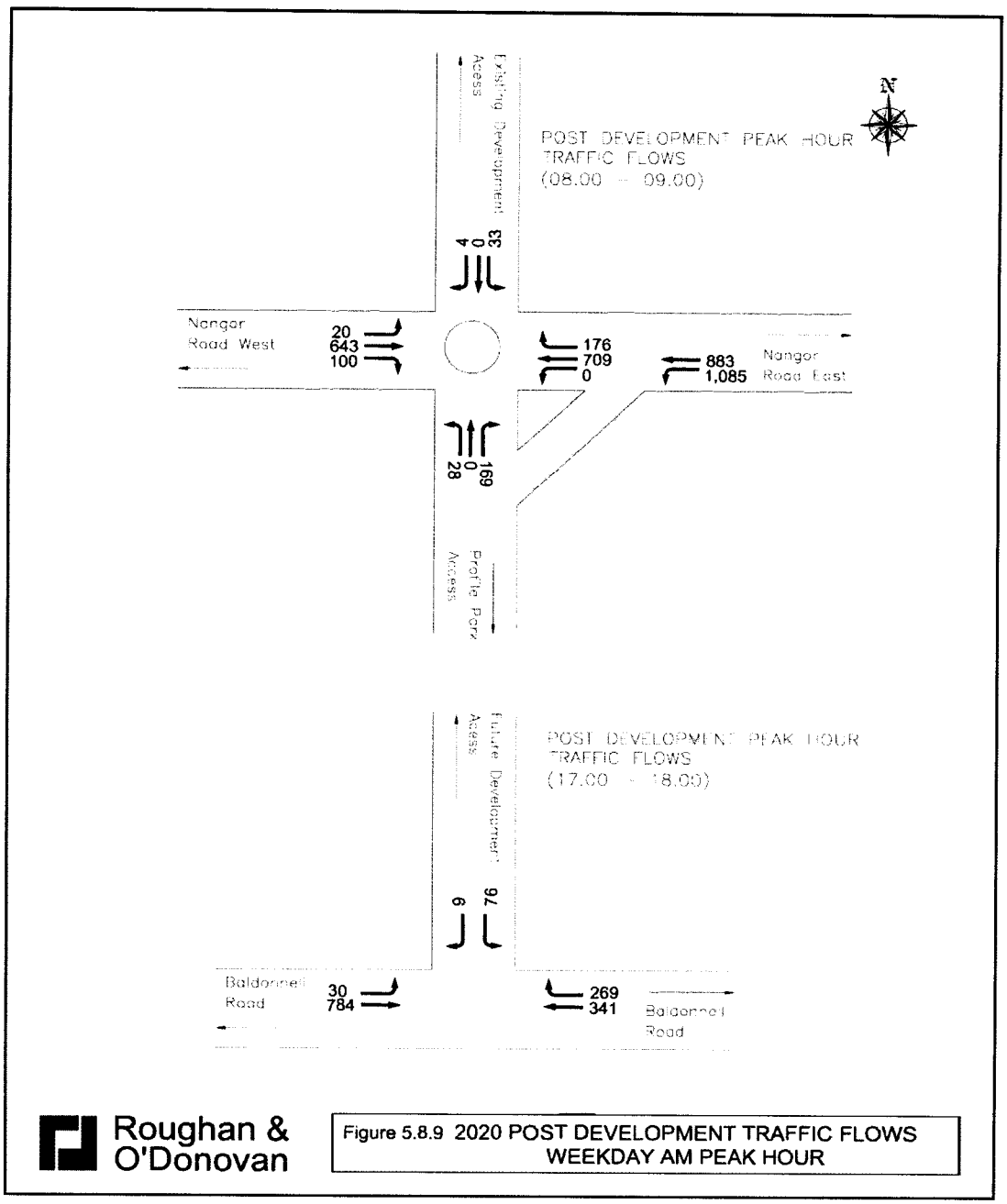
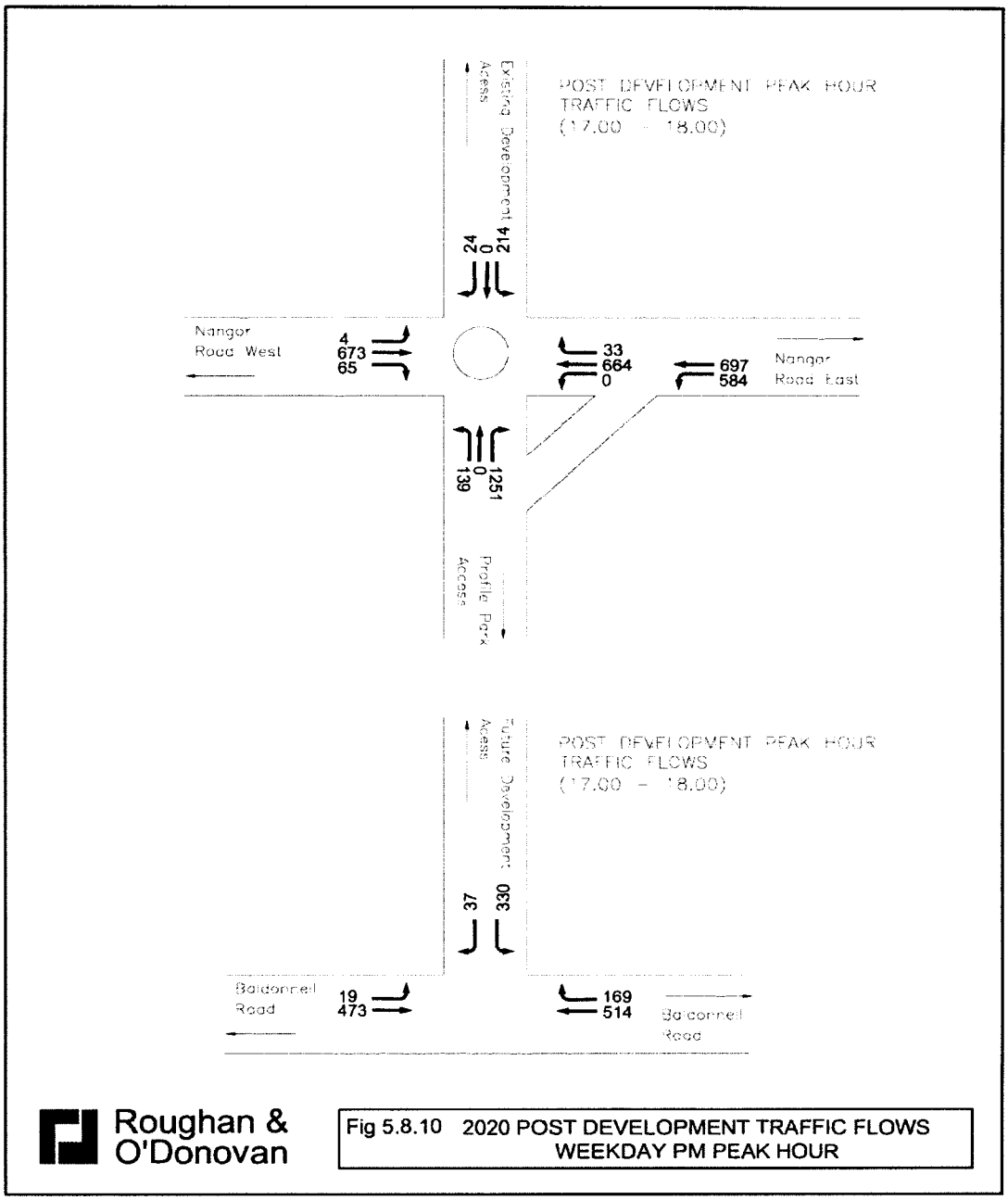


Figure 5.8.10: 2020 Post Development Traffic Flows Weekday PM Peak Hour



5.8.5 POTENTIAL IMPACT OF THE PROPOSAL

The potential transport impacts of this development are considered below.

Development Access; Safe access to junctions that, where possible, comply with the normal junction standards should serve new developments.

Trip Generation; The proposed development will generate a mixture of car trips as well as public transport, cycle and walk trips There will also be trips generated between the subject site and other lands within development, as workers visit the retail and service facilities proposed on the subject site (and vice-versa).

Traffic Impact; The traffic impact of this development is dependent on the interaction of the following:

- The existing traffic on the road network;
- Additional traffic generated or diverted by the development;
- Capacity of the road network.

These features will vary over different parts of the road network for different times of the day and different days of the week. In accordance with general practice, the traffic situation during the midweek morning and evening peaks has been selected to illustrate the traffic impact of this development, on the basis that traffic at these times of the week is most representative of the general peak traffic conditions on the network and also peak development traffic.

Typically, the main traffic impact of a traffic generating development is the imposition on the surrounding road network of traffic volumes, which could lead to congestion and delays where the capacity of nearby junctions is either being approached or exceeded. The scale of the impact can vary depending on the nature of the road network. In urban areas, the extent of the road network and the spread of trip origins and destinations are usually such that a variety of routes can be reached quickly, thus dissipating the impact.

Car Parking; A major consideration for any development is the adequate provision of parking spaces consistent with the transportation strategy for the development.

Cycle Parking and Facilities; Consideration should be given to the adequacy of the cycle parking provision and facilities consistent with the transportation strategy for the development.

Construction Traffic; The construction impacts of this development are dependent on the capacity of the surrounding road network and the adequacy to accommodate temporary car and truck parking and storage of materials.

5.8.6 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

A construction management plan will be prepared where construction traffic including both construction plant and materials deliveries will be programmed to avoid peak traffic conditions on the surrounding road network.

Operational Phase

The site of the proposed development is ideally situated for travel by public transport. The proposed public transport infrastructure improvements as described above will significantly improve the accessibility of the site by sustainable modes.

Access to public transport, provision of safe and convenient pedestrian and cycle links will encourage travel to the development by sustainable modes. The developer seeks to promote the use of public transport, cycling and walking and reduce the reliance on private car usage with the implementation of a mobility management plan, in compliance with South Dublin County Council's policies on sustainable development and as per the Dublin Transportation Office, 2000 –

2016 strategy, 'A Platform for Change'. The Mobility Management Plan for Profile Park is included in Appendix D.

5.8.7 PREDICTED IMPACT OF THE PROPOSAL

Operational Phase - Traffic Capacity

The forecast operational phase development flows are outlined in earlier sections, and summarised on Figures 5.8.5 to 5.8.10.

The performance of the site access junctions, were analysed using software ARCADY, OSCADY and PICADY designed by the Transport Research Laboratory (TRL) of the UK[1]. The results of the junction performance assessments are shown in Tables 5.8.3 – 5.8.5 (further details are attached in Appendix D).

Table 5.8.3 - Results of ARCADY Assessment - 2007 Site Access / Nangor Road / Kilcarbery Roundabout

	Max Ratio of Flow to Capacity (RFC)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – No Development	0.553	1.2	0.08
PM Peak – No Development	0.134	0.5	0.06
AM Peak – Post Development	0.559	1.3	0.08
PM Peak – Post Development	0.608	1.5	0.10

The junction analysis of the roundabout junction on the Nangor Road indicate that the junction will operate satisfactorily in the year 2007 with approximately 70% of the traffic from the overall development. It is expected that within the next two years this roundabout junction will be changed to a signalised junction as part of the Nangor Road Improvement Scheme and this is reflected in the junction assessment for the 2020 year scenario below.

Table 5.8.4 - Results of OSCADY Assessment - 2020 Proposed Signalised Site Access / Nangor Road / Kilcarbery Junction

	Max Degree of Saturation (DoS)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – Post Development	69.7%	6.4 (Nangor Rd –west)	0.34
PM Peak – Post Development	89.5%	18.1 (Profile Park)	0.82

[1] ARCADY in the instance of roundabout junctions, OSCADY for the traffic signal control junction of the Nangor Road Junction and PICADY for the priority junction on Baldonnell Road.

The junction analysis of the proposed signalised junction on the Nangor Road indicate that the junction will operate satisfactorily in the year 2020 with approximately 70% of the traffic from the overall development. Any additional traffic from the proposed development will result in over saturation of the junction and lead to excessive queuing. Therefore it is proposed that South Dublin County Council phase the completion of the proposed business park development to 70% until such a time as the Baldonnell Road access junction is provided.

Table 5.8.5: Results of PICADY Assessment 2020 Proposed Priority Junction on Baldonnell Road

	Max Ratio of Flow to Capacity (RFC)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – Post Development	0.768	3.2 (Profile Park)	0.14
PM Peak – Post Development	0.685	2.1 (Right turn into site)	0.09

The above analysis shows that the proposed Baldonnell Road priority junction will perform well within capacity during the 2020 post development scenario when 30% of the development traffic will access the site via Baldonnell Road.

Operational Phase - Car Parking Provision

The South Dublin County Development Plan 2004 – 2010 recommends parking provision rates as follows (Table 11.5 Parking Standards):

- Offices, Office based industry — 1 space per 40 sq.m gross floor area;
- Restaurant / Café — 1 space per 6 sq.m of public space;
- Retail Warehousing in industrial areas — 1 space per 35sq.m gross floor area;
- Shopping Centres and retail stores — 1 space per 20sq.m gross floor area;
- Warehousing — 1 space per 100sq.m gross floor area.

It is proposed to provide parking generally in accordance with the County Development Plan standards. However each individual site within Profile Park will require planning permission when the exact parking provision will be determined.

Construction Phase

The primary access point during construction is likely to be via the existing roundabout junction on Nangor Road.

A construction management plan will be prepared where construction traffic will be managed to avoid peak traffic conditions on the surrounding road network. Where possible, excavated material will be recycled / reused on site. During excavation and removal of this material from the site, road cleaning and wheel washing at vehicular accesses from the site will be carried out.

During construction it is considered that there will be adequate land within the curtilage of the site to accommodate temporary car and truck parking for construction staff and operations at the early stage of the programme, and at later stages there will be adequate car parking space available in the basements of the development.

5.8.8 MONITORING

No monitoring measures are proposed.

5.8.9 REINSTATEMENT

No reinstatement measures are proposed.

5.9 CULTURAL HERITAGE

5.9.1 INTRODUCTION

Cultural Heritage, in respect of a project, is assumed to include all humanly created features on the landscape, including portable artefacts, which might reflect the prehistoric, historic, architectural, engineering and/or social history of the area. The Cultural Heritage of the area of the proposed development was examined through an Archaeological, Architectural and Historical study. The Archaeological and Architectural studies involved a documentary/cartographic search and field inspection of the area, while the Historical study involved a documentary search.

Methodology

The Local History, Archaeological and Architectural Heritage Assessment components of the study comprise the results of a survey and evaluation of selected sites of historical, archaeological, architectural heritage potential within, and in the immediate environs of, the proposed development area. The work consists of the results of a desk-top survey and field inspection of the site and immediate surrounds.

(i) Paper Survey

As part of a documentary/cartographic search, the following principal sources were examined from which a list of sites and areas of Cultural Heritage interest/potential was compiled:

- Record of Monuments and Places – Co. Dublin.
- Archives of the Archaeological Survey of Ireland.
- Records of the National Museum of Ireland.
- Annual Archaeological Excavation Bulletin (up to 2002).
- Survey of the Architectural Heritage of South Dublin County (NIAH).
- Stereoscopic photographic coverage carried out by the Geological Survey of Ireland.
- Documentary and cartographic sources in South Dublin County Library (see Appendix 5.9.2).
- South Dublin County Development Plan 2004-2010.
- Grange Castle Master Plan 2005.

(ii) Field Inspection

From the preceding paper survey, a list of cultural heritage sites/sites of cultural heritage potential was compiled for inspection. The subject lands and a 200m area surrounding the boundaries of such lands was assessed for the presence of archaeological monuments and structures of architectural heritage potential by reference to map and aerial photographic sources. Detailed field surveys of the subject lands were undertaken in late November 2005 and late March/early April 2006.

An attempt was also made to identify previously unrecorded sites of cultural heritage potential within, and in the immediate environs of, the proposed development area.

Sites of cultural heritage potential identified on the basis of the paper survey were inspected in an attempt to confirm their locations on the ground and to determine, if possible, their likely extent.

Assessment of Impacts

The following table (based on NRA, 2003, 21) provides the baseline criteria used to describe the impacts that the proposed development will have on Cultural Heritage sites.

Table 5.9.1: Criteria Used to Determine Impacts on Cultural Heritage Sites

	Direct	Indirect
Severe	Cultural Heritage site is within a proposed development area. Construction work will entail the removal of part or the entire cultural heritage site.	Cultural Heritage site is within a proposed development area. Construction works will entail the destruction of the visual context of the site or isolate it from associated groups or features.
Potentially Severe	Cultural Heritage site is adjacent to a proposed development area. There is potential for related remains being affected by development works.	Cultural Heritage site is adjacent to a proposed development area. Construction works will greatly injure the visual context of the site or isolate it from associated groups or features.
Moderate	Existing access to a cultural heritage site will be severed. Development works will affect the context of a cultural heritage site.	N/A
No Predicted	The proposed development will have no predicted impact.	N/A

General Receiving Environment

The subject lands are located in the townland of Ballybane(O.S. 6" Map: Dublin Sheets 21), in the central western area of County Dublin, to the north of Baldonnell Military Aerodrome and c. 2.5km to the west of Clondalkin. The subject lands are generally bounded to the north by the R134 (Clondalkin – Milltown) road, to the south by a minor road which links the R134 road to the N7, to the east by golf course lands and to the west by agricultural lands.

The lands are comprised of 5 fields with a series of open drains/streams flowing in a general northerly direction through the centre. The subject lands are under grass, with those to the south used for pasture, and generally fall from south to north.

5.9.2 LOCAL HISTORY

5.9.2.1 RECEIVING ENVIRONMENT

The subject development lands are located in the townland of Ballybane and the parish of Kilbride and in the barony of Newcastle. The name Kilbride is an Anglicisation of Cill Bríde – (St.) Brigid's Church and takes its name from a former parish church to the south/southeast of the subject lands (see Site CH-2; Section 5.9.3.1).

In the seventeenth century this parish consisted of the townlands of Baldonan and Kilbride but it now contains the townlands of Baldonnell Little, Lower and Upper, Kilbride and Kilcarbery.

Following the Anglo-Normans Invasions, the lands of Kilbride were held under the Crown, for the service of a foot sergeant on payment of five shillings, by the Comyns, and formed part of the manor of Balgriffin. In about 1270 the Comyns' property was temporarily in the hands of the King, and the escheator accounted for rents received from the betaghs of Kilbride. A castle (see Site CH-1; Section 5.9.3.1) was built before the sixteenth century, and was leased in 1537 to John Gibbons, with a reversion to Chief Justice Aylmer, and in 1570 to Thomas Bathe, whose family acquired the manor of Balgriffin. In the early part of the sixteenth century the Bathes were still in possession of the Kilbride lands, but at the time of the Restoration they had been succeeded by the family of Carberry, from whom the adjacent townland of Kilcarbery takes its name, while the Luttrells appear as owners of Baldonan.

Nothing much is known of the history of the parish church (see Site CH-2; Section 5.9.3.1), except that it formed a portion of the corps of the Dean of St. Patrick's Cathedral. In 1547 it was described as an old chapel and had an associated cottage.

Lewis, writing in 1837, notes that the parish of Kilbride "is a vicarage in the diocese of Dublin, and forms part of the union of Clondalkin. The church is in ruins. In the R.C. divisions it is united to Lucan, Palmerstown, and Clondalkin" (Ryan, 2001, 185).

The eastern boundary of the parish of Kilbride serves as a townland boundary, as does much of the western boundary. This latter boundary also serves as a parish boundary.

5.9.2.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park on the subject lands, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary

works, on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

Changes to the existing topography by developments of this kind can have the ability to remove the 'sense of place' to areas where previous historical events took place. Furthermore, the securing of boundaries and extinguishing of 'rights of way' can also impact on places of historical activity.
There are no historic events associated within the proposed development area that require consideration in the undertaking of the overall design and boundaries of the development.

Operational Stage

Potential adverse impacts with respect to historical events are not anticipated during the operational lifetime of the development.

'Do-Nothing' Scenario

In historical terms, the site will remain as it is and no impacts will occur.

5.9.2.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Stage

It is not considered that potential adverse impacts with respect to events of historical interest will occur as a result of the development of the site. Consequently, no remedial measures are deemed necessary.

Operational Phase

Potential adverse impacts with respect to events of historical interest are not anticipated during the operational lifetime of the development. Therefore no remedial measures are deemed necessary.

5.9.2.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Stage

There are no predicted impacts with respect to historical events associated with the proposed development.

Operational Phase

There are no predicted adverse impacts with respect to historical events once the development has become operational.

'Worst Case' Scenario

No 'worst case' scenario is envisaged

5.9.2.6 MONITORING

It is not envisaged that monitoring measures are required.

5.9.2.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

5.9.3 ARCHAEOLOGY

5.9.3.1 RECEIVING ENVIRONMENT

The area examined included the proposed development site, as well as an area of c. 200m surrounding the defined boundaries of the site, where possible.

The area under assessment is part of a landscape which is rich in historical and archaeological material. The general region has attracted settlement from early times as evidenced by the presence of monuments dating back to the prehistoric period. Continuity of settlement is illustrated by artefacts dating to the Neolithic and by identified monuments ranging from Neolithic to Medieval and Post-Medieval remains.

The siting preferences of particular monument types are well documented. Broadly speaking, the general landscape of the proposed development area offers a potential setting for the discovery of archaeological sites and remains, as follows:

- The subject lands and surrounding landscape offer many opportunities for the location of Fulachta Fiadh (prehistoric cooking sites). These sites are location specific, generally located close to rivers and streams or in wet marshy areas, and sometimes occur in groups.

- The general rolling nature of the landscape is a favoured position for the location of prehistoric burial sites, ringforts and enclosure sites in the general region surrounding the subject development lands.

There are no previously recorded archaeological sites identified, on the basis of the Paper Survey, within the subject development lands. Furthermore, cartographic and aerial photographic research does not indicate any topographical features within the subject lands which might be of archaeological interest/potential. There are, however, two archaeological sites located within the defined study area (subject lands + 200m surrounding area) outside the south-eastern boundary of the subject lands. The locations of these sites are indicated in Fig. 5.9.1 and are described as follows:

SITE CH-1

Townland	Classification	SMR No.:	Protection[1]
Kilbride	Castle (site of)	DU 021:004	RMP

[1] Note: See Appendix C for information relating to Statutory Protections

Description

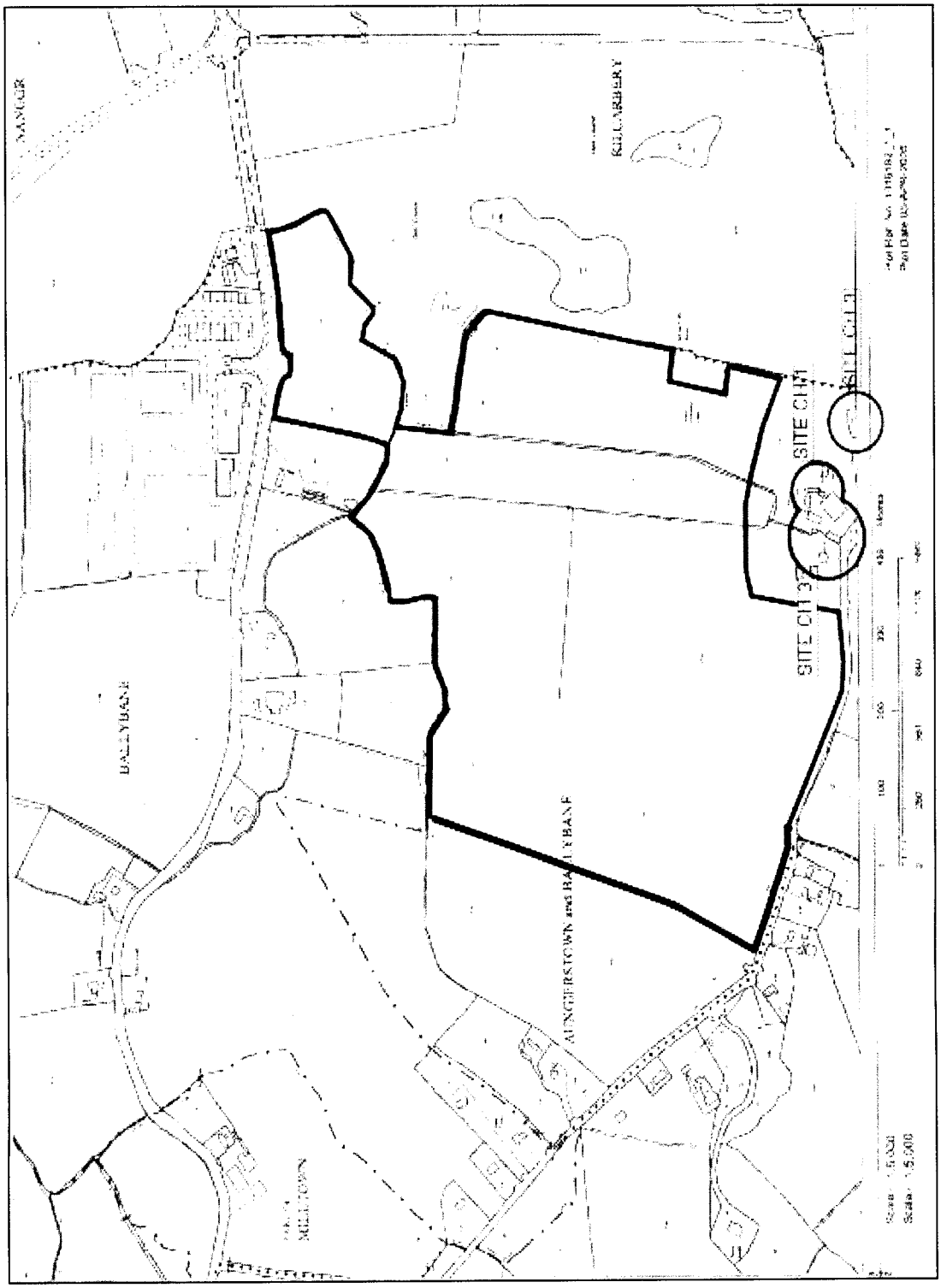
Kilbride Castle was built before the sixteenth century (Ball, vi, 68) and was leased in 1537 to John Gibbons and in 1570 to Thomas Bathe. The castle was subsequently occupied by Francis Carberry, who was succeeded by his widow, and later by Alderman John Carberry.

No visible traces of the castle remain, which was probably a tower house. The site is presently occupied by farm buildings (see photograph 5.9.1 below). An

inspection of the site in 1986 by the Archaeological Survey of Ireland did not note any cut-stone in the then unplastered walls of the farm buildings, although it is likely that these walls were built using material from the castle.

The site of the castle is marked on the O.S. 6" maps (Dublin Sheet 21) of 1837 and 1937.

Figure 5.9.1: Location of Archaeological Sites



Photograph 5.9.1 Outbuildings in general location of site CH-1



SITE CH-2

Townland	Classification	SMR No.:	Protection
Kilbride	Ecclesiastical Complex	DU 021:005	RMP & RPS

Description

This complex comprises three separate elements, namely a Church and Graveyard (SMR: DU021:00501), an Enclosure (SMR: DU021:00502) and Earthworks (SMR: DU021:00503). The site is marked on both the 1837 and 1937 editions of the O.S. 6" Map – Dublin Sheet 21.

The church is located in a circular raised graveyard (see photograph 5.9.2 below), possibly the remains of an early ecclesiastical enclosure, at the edge of a broad-bottomed valley. The church remains comprise a small rectangular building with a north-west turret in ruinous condition. The church is built of randomly coursed masonry and was formerly entered through a now damaged, doorway in the west gable. There is an ambry in the east-end of the north wall. The east window has a southern jamb of tufa (internal dimensions.; L-5.8m; W-3.63m; Wall T-0.85m). There are remnants of another window in the western end of the southern wall. The north-west turret is entered through a linteled doorway of the church. It has a corbelled roof (L-1.35m; W-0.77m; H-1.78m). There are traces of a stairwell in the southern side.

Photograph 5.9.2 Site CH-2 viewed from the west.



5.9.3.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park on the subject lands, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.3.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development/Site Preparation Phase

There are no previously identified monuments or features of archaeological interest and/or potential located within the proposed development lands. The former castle remains (site CH-1) and ecclesiastical remains (site CH-2) are located at minimum distances of c. 100m and c. 120m, respectively, from the subject development lands (see Fig. 5.9.1). Consequently, these monuments do not have the ability to be directly impacted by the development proposals.

However, in general, ground reductions associated with developments of the kind proposed for the lands have the ability to uncover and disturb hitherto unrecorded subsurface features, deposits, structures and finds of archaeological

interest and potential. In this regard, it is noted that works associated with the development of the adjacent Grange Castle International Business Park uncovered a number of previously unrecorded archaeological sites and features, including a prehistoric ring-barrow burial site (Doyle, 2002a, 75-76), a medieval field system (Doyle, 2002b, 76), prehistoric and medieval features (McConway, 1998, 26; O'Brien, 1996, 26-7; Doyle, 2002c, 73-4) and a fulacht fiadh - prehistoric cooking site (Doyle, 2002d, 74-5). In addition, remains of a Neolithic house were excavated in the townland of Kishoge (O'Donovan, 2003, 125-6). Without specific mitigation strategies, such subsurface archaeological features which might exist within the boundaries of the subject lands would be disturbed and destroyed and not identified and recorded.

Operational Phase

There are no previously identified monuments or features of archaeological potential located within the subject lands. There are no extant remains of the former castle site (Site CH-1 above) located to the south/southeast of the subject lands. The site of the ecclesiastical remains (Site CH-2) are situated a minimum of c. 120m from the nearest boundary to the subject lands. Given this distance, and the low visual nature of the subject development, coupled with the fact that the views from the ecclesiastical remains towards the subject development lands are largely restricted by farm buildings, a house and associated boundaries (see site CH-3; Section 5.9.4.1 below) it is not considered that any visual impact will result on the setting of the monument. Consequently, potential adverse impacts with respect to the archaeological heritage are not anticipated during the operational phase of the proposed development.

'Do-Nothing' Scenario

In terms of Archaeological Heritage, the site will remain as it is and no impacts will occur.

5.9.3.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Phase

As noted above in Section 5.9.3.3 there is a possibility that undocumented sub-surface archaeological features and material might exist within the boundaries of the overall development lands. In addition, it is the policy of the Department of the Environment, Heritage and Local Government that developments of this scale should be subjected to some manner of archaeological intervention (Dept. of Arts, Heritage, Gaeltacht & the Islands, 1999). Consequently, it is recommended that the following general mitigation strategies should be considered with regard to the overall development of the subject lands.

All topsoil stripping / general ground surface reductions down onto the surface of the underlying sterile geological subsoils required of the development should be monitored, on a full-time basis, by a suitably qualified and experienced archaeologist. Although it is not a legal requirement for an archaeologist to obtain an excavation licence from the Department of the Environment, Heritage and Local Government in order to undertake such monitoring, it is suggested that such a licence be obtained. This would allow the archaeologist to investigate, almost immediately, any features of archaeological potential that might be uncovered during the course of the development works, thus minimising any potential delays to the project. In addition, it is recommended by the Department

of the Environment, Heritage and Local Government that archaeologists involved in the monitoring of large-scale developments obtain an excavation licence prior to the commencement of such works (Dept. of Arts, Heritage, Gaeltacht and the Islands, 1999, 28-9).

In the event of archaeological material being uncovered during the course of such monitoring, the archaeologist shall be empowered to have works ceased in the vicinity of such material pending the receipt of advise from the Heritage and Planning Division of the Department of the Environment, Heritage and Local Government (National Monuments Section). Likewise, should archaeological artifactual material be uncovered/recovered during such works, the requirements of the National Museum of Ireland with regard to such items should be implemented.

Following completion of all monitoring, and other possible archaeological investigations, the archaeologist shall prepare a report for submission to both the Planning Authority and the Department of the Environment, Heritage and Local Government.

Operational Phase

No remedial measures are deemed necessary.

5.9.3.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

There are no predicted impacts with respect to previously identified monuments. The requirement for an archaeologist to be present during all programmes of topsoil stripping / general ground surface reduction works will ensure that in the event of previously unidentified subsurface archaeological features being uncovered, appropriate measures can be implemented in consultation with the Department of the Environment, Heritage and Local Government. Likewise, should archaeological artifactual material be recovered during the course of such works, the requirements of the National Museum of Ireland, with regard to such items, can be implemented.

Operational Phase

There are no predicted impacts during the operational phase.

'Worst Case' Scenario

A 'worst-case scenario' with respect to archaeological heritage would arise where the development was permitted to commence without any archaeological mitigation requirements being included in a grant of planning permission, without the appointment of an archaeologist to undertake monitoring and/or without the attendance of such appointed archaeologist. In such scenarios, features or artefacts of archaeological interest uncovered during the process of topsoil stripping/general ground reduction works would, most likely, not be identified and recorded.

5.9.3.6 MONITORING

Monitoring of all topsoil stripping/general ground reductions onto the surface of the underlying subsoils should be undertaken by a suitably qualified archaeologist.

5.9.3.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

5.9.4 ARCHITECTURAL HERITAGE

5.9.4.1 RECEIVING ENVIRONMENT

There are no protected structures within the meaning of the Planning and Development Act, 2000 situated within the boundaries of the proposed development lands. The only structure listed in the South Dublin County Development Plan – Record of Protected Structures (RPS) as being situated within 200m of the boundaries of the subject site is Site CH-2 (see Section 5.9.3.1 above). Furthermore, there are no structures located within the overall subject landholding.

There is a modern dwelling with associated outbuildings located outside the central northern area of the subject lands. Following an inspection of these structures, it is not considered that they are of interest from an architectural heritage perspective. However, there is one complex of structures located outside and to the central southern area of the subject lands which are considered to be of architectural heritage interest and, thus, worthy of a brief description. The location of this complex is illustrated in Fig. 5.9.1 and is described as follows:

SITE CH-3

Townland	Classification
Kilbride	Dwelling, garage and farm buildings

Kilbride House, with associated structures, is located a minimum of c. 60m from the boundaries to the subject lands. The outbuildings, consisting of nineteenth century single and one-and-half storey gable-ended stone structures, as well as modern steel-framed barns, have already been mentioned with respect to Site CH-2. It is considered that some of these structures are built on the site of the former Kilbride Castle and that some of the stone used in the construction of the earlier outbuildings may be re-used from the former castle structure (see Section 5.9.3.1 above).

The house is situated in a private garden setting, fronting the road, and at a distance of c. 40m to the west of the outbuildings. It consists of a two-storey stone-faced structure with a partial single-storey and partial lean-to two-storey rear extension. There is a large modern brick-built, flat-roofed porch structure to the front, in which is set the entrance door. A central window on the first floor has been enlarged to accommodate a doorway leading onto the roof of the porch, which serves as a balcony. All the windows and doorway on the façade appear to be of a dark hardwood, indicating that they are replacements, although the windows reflect the probable nature of the originals. The hipped-roof is in slate with ridge tiles, and the two central chimneys are in brick.

There is a modern stone-faced double garage to the west of the house. The road frontage boundary consists of a modern stone wall, with end and gate pillars, all of which are topped with a cope-stone effect, while the western boundary to the garden is a modern metal fence (see photograph 5.9.3 below).

Photograph 5.9.3 Kilbride House (Site CH-3)



5.9.4.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.4.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

During the pre-development/site preparation phase of a project, the potential direct impacts on buildings and structures of architectural interest from a development of this kind include:

- The demolition or loss of a structure or site of architectural interest.
- The severance of other linked features such as gardens, paddocks or outbuildings.
- Alteration of the original landscape of the building or site.

There are no buildings located within the overall development site. Therefore, no direct impacts can occur. Furthermore, given the location of Site CH-1, it is not considered that any impacts will occur with respect to this complex of buildings.

Operational

During the operational phase of a project, the potential indirect impacts from a development of this kind include:

- Increased visual intrusion.
- Increased noise and vibration disturbance.
- Loss of amenity, especially where open to the public.

It is not considered that the development proposals under discussion have the ability to cause any major impacts during the operation phase of the project.

5.9.4.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Phase

The development of the subject lands will not cause any impacts with respect to structures of architectural heritage interest. Consequently, no pre-development remedial or reductive measures are required.

Operational Phase

It is not envisaged that any structures of architectural heritage interest will be adversely impact upon during the operational phase of the proposed development. Consequently, no remedial or reductive measures are proposed.

5.9.4.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

There are no predicted adverse impacts on any structures of architectural heritage.

Operational Phase

There are no predicted adverse impacts with respect to the architectural heritage of the environs of the project area during the operation phase of the development.

5.9.4.6 MONITORING

It is not envisaged that monitoring measures are required.

5.9.4.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

6.0 INTERACTIONS

In addition to the requirement to describe the likely significant effects of the proposed development on particular aspects of the environment, it is also a requirement to consider the interaction of those effects.

Human Beings and Material Assets

The development of the roads and services infrastructure, which is the subject of the current planning application, will not have a significant impact on employment levels in the locality having regard to the nature and scale of the development involved. However the proposed development will facilitate the development of a business park on the subject lands and as such, will introduce a new employment resource into the area.

Emissions from vehicles associated with the proposed development are not expected to have a significant impact on air quality in the general area.

Human Beings and Air

There is a potential for dust generation during construction and development works which under dry windy conditions could lead to localised dust nuisance for properties close to the development site. However, the implementation of proper on-site controls as proposed will ensure that no adverse impacts will accrue to local residents.

Human Beings/Cultural Heritage

The proposed development will be undertaken on a greenfield site, at some distance from recorded sites in the area. Consequently, it is highly unlikely that any construction work associated with the proposed development will reveal subsurface archaeological remains. However, periodic monitoring of the site will ensure that any soils, features, or deposits of an archaeological nature encountered during the construction phase are fully recorded.

Human Beings/Landscape

Existing residents, workers and visitors to the site will be aware of the change in the landscape from an agricultural setting to an infrastructural/commercial setting. However in the wider landscape context this is a continuation of the established pattern on adjacent lands. Additional planting on the site will result in an overall significant positive impact on the landscape.

Landscape/Flora and Fauna

The landscape works associated with the construction works will involve some disturbance to the flora and fauna of the site including the removal of portions of the existing hedgerows to facilitate the proposed road layout. This will have a localised impact on the flora and fauna of the site. Where such impacts are predicted appropriate mitigation measures will be undertaken to avoid significant or permanent negative impacts.

PLANNING AND DEVELOPMENT ACT, 2000,
PLANNING & DEVELOPMENT (AMENDMENT) ACT, 2002
EUROPEAN COMMUNITIES (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 1989 TO 1999,
PLANNING AND DEVELOPMENT REGULATIONS, 2001 & 2002

APPENDICES

South Dublin County Council
Planning Department - Registry
05. JUL 2006 SD 06 A 0568
Date Received | Register Reference

ENVIRONMENTAL IMPACT STATEMENT

Prepared for

DASNOC LIMITED

By

RPS Planning & Environment

Ordnance Survey Licence No. SU 0001006

July 2006

Appendix A

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APPENDIX B

SOILS AND GEOLOGY

Trial Pit Logs – Profile Park Investigation 21 – 24 March 2006

TP1

0 – 0.25	Mid brown slightly sandy, slightly silty CLAY.
0.25 – 0.7	Orange/brown slightly gravely CLAY. Gravels are medium fragments of limestone.
0.7 – 1.5	Grey gravely CLAY. Gravels are medium fragments of limestone.
1.5 -	Fractured LIMESTONE with minor calcite veining
	Groundwater ingress @ 1.5 mbgl

TP2

0 – 0.3	Mid brown slightly sandy, slightly silty CLAY.
0.3 – 0.8	Orange/brown slightly sandy CLAY.
0.8 – 1.3	Mid brown slightly gravely CLAY. Gravels are medium to coarse fragments of limestone.
1.3 – 2.5	Grey very gravely CLAY. Gravels are coarse to cobble sized fragments of limestone
2.5 -	Fractured LIMESTONE
	Dry

TP3

0 – 0.35	Mid brown slightly sandy, slightly silty CLAY.
0.35 – 1.05	Mid brown slightly sandy gravely CLAY
1.05 – 2.30	Grey/brown very gravely CLAY
2.3 -	Fractured LIMESTONE
	Groundwater ingress @ 2.3m bgl

TP4

0 – 0.30	Mid brown slightly sandy, slightly silty CLAY.
0.3 – 0.9	Mid brown slightly sandy gravely CLAY
0.9 – 1.6	Grey very gravely CLAY
1.6 -	Fractured LIMESTONE
	Dry

TP5

0 – 0.30	Mid brown slightly sandy CLAY.
0.3 – 0.9	Light brown to grey slightly sandy slightly gravely CLAY.
0.9 – 2.10	Grey very gravely CLAY. Gravels are coarse fragments of limestone
2.1 –	Fractured LIMESTONE with major calcite veining
	Groundwater ingress @ 2.25m bgl

TP6

0 – 0.35	Mid brown slightly sandy CLAY.
0.35 – 1.0	Mid brown slightly gravely CLAY.
1.0 – 1.8	Dark grey/black organic gravely CLAY with many rootlets and plant fragments. Gravels are fine to medium fragments of limestone.
1.8 – 2.0	Fractured LIMESTONE
	Groundwater ingress @ 2.0m bgl

TP7

0 – 0.35	Mid brown slightly sandy CLAY.
0.35 – 1.8	Mid brown slightly sandy gravely CLAY. Gravels are coarse with occasional boulders of limestone
1.8 –	Fractured LIMESTONE
	Groundwater ingress @ 1.8m bgl

TP8

0 – 0.30	Mid brown slightly sandy CLAY.
0.30 – 1.2	Light brown slightly gravely CLAY. Gravels are coarse with occasional boulders of limestone
1.2 – 2.0	Mid brown clayey GRAVEL. Gravel is very loose coarse limestone fragments
	Groundwater ingress @ 2.0m bgl. Trial pit very unstable

TP9

0 – 0.6	Light brown slightly sandy CLAY.
0.6 – 1.6	Mid brown slightly gravely CLAY. Gravels are coarse fragments of limestone
1.6 – 2.0	Brown/Gray clayey GRAVEL. Gravels are coarse fragments of limestone
2.0 – 2.3	Fractured LIMESTONE
	Groundwater ingress @ 2.2m bgl

TP10

0 – 0.4	Mid brown slightly sandy CLAY.
0.4 – 0.6	Light brown slightly sandy CLAY.
0.6 – 1.4	Brown gravely CLAY
1.4 – 2.2	Dark grey loose GRAVEL. Gravel is composed of limestone fragments.
2.2 – 2.4	Fractured LIMESTONE
	Groundwater ingress @ 2.4m bgl

TP11

0 – 0.5	Mid brown slightly sandy CLAY.
0.5 – 2.4	Mid brown very gravely CLAY.
2.4 – 3.0	Grey/Black clayey GRAVEL. Gravel is composed of limestone fragments
3.0 -	Fractured LIMESTONE
	Groundwater ingress @ 3.0m bgl

TP12

0 – 0.5	Mid brown slightly sandy CLAY.
0.5 – 1.8	Mid brown slightly gravely CLAY.
1.8 – 2.1	Grey slightly clayey GRAVEL. Gravel is composed of limestone fragments
2.1 – 2.35	Fractured LIMESTONE
	Groundwater ingress @ 2.30m bgl

TP13

0 – 0.4	Mid brown slightly sandy CLAY.
0.4 – 2.1	Mid brown very gravely CLAY. Gravels are coarse with many cobbles and occasional boulders of limestone.
2.1 – 2.4	Grey clayey GRAVEL. Gravels are coarse limestone fragments.
	Groundwater ingress @ 2.40m bgl. Pit becoming unstable from 2.0m.

TP14

0 – 0.8	Mid brown slightly sandy CLAY.
0.8 – 2.1	Mid brown gravely CLAY. Gravels becoming coarser with depth
2.1 – 2.5	Grey/brown clayey GRAVEL. Gravel is coarse fragments of limestone with occasional cobble and boulder sized gravels.
2.5 -	Fractured LIMESTONE
	Groundwater ingress @ 2.50m bgl

TP15

0 – 0.7	Mid brown slightly sandy CLAY.
0.7 – 2.2	Mid brown gravely CLAY. Gravels becoming coarser with depth.
2.2 – 2.5	Grey/brown clayey GRAVEL. Gravel is coarse fragments of limestone with occasional cobble and boulder sized gravels.
2.5 -	Fractured LIMESTONE.
	Dry

TP16

0 – 0.3	Mid brown slightly sandy gravely CLAY. Gravels are fragments of limestone and masonry.
0.3 – 0.8	Mid brown gravely CLAY. Gravels are composed of limestone, concrete and occasional brick fragments.
0.8 – 2.3	Brown/grey clayey GRAVEL. Gravel comprises limestone, concrete and slate fragments with occasional metal wiring, re-bar, wood and chip board fragments.
2.3 – 3.1	Grey mottled brown organic slightly gravely CLAY with many rootlets and occasional coarse gravels.
	Dry

TP17

0 – 0.2	Mid brown sandy gravely CLAY.
0.2 – 0.4	Mid brown very gravely CLAY. Gravels are composed of limestone, and concrete fragments.
0.4 – 0.8	Black clayey GRAVEL. Gravel comprises tarmac fragments.
0.8 – 2.8	Light brown clayey GRAVEL. Gravel consists of boulders of concrete and limestone with occasional concrete piping and copper wiring. Section of cable encountered at 0.8m bgl.
2.8 -	Fractured LIMESTONE.
	Groundwater inflows @ 2.8m bgl

TP18

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 0.7	Light brown gravely CLAY. Gravels are fine to coarse fragments of limestone, granite and concrete.
0.7 – 0.8	Grey gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete.
0.8 – 2.8	Brown gravely CLAY. Gravels are cobbles and boulders of limestone and concrete with rare plastic fragments and metal cans.
2.8 – 3.4	Grey mottled brown slightly gravely organic CLAY with many rootlets.
	Groundwater inflows @ 1.0m bgl but dry at base of trial pit.

TP19

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.0	Light brown gravely CLAY. Gravels are fine to coarse fragments of limestone, bricks and concrete.
1.0 – 1.7	Dark grey/black clayey GRAVEL. Gravel is coarse to cobble sized fragments of limestone, comprises occasional concrete boulders, and rare metal wheel hub cap.
1.7 – 2.0	Light brown gravely CLAY. Gravels are coarse fragments of limestone and masonry.
2.0 – 3.1	Grey mottled brown slightly gravely organic CLAY with many rootlets.
	Groundwater inflows @ 1.7m bgl causing instability.

TP20

0 – 0.2	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 2.3	Mid brown slightly sandy very gravely CLAY. Gravel is medium to cobble sized fragments of limestone, and concrete with occasional wood fragments (tree branches) and boulders or concrete
	Groundwater inflows @ 2.3m bgl causing instability.

TP21

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.0	Mid brown slightly sandy gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete with occasional wire and wood fragments.
1.0 – 2.0	Brown gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete with occasional wire and wood fragments.
2.0 – 2.2	Light grey slightly silty slightly gravely CLAY. Gravels are fine to medium (Possibly ash origin).
2.2 – 3.2	Brown gravely CLAY. Gravels are coarse fragments of limestone and concrete.
3.2 – 3.4	Dark grey/black gravely CLAY. Gravels are medium to coarse limestone fragments.
	Dry

TP22

0 – 0.4	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.4 – 2.2	Mid brown slightly sandy very gravely CLAY. Gravel is medium to cobble sized fragments of limestone, granite and concrete with occasional wood fragments (tree branch) and boulders of concrete. Rare metal and roof tiles (slate) were encountered.
2.2 – 3.6	Grey gravely CLAY. Gravels are medium to cobbles of limestone and concrete with rare boulders of limestone. Occasional plastic and wood fragments were encountered.
	Groundwater inflows @ 2.5 bgl causing instability.

TP23

0 – 0.2	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 1.2	Brown gravely CLAY. Gravels are medium to coarse fragments of limestone and concrete.
1.2 – 1.7	Layer of wood – branches and root fragments.
1.7 – 2.8	Grey/brown gravely CLAY. Gravel is medium to coarse fragments of limestone
2.8 – 3.4	Grey gravely CLAY. Gravels are medium to coarse fragments of concrete and limestone with many rootlets.

TP24

0 – 0.25	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.25 – 2.7	Mid brown very gravely CLAY. Gravels are coarse fragments of limestone and concrete with many cobbles and occasional boulders. Occasional wood, metal, piping, concrete and rare tarpaulin was encountered.
2.7 – 3.2	Dark grey gravely CLAY. Gravels are medium to coarse fragments of limestone.
	Major groundwater inflow @ 2.4m bgl – (from water treatment area). Slight odour.

TP25

0 – 0.35	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.35 – 1.1	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.1 – 1.2	Light brown slightly gravely CLAY with some organic matter. Gravels are fine to medium
1.2 – 2.4	Grey clayey GRAVEL. Gravel is medium to coarse fragments of limestone
2.4 -	Fractured LIMESTONE.
	Groundwater inflow @ 2.4m bgl

TP26

0 – 0.30	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.5	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.5 – 2.4	Grey clayey GRAVEL. Gravel is coarse limestone fragments
2.4 -	Competent LIMESTONE
	Groundwater inflow @ 2.4m bgl

TP27

0 – 0.30	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.6	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.6 – 1.7	Fractured LIMESTONE
1.7	Competent LIMESTONE.
	Dry

TP28

0 – 0.20	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 1.2	Mid brown gravely CLAY. Gravels are coarse to cobble sized fragments of limestone and concrete with occasional ceramic fragments and rare metal and plastic.
1.2 – 2.5	Grey gravely CLAY. Gravel is coarse to cobble sized fragments limestone and concrete. Section of disused plastic pip encountered at 2.3m bgl
2.5 – 2.6	Light grey sandy gravely CLAY. Gravels are coarse fragments of limestone.
3.0 – 3.75	Dark grey/black slightly gravely organic CLAY. Gravels are coarse to cobble sized fragments of limestone. Occasional fragments of wood (branches) were encountered.
3.75 -	Fractured LIMESTONE
	Groundwater inflow @ 3.75m bgl

TP29

0 – 0.70	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.7 – 1.5	Grey gravely CLAY. Gravels are fragments of limestone.
1.5 – 1.8	Fractured LIMESTONE
1.8	Competent LIMESTONE.
	Groundwater inflow @ 1.8m bgl

APPENDIX C

CULTURAL HERITAGE

C1 Abbreviations & Protections

SMR No. – Sites and **M**onuments **R**ecord Number.
This refers to the unique reference number of each individual archaeological monument, or monument element, as listed in the Sites and Monuments Record Archive of the Archaeological Survey of Ireland. The number comprises three elements. The first element consists of a two letter county code; the second element refers to the O.S. 6" map sheet on which the monument is located and the third element refers to the number of the site, as contained on the specific 6" map.

RMP - **R**ecord of **M**onuments and **P**laces.
Section 12 (1) of the National Monuments (Amendment) Act, 1994, provides that the Minister of the Environment, Heritage and Local Government shall establish and maintain a record of monuments and places where the Minister believes there are monuments, such record to be comprised of a list of monuments and relevant places and a map or maps showing each monument and relevant place of each county of the State. This is referred to as the *Record of Monuments and Places*, and monuments entered into it are referred to as *Recorded Monuments*.

Section 12 (3) of the 1994 Act provides that where the owner or occupier (other than the Minister) of a monument or place included in the Record, or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he or she shall give notice in writing of his proposal to carry out the work to the Minister of the Environment, Heritage and Local Government and shall not, except in cases of urgent necessity and with the consent of the Minister, commence work for a period of two months after having given the notice.

RPS – **R**ecord of **P**rotected **S**tructures.
This refers to a protection or mention in the County Development Plan.

C2 List of Consulted Sources

A. Cartographic

Origin	Scale	Sheet Ref.	Publication Date
Ordnance Survey	1:10,560 (6")	Dublin 21	1837
Ordnance Survey	1:10,560 (6")	Dublin 21	1937
Ordnance Survey	1:50,000	50	2005

B. Documentary
See Appendix A

APPENDIX D

TRAFFIC

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : J - RETAIL PARK - INCLUDING FOOD
VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	HC	HAMPSHIRE	1 days
04	**EAST ANGLIA**		
	NF	NORFOLK	1 days
05	**EAST MIDLANDS**		
	LN	LINCOLNSHIRE	1 days
06	**WEST MIDLANDS**		
	WK	WARWICKSHIRE	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	2 days
11	**SCOTLAND**		
	FI	FIFE	1 days
	HI	HIGHLAND	1 days
	SL	SOUTH LANARKSHIRE	5 days

Main parameter selection:

Parameter: Gross floor area
Range: 734 to 45000 (units: sqm)

Date Range: 01/01/97 to 18/06/05

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	3 days
Friday	7 days

Selected survey types:

Manual count	9 days
Directional ATC Count	5 days

TRIP RATE for Land Use 01 - RETAIL/J - RETAIL PARK - INCLUDING FOOD

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	5	22682	0.06	5	22682	0.11	5	22682	0.17
01:00 - 02:00	5	22682	0.03	5	22682	0.04	5	22682	0.07
02:00 - 03:00	5	22682	0.01	5	22682	0.04	5	22682	0.05
03:00 - 04:00	5	22682	0.01	5	22682	0.02	5	22682	0.03
04:00 - 05:00	5	22682	0.02	5	22682	0.03	5	22682	0.05
05:00 - 06:00	5	22682	0.08	5	22682	0.08	5	22682	0.16
06:00 - 07:00	5	22682	0.17	5	22682	0.16	5	22682	0.33
07:00 - 08:00	11	16857	0.64	11	16857	0.47	11	16857	1.11
08:00 - 09:00	14	15970	1.31	14	15970	0.88	14	15970	2.19
09:00 - 10:00	14	15970	2.02	14	15970	1.32	14	15970	3.34
10:00 - 11:00	14	15970	2.39	14	15970	1.95	14	15970	4.34
11:00 - 12:00	14	15970	2.60	14	15970	2.44	14	15970	5.04
12:00 - 13:00	14	15970	3.08	14	15970	2.95	14	15970	6.03
13:00 - 14:00	14	15970	3.13	**14**	**15970**	**3.26**	**14**	**15970**	**6.39**
14:00 - 15:00	14	15970	2.88	14	15970	3.01	14	15970	5.89
15:00 - 16:00	14	15970	2.84	14	15970	2.98	14	15970	5.82
16:00 - 17:00	14	15970	3.06	14	15970	3.10	14	15970	6.16
17:00 - 18:00	**14**	**15970**	**3.14**	14	15970	3.16	14	15970	6.30
18:00 - 19:00	14	15970	2.94	14	15970	3.07	14	15970	6.01
19:00 - 20:00	12	16122	2.40	12	16122	2.66	12	16122	5.06
20:00 - 21:00	12	16122	1.20	12	16122	1.89	12	16122	3.09
21:00 - 22:00	10	18147	0.69	10	18147	0.97	10	18147	1.66
22:00 - 23:00	7	20227	0.42	7	20227	0.59	7	20227	1.01
23:00 - 24:00	6	20410	0.18	6	20410	0.25	6	20410	0.43
Daily Trip Rates:			35.31			35.41			70.73

Parameter summary

Trip rate parameter range selected:	734 - 45000 (units: sqm)
Survey date date range:	01/01/97 - 18/06/05
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : A - OFFICE
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	2 days
02	**SOUTH EAST**		
	EX	ESSEX	1 days
	HF	HERTFORDSHIRE	1 days
	OX	OXFORDSHIRE	1 days
	SC	SURREY	3 days
	WS	WEST SUSSEX	5 days
03	**SOUTH WEST**		
	CW	CORNWALL	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	LE	LEICESTERSHIRE	3 days
08	**NORTH WEST**		
	LC	LANCASHIRE	1 days
09	**NORTH**		
	CB	CUMBRIA	1 days
	TV	TEES VALLEY	2 days
	TW	TYNE & WEAR	2 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	AS	ABERDEENSHIRE	2 days
	FI	FIFE	1 days
	PK	PERTH & KINROSS	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 408 to 175000 (units: sqm)

Date Range: 01/01/97 to 04/07/05

Selected survey days:

Monday	4 days
Tuesday	6 days
Wednesday	8 days
Thursday	10 days
Friday	2 days

Selected survey types:

Manual count	25 days
Directional ATC Count	5 days

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
00:30 - 01:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
01:00 - 01:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
01:30 - 02:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
02:00 - 02:30	5	5442	0.00	5	5442	0.01	5	5442	0.01
02:30 - 03:00	5	5442	0.00	5	5442	0.01	5	5442	0.01
03:00 - 03:30	5	5442	0.00	5	5442	0.01	5	5442	0.01
03:30 - 04:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
04:00 - 04:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
04:30 - 05:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
05:00 - 05:30	5	5442	0.01	5	5442	0.05	5	5442	0.06
05:30 - 06:00	5	5442	0.00	5	5442	0.04	5	5442	0.04
06:00 - 06:30	5	5442	0.05	5	5442	0.06	5	5442	0.11
06:30 - 07:00	5	5442	0.04	5	5442	0.04	5	5442	0.08
07:00 - 07:30	28	5008	0.25	28	5008	0.07	28	5008	0.32
07:30 - 08:00	28	5008	0.45	28	5008	0.07	28	5008	0.52
08:00 - 08:30	29	5468	0.94	29	5468	0.11	29	5468	1.05
08:30 - 09:00	**29**	**5468**	**1.05**	29	5468	0.12	**29**	**5468**	**1.17**
09:00 - 09:30	30	5319	0.70	30	5319	0.17	30	5319	0.87
09:30 - 10:00	30	5319	0.49	30	5319	0.20	30	5319	0.69
10:00 - 10:30	30	5319	0.26	30	5319	0.19	30	5319	0.45
10:30 - 11:00	30	5319	0.23	30	5319	0.19	30	5319	0.42
11:00 - 11:30	30	5319	0.19	30	5319	0.21	30	5319	0.40
11:30 - 12:00	30	5319	0.21	30	5319	0.23	30	5319	0.44
12:00 - 12:30	30	5319	0.25	30	5319	0.41	30	5319	0.66
12:30 - 13:00	30	5319	0.33	30	5319	0.43	30	5319	0.76
13:00 - 13:30	30	5319	0.40	30	5319	0.39	30	5319	0.79
13:30 - 14:00	30	5319	0.40	30	5319	0.31	30	5319	0.71
14:00 - 14:30	30	5319	0.30	30	5319	0.25	30	5319	0.55
14:30 - 15:00	30	5319	0.22	30	5319	0.24	30	5319	0.46
15:00 - 15:30	30	5319	0.16	30	5319	0.25	30	5319	0.41
15:30 - 16:00	30	5319	0.18	30	5319	0.27	30	5319	0.45
16:00 - 16:30	30	5319	0.18	30	5319	0.54	30	5319	0.72
16:30 - 17:00	30	5319	0.21	30	5319	0.62	30	5319	0.83
17:00 - 17:30	29	5468	0.16	**29**	**5468**	**0.95**	29	5468	1.11
17:30 - 18:00	29	5468	0.15	29	5468	0.67	29	5468	0.82
18:00 - 18:30	28	5417	0.05	28	5417	0.28	28	5417	0.33
18:30 - 19:00	28	5417	0.03	28	5417	0.17	28	5417	0.20
19:00 - 19:30	5	5442	0.03	5	5442	0.20	5	5442	0.23
19:30 - 20:00	5	5442	0.03	5	5442	0.19	5	5442	0.22
20:00 - 20:30	5	5442	0.02	5	5442	0.08	5	5442	0.10
20:30 - 21:00	5	5442	0.02	5	5442	0.07	5	5442	0.09
21:00 - 21:30	5	5442	0.04	5	5442	0.15	5	5442	0.19
21:30 - 22:00	5	5442	0.03	5	5442	0.14	5	5442	0.17
22:00 - 22:30	5	5442	0.00	5	5442	0.03	5	5442	0.03
22:30 - 23:00	5	5442	0.00	5	5442	0.02	5	5442	0.02
23:00 - 23:30	5	5442	0.00	5	5442	0.02	5	5442	0.02
23:30 - 24:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
Daily Trip Rates:			8.08			8.49			16.52

Parameter summary

Trip rate parameter range selected:	408 - 175000 (units: sqm)
Survey date date range:	01/01/97 - 04/07/05
Number of weekdays (Monday-Friday):	30
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : K - RETAIL PARK - EXCLUDING FOOD

VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	ES	EAST SUSSEX	1 days
	HC	HAMPSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
06	**WEST MIDLANDS**		
	ST	STAFFORDSHIRE	1 days
	WM	WEST MIDLANDS	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	5 days
	LC	LANCASHIRE	1 days
	MS	MERSEYSIDE	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 2057 to 35244 (units: sqm)

Date Range: 01/01/97 to 25/06/05

Selected survey days:

Monday	1 days
Thursday	3 days
Friday	11 days

Selected survey types:

Manual count	15 days
Directional ATC Count	0 days

TRIP RATE for Land Use 01 - RETAIL/K - RETAIL PARK - EXCLUDING FOOD

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	6	12889	0.13	6	12889	0.06	6	12889	0.19
08:00 - 09:00	14	11596	0.53	14	11596	0.26	14	11596	0.79
09:00 - 10:00	15	11054	1.06	15	11054	0.67	15	11054	1.73
10:00 - 11:00	15	11054	1.35	15	11054	1.12	15	11054	2.47
11:00 - 12:00	15	11054	1.49	15	11054	1.33	15	11054	2.82
12:00 - 13:00	15	11054	1.67	15	11054	1.58	15	11054	3.25
13:00 - 14:00	**15**	**11054**	**1.72**	**15**	**11054**	**1.72**	**15**	**11054**	**3.44**
14:00 - 15:00	15	11054	1.60	15	11054	1.63	15	11054	3.23
15:00 - 16:00	15	11054	1.49	15	11054	1.57	15	11054	3.06
16:00 - 17:00	15	11054	1.37	15	11054	1.47	15	11054	2.84
17:00 - 18:00	15	11054	1.20	15	11054	1.31	15	11054	2.51
18:00 - 19:00	15	11054	1.28	15	11054	1.33	15	11054	2.61
19:00 - 20:00	15	11054	0.89	15	11054	1.36	15	11054	2.25
20:00 - 21:00	9	12686	0.33	9	12686	0.58	9	12686	0.91
21:00 - 22:00	6	12889	0.19	6	12889	0.37	6	12889	0.56
22:00 - 23:00	2	17788	0.04	2	17788	0.21	2	17788	0.25
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			16.33			16.57			32.91

Parameter summary

Trip rate parameter range selected:	2057 - 35244 (units: sqm)
Survey date date range:	01/01/97 - 25/06/05
Number of weekdays (Monday-Friday):	15
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : F - WAREHOUSING (COMMERCIAL)

VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	BU	BUCKINGHAMSHIRE	1 days
	HF	HERTFORDSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	3 days
04	**EAST ANGLIA**		
	SF	SUFFOLK	1 days
06	**WEST MIDLANDS**		
	WO	WORCESTERSHIRE	2 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	GC	GLASGOW CITY	1 days
	SL	SOUTH LANARKSHIRE	1 days
12	**NORTHERN IRELAND**		
	NI	NORTHERN IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 950 to 55740 (units: sqm)

Date Range: 01/01/97 to 06/03/03

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	9 days
Friday	3 days

Selected survey types:

Manual count	16 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	1	7500	0.09	1	7500	0.08	1	7500	0.17
00:30 - 01:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
01:00 - 01:30	1	7500	0.01	1	7500	0.03	1	7500	0.04
01:30 - 02:00	1	7500	0.04	1	7500	0.07	1	7500	0.11
02:00 - 02:30	1	7500	0.03	1	7500	0.03	1	7500	0.06
02:30 - 03:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
03:00 - 03:30	1	7500	0.03	1	7500	0.01	1	7500	0.04
03:30 - 04:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
04:00 - 04:30	1	7500	0.05	1	7500	0.05	1	7500	0.10
04:30 - 05:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
05:00 - 05:30	1	7500	0.08	1	7500	0.07	1	7500	0.15
05:30 - 06:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
06:00 - 06:30	2	18844	0.06	2	18844	0.10	2	18844	0.16
06:30 - 07:00	2	18844	0.07	2	18844	0.07	2	18844	0.14
07:00 - 07:30	16	17995	0.05	16	17995	0.06	16	17995	0.11
07:30 - 08:00	16	17995	0.09	16	17995	0.04	16	17995	0.13
08:00 - 08:30	16	17995	0.08	16	17995	0.04	16	17995	0.12
08:30 - 09:00	16	17995	0.09	16	17995	0.04	16	17995	0.13
09:00 - 09:30	16	17995	0.08	16	17995	0.05	16	17995	0.13
09:30 - 10:00	16	17995	0.08	16	17995	0.05	16	17995	0.13
10:00 - 10:30	16	17995	0.06	16	17995	0.05	16	17995	0.11
10:30 - 11:00	16	17995	0.05	16	17995	0.05	16	17995	0.10
11:00 - 11:30	16	17995	0.06	16	17995	0.05	16	17995	0.11
11:30 - 12:00	16	17995	0.06	16	17995	0.05	16	17995	0.11
12:00 - 12:30	16	17995	0.05	16	17995	0.07	16	17995	0.12
12:30 - 13:00	16	17995	0.05	16	17995	0.05	16	17995	0.10
13:00 - 13:30	16	17995	0.09	16	17995	0.07	16	17995	0.16
13:30 - 14:00	**16**	**17995**	**0.16**	16	17995	0.11	**16**	**17995**	**0.27**
14:00 - 14:30	16	17995	0.07	**16**	**17995**	**0.12**	16	17995	0.19
14:30 - 15:00	16	17995	0.07	16	17995	0.10	16	17995	0.17
15:00 - 15:30	16	17995	0.05	16	17995	0.07	16	17995	0.12
15:30 - 16:00	16	17995	0.05	16	17995	0.07	16	17995	0.12
16:00 - 16:30	16	17995	0.05	16	17995	0.08	16	17995	0.13
16:30 - 17:00	16	17995	0.04	16	17995	0.08	16	17995	0.12
17:00 - 17:30	16	17995	0.04	16	17995	0.09	16	17995	0.13
17:30 - 18:00	16	17995	0.06	16	17995	0.08	16	17995	0.14
18:00 - 18:30	15	17183	0.04	15	17183	0.06	15	17183	0.10
18:30 - 19:00	15	17183	0.03	15	17183	0.04	15	17183	0.07
19:00 - 19:30	2	6775	0.03	2	6775	0.03	2	6775	0.06
19:30 - 20:00	2	6775	0.01	2	6775	0.04	2	6775	0.05
20:00 - 20:30	1	7500	0.05	1	7500	0.01	1	7500	0.06
20:30 - 21:00	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:00 - 21:30	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:30 - 22:00	1	7500	0.01	1	7500	0.03	1	7500	0.04
22:00 - 22:30	1	7500	0.07	1	7500	0.05	1	7500	0.12
22:30 - 23:00	1	7500	0.07	1	7500	0.04	1	7500	0.11
23:00 - 23:30	1	7500	0.04	1	7500	0.04	1	7500	0.08
23:30 - 24:00	1	7500	0.04	1	7500	0.04	1	7500	0.08
Daily Trip Rates:			2.71			2.73			5.47

Parameter summary

Trip rate parameter range selected:	950 - 55740 (units: sqm)
Survey date date range:	01/01/97 - 06/03/03
Number of weekdays (Monday-Friday):	16
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : C - INDUSTRIAL UNITS
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	4 days
	GS	GLOUCESTERSHIRE	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
	NF	NORFOLK	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	1 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	ER	EAST RENFREWSHIRE	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 620 to 34581 (units: sqm)

Date Range: 01/01/97 to 21/06/04

Selected survey days:

Monday	2 days
Tuesday	5 days
Wednesday	2 days
Thursday	5 days

Selected survey types:

Manual count	14 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNITS

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	0	0	0.00	0	0	0.00	0	0	0.00
00:30 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 01:30	0	0	0.00	0	0	0.00	0	0	0.00
01:30 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 02:30	0	0	0.00	0	0	0.00	0	0	0.00
02:30 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 03:30	0	0	0.00	0	0	0.00	0	0	0.00
03:30 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 04:30	0	0	0.00	0	0	0.00	0	0	0.00
04:30 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 05:30	0	0	0.00	0	0	0.00	0	0	0.00
05:30 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 06:30	1	22926	0.02	1	22926	0.09	1	22926	0.11
06:30 - 07:00	1	22926	0.03	1	22926	0.02	1	22926	0.05
07:00 - 07:30	14	15321	0.14	14	15321	0.03	14	15321	0.17
07:30 - 08:00	14	15321	0.18	14	15321	0.03	14	15321	0.21
08:00 - 08:30	**14**	**15321**	**0.20**	14	15321	0.03	14	15321	0.23
08:30 - 09:00	14	15321	0.17	14	15321	0.04	14	15321	0.21
09:00 - 09:30	14	15321	0.09	14	15321	0.03	14	15321	0.12
09:30 - 10:00	14	15321	0.06	14	15321	0.04	14	15321	0.10
10:00 - 10:30	14	15321	0.04	14	15321	0.05	14	15321	0.09
10:30 - 11:00	14	15321	0.05	14	15321	0.04	14	15321	0.09
11:00 - 11:30	14	15321	0.04	14	15321	0.05	14	15321	0.09
11:30 - 12:00	14	15321	0.05	14	15321	0.05	14	15321	0.10
12:00 - 12:30	14	15321	0.05	14	15321	0.07	14	15321	0.12
12:30 - 13:00	14	15321	0.06	14	15321	0.08	14	15321	0.14
13:00 - 13:30	14	15321	0.08	14	15321	0.06	14	15321	0.14
13:30 - 14:00	14	15321	0.08	14	15321	0.05	14	15321	0.13
14:00 - 14:30	14	15321	0.05	14	15321	0.07	14	15321	0.12
14:30 - 15:00	14	15321	0.04	14	15321	0.04	14	15321	0.08
15:00 - 15:30	14	15321	0.04	14	15321	0.06	14	15321	0.10
15:30 - 16:00	14	15321	0.04	14	15321	0.06	14	15321	0.10
16:00 - 16:30	14	15321	0.03	14	15321	0.12	14	15321	0.15
16:30 - 17:00	14	15321	0.03	14	15321	0.21	14	15321	0.24
17:00 - 17:30	14	15321	0.03	**14**	**15321**	**0.31**	**14**	**15321**	**0.34**
17:30 - 18:00	14	15321	0.04	14	15321	0.14	14	15321	0.18
18:00 - 18:30	14	15321	0.01	14	15321	0.07	14	15321	0.08
18:30 - 19:00	14	15321	0.01	14	15321	0.03	14	15321	0.04
19:00 - 19:30	2	17449	0.00	2	17449	0.03	2	17449	0.03
19:30 - 20:00	2	17449	0.01	2	17449	0.01	2	17449	0.02
20:00 - 20:30	2	17449	0.00	2	17449	0.01	2	17449	0.01
20:30 - 21:00	2	17449	0.00	2	17449	0.01	2	17449	0.01
21:00 - 21:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:30 - 22:00	2	17449	0.01	2	17449	0.00	2	17449	0.01
22:00 - 22:30	1	11972	0.00	1	11972	0.00	1	11972	0.00
22:30 - 23:00	1	11972	0.18	1	11972	0.01	1	11972	0.19
23:00 - 23:30	0	0	0.00	0	0	0.00	0	0	0.00
23:30 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			1.88			1.94			3.80

Parameter summary

Trip rate parameter range selected:	620 - 34581 (units: sqm)
Survey date date range:	01/01/97 - 21/06/04
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 14 - CAR SHOW ROOMS
Category : A - CAR SHOW ROOMS
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	KC	KENT	1 days
	SC	SURREY	1 days
	WS	WEST SUSSEX	3 days
03	**SOUTH WEST**		
	DV	DEVON	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	DS	DERBYSHIRE	1 days
	LE	LEICESTERSHIRE	3 days
06	**WEST MIDLANDS**		
	WM	WEST MIDLANDS	1 days
07	**YORKSHIRE & NORTH LINCOLNSHIRE**		
	WY	WEST YORKSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	3 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	3 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	EA	EAST AYRSHIRE	2 days
14	**REPUBLIC OF IRELAND**		
	IR	REPUBLIC OF IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 695 to 5058 (units: sqm)

Date Range: 01/01/97 to 06/07/05

Selected survey days:

Monday	4 days
Tuesday	3 days
Wednesday	3 days
Thursday	4 days
Friday	12 days

Selected survey types:

Manual count	26 days
Directional ATC Count	0 days

TRIP RATE for Land Use 14 - CAR SHOW ROOMS/A - CAR SHOW ROOMS

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	9	2700	0.41	9	2700	0.08	9	2700	0.49
08:00 - 09:00	**23**	**2445**	**1.05**	23	2445	0.37	23	2445	1.42
09:00 - 10:00	25	2324	0.79	25	2324	0.57	25	2324	1.36
10:00 - 11:00	26	2291	0.68	26	2291	0.67	26	2291	1.35
11:00 - 12:00	26	2291	0.64	26	2291	0.65	26	2291	1.29
12:00 - 13:00	26	2291	0.72	26	2291	0.79	**26**	**2291**	**1.51**
13:00 - 14:00	26	2291	0.72	26	2291	0.64	26	2291	1.36
14:00 - 15:00	26	2291	0.61	26	2291	0.68	26	2291	1.29
15:00 - 16:00	26	2291	0.66	26	2291	0.72	26	2291	1.38
16:00 - 17:00	26	2291	0.61	26	2291	0.78	26	2291	1.39
17:00 - 18:00	26	2291	0.40	**26**	**2291**	**0.89**	26	2291	1.29
18:00 - 19:00	22	2360	0.13	22	2360	0.39	22	2360	0.52
19:00 - 20:00	11	2539	0.05	11	2539	0.09	11	2539	0.14
20:00 - 21:00	0	0	0.00	0	0	0.00	0	0	0.00
21:00 - 22:00	0	0	0.00	0	0	0.00	0	0	0.00
22:00 - 23:00	0	0	0.00	0	0	0.00	0	0	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			7.48			7.30			14.79

Parameter summary

Trip rate parameter range selected:	695 - 5058 (units: sqm)
Survey date date range:	01/01/97 - 06/07/05
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : J - RETAIL PARK - INCLUDING FOOD
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	HC	HAMPSHIRE	1 days
04	**EAST ANGLIA**		
	NF	NORFOLK	1 days
05	**EAST MIDLANDS**		
	LN	LINCOLNSHIRE	1 days
06	**WEST MIDLANDS**		
	WK	WARWICKSHIRE	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	2 days
11	**SCOTLAND**		
	FI	FIFE	1 days
	HI	HIGHLAND	1 days
	SL	SOUTH LANARKSHIRE	5 days

Main parameter selection:

Parameter: Gross floor area
Range: 734 to 45000 (units: sqm)

Date Range: 01/01/97 to 18/06/05

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	3 days
Friday	7 days

Selected survey types:

Manual count	9 days
Directional ATC Count	5 days

TRIP RATE for Land Use 01 - RETAIL/J - RETAIL PARK - INCLUDING FOOD

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	5	12247	0.01	5	12247	0.02	5	12247	0.03
08:00 - 09:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
09:00 - 10:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
10:00 - 11:00	**6**	**13326**	**0.04**	**6**	**13326**	**0.03**	**6**	**13326**	**0.07**
11:00 - 12:00	6	13326	0.03	6	13326	0.02	6	13326	0.05
12:00 - 13:00	6	13326	0.03	6	13326	0.03	6	13326	0.06
13:00 - 14:00	6	13326	0.02	6	13326	0.03	6	13326	0.05
14:00 - 15:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
15:00 - 16:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
16:00 - 17:00	6	13326	0.01	6	13326	0.02	6	13326	0.03
17:00 - 18:00	6	13326	0.01	6	13326	0.01	6	13326	0.02
18:00 - 19:00	6	13326	0.01	6	13326	0.01	6	13326	0.02
19:00 - 20:00	4	12462	0.01	4	12462	0.00	4	12462	0.01
20:00 - 21:00	4	12462	0.00	4	12462	0.00	4	12462	0.00
21:00 - 22:00	2	18924	0.00	2	18924	0.00	2	18924	0.00
22:00 - 23:00	1	19128	0.01	1	19128	0.00	1	19128	0.01
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.25			0.24			0.51

Parameter summary

Trip rate parameter range selected:	734 - 45000 (units: sqm)
Survey date date range:	01/01/97 - 18/06/05
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : K - RETAIL PARK - EXCLUDING FOOD
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	ES	EAST SUSSEX	1 days
	HC	HAMPSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
06	**WEST MIDLANDS**		
	ST	STAFFORDSHIRE	1 days
	WM	WEST MIDLANDS	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	5 days
	LC	LANCASHIRE	1 days
	MS	MERSEYSIDE	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 2057 to 35244 (units: sqm)

Date Range: 01/01/97 to 25/06/05

Selected survey days:

Monday	1 days
Thursday	3 days
Friday	11 days

Selected survey types:

Manual count	15 days
Directional ATC Count	0 days

TRIP RATE for Land Use 01 - RETAIL/K - RETAIL PARK - EXCLUDING FOOD
OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	3	13810	0.01	3	13810	0.01	3	13810	0.02
08:00 - 09:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
09:00 - 10:00	7	10709	0.03	7	10709	0.03	7	10709	0.06
10:00 - 11:00	7	10709	0.02	7	10709	0.03	7	10709	0.05
11:00 - 12:00	**7**	**10709**	**0.04**	**7**	**10709**	**0.04**	**7**	**10709**	**0.08**
12:00 - 13:00	7	10709	0.02	7	10709	0.03	7	10709	0.05
13:00 - 14:00	7	10709	0.03	7	10709	0.02	7	10709	0.05
14:00 - 15:00	7	10709	0.03	7	10709	0.03	7	10709	0.06
15:00 - 16:00	7	10709	0.02	7	10709	0.02	7	10709	0.04
16:00 - 17:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
17:00 - 18:00	7	10709	0.00	7	10709	0.01	7	10709	0.01
18:00 - 19:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
19:00 - 20:00	7	10709	0.00	7	10709	0.01	7	10709	0.01
20:00 - 21:00	3	13810	0.00	3	13810	0.00	3	13810	0.00
21:00 - 22:00	3	13810	0.00	3	13810	0.00	3	13810	0.00
22:00 - 23:00	1	15750	0.00	1	15750	0.00	1	15750	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.24			0.26			0.49

Parameter summary

Trip rate parameter range selected:	2057 - 35244 (units: sqm)
Survey date date range:	01/01/97 - 25/06/05
Number of weekdays (Monday-Friday):	15
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : F - WAREHOUSING (COMMERCIAL)
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	BU	BUCKINGHAMSHIRE	1 days
	HF	HERTFORDSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	3 days
04	**EAST ANGLIA**		
	SF	SUFFOLK	1 days
06	**WEST MIDLANDS**		
	WO	WORCESTERSHIRE	2 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	GC	GLASGOW CITY	1 days
	SL	SOUTH LANARKSHIRE	1 days
12	**NORTHERN IRELAND**		
	NI	NORTHERN IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 950 to 55740 (units: sqm)

Date Range: 01/01/97 to 06/03/03

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	9 days
Friday	3 days

Selected survey types:

Manual count	16 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	**1**	**7500**	**0.09**	**1**	**7500**	**0.08**	**1**	**7500**	**0.17**
00:30 - 01:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
01:00 - 01:30	1	7500	0.01	1	7500	0.03	1	7500	0.04
01:30 - 02:00	1	7500	0.04	1	7500	0.07	1	7500	0.11
02:00 - 02:30	1	7500	0.03	1	7500	0.03	1	7500	0.06
02:30 - 03:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
03:00 - 03:30	1	7500	0.03	1	7500	0.01	1	7500	0.04
03:30 - 04:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
04:00 - 04:30	1	7500	0.05	1	7500	0.05	1	7500	0.10
04:30 - 05:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
05:00 - 05:30	1	7500	0.04	1	7500	0.07	1	7500	0.11
05:30 - 06:00	1	7500	0.03	1	7500	0.04	1	7500	0.07
06:00 - 06:30	2	18844	0.03	2	18844	0.03	2	18844	0.06
06:30 - 07:00	2	18844	0.04	2	18844	0.06	2	18844	0.10
07:00 - 07:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
07:30 - 08:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
08:00 - 08:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
08:30 - 09:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
09:00 - 09:30	14	18310	0.02	14	18310	0.03	14	18310	0.05
09:30 - 10:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
10:00 - 10:30	14	18310	0.03	14	18310	0.03	14	18310	0.06
10:30 - 11:00	14	18310	0.02	14	18310	0.03	14	18310	0.05
11:00 - 11:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
11:30 - 12:00	14	18310	0.03	14	18310	0.03	14	18310	0.06
12:00 - 12:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
12:30 - 13:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
13:00 - 13:30	14	18310	0.03	14	18310	0.02	14	18310	0.05
13:30 - 14:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
14:00 - 14:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
14:30 - 15:00	14	18310	0.03	14	18310	0.03	14	18310	0.06
15:00 - 15:30	14	18310	0.03	14	18310	0.02	14	18310	0.05
15:30 - 16:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
16:00 - 16:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
16:30 - 17:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
17:00 - 17:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
17:30 - 18:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
18:00 - 18:30	13	17396	0.02	13	17396	0.02	13	17396	0.04
18:30 - 19:00	13	17396	0.02	13	17396	0.02	13	17396	0.04
19:00 - 19:30	2	6775	0.03	2	6775	0.01	2	6775	0.04
19:30 - 20:00	2	6775	0.01	2	6775	0.02	2	6775	0.03
20:00 - 20:30	1	7500	0.05	1	7500	0.01	1	7500	0.06
20:30 - 21:00	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:00 - 21:30	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:30 - 22:00	1	7500	0.01	1	7500	0.03	1	7500	0.04
22:00 - 22:30	1	7500	0.07	1	7500	0.05	1	7500	0.12
22:30 - 23:00	1	7500	0.07	1	7500	0.04	1	7500	0.11
23:00 - 23:30	1	7500	0.04	1	7500	0.04	1	7500	0.08
23:30 - 24:00	1	7500	0.04	1	7500	0.04	1	7500	0.08
Daily Trip Rates:			1.59			1.59			3.18

Parameter summary

Trip rate parameter range selected:	950 - 55740 (units: sqm)
Survey date date range:	01/01/97 - 06/03/03
Number of weekdays (Monday-Friday):	16
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : C - INDUSTRIAL UNITS
OGVS

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	4 days
	GS	GLOUCESTERSHIRE	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
	NF	NORFOLK	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	1 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	ER	EAST RENFREWSHIRE	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 620 to 34581 (units: sqm)

Date Range: 01/01/97 to 21/06/04

Selected survey days:

Monday	2 days
Tuesday	5 days
Wednesday	2 days
Thursday	5 days

Selected survey types:

Manual count	14 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNITS

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	0	0	0.00	0	0	0.00	0	0	0.00
00:30 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 01:30	0	0	0.00	0	0	0.00	0	0	0.00
01:30 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 02:30	0	0	0.00	0	0	0.00	0	0	0.00
02:30 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 03:30	0	0	0.00	0	0	0.00	0	0	0.00
03:30 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 04:30	0	0	0.00	0	0	0.00	0	0	0.00
04:30 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 05:30	0	0	0.00	0	0	0.00	0	0	0.00
05:30 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 06:30	1	22926	0.01	1	22926	0.00	1	22926	0.01
06:30 - 07:00	**1**	**22926**	**0.02**	**1**	**22926**	**0.02**	**1**	**22926**	**0.04**
07:00 - 07:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
07:30 - 08:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
08:00 - 08:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
08:30 - 09:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
09:00 - 09:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
09:30 - 10:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
10:00 - 10:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
10:30 - 11:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
11:00 - 11:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
11:30 - 12:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
12:00 - 12:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
12:30 - 13:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
13:00 - 13:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
13:30 - 14:00	13	15818	0.00	13	15818	0.01	13	15818	0.01
14:00 - 14:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
14:30 - 15:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
15:00 - 15:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
15:30 - 16:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
16:00 - 16:30	13	15818	0.00	13	15818	0.01	13	15818	0.01
16:30 - 17:00	13	15818	0.00	13	15818	0.01	13	15818	0.01
17:00 - 17:30	13	15818	0.00	13	15818	0.00	13	15818	0.00
17:30 - 18:00	13	15818	0.00	13	15818	0.00	13	15818	0.00
18:00 - 18:30	13	15818	0.00	13	15818	0.01	13	15818	0.01
18:30 - 19:00	13	15818	0.00	13	15818	0.00	13	15818	0.00
19:00 - 19:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
19:30 - 20:00	2	17449	0.01	2	17449	0.00	2	17449	0.01
20:00 - 20:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
20:30 - 21:00	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:00 - 21:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:30 - 22:00	2	17449	0.00	2	17449	0.00	2	17449	0.00
22:00 - 22:30	1	11972	0.00	1	11972	0.00	1	11972	0.00
22:30 - 23:00	1	11972	0.00	1	11972	0.00	1	11972	0.00
23:00 - 23:30	0	0	0.00	0	0	0.00	0	0	0.00
23:30 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.23			0.22			0.44

Parameter summary

Trip rate parameter range selected:	620 - 34581 (units: sqm)
Survey date date range:	01/01/97 - 21/06/04
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 14 - CAR SHOW ROOMS
Category : A - CAR SHOW ROOMS
OGVS

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	KC	KENT	1 days
	SC	SURREY	1 days
	WS	WEST SUSSEX	3 days
03	**SOUTH WEST**		
	DV	DEVON	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	DS	DERBYSHIRE	1 days
	LE	LEICESTERSHIRE	3 days
06	**WEST MIDLANDS**		
	WM	WEST MIDLANDS	1 days
07	**YORKSHIRE & NORTH LINCOLNSHIRE**		
	WY	WEST YORKSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	3 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	3 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	EA	EAST AYRSHIRE	2 days
14	**REPUBLIC OF IRELAND**		
	IR	REPUBLIC OF IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 695 to 5058 (units: sqm)

Date Range: 01/01/97 to 06/07/05

Selected survey days:

Monday	4 days
Tuesday	3 days
Wednesday	3 days
Thursday	4 days
Friday	12 days

Selected survey types:

Manual count	26 days
Directional ATC Count	0 days

TRIP RATE for Land Use 14 - CAR SHOW ROOMS/A - CAR SHOW ROOMS
OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	**8**	**2936**	**0.04**	8	2936	0.02	**8**	**2936**	**0.06**
08:00 - 09:00	19	2643	0.02	**19**	**2643**	**0.03**	19	2643	0.05
09:00 - 10:00	19	2643	0.02	19	2643	0.02	19	2643	0.04
10:00 - 11:00	20	2584	0.01	20	2584	0.02	20	2584	0.03
11:00 - 12:00	20	2584	0.01	20	2584	0.01	20	2584	0.02
12:00 - 13:00	20	2584	0.03	20	2584	0.02	20	2584	0.05
13:00 - 14:00	20	2584	0.02	20	2584	0.02	20	2584	0.04
14:00 - 15:00	20	2584	0.01	20	2584	0.01	20	2584	0.02
15:00 - 16:00	20	2584	0.02	20	2584	0.01	20	2584	0.03
16:00 - 17:00	20	2584	0.01	20	2584	0.02	20	2584	0.03
17:00 - 18:00	20	2584	0.00	20	2584	0.00	20	2584	0.00
18:00 - 19:00	17	2682	0.00	17	2682	0.00	17	2682	0.00
19:00 - 20:00	9	2749	0.00	9	2749	0.00	9	2749	0.00
20:00 - 21:00	0	0	0.00	0	0	0.00	0	0	0.00
21:00 - 22:00	0	0	0.00	0	0	0.00	0	0	0.00
22:00 - 23:00	0	0	0.00	0	0	0.00	0	0	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.19			0.18			0.37

Parameter summary

Trip rate parameter range selected:	695 - 5058 (units: sqm)
Survey date date range:	01/01/97 - 06/07/05
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

Roughan & O'Donovan Consulting Engineers

Profile Park
Traffic Assessment

		Made:	KD	04/05/2006
ROD Ref:	5.311	Checked:	JB	
		Approved:	KD	

Use		Scale	1 acre =
Neighbourhood Centre	2.47 acres	4,998 sqm	4046.856 sqm
Office	10.20 acres	20,639 sqm	
Retail park	14.67 acres	29,684 sqm	Plot ratio = 0.5
General Industry/enterprise	39.96 acres	80,856 sqm	
General industry/logistics	39.00 acres	78,914 sqm	
Showroom	8.61 acres	17,422 sqm	

AM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips* Inbound (veh/hr)	No. Trips* Outbound (veh/hr)	No. Trips* Two-way (veh/hr)
Neighbourhood Centre	1.31	0.88	52	35	88
Office	1.99	0.23	329	38	367
Retail park	0.53	0.26	126	62	188
General Industry/enterprise	0.17	0.08	110	52	162
General industry/logistics	0.37	0.07	234	44	278
Showroom	1.05	0.37	146	52	198
Total Trips			*997*	*282*	*1,279*

* 20% reduction due to dual use / multi purpose trips and implementation of the Mobility Management Plan

PM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips* Inbound (veh/hr)	No. Trips* Outbound (veh/hr)	No. Trips* Two-way (veh/hr)
Neighbourhood Centre	3.14	3.16	126	126	252
Office	0.31	1.62	51	267	319
Retail park	1.2	1.31	285	311	596
General Industry/enterprise	0.1	0.17	65	110	175
General industry/logistics	0.07	0.45	44	284	328
Showroom	0.4	0.89	56	124	180
Total Trips			*626*	*1,223*	*1,849*

* 20% reduction due to dual use / multi purpose trips and implementation of the Mobility Management Plan

TRICS rates for vehicles used for the following uses:

Neighbourhood Centre	- retail park including food
Office	- office
Retail park	- retail park excluding food
General Industry/enterprise	- warehousing (commercial)
General industry/logistics	- industrial units
Showroom	- car show rooms

Roughan & O'Donovan Consulting Engineers

Profile Park
Traffic Assessment - HGVs

		Made:	KD	28/04/2006
ROD Ref:	5.311	Checked:	JB	
		Approved:	KD	

Use		Scale	1 acre =
Neighbourhood Centre	2.47 acres	4,998 sqm	4046.856 sqm
Office	10.20 acres	20,639 sqm	
Retail park	14.67 acres	29,684 sqm	
General Industry/enterprise	39.96 acres	80,856 sqm	
General industry/logistics	39.00 acres	78,914 sqm	
Showroom	8.61 acres	17,422 sqm	

AM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips Inbound (veh/hr)	No. Trips Outbound (veh/hr)	No. Trips Two-way (veh/hr)
Neighbourhood Centre	0.02	0.02	1	1	2
Office	0	0	0	0	0
Retail park	0.01	0.01	3	3	6
General Industry/enterprise	0.05	0.04	40	32	73
General industry/logistics	0.02	0.02	16	16	32
Showroom	0.02	0.03	3	5	9
Total			*64*	*57*	*121*

PM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips Inbound (veh/hr)	No. Trips Outbound (veh/hr)	No. Trips Two-way (veh/hr)
Neighbourhood Centre	0.01	0.01	0	0	1
Office	0	0	0	0	0
Retail park	0	0.01	0	3	3
General Industry/enterprise	0.04	0.04	32	32	65
General industry/logistics	0	0	0	0	0
Showroom	0	0	0	0	0
Total			*33*	*36*	*69*

TRICS rates for vehicles used for the following uses:

Neighbourhood Centre	- retail park including food
Office	- office
Retail park	- retail park excluding food
General Industry/enterprise	- warehousing (commercial)
General industry/logistics	- industrial units
Showroom	- car show rooms

Profile Park
Proposed Commercial Development

Mobility Management Plan

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1.0 INTRODUCTION

The development that is the subject of the current planning application consists of the provision of roads and services infrastructure, which will accommodate the future development of a business park on the subject site. The future land uses proposed on the site include industrial, office, retail, and neighbourhood centre uses including shops, cafes, crèche etc. Vehicular access to the site is proposed via the Nangor Road Regional Road R134, which has access to the Outer Ring Road R136. When completed, the Outer Ring Road will connect the N4 to the N7 and N81. Pedestrian and cycle access will be provided throughout the site and will connect with the Nangor Road which is to be upgraded to provide for these modes of travel.

This Mobility Management Plan has been prepared in support of the planning application for the proposed development.

1.1 Background to Mobility Management Plans

Road traffic growth is having a damaging effect on the environment, the economy and public health. A key contributor to this is the number of people commuting to work in a 'driver only car'. The impact that new developments have on the local road network can be reduced through the preparation and implementation of a mobility management plan. A mobility management plan assesses a development in terms of its accessibility by all modes of transport and makes recommendations that encourage and makes it easier for staff and visitors to travel to the workplace by public transport, car sharing, walking or cycling. The transportation policies and objectives of South Dublin County Council reflect the central elements of the Dublin Transportation Office (DTO) strategy. The DTO strategy outlined in 'A Platform for Change: An Integrated Transportation Strategy for the Greater Dublin Area 2000-2016' is to support and compliment the strategic land use planning framework for the Greater Dublin Area. The DTO Strategy has two interdependent elements: infrastructure and service improvements and demand management. The DTO Strategy on demand management is:

"To reduce the growth in travel through the application of land use and other policies while maintaining economic progress, and which is designed to encourage a transfer of trips, especially at peak periods, from the private car to sustainable modes of transport (such as public transport, cycling and walking)."

The DTO considers mobility management to be a suitable mechanism by which new developments can support the objectives of sustainable development and the achievement of reduced car dependency.

1.2 Structure of this Mobility Management Plan

It is intended that this report will provide a review of the existing transport options at the site of the proposed development together with direction to the developer, the Local Authority and public transport agencies on ways to best achieve an improved modal split for the journey to work, and minimise the traffic impact as a result of encouraging greater use of public transport, cycling and walking.

This mobility management plan is divided into the following principal sections:

- Objects and scope of the Mobility Management Plan;
- Existing transport infrastructure available in the vicinity of the site;

- Current commuter trends in the Dublin area;
- Recommendations to encourage greater use of more sustainable modes of transport by the future office employees at the site; and
- Likely commuter trends of the employees at the proposed development.

2.0 OBJECTIVES AND SCOPE OF THE MOBILITY MANAGEMENT PLAN

2.1 Objectives

The purpose of the Mobility Management Plan is to assist the Development Managers and 'unit end users' to minimise the amount of road traffic the development will generate. It encourages and makes it easier for staff of incoming companies and people visiting the site to travel by public transport, cycle, walk and car share. It particularly focuses upon journeys to work made by staff and their business trips.

Target modal splits have been identified for each mode of transport, and associated mobility management proposals are identified to enable these targets to be achieved. Thus the plan will make a direct contribution to reducing the traffic impact of the proposed development.

2.2 Scope

The Mobility Management Plan is a strategy consisting of a package of both physical measures and good working practices and policies that will be put in place once the commercial development is operational.

3.0 TRANSPORTATION INFRASTRUCTURE

This Section outlines how the transport infrastructure available in the vicinity of the site will support the objectives of this Mobility Management Plan.

3.1 Road Network

The site is situated between the N4 and N7 National Primary Routes and approximately 5km west of the M50 Motorway. The M50 is an orbital ring road around Dublin City with interchanges at all radiating National Primary Roads from the N1 to the North and the M11 to the South.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has seen steady improvements over recent years, and is a wide single carriageway with dedicated bus lanes in each direction extending as far out as the Outer Ring Road. The Nangor Road along the northern boundary of the site and to the west is of lower standard in terms of alignment and cross-sections, but will soon be upgraded and widened to include bus lanes in each direction.

The Outer Ring Road Phase 1 was opened from the N7 as far as Grange Castle Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction. Phase 2 of the Outer Ring Road, will see a local road link from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road. With completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and

the N7. Phase 3 of the Outer Ring Road, will extend south from the N7 to the N81 Blessington Road.

3.2 Public Transport Services

Public Transport Accessibility

Currently the Dublin Bus Route No. 68 operates along the Nangor Road at the northern boundary of the site. Approximately 1.5km east of the site the Dublin Bus Route Nos. 51B, 51X and 210 operate along the Nangor Road. Clondalkin Village 3km east of the site is served by the Dublin Bus Route Nos. 69, 76, 76A and 76B.

The Quality Bus Network in the area continues to expand with dedicated bus lanes on the Nangor Road east of the site and the Outer Ring Road.

The main intercity railway line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, runs to the north of the subject site. Intercity services are mainly to Cork and Limerick / Shannon, with the commuter service to Kildare. The nearest station is Clondalkin Station which is located approximately 3km northeast of the site and is served by 15 suburban commuter trains in each direction during weekdays.

Proposed Public Transport Infrastructure

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme) within the vicinity of the site including:

- Outer Ring Road QBC – Phase 1 N7 to Adamstown roundabout complete - Phase 2 connecting to the N4 under construction
- Nangor Road QBC west of Outer Ring Road currently at design stage
- Naas Road QBC Kingswood to Bluebell under construction.

These objectives form part of the extensive QBN (Quality Bus Network) that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 - 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, with better pedestrian and cycle facilities thereby encouraging commuters to use alternate modes of transport to private cars.

The Kildare Route Project is a railway improvement project for part of the Dublin to Hazelhatch railway line, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site, and additional railway tracks to allow for the separation of suburban, regional and intercity trains and the introduction of a new high capacity suburban service, which is expected to be complete by 2010.

Proposed public transport infrastructure identified in Transport 21, which will have a positive impact on the public transport infrastructure network in the area, include the following (completion dates):

- Dublin City Centre rail resignalling (2008)
- Opening of the new Dublin City Centre railway station (2009)
- Kildare rail upgrade (2010)
- Metro West Phase 1 Tallaght to Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)

- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extend Electrification to Hazelhatch (2015)
- Rail Interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015).

3.3 Cycle Facilities

There is a good cycle track network on the existing roads in the vicinity of the site with the recently improved Nangor Road and Outer Ring Road Phase 1 which include cycle tracks that form part of the extensive and emerging cycle path network in the area.

The developing cycle route network will increase the attractiveness of cycling for people working in the development. Commitments by the developers to provide secure and sheltered cycle parking throughout the development will serve to complement the efforts of the local authority in promoting and sustaining cycling.

Cycle access to the site will be available at the northeastern corner via the site access roundabout or the neighbourhood centre link and northwestern corners via a pedestrian / cycle link only to Nangor Road. A north-south link road will connect the main access road to Baldonnell Road, with the adjoining development lands to the west of the site connected by a pedestrian and cycle only link.

The internal roads within the site will have cycle paths on one side and will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority to cyclists at the junctions.

Secure sheltered cycle parking will be provided at appropriate locations adjacent to the main building entrances and changing and shower facilities will be available for use by cyclists where practicable.

3.4 Pedestrian Facilities

There are well-established footpaths along the roads to the east of the site, while the roads to the west are generally rural roads without dedicated pedestrian facilities, although there are proposals to upgrade the Nangor Road west of the main site access which will further improve pedestrian access.

People are typically prepared to walk up to 30 minutes to work. Special attention was given to creating a high quality safe walking environment, where pedestrian routes should be:

- Comfortable – provide a good surface without puddles and trips;
- Convenient – provide continuous footpaths;
- Convivial – be safe to use, and free from litter;
- Conspicuous – routes should be open to view, clearly signed and lit, assisting to improve perceptions of personal security; and
- Connected – direct routes reflecting desire lines where possible. They should link the main starting points with the destinations.

The internal roads on the site will have footpaths included on both sides with street lighting and landscaping of a high standard to make walking to and from the site more secure and attractive for people working there.

4.0 TRANSPORT MODAL SPLITS

4.1 Existing Modal Splits

The modal split of employees cannot be anticipated at this stage, although looking at modal splits for other similar sites a high portion of staff will commute to the development by car. The following modal split is a worst case assumption based on the location of the site and the existing availability of alternative modes of transport but without the expected improvements to the public transport network as described in Section 3 and the introduction of a Mobility Management Plan.

Table 1: Modal Split – Existing

Mode of Travel	*2006*
	%
Car Driver	70
Car Passenger	10
Bus & Rail	16
Walk	2
Cycle	2

4.2 External Factors which may Influence Modal Choice

A number of developments are likely to have a significant impact on the journey to work practices of the future workforce, on the site:

- Further development of the Quality Bus Network, and improved bus services for the area provided by Dublin Bus and the private sector, especially along the Nangor Road and Outer Ring Road QBC's;
- Completion of the Kildare Route Project, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site.
- Further development of the cycle track network and improved pedestrian facilties.

It is important to note that proposed changes to the public transport system such as integrated ticketing and co-ordination of timetables have yet to be implemented. It is expected that these measures will remove some of the barriers currently dissuading potential passengers from using public transport.

5.0 MOBILITY MANAGEMENT PLAN

This section outlines a series of recommendations to help achieve and maintain the 'Target Modal Split', throughout the life of the development.

5.1 Mobility Plan Administration

A Mobility Management Plan Co-ordinator is required to administer, implement, monitor and review the Mobility Management Plan. The Plan Co-ordinator should liaise with the management companies from adjacent developments, the Local Authority, and public transport operators.

5.2 Mobility Plan Details

Car travel is comfortable and convenient and inevitably an attractive mode of transport. There are a number of measures that will be undertaken by the development managers and 'unit end users' to help reduce car travel as outlined below. The Plan Co-ordinator will play a key role in encouraging and enabling companies locating within the development to adopt these recommendations. These are set out under the following general headings:

A. Travel awareness
B. Travel database
C. Public transport
D. Car sharing scheme
E. Cycling
F. Walking
G. Working practices
H. Car parking management
I. Policies on car use

(A) Travel Awareness

It will be the responsibility of the Plan Co-ordinator to make all staff and visitors aware of the environmental consequences of their travel choices. Consideration will be given to the various media for communicating the Mobility Management Plan to staff and visitors. Ideas include a Mobility Management Plan Newsletter or Website. These will provide details of the Mobility Management Plan and information on public transport services, car sharing, etc.

(B) Travel Database

The Plan Co-ordinator will produce and maintain a staff travel database. This will contain information relating to the travel patterns of employees to the site. It is envisaged that once the development is occupied, the Plan Co-ordinator would distribute a Travel Survey Questionnaire for the occupants to then forward to their own employees. The survey would provide details of the following:

- staff profile;
- home location;
- normal working hours;
- mode of travel to work;
- route taken to work;
- interest in car sharing;
- home to work journey time;
- distance home to work;
- car ownership;
- work related travel throughout the day;
- reasons for not car sharing, using public transport, cycling, walking or motorcycling;
- measures that would encourage the use of public transport, cycling, walking or motorcycling;
- estimates of public transport journey times and cost.

The availability of this data will assist in more accurately defining travel requirements for the site, and in defining the specific measures that would maximise the success of the Plan. This survey should be repeated annually, with published

results in a report highlighting any changes. In addition the Plan Co-ordinator would carry out further on-site data collection, which will include surveys to measure car park and cycle facility use. This data will complement the information provided in the staff survey questionnaires and will provide guidance on how the Plan could be improved or modified.

(C) Public Transport

It is anticipated that the management company will provide a shuttle bus service to and from appropriate locations so as to improve the accessibility of the development by public transport. In particular, a shuttle bus services could operate between the site and the nearest rail station on the Kildare Line, and to other public transport nodes such as Clondalkin Village.

The Plan Co-ordinator will enable the management company to promote a public transport culture amongst staff and visitors. Poor or insufficient access to information can be a major barrier to public transport use. Making people aware of travel alternatives will form a key element to the Mobility Management Plan. It will be the responsibility of the Plan Co-ordinator to regularly liaise with public transport operators to ensure that visitors and employees are provided with up to date public transport information to help maximise patronage. This includes timetable information, fares, bus stop location and route planning and the provision of annual and monthly public transport tickets to employees, which has tax benefits for both the employer and employee.

This information will be on permanent display at prominent locations throughout the development and included on a Mobility Management Plan Newsletter / Website which will be provided to all occupants of the development.

(D) Car Sharing Scheme

Using the Travel Database the Plan Co-ordinator will set a staff car-sharing scheme. This will involve preparing a car-sharing database or list, regularly updated, of those wishing to car share and the locations from which they travel.

Experience has shown that one of the issues that currently prevents car sharing is the lack of flexibility should an emergency occur at home. To overcome this obstacle a guaranteed ride home service could be provided in such circumstances. This could be from a colleague or through a company-paid / reimbursed taxi ride. A contract with a local taxi firm could be negotiated, allowing business related trips to be invoiced directly to the company.

It would also be possible for a car-sharing database to be developed for individual companies within the development or Profile Park as a whole, which would involve a number of companies within the park and allow car sharing to occur on a wider basis between various organisations.

(E) Cycling

In addition to providing 'bicycle friendly' facilities such as cycle parking, showers, changing rooms and lockers, the Plan Co-ordinator will promote cycling in a number of other ways. In order to encourage more staff to cycle to work, the Mobility Management Plan newsletter or website could set up a bicycle user group, provide information on the cycle facilities in the area and raise awareness amongst staff of the health benefits of cycling.

(F) Walking

Similar to cycling, the Plan Co-ordinator will encourage more staff to walk to work by raising awareness of the health benefits of walking.

(G) Working practices

Other initiatives the management company could use to encourage the staff to adopt more sustainable travel habits may include:

- Only paying user mileage on business journeys where no alternative is realistic by other means of travel.
- Introducing flexitime. This can help reduce congestion as not everyone is arriving and leaving the site at the same time. Flexitime can also help cyclists and walkers by allowing them to make trips in daylight during winter months or before bad weather sets in.
- Investigate the scope for introducing a home working scheme.

If reasonable, the introduction of pool cars. This would allow the staff that need to use a car in the course of their business to walk, cycle or use public transport to get to and from work.

(H) Car park management

Where there is free and plentiful car parking it is difficult to persuade people to try the other alternatives available. A car parking management plan should be produced to review the allocation of car parking spaces and the introduction of controls. The underlying assumption will be that the supply of car parking spaces is controlled and that they are allocated according to need. Should car-parking charges be introduced, the revenue raised should be used to subsidise other elements of this Mobility Plan.

(I) Policies on car use

Many companies provide company cars, car loans and car allowances as benefits for employees. Staff should be dissuaded from car travel by limiting provision of subsidised cars. For example, they should only pay car loans to those employees who need to use a car as part of their job. Similarly, staff may only qualify for these loans if they buy low emission fuel-efficient cars. Staff may also only qualify for car mileage payments if use of a car is essential for their trip / journey. Car mileage should also only be paid at a flat rate so as not to encourage staff to drive larger less fuel-efficient vehicles.

5.3 Mobility Plan Monitoring and Assessment

To enable the success of the various measures included in the Mobility Management Plan to be assessed and to help identify those measures that are performing most effectively, the Plan Co-ordinator will be responsible for ongoing monitoring and regular staff surveys. The monitoring should include items such as:

- Review the ongoing implementation of the Mobility Management Plan measures;
- Level of usage of cycle stands and lockers to determine demand;

- Car park surveys to establish car usage by employees and overall car parking demands; and
- Updated employee surveys to establish effective comparisons from earlier surveys, for example on mode of travel to the site.

A website could be established to post this information, which could then be accessed by all employers and employees. Future strategies can then be developed between the occupiers, the Local Authority and public transport operators.

6.0 Target Modal Split

Efforts can be made to reduce the reliance on car travel to the site. Table 2 shows the existing and target modal splits for the centre.

Table 2: Modal Split Targets for the Proposed Development

Mode of Travel	2006 – Existing Split	2008 – Target split with implementation of the MMP
	%	%
Car Driver	70	55
Car Passenger	10	15
Bus & Rail	16	22
Walk	2	4
Cycle	2	4

The targets for public transport, walking and cycling as commuter travel choices are based on the expectation of improvements to the public transport infrastructure and pedestrian / cycle facilities and the implementation of the Mobility Management Plan. These modes of transport will become more attractive to a larger number of staff who are likely to choose to live relatively close to their workplace.

Considering the efforts in Dublin to encourage drivers not to travel to work by car, and on the basis that the local authorities and public transport agencies are making substantial investments in the facilities for alternative modes of transport, the proposed modal split targets are considered realistic and achievable.

Chapter 5 outlines a series of recommendations to help achieve and maintain the 'Target Modal Split'.

7.0 Summary

This Mobility Management Plan identifies measures that will be introduced once the development is operational. These measures will be administered by the Mobility Management Plan Co-ordinator in co-operation with the management company, the Local Authority and public transport provider and include the following measures:

- Appoint a Mobility Management Plan Co-ordinator to administer, implement, monitor and review the Mobility Management Plan;
- Provide a shuttle bus service to and from appropriate locations so as to improve the accessibility of the development by public transport;

- Produce a Newsletter or Website to promote the Mobility Management Plan;
- Supply of information on public transport including timetable information, fares, bus stop location and route planning;
- Provision of annual and monthly public transport tickets to employees, which has tax benefits for both the employer and employee.
- Examining the feasibility of setting up a car-sharing scheme, either within each individual company or within Profile Park as a whole, to include a car-sharing database and providing facilities to match trip mates;
- Promoting the use of cycling among staff by providing secure sheltered cycle parking both at ground level and within the car park and providing showers and changing rooms for cyclists;
- Examining the feasibility of introducing a flexitime system for employees and investigate the scope for introducing a home working scheme of the each individual company.

Target modal splits for each mode of transport have been identified in this Mobility Management Plan. It has been estimated that without proactive measures to promote travel to work by non-car modes of transport, that approximately 70% of the workforce at the proposed development would be likely to drive to work. To improve on this projection, and to reduce the traffic impact of the development, a target modal split has been set at 55% car drivers, increasing the car expected car occupancy from 1.14 to 1.26 and increase the share by other modes from 20% to 30% by public transport, cycling and walking. Considering the widespread publicity in Dublin to encourage drivers not to travel to work by car, and on the basis that the local authorities and public transport agencies are making substantial investments in the facilities for alternative modes of transport, the proposed modal split targets are considered realistic and achievable.

Appendix G – Professional Profile

David Kerr BSc (Hons) MSc MIEnvSc CEnv

Principal Consultant

Experience Summary

David is a Principal Environmental Consultant with Delta-Simons Environmental Consultants Ltd. with 7+ years' experience in contaminated land assessment, management and remediation and environmental due diligence.

David's vocational experience includes the management and undertaking of small to large scale site investigation projects with associated qualitative and quantitative assessments; project management, verification and validation of remediation projects; and providing bespoke environmental liability management advice. He has also provided planning support services for a range of residential, commercial and industrial developments.

David has worked with numerous public and private sector Clients throughout the United Kingdom and Republic of Ireland including government bodies, transport agencies, financial and legal institutions and private equity firms.

David joined Delta-Simons in January 2021 where he will focus on the delivery of Phase I and Phase II environmental investigations to support investment, management and divestment of property assets throughout the UK, Ireland and Europe.

Education

Geography BSc (Hons)
Environmental Management (MSc)

Professional Memberships

- Chair of the Ireland Brownfield Network
- Chartered Environmentalist (CEnv)
- Member of the Institution of Environmental Sciences (MIEnvSc)

Conferences and Training

- Personal Trackside Safety (PTS) Northern Ireland
- Construction Skills Certification Scheme (CSCS) General Construction Operative
- Emergency First Aid at Work QA Level 3
- Asbestos Awareness
- Property Care Association (PCA) Certified Surveyor of Japanese Knotweed (CSJK)
- Technical courses on hazardous waste assessment; ground gas assessment and mitigation, and human health risk assessment.

Representative Project Experience

- David has conducted and managed the delivery of Phase I and Phase II Environmental Assessments for a range of residential, commercial and industrial schemes to support investment, divestment, management and development. These have involved the collection, interpretation and reporting of desktop information; geo-environmental soil, groundwater and ground gas data; Regulator and Local Authority correspondence; and third-party reports.
- David has also conducted and managed complex intrusive geo-environmental site investigations at a range of small to large scale sites throughout the UK and Ireland for the delivery of qualitative and quantitative contaminated land risk assessments to support land investment and divestment and also development schemes.
- David has project managed remediation schemes at a range of residential, commercial and former military sites to address risks associated with soil and groundwater contamination; the presence of ground borne gases and vapors; asbestos in sol; and also the presence of invasive non-native plan species (INNS) like Japanese Knotweed and Giant Hogweed.
- David has experience providing bespoke advice to Client regarding the management of legal, financial and reputational liabilities associated with the acquisition, divestment and management of land and property portfolios. Client's have included Local Authorities, financial and legal institutions and Northern Irelands largest transport provider.
- David is currently responsible for a team of environmental consultants overseeing the delivery of Phase I and Phase II Environmental Assessments including technical appraisal, health and safety and financial management.
- As a member and current Chair of the Ireland Brownfield Network, David has contributed to the delivery of guidance documents regarding the management of asbestos in soil in Ireland and has also attended and presented at several conferences and networking events.

Rachel Gregory MESci

Senior Consultant

Experience Summary

Rachel has six years' experience as an environmental consultant, managing and completing a wide range of Phase I, Phase II and Phase III Environmental Site Assessments in the UK and Canada.

Rachel's main capabilities include:

- Interpretation of complex environmental datasets and historical mapping, interviews, site inspections and technical report writing as part of Phase I Environmental Site Assessments;
- Management and supervision of health and safety aspects and successful project delivery of a variety of Phase I, Phase II and Phase III Environmental Assessments and Remediation projects including consideration of aspects such as UXO mitigation, ecological constraints, and working on sites with extensive PPE / RPE / decontamination requirements;
- Effective communication of technical information to a variety of stakeholders including groundworkers and contractors, site managers, clients, regulators and technical specialists.

Education and Professional Associations

- MESci (Master of Earth Sciences) Environmental Geoscience, Cardiff University (2012), including a year at the University of Vermont, USA.
- Fellow of the Geological Society of London (FGS).

Representative Project Experience

- Completion of Phase I Environmental Assessments for a wide variety of sites, including residential, commercial and industrial properties (both active and vacant), including an estate in London (UK) comprising 13 occupied and derelict buildings and associated roads, facilities and soft landscaping. Extensive client, agent, tenant and regulator contact was required.
- Attended an active construction site following reports of odours causing nausea in site workers, undertook testing to determine the potential source, and subsequently designed a bespoke investigation to establish the 3D extent and impact of a presumed insecticide spill directly into the shallow groundwater aquifer. Working with senior colleagues, recommendations were made regarding remediation and appropriate health and safety measures to be implemented.
- Project manager and site supervisor for extension of a superstore and construction of a stormwater detention vault over a three month period. The project required continuous supervision with sampling and analysis of soils due to the potential presence of contamination within an area of high environmental sensitivity. Groundworkers were supervised to ensure compliance with all relevant regulations throughout the project, including the collection, treatment and disposal of surface water from within excavations.
- Project manager and site supervisor for the investigation and remediation works on a high-profile 270-home development found to be contaminated with asbestos. The contamination was discovered once construction was underway, with some properties completed and in the process of being sold. The project involved extensive communication with the client, groundworkers, and regulatory bodies; preparation of a statement on behalf of the client for the local newspaper; preparation of a method statement to enable the safe reuse of asbestos-contaminated soils on site; extensive site presence to ensure health and safety guidelines were being adhered to by groundworkers and prevent the potential spread of contaminated materials to unaffected areas.
- Project manager and site supervisor for an investigation across a historical landfill known to be contaminated with metals, polycyclic aromatic hydrocarbons and asbestos. The purpose of the project was to establish depth and extent of fill, and level of contamination, and subsequently design an appropriate remediation strategy to enable development. The project included risk assessment of a complicated ground gas regime utilising continuous monitoring equipment; UXO mitigation measures, monitoring for elevated radiation levels, consideration of invasive plant species and extensive decontamination procedures.

Kevan Holbrook BSc (Hons)

Associate

Experience Summary

Kevan Holbrook is an Environmental Consultant for Delta-Simons Environmental Consultants Ltd and has been with Delta-Simons since April 2014. Initially he worked for four years at an environmental consultancy providing consultancy services relating to large petroleum retail portfolios and Network Rail sites; before moving onto a multidisciplinary environmental, civil and structural engineering consultancy for seven years.

Kevan's vocational experiences have involved extensive field works experience, including the management and supervision of remediation works, tank decommissioning works, collection of validation data, investigation works; as well as hands on experience, including the operation of drilling equipment and the maintenance of a water treatment plant.

His technical experiences include the production of Phase I desk studies, Phase II site investigations, providing support to quantitative risk assessments, the generation of remedial strategies; and the production of remediation validation reports.

Kevan's project experiences have included project management on project by project scale through to the co-ordination of a team of up to six environmental and geotechnical engineers.

While at Delta-Simons, Kevan has been involved in a range of Phase I and Phase II site investigations; and producing / managing assessments to support divestments and acquisitions.

Education

Environmental Science BSc (Hons)

Conferences and Training

- Construction Skills Certification Scheme (CSCS) Site Visitor.
- Attended training courses and conferences on technical contaminated land issues, field procedures, waste classification, monitored natural attenuation and risk assessment.
- In addition, Kevan has formerly held a Personal Track Safety card for working on active rail sites.

Representative Project Experience

Contaminated Land Risk Assessment including:

- Kevan has carried out and managed Phase I Environmental Assessments on a range of commercial, residential and industrial properties for various property funds/portfolios, developers and international clients, including pre-acquisition, pre-divestment, pre-development and asset management. These have involved the: collection and interpretation of information, including historical maps, regulatory information, third party reports, liaising with statutory bodies (which predominantly include the Local Authority and Environment Agency), site inspection surveys, and the production of risk assessment reports based on the collated information.
- Kevan has undertaken Phase II Site Investigations on a variety of Brownfield sites including engineering works, various manufactories, breweries, landfills, petrol fillings stations, Ministry of Defense sites, coal mines; and fuel depots. Investigations have involved a wide range of drilling and sampling techniques; and ground gas and groundwater monitoring. The results of the investigations have been used to assess risks in the context of human health and pollution of controlled waters under the UK legislative framework and waste classification. The subsequent reports have been produced predominantly for planning, detailed design and asset management purposes.
- Kevan has undertaken numerous Site walkover assessments to support due diligence assessments and Phase II investigation constraints.
- Kevan has been involved in the supervision and associated data collection of remediation projects, typically involving the removal of above ground and underground storage tanks, the excavation contaminated soil, natural attenuation monitoring, cover systems, gas protection, bioremediation, nutrient amendment; and dual phase extraction. These works have involved post-remediation validation sampling of soil and groundwater. Remediation Strategies and Validation Reports have been produced associated with these works; and Kevan has experience of acting as the Clients Agent for such works.
- Kevan has been involved in the production of numerous proposals and bid preparations for Phase I and II site investigations, quantitative risk assessments, remedial strategies, remediation supervision; validation works and reports. This has included a project by project level as well as preparation of rates for framework agreements.
- Kevan has been responsible for a team of consulting engineers to deliver many challenging projects with respect contaminated land and geotechnical projects. This has included overseeing and coordinating team aspects such as: health and safety, technical requirements, budgetary constraints in addition to resource and time management.

Appendix H – AST Phase I ESA Questionnaire

Delta-Simons Environmental Consultants
3 Henley Office Park, Doddington Road, Lincoln LN6 3QR
www.deltasimons.com

ASTM Phase I ESA Information Request

The following documents, if applicable, should be supplied by the property owner or occupant and reviewed during the site inspection:

- Site plans showing;
  - Buildings and their layouts;
  - Manufacturing, process, and storage areas (including chemical and waste);
  - Waste disposal areas; and
  - Waste water outfalls.
- Any permits associated with the Site (e.g. air permit, discharge permit etc);
- Compliance orders, enforcement actions, citations, or other correspondence with regulatory bodies;
- Monitoring records for the last two years for monitoring required as a condition of a permit (e.g. stack test result for air permit or monitoring results for waste water discharge);
- Hazardous waste reports / manifests;
- Asbestos/lead-based paint survey or other relevant information;
- Information regarding polychlorinated biphenyls (PCBs) present at the property (e.g. in dielectric fluid in transformers);
- Information regarding maintenance of company-owned or leased vehicles, fork lift trucks, and other equipment;
- MSDSs for chemicals stored or produced at the site;
- Inventory consisting of the type and quantity of raw materials stored at the facility for manufacturing purposes;
- Volume of containment areas, tanks, etc.;
- Information pertaining to interceptors or septic tanks which may be present;
- Copies of previously performed internal company audits or evaluations; and
- Type, frequency, and areas of pesticide application at the facility.

Are any buildings present on the Site? If so, please complete the table below.

There are no buildings on the lands in sale.

Building Name	Use	Age	Size	Potential ACM / LBP(1)	Describe
				Yes / No	

(1) LBP: Lead Based Paints

Please list historical uses of this property:

The site was agricultural land up to 2007. Since then it has been a vacant site which was used on two occasions as a building contractor's compound

Owner/Occupant	Timeframe	Use	Comment
Moffash Limited	**2016-**		
Sammark Limited	**2004 -2016**		

Are any outdoor areas used for industrial activities (e.g. maintenance, sand blasting, chemical storage, etc.)? Yes / **No**

If yes, please list all outdoor areas, their location in relation to the buildings listed above, and the process conducted in the area.

Area Name	Location	Activity Performed
Not Applicable		

Please list all hazardous materials storage areas at the facility and the hazardous materials (e.g. chlorinated pesticides, petroleum-based lubricants, etc.) stored in each area.

Storage Area Name	Building / Location	Hazardous Material	Use	Quantity On-Site
None				

Are any wastes produced at the Site? If so, please list in the table below.

Waste Storage Area	Building / Location	Disposal Method	Typical Quantity
None			

Please list all on-site discharge/disposal areas (e.g. landfills, percolation ponds, storm water retention ponds, etc.) in the table below.

Discharge / Disposal Area	Location	Type of Waste	Years of Operation	Permitted?
None				Yes / No

What company provides waste disposal services for the site? **None - Site is unused and undeveloped**

Does the facility recycle any materials (e.g., used oil)? Yes / **No**

If yes, indicate the material recycled, the recycling facility, and how the material is transported.

Recycled Material	Recycling Facility	Method of Transporting
Not Applicable		

What company provides electricity to the site? **None - Site is unused and undeveloped**

Are you aware of any electrical transformers located on the property? Yes / **No**

If yes, indicate the location, type, PCB label, and PCB content.

Location	Dry Type?	PCB Label?	PCB Content?
	Yes / No	Yes / No	
	Yes / No	Yes / No	
	Yes / No	Yes / No	

Has an asbestos or lead-based paint survey been performed for the buildings located at the site? Yes / **No** / N/A

If yes, describe. _____

_____

Is drinking water available at the site? Yes / **No**

If yes, what is the source of the drinking water? _____

_____

_____

Are wells located on the property? Yes / **No**

If yes, for what purpose? _____

_____

_____

Has the facility ever had a septic tank and/or drain field? Yes / **No**

If yes, is it currently used or out of service? Yes / Out of Service

What is the purpose of it? _____

_____

If no, how is sanitary wastewater disposed? _____

_____

_____

Does the facility operate a wastewater or waste water pretreatment system?

Yes / **No**

If yes, what type of system (e.g. settling pond, filtration, etc)? _____

_____

_____

How is sludge from the system disposed? _____

_____

Are there any of the following on-site?

		Describe
Pits	Yes / **No**	
Sumps	Yes / **No**	
Areas of Wetlands	Yes / **No**	

Please list all permits/registrations (e.g. air, hazardous waste, waste water discharge, underground storage tanks, etc.) for the facility.

Permit Type	Permit Number	Issuing Agency	Expiration Date
None			

Please provide any other information which may be useful or relevant to this assessment:

_____

_____

Please list neighbouring properties and use.

North	Adjacent	**National Road R134.**
	Vicinity	
South	Adjacent	**Part of Folio DN36090F. The registered owner is South Dublin County Council. Part of the lands are currently used as a golf course.**
	Vicinity	
East	Adjacent	**Part of Folio DN36090F. The registered owner is South Dublin County Council. Part of the lands are currently used as a golf course.**
	Vicinity	
West	Adjacent	**The Spine Road [known as Falcon Avenue] leading from the R134 into Profile Park.**
	Vicinity	

Appendix 6.2 '*Geo-Environmental Assessment*', Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.02) dated, April 2021



Geo-Environmental Assessment

Grange Castle, Dublin

Presented to **Pinnacle Consulting Engineers Ltd**

Issued: April 2021

Delta-Simons Project No. 20-2018.02



Delta-Simons Environmental Consultants Limited
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Report Details

Client	Pinnacle Consulting Engineers Ltd
Report Title	Geo-Environmental Assessment
Site Address	Land at Grange Castle, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin
Project No.	20-2018.02
Report Date	April 2021
Delta-Simons Contact	David Kerr (david.kerr@deltasimons.com)

Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
1	Final	19th April 2021				
				Kirsten Mills **Senior Consultant**	**David Kerr** **Principal Consultant**	**John Rhoades** **Principal Consultant**

About us

Delta-Simons is a trusted, multidisciplinary environmental consultancy, focused on delivering the best possible project outcomes for customers.

Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from across the UK we employ over 120 environmental professionals, bringing experience from across the private consultancy and public sector markets.

Delta-Simons is proud to be a founder member of the Inogen Environmental Alliance, enabling us to efficiently deliver customer projects worldwide by calling upon over 5000 resources in our global network of consultants, each committed to providing superior EH&S and sustainability consulting expertise to our customers. Inogen Environmental Alliance offers its clients more consultants, with more services in more countries than the traditional multinational consultancy.

Delta-Simons is a '***Beyond Net-Zero'*** company. We have set a Science-Based Target to reduce our Scope 1 and Scope 2 carbon emissions in line with the Paris Agreement and are committed to reducing Scope 3 emissions from our supply chain. Every year we offset our residual emissions by 150% through verified carbon removal projects linked to the UN Sustainable Development Goals.

Therefore, our consultancy services to you are carbon positive.

If you would like support in calculating your carbon footprint and playing your part in tackling the global climate crisis, please get in touch with your Delta-Simons contact above who will be happy to help.

Executive Summary

Brief	Delta-Simons Environmental Consultants Limited ('Delta-Simons') was instructed by Pinnacle Consulting Engineers Limited (the 'Client') to prepare a Geo-Environmental Assessment for land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin (hereafter referred to as the 'Site'). It is understood that the Site is to be developed for a commercial data centre. No proposed layout plans have been provided and no planning application has been submitted for the development at the time of report issue. The purpose of this assessment is to identify the potential for land contamination issues to be present at the Site in the context of the proposed development, to support the planning application.
Site Setting	The Site is currently vacant, following recent use as construction compounds. There are mounded stockpiles present across the east of the Site. Prior to 2009, the Site was undeveloped in general agricultural/pastoral use. The surrounding area is noted to be a mixture of undeveloped open land and commercial/light industrial use. The New Nangor Road forms the northern boundary of the Site. Profile Park forms the western boundary of the Site. The Baldonnel Stream forms the southern and eastern boundaries.
Ground Conditions	Intrusive ground investigation has identified top soil (southeast only), hardcore fill (north and west of the Site) and sporadically distributed Made Ground present over Site-wide Glacial Till deposits, predominantly comprising clay with silt, sand, gravel and cobbles, and occasional clayey sandy gravel layers, over weathered mudstone bedrock of the Lucan Formation. Groundwater was recorded in the Glacial Till deposits, with standing water levels between 0.33 m and 2.55 m bgl.
Land Contamination Assessment	<u>Human Health</u> No soil or groundwater concentrations have been recorded at levels that would pose a risk to human health in the context of the proposed commercial use. No asbestos containing materials have been identified in soils collected. <u>Controlled Waters</u> No widespread contamination of groundwater was encountered during this investigation. Localised concentrations of cadmium, copper, naphthalene and total TPH were identified as exceeding relevant GAC during the first sampling visit; however, subsequent sampling found concentrations either below GAC or below lower laboratory detection limits, likely indicating the initial raised concentrations to be the result of ground disturbance from drilling. Distributed elevated concentrations of total chromium were found to be relatively consistent between sampling visits; as such, in the absence of an identified potential on-Site or off-Site source of chromium, it is considered probably that the detected chromium is the result of natural background levels, and is not considered to represent a risk to the adjacent Baldonnel Stream. <u>Built Environment</u> Some localised temporary concentrations of hydrocarbons were identified during the investigation's initial groundwater sampling visit. Whilst these were reduced in the second visit undertaken, there is the potential for localised hydrocarbons to be present, and groundwater is noted to be shallow in places.

	It is recommended that liaison with the local water authority be undertaken, and this report submitted for review, to confirm any requirements for upgraded potable supply pipework and/or clean service corridors prior to the redevelopment. Ground Gas The Site has generally been classified as CS1, not requiring any ground gas protection measures. No elevated concentrations of volatile hydrocarbons were identified in soils or groundwater. This assessment has not included a radon assessment. Radon protection measures may be required.
Recommendations	Based on the findings of this report, it is considered that no further investigation is required Construction-phase mitigation measures including potential upgraded potable water supply pipework, implementation of a discovery strategy for dealing with any unexpected contamination, dust suppression, and testing of any Site-sourced topsoil materials prior to reuse to confirm suitability.
This is intended as a summary only. Further detail and the limitations of the assessment are provided within the main body of the Report.	

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Appendix G Geotechnical Environmental Services Ltd Factual Report

1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Pinnacle Consulting Engineers Ltd (the "Client") to prepare a Geo-Environmental Assessment for land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin (the "Site").

1.2 Context & Purpose

The aim of the study was to complete a geo-environmental assessment of the proposed development area. The investigation has obtained information regarding ground conditions, from which risks to end-users, the environment and structures have been assessed, with mitigation measures suggested where necessary.

The investigation has also gathered geotechnical information to inform comment on the preliminary design of foundations and infrastructure. The report provides recommendations for further work (where appropriate) based on the findings of the investigation.

It is understood that the Site is to be developed for a commercial data centre. No proposed layout plans have been provided and no planning application has been submitted for the development at the time of report issue.

1.3 Scope of Works

This assessment has been undertaken in general accordance with:

- Framework Approach for the Management of Contaminated Land and Groundwater at EPA Licensed Facilities" (EPA, 2012);
- Code of Practice: Environmental Risk Assessment for Unregulated Disposal Sites" (EPA, 2007); and
- Land Contamination: Risk Management pages of the United Kingdom GOV.UK web pages that superseded the Model Procedures for the Management of Land Contamination – Contaminated Land Report 11 (CLR11) (EA, 2004).

The project was carried out to an agreed brief as set out in Delta-Simons' proposal dated February 2021 (Ref.20-2018.02). The scope of works is outlined in Section 4.2.1.

1.4 Existing Information

The following information has been used within the Assessment:

- Current and historical Ordnance Survey (OS) maps;
- Geological Survey Ireland (BGS) data;
- Environment Protection Agency Ireland (EPA) online data including water resource and radon maps;
- EPA Ireland online licensing and permitting registers;
- Northern Mine Research Society (NMRS) online data;
- Information provided by South Dublin County Council; and
- A third-party report by White Young Green from 2006.

1.5 Limitations

The assessment is limited to the issues agreed within the proposal for the works. Notes on limitations associated with this assessment are provided in Appendix A. In addition, there are the following specific limitations that apply to this assessment:

- No proposed development layout plan has been provided.

2.0 Site Details & Preliminary Risk Assessment

2.1 Site Setting

A summary of the current Site status, environmental setting and key historical features is presented below.

Co-ordinates	Irish National Grid co-ordinates SG 04445 89240.	**Elevation**	73 - 75 m AOD
		Area	3.0 Ha
Site Location	The Site is located at the Profile Park development area, located to the south of New Nangor Road and to the east of Profile Park, Kilcarbery, Co. Dublin. It is located in South Dublin County, approximately 12 km east of Dublin City Centre. A Site Location Map is provided as Figure 1.		
Current Site Use	The Site is currently vacant and undeveloped. Until recently it has been used as an Electricity Supply Board (ESB) Ireland construction site compound and stockpiling area for excavated material and building rubble. The construction compound contained prefabricated cabins and storage containers and open storage of construction related materials. The former construction compound is relatively flat, with a slight grade to the south. Ground cover now comprises a mixture of gravel hardstanding in the north-west with stockpiles of aggregate and soil in the north-east. The south of the Site is dominated by undulating grass cover and scrub vegetation. The Site is now vacant with no ongoing operations.		
Surrounding Area	The Site is located with an area zoned for enterprise and employment related uses, extending to the north, west and south-west of the Site and including Profile Park, under development to the south-west and Grange Castle Business Park to the north and west. Current occupants of premises on Profile Park include web/technology company data centres. Occupants of Grange Castle business park on the north side of New Nangor Road include food distribution depots, IT companies, office buildings and a hotel. Opposite the Site on the north side of New Nangor Road is a petrol filling station operated by Circle K. Also, approximately 400 m west along New Nangor Road is a garage and crash repair business. Land immediately to the west on the far side of the Profile Park access road, although zoned for development, currently remains in agricultural use. The land to the south-east consists of Grange Castle golf course, an area zoned for open space and recreational amenities. Regional topography slopes gently to the north.		
Proposed Development	It is understood that the Site is intended for development as a data centre; however, no specific development plans have been provided to Delta-Simons at this time, and no planning applications have yet been submitted. Identified human and built environment receptors relevant to the proposed development comprise: ▲ Construction workers; ▲ Third parties during construction (adjacent Site users); ▲ Future Site users and maintenance workers; and		

	▲ The built environment (new buildings and infrastructure/utilities).
Site Reconnaissance	Delta-Simons conducted a Site visit on 19th November 2020. A series of Site photographs are presented as Appendix B, and pertinent information that was observed or reported on-Site is summarised as follows: ▲ The Site is bounded by the New Nangor Road to the north, the Profile Park roadway to the west and a surface watercourse with a golf course beyond to the east and south; ▲ The majority (approximately 60%) of the Site was noted as vacant land where ground cover was dominated by stockpiles of construction and demolition materials and coarse infill. Ground cover in peripheral areas comprises scrub-type vegetation; ▲ No permanent structures have been developed. A construction Site compound was located in the west of the Site, occupying approximately 40% of the Site, including prefabricated cabins and converted storage containers; ▲ The construction Site compound was serviced by an above ground potable water supply pipe. No underground septic systems or field drains were identified; therefore, it is assumed that the Site compound was serviced by an above ground septic storage (now removed) or a temporary connection to mains sewerage which runs along the New Nangor Road; ▲ A small above ground storage tank was observed within the Site compound; however, this was not labelled to contain any hydrocarbon fuels or oils, but the storage and use of small volumes of fuels, oils and lubricants during its operation is assumed; ▲ Intermediate bulk containers (IBCs) were observed in the construction Site compound; however, close inspection to determine their contents was not possible due to access constraints; ▲ No evidence of staining or corrosion was identified during the Site walkover; ▲ Some areas of pooled surface water were observed between the stockpiled materials in the east of the Site, and on the compacted gravel hardstanding in the south of the Site; ▲ The stockpiles of construction and demolition waste identified in the centre and east of the Site were visually inspected, with no evidence of asbestos containing materials (ACMs) observable; however, the presence of ACMs within the material cannot be discounted; ▲ The stockpiles on the east of the Site were estimated to be between 3 m and 4 m high, comprising and estimated 18,000 m^3 in volume, placed above original topographic levels; and ▲ No evidence of invasive plant species was identified during the Site walkover; however, as the visit was conducted in winter, the potential presence of such species could not be excluded. Delta-Simons also conducted as updated Site reconnaissance on 17th February 2021, prior to ground investigation works. The following pertinent points were noted: ▲ The ESB Site compound had been removed, with only the hardstanding beneath remaining present; and ▲ Some limited ground scarring from the storage of materials in the northwest of the Site was noted; however, no evidence of gross contamination was observed associated with the former compound or its removal.

Current Surrounding Area	**North**	The Kilcarbery Park industrial and commercial estate comprising commercial premises and office space, and a petrol filling station to the east of the estate.
	East	Grange Castle Golf Course.
	South	Grange Castle Golf Course.
	West	Undeveloped lands possibly used for agriculture.
	The petrol filling station is considered to represent a potential off-Site source of contamination.	

2.2 Environmental Setting

Published Geology	From Geological Survey of Ireland (GSI) mapping data, the Site is indicated to be underlain by superficial deposits of Glacial Till derived from limestones. The underlying bedrock is described as dark limestone and shale of the Lucan Formation, also locally known as Calp.
Specific Ground Conditions	There are no Geological Survey of Ireland (GSI) recorded boreholes on the Site or in the immediate vicinity of the Site. However, from the previous investigation conducted on the wider Profile Park site by WYG in 2006, the following general sequence was encountered: ▲ Quaternary deposits consisting of sandy gravelly clays to gravelly clays, recorded to a depth of between 1.50 m below ground level (bgl) to 3.50 m bgl; overlying ▲ Fractured limestone, becoming competent limestone with depth, thickness not proven. Although Made Ground was recorded 100 m south of the current Site, it was not recorded in the four intrusive locations positioned on the Site itself.
Hydrogeology	From GSI mapping data, the bedrock underlying the Site is classified as a locally important aquifer which is moderately productive only in local zones and is part of the Dublin WFD groundwater body. The Site is considered to be in an area of high vulnerability but low subsoil permeability. The Site is not within a drinking water protection area and there are no proximate abstractions recorded. During the 2006 WYG ground investigations, groundwater was encountered between 1.00 m and 3.00 m bgl.
Hydrology	The main watercourses in the vicinity of the Site are: ▲ The Baldonnel Stream, abutting the south-west corner of the Site and fed by a tributary stream running alongside the southern Site boundary, and flowing north-west to join the Griffeen River, approximately 1 km from the Site; and ▲ The Griffeen River, approximately 1 km north-west of the Site, flowing north to join the River Liffey at Lucan, approximately 4 km north of the Site. In addition, The Grand Canal is located approximately 1.4 km to the north of the Site flowing east; however, the canal is not in hydraulic continuity with the groundwater or other surface watercourses in the area. The Baldonnel Stream Water Framework Directive (WFD) status (2013-18) is recorded as good.

Coal Mining	From information available through the Northern Mine Research Society, the Site is not located in an area of known coal mining.
Radon Gas	The Site lies within an area where between 5 % and 10 % of homes are above the EPA Reference Level for homes of 200 becquerel per cubic metre (Bq/m^3) for radon. The EPA website indicates that radon protective measures may be necessary in the construction of new buildings at the Site.
Ecological Receptors	According to the National Parks & Wildlife Service mapping, there are no sensitive ecological receptors located within 1 km of the Site.
Environmental Sensitivity	The Site is considered to be of a moderate environmental sensitivity given the presence of a limited thickness of glacial till (water bearing) over bedrock limestone which is a locally important aquifer, the surface watercourse on the eastern and southern boundaries, the absence of any ecological receptors and the partial commercial/industrial use of the Site and surrounding area, with remaining areas predominantly open undeveloped land.

2.3 Historical Use of the Site & Surrounding Area

Approach	The historical development of the Site and surrounding area has been assessed through a review of available historical OS maps and available online historical satellite imagery. A summary of the key historical Site uses and developments in the surrounding area is presented below. Historical maps are included in Appendix C.
Historical Features On-Site	The Site appears to have been undeveloped land, assumed to be in agricultural use from the earliest mapping in 1837 until at least 1913. *A significant gap in available mapping and images covers the period from 1913 to 1995.* The Site appears to remain undeveloped in 1995 aerial imaging. The R134 roadway to the north was present, with an access onto Site evident in the northwest corner. By 2000 imagery, the Site remained undeveloped, but ground disturbance in the form of bare earth was present in the northwest, indicating plant movement, likely associated with the new roundabout to the northwest of the Site. By 2005, the ground disturbance was no longer visible, and the Site remained undeveloped. By 2009, the Site was in use as a construction compound for the adjacent and nearby Profile Park development. Loose building materials appear to have been present on the east of the Site. A second entrance, two small structures (potentially temporary cabins) and a small hardstanding area were present halfway down the western boundary. The compound appeared disused by 2012, with the east of the Site left in hummocky state, and some potential deposition of material in the centre of the Site in a collection of mounds. The temporary cabins were no longer present by 2013. The Site remained unchanged until 2017 when imagery shows the Site had been stripped of vegetation, and the east of the Site had undergone more earth movement, with two long stockpiles created, surrounding a number of smaller mounds of materials. The previously mounded materials from 2012 were no longer present where they were previously shown. By later in 2017, activities on-Site appeared to have ceased with vegetation returning outside of trafficked and hardstanding areas, although an item of unidentified plant was present in the centre of the Site. Further piles of materials were present in the centre of the Site by 2018.

	By 2019, the western half of the Site was in use as the Electricity Supply Board compound, and the northern edge of the east of the Site formed an accessway from the compound to off-Site to the east. The Site remained relatively unchanged through to the most recent aerial image held by Google Earth for June 2020. *The various deposited materials and the Site's use as construction compounds for the nearby Profile Park development and for the Electricity Supply Board works represent potential sources of contamination.*
Potentially Contaminative Historical Features Off-Site	Potential sources of contamination within the vicinity of the Site include: ▲ A petrol filling station, located approximately 20 m north, from circa 2000 until present day; ▲ Commercial warehouses and office buildings, including a food distribution warehouse, located approximately 35 m north at their closest, from circa 2000 until present day; and ▲ Car sales forecourt and servicing garage, located approximately 415 m west, from pre-2000 until present day.

2.4 Environmental Database Review

Approach	Delta-Simons has consulted the EPA Ireland online licensing and permitting registers that include: ▲ Industrial Emissions/IPC; ▲ Waste; ▲ Historic Landfills; ▲ Waste Permits; ▲ VOCs; and ▲ Medium Combustion Plan.
Features On-Site	There are no records on publicly available database sources (e.g. Environmental Protection Agency) pertaining to the Site.
Potentially Contaminative Features Off-Site	Publicly available database sources, regulatory information, and other information sources (e.g. third-party reports) have been reviewed to identify any area-wide contamination or properties of potential concern in the surrounding area. The following have been identified in the vicinity of the Site: ▲ The south-eastern half of the Grange Castle Golf Course, approximately 525 m south-east of the Site, is recorded on the EPA online database as within a waste boundary record, reference W0306-01. Deposition was noted to be between 2007 and 2010 – with a retrospective Waste License issued in 2010. Materials imported comprised EWC Codes 17 05 04 soils and stones (other than those mentioned in 17 05 03), and 17 01 07 mixture of concrete, bricks, tiles, and ceramics (other than those mentioned in 17 01 06; ▲ The Pfizer Biotech Campus site, 600 m northeast of the current Site, is recorded as a licensed Integrated Pollution Prevention and Control (IPPC) site, and an Industrial Emissions Licensing (IEL) site, engaged in pharmaceuticals manufacture; and ▲ A Section 4 discharge licence to surface water is located at a Google Ireland facility, approximately 250 m south of the current Site.

	Due to the distance from Site and the likely cohesive nature of the geology in between, the off-Site deposited waste materials at the Grange Castle Golf Course to the southeast, and the pharmaceuticals manufacture at the Pfizer factory to the northeast, are unlikely to represent a potential source of off-Site risk to the Site.
Implications for Land Contamination Risk	No potential sources of contamination have been identified at the Site from the regulatory information. Potential off-Site sources of contamination have been identified that will be considered in the preliminary risk assessment.

2.5 Planning Review/Regulatory Enquiries

On-line Planning Portal	South Dublin County Council	**Date Accessed**	19/11/2020
Findings	In the 2016-2022 South Dublin County Council Development Plan the Site is part of an area zoned for enterprise and employment uses. Several applications have been identified for the Site and wider Profile Park area on the South Dublin County Council online planning register. The applications pertinent to this assessment are summarised below: ▲ SD06A/0568 – Provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on these lands. The development included the provision of 1,675 m of internal distributor roads consisting of 267 m to dual carriageway standard (at the main entrance) with a further 1,408 m to single carriageway standard and one internal roundabout. The development also included surface water drainage, foul drainage and water supply infrastructure, associated landscaping, and all ancillary works, on a 39.84 ha site. The application was accompanied by an Environmental Impact Statement (including a section on geology and soils – refer to Section 2.6 below). The application, which relates to the wider Profile Park area including the current Site and also extending further west and south-west, was granted consent in January 2007. No contaminated land or flood risk related conditions were set; ▲ SD07A/1059 – Phase 1 of a services and retail centre and will consist of 3 no. office blocks as follows: (1) Block A comprises a five-storey office building of 3,019.6 m^2. gross floor area which fronts onto the Nangor Road and which will accommodate 18 no. own door office units and 1 no. ESB substation; (2) Block B comprises a five storey office building of 2,905.1 m^2 gross floor area which fronts onto the Nangor Road and is located adjacent to the boundary with Grange Castle Golf Course - this block will accommodate 26 no. own door office units; (3) Block C comprises a four storey office building of 2,684.8 m^2. gross floor area located adjacent to the boundary with Grange Castle Golf Course which will accommodate 24 no. own door office units. The application, which relates to the eastern half and southern edge of the current Site area, was granted consent in April 2008 but has not been implemented and may have expired. No contaminated land related conditions were set. A condition requiring any buildings to be completed with floor levels at least 500 mm above highest known flood levels was included; ▲ SD12A/0150 – Erection of a 2.4 m high perimeter fence along Nangor Road boundary (approximately 250 m long) with separate entrance gates for vehicular, bicycle and pedestrian access; construction of a single storey security hut with security barriers. The application, which relates to the current Site area, was granted consent in October 2012. No contaminated land or flood risk conditions were set; and ▲ The Site is not listed on the registers of derelict and vacant land held by South Dublin County Council.		

	No additional potentially contaminative activities or other information pertinent to this assessment was identified from the historical planning records. Copies of the pertinent information is appended as Appendix D.

2.6 Previous Reports Review

List of Reports	Delta-Simons has obtained the following reports relating to the Site: ▲ Environmental Impact Statement – Profile Park: Roads and Services Application, by RPS Planning and Environment, dated July 2006. Chapter 6 and Appendix B – Soils, Geology and Hydrogeology (including waste), including trial pit logs by WYG. Copies of these reports are appended as Appendix E.
Key Findings – RPS EIA, 2006	The Environmental Impact Statement was prepared in support of the application for roads and servicing for the Profile Park development, including the Site and a larger area to the south-west. A range of potential environmental impacts of the development were considered, of which Chapter 6, concerning soils, geology, hydrogeology and waste, and the supporting Appendix B, are considered relevant to the current assessment and have been reviewed. Although the EIS was authored by RPS, Chapter 6 was based on a desktop study, Site walkover and trial pit investigation by a WYG hydrogeologist. The geological and hydrogeological findings have been referenced in Section 2.2. The site investigation comprised twenty-nine trial pits in total, or which four, TP12 to 15, were located on the current Site. The soils encountered in these four trial pits were of natural origin, although an area of Made Ground incorporating waste materials was identified approximately 100 m south of the Site. Soil chemical analysis samples were taken from the trial pits and were also analysed for "*soil gases*". Detailed monitoring data and laboratory analysis certificates were not appended to the report. According to Chapter 6, concentrations of metals in soils recovered from "agricultural land" areas (including the current Site at the time) were low in comparison with assessment criteria used by WYG [*Delta-Simons notes that this conclusion appears to remain valid when compared with current assessment criteria*]. Diesel-range organics and mineral oils were below or at the limit of detection and not in exceedance of assessment criteria. No VOCs were detected. Soil leachate analyses did not indicate that a risk of contamination of groundwater was present from trial pits on the current Site, although some anomalously high leachate results were recorded elsewhere on the Profile Park site. Low levels of ground gas were recorded in the area where Made Ground identified approximately 100 m south of the Site; however, ground gas was not reported in areas of Profile Park, including the current Site, not containing Made Ground. *It should be reiterated that the 2006 investigation predated later use of the current Site as a construction compound and excavated material/building rubble stockpile area and therefore may not be representative of current conditions*.

3.0 Preliminary Conceptual Site Model

A Conceptual Site Model (CSM) represents the relationships between contaminant sources, pathways, and receptors, to support the identification and assessment of Possible Contaminant Linkages (PPL).

3.1 Potential Contamination Sources

Identified potential contamination sources are presented in the following table:

Source	Location	Dates Present	Potential Associated Contaminants of Concern
Deposited stockpile materials comprising demolition rubble	On-Site, east	Circa 2009 to present day	Metals and metalloids, polycyclic aromatic hydrocarbons (PAHs), asbestos-containing materials, ground gas.
Potential areas of localised Made Ground	Across Site	Unknown	
Site use as various construction compounds	On-Site, west	Circa 2009 to circa 2000	Petroleum hydrocarbons, PAHs, and metals and metalloids.
Petrol Filling Station	Off-Site, approx. 10 m north.	Circa 2000 to present day	Petroleum hydrocarbons, PAHs, volatile organic compounds (VOCs).
Radon	Site-wide	All dates.	Radon gas.

* Based on UK Department of the Environment Industry Profiles

3.2 Potential Receptors

Relevant potential receptors are considered to include:

- Construction workers;
- Third parties during construction (adjacent Site users);
- Future Site users and maintenance workers;
- The Baldonnel Stream watercourse;
- The underlying aquifer; and,
- The Built Environment (new buildings and infrastructure / utilities).

The surface watercourses of the Griffeen River, approximately 1 km northwest, and the River Liffey, approximately 4 km north, are not considered to be plausible receptors given its distance from the Site.

3.3 Potential Pathways

The potential pathways are considered to be as follows:

- Direct contact, ingestion or inhalation of soil bound contaminants / dust during or following redevelopment.
- Inhalation of organic vapours associated with contamination.
- Migration of ground gas / vapours into on-site buildings causing asphyxiation or risk of explosion.

- Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or discharge to surface waters.
- Direct contact between aggressive ground conditions and new infrastructure.

3.4 Preliminary Conceptual Site Model

The following table presents the Preliminary Risk Assessment which has formed the basis for the ground investigation works.

Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)	Requires Investigation
On-Site potential sources of soil and groundwater contamination. Potential migration of contaminants from off-Site sources	Direct contact, ingestion or inhalation of soil bound contaminants / dust	Future Site users	**Low to Moderate Risk**	From available information, the development/historical usage of the Site has been limited; however, it is not possible to discount the potential for contamination due to data gaps in the Site's known history, and the Site's recent use for construction compounds and the deposited demolition rubble stockpiles. Although plans have not been provided for the proposed development, it is anticipated that the development will comprise a majority coverage of buildings or hardstanding car parking/access road, breaking any potential pathways between contaminants and future Site users in these areas, with only limited soft landscaping. Ground investigation is recommended to determine the risks posed to future Site users from soft landscaped areas.	**Yes**
		Maintenance workers and construction workers	**Low to Moderate Risk**	From available information, the development/historical usage of the Site has been limited; however, it is not possible to discount the potential for contamination due to data gaps in the Site's known history, and the Site's recent use for construction compounds and the deposited demolition rubble stockpiles. Ground investigation is considered required to quantify this risk and assist in determining what mitigation measures are required during/following construction.	**Yes**
	Inhalation of dusts/vapours	Third parties during construction (adjacent Site users)	**Low Risk**	From available information, the development/historical usage of the Site has been limited; however, it is not possible to discount the potential for contamination due to data gaps in the Site's known history, and the Site's recent use for construction compounds and the deposited demolition rubble stockpiles. Ground investigation is considered required to quantify the risk of contaminants including asbestos in soils and stockpiles becoming mobilised into the air during construction. Dust/vapour suppression may be determined as required.	**Yes**

Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)	Requires Investigation
	Vertical/lateral migration of contaminants to/through groundwater	The underlying aquifer and the Baldonnel Stream watercourse	**Low to Moderate Risk**	From available information, the development/historical usage of the Site has been limited; however, it is not possible to discount the potential for contamination due to data gaps in the Site's known history, and the Site's recent use for construction compounds and the deposited demolition rubble stockpiles. Ground investigation is recommended to determine the condition of any groundwater, and the risk posed to the groundwater body and the adjacent surface watercourse, the Baldonnel Stream.	**Yes**
	Permeation of hydrocarbons through plastic pipe work.	New buildings and infrastructure / utilities	**Low to Moderate Risk**	Hydrocarbons, especially aromatics and chlorinated solvents are known to permeate plastic pipes, particularly when encountered at high concentrations. However, it is considered unlikely that significant hydrocarbon contamination is present, particularly in areas of current water supply pipes. Site investigation would be required to inform supply pipework requirements in the context of redevelopment. Ground investigation is recommended to determine the condition of shallow soils and any shallow groundwater which might contact water supply pipework.	**Yes**
	Aggressive ground conditions		**Low to Moderate Risk**	Aggressive ground conditions may be present which have the potential to attach buried concrete features, including building foundations and underground infrastructure. Ground investigation is recommended to determine the condition of shallow soils and any shallow groundwater which might contact buildings foundations.	**Yes**
Ground gas from potential on-Site and off-Site sources.	Ingress into buildings/ confined spaces and inhalation/ asphyxiation or generation of explosive atmospheres.	Future Site users, future maintenance workers, and new buildings and infrastructure/ utilities.	**Low to Moderate Risk**	From available information, the development/historical usage of the Site has been limited; however, the Site has been used for the stockpiling of various materials in several phases, with the potential for localised Made Ground and/or putrescible materials to be present, which could generate ground gases. Off-Site potentials sources of ground gas are limited but cannot be discounted. Ground investigation is recommended to confirm the presence/absence of ground gases and the requirement, if any, for ground gas protection measures in new buildings to prevent ground gas ingress.	**Yes**

Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)	Requires Investigation
Radon ground gas.	Ingress of radon gas into buildings/ confined spaces and inhalation	Future Site users and future maintenance workers.	**Moderate Risk**	A radon assessment is not in the scope of this assessment; however, the Site is located within an area where between 5 % and 10 % of homes are above the EPA Reference Level for homes for radon. Radon protection measures may be necessary in the construction of new buildings.	**Outside remit.**

Risk ratings are based on the classifications given in Appendix F.

4.0 Ground Investigation

4.1 Intrusive Investigation

Delta-Simons carried out intrusive investigation work from 17th to 24th February 2021 to assess the potential linkages identified in the outline conceptual model (see Section 3.4 above) and to provide geotechnical information.

4.1.1 Health & Safety Considerations

Service plans for the site were provided by the client, and the ground investigation contractor, Geotechnical Environmental Services Ltd undertook a utilities clearance of intrusive locations prior to excavation.

An initial assessment of the Site identified a low risk in relation to Unexploded Ordnance (UXO) and so no specific precautionary measures were required for the works.

Future Contractors should undertake their own assessment of UXO risk in relation to their specific proposed scope of works.

4.2 Scope of Ground Investigation and Rationale

4.2.1 Scope

The ground investigation comprised the following items:

- Supervision of all works by a Geotechnical Environmental Services Ltd engineer. All intrusive locations were logged to BS 5930:2015+A1:2020 Code of Practice for Site Investigations;
- Excavation of 11no. trial pits (TP01 to TP11) to a maximum depth of 3.00 m bgl;
- Drilling of four dynamic sampler holes (WS01 to WS04) to a maximum depth of 3.25 m bgl, with three monitoring wells installed (WS01 to WS03);
- Drilling of 12no. rotary auger holes (BH01 to BH12) to a maximum depth of 4.40 m bgl , with seven monitoring wells installed (BH01, BH03, BH05, BH08, BH10-BH12); and,
- Collection of four samples from stockpiled materials on-Site.

4.2.2 Rationale

The locations were positioned to provide a good coverage for environmental and geotechnical data, ground gas and groundwater monitoring, and target any potential on-Site sources of contamination, including the current on-Site stockpiles.

4.3 Ground Investigation Factual Data

The investigation locations were surveyed in by the appointed surveying contractor to an accuracy of approximately +/- 0.1m. An intrusive exploratory hole location plan is presented as Figure 2.

Geotechnical Environmental Services Ltd engineer verified borehole logs are presented as Appendix G.

4.4 In-Situ Testing and Sampling

Sampling comprised disturbed tub and jar samples as detailed on the borehole logs in Appendix G.

4.5 Environmental Sampling, In-Situ Testing and Laboratory Analysis

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite. Records of the samples taken as part of the site investigation works, including their depths and location, are included within the exploratory hole records in Appendix G.

One groundwater sample was collected from each of the installed boreholes with sufficient water present on two occasions, 5th March 2021 and 24th March 2021. The groundwater samples were collected using a dedicated disposable bailer.

Samples analysed for environmental purposes were placed in chilled cool boxes on site and transported to the laboratory for analysis on completion of the site investigation works/groundwater sampling visit.

The rationale for chemical analysis is presented in the table below and the results of the chemical laboratory testing are included in Appendix G.

Analytes	No. of Samples Tested		Rationale
	Soil	Ground water	
Asbestos	30	-	Common potential contaminant - Analysed in all samples of Made Ground.
Metals and metalloids (As, Cd, Cu, Cr, Hg, Pb, Ni, Zn)	30	16	Potential contaminants of concern, common to many sites.
Speciated Polycyclic Aromatic Hydrocarbons (PAH)	30	16	
Free Cyanide	30	16	Contaminant assessed for waste classification.
Speciated Total Petroleum Hydrocarbons, Criteria Working Group Method (TPHCWG)	30	16	Potential contaminants of concern associated with hydrocarbon use and storage.
Volatile and Semi-Volatile Organic Compounds (VOC and SVOC)	30	8	
pH,	33	16	To assess potential for chemical attack on buried concrete.
Water soluble sulphate	47	16	
Waste Acceptance Criteria	3	-	Undertaken to provide preliminary WAC classification.

4.6 Monitoring Programme

Three rounds of groundwater level and ground gas monitoring were undertaken on all newly installed wells between 5th March and 31st March 2021. Measurements of the depth to groundwater within the monitoring wells were taken using an electronic dip meter. The groundwater level monitoring sheets are included as Appendix G.

To characterise the ground gas regime at the site, an infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO_2), methane (CH_4) and oxygen (O_2) in percentage by volume. Initial and steady state concentrations were recorded. The atmospheric pressure before and during monitoring, together with the weather conditions, was recorded. All monitoring results obtained to date together with the temporal conditions are contained within Appendix G.

5.0 Ground Summary

5.1 Introduction

The sections below summarise the ground and groundwater conditions encountered during the site investigation.

5.2 Ground Model

A summary of the observed ground conditions at the Site is provided below.

Summary of Observed Ground Conditions				
Strata	**Typical Strata Description**	**Depth Range of Strata Base (m bgl)**	**Maximum Proven Thickness (m)**	**Comments**
Topsoil	No description.	*0.05 – 0.25*	*0.25*	*Encountered in three locations, TP04, BH04, and BH05, in the southeast of the Site only.*
Hardstanding	Encountered as grey hardcore. Occasionally containing rebar, red brick fragments and geotextile membrane.	*0.05 – 0.95*	*0.95*	Encountered in 16 locations (TP01, TP02, TP03, TP05, TP06, BH01, BH02, BH03, BH07, BH08, BH09, BH10, BH11, WS01, WS02, WS04) – *across north of the Site and centered around western vehicle entrance.*
Made Ground	Typically comprising soft to firm friable brown grey sandy gravelly silty clay with cobbles. Anthropogenic materials including timber, wire, tarmac, metal, plastic, and concrete fragments.	*0.15 – 1.60*	*1.45*	*Encountered in 16 locations (TP02, TP07, TP08, TP09, TP10, TP11, BH02, BH03, BH06, BH07, BH10, BH11, BH12, WS02, WS03, WS04) – sporadic distribution.*
Suspected Made Ground (Reworked Natural)	Encountered as firm friable light brown sandy gravelly silty clay.	*0.80 – >3.00*	*1.55*	*Encountered in three locations, TP01, TP02, WS01, in the northeast of the Site only.*
Glacial Till	Encountered as soft becoming firm to stiff friable light brown grey sandy gravelly silty clay, with occasional cobbles. Occasional clayey sandy gravel layers present.	*1.40 – >4.35*	*>3.90*	*Encountered in all locations except TP02 – this is a localized position where suspected Made Ground is recorded to the maximum excavated depth of 3.00 m. Glacial Till may be present below 3.00 m bgl at this location.*
Lucan Formation	Encountered as grey fine to coarse angular limestone gravel (weathered limestone) in a sandy clay matrix or soft to stiff silty clay (weathered mudstone).	*>1.65 – >4.40*	*>0.85*	*Encountered in all locations except TP02, TP03, TP04, and TP11, which are considered not to have reached this unit.*

Stockpiled materials were noted to be heterogenous, comprising soft friable black sandy gravelly silty clay with cobbles, black clayey sandy gravel, grey sandy gravel, or stockpiled natural glacial till deposits based on the four stockpile excavations undertaken.

5.3 Visual and Olfactory Evidence of Contamination - Soils

No visual or olfactory evidence of potential gross contamination was observed in soils during the investigation.

5.4 Groundwater

5.4.1 Strikes During Investigations

Groundwater strikes recorded as excavation progressed during the site investigation range from 0.20 m to 3.60 m bgl (74.74 m to 70.88 m AOD). The groundwater strikes during drilling are summarised below.

Exploratory Hole	Water strike during drilling (m bgl)	Water strike during drilling (m AOD)	Stratum	Comment
BH01	2.90	72.89	Glacial Till	No rise in 20 minutes. Final level after installation: 2.40 m bgl.
BH02	2.50	72.91	Glacial Till	Rise to 2.30 m bgl in 20 minutes.
BH03	3.60	71.27	Glacial Till	Rise to 3.10 m bgl in 20 minutes.
BH04	0.50	74.32	Glacial Till	No rise in 20 minutes.
BH05	2.20	72.09	Glacial Till	Gravel band. Rise to 0.80 m bgl in 20 minutes.
BH06	2.60	71.54	Glacial Till/Lucan Formation Mudstone	No rise in 20 minutes.
BH07	1.95	71.97	Glacial Till/Lucan Formation Mudstone	No rise in 20 minutes.
BH09	2.50	72.06	Glacial Till/Lucan Formation Mudstone	Seepage.
BH11	2.00	72.23	Glacial Till	Seepage.
BH12	2.00	71.58	Glacial Till	Seepage.
	2.70	70.88	Glacial Till/Lucan Formation Mudstone	Rise to 1.60 m bgl in 20 minutes.
WS01	0.90	74.74	Suspected Made Ground	No rise in 20 minutes.
WS02	1.75	72.91	Glacial Till	-
WS03	2.00	71.91	Glacial Till	No rise in 20 minutes.
	2.65	71.26	Glacial Till/Lucan Formation Mudstone	Rise to 1.20 m bgl in 20 minutes.
TP02	2.80	NR	Suspected Made Ground	Seepage.
TP04	1.90	NR	Glacial Till	-
TP05	1.70	NR	Glacial Till	Seepage.
TP06	0.20	NR	Made Ground/Glacial Till	Seepage.

Evidence from the observed groundwater strikes suggest that there are some areas of perched groundwater in the top of the glacial till, and permeable layers within the glacial till, evidenced by the observed rises in levels following strikes, which are potentially carrying a continuous body of groundwater.

5.4.2 Levels During Monitoring Programme

Groundwater levels were monitored on a total of three occasions between 5th March and 31st March 2021. Monitoring data and LNAPL measurements are provided in Appendix G and summarised in the table below.

Exploratory Hole	Response Zone		Water level during monitoring Max to Min Range		LNAPL Y/N	Stratum
	m bgl	m AOD	m bgl	m AOD		
BH01	1.00 – 3.50	74.79 – 72.29	2.37 – 2.55	73.42 – 73.24	**N**	Glacial Till
BH03	1.50 – 4.00	73.37 – 70.87	1.41 – 1.70	73.46 – 73.17	**N**	Glacial Till
BH05	1.00 – 3.00	73.29 – 71.29	0.37 – 1.13	73.92 – 73.16	**N**	Glacial Till
BH08	0.50 – 2.00	74.12 – 72.62	1.96 – 1.98	72.66 – 72.64	**N**	Glacial Till
BH10	0.50 – 1.50	74.05 – 73.05	Dry			Made Ground/Glacial Till
BH11	1.00 – 3.00	73.23 – 71.23	1.14 – 1.18	73.09 – 73.05	**N**	Glacial Till
BH12	1.00 – 2.50	72.58 – 71.08	1.46 – 1.50	72.12 – 72.08	**N**	Glacial Till
WS01	0.50 – 2.50	75.14 – 73.14	2.46 – 2.51	73.18 – 73.13	**N**	Glacial Till
WS02	1.00 – 2.50	73.66 – 72.16	1.10 – 1.43	73.56 – 73.23	**N**	Glacial Till
WS03	1.00 – 2.50	72.91 – 71.41	0.33 – 1.09	73.58 – 72.82	**N**	Glacial Till

It is not clear how consistent groundwater levels are across the Site and with depth, due to the presence of shallow bedrock, which may or may not be permeable enough to be in continuity. The presence of shallow bedrock may locally influence groundwater flow direction, where the mudstone is effectively impermeable. Available evidence does suggest that the superficial glacial till does carry a laterally consistent groundwater body.

It is noted that the observed strike in WS01 has not subsequently translated into a long-term standing groundwater level in the installed monitoring well. It is considered that the initial strike was likely perched water in the shallow suspected Made Ground, and the observed standing groundwater level was likely to remnants of this water trapped in the base of the well's response zone. The standing groundwater level observed in BH08 is also unlikely to be representative of any true groundwater level in this location for the same reason, water trapped in the base of the well.

Elevated groundwater levels were observed in BH05 and WS03 during the first groundwater monitoring visit. Due to the position of those wells in close proximity to the Baldonnel stream along the southern and eastern boundaries of the Site, it is possible that these elevated levels were the result of short-term influence from higher water levels in the stream, but this is not able to be confirmed as no documentation of the stream's water levels were taken at the time of the monitoring visits.

Based on the remaining wells, a groundwater flow direction generally towards the south can be inferred.

5.5 Visual and Olfactory Evidence of Contamination - Groundwater

No visual or olfactory evidence of potential gross contamination was observed in groundwater during the investigation.

5.6 Ground Gas Data

Gas monitoring results are presented in Appendix G and are summarised in the table below, a total of three rounds of gas monitoring was undertaken over a period of four weeks.

Barometric pressures ranged from 1006 mB (visit 2) to 1024 mB (visit 1).

Exploratory Hole	Steady Gas Concentration (%v/v)						Steady Flow Rate (l/hr)		Response Zone (m bgl)	Stratum	Flooded?
	Methane		Carbon Dioxide		Oxygen						
	Min	Max	Min	Max	Min	Max	Min	Max			
BH01	<0.1	1.6	0.1	1.5	13.4	16.5	<0.1	<0.1	1.00 – 3.50	Glacial Till	N
BH03	<0.1	<0.1	<0.1	<0.1	14.0	19.6	<0.1	<0.1	1.50 – 4.00	Glacial Till	Y (1/3)
BH05	<0.1	<0.1	<0.1	<0.1	5.9	20.1	-3.5	<0.1	1.00 – 3.00	Glacial Till	Y (1/3)
BH08	<0.1	<0.1	1.1	2.3	15.9	19.1	<0.1	<0.1	0.50 – 2.00	Glacial Till	N
BH10	<0.1	<0.1	0.1	2.2	8.3	20.3	<0.1	<0.1	0.50 – 1.50	Made Ground/ Glacial Till	N
BH11	<0.1	<0.1	0.1	3.3	18.5	19.9	<0.1	<0.1	1.00 – 3.00	Glacial Till	N
BH12	<0.1	<0.1	0.3	3.3	16.6	18.7	-5.3	<0.1	1.00 – 2.50	Glacial Till	N
WS01	<0.1	<0.1	<0.1	1.8	5.4	20.5	<0.1	<0.1	0.50 – 2.50	Glacial Till	N
WS02	<0.1	<0.1	<0.1	<0.1	19.9	20.6	<0.1	<0.1	1.00 – 2.50	Glacial Till	N
WS03	<0.1	<0.1	2.2	3.8	16.2	20.3	<0.1	2.9	1.00 – 2.50	Glacial Till	Y (1/3)

6.0 Generic Quantitative Risk Assessment

6.1 Introduction

The presence of hazardous substances in or on a site is generally only of concern if an actual or potential unacceptable risk exists. Legislation and guidance on the assessment of contaminated sites, consistent with UK best practice, acknowledges the need for a tiered risk-based approach. A Preliminary Risk Assessment is presented in Section 3.4. This section represents a Generic Quantitative Risk Assessment (GQRA) being a comparison of site contaminant levels against Generic Assessment Criteria.

6.2 Human Health GQRA

The assessment of risks in relation to human health has been undertaken using Generic Assessment Criteria (GAC) as detailed within the appropriate tables. Risks from soil, groundwater, and Non-Aqueous Phase Liquids (NAPL) have been considered. The GAC are predominantly based on long term (chronic) risk to health. However, in the limited circumstances where short-term (acute) risks are more pronounced, these GAC have been utilised to ensure a thorough and conservative initial assessment is undertaken.

The end use scenario adopted for the assessment is a commercial/industrial end use, considered appropriate based on the proposed development for a data centre.

6.2.1 Risks from Soil Sources

Based on the proposed use of the Site for light industrial use, the soil and groundwater chemical data has been compared against a commercial/industrial end use GAC for 1% soil organic matter (SOM) content.

None of the contaminant concentrations reported in soil exceeded the relevant Generic Assessment Criteria (GAC). Therefore, the soil contaminant concentrations are not considered likely to represent a risk to human health.

The soil analysis results are considered further in the revised Conceptual Site Model (CSM) presented in Section 8.0 with regard to potential contaminant linkages.

6.2.2 Risks from Groundwater Sources

Based on the proposed use of the Site for commercial/industrial use, the soil and groundwater chemical data has been compared against commercial/industrial end use GAC developed by the Society of Brownfield Risk Assessment (SoBRA) to assess risks from groundwater sources to indoor air and subsequent vapour inhalation indoors.

Several potentially volatile contaminants were detected within the groundwater samples in excess of detection limits and a comparison of the concentrations above detection limits to relevant human health criteria is provided in the table below.

None of the site-specific contaminants of concern were recorded at concentrations in excess of their respective GAC.

The water analysis results are considered further in the revised Conceptual Site Model (CSM) presented in Section 8.0 with regard to potential contaminant linkages.

6.2.3 Risks from Non-Aqueous Phase Liquids (NAPL)

Soil and groundwater exposure models used in generating Generic Assessment Criteria do not account for the potential for NAPL to represent a source of risk to human health, principally due to the production of vapours. Whilst it is possible to calculate theoretical soil saturation limits, in reality, due to co-solubility effects, these are not an appropriate indicator of the presence of NAPL. In order to assess the presence of NAPL, for petroleum hydrocarbons, an assessment criterion of 5,000 mg/kg has been applied based on professional experience.

The following has been identified in relation to NAPL at the Site:

- No observations of NAPL were made within the soils observed during drilling;
- No concentrations of Total Petroleum Hydrocarbons in excess of 5,000 mg/kg were recorded;
- No NAPL was measured during groundwater monitoring works.

On this basis, there is no evidence of NAPL being present on the Site.

6.3 Controlled Waters/Water Environment GQRA

6.3.1 Groundwater Results

The approach adopted to assessing risks to Controlled Waters/Water Environment is based principally on considering the concentrations of contaminants identified within the groundwater samples obtained in comparison to relevant GAC.

Given the 'prevent and limit' approach of the Water Framework Directive (2000/60/EC) and the identified receptors, a range of Water Quality Standards (WQS) have been applied as Generic Assessment Criteria (GAC), these include European Communities Environmental Objectives standards and thresholds (ECEO), or WHO Guidelines for Drinking Water Quality which have been used as initial conservative GAC to assess whether groundwater contamination requires further assessment or discussion in terms of the risks to controlled waters. Where specific water quality standards are not available, Delta-Simons has adopted surrogate values based on professional judgement (DS GAC).

Groundwater contaminant concentrations that exceed the applied GAC are then considered in the context of the Site's environmental setting as to whether further qualitative or quantitative assessment is required as described in subsequent sections. Laboratory results above relevant detection limits are summarised in the table below with a comparison to the GAC applied.

Contaminant	No. Samples	Max Conc. (µg/l)	GAC (µg/l)	GAC Source	No. Exceed GAC	Location of Exceedances (depth)	Area of Site of Exceedance
Metals and Metalloids							
Arsenic	16	10.0	25	ECEO SWa	0	-	-
Cadmium		0.2	0.15	ECEO SWc	1	WS03 (05/03/21) = 0.20	South of the Site.
Chromium		43.0	3.4*	ECEO SWa	9	BH03 (05/03/21) = 7.0 BH05 (05/03/21) = 5.2 WS02 (05/03/21) = 43 WS03 (05/03/21) = 5.3 BH03 (24/03/21) = 7.4 BH05 (24/03/21) = 6.6 BH12 (24/03/21) = 4.2 WS02 (24/03/21) = 25 WS03 (24/03/21) = 3.5	Distributed across the Site.
Copper		40.0	30	ECEO SWa	1	WS02 (05/03/21) = 40	Centre of the Site.
Lead		6.1	7.2	ECEO SWb	0	-	-
Mercury		<0.05	0.05	ECEO SWc	0	-	-
Nickel		16.0	20	ECEO SWb	0	-	-
Selenium		38.0	No GAC	No GAC	N/A	-	-
Zinc		13.0	100	ECEO SWa	0	-	-
Inorganics							
Free Cyanide	16	<50	10	ECEO SWa	0	-	-
Polyaromatic Hydrocarbons							
Naphthalene	16	3.2	2.4	ECEO SWb	1	WS02 (05/03/21) = 3.2	Centre of the Site.
Acenaphthylene		<0.10	No GAC	No GAC	N/A	-	-
Acenaphthene		<0.10	No GAC	No GAC	N/A	--	-
Fluorene		<0.10	No GAC	No GAC	N/A	-	-
Phenanthrene		<0.10	No GAC	No GAC	N/A	-	-
Anthracene		<0.10	0.1	ECEO SWc	0	-	-

Contaminant	No. Samples	Max Conc. (µg/l)	GAC (µg/l)	GAC Source	No. Exceed GAC	Location of Exceedances (depth)	Area of Site of Exceedance
Fluoranthene		<0.10	0.1	ECEO SWb	0	-	-
Pyrene		<0.10	No GAC	No GAC	N/A	-	-
Benzo[a]anthracene		<0.10	No GAC	No GAC	N/A	-	-
Chrysene		<0.10	No GAC	No GAC	N/A	-	-
Benzo[b]fluoranthene		<0.10	0.03	ECEO SWc	0	-	-
Benzo[k]fluoranthene		<0.10					
Benzo[a]pyrene		<0.10	0.05	ECEO SWc	0	-	-
Indeno(1,2,3-c,d)pyrene		<0.10	0.002	ECEO SWc	0	-	-
Benzo[g,h,i]perylene		<0.10					
Dibenz(a,h)anthracene		<0.10	No GAC	No GAC	N/A	-	-
Petroleum Hydrocarbons							
Benzene	8	<1.0	10	ECEO SWb	0	-	-
Toluene		<1.0	10	ECEO SWa	0	-	-
Ethylbenzene		1.6	No GAC	No GAC	N/A	-	-
o-Xylene		4.1	10	ECEO SWa	0	-	-
m/p-Xylene		2.8					
Aliphatic TPH >C5-C6	16	<0.10	300	DS GAC	0	-	-
Aliphatic TPH >C6-C8		<0.10	300	DS GAC	0	-	-
Aliphatic TPH >C8-C10		23.0	300	WHO 2008	0	-	-
Aliphatic TPH >C10-C12		48.0	300	WHO 2008	0	-	-
Aliphatic TPH >C12-C16		170	300	WHO 2008	0	-	-
Aliphatic TPH >C16-C21		120	No GAC	No GAC	N/A	-	-
Aliphatic TPH >C21-C35		<0.10	No GAC	No GAC	N/A	-	-
Aliphatic TPH >C35-C44		<0.10	No GAC	No GAC	N/A	-	-
Aromatic TPH >C5-C7		<0.10	10	ECEO SWb	0	-	-

Contaminant	No. Samples	Max Conc. (µg/l)	GAC (µg/l)	GAC Source	No. Exceed GAC	Location of Exceedances (depth)	Area of Site of Exceedance
Aromatic TPH >C7-C8		<0.10	10	ECEO SWa	0	-	-
Aromatic TPH >C8-C10		260	300	WHO 2008	0	-	-
Aromatic TPH >C10-C12		71.0	90	WHO 2008	0	-	-
Aromatic TPH >C12-C16		37.0	90	WHO 2008	0	-	-
Aromatic TPH >C16-C21		45.0	90	WHO 2008	0	-	-
Aromatic TPH >C21-C35		<0.10	90	WHO 2008	0	-	-
Aromatic TPH >C35-C44		<0.10	No GAC	No GAC	N/A	-	-
Total Petroleum Hydrocarbons	16	558	300	WHO 2008	2	BH05 (05/03/21) = 558 WS02 (05/03/21) = 331	Centre and southeast of the Site.
Other Organic Contamination (including VOC and SVOC results)							
1,3,5-trimethylbenzene	8	5.0	No GAC	No GAC	N/A	-	-
1,2,4-trimethylbenzene		23.0	No GAC	No GAC	N/A	-	-

Notes: Shaded = Maximum concentration exceeds GAC.
No GAC = No GAC available for individual compounds.
ECEO SWa = European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009), Schedule 5, Part B, Table 10: Specific Pollutants.
ECEO SWb = European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009), Schedule 6, Table 11: Priority Substances.
ECEO SWc = European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009), Schedule 6, Table 12: Priority Hazardous Substances.
WHO 2008 = WHO Petroleum Products in Drinking Water, 2008.
DS GAC = Professional judgment based on WHO 2008 – conservative screening values in place of high human health-based criteria of 15,000 µg/l.

6.3.2 Groundwater Analysis Summary

Widespread significant contamination has not been identified at the Site.

Localised concentrations of cadmium, copper, naphthalene and total TPH have been identified as exceeding the relevant GAC in samples collected during the first groundwater monitoring; however, it is noted that subsequent sampling of the same locations during the second sampling round found concentrations either below GAC or below lower laboratory detection limits, indicating that the initial exceedances were likely the result of ground disturbance from the drilling and installation of the monitoring wells. These initial concentrations are not considered to represent a potential risk to controlled waters.

Distributed but widespread concentrations of total chromium have been detected exceeding the conservative screening GAC for chromium VI across the two sampling rounds. Concentrations in four of the five exceeding wells were noted to be broadly consistent between the two sets of samples. In the absence of an on-Site or off-Site potential source of chromium in the area, it is considered probable that the detected chromium concentrations are from a natural source. These concentrations, although elevated above the GAC, are not considered to represent a potential significant risk to controlled waters.

The groundwater analysis results are considered further in the revised CSM presented in Section 8.0 with regard to potential contaminant linkages.

6.3.3 Light Non-Aqueous Phase Liquid (LNAPL)

No LNAPL was detected during the three rounds of groundwater monitoring.

6.4 Built Environment

6.4.1 Potable Water Supply Pipes

Specific requirements for investigation of potable water supply pipe routes across potentially contaminated sites are not specified within Republic of Ireland legislation. To provide an initial screen of the results in relation to future potable water supply routes, the UK approach has been adopted.

The investigation requirements for the selection of potable water pipe material are set out in UKWIR Report 10/WM/03/21. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (UKWIR, 2010). This report has very specific and onerous investigation requirements and as such the detailed investigation of each utility route was not within the scope of this investigation.

A preliminary review of the results indicates that a relevant linkage is unlikely to exist associated with organic contaminants and therefore contaminant polyethylene (PE) and/or polyvinyl chloride (PVC) water supply pipes may be suitable for use on the development.

It should be noted that at the time of this investigation the future routes of water supply pipes had not been established, hence the investigation and sampling strategy is not likely to be considered fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling/analytical strategy may be required at a later date once the route(s) of the supply pipe(s) are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

7.0 Bulk Ground Gas Risk Assessment

7.1 Ground Gas Conceptual Site Model

7.1.1 Sources

Although data gaps are present in information regarding any potential historical use of the Site, the Site appears to have been in generally agricultural use until recently, with use for stockpiling of materials and as construction compounds for the adjacent Profile Park development works and for the ESB since 2009.

Ground investigation works identified localised areas of suspected Made Ground, comprising reworked natural geology, in addition to stockpiled demolition rubbles, although no significant thicknesses of Made Ground were encountered, and no significant putrescible constituents were identified in the suspected Made Ground deposits.

Natural deposits beneath comprise Glacial Till, predominantly clay with some silt, sand, gravel, and cobble content.

The Made Ground and natural deposits are not considered to represent significant ground gas sources.

Development of the surrounding land is noted to have been relatively recent also, although the data gaps are again noted, with sources of potential ground gas relatively limited to the last 25 years. The off-Site petrol forecourt may be considered a potential source, associated with degradation of petroleum products; however, the relatively young age of the development is likely to have a limiting factor on the likelihood of significant spill events, and the cohesive nature of the geology between the Site and the forecourt would have a limiting effect on migration of any contamination. As such, this is not considered to represent a significant ground gas source.

No current waste management facilities (landfills) have been identified within a 250 m radius of the site. One former landfill has been identified beyond 250 m from the Site, as follows:

- Grange Castle Golf Course, approximately 525 m to the southeast of the Site, with deposition between 2007 and 2010 – retrospective Waste License issued. Materials imported comprising EWC Codes 17 05 04 soils and stones (other than those mentioned in 17 05 03), and 17 01 07 mixture of concrete, bricks, tiles, and ceramics (other than those mentioned in 17 01 06).

However, given the distance to the waste boundary and the reported nature of the deposited materials, and the open ground between, the deposited wastes at Grange Castle Golf Course are not considered to represent a potential risk for ground gas migrating to the Site.

7.1.2 Receptors

The principal receptors under consideration are future Site users. Other receptors include adjacent site users and future on-Site maintenance/construction workers.

7.1.3 Pathways

The underlying geology is likely to be of variable but low permeability with respect to ground gases. Any Made Ground is likely to be limited in thickness and unlikely to present a continuous migration pathway. The underlying Glacial Till is predominantly clay and likely to limit vertical migration from below and also lateral migration. Based on the above, migration from off-site sources is considered unlikely due to the presence of Glacial Till.

The most significant pathways with respect to future Site users relate to the potential for gases to enter future Site buildings. At present, no gas protections measures are assumed. Consequently, ingress into buildings may be possible through voids in the floor including service entry points and cracks.

Future maintenance/construction workers may come into contact with hazardous ground gases via entry into below ground confined spaces such as excavations or service entries/inspection points.

7.2 Duration & Extent of Monitoring

Tables 5.5a and 5.5b within CIRIA C665 detail current recommended monitoring duration and frequency for sites in the UK. The preceding section has not identified any significant sources of gas generation potential; however, three ground gas monitoring visits have been undertaken to provide data to confirm the qualitative assessment. Gas monitoring has been carried out over a 1-month period.

During the three monitoring events, ground gas concentrations have been recorded in a total of 10 monitoring positions. The locations of the monitoring wells are highlighted on Figure 2 and indicate representative coverage across the whole study area.

Barometric pressures during the gas monitoring period ranged from 1006 mBar to 1024 mBar. Two of the three visits were completed during periods of falling pressure.

7.3 Ground Gas Risk Assessment

7.3.1 Background

Based on the proposed commercial end use, the following documents have been consulted when assessing the gas regime at the site:

- British Standards Institute (BSI, 2019): Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, BS:8485:2015+A1:2019.

The presence of a source of hazardous gas within the ground does not necessarily indicate a risk will be present. Consideration of recorded gas flows together with source concentrations can allow an initial assessment to be made of the potential both for generation and subsequent migration of gas. A Characteristic Situation (CS) is derived from an assessment of the ground gas data and forms the basis of determining mitigation measures.

7.3.2 Gas Screening Value (GSV)

The Gas Screening Value (gas concentration as a fraction x maximum recorded flow) is used to provide an initial assessment of risks to future site users. The GSVs calculated for the monitoring wells are presented in the following table.

Location	Maximum Steady Methane (%v/v)	Maximum Steady Carbon Dioxide (%v/v)	Maximum Steady Flow Rate (l/hr)	GSV/Characteristic Situation				Flooded?
				Methane		Carbon Dioxide		
				GSV	CS	GSV	CS	
BH01	**1.6**	1.5	<0.1	0.0016	**1+**	0.0015	1	N
BH03	<0.1	<0.1	<0.1	<0.0001	1	<0.0001	1	Y (1/3)
BH05	<0.1	<0.1	<0.1	<0.0001	1	<0.0001	1	Y (1/3)
BH08	<0.1	2.3	<0.1	<0.0001	1	0.0023	1	N
BH10	<0.1	2.2	<0.1	<0.0001	1	0.0022	1	N
BH11	<0.1	3.3	<0.1	<0.0001	1	0.0033	1	N
BH12	<0.1	3.3	<0.1	<0.0001	1	0.0033	1	N
WS01	<0.1	1.8	<0.1	<0.0001	1	0.0018	1	N
WS02	<0.1	<0.1	<0.1	<0.0001	1	<0.0001	1	N
WS03	<0.1	3.8	2.9	0.0029	1	0.1102	**2**	Y (1/3)
Notes: CS1+ = Calculated GSV is CS1; however, peak methane exceeds 1%v/v and/or peak carbon dioxide exceeds 5%v/v, therefore, consider increase in CS value.								

The preliminary data indicates that the Site can be provisionally classified as CS1 (very low hazard potential) in accordance with BS:8485:2015+A1:2019 Table 2 and Green in accordance with NHBC classification for low rise housing.

In accordance with BSI guidance, and using maximum steady state recorded parameters and the calculated GSV's the proposed development has a CS1 classification across the majority of the Site, with localised CS2 on the Site's southern boundary. This is entirely due to an elevated maximum flow rate and a slightly elevated maximum carbon dioxide concentration, which has not exceeded 5%v/v.

Elevated flow was not observed in WS03 during the first monitoring visit but was on the second and third. It is considered likely that the elevated flow was a result of a piston-effect within the well as a result of groundwater being lowered within the well following groundwater sampling during visits 1 and 2. Release of the gas tap at the beginning of sampling would have allowed pressure within the well to equalise with atmospheric pressure at the time of the monitoring. Individually assessed, the conditions observed in WS03 during visits 1 and visit 3 fall within CS1 classification, with only the conditions during visit 2 classifying as CS2.

The GSVs and maximum methane concentration would classify the site as CS1, with only one location (BH01) recording elevated methane of >1 % v/v on one occasion, during visit 2. No detectable flow rate was recorded at this location during the three monitoring visits.

On the basis of these results, and in the absence of any appreciable ground gas source, it is considered appropriate to apply CS1 conditions to the Site.

7.4 Ground Gas Risk Mitigation

BS:8485 provides a scoring system to determine the appropriate protection measures for a proposed development in accordance with the identified ground gas regime. Table 3 of BS:8485 summarises typical UK building types, which for this development will comprise Type D.

For CS1 conditions, no ground gas protection measures would be required.

7.5 Radon

The Site is located within an area where radon protective measures may be required, any ground gas protection measures installed will need to consider the incorporation of radon protective measures in accordance with EPA guidance and Building Regulations.

7.6 Organic Vapours

No significant sources of volatile vapours have been identified in soils or groundwater, therefore, ground gas protection measures installed do not need to include any specialist provisions against vapour intrusion as part of any applied ground gas protection measures.

8.0 Revised Conceptual Site Model

A revised CSM is presented in the table below and has been formulated taking into account all of the available data from the Delta-Simons intrusive investigation, suitable for a Site with a proposed commercial end-use appropriate for the proposed data centre use.

Source	Pathways	Receptors	Confirmed Risk?	Mitigation
No elevated concentrations of contaminants in soils sampled.	Direct contact, ingestion or inhalation of soil bound contaminants / dust	Future Site users	No	Any Site-sourced topsoil should be tested to confirm suitability for re-use in soft landscaped areas.
		Maintenance workers and construction workers	No	Groundworkers should be made aware of the potential for encountering unidentified contamination, and protocols, PPE and hygiene practices should be captured and implemented in methodologies and health and safety plans.
	Inhalation of dusts/vapours	Third parties during construction (adjacent Site users)	Minimal	Dust suppression is recommended during the construction groundworks to mitigate against any dust generation.
Localised temporarily elevated concentrations of metals, naphthalene and total TPH identified. Potential elevated background levels of chromium present, sporadically distributed.	Vertical/lateral migration of contaminants to/through groundwater	The underlying aquifer and the Baldonnel Stream watercourse	Unlikely	Some localised temporary concentrations of metals and hydrocarbons were identified during the investigation's initial groundwater sampling visit; however, these were reduced by the second sampling visit. Given the generally cohesive nature of the Glacial Till, and the reduction in concentrations of all but chromium (suspected to be elevated background levels), it is considered that the Site does not pose a risk to the Baldonnel Stream, running adjacent to the south and east boundaries.
No elevated concentrations of hydrocarbons in soils, temporarily elevated concentration in groundwater	Permeation of hydrocarbons through plastic pipe work.	New buildings and infrastructure / utilities	Potential	Some localised temporary concentrations of hydrocarbons were identified during the investigation's initial groundwater sampling visit. Whilst these were reduced in the second visit undertaken, there is the potential for localised hydrocarbons to be present, and groundwater is noted to be shallow in places. It is recommended that liaison with the local water authority be undertaken, and this report submitted for review, to confirm any requirements for upgraded potable supply pipework and/or clean service corridors prior to the redevelopment.

Source	Pathways	Receptors	Confirmed Risk?	Mitigation
Localised slightly elevated methane or GSV (from carbon dioxide and elevated flow rate). No elevated volatiles in soils or groundwater.	Ingress into buildings/ confined spaces and inhalation/ asphyxiation or generation of explosive atmospheres.	Future Site users, future maintenance workers, and new buildings and infrastructure/ utilities.	No	The Site has been classified as CS1, not requiring any ground gas protection measures. No elevated concentrations of volatile hydrocarbons were identified in soils or groundwater. This investigation did not include any assessment of radon risks. As the desk-based information indicates, there may be the potential requirement for radon protection measures. Further works should be undertaken by specialists to determine the level of Site-specific risk and any radon protection measures required.
Previously unidentified contamination	All pathways	All receptors	Potential	Groundworkers should be made aware of the potential for encountering unidentified contamination, and protocols, PPE and hygiene practices should be captured and implemented in methodologies.

9.0 Conclusions & Recommendations

9.1 Contamination Issues

The investigation has been carried out in order to provide information on the quality of the soil and groundwater beneath the Site in the context of land contamination and provide information on the ground gas regime beneath the Site for a commercial end use. The assessment is being completed prior to the proposed redevelopment of the Site.

9.1.1 Human Health

No elevated concentrations of contaminants have been identified in the soils sampled during this investigation, and no detectable concentrations of asbestos have been found. Whilst this does not preclude the potential for localised contamination outside of those areas directly investigated, the investigation coverage of the Site provides reasonable confidence that the Site is suitable for use.

Whilst no asbestos was identified in any of the soils or stockpiled materials, ACMs may still be present in other areas of stockpiled materials not directly investigated.

9.1.2 Controlled Waters

No widespread contamination of groundwater was encountered during this investigation. Localised concentrations of cadmium, copper, naphthalene and total TPH were identified as exceeding relevant GAC during the first sampling visit; however, subsequent sampling found concentrations either below GAC or below lower laboratory detection limits, likely indicating the initial raised concentrations to be the result of ground disturbance from drilling.

Distributed elevated concentrations of total chromium were found to be relatively consistent between sampling visits; as such, in the absence of an identified potential on-Site or off-Site source of chromium, it is considered probably that the detected chromium is the result of natural background levels, and is not considered to represent a risk to the adjacent Baldonnel Stream.

9.1.3 Ground Gas

One slightly elevated concentration of methane in one location in the north of the Site, and one elevated GSV in a location in the south of the Site were recorded during the three ground gas monitoring rounds undertaken; however, the slightly elevated concentration of methane was not replicated in following visits in the northern location, and it is considered that elevated flows at the southern location recorded during the second and third monitoring visits was the result of lowered groundwater levels in the well following sampling during the first and second monitoring visits creating a piston effect rather than gas generation. It is considered appropriate that the Site is classified as CS1, requiring no ground gas protection measures.

No sources of vapour posing a risk to human health have been identified and no NAPL has been recorded at the Site.

9.2 Recommendations for Supplementary Work

Based on the findings of this report, it is considered that no further investigation is required

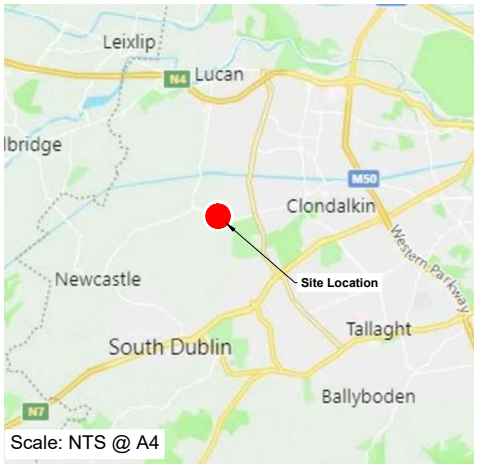
During the construction works, the following measures are recommended:

- Liaison with the water authority should be undertaken to confirm the requirements for any upgraded potable water supply pipework and/or clean service corridors. It is recommended that this report be submitted to the water authority for their review alongside future plans for proposed water supply pipework routes, to inform the authority's decision process;
- A discovery strategy should be implemented, providing a protocol to follow should any previously unidentified contamination be found during ground works. Groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils through toolbox talks and, in particular, the potential presence of asbestos and an appropriate protocol to mitigate exposure of the workforce and general public should be in place. The Contractor will need to prepare a risk assessment

which identifies a safe system of work to handle the asbestos containing soils which is likely to include asbestos awareness training, a protocol for unexpected finds (should gross asbestos material be identified) as well as safe working procedures such as damping down of excavations and stockpiles in line with general dust generation mitigation. The risk assessment will need to identify the appropriate levels of PPE and/or RPE required. This recommendation should be captured in Site health and safety documentation and in maintenance plans. Good hygiene practices should be in place to mitigate the risks associated with contact with the soils at the Site;

- It is recommended that any Site-sourced topsoil materials be tested prior to re-use in soft landscaped areas to confirm their suitability for use, both in terms of contamination and in terms of providing a suitable growing medium for plants; and
- Radon protection measures may be required.

Figure 1 – Site Location Map



Scale: NTS @ A4

LEGEND

Site Boundary

Scale: 1 / NTS @ A4

Bing maps

deltasimons
Environment - Health & Safety - Sustainability

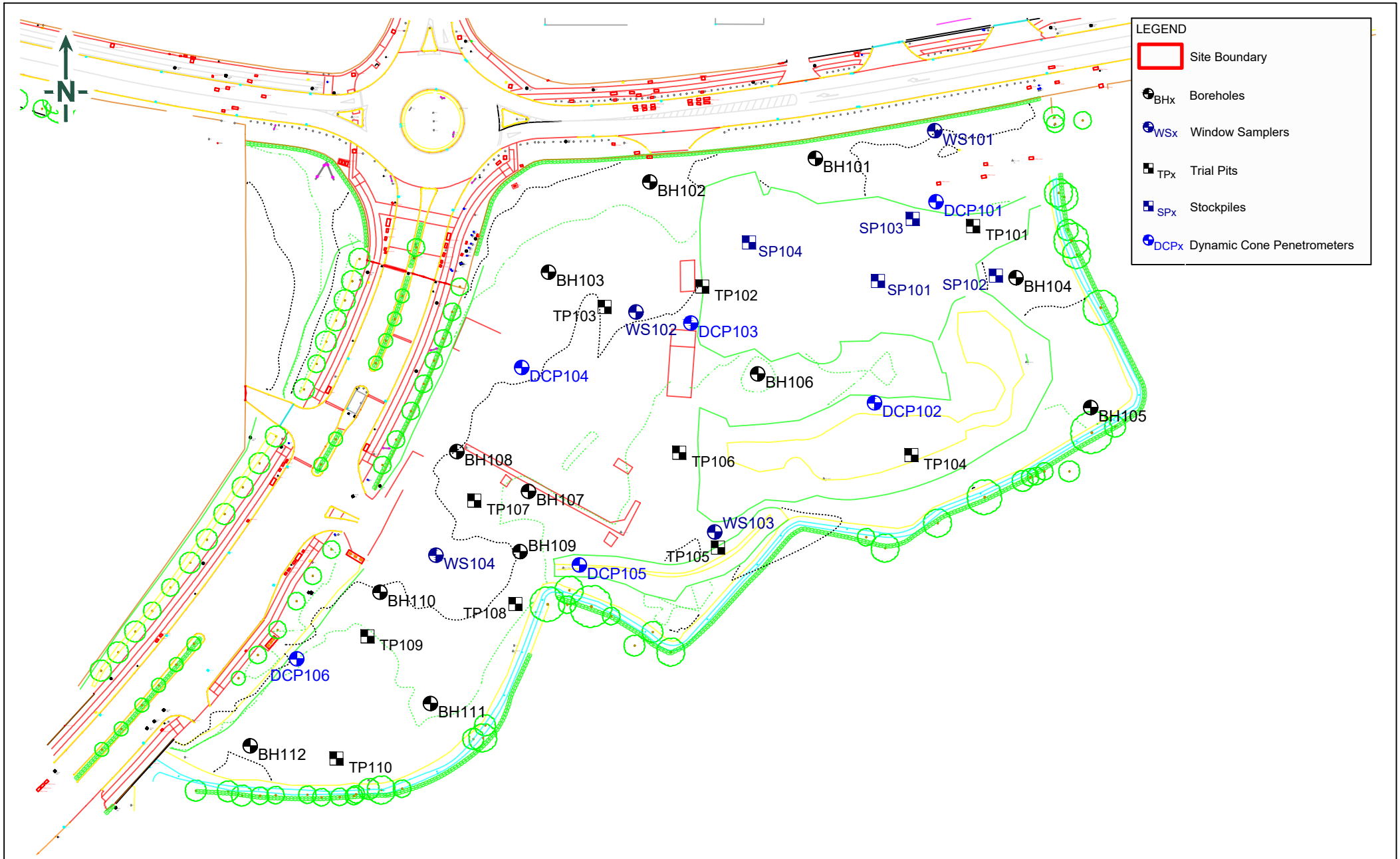
TITLE:
Site Location Map
IER Grange Castle
Dublin

DRAWN BY: KE	SCALE: To Scale@A4
CHECKED BY: JB	REVISION: 1
DATE: 13 November 2020	

PROJECT NO: 20-2018.07

FIGURE NO: 1

Figure 2 – Intrusive Exploratory Location Plan



deltasimons
Environment - Health & Safety - Sustainability

TITLE:
Exploratory Hole Location Plan
Grange Castle
Dublin

DRAWN BY: KE	SCALE: Not to Scale
CHECKED BY: DK	REVISION: 1
DATE: 01 April 2021	

PROJECT NO: 20-2018.01
FIGURE NO: 2

Appendix A – Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Due to the evolving regulatory climate specific to Per Fluoro Alkyl Substances (PFAS), the scope of works is not intended to be conclusive as it relates to the identification of any PFAS related issues. While Delta-Simons may advise its Client if Delta-Simons becomes aware of the use of PFAS at the subject property, Delta-Simons makes no representation nor accepts any liability that any or all PFAS issues have been identified and/or revealed to its client through its scope of work, as presented herein.

Delta-Simons obtained, reviewed, and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B – Site Photographs

Site Photographs



Photograph 1 - The Site is located off the Profile Park access road.



Photograph 2 - The south of the Site is bound by a ‘shuck’ watercourse.



Photograph 3 - The shuck flow west to east below the Profile Park access road.



Photograph 4 - A high voltage cable is shown entering the south of the Site.



Photograph 5 - The southwest of the Site is covered by compacted gravel.



Photograph 6 - A construction compound was located in the northwest.



Photograph 7 - Numerous stockpiles are located in the south covered by scrub-type vegetation.



Photograph 8 - Unlabelled IBCs were identified in the previous site compound (now removed). These could not be inspected due to access constraints.



Photograph 9 - Large stockpiles of gravel and construction and demolition materials are located in the east of the Site.



Photograph 10 - Localised stockpiles of construction and demolition materials are located in the east of the Site.



Photograph 11 - A petrol station is located north of the Site beyond the New Nangor Road.



Photograph 12 - A commercial / industrial estate is located north of the Site.



Photograph 13 - Localised construction and demolition materials in the centre of the Site.



Photograph 14 - Localised construction and demolition materials in the centre of the Site.



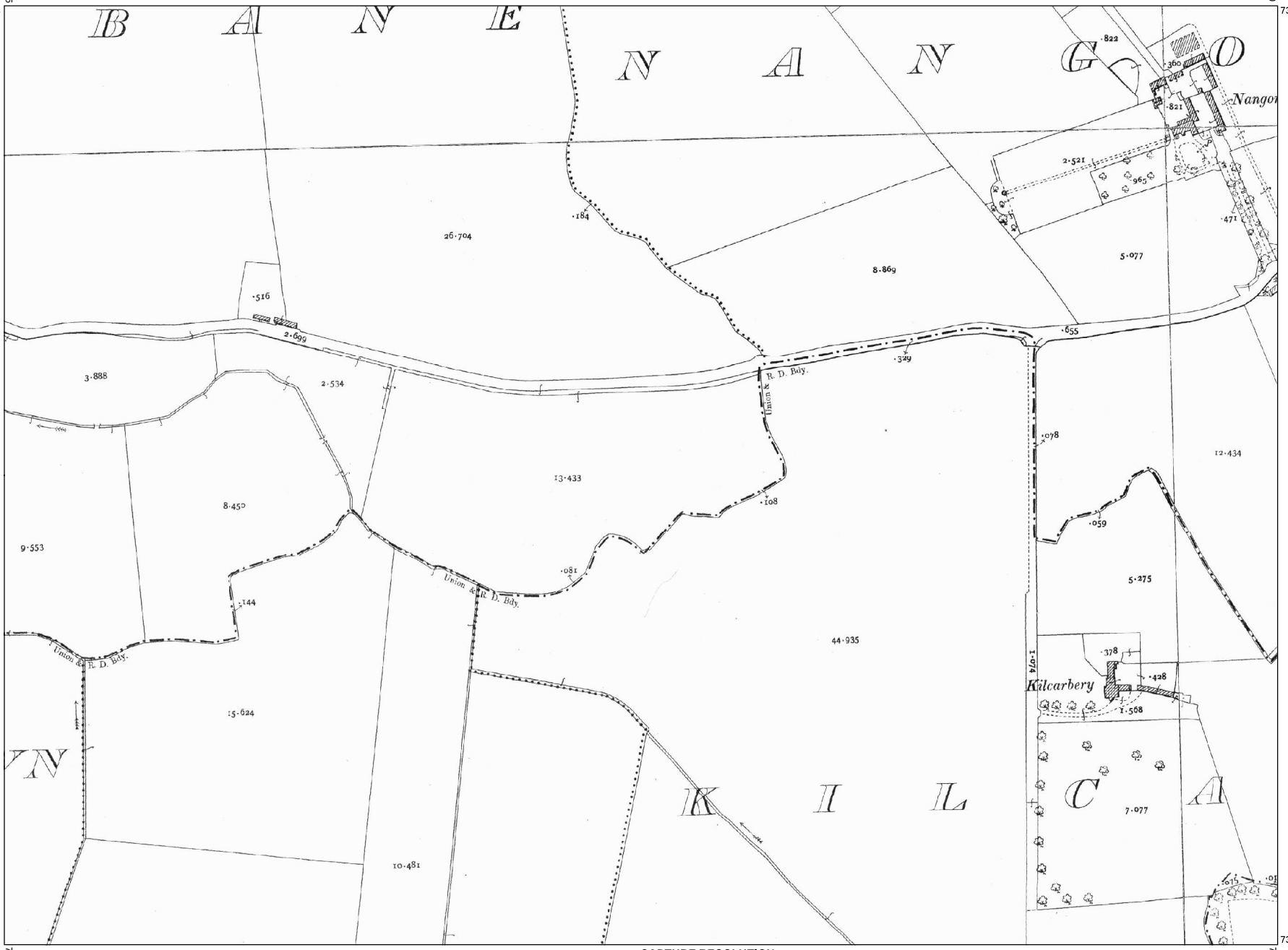
Photograph 15 - (February 2021) The Site compound has since been removed with only limited associated hard standing remaining.



Photograph 16 - The material stockpiles remain present in the north east of the site.

Appendix C – Historical Maps

1st Edition 25 Inch Historic Map



0 50 100 150 200 metres

0 100 200 300 400 500 Feet

OUTPUT SCALE: 1:5,000

CAPTURE RESOLUTION:
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ITM 704008,730798

PUBLISHED:	ORDER NO.:
18/11/2020	50156196_1

MAP SERIES:	MAP SHEETS:
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Aerial Imagery Map

703398 704563

731232 731232



730372 730372

703398 704563

0 50 100 150 200 metres

0 100 200 300 400 500 Feet

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CENTRE COORDINATES:
ITM 703981,730802

PUBLISHED:	**ORDER NO.:**
18/11/2020	50156196_2

MAP SERIES:	**MAP SHEETS:**
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1995 Ortho	O3325-D
1995 Ortho	O3326-A
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search 'Large Scale Legend'

Aerial Imagery Map

703398 704563

731232 731232



730372 730372

703398 704563

0 50 100 150 200 metres

0 100 200 300 400 500 Feet

OUTPUT SCALE: 1:5,000

CAPTURE RESOLUTION:
The map objects are only accurate to the resolution at which they were captured.
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CENTRE COORDINATES:
ITM 703981,730802

PUBLISHED: 18/11/2020

ORDER NO.: 50156196_3

MAP SERIES:	MAP SHEETS:
2000 Ortho	O702730
2000 Ortho	O704730

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Aerial Imagery Map

703398 704563

731232 731232



730372 730372

703398 704563

0 50 100 150 200 metres

0 100 200 300 400 500 Feet

OUTPUT SCALE: 1:5,000

CAPTURE RESOLUTION:
The map objects are only accurate to the resolution at which they were captured.
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National Mapping Agency

CENTRE COORDINATES:
ITM 703981,730802

PUBLISHED:	ORDER NO.:
18/11/2020	50156196_4

MAP SERIES:	MAP SHEETS:
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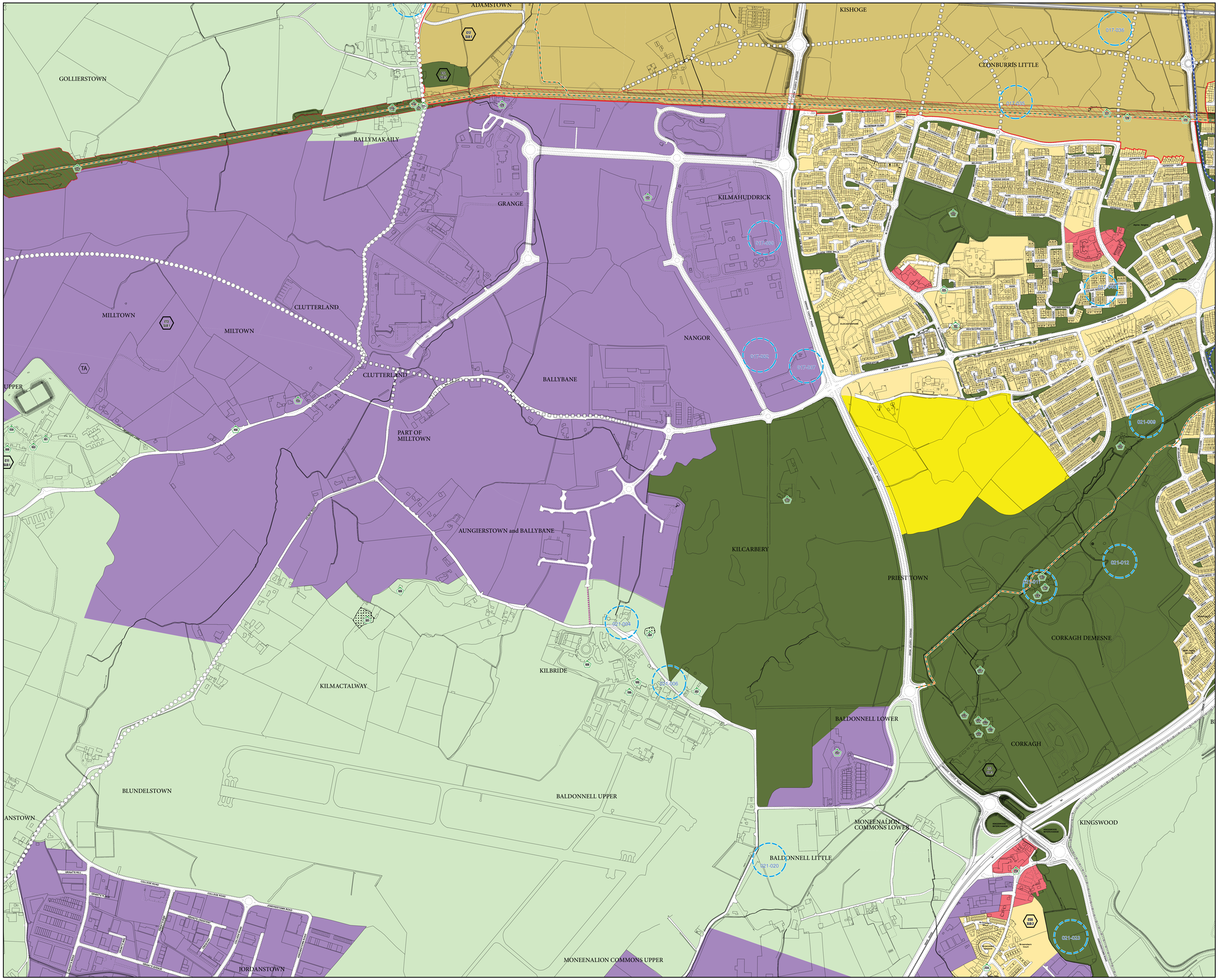
Appendix D – Regulatory Information

South Dublin County Council

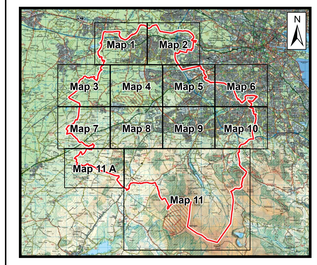
Development Plan 2016 - 2022

Map includes Variations 1 & 2

Map 4



South Dublin County Council
Development Plan
2016 – 2022



Use Zoning Objectives

Objective RES	To protect and/or improve residential amenity
Objective RES-N	To provide for new residential communities in accordance with approved area plans
Objective SDZ	To provide for strategic development in accordance with approved planning schemes
Objective REGEN	To facilitate enterprise and/or residential-led regeneration
Objective TC	To protect, improve and provide for the future development of Town Centres
Objective MRC	To protect, improve and provide for the future development of a Major Retail Centre
Objective DC	To protect, improve and provide for the future development of District Centres
Objective VC	To protect, improve and provide for the future development of Village Centres
Objective LC	To protect, improve and provide for the future development of Local Centres
Objective RW	To provide for and consolidate retail warehousing
Objective EE	To provide for enterprise and employment related uses
Objective OS	To preserve and provide for open space and recreational amenities
Objective HA (LV, DV, DM)	To protect and enhance the outstanding natural character and amenity of the Liffey Valley, Dodder Valley and Dublin Mountains areas
Objective RU	To protect and improve rural amenity and to provide for the development of agriculture

Specific Objectives:

- PPS — Proposed Post Primary School
- PS — Proposed Primary School
- Seveso Sites
- SLO 1 — Specific Local Objectives (See Written Statement for Details)
- TA — To provide for Traveller Accomodation Sites to be Selected
- TA — To provide for Traveller Accommodation
- To protect and / or provide for a Burial Ground
- Contour Lines
- SDZ Planning Scheme Boundaries
- County Boundary

Transport

- Junction Proposals
- Road Proposals - Long Term
- Road Proposals - 6 Year
- Long Term High Capacity Public Transport (RPA Preferred Route)
- NTA Greater Dublin Cycle Network Plan
- Proposed Local Cycle / Pedestrian Link

Conservation

- To Preserve Prospects
- TPO — Tree Preservation Order (See Written Statement For Details)
- 397 — Record of Protected Structures (See Written Statement for Details)
- 017-021 — Record of Monuments and Places (See Written Statement for Details) (For Areas of Archaeological Potential see Index Map)
- Protect and Preserve Significant Views
- Geological Sites for Protection
- Bohernabreena Reservoir Catchment
- Architectural Conservation Areas (ACA)
- Proposed Natural Heritage Areas (pNHA)
- Special Protection Areas (SPA)
- Liffey Valley Special Area Amenity Order 1990 (SAAO)
- Special Area of Conservation (SAC)

Note:
See Index map for details of approach areas and height control zones for Casement Aerodrome, Baldonnell and Backweston Aerodrome, Backweston Park.

The lines of the Transport Proposals shown on this map are diagrammatic only and are subject to change during the detailed design process

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SCALE 1:5,000

0 75 150 300 450 600 metres

Land Use Planning and Transportation Department

Laura Leonard
BA MBA
A/Director

Brian Keaney
MIPI MRTPI
Senior Planner

4

Search and View

View Application SD06A/0568

Back to Search

Date Received:	05/07/2006
Last Action:	03/11/2006, Additional Information
Application Type:	Permission
Submission Type:	Additional Information
Closing Date for Submissions:	Closed
Applicant:	(IASNDC Limited,
Location:	Nangor Road, Ballyfane, Clondalkin, Dublin 22
Proposed Development:	Provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on these lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 357 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary works, on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park. This application is accompanied by an Environmental Impact Statement.
Decision Due:	30/11/2006

Decision Details

Decision Date:	30/11/2006
Decision:	GRANT PERMISSION
Final Grant Date:	13/01/2007


Dunboyne
Blanchardstown
Lucan
Dublin
Clondalkin
Tallaght
Dundrum
Bray
Greystones
Wicklow
Arklow
Malahide
Howth
Dublin Port
Dublin Airport
Port Tunnel
Poolbeg
Dublin Bay
South Dublin Bay and River Tolka Estuary
Baldoyle
Howth Head
Ireland's Eye
Lambay Island
Rockabill
Skerries
Balbriggan
Ashbourne
Kells
Navan
Trim
Maynooth
Leixlip
Celbridge
Naas
Newbridge
Kilcullen
Blessington
Rathcoole
Saggart
Brittas
Enfield
Edenderry
Tullamore
Portlaoise
Portarlington
Athy
Carlow
Kildare
Meath
Offaly
Laois
Wicklow
Wexford
Kilkenny
Louth
Monaghan
Cavan
Westmeath
Longford
Roscommon
Galway
Offaly
Laois
Kildare
Wicklow
Wexford
Carlow
Kilkenny
Tipperary
Waterford
Cork
Kerry
Limerick
Clare
Galway
Mayo
Roscommon
Sligo
Leitrim
Longford
Westmeath
Cavan
Monaghan
Louth
Meath
Kildare
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Laois

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RPS Planning & Environment
Block E
Fifth Floor
Iveagh Court
Harcourt Road
Dublin 2

NOTIFICATION TO GRANT PERMISSION
PLANNING & DEVELOPMENT ACT, 2000 AND PLANNING REGULATIONS THEREUNDER

Final Grant Order No.:	**0107**	Date of Final Grant:	**19-Jan-2007**
Decision Order No.:	**2637**	Date of Decision:	**30-Nov-2006**
Register Reference:	**SD06A/0568**	Date:	**03-Nov-2006**

Applicant: DASNOC Limited,

Development: Provision of roads and services infrastructure to facilitate the futu development of a business park, to be known as 'Profile Park' on lands. The development includes the provision of 1,675 metres c internal distributor roads consisting of 267 metres to dual carriag standard (at the main entrance) with a further 1,408 metres to sin carriageway standard and one internal roundabout. The develop also includes surface water drainage, foul drainage and water sup infrastructure, associated landscaping and all ancillary works, on of 39.84 hectares. Access to the site will be provided at the nort boundary off the existing roundabout to Kilcarbery Business Par This application is accompanied by an Environmental Impact Statement.

Location: Nangor Road, Ballybane, Clondalkin, Dublin 22.

Time extension(s) up to and including
Additional Information Requested/Received 28-Aug-2006 / 03-Nov-2006

A Permission has been granted for the development described above, subject to the followi conditions.

Conditions and Reasons:

1. The development shall be carried out in its entirety in accordance with the plans, particu and specifications lodged with the application and additional information received on 3/11/2006, save as may be required by the other conditions attached hereto.
   REASON: To ensure that the development shall be in accordance with the permission,and that effective control be maintained.

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2. a) The water supply and drainage infrastructure, including the disposal of surface water, comply with the technical requirements of the Planning Authority.
b) There shall be complete separation of the foul and surface water drainage systems.
c) Adequate provision shall be made for future connections to foul drainage system from adjacent lands which may be developed in the future.
d) All foul and surface water sewers with the potential to be taken in charge shall be a minimum of 225mm in diameter, not closer than 3m to the nearest building and be locate roads, footpaths or public open space.
e) The minimum pipe size for any proposed piping/culverting of ditches/ watercourses sl be 1050mm and details shall be submitted to the Drainage Area Engineer (Deansrath Dep 457 0784) for agreement prior to the commencement of development. The flow in the watercourse shall not be constricted or reduced as a result of this work.
f) All surface water runoff from proposed roads shall be routed via a silt trap and petrol/oil/diesel interceptor before discharging to the public surface water drainage syste
g) Prior to commencement of development, foul and surface water drainage details and a water details shall be submitted to the Area Drainage Engineer, Deansrath Depot (Ph 01-784) for agreement.
REASON: In the interests of public health and in order to ensure adequate drainage prov

3. a) Footpath/cycle ways shall be constructed of maintenance free materials (concrete, imprinted concrete/asphalt, dense bitumen macadam) or with alternate materials the type form of which shall be agreed in writing by the Planning Authority prior to the commenc of development.
b) A 1.5m wide cycleway shall be constructed on both sides of Roads number 1 and 2.
REASON: In the interest of road safety and to ensure the provision of adequate road infrastructure.

4. a) All trees within the site, other than those indicated for removal as part of the developn shall be protected in accordance with BS 5837:2005 'Trees in relation to construction' ar detailed in the Arboricultural Method Statement submitted. Protection measures for all within the site shall be implemented prior to the commencement of any works associate the proposed development.
b) Details of landscape screening proposals for eastern boundary along Grange Castle G Course shall be agreed with Parks & Landscape Department and shall be submitted for t written agreement of the Planning Authority prior to commencement of development.
REASON: In the interest of amenity and the proper planning and sustainable developme the area.

5. Road number 1 shall be constructed as shown on drawing number 04173/100 revision A the area between the western side of the hammerhead/ turning area and the site boundary free from development in accordance with submitted Masterplan
REASON: In the interest of the proper planning and sustainable development of the are

6. All public services to the proposed development, including electrical, telephone cables a equipment shall be located underground throughout the entire site.
REASON: In the interest of amenity.

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7. No advertising sign(s) or structure(s) shall be erected except those, which are, exempted development, without the prior approval of the Planning Authority or An Bord Pleanála o appeal.
REASON: In the interest of the proper planning and development of the area.

8. (a) Suitable facilities for vehicle cleansing and wheel washing, to the satisfaction of the A Engineer shall be provided on site prior to commencing of earthworks.
(b) Adequate on-site car parking facilities, to the satisfaction of South Dublin County Cou shall be made available for site workers during the course of construction.
REASON: In the interest of the amenity, safety and maintenance of adjoining roads and footpaths.

9. During the construction phase of the development, Best Practicable Means shall be emplo to minimise air blown dust being emitted from the site. This shall include covering skips slack-heaps, netting of scaffolding, daily washing down of pavements or other public are and any other precautions necessary to prevent dust nuisances.
REASON: To contain dust arising from construction/demolition in the interests of public health and to prevent nuisance being caused to occupiers of buildings in the vicinity.

10. No heavy construction equipment/machinery (to include pneumatic drills, construction vehicles, generators, etc.) shall be operated on or adjacent to the construction site before hours on weekdays and 9.00 hours on Saturdays nor after 18.00 hours on weekdays and hours on Saturdays, nor at any time on Sundays, Bank Holidays or Public Holidays. The applicant/developer shall comply with British Standard B.S. 5228 Noise Control on Construction and Open sites and British Standard B.S. 6187 Code of Practice for demoli
REASON: In the interest of public health.

Note 1: The applicant is advised that under the provisions of Section 34(13) of the Plann and Development Act 2000 a person shall not be entitled solely by reason of a permissio carry out any development.

(1) All buildings must be designed and constructed in accordance with the Building Regul 1997.
(2) Building Control Regulations require a Commencement Notice. A copy of the Commencement Notice is attached.
(3) A Fire Safety Certificate must be obtained from the Building Control Authority, where applicable.
(4) Free Standing Walls must be designed and constructed in accordance with IS 325: Co Practice for use of Masonry Part 1 : Structural use of reinforced Masonry. The Owne also ensure that the construction of all walls is supervised by a competent person.

Signed on behalf of South Dublin County Council.

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Strategic Development Zones
Change of Use
Transport Planning
Heritage and Conservation
Guidelines and Legislation
Domestic Extensions
European Projects
Derelict Sites
Vacant Sites

View Application SD07A/1059

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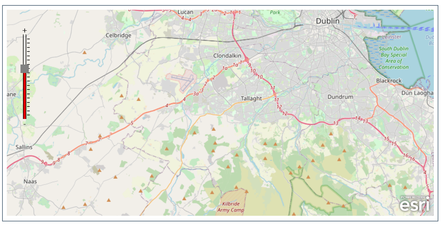
Date Received:	21/12/2007
Last Action:	21/12/2007
Application Type:	Permission
Submission Type:	New Application
Closing Date for Submissions:	Closed
Applicant:	Dasnoc Limited
Location:	'Profile Park', Nangor Road, Ballybane, Dublin 22.
Proposed Development:	Phase 1 of a services and retail centre and will consist of 3 no. office blocks as follows: (1) Block A comprises a five storey office building of 3,019.6 sq.m. gross floor area which fronts onto the Nangor Road and which will accommodate 18 no. own door office units and 1 no. ESB substation; (2) Block B comprises a five storey office building of 2,905.1 sq.m gross floor area which fronts onto the Nangor Road and is located adjacent to the boundary with Grange Castle Golf Course - this block will accommodate 26 no. own door office units; (3) Block C comprises a four storey office building of 2,684.8 sq. m. gross floor area located adjacent to the boundary with Grange Castle Golf Course which will accommodate 24 no. own door office units. The proposed blocks are arranged in a u-shaped configuration around a central landscaped square. Vehicular access to the site is proposed via a left-turning entry and exit slip lane from the Nangor Road and also via the internal Spine Road permitted under application Reg. Ref. SD06A/0568. The proposed development includes 30 no. surface level car parking spaces and one level of underground car parking which will accommodate 200 no. car spaces. The development also includes all ancillary services, landscaping and site works on a site of 1.3163 hectares. This application is being lodged pursuant to application Reg. Ref. SD06A/0568 under which planning permission was granted for the development of roads and services to facilitate the 'Profile Park' Business Park.
Decision Due:	22/02/2008

Decision Details

Decision Date:	22/02/2008
Decision:	GRANT PERMISSION
Final Grant Date:	01/04/2008



Documents

Please note: Most documents are in Adobe Acrobat pdf format which is free to download and install. If you have any problems displaying the document in your browser then right-click the link below and save the file to your computer.

File	Type
Acknowledgement SDCC ack letter	Adobe PDF
Application(Form/Letter)	Adobe PDF
Site Notice	Adobe PDF
Site Location Map	Adobe PDF
Layout/Block Plans x3 existing and proposed	Adobe PDF
Layout/Block Plans x3 existing and proposed	Adobe PDF
Layout/Block Plans x3 existing and proposed	Adobe PDF
Floor Plans x7	Adobe PDF
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Water/Drainage Drawings x8	Adobe PDF
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Other Plans/Drawings site visibility	Adobe PDF
Landscape Plans x5	Adobe PDF
Landscape Plans x5	Adobe PDF
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Landscape Plans x5	Adobe PDF
Application(Letter) agents letter	Adobe PDF
Application(Letter) sch of drawaings x3	Adobe PDF
Application(Letter) sch of areas	Adobe PDF
Application(Reports/Spec) signage	Adobe PDF
Application(Reports/Spec) engineering services report x2	Adobe PDF
Application(Reports/Spec) engineering services report x2	Adobe PDF
Application(Reports/Spec) traffic impact x3	Adobe PDF
Application(Reports/Spec) traffic impact x3	Adobe PDF
Application(Reports/Spec) traffic impact x3	Adobe PDF
Site Notice Inspection, Fee Sheet, Validation Forms	Adobe PDF
Manager's Orders grant permission	Adobe PDF
Notification of Decision grant permission	Adobe PDF
Consultee Reports (Internal/External) Roads Dept.	Adobe PDF
Consultee Reports (Internal/External) Envir. Services dept.	Adobe PDF
Consultee Reports (Internal/External) E. H. O.	Adobe PDF
Consultee Reports (Internal/External) Enviro Serv	Adobe PDF
Final Grant	Adobe PDF
Fee Check Sheet	Adobe PDF
Consultee Reports (Internal/External) environmental services	Adobe PDF

South Dublin County Council
County Hall Tallaght,
Dublin 24, D24 A3XC

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Richard Hamilton,
RPS Planning & Environment
Block E, 5th Floor
Iveagh Court
Harcourt Road
Dublin 2

NOTIFICATION TO GRANT PERMISSION
PLANNING & DEVELOPMENT ACT, 2000 AND PLANNING REGULATIONS THEREUNDER

Final Grant Order No.:	**0617**	Date of Final Grant:	**01-Apr-2008**
Decision Order No.:	**0384**	Date of Decision:	**22-Feb-2008**
Register Reference:	**SD07A/1059**	Date:	**21-Dec-2007**

Applicant: Dasnoc Limited

Development: Phase 1 of a services and retail centre and will consist of 3 no. office blocks as follows: (1) Block A comprises a five storey office building of 3,019.6 sq.m. gross floor area which fronts onto the Nangor Road and which will accommodate 18 no. own door office units and 1 no. ESB substation; (2) Block B comprises a five storey office building of 2,905.1 sq.m gross floor area which fronts onto the Nangor Road and is located adjacent to the boundary with Grange Castle Golf Course - this block will accommodate 26 no. own door office units; (3) Block C comprises a four storey office building of 2,684.8 sq. m. gross floor area located adjacent to the boundary with Grange Castle Golf Course which will accommodate 24 no. own door office units. The proposed blocks are arranged in a u-shaped configuration around a central landscaped square. Vehicular access to the site is proposed via a left-turning entry and exit slip lane from the Nangor Road and also via the internal Spine Road permitted under application Reg. Ref. SD06A/0568. The proposed development includes 30 no. surface level car parking spaces and one level of underground car parking which will accommodate 200 no. car spaces. The development also includes all ancillary services, landscaping and site works on a site of 1.3163 hectares. This application is being lodged pursuant to application Reg. Ref: SD06A/0568 under which planning permission

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was granted for the development of roads and services to facilitate the 'Profile Park' Business Park.

Location: 'Profile Park', Nangor Road, Ballybane, Dublin 22.

Time extension(s) up to and including
Additional Information Requested/Received 11-Jan-2008 / 24-Jan-2008

A Permission has been granted for the development described above, subject to the following (20) conditions.

Conditions and Reasons:

1. The development shall be carried out in its entirety in accordance with the plans, particulars and specifications lodged with the application, save as may be required by the other conditions attached hereto.
   REASON: To ensure that the development shall be in accordance with the permission, and that effective control be maintained.
2. The proposed left in / left out vehicular access off the Nangor Road shall be omitted. Prior to the commencement of any development on site, the developer of these lands shall submit revised drawings showing this access omitted from the proposal. Vehicular access to the proposed development shall be from the internal Profile Park spine road only, as approved under Planning Register Reference SD06A/0568.
   REASON: In the interests of traffic safety and the proper planning and sustainable development of the area.
3. No intensification of the proposed office uses on site, change of use within the units nor the amalgamation of same, shall take place, without the prior approval of the Planning Authority, or An Bord Pleanala on appeal.
   REASON: In the interests of clarity, and the proper planning and sustainable development of the area.
4. a) The water supply and drainage infrastructure, including the disposal of surface water, shall comply with the technical requirements of the Planning Authority.
   b) There shall be complete separation of the foul and surface water drainage systems.
   c) All drainage works for this development shall comply with the Greater Dublin Regional Code of Practice for Drainage Works which can be viewed/downloaded from http://environment.southdublin.ie (click-publications then specifications).
   d) No unit in this development shall be occupied until the foul sewers under Planning Reg. Ref

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SD06A/0568 are fully operational.
e) No unit in this development shall be occupied until the surface water sewers under Planning Reg. Ref SD06A/0568 are fully operational.
f) All surface water runoff from car parking areas shall be routed via a petrol/oil/diesel interceptor before discharging to the surface water sewer.
g) Each unit shall be fitted with South Dublin County Council specification water meter fitted at developer's expense.
h) No unit in this development shall be occupied until the watermains under Planning Reg. Ref SD06A/0568 are fully operational
i) The development shall have its own individual connection to the public watermain and 24 hour storage.
j) The developer shall install stopcock valve, within a boundary box, at the curtilage of the premises (not more than 9'/225mm from boundary wall).
k) Buildings of 3 storeys or more shall require balancing tanks and booster pumps on rising main to top storey units to ensure adequate pressure to top storey units.
REASON: In the interests of public health and in order to ensure adequate drainage provision.

5. Finished floor levels shall be at least 500mm above highest known flood levels.
REASON: In the interests of public health and in order to ensure adequate drainage provision.

6. a) The development shall be landscaped in accordance with a detailed Landscape Plan, which shall be agreed with South Dublin County Council Parks and Landscape Services Department prior to the commencement of the proposed development, and approved in writing by the Planning Authority. This plan shall include detailed specifications relating to paths, drainage, boundary treatment, planting, hard surfaces and street trees planting where necessary. In particular, the landscape plan shall show a strip of continuous planting along the eastern boundary with Grange Castle Golf Course no less than 8 metres in width. Details regarding the type, size, location and number of plants proposed should be clearly indicated on a Planting Plan to accompany the Landscape Master Plan. The developer of these lands shall consult with the Parks and Landscape Services Department prior to the submission of same.
b) The developer of these lands shall submit a certificate of effective completion for the landscape scheme, such certificate to be prepared by the Landscape Architect for the project.
c) Detailed proposals for the future maintenance/management of all landscaped areas shall be submitted for the written agreement of the Planning Authority prior to the commencement of development, in order to ensure proper establishment of proposed planting and grassed areas. Any tree / plant which fails in the first planting season shall be replaced.
REASON: In the interests of visual amenity and the proper planning and sustainable development of the area.

7. a) Details of all proposed external finishes shall be submitted for the agreement of the

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COMHAIRLE CONTAE ÁTHA CLIATH THEAS

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Dublin 24.
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Email: *cccounter@sdublincoco.ie*
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Planning Authority
b) Details (height, material etc) of all walls, fences and other means of enclosure shall be submitted for the agreement of the Planning Authority
REASON: In the interest of the proper planning and sustainable development of the area

8. Prior to the commencement of any development on site, the developer of these lands shall submit and agree revised drawings showing the detailed design of the proposed lightwells to Cores A and B.
REASON: In the interests of visual amenity.

9. a) Any external lighting system shall be designed to minimise potential glare and light spillage.
b) All lighting should be of a type that ensures deflection of lighting downwards.
REASON: To prevent light pollution in the interests of the proper planning and sustainable development of the area.

10. The kerbs at the vehicular entrance shall be dished to the requirements of the Planning Authority at the developer's expense.
REASON: In the interests of the proper planning and development of the area.

11. Sheltered and secure cycle parking facilities shall be provided. Details of bicycle parking facilities for the unit shall be submitted to the Planning Authority for agreement in writing prior to commencement of development.
REASON: To promote sustainable forms of transport and in the interests of permeability and proper planning and sustainable development.

12. Prior to the commencement of the development a street naming and numbering scheme shall be submitted for the written agreement of the Planning Authority that reflects the local and historical context of the approved development, complies with the guidelines on naming and numbering of the Department of the Environment, Heritage and Local Government and preferably makes reference to the use of the Irish language and have regard to the Guidelines issued by the Placenames Commission (An Coimisiún Logainmneachta).
REASON: In the interest of the proper planning and development of the area.

13. Prior to commencement of development, the developer shall submit, and obtain the written agreement of the Planning Authority, a plan containing details for the management of waste (and in particular, recyclable materials) within the development, including the provision of facilities for the storage, separation and collection of the waste and, in particular, recyclable materials, and for the ongoing operation of these facilities.
REASON: To provide for the appropriate management of waste and, in particular recyclable materials, in the interests of protecting the environment and in the interests of the amenities of

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the area.

14. a) No advertising sign(s) or structure(s) shall be erected except those, which are exempted development, without the prior approval of the Planning Authority or An Bord Pleanala on appeal.
b) Any proposed signage shall not be internally illuminated.
REASON: In the interest of visual amenity and the proper planning and development of the area.

15. All requirements of the Environmental Health Officer shall be ascertained prior to the commencement of the proposed development.
REASON: In the interests of public health.

16. During the construction/demolition phase of the development, Best Practicable Means shall be employed to minimise air blown dust being emitted from the site. This shall include covering skips and slack-heaps, netting of scaffolding, daily washing down of pavements or other public areas, and any other precautions necessary to prevent dust nuisances.
REASON: To contain dust arising from construction / demolition in the interests of public health and to prevent nuisance being caused to occupiers of buildings in the vicinty.

17. a) All necessary measures shall be taken by the developer of these lands to prevent the spillage or deposit of clay, rubble or other debris on adjoining roads during the course of the works.
b) All footpaths and roads affected by the development works shall be maintained in a safe and tidy condition.
REASON: In the interest of the amenity, safety and maintenance of adjoining roads and footpaths.

18. The developer of these lands shall comply with British Standard B.S 5228 Noise Control on Construction and Open sites.
REASON: In the interest of public health.

19. The developer shall pay the sum of € 771,796.85(seven hundred and seventy one thousand seven hundred and ninety six euro and eigty five cent) (updated to the appropriate rate at the date of commencement of development in accordance with changes in the Tender Price Index) to South Dublin County Council as a contribution towards expenditure in respect of public infrastructure and facilities benefiting development in the area of the planning authority and that is provided, or that it is intended will be provided, by or on behalf of the County Council as provided for in the Contribution Scheme for the County made by the Council. This

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contribution to be paid before the commencement of development on the site.

REASON: The provision of such facilities will facilitate the proposed development. It is considered reasonable that the payment of a contribution be required, in respect of public infrastructure and facilities benefiting development in the area of the planning authority and that is provided, or that is intended will be provided, by or on behalf of the Local Authority.

20. Before the development is commenced, the developer shall lodge with the South Dublin County Council a cash deposit of € 45, 524.69 (forty five thousand five hundred and twenty four euro and sixty nine cent) (updated to the appropriate rate at the date of commencement of development in accordance with changes in the Tender Price Index) , or a bond of an Insurance Company of € 75,873.07 (seventy five thousand eight hundred and seventy three euro and seven cent) (updated to the appropriate rate at the date of commencement of development in accordance with changes in the Tender Price Index) , or other security to secure the provision and satisfactory completion and maintenance to taking-in-charge standard of roads, footpaths, sewers, watermains, drains, public lighting and other services required in connection with the development.
REASON: To ensure the satisfactory completion of the development.

Note 1: The applicant/developer is advised that under the provisions of Section 34 (13) of the Planning and Development Act 2000 a person shall not be entitled solely by reason of a permission to carry out any development.

(1) All buildings must be designed and constructed in accordance with the Building Regulations 1997.
(2) Building Control Regulations require a Commencement Notice. A copy of the Commencement Notice is attached.
(3) A Fire Safety Certificate must be obtained from the Building Control Authority, where applicable.
(4) Free Standing Walls must be designed and constructed in accordance with IS 325: Code of Practice for use of Masonry Part 1 : Structural use of reinforced Masonry. The Owner must also ensure that the construction of all walls is supervised by a competent person.

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Signed on behalf of South Dublin County Council.

..... Marcin Dolan 02-Apr-2008

for SENIOR EXECUTIVE OFFICER.

Contact South Dublin County Council 24 hours a day at www.southdublin.ie
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Derelict Sites
Vacant Sites

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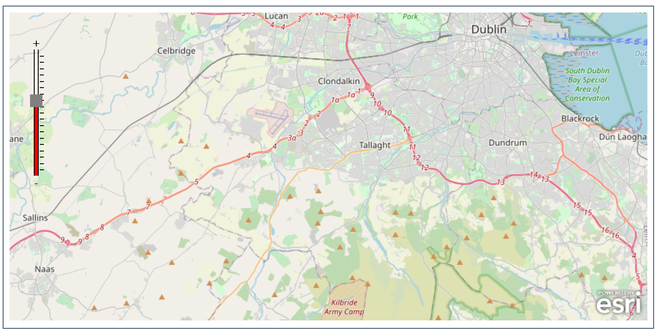
Date Received:	23/07/2012
Last Action:	02/10/2012, Additional Information
Application Type:	Permission
Submission Type:	Additional Information
Closing Date for Submissions:	Closed
Applicant:	Crowe Howarth
Location:	Profile Park, Nangor Road, Clondalkin, Dublin 22
Proposed Development:	Erection of a 2.4m high perimeter fence along Nangor Road boundary (approximately 250m long) with separate entrance gates for vehicular, bicycle and pedestrian access; construction of a single storey security hut with security barriers.
Decision Due:	26/10/2012

Decision Details

Decision Date:	22/10/2012
Decision:	GRANT PERMISSION
Final Grant Date:	N/A



Documents

Please note: Most documents are in Adobe Acrobat pdf format which is free to download and install. If you have any problems displaying the document in your browser then right-click the link below and save the file to your computer.

File	Type
Acknowledgement	Adobe PDF
Application(Form/Letter)	Adobe PDF
Site Notice	Adobe PDF
Site Location Map	Adobe PDF
Plans Elevations & Sections	Adobe PDF
Plans Security Fencing	Adobe PDF
Correspondence Schedule of Documents	Adobe PDF
Fee Check Sheet	Adobe PDF
Consultee Reports (Internal/External) Envir. Services	Adobe PDF
Manager's Orders A.I. requested	Adobe PDF
Notification of Decision A.I. requested	Adobe PDF
Consultee Reports (Internal/External) Roads	Adobe PDF
Further Information Acknowledgemnet Letter	Adobe PDF
Further Information Correspondance from Architect	Adobe PDF
Further Information Method statement	Adobe PDF
Further Information Security Hut elevations & Sections	Adobe PDF
Further Information Security Fencing	Adobe PDF
Further Information Site Location Map	Adobe PDF
Site Notice Inspection, Fee Sheet, Validation Forms	Adobe PDF
Manager's Orders Re : Grant permission	Adobe PDF
Notification of Decision Re : Grant permission	Adobe PDF
Consultee Reports (Internal/External) Environment	Adobe PDF
Consultee Reports (Internal/External) Roads A. I.	Adobe PDF
Final Grant	Adobe PDF

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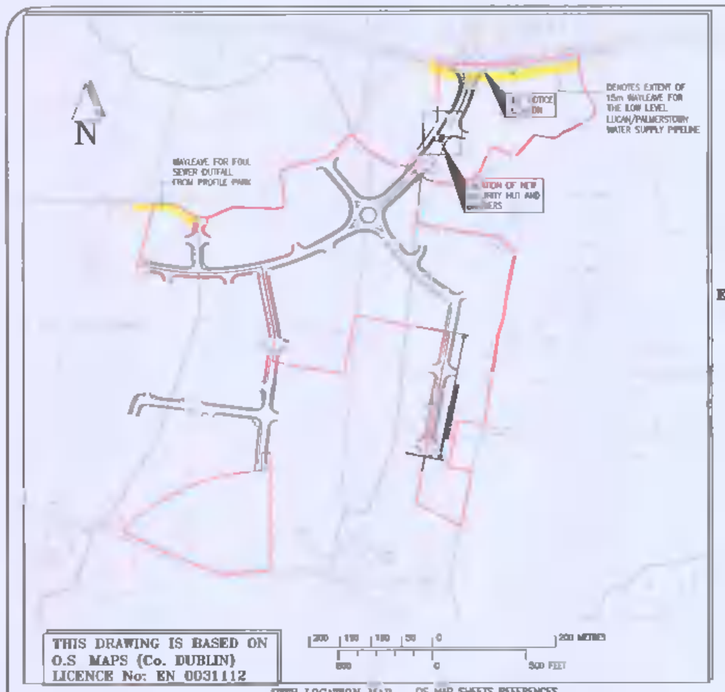

SITE LOCATION MAP
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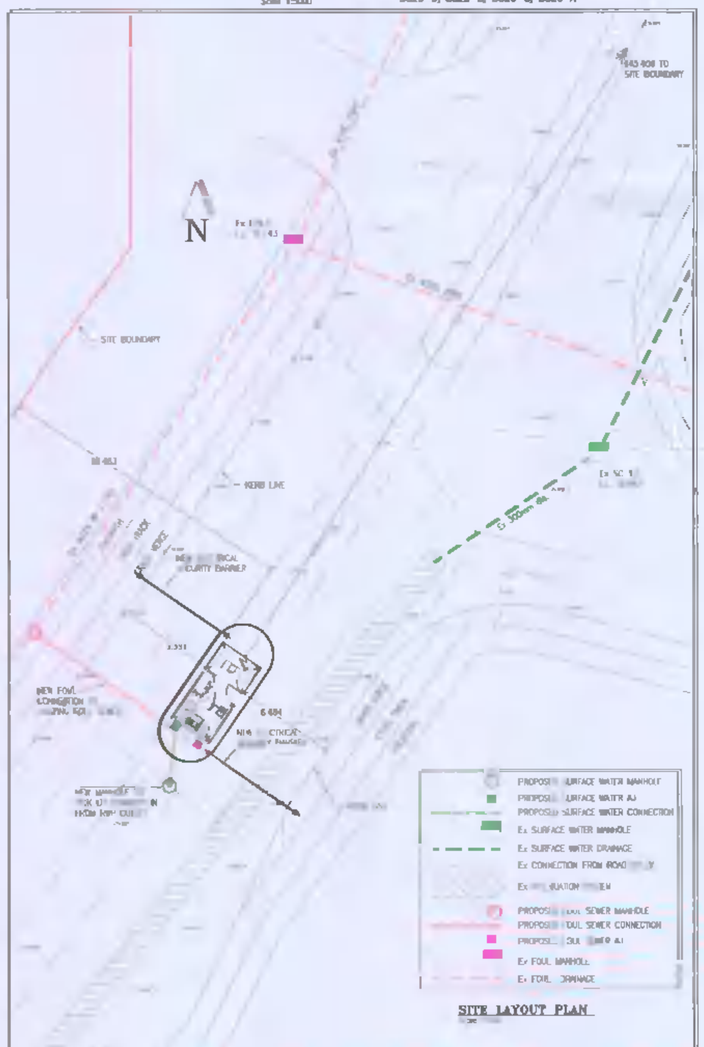
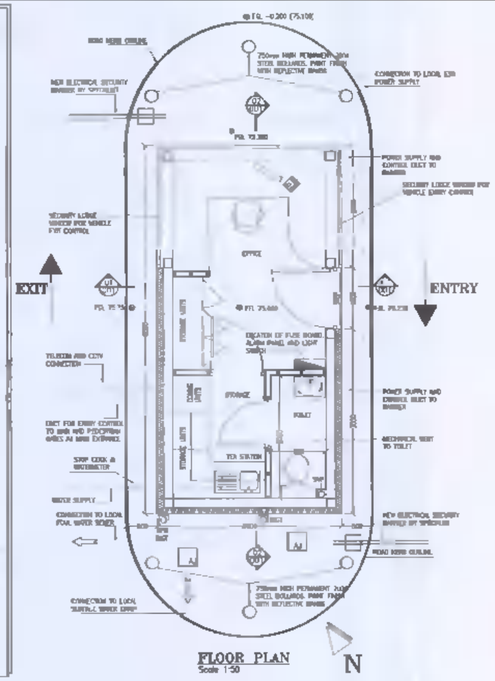
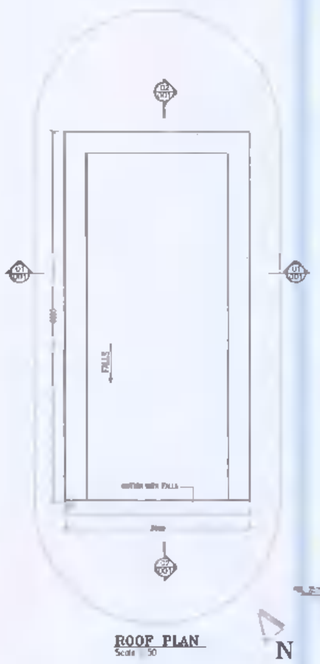
OS MAP SHEETS REFERENCES
3325-D, 3325-B, 3326-C, 3326-A



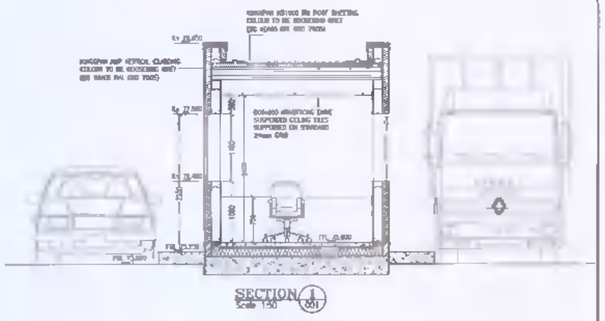
SITE LAYOUT PLAN



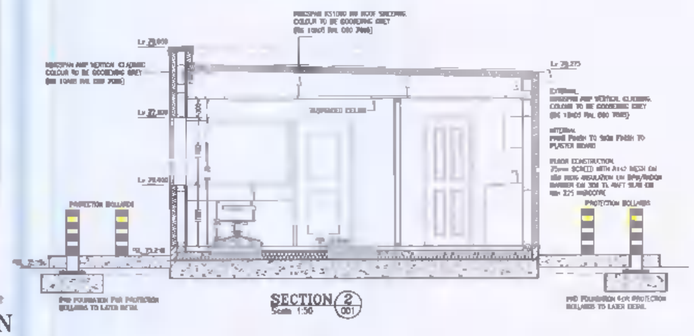
FLOOR PLAN
Scale 1:50



ROOF PLAN
Scale 1:50



SECTION 1
Scale 1:50



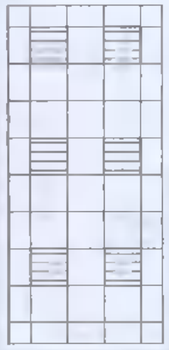
SECTION 2
Scale 1:50

CEILING AREA:
- PAINTED FINISH TO STUD WALL CONSTRUCTION
- ANTI SLIP FLOOR TILES TO FLOOR SPEC
- PLASTICA NEW TOP WITH LAMINATED STORAGE CABINETS
- CONTROL PANEL FOR SECURITY BARRIER AND EMERGENCY EXITS
- SECURITY MONITOR WITH CONNECTION TO INTERNAL CCTV
- THREE POWER POINTS AT 3 LOCATION TO BE AGREED
- INTERNAL AND EMERGENCY SIGNAGE (LOCATIONS TO BE AGREED)

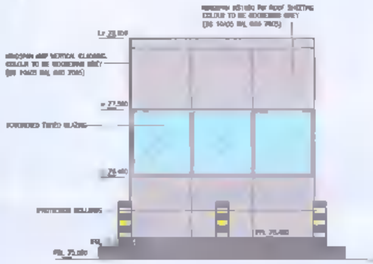
KITCHEN AREA:
- STAINLESS STEEL SINK AND DRAINER C/W WITH TAPS
- CERAMIC SPLASH BACK TILE FINISH TO WALL
- ANTI SLIP FLOOR TILES TO CLIENT SPEC
- FORMICA WORK TOP WITH HIGH GLOSS LAMINATED CUPBOARDS/UNITS UNDER C/W WITH HANDLES
- HIGH LEVEL WHITE GLOSS LAMINATED CUPBOARDS/UNITS FOR STORAGE
- TWIN POWER POINT

TOILET AREA:
- STAINLESS STEEL HAND WASH BASIN C/W WITH TAPS
- SURFACE MOUNTED SHELF AND EXTRACT C/W WITH SLOT AND COVER
- CERAMIC WALL AND ANTI SLIP FLOOR TILES TO CLIENT SPEC
- BATHROOM EXTRACTOR FAN

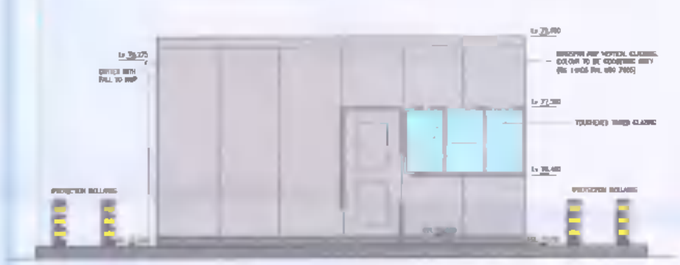
CEILING FINISH:
- 600x600 ARMSTRONG DUNE SUSPENDED CEILING TILES SUPPORTED ON STANDARD 24mm GRID
- 6 No. RECESSED FLUORESCENT LUMINAIRE C/W 4 NO 58W TRI-PHOSPHOR LAMPS, CAT 2 LOUVRE OR SIMILAR APPROVED (LOCATION TO BE AGREED)



CEILING GRID



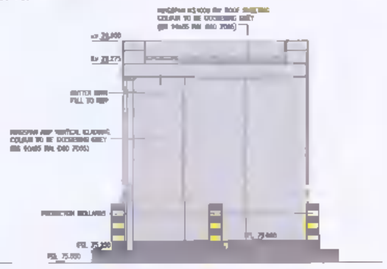
NORTH ELEVATION
Scale 1:50



EAST ELEVATION
Scale 1:50



WEST ELEVATION
Scale 1:50



SOUTH ELEVATION
Scale 1:50

NOTES A1

NOTES:-

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING. DIMENSIONS TO BE CHECKED ON SITE.
2. THIS DRAWING TO BE READ IN CONJUCTION WITH ALL OTHER ARCHITECTURAL & ENGINEERING DRAWINGS & ALL OTHER RELEVANT DRAWINGS & SPECIFICATIONS
3. ALL LEVELS RELATE TO O.S. DATUM AT MALIN HEAD UNLESS NOTED OTHERWISE

Rev	Note	Drawn By	Checked By	Date
A	DRAFT ISSUE	KeB	FD	08 May '12
B	ISSUED FOR PLANNING APPLICATION	KeB	FD	08 May '12

Status
FOR PLANNING

Client
AIDEN MURPHY, STATUTORY RECEIVER FOR DASNOC LTD

Project
NEW ENTRANCE SECURITY HUT AND BOUNDARY FENCING ALONG NANGOR ROAD

Drg.Title
SECURITY HUT-
PLANS ELEVATION AND SECTION

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Glasnevin, Dublin 9.
Tel: 01 8301852 Fax: (01) 8602265
Mail: mail@dfk.ie

Scale: AS SHOWN

Drg.No. 12008/001 Rev B

Connecting You to

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Átha Cliath Theas
South Dublin County Council

Land Use, Economic and Transport Planning Department.
County Hall, Tallaght, Dublin 24.
Telephone: 01 414 9000 : *Fax: 01 414 9104* *Email:* **planning.dept@sdublincoco.ie**

Doherty Finegan Kelly
Botanic Court
30-32, Botanic Road
Glasnevin
Dublin 9

NOTIFICATION TO GRANT PERMISSION
PLANNING & DEVELOPMENT ACT, 2000 (as amended) AND PLANNING REGULATIONS THEREUNDER

Final Grant Order No.:	**1033**	Date of Final Grant:	**03-Dec-2012**
Decision Order No.:	**0922**	Date of Decision:	**22-Oct-2012**
Register Reference:	**SD12A/0150**	Date:	**02-Oct-2012**

Applicant: A. Murphy, Receiver for Dasnoc Ltd., Crowe Howarth
Development: Erection of a 2.4m high perimeter fence along Nangor Road boundary (approximately 250m long) with separate entrance gates for vehicular, bicycle and pedestrian access; construction of a single storey security hut with security barriers.
Location: Profile Park, Nangor Road, Clondalkin, Dublin 22

Time extension(s) up to and including
Additional Information Requested/Received 08-Aug-2012, 11-Sep-2012 / , 02-Oct-2012

A Permission has been granted for the development described above, subject to the following () conditions.

Conditions and Reasons:

1. The development shall be carried out in its entirety in accordance with the plans, particulars and specifications lodged with the application, as amended by Further Information received on 02/10/2012, save as may be required by the other conditions attached hereto.
   REASON: To ensure that the development shall be in accordance with the permission and that effective control be maintained.

2. (a) The water supply and drainage infrastructure, including the disposal of surface water, shall comply with the technical requirements of the Planning Authority.
   (b) There shall be complete separation of the foul and surface water drainage systems.
   (c) All drainage works for this development shall comply with the Greater Dublin Regional Code of Practice for Drainage Works which can be viewed/downloaded from http://environment.southdublin.ie (click-publications then specifications).
   (d) Prior to the commencement of development a method statement for locating and protecting the 700mm public watermain at the site entrance shall be submitted to and approved in writing by the Planning Authority.
   REASON: In the interests of public health and in order to ensure adequate drainage provision.

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Land Use, Economic and Transport Planning Department.
County Hall, Tallaght, Dublin 24.
Telephone: 01 414 9000 : ***Fax: 01 414 9104*** ***Email:*** **planning.dept@sdublincoco.ie**

3. No advertisement signs, advertisement structures, banners, canopies, flags, or other projecting elements shall be displayed or erected on the railings or gates unless authorised by a further grant of planning permission.
   REASON: To protect the visual amenities of the area.
4. All necessary measures shall be taken by the contractor to prevent the spillage or deposit of clay, rubble or other debris on adjoining roads and footpaths during the course of the works.
   REASON: To protect the amenities of the area.

Note 1: The developer is advised that under the provisions of Section 34 (13) of the Planning and Development Act 2000 a person shall not be entitled solely by reason of a permission to carry out any development.

Note 2. The excavation of the proposed trial holes where the new fence crosses over the watermain at the site entrance shall be witnessed by Water Maintenance personnel. Personnel at Deansrath Depot, (Phone 4138500) shall be contacted prior to the excavation of the proposed trial holes in order to arrange for site inspection.

Note 3. A T3 licence shall be secured from South Dublin County Council, Roads Maintenance Department prior to commencement of any works in the public domain, in order to comply with The Roads Act 1993 Section 13 Paragraph 10.

(1) All buildings must be designed and constructed in accordance with the Building Regulations 1997.
(2) Building Control Regulations require a Commencement Notice. A copy of the Commencement Notice is attached.
(3) A Fire Safety Certificate must be obtained from the Building Control Authority, where applicable.
(4) Free Standing Walls must be designed and constructed in accordance with IS 325: Code of Practice for use of Masonry Part 1 : Structural use of reinforced Masonry. The Owner must also ensure that the construction of all walls is supervised by a competent person.

Signed on behalf of South Dublin County Council.

..... 04-Dec-2012
for Senior Planner

DS Ref	Reg No	Address of Property	Owner	Address of Owner	Occupier	Electoral Area	Section 8(2) Notice Intention to Register	Section 11 Notice Works Required	Section 8(7)Entered on to Register	Valuation	Valuation Date	Levy applied from	Annual value of Levy to date 31/12/19	Annual Value of Levy 2020
1595X	19	Sites at No,3 Ballymount Road Lower, Walkinstown, Dublin 12	Mr. Yung Yiu Ronnie Tang & Miss Sokam Wong	c/o 65 Middle Abbey Street, Dublin 1	Unoccupied	Templeogue Terenure	21/02/2014	14/03/2014	26/06/2014	€300,000	20/03/2020	2016	€15,000	€21,000
1734	20	Capri' Bungalow, Whitechurch Road, Rathfarnham, Dublin 16	Cashwood Poles Ltd	Cashwood Poles Ltd. Ballycrystal, Bunclody, Co. Wexford	Unoccupied	Rathfarnham	03/03/2014	26/01/2015	29/07/2014	€750,000	18/03/2020	2016	€16,500	€52,500
1317A	22	Ballyroan House Lodge, Ballyboden Road, Rathfarnham, Dublin 16	Ballycragh Developments Ltd	4 Inver Mews, Old Chapel Ground, Arklow, Co. Wicklow	Unoccupied	Rathfarnham	14/11/2013	05/02/2013	04/11/2014	€300,000	20/03/2020	2018	€7,500	€21,000
1726	27	38 Russell Crescent, Jobstown, Tallaght, Dublin 24	Sean McGowan	38 Russell Crescent, Jobstown, Tallaght, Dublin 24	Unoccupied	Tallaght South	08/12/2014	21/01/2014	16/02/2015	€70,000	30/03/2016	2018	€2,100	€4,900
1759	30	Land Between New Hall & Deselby, N81 opp Topaz,Tallaght, Dublin 24	David McCreevey & Kevin O'Hare	2 Saggart Lakes, Citywest. Saggart, Co. Dublin & River Lodge, Firhouse, Dublin 24	Unoccupied	Tallaght South	29/05/2015	18/09/2014	26/08/2015	€65,000	14/04/2016	2018	€1,950	€4,550
1701	34	35 Wheatfield Road, Palmerstown, D.20	Della Moynihan	3/4 Ushers Quay, D.8	Unoccupied	Clondalkin	10/06/2016	08/07/2014	15/08/2016	€275,000	24/01/2017	2018	€8,250	€19,250
1783	39	37a Suncroft Park, Tallaght, Dublin 24	Connect Serviced Offices Ltd	Maple House, South County Business Park, Dublin 18, D18 F863	Unoccupied	Tallaght	15/11/2016	12/09/2016	07/12/2016	€100,000	07/02/2017	2018	€3,000	€7,000
1817	40	Lynch's Lane, Newcastle, Co Dublin	Anthony Mc Dermott	36 Cloona Crescent, Dunmurray, Belfast BT17 OHG, Northern Ireland	Unoccupied	Clondalkin	30/11/2016	16/09/2016	02/02/2017	€160,000	20/07/2017	2018	€4,800	€11,200
1825	45	61 Swiftbrook Park, Tallaght, Dublin 24	Permanent TSB	56-59 St Stephen's Green, Dublin 2	Unoccupied	Tallaght South	29/03/2017	n/a to date	16/03/2018	€180,000	16/10/2018	2019	€5,400	€12,600
1865	48	Chetwynd's Cottage, Greenhills Road, Dublin 12	Walkinstown Capital Development Ltd	29, Fitzwilliam Place, Dublin 2 D02Y Y38	Unoccupied	Templeogue Terenure	11/12/2018	n/a	27/02/2019	€290,000	01/11/2019	2020	------	€20,300

Register No.	Address of Property	Folio Reference	Owner	Address of Owner	Address of Owner	Date Site Entered onto Register	Valuation €	Date Valuation Entered onto Register
SD/VS304	Junction of Hazelhatch Road and Newcastle Main Street, Newcastle, Co. Dublin (Formerly McEvoys Pub)	DN4316N	Ms.Aislinn Van Lonkhuyzen	Moate Lodge,	Newcastle, Co. Dublin	19th May 2017	€270,000	11 October 2018
SD/VS157	Site located at Alymer Heath; accessed off Alymer Green and Alymer Grove, Newcastle, Co. Dublin	DN193101F	Dunkirk Properties Limited	62 Hayfield,	Maynooth, Co. Kildare	11th August 2017	€2,750,000	11 October 2018
SD/VS64	Lands at the junction of Grange Road, Nutgrove Avenue and Loreto College, Rathfarnham, Dublin 14	Memorial No. 2006-119-203	Mr. Karl Reid	39 Waterloo Road	Ballsbridge, Dublin 4	15th March 2018	€2,000,000	12 December 2018
			Mr. Stuart Reid	39 Waterloo Road	Ballsbridge, Dublin 4			
SD/VS367	Blessington Road, Tallaght, Dublin 24	DN187625F	Mr Kevin O'Hare	River Lodge,	Firhouse Road, Dublin 24	15th March 2018	€180,000	12 December 2018
			Mr. David McCreevy	2 Saggart Lawns,	Citywest, Saggart			
SD/VS079	Site located along Peamount Road, Newcastlem, Co. Dublin	DN13077N	Swords and Fitzgerald Ltd	c/o Conway, Conway & Co, 11 Basin Street,	Naas, Co. Kildare, W91 X290	18th December 2018	€175,000	16 October 2019
SD/VS248	Site at junction of Main Street & Boherboy, Saggart, Co. Dublin	DN11211F DN2357F	Maxol Ltd	3 Custom House Plaza,	4th Floor, IFSC, Dublin 1.	18th December 2018	€1,400,000	16 October 2019
			Thomas McMullan	3 Custom House Plaza,	4th Floor, IFSC, Dublin 1.			

Register No.	Address of Property	Folio Reference	Owner	Address of Owner	Address of Owner	Date Site Entered onto Register	Valuation €	Date Valuation Entered onto Register
SD/VS315	Ardeevin Avenue, Lucan, Co. Dublin	DN199741F	Phoenix Croft Ltd	Gardenia,	Tandy's Lane, Lucan, Co. Dublin	18th December 2018	€1,600,000	16 October 2019
SD/VS365	Site located at Mill Road, Saggart, Co. Dublin	DN10805	Jackie Cosgrave	The Sheldon Park Hotel,	Kylemore Road, Dublin 12.	18th December 2018	€1,800,000	16 October 2019
SD/VS216	Site located at the junction of the Belgard Road and Blessington Road, Belgard Square East, Tallaght, Dublin 24.	DN216605F DN92077F	SDI (Tallaght) Limited	c/o Heatons, IDA Business Park,	Whitestown Road, Tallaght, Dublin 24, D24 E932.	5th July 2019	€4,750,000	16 October 2019
SD/VS368	Site located at Mill Bridge, Saggart, County Dublin	DN7185F	Crekav Trading GP Limited	Heritage House,	23 St. Stephen's Green, Dublin 2.	5th July 2019	€5,900,000	16 October 2019
SD/VS370	Site at Parson's Court bounded by Burgage Green to the west, Newcastle, Co. Dublin	DN8033	Vincent Buggy	12 The Crescent,	Temple Manor, Celbridge, Co. Kildare.	5th July 2019	€220,000	18 December 2019
			Dermot P Coyne	Ards, Westmanstown,	Lucan, County Dublin.	5th July 2019		
SD/VS097	Site at junction of Nangor Road and Fonthill Road, Clondalkin, Dublin 22	DN4922 DN6259F	South Dublin County Council	County Hall,	Tallaght, Dublin 24. D24 YNN5	16th October 2019	€1,800,000	18 December 2019
SD/VS098	Site located off the Bawnogue Road, adjacent to 151 & 208 Alpine Heights, Dublin 22	DN18643	South Dublin County Council	County Hall,	Tallaght, Dublin 24. D24 YNN5	16th October 2019	€500,000	18 December 2019

Appendix E – Previous Reports

PLANNING AND DEVELOPMENT ACT, 2000,
PLANNING & DEVELOPMENT (AMENDMENT) ACT, 2002
EUROPEAN COMMUNITIES (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 1989 TO 1999,
PLANNING AND DEVELOPMENT REGULATIONS, 2001 & 2002

South Dublin County Council
Planning Department - Registry

05. JUL 2006 SD06A 0568

Date Received	Register Reference

Planning permission is sought by Dasnoc Limited for development consisting of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Ballybane, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

ENVIRONMENTAL IMPACT STATEMENT

Prepared for

DASNOC LIMITED

By

RPS Planning & Environment

Ordnance Survey Licence No. SU 0001006

July 2006

PROFILE PARK – ROADS AND SERVICES APPLICATION
ENVIRONMENTAL IMPACT STATEMENT
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1.0 INTRODUCTION

1.1 NATURE AND EXTENT OF PROPOSED DEVELOPMENT

Planning permission is sought by Dasnoc Limited for development consisting of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

This business park forms part of a larger overall area of approximately 200 acres for which a Masterplan has already been prepared in line with the requirements of the South Dublin County Development Plan 2004-2010 (See figure 1.1).

1.2 REASON FOR THIS ENVIRONMENTAL IMPACT STATEMENT

The roads and services development which is the subject of this planning application is sub-threshold in terms of the requirement to carry out an Environmental Impact Assessment. Notwithstanding this, these roads and services will facilitate a business park development of 39.84 hectares and in this regard, it is a requirement under Schedule 5, Part 2, 10 (a) of the Planning and Development Regulations 2001, that infrastructure projects consisting of industrial estate development projects, where the area would exceed 15 hectares, require the undertaking of an Environmental Impact Assessment. Thus having carried out a scoping exercise at the outset of the project it was decided that an Environmental Impact Assessment of the proposed roads and services development should be undertaken in light of the size of the overall development of which the current application forms part, and in light of the potential for significant or cumulative environmental impacts.

1.3 EIS STRUCTURE AND CONTENT

The information contained in this EIS has been completed in accordance with the relevant provisions set out in Article 94 of the Planning and Development Regulations, and detailed in Schedule 6 as follows:

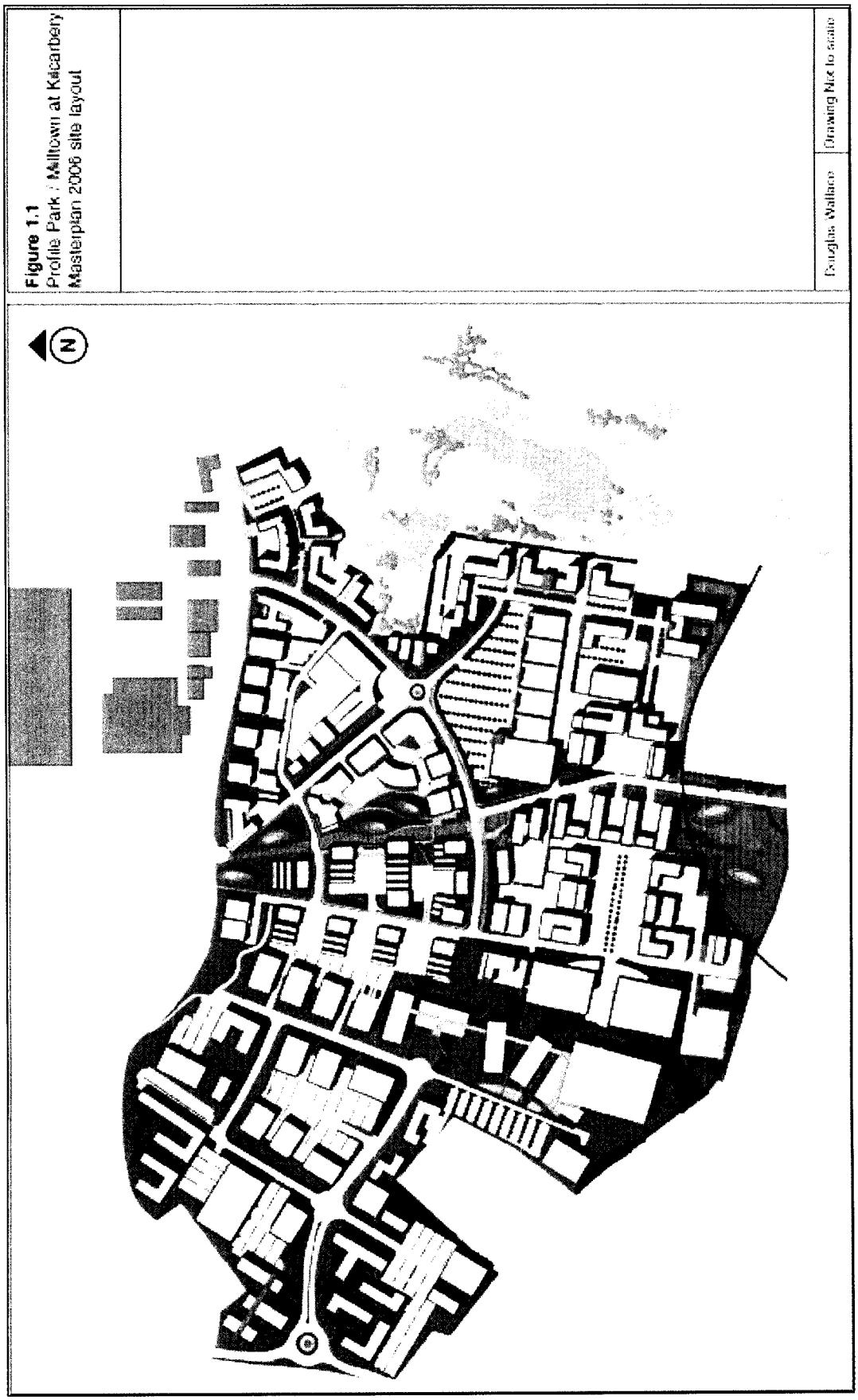
1. (a) A description of the proposed development comprising information on the site, design and size of the proposed development.

(b) A description of the measures envisaged in order to avoid, reduce and if possible, remedy significant adverse effects.

(c) The data required to identify and assess the main effects which the proposed development is likely to have on the environment.

(d) An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment.

Figure 1.1: Profile Park/Milltown at Kilcarbery Masterplan 2006 – Site layout



2. Further information by way of explanation or amplification of the information referred to in paragraph 1, on the following matters:

(a)(i) a description of the physical characteristics of the whole proposed development and the land-use requirements during the constructional and operational phase;

(ii) a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;

(iii) an estimate, by type and quantity, of expected residues and emissions (including water, air, and soil pollution, noise, vibration, light, heat and radiation) resulting from the operation of the proposed development;

(b) a description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular:

- human beings, fauna and flora
- soil, water, air, climatic factors and the landscape
- material assets, including the architectural and archaeological heritage and the cultural heritage.
- The inter-relationship between the above factors;

(c) a description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from:

- the existence of the proposed development,
- the use of natural resources,
- the emission of pollutants, the creation of nuisances and the elimination of waste,

and a description of the forecasting methods used to assess the effects on the environment;

(d) an indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.

The preparation of an EIS requires the co-ordination and synthesis of associated yet diverse elements of the overall assessment. To facilitate this process, a schematic structure was used in order to provide a coherent documentation of the varied aspects of the environment considered. Specifically, this Environmental Impact Statement follows the "grouped format structure" as referred to in Section 1.7.2 of the EPA document – "*Guidelines on the Information to be contained in Environmental Impact Statements*". The grouped format structure used for the purposes of this EIS is detailed below.

(1) The Receiving Environment (Baseline Situation)

This section contains a description of the existing environment in which the proposed development is located. The particular aspects of the environment are discussed in terms of their context, character, significance and sensitivity.

(2) The Characteristics of the Proposal

This section provides a projection of the specific "load" on the particular aspects of the environment, specific to a particular topic, which the proposal would be likely to generate. This includes a summary of the principal aspects of the scheme that have the potential to impact on the environment.

(3) The Potential Impact of the Proposal

This section comprises a general description of the possible types of impacts which proposals of this kind would be likely to produce. This includes a consideration of the "Do Nothing" scenario which describes the environment as it would be in the future if there was no development.

(4) Remedial or Reductive Measures

This section contains a description of any specific remedial or reductive measures considered necessary and practicable resulting from the assessment of potential impacts described in (3) above.

(5) The Predicted Impact of the Proposal

(a) An assessment of the specific direct and indirect impacts of the proposal arrived at by adding to the receiving environment (as in (1) above), the loading of the proposal (as in (2) above) and the remedial or reductive measures (as in (4) above) is provided. The predicted impacts are discussed having regard to their character, magnitude, duration, consequences and significance.

(b) This includes a consideration of a "Worst Case" scenario which would arise where a development, or its mitigation measures, substantially fails.

(6) Monitoring

A description of any post development monitoring of effects on the environment which might be necessary, covering the monitoring methods, and the Agencies responsible for their implementation is provided in this sub-section.

(7) Reinstatement

Where required, a description of reinstatement measures and the Agencies responsible for their implementation is provided.

This EIS has also been prepared having regard to the "*Guidelines on the Information to be contained in Environmental Impact Statements*" and also "*Advice Notes on Current Practice in the preparation of Environmental Impact Statements*", which were published by the Environmental Protection Agency in 2002 and 2003 respectively.

1.4 EIS STUDY TEAM

This EIS was prepared by a study team led by RPS Planning and Environment, who were responsible for the overall management and co-ordination of the study. RPS Planning and Environment were also responsible for the preparation of various sections of the EIS including the introduction, the non-technical summary, the description of the proposed development, the planning and development context and the sections in relation to human beings and interactions. The members of the study team and their respective inputs into this EIS are outlined in Table 1.1 below.

Table 1.1 – EIS Study Team

EIS Consultant	EIS Section
RPS Planning and Environment	• Introduction • Non technical summary • Description of Proposed Development • Planning and Development Context • Human Beings • Interactions
Scott Cawley	• Flora and Fauna
White Young Green	• Soils, Geology and Hydrogeology including Waste
Doherty Finnegan Kelly Consulting Engineers	• Water – including water supply, surface water and foul sewerage
Roughan O'Donovan Consulting Engineers	• Traffic
RPS Consulting Engineers	• Air – including noise and vibration • Climate – air quality
Murray and Associates	• Landscape and Visual Appraisal
Byrne Mullins	• Archaeology • Architectural Heritage • Cultural Heritage

2.0 NON-TECHNICAL SUMMARY

2.1 INTRODUCTION

This non-technical summary follows the format outlined in Articles 2 and 3 of the Second Schedule of the European Communities (Environmental Impact Assessment), Regulations 1989 (S.I. No. 349 of 1989), as amended by the European Communities (Environmental Impact Assessment) Regulations, 1999 and the Planning & Development Regulations, 2001.

This Environmental Impact Statement has also been prepared having regard to the "*Guidelines on the Information to be contained in Environmental Impact Statements*" and also "*Advice Notes on Current Practice in the preparation of Environmental Impact Statements*" both of which were prepared by the Environmental Protection Agency and published in 2002 and 2003 respectively.

2.2 DESCRIPTION OF THE SUBJECT SITE

The site to which this EIS relate is located in the central western area of County Dublin, to the north of Baldonnell (Military) Aerodrome and approximately 2.5km to the west of Clondalkin village. The site is bound to the north by the R134 (the Nangor or Clondalkin-Milltown Road), the Grange Castle Business Park and Kilcarbery Business Park and to the south by a minor road which runs from the R134 to the N7, and Baldonnell Aerodrome. The eastern edge of the subject lands is bordered by Grange Castle Golf Club. The lands to the west are currently in agricultural use. The subject site itself consists of vacant agricultural fields which collectively comprise an area of 39.84 hectares.

2.3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The development which is the subject of this planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park on the subject site, which will be known as 'Profile Park'. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

2.4 ALTERNATIVES CONSIDERED

The subject site is zoned for enterprise, employment and relates uses under the South Dublin Development Plan 2004-2010, thus the consideration of alternative sites to accommodate the proposed development was not deemed necessary in this instance.

The undertaking of a scoping exercise in the preparation of the Masterplan for the subject lands allowed an examination of alternative land uses on the site to be undertaken and a final masterplanning approach to be decided upon.

The consideration of alternative road layouts on the subject site reflects the constraints of the site itself, the requirements of the Roads Department of South

Dublin County Council and inputs received from the other EIS specialists with regard to potential impacts arising from the proposed development.

2.5 ASPECTS OF THE ENVIRONMENT CONSIDERED

Human Beings

The results of the 2002 Census of Population were used to establish the baseline environment of the site and it surroundings with regard to population, employment and community aspects.

Flora and Fauna

A constraints assessment was carried out on 3rd November 2005 followed by a more detailed site survey on 31st March 2006. Bat foraging surveys were undertaken on 1st May 2006. These surveys allowed an assessment of the ecological status of the site, identification of any ecological constraints, and an assessment of any likely significant impacts of the proposed development on the ecology of the site and its surroundings. During the site visits a detailed account of the floral and faunal composition encountered during the survey was recorded.

Soils, Geology and Hydrogeology (including waste)

A desktop study, site walkover and trial pit investigations were undertaken in order to determine the nature of the existing soils and geology of the site and to assess the impact of construction and operation of the proposed development at the site on the underlying soils and geology. Information relating to the hydrogeological setting at the site was derived from trial pit information and a desk-based study using the Geological Survey of Ireland (GSI) database.

Water

The effects of the development on water was examined under three headings – Surface Water Drainage, Water Supply and Foul Drainage.

Surface water run-off from all individual sites within the business park will be attenuated within the curtilage of each site and that the surface water run-off from the estate roads etc. will be attenuated before discharge to the Griffeen River, the attenuated water being stored in oversized pipes.

Water Supply to the site will be provided from the 700mm diameter trunk main (the Low Level Lucan/Palmerstown Water Supply Scheme) which passes across the northern edge of the site. This watermain is connected to the Belgard reservoir and has sufficient pressure to service this development.

With regard to Foul Drainage, the effluent from this site will be discharged to a pumping station within Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend. All wastewater from the area is treated at the Ringsend Wastewater Treatment Plan (WWTP), which has the capacity to treat a population equivalent of 1.7 million.

Air

Six sample locations were chosen to represent the baseline air quality in the vicinity of the proposed development. As a result of existing site conditions and the potential for traffic derived pollution, the following parameters were measured: nitrogen dioxide (NO_2), sulphur dioxide (SO_2), Benzene, Carbon monoxide (CO) and Particulate Matter PM_{10}. Information regarding the climate at the location of the subject site was obtained from meteorological data from the nearest meteorological station at Baldonnell Aerodrome.

Noise

A baseline noise survey was carried out on the 29th and 30th of March 2006 at four noise sensitive locations in the area of the proposed development. Measurements were made for a period of 15 minutes during the survey. All measurements were carried out in accordance with ISO 1996: '*Acoustics-Description and Measurement of Environmental Noise*'.

Landscape and Visual Assessment

An assessment of the impact of the proposed development on the visual character of the site was undertaken. The methodology employed included a site survey to determine the character of the site and its surrounding area, an assessment of the proposed development using layout plans and sections to determine the impacting features and evaluating the impacts on the landscape in accordance with EPA guidelines.

Traffic and Transportation

The transportation impact of the proposed development was assessed using widely acceptable methods including the T.R.I.C.S. database, which is widely used for trip estimation in Ireland. Consideration was given to access to/from and within the site for all users (cars, pedestrians, cyclists and public transport users). The parking requirements on the site were considered with reference to the South Dublin Development Plan 2004-2010.

Cultural Heritage

The cultural heritage of the area of the proposed development was examined through an archaeological, architectural and historical study. The archaeological and architectural studies involved a documentary/cartographic search and field inspection of the area, while the historical study involved a documentary search.

2.6 LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS AND THE MEASURES ENVISAGED TO AVOID, REDUCE OR REMEDY THEM.

The proposed development was assessed under various environmental headings. The likely predicted impacts of the development on each of these environmental aspects are outlined below.

Human Beings

Population

The development which is the subject of this planning application and the development of the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their construction and operational phases. Thus no remedial measures are required in this regard.

Employment

The construction and operation of the roads and services which are the subject of this planning application will not have a significant impact on employment levels having regard to the nature and scale of the development proposed.

The development of the remainder of the business park has the potential to have a temporary positive impact on employment levels in the locality. In addition, it is estimated that the operational phase of the business park has the potential to increase the workforce of the area by some where in the range of 5,000 - 10,000 persons.

As the impacts on employment levels are expected to be either insignificant or positive, no remedial measures are proposed in this regard.

Community Aspects

There will be no significant negative impact on the resident, working or visiting community at this location during the construction phase of the proposed development. Some short-term localised impacts may be experienced by the adjoining residential units as a result of noise during construction and increased traffic levels. The hours of operation of construction machinery on the subject site will be limited in order to limit any such potential impacts. A construction management plan will also be prepared where construction traffic will be programmed to avoid peak traffic conditions on the surrounding road network. Thus these impacts are not predicted to be significant.

There will be no significant impacts on the resident, working or visiting community at this location during the operational phase of the proposed development thus no mitigation measures are required in this regard.

Some potential adverse localised impacts may be expected to occur during the construction phase of the business park. Many of these would be of a nuisance nature such as an increase in daytime noise levels in the locality. Construction traffic has the potential to pose impacts to the neighbourhood community depending on its frequency, overall numbers and routing. In order to limit any potential short-term noise impact on adjacent residential properties during the construction phase of the business park, the hours of operation of construction machinery on the subject site will be limited. As stated previously a construction management plan will also be prepared in order that construction traffic avoids peak conditions on the surrounding road network.

Potential impacts that may arise during the operational phase of the business park include increased traffic levels, both pedestrian and vehicular in the area, impacts on the existing natural landscape, increased employment opportunities in the area and impact on local services and commercial facilities.

Mitigation measures proposed in this regard include the planting of the boundaries of the subject site with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings. In addition, the heights of any buildings proposed will be reduced adjacent to existing housing at the site boundaries in order to reduce the visual bulk of the buildings. A mobility management plan will also be implemented to reduce the reliance on private car usage.

Flora and Fauna

Replanting or relocation of hedgerows will compensate the loss of hedgerow habitat during the construction phase so that there is no net loss of hedgerow habitat. The ecological functions of the hedgerow will be diminished, as the disturbance of habitats will push otters, badgers and bats away from the site. The residual impacts of this disturbance are likely to be temporary but monitoring of bat, badger and otter activity will help to determine the level of impact prior to any further development of the site. Careful control of the construction works will reduce any potential indirect construction related impacts on off-site areas.

It is not anticipated that there will be any significant impacts to flora and fauna during the operational phase of the proposed development. In order to identify any unforeseen effects during construction and operation of the proposed development, the following mitigation measures are proposed: water quality monitoring of any off-site discharges, monitoring of use of wildlife underpasses, monitoring for otter, bat and badger activity and annual monitoring of condition of planted or relocated hedgerow vegetation.

Soils, Geology and Hydrogeology (including waste)

The soils present across much of the site are of good quality. There were isolated elevated concentrations of lead, diesel range organics, and mineral oil in the leachate analyses at 2 of the 29 trial pit locations. These are not considered to be significant due to the localised extent of the contamination and can easily be resolved by removal of the source material to a licensed facility for disposal.

The area of the site that has received waste in the past comprises mainly inert fill material. While the concentrations of metals were higher in this area they do not pose a risk to the environment or to human health. The presence of wood material within this area may lead to methane generation. Removal of the main area of the wood source would be required in order to reduce further gas generation.

The development of the roads and services infrastructure which is the subject of the current planning application and the associated development of "Profile Park" will involve the disturbance and the removal of soils from the site. This will be mitigated against by keeping earth movements to a minimum. This will result in no residual impacts on the environment.

The removal of the two localised areas containing wood and hydrocarbon compounds will improve the conditions of the site prior to development.

Depending on the specific industries which locate within the business park, some monitoring of groundwater quality may be required.

Water

As noted in Section 2.5, the effects of the development on water are examined under three headings – Surface Water Drainage, Water Supply and Foul Drainage.

Surface Water

With regard to surface water drainage, during the construction phase, there is potential for some silt loads to enter the existing watercourses during rainy periods.

Silltation and groundwater control ponds and underground structures will be utilised at construction stage in order to minimise any potential impact, as well as oil interceptors and post-construction re-instatement. If these measures are put in place, minimal effect is anticipated on stream flows downstream of the subject development.

During the operational phase of the development, due to the increase in the hard surface area, there will be an increase in surface water run-off from the subject lands. Oil spillages are also a possibility.

However, due to the implementation of attenuation measures and petrol interceptors, there should be no appreciable impact on surface water volumes from the proposed development.

Water Supply

The water supply for this proposed development has been designed to cater for the entire Masterplan development. Potential impacts on the existing watermain include construction stage impacts when installing new pipelines and additional demand on the local water supply. During the operational phase, the development will result in an increase in the water demand on the existing watermain network.

In order to limit the possibility of unclean pipework and to limit the likelihood of leaks, all connections to the existing network will be carried out under Local Authority supervision. During the operational phase water usage will be monitored by water meters. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

The impact on water supply during the construction phase will be minimised due to the remedial measures put in place. During the operational phase the development will cause an increase in water usage. However, there is adequate capacity available with the existing network for the Masterplan development.

Foul Drainage

Due to the nature of the proposed development on site, the effluent to be discharged from the site will generally be domestic standard wastewater.

During the construction phase, the significant numbers of workers on the overall subject lands will lead to the generation of foul sewage associated with temporary showers, toilets, canteen and washing facilities. There is also the

possibility of debris and building rubble falling into the existing sewer, as well as health and safety issues resulting from working in close proximity to a live foul sewer. The construction of the sewer network could result in the discharge of silt to existing watercourses.

During the operational phase, there will be an increase in the hydraulic loading within the existing sewer network and a reduction in the capacities of the existing sewer system and there is a possibility of untreated effluent discharging to the water table if pipes are broken or not laid properly during construction.

A number of remedial measures will be put in place in order to minimise potential impacts on the existing sewer system. Temporary, chemical or waterborne facilities will be provided by contractors for the duration of the construction phase.

Siltation and groundwater control ponds and underground structures will be utilised during the construction of the sewer network in order to minimise the potential of silt discharging to water courses.

Mitigation measures during the operational phase include the inspection of sewers by C.C.T.V. cameras and testing in accordance with Local Authority requirements, prior to the discharge of foul effluent to the public sewer system.

There will be no significant impacts on the foul drainage network as a result of foul drainage during the construction phases due to the remedial measures being put in place.

During the operational phase, the increase in the quantity of effluent within the Local Authority sewer network will result in a slight impact on this network.

Air

The main environmental nuisance associated with construction activities is dust. However, if the construction contractor adheres to good working practices and dust mitigation measures the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.

A modelling assessment was carried out to determine the potential increase in ambient pollutant concentrations as a result of the traffic volumes onto the current road network. The modelling approach took a number of conservative approaches to the input data to allow a margin of tolerance in the results and ensure a worst-case scenario of predicted results. The results for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality. The existing backgrounds are relatively low and the increased pollution as a result of the evening peaks of traffic from the proposed development is not predicted to lead to breaches of the relevant air quality limits.

With regard to the potential impact of the proposed development on the climate of the environs of the subject site, it is anticipated that once significant consideration is given to the environmental impact of greenhouse gas emissions at the design stage and that heating and energy systems are operated in accordance with principles of best practice or within consent conditions, the effect of a domestic heating system and energy supply are not considered to be significant. Furthermore the use of natural gas will significantly reduce the

potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Noise

Noise during the operational phase of the development is predicted to be minor with road traffic being the largest contributor. Noise resulting from development related traffic is not predicted to lead to any significant impact at the nearest noise sensitive locations to the proposed site.

With regard to construction activities, all plant items used during the construction phase should comply with standards outlined in 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1998. During the construction phase the following noise control measures are proposed: (i) selection of plant with low inherent potential for generation of noise and/or vibration (ii) siting of plant away from sensitive noise receptors where possible (iii) erection of temporary screens around noisy items of plant where possible and/or at the site boundary (iv) erection of temporary screens around noisy items of plant and around the site perimeter.

Predicted noise levels for the construction phase of the development are within recommended limits. The Local Authority will set down permissible construction times. Hence the noise and vibration impact of this phase of the development should be kept to a minimum.

Landscape and Visual Assessment

The removal of existing hedgerows and trees from the interior of the site in the initial stages of construction will result in a slight, permanent landscape impact. However, following additional planting on the site the overall effect on landscape vegetation will be positive.

In the operational stage the landscape measures and planting proposed on the site will mature changing the landscape character from agricultural to infrastructural/commercial. Additional distinct landscape features such as water features, tree and shrub plantings, sculptures etc, will have a positive impact on the landscape amenity value of the site and the overall amount of significant tree cover will be increased.

The subject site is not particularly visible in the wider landscape area and consequently, the effects on views during the construction phase will be generally slight.

During the operational phase, the effect on views from dwellings along the Nangor Road will be moderately negative, as views of the Dublin Mountains from these dwellings will be partially blocked. Views from Kilbride House to the north will have a moderate negative impact due to a reduction in the visual quality of the landscape.

With regard to views from within the site, the proposed development will generate a moderate change to the character of the existing views during its operational phase. New landscape features will create a distinct, visually interesting landscape setting. However, removal of the agricultural landscape will result in a slight negative impact overall.

The impact on views of the site from Grange Castle Golf Course is predicted to be slight as the proposed development will be screened from the course.

During the construction phase, all mature trees, hedgerows and bushes to be retained should be appropriately fenced for protection. The landscape works during the construction stage will entail the monitoring of the topsoil stripping and the establishment of the main structural planting on the street areas. Following completion of the works there will be an ongoing programme of landscape management for the site, which will be overseen by a Landscape Manager or Landscape Architect.

Traffic and Transportation

During the construction phase, the primary access point to the site will be via the existing roundabout junction on the Nangor Road. A construction management plan will be prepared where construction traffic will be managed to avoid peak traffic conditions on the surrounding road network. Where possible, excavated material and material will be recycled / reused on site. During excavation and removal of this material from the site, road cleaning and wheel washing at vehicular accesses from the site will be carried out.

During construction it is considered that there will be adequate land within the curtilage of the site to accommodate temporary car and truck parking for construction staff and operations at the early stage of the programme, and at later stages there will be adequate car parking space available in the basement of the development.

With regard to the operational phase of the development, the analysis undertaken for the roundabout junction on the Nangor Road indicates that this junction will operate satisfactorily in the year 2007 with approximately 70% of the traffic from the overall development. Any additional traffic from the proposed development will result in excessive queuing. Consequently it is proposed to phase the completion of the completion of the development to 70% until such a time as the Baldonnell Road access junction is provided at the southern site boundary.

The analysis further indicates that the Baldonnell Road priority junction will perform well within capacity during the 2020 post development scenario when 30% of the development traffic will access the site via Baldonnell Road.

It is proposed to provide parking on the site generally in accordance with the county development plan standards. The exact details with regard to the quantity of parking provided will be decided at planning application stage when applications for individual buildings within the business park are submitted.

A mobility management plan has been prepared in order to provide direction to the developer, the Local Authority and public transport agencies on ways to best achieve an improved modal split for the journey to work, and minimise the traffic impact as a result of encouraging greater use of public transport, cycling and walking.

Cultural Heritage

Local History

An assessment of the receiving environment in terms of local history indicated that there are no historic events associated with the subject site that require consideration in the undertaking of the overall design and boundaries of the development. Consequently no remedial measures are deemed necessary with respect to local history.

Archaeology

There are no previously identified monuments or features of archaeological interest and/or potential located within the proposed development lands. Consequently no remedial measures are required with respect to existing archaeological monuments.

There is a possibility that undocumented sub-surface archaeological features and material might exist within the boundaries of the overall development lands. Mitigation measures in this regard include the presence of an archaeologist on site to monitor all programmes of topsoil stripping/general ground surface reduction works.

The development of the subject lands will not cause any impacts with respect to structures of architectural heritage. Consequently, no pre-development remedial or reductive measures are required in this regard.

2.7 INTERACTIONS

There are a number of interactions of effects regarding aspects of the environment. There are no significant long-term adverse impacts arising from this proposed development. There will be short-term adverse impacts, and there will there be positive and beneficial impacts arising from the development.

2.8 ESTIMATED TYPE AND QUANTITY OF EXPECTED RESIDUES AND EMISSIONS RESULTING WHEN DEVELOPMENT IS OPERATIONAL

These are detailed elsewhere in this non-technical summary in Section 2.6 entitled – *'Likely Significant Environmental Effects and the Measures Envisaged to Avoid, Reduce or Remedy them'*. It is not considered necessary to reiterate them at this point.

2.9 DIRECT AND INDIRECT EFFECTS ON THE ENVIRONMENT RESULTING FROM THE USE OF NATURAL RESOURCES

The likely significant direct and indirect effects on the environment of the proposed development which may result from the use of natural resources, in this case the natural resources being the land encompassed within the subject site, have been comprehensively assessed in this Environmental Impact Statement.

2.10 LIKELY SIGNIFICANT DIRECT AND INDIRECT EFFECTS RESULTING FROM EMISSION OF POLLUTANTS, CREATION OF NUISANCES AND ELIMINATION OF WASTE

Details of emissions arising from the development together with any direct and indirect effects resulting from same have been comprehensively addressed and are outlined in greater detail in the relevant sub-sections of Section 5.0 – 'Aspects of the Environment Considered'. There will be no significant direct or indirect effects on the environment arising from these sources.

2.11 METHODS USED TO FORECAST IMPACTS ON THE ENVIRONMENT

The methods employed to forecast the effects on the various aspects of the environment are standard techniques used by each of the particular individual disciplines. The general format followed was to identify the receiving environment, to add to that a projection of the 'loading' placed on the various aspects of the environment by the development, to put forward mitigation measures to lessen or remove an impact and thus arrive at a net predicted impact.

2.12 DIFFICULTIES IN COMPILING ANY SPECIFIED INFORMATION

No specific difficulties were encountered in obtaining baseline information. Wherever necessary, surveys were carried out to supplement existing available data. Generally speaking, the best available methods were employed to forecast environmental effects.

3.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 INTRODUCTION

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of approximately 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

3.2 INFORMATION ON THE SITE OF THE PROPOSED DEVELOPMENT

The site to which this EIS relates is located in the central western area of County Dublin, to the north of Baldonnell (Military) Aerodrome and approximately 2.5km to the west of Clondalkin village. The site is bound to the north by the R134 (the Nangor or Clondalkin-Milltown Road), Grange Castle Business Park and Kilcarbery Business Park and to the south by a minor road which runs from the R134 to the N7, and Baldonnell Aerodrome. The eastern edge of the subject lands is bordered by Grange Castle Golf Club. The lands to the west of the subject site are currently in agricultural use.

The subject site currently consists of vacant agricultural fields which collectively comprise an area of 39.84 hectares. The site is zoned for enterprise, employment and related uses under the South County Dublin Development Plan 2004-2010. In this regard the development plan contains an objective in relation to this area requiring the production of a Masterplan for the *"lands at Baldonnell, Greenogue and west of Grange Castle Golf Course, zoned in this Development Plan for Enterprise and Employment purposes".*

The Development Plan further stipulates in relation to these lands that *"Masterplans shall be prepared and agreed with the Council for their overall development and the control of new development shall be carried out in accordance with the terms of these Masterplans".*

In this regard a Masterplan has now been prepared for the subject site together with the existing agricultural land immediately to the west of the subject site at Milltown, which collectively comprise an area of approximately 200 acres. A copy of this Masterplan is included with this planning application.

The objective of the Masterplan is to guide the development of the lands at Milltown and Kilcarbery in a coherent, transparent and rational manner. It is intended that each of these sites will be developed as two distinct business parks. The vision for the area is to carefully control development to attract the right balance of enterprise/financial and clean industry employers that will increase the value and profile of the area. The provision of roads and services to facilitate the future development of Profile Park is the subject of this planning application.

3.3 INFORMATION ON THE DESIGN AND SIZE OF THE PROPOSED DEVELOPMENT

Road Network

The spine road in Profile Park will connect to the Nangor Road at the location of the existing roundabout providing access to Kilcabery Business Park. This roundabout will be changed to a traffic signal controlled junction, if a QBC is installed on the Nangor Road. A spur connection off the spine road in Profile Park will connect onto the Baldonnell Road at the southern perimeter of the site. This spur connection will be the subject of a subsequent planning application. The spine roads in Profile Park and the adjacent business park at Milltown will not be connected in order to prevent through-traffic movements.

The first section of spine road leading into the business park will be a dual carriageway from the entrance to the first internal roundabout. The dual carriageway generally consists of two 6.5 metre wide carriageways with a 2 metre wide central median. On either side of the carriageway there are 4.5 metre wide zones containing grass verges, footpaths and on one side only, a cycle path. Outside these zones there are two, five metre wide landscaped mounds.

Inside the first roundabout after the entrance, the central median is omitted and the spine rod becomes a 9 metre wide single carriageway. The 4.5 metre wide verge/footpath/cycle path and the 5 metre wide landscaped mounds are retained for the full length of the spine road. Car parking will not be permitted on the spine road, which will be achieved by having a painted median in the centre of the road with the lane widths kept to a minimum to discourage parking. The painted median will be omitted at junctions, etc, where right turning lanes are required.

The remainder of the estate roads will have a 7.5 metre wide carriageway with the same 4.5 metre wide verge/footpath/cycle path zones on either side. The future link road connecting onto the Baldonnell Road will be 9 metres wide. The width of the landscaped mounds on either side of these roads will be 5 metres.

The cycle path will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority for cyclists.

Services

The infrastructure within the Grange Castle Business Park to the north of the site was designed to cater for the lands for which a Masterplan has been prepared and of which the subject site forms part. Thus in general, each of the business parks will be served via the Grange Castle Business Park.

Services within the subject site including drainage, water mains, telecommunication ducting, ESB ducting, gas main, etc are generally located under the grass verges, footpaths and cycle paths.

The service connections for the foul drainage, telecommunications and IT, gas main and ESB will all be provided as part of the road construction comprising the realignment of the Nangor Road and the construction of a new entrance into Grange Castle Business Park. The connection point for the services feeding into Profile Park will be located in a services wayleave to the south of the realigned section of the Nangor Road. The services for Profile Park will pass through a

wayleave on the Milltown park site, to reach the connection point on the Nangor Road.

The surface water run-off from the site will be discharged to the tributary of the Griffeen River which flows from south to north through the site to Grange Castle Business Park. This tributary will be upgraded to cater for this surface water run-off. The run-off from each of the business park sites will be attenuated on site to give a maximum discharge of 4.2 litres/second/hectare, and any run-off from the roads, car parks, etc within each site will be passed through a petrol inceptor before being discharged to the main drainage system.

The watermain connection for each business park will be taken from a 700 mm diameter trunk water main (the 'Low Level Lucan/Palmerstown Water Supply Scheme'), which runs along the southern edge of the Nangor Road. Each of the business parks will have two connections to this watermain, and a ring main will be provided within each park. In order to reduce water requirements on the site some rainwater run-off will be stored on site in several water features and water from this source will be used for the irrigation of soft landscaped areas. In addition each business within the park will have a metered water connection and shall be liable for water charges.

The foul effluent from the business park will discharge by gravity to a new foul sewer, which is being installed as part of the road construction works comprising the realignment of the Nangor Road and the construction of the new entrance to the Grange Castle Business Park. The effluent from Profile Park will discharge to a new manhole on the realigned Nangor Road and will then fall by gravity to an existing pumping station in the Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend in Dublin City, via the Grand Canal Sewer.

The effluent from each business shall be treated to at least domestic standard before being discharged to the Council's sewer.

Telecommunications and IT ducting is being provided to cater for four different telecoms providers, each of which will have their one dedicated set of ducting and chambers.

The electricity supply to Profile Park will be taken from a 110 kV National Grid substation, which was constructed within the Grange Castle Business Park. This substation serves the existing Wyeth and Takeda developments, and has the capacity to cater for the foreseeable future demand in the area.

Profile Park will be supplied with natural gas from Bord Gais via a new pressure reducing station which has been installed within the Grange Castle Business Park. Where individual users within the site decide to use oil or LPG for heating etc, this will be stored on their own site and no significant lengths of distribution pipe work will be required.

3.4 CONSTRUCTION PROGRAMME, PHASING AND LAND USE REQUIREMENTS DURING CONSTRUCTION

It is anticipated that the development which is the subject of this planning application will be constructed in two phases. The first phase comprises the majority of the road network except the secondary road which runs parallel to the

boundary with Grange Castle Golf Club. The estimated completion timeframe for phase 1 is 6 months. It is estimated that construction of Phase 2 may commence approximately one year later subject to demand for individual sites within the business park.

The development of the remainder of the business park will be subject to market forces and as such will be developed on a site by site basis as required.

3.5 EMISSIONS AND WASTES

Drainage

Foul effluent arising from Profile Park will discharge to a new manhole on the realigned Nangor Road and will then fall by gravity to an existing pumping station in the Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend in Dublin City, via the Grand Canal Sewer.

Emissions

The main environmental nuisance associated with construction activities is dust emissions. If good working practices and dust mitigation measures are adhered to the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.

With regard to traffic derived pollution resulting from the business park development, the results of the traffic modelling for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality.

The impact of the business park on the climate of the area is not considered to be significant. The use of natural gas to fuel individual buildings will significantly reduce the potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Solid Waste Disposal

It is intended to minimise the volume of material removed from the site. Topsoil will be retained on site for re-use in the landscaped mounds. The material to be removed from the site will generally be subsoil with an estimated volume of approximately 14,000 m^3. This equates to approximately 11-12 truck movements per day over a 6 month period. This material will be transported to a normal landfill facility.

A policy of waste recycling will be adopted in the management of Profile Park which will be incorporated into tenancy agreements etc. Paper, plastic and glass waste will be stored and collected separately.

4.0 PLANNING AND DEVELOPMENT CONTEXT

4.1 INTRODUCTION

This chapter sets out the strategic and statutory development context for the subject lands. This analysis refers to a number of Guidelines and Statutory documents as well as to the South County Dublin Development Plan 2004-2010. Reference is also made to other Masterplan documents which have been prepared for lands within the immediate vicinity of the subject site.

In addition this Chapter examines issues of accessibility in respect of the subject lands as well as providing an analysis of the alternatives considered with respect to the proposed development.

4.2 STRATEGIC PLANNING CONTEXT

Sustainable Development: A Strategy for Ireland (1997)

The Department of the Environment document *'Sustainable Development; A Strategy for Ireland'* recognises that land use planning can support sustainable development in a number of ways.

The principle of sustainable development underpins Ireland's industrial policy, the key objective of which is to promote a strong, internationally competitive enterprise sector, comprising both indigenous and non-national companies, which will make the maximum contribution to self-sustaining employment growth.

Dublin Transportation Office: A Platform for Change (2000-2016)

This Government backed strategy has two interdependent elements:

- Improvements in infrastructure and services to increase the supply of transport, including a substantial expansion of the public transport network, some strategic road construction and traffic management.

- Demand management, to reduce the growth in travel through the application of land use and other policies while maintaining economic progress, and which is designed to encourage a transfer of trips, especially at peak periods, from the private car to sustainable modes of transport (such as public transport, cycling and walking).

As this is an integrated strategy, it is recognised that it will only be effective when both elements are implemented together in a coherent manner. Developing the infrastructure element alone will not be enough. It must be accompanied by the demand management element and the complementary policies if the strategy is to achieve its overall objectives.

With regard to the lands which are the subject of this planning application, the strategy indicates proposals for both the expansion of the strategic road network as well as improved public transport within close proximity of the subject site.

These proposals have been integrated into overall proposals for the Masterplan study area. The more recent "Transport 21" investment programme (November 2005) has solidified those proposals for public transport in the Clondalkin area.

For example, proposals for both Dart/Suburban Rail and Metro serving the Clondalkin area have been reconfirmed, while the 'Outer Ring Road' section to the immediate east of the site was recently completed. These transport infrastructure developments will beneficially serve the future development of the subject site and the remainder of the Masterplan lands. The consolidation of public transport already serving the adjoining Business Parks will comply with demand management strategies without hindering economic progress.

National Spatial Strategy (2002-2020)

The Government's *"National Spatial Strategy"* (NSS) is intended to set a national context for spatial planning which will inform Regional Planning Guidelines and strategies, as well as County and City Development Plans and strategies.

The NSS advocates that, "*policy must recognise the different locational requirements of enterprise activity in various parts of the country. Targeted strategies must seek to strengthen a wider range of areas, without damaging areas that are already performing strongly. The inherent advantages of the South and East (S&E) region in its overall contribution to national economic development must be consolidated and, at the same time, the relative deficit of demographic, settlement and productive resources which is limiting the development potential of the Border, Midlands and West (BMW) region must be addressed.*"

It is envisaged that the proposed Masterplan area will develop in tandem with the existing International Business Park at Grange Castle, immediately to the north of the study area. Thus, the policies of the NSS for the South and East region relating to the consolidation of established development areas which contribute to national economic development are consistent with the principle of development at the subject site.

Regional Planning Guidelines for the Greater Dublin Area (2004 – 2016)

The Regional Planning Guidelines for the Greater Dublin Area (RPGGDA) were prepared for the four Dublin Local Authorities (Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire-Rathdown County Council) together with Meath, Wicklow and Kildare County Councils. These Guidelines provide a long term planning framework for the development of the Greater Dublin Area in the 12-year period up to 2016 and within the vision of the National Spatial Strategy for 2020. The Guidelines have statutory force under the Planning and Development Act 2000 and must be taken into account by local authorities in the preparation of development plans and the assessment of planning applications.

The Guidelines embrace the principles of sustainable development, as set out in the National Sustainable Development Strategy and conform to the direction of emerging policy in Europe, emanating from the European Spatial Development Perspective. The main aim of the RPGGDA is the consolidation of future growth as a response to the unsustainable urban sprawl that has characterised the Greater Dublin Area in recent decades.

The key to future development of the Metropolitan Area is the realisation of a sustainable and integrated public transportation system that will reduce dependency on the private car. This will allow for the consolidation of significant

levels of additional development into the area and allow for higher development densities than traditionally applied.

The principal implications of the Guidelines for the development of Profile Park, which is located within the Metropolitan Area, include:

- The incorporation of the principles of sustainable development.
- The inclusion of adequate provision for appropriate public transport, which should have precedence over the requirements of the private car.
- The close integration of new and existing development with the public transport system.

The Guidelines state that within the economy there are a number of distinct trends that are predicted to continue, including the tendency towards spatial concentrations of technology intensive companies in electronics, chemicals and pharmaceuticals, medical products and software. The Guidelines also add that the key centres for future economic development in the Greater Dublin Area are Arklow, City West, *Grange Castle*, Media Lab-Liberties, Naas, Navan and Park West. Four sectors are considered to offer the best potential to contribute to the future development of the region; they are Life Sciences, International Services (including Financial Services (IFSC) and e-commerce, ICT/ Software development and e-learning/ Digital Media).

Having regard to the '*Location of Industrial and Commercial Development*', the Guidelines state that the least restrictive enterprise land use approach to zoning of land, consistent with good planning, should be taken and a sufficient amount of serviced land should be available to meet demands from enterprise. A high quality built and natural environment that is attractive to industry is to be promoted and the speedy implementation of key infrastructural projects, including a coherent solid waste management strategy, should be supported. The Guidelines add that the location of developments that attract a large numbers of people, such as employment uses or major recreational facilitates, should be encouraged on transportation corridors offering access to a number of transport modes.

The proposed development of the Masterplan study area, which is a suitably zoned and serviced subject site, located adjacent to an already successful International Business Park at Grange Castle, is clearly consistent with the policies and objectives of the RPGGDA to consolidate and expand the development of enterprise within an already developed enterprise area.

4.3 COUNTY AND LOCAL CONTEXT

South Dublin County Development Plan

Land use in the study area is subject to the objectives and polices of the South Dublin County Development Plan 2004-2010, which came into effect on 8th December 2004.

The most significant land-use planning issues affecting the study area include:

- The application of the principles of sustainable development.

- The close integration of development with existing and future public transportation.

- The balanced development of the area for a range of appropriate uses, including small, medium and large scale businesses, together with ancillary services.

- Conformance with the planning polices and standards relating to Baldonnell Aerodrome. It should be noted that the Masterplan which has been prepared for the subject lands conforms with the Development Plan policies relating to development in the vicinity of Baldonnell Aerodrome, with specific reference to Schedule 4 of the current County Development Plan, where the use, height and type of development are controlled within the envelope of the aerodrome cordon as illustrated in the County Development Plan Index Map.

The following Development Plan zoning objective covers the entire Masterplan area (see figure 4.1 below):

'Objective E: To provide for Enterprise, Employment and Related Uses'

Uses which are '*permitted in principle*' in this zone include:

Abattoir, advertisements and advertising structures, carpark, cash & carry/ wholesale outlet, crèche / nursery school, enterprise centre, halting sites / group housing, heavy vehicle park, household fuel depot, industry – general, industry – light, industry – special, motor sales outlet, office less than 100 sqm, offices 100 sqm – 1,000 sqm, offices over 1,000 sqm, office based industry, open space. Petrol station, public services, refuse transfer station, science and technology based enterprise, scrap yard, service garage, shop – local, transport depot, warehousing.

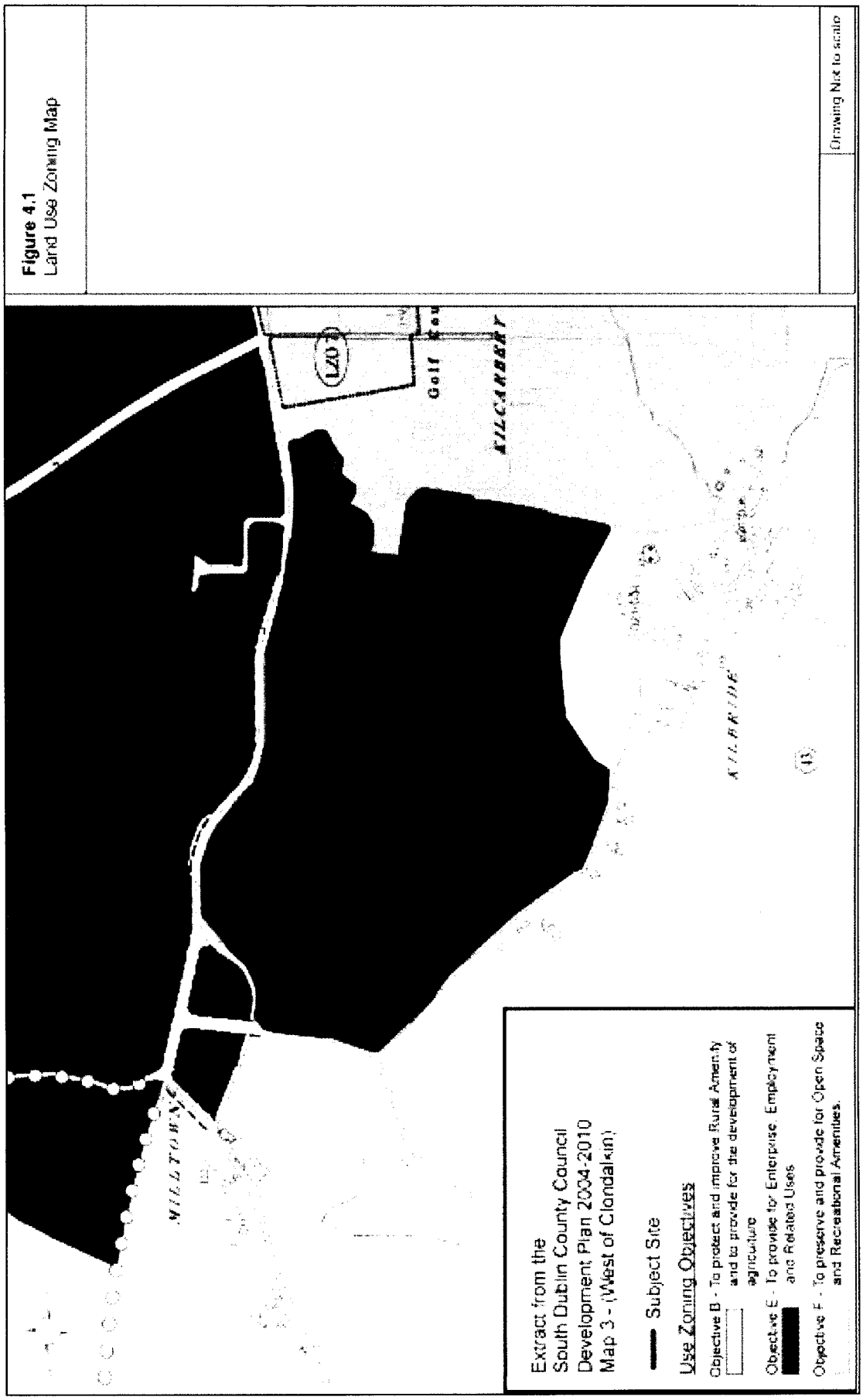
Uses which are '*open for consideration*' include:

Agricultural buildings, bed & breakfast barding kennels, church, community centre, concrete/asphalt (etc.) plant in or adjacent to a quarry, cultural use, dance hall / discotheque, doctor / dentist, education, funeral home, garden centre, health centre, home based economic activities, hotel / motel, industry – extractive, public house, recreational buildings (commercial), recreational facility / sports club, refuse landfill / tip, restaurant, retail warehouse, shop – discount food store, shop – neighbourhood, veterinary surgeon.

Uses which are '*not permitted*' include:

Aerodrome / airfield, betting office, caravan park / holiday, caravan park – residential, cemetery, guest house, hospital, nursing home, residential, residential institution, retirement home, rural industry – cottage, rural industry – food, shops – major sales outlet.

Figure 4.1: Land Use Zoning Map



Objectives/Policies Pertinent to the Subject Site

The County Development Plan makes reference to a number of specific local objectives in regard to development of the subject lands:

- Specific Local Objective No. 49

Prior to the commencement of any development on the lands at Baldonnell, Greenogue and West of Grange Castle Golf Course, zoned in the Development Plan for Enterprise and Employment purposes, Masterplans shall be prepared and agreed with the Council for their overall development and the control of new development shall be carried out in accordance with the terms of these Masterplans. Any office floorspace which is ancillary to industrial or warehousing uses shall not exceed 20% of the total floor area of any such developments. (South Dublin Development Plan; Ch.14)

A Masterplan for the subject lands has now been prepared and is included as part of this planning application.

- Specific Local Objective No. 51

Development on the eastern boundary of lands adjoining Grange Castle Golf Course shall be of high quality siting, design and finish, and shall have regard to the location of the Golf Course. (South Dublin Development Plan; Ch.14)

Further Development Plan policies, which are of relevance to the subject lands, include the following:

- Policy EE7

Office developments with a high level of employment should normally be located in areas where there is convenient access to a good public transport network (i.e. QBC, LUAS or heavy rail. (Ch. 2.3.7.ii)

- Policy EE8

On lands zoned for enterprise and employment (objective 'E'), it will be an objective to consider whether there is a need to require that suitable provision should be made for small and medium scale enterprises within the overall development scheme, in order to ensure that an appropriate mix of commercial / industrial uses is accommodated within the area. (Ch. 2.3.8.ii)

- Policy EE10

It is the policy of the Council to facilitate the provision of local service centres in enterprise and employment zones to cater for the local retail, crèche and other daily services needs of those working in these employment areas as appropriate. (Ch. 2.3.10.i)

Grange Castle/Corkagh Masterplan and Framework Study 2000

This Masterplan, as adopted by South Dublin County Council relates to approximately 783 hectares of land, with a core area of approximately 442 hectares located immediately to the north and east of the site which is the subject

of this planning application. The County Council owns the principal development areas within the Framework/Masterplan area.

The area incorporates the Grange Castle International Business Park, which is the world's largest integrated biotechnology campus, together with wide-ranging amenities including Corkagh Regional Park, Grange Castle Golf Course and a section of the Grand Canal.

The plan for the Business Park element proposed a flexible response to the needs of incoming biotechnology, information and communication technology, pharmaceutical and electronics investors.

The Framework/Masterplan also proposed an extension to the Grange Castle Golf course to include a 27-hole course, a 100 bedroom hotel with conference and leisure facilities, 40 apartments and 60 houses. The Framework/Masterplan further proposed to extend the Corkagh Regional Park along the Outer Ring Road, to enhance the Grand Canal corridor, and to develop an area of residential land to the south of the Nangor Road, including the possible neighbourhood centre and further development of the existing school, with links to the existing residential area to the north of the Nangor Road to be improved.

At this point in time, the Wyeth and Takeda plants, located within this Business Park, are operational, and the majority of the primary infrastructural work within that Business Park has been completed. In addition a planning application lodged by the IDA for a single large 'circuit manufacturing campus' at the end of January 2006, which will occupy much of the remaining land within this business park, was recently granted permission by South Dublin County Council.

Grange Castle Masterplan (updated) 2005

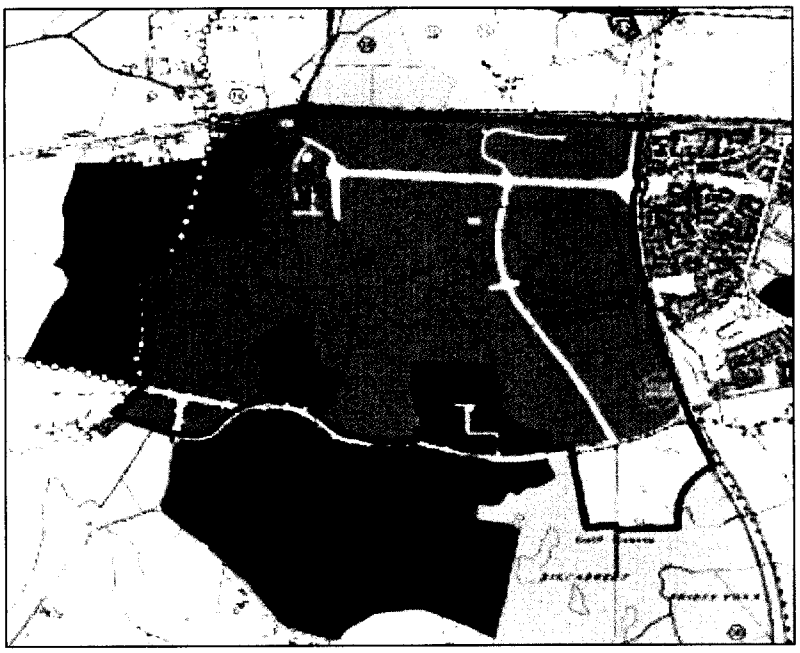
The updated Masterplan for Grange Castle focuses primarily on the Grange Castle Business Park element of the previous Framework/Masterplan. This smaller area now covers approximately 200 hectares (see figure 4.2 below). As per the 2000 Masterplan, it is being developed as a high-tech industrial environment with sites of up to 40 hectares in size. It has been designed in a low density campus style format "*so that the rural benefits of the location are preserved for all to enjoy*". Having regard to the proposed roads network, it is notable that the "Stables Greenway" from the 2000 plan has been realigned to connect with the Nangor Road further to the west near the Griffeen River. Furthermore, prior proposals in the 2000 plan for a central connector road between the "Stables Greenway" and the "Fairways Greenway" have been omitted.

The 2005 Plan includes a non-statutory zoning diagram of the study area that identifies the preferred land use in the various potential development sites. This concept was developed in the original zoning study in the 2000 Plan. The 2005 Plan also examines the issues associated with the implementation of a large Masterplanning project. It proposes an ongoing review of design guidelines and a maintenance structure including a pivotal role for site management in the Park.

The establishment of a marketing plan with IDA Ireland for the Business Park land and also the golf course site is stated to be of critical importance to achieve full development of the study area. The Business Park's Marketing Plan will be an important tool in attracting potential clients to the site, as public awareness of the identity of Grange Castle area needs to be increased. To this end, the

document is published on the internet as a live webpage that will be maintained and updated in line with the growth and development of the Business Park.

Figure 4.2: Grange Castle Masterplan 2005



Profile Park/Milltown at Grange Castle Masterplan 2006

This Masterplan relates to an area of approximately 200 acres located to the south of Grange Castle in South County Dublin. The site which is the subject of the current application accounts for approximately 100 acres of this area. This Masterplan has been prepared in accordance with the requirements of the South County Dublin Development Pan 2004-2010 which has zoned this area for *'Enterprise, Employment and Related Uses'* and which has identified the area as one for which a Masterplan must be prepared. The Development Plan also states that control of new development shall be carried out in accordance with the terms of this Masterplan.

The stated objective of the Masterplan is to guide the development of these lands in a coherent, transparent and rational manner. It is proposed that the Masterplan area will be developed as two distinct business parks. The site which is the subject of this planning application shall be known as *'Profile Park'*, while the site to the west will be known as *'Milltown Business Park'*. Pedestrian links are proposed between the two parks however, the internal road network on the Masterplan lands will reflect the separation of the business parks as both will have separate vehicular entrances.

As the Masterplan area comprises a single Development Plan zoning objective, it is proposed that the distribution of uses through this area will be more a function of form than zoning with specific building uses laid out in a logical and coherent pattern. High profile enterprise, services and office uses shall address the primary internal road network and public areas, while larger unit uses will generally occupy discreet sites.

The Masterplan proposes the creation of five 'Character Areas' within the Masterplan lands. In each of these areas a vocabulary of the landscape treatment of public spaces is suggested, with objectives for green spaces, squares, courtyards and spaces for cars.

The landscape design concept for the Masterplan area aims to create a unique visual image for the park. This involves enhancing the entrance spaces, roadways, building frontages and incidental spaces with a select landscape treatment with high quality materials proposed throughout. The landscape design concept also aims to create a network of open spaces for the site, forming a hierarchy of pedestrian spaces which can be used to provide pedestrian-friendly access.

4.4 ACCESSIBILITY

Existing Road Network

The Grange Castle area is strategically located on the western fringe of Dublin approximately 16 km southwest of Dublin International Airport, 10 km west of Dublin City Centre and approximately 2.5 km from Clondalkin village. Nearby towns and villages within the administrative area of South Dublin County Council include Lucan 2.5 km to the north, Tallaght 3 km to the southeast, Saggart 4 km to the southwest, Newcastle 3 km to the west. Leixlip is located 6 km to the northwest within Co. Kildare.

The subject site is located between the N4 and N7 National Primary Routes and approximately 5 km west of the M50 Motorway, the orbital ring road around Dublin City. The recently completed Grange Castle Road (R136) (Outer Ring Road – Phase 1) links the subject site with the N7 National Primary Route from Dublin to the south and southwest of the country. The subject site is 2.5 km south of the N4/M4 National primary road from Dublin to the Midlands, West and Northwest, which is proposed to be linked directly in Phase 2 of the Outer Ring Road.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has been improved over recent years and consists of a single side carriageway with dedicated bus lanes in each direction extending as far out as the Outer Ring Road. The Nangor Road along the northern site boundary and to the west is of lower standard in terms of alignment and cross-sections, but is due to be upgraded shortly. The Outer Ring Road Phase 1 opened from the N7 as far as Grange Castle International Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction.

Existing Public Transport

The No. 68 Dublin Bus Route operates along the Nangor Road at the northern boundary of the subject site. Approximately 1.5 km east of the site, the No. 51B, 51X and 210 Dublin Bus Routes operate along the Nangor Road. Clondalkin Village is served by the No. 69, 76, 76A and 76B Dublin Bus Routes. The Quality Bus Network in the area is expanding with dedicated bus lanes on the Nangor Road east of the Outer Ring Road and the Outer Ring Road itself.

The main intercity rail line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, is located north of the subject site. Intercity services are mainly to Cork and Limerick/Shannon, with a commuter service to Kildare. The nearest station is at Clondalkin approximately 3 km northeast of the subject site which is served by 15 commuter trains in each direction during weekdays.

Proposed Transport Improvements

'Transport 21' is a transportation strategy commitment by the Government to significantly improve the country's transport network within a 10-year timeframe up to 2015. The Strategy will include major investment in both public transport and road infrastructure in the Greater Dublin Area.

Proposed Road Improvements

Phase 2 of the Outer Ring Road, which will see a local link road from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road, is due for completion in 2006. Following completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and N7. Phase 3 of the Outer Ring Road, continuing south from the N7 to the N81 Blessington Road is scheduled to open late 2006/early 2007.

The upgrading of the N7 to dual three-way standard from Dublin to Naas is underway and is anticipated to be completed by the end of 2006. Improvements are also planned to the N4 to bring it to dual three-lane standard as far as the Leixlip Interchange from the M50/N4 Interchange within three years.

The Nangor Road west of the subject site and extending as far as the R120 is also being realigned and will consist of approximately 2.03 km of a two-way, single carriageway road. The land acquisition process for this realignment commenced in January 2006.

The following road infrastructure identified in Transport 21 will have a positive impact on the road network in the area:

- Dublin Port Tunnel (completion date - 2006)
- M50 upgrade Phase 1 (completion date - 2007)
- M50 upgrade Phase 2 (completion date - 2010)

Proposed Public Transport Improvements

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme – 2004/5) within the vicinity of the site including the following:

- South Clondalkin QBC – Grange Castle roundabout to Bawnogue Road – Work completed.
- South Clondalkin QBC – Ninth Lock to Naas Road – Completed March 2006
- Outer Ring Road QBC – Completed January 2005

- Naas Road QBC – Kingswood to Bluebell Q3 –Phase 1 completed April 2005, Phases 2 and 3 60% and 98% complete respectively as of April 2006.

These objectives form part of the extensive QBN that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 – 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, better pedestrian and cycle facilities encouraging commuters to use alternate mode of transport to private cars.

Proposed public transport infrastructure identified in Transport 21 which will have a positive impact on the public transport infrastructure network in the area include the following:

- Dublin City Centre rail resignalling (completion date 2009)
- Opening of new Dublin City Centre railway station (2010)
- Kildare rail upgrade
- Metro West Phase 1 Tallaght - Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)
- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extended electrification to Hazelhatch (2015)
- Rail interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015)

In addition the development at Adamstown, north of the subject site, includes a new railway station which will be approximately 2 km from the subject site.

4.5 ALTERNATIVES CONSIDERED

The subject site is zoned for enterprise, employment and related uses under the South Dublin Development Plan 2004-2010. The development of a business park on these lands was deemed appropriate having regard to the relevant policies contained in the development plan and to the land uses which are *'permitted in principle'* and *'open for consideration'* under the use zoning. Furthermore the subject site is located in an area which has already seen considerable development of a similar nature at Kilcarbery and Grange Castle Business Parks which are located immediately north of the subject site. Consequently the consideration of alternative sites to accommodate the proposed development was not deemed necessary in this instance.

In line with the requirements of the South Dublin Development Plan 2004-2010, a Masterplan has been prepared for the subject lands. The initial step in the preparation of this Masterplan was to undertake a scoping exercise for the lands. This exercise allowed alternative development options to be assessed and a final masterplanning approach to be decided upon.

A number of alternatives were considered during the design process of the roads layout which is the subject of the current planning application. The final road layout proposed reflects the requirements of the Roads Engineering Department of South Dublin County Council and also the future land uses proposed on the site in terms of plot size and arrangement.

The final road layout proposed within the site also reflects input received from the other EIS specialists with regard to potential impacts arising from the proposed development.

The option of providing road access to the site from the southern site boundary was also considered as part of this planning application. However, an analysis of the traffic levels which will be generated on site as a result of the completed business park development indicate that a 70% build out of the site can be accommodated by the northern access alone. As a result it was decided during the road design process that the southern access to the site will be provided at a later stage and as such will be the subject of a separate future planning application.

5.0 ASPECTS OF THE ENVIRONMENT CONSIDERED

5.1 HUMAN BEINGS

General

Human beings form one of the most important aspects of the environment which must be given consideration as part of this EIS. Any likely significant impact on human beings therefore must be comprehensively addressed. The principal concern in this regard is that human beings experience no significant unacceptable diminution in any aspect of *'quality of life'* as a consequence of the construction or operation of the proposed development. This section of the Environmental Impact Statement considers the human environment in the vicinity of the subject site, in terms of population profile and trends, employment and community aspects.

The site which is the subject of the current planning application is a vacant greenfield site and as such, does not have any resident population. Thus the proposed development will have no negative impact on any existing population nor will it result in the severance of any existing community. The site is located within the Electoral Division of Clondalkin Village. Census data for this Electoral Division has been used as the best available source to identify trends with respect to the population of the wider area of which the site forms part.

5.1.1 POPULATION

5.1.1.1 RECEIVING ENVIRONMENT

The most recent census of population was undertaken on 23rd April 2006. The results of this census were not available at the time of the writing of this EIS therefore the results of the 2002 Census of Population have been used for the purposes of this assessment. The smallest geographical units distinguished by the Central Statistics Office are Electoral Divisions. In this regard the subject site is located within the Electoral Division (ED) of Clondalkin Village.

This section of the Environmental Impact Statement examines recent demographic trends at Electoral Division, Local, County and State level. For the purposes of this assessment, the figures for County level relate to South County Dublin only, while the local level has been defined as those electoral divisions which are located immediately adjacent to the Electoral Division of Clondalkin Village as follows:

- Clondalkin-Ballymount
- Clondalkin-Dunawley
- Clondalkin-Monastery
- Tallaght-Belgard
- Tallaght-Fettercairn
- Newcastle

Figure 5.1.1 illustrates the location of the Electoral Divisions which have been defined as being at the 'Local Level' for the purposes of this assessment.

Figure 5.1.1: Electoral Divisions (ED) Map



Table 5.1.1 below indicates the population increase experienced in these areas between 1996 and 2002. It is noted that the population increase experienced in South Dublin exceeded that in the State as a whole between 1996 and 2002. The population growth at local level (as defined in Section 5.2.2 above) for the same period also exceeded that at State level. However the population growth in the Electoral Division of Clondalkin Village was notably lower than that experienced at Local, County and State level.

Table 5.1.1: Total Population 1996 – 2002

Area	1996	2002	Change in Population 1996-2002 (%)
Clondalkin Village ED	8,123	8,595	5.8
Local	29,688	32,897	10.8
County	218,728	238,835	9.2
State	3,626,087	3,917,203	8.0

Source: Census of Population 1996, 2002

Section 1.3.1(ix) of the South Dublin Development Plan 2004-2010 outlines population projections for South Dublin in 2010 based on the projections contained in the Regional Planning Guidelines. In this regard the projected population for South Dublin in 2010 is 253,292. This represents a 6% increase on the 2002 Census figure.

Age Profile

Table 5.1.2 below contains information on population according to age group for South Dublin, the whole of the Dublin Area and for the State.

Table 5.1.2: Population Classified by Age Profile

Age Group (years)	South Dublin (persons)	%	Dublin Area (persons)	%	State (persons)	%
0-14	53,671	22.5	215,192	19.2	827,428	21.1
15-24	44,248	18.5	199,267	17.8	641,522	16.4
25-44	76,808	32.2	367,138	32.7	1,180,259	30.1
45-64	49,147	20.5	227,252	20.2	831,993	21.2
65+	14,961	6.3	113,972	10.2	436,001	11.1
Total	**238,835**	**100**	**1,122,821**	**100**	**3,917,203**	**100**

Source: Census of Population 1996, 2002

From an analysis of the figures above it is noted that a high proportion of the population of South Dublin is less than 25 years of age, accounting for 41% of the total population. This figure is higher than that for the Dublin Area (37%) and for the State (37%). The County also has a low proportion of people aged 65 and over accounting for just 6%. The corresponding figures for the whole of the Dublin Area and the State are 10% and 11% respectively.

It is further noted from the figures outlined in Table 5.2 above that those persons in the working age cohort (15-64 years) account for 71% of the total population of South Dublin. This figure corresponds generally to those figures for the Dublin Area and the State which are 71% and 68% respectively.

Household Size

The results of the 2002 Census of Population indicate that the average household size in Ireland is decreasing over time. Between 1991 and 2002 the average number of persons per private household in the State decreased from 3.34 to 2.95. The figures for South Dublin over the same period showed a similar pattern, decreasing from 3.77 to 3.21.

The total number of private households in South Dublin in 2002 was 73,516. The corresponding figures for the whole of Dublin and for the State are 379,372 and 1,287,958 respectively. The Regional Planning Guidelines projected number of households in South Dublin in 2010, (as outlined in Section 1.1.3 (ix) of the South Dublin Development Plan 2004-2010), is 91,815. This represents a 25% increase over the 2002 figure.

Population Catchment

The Masterplan for Profile Park, a copy of which has been submitted as part of this planning application, includes an analysis of the population catchment of the Masterplan lands according to 15, 30 and 45 minute drive times. The 15 minute drive time extends from north of Lucan to Saggart in the south and to the east of Clondalkin. The 30 minute drive time includes Finglas and Mulhuddart in the north, Celbridge, Leixlip and Maynooth in the west, Kill and Brittas in the south and Santry and Dundrum in the east. The 45 minute drive time extends beyond the Greater Dublin Area and extends northwards as far as the main M1 exit for Skerries including Ashbourne and Dunboyne. The 45 minute drive time catchment also includes most of the east coast from Rush to Bray, Blessington in the south and Naas and Kilcock in the west.

An analysis of the relevant 2002 Census data for each drive time is summarised below in Table 5.1.3.

Table 5.1.3: Drive Time Population Catchments

Drive Time	Population	Households
15 minute	95,646	29,220
30 minute	734,869	249,857
45 minute	1,135,258	381,171

Source: Jones Lang Lasalle (2005) & Gamma, CSO 2002 Census of Population

The Masterplan also highlights the potential catchment at the new urban district of Adamstown which consists of approximately 10,000 additional household units which will be provided on a phased basis with a potential population of between 20,000 and 25,000 people.

5.1.1.2 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.1.1.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

It is anticipated that the construction phase of the proposed development will not have any direct impact on the population of the immediate environs of the site. Given the nature and extent of the proposed development and the anticipated construction timeframe, it is expected that the work force employed on the site will travel from existing places of residence to the construction site rather than reside temporarily in the immediate environs of the site.

It is anticipated that the construction phase of the future business park scheme will increase the temporary working population of the area but is not expected to permanently increase population figures for the area.

Operational Phase

There will be no increase in the population of the area during the operational phase of the proposed development.

The operational phase of the business park will result in an increase in the temporary working population of the area. However, as no residential development is proposed as part of the overall scheme it is considered unlikely that there would be any permanent increase in population figures for the area as a result of this development.

Do-Nothing Impact

If the proposed development did not proceed there would be no impact on the population of the area.

5.1.1.4 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

The development which is the subject of this planning application and the development of the remainder of the business park scheme will not result in any adverse potential impacts on population during the course of construction. Consequently no remedial or reductive measures are required in this regard.

Operational Phase

The development which is the subject of this planning application and the completion of the business park scheme will not result in any adverse potential impacts on population during the operational phase. Therefore no remedial or reductive measures are required in this regard.

5.1.1.5 PREDICTED IMPACT OF THE PROPOSAL

The development which is the subject of this application and the development of the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their construction phases.

Operational Phase

The proposed development and the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their operational phases.

Worst Case Scenario

If the development which is the subject of this planning application did not proceed, there would be no significant impact on the population of the area.

If the business park scheme which the proposed development will facilitate did not proceed, there would be no significant impact on the population of the area.

5.1.1.6 MONITORING

No monitoring measures are required in relation to population as a result of the proposed development.

5.1.1.7 REINSTATEMENT

No reinstatement measures are required in relation to population as a result of the proposed development.

5.1.2 EMPLOYMENT

5.1.2.1 RECEIVING ENVIRONMENT

In 2002 the total number of persons aged 15 years and over at work in the State was 1,641,587. Of this total, 110,101 were at work in South Dublin. By comparison, a total of 138,199 persons were unemployed in the State in 2002 of which 8,148 were accounted for in South Dublin.

It is stated in Section 2.1(i) of the South Dublin Development Plan 2004-2010 that South Dublin has a variety of employment types with large employment centres including sixteen major industrial estates and two international business parks at Grange Castle and Citywest. It is estimated in the plan that there are over 3,500 businesses in operation with 11 of Ireland's top 100 companies located in the county. The growth sectors in the county are identified as chemical industries, biotechnology, information technology, communications, electronics, hospitality, transport, internationally traded services and prepared food.

This area of the County is envisaged to become the premier location for enterprise and employment generation. A Masterplan has previously been prepared for the lands to the north and east (The Grange Castle Masterplan), and South Dublin County Council has recently published an updated version of this document. A number of large-scale developments have been implemented following the adoption of this Masterplan, including the Wyeth Medica campus and the Takeda Pharma pharmaceutical plant (Profile Park Masterplan, 2006). South Dublin County Council have also recently granted planning permission for an Integrated Circuit Manufacturing Facility on a 145 acre site at Grange Castle Business Park.

5.1.2.2 CHARACTERISTICS OF THE PROPOSAL

The roads and services which are the subject of this planning application will not have a significant impact on employment numbers having regard to the nature and scale of the development involved.

However the Masterplan for Profile Park envisages that the business park itself, which these roads and services will facilitate, will consist of a *'vibrant mixed use area, with enterprise, service, employment and office activities'* (Profile Park Masterplan, 2006). Indicative building layouts and land uses have been identified in the Masterplan. The design and size of the buildings proposed on the site will be addressed at planning application stage when detailed plans for each building type and land use have been decided.

Although the final details regarding the nature and scale of the buildings proposed within the business park have not yet been decided, it is possible at this stage to make an approximate 'best estimate' of the level of employment that may potentially be generated at Profile Park. Having regard to the land uses proposed on the site, it is considered that somewhere in the range of 5,000 – 10,000 jobs may be generated as a result of the future business park development. It is evident therefore that the proposed business park has the potential to have a moderate positive impact on employment levels in the locality.

5.1.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

The construction of the roads and services which are the subject of this planning application will not have a significant impact on employment levels having regard to the nature and scale of the development proposed.

The development of the remainder of the business park will have a temporary positive impact on employment levels in the locality. Temporary construction employment will be directly created on the site. Indirect employment will also be created through the provision of building supplies, local goods and services to the site and its employees. Overall a moderate positive impact will result an employment levels as a result of the business park development.

Operational Phase

The operational phase of the proposed development will have no impact on employment levels in the locality.

The development of the remaining area of the business park lands has the potential to a moderate positive impact on employment levels in the locality.

Do Nothing Impact

If the development which is the subject of the current planning application does not proceed there would be no significant impact on employment levels in the locality.

If the business park development did not proceed the opportunity for the creation of additional jobs in the locality would not be realised.

5.1.2.4 REMEDIAL OR REDUCTIVE MEASURES

No remedial or reductive measures are required in relation to employment.

5.1.2.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

The predicted impact would be the same as the potential impact.

Operational Phase

The predicted impact would be the same as the potential impact.

Worst Case Scenario

The predicted impact would be the same as the potential impact.

5.1.2.6 MONITORING

No monitoring measures are required in relation to employment.

5.1.2.7 REINSTATEMENT

No reinstatement measures are required in relation to employment.

5.1.3 COMMUNITY ASPECTS

5.1.3.1 RECEIVING ENVIRONMENT

There are three principal components of the community within the vicinity of the subject site which are considered in this section: the resident, working and visitor communities.

The Resident Community

The subject site consists of a rural greenfield site which was previously used for agricultural purposes. There is some dispersed housing along the site boundaries. Consequently there will be no severance of any existing community as a result of the proposed development. The nearest existing resident community is located approximately 2.5 km to the east of the subject site at Clondalkin Village. There are a small number of residential units and a car sales operation located west of the subject site along the Nangor Road. There are also a number of residential units located in the vicinity of the southern boundary of the site.

The Working Community

The major employers at this location are located immediately to the north of the subject site at Kilcarbery Business Park, which is now fully developed and occupied and Grange Castle Business Park, which contains two large bio-technology facilities – Wyeth Medica Ireland and Takeda Pharma Ireland. Wyeth Medica Ireland has 1,100 staff in direct employment with an additional 600 in indirect employment. When fully operational the Takeda plant will create approximately 80 high quality jobs. Baldonnell Aerodrome to the south of the subject site is another employment generator in the locality.

The Visiting Community

The primary attractions for visitors to this area consist of Grange Castle Golf Course which borders the subject site to the east and Corkagh Regional Park, including Camac Valley Tourist Caravan and Camping Park to the east of the golf course. Ballybane Pitch and Putt course is also located along the Nangor Road to the northwest of the subject site.

5.1.3.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.1.3.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

Given the nature and scale of the proposed development it is considered that there will be no significant negative impact on the resident, working or visiting community at this location during the construction phase. Some short-term localised impacts may result on the adjoining residential units as a result of noise during construction.

Having regard to the scale of the overall business park development, which the proposed development will facilitate, some potential adverse localised impacts may be expected to occur during the construction phase of the business park. It is expected that the resident, working and visiting communities would experience these short-term localised impacts. Many of these would be of a nuisance nature such as an increase in daytime noise levels in the locality. Construction traffic has the potential to pose impacts to the neighbourhood community depending on its frequency, overall numbers and routing. These impacts are more fully addressed in the relevant specialist sections of this EIS.

Operational Phase

The proposed development will have no significant negative impact on the existing community during its operational phase. Additional planting will be provided along site boundaries adjacent to existing housing to mitigate any potential negative visual impact.

It is considered that the following potential impacts may arise as a result of the operation of the completed business park development:

- Increased traffic levels, both pedestrian and vehicular in the area.
- Impact on the existing natural landscape.
- Increased employment opportunities in the area.
- Impact on local services and commercial facilities.

Do Nothing Impact

If the proposed development did not proceed, it is likely that there would be no significant impact on the existing community.

If the business park which the proposed development will facilitate did not proceed, the potential benefits associated with the business park development, such as increased employment opportunities in the locality, would not be available to the community.

5.1.3.4 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

The hours of operation of construction machinery on the subject site will be limited in order to limit any potential short-term noise impact on adjacent residential properties associated with the development of roads and services infrastructure at this location. No further remedial or reductive measures are considered necessary during the construction phase of the proposed development.

Similarly the hours of operation of construction on site will be limited during the construction of the business park in order to limit any potential short-term noise impact on adjacent residential properties. These measures are discussed in greater detail in the specialist chapters of this EIS.

Operational Phase

No remedial or reductive measures are considered necessary during the operational phase of the proposed development.

A number of reductive measures are proposed during the operational phase of the business park scheme. It is proposed that the boundaries of the subject site be planted with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings. In addition, the heights of any buildings proposed will be reduced adjacent to existing housing at the site boundaries in order to reduce the visual bulk of the buildings.

5.1.3.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

Having regard to the remedial and reductive measures proposed during the construction period, the impact of the proposed development on the community will not be significant and any impact will be temporary in nature.

Having regard to the remedial and reductive measures proposed during the construction phase of the overall business park scheme it is considered that there be no significant negative impact on the community as result of the proposed development and any impact will be temporary in nature.

Operational Phase

The operational phase of the development which is the subject of this application will have no significant impact on the existing community.

Having regard to the remedial and reductive measures proposed during the operational phase of the overall business park scheme it is considered that there be no significant negative impact on the community as result of the proposed development.

Worst Case Scenario

The predicted impact will be the same as the potential impact.

5.1.3.6 MONITORING

No monitoring measures are required in this regard.

5.1.3.7 REINSTATEMENT

No reinstatement measures are required in this regard.

5.2 FLORA AND FAUNA

5.2.1 INTRODUCTION

This flora and fauna impact assessment has been prepared by Scott Cawley. It qualitatively assesses the development of lands in Grange Castle, County Dublin, within the context of the potential direct, indirect and cumulative impacts upon the flora and fauna presently existing on-site, and in the immediate environs.

The proposed development area is located within Grange Castle to the south-west of the Dublin conurbation. It is composed of agricultural grassland divided by hedgerows and wet ditches.

Methodology

The assessment comprised a constraints assessment on the 3rd November 2005 and a more detailed site survey on 31st March 2006. Bat foraging surveys were undertaken on 1st May 2006.

During the site visits a detailed account of the floral and faunal composition encountered during the survey was recorded. These, combined with desktop consultations of the following resources, produced the finalised baseline report as presented.

- O.S. maps for Co. Dublin;
- Site layout plans;
- EIS of proposed Integrated Circuit Manufacturing Facility in Grangecastle, Co. Dublin (2006);
- National Parks and Wildlife Service Database, The Department of the Environment, Heritage and Local Government.

The proposed development site was surveyed using the methodology outlined in the Heritage Council Habitat Survey Guidelines (Draft April 2005). The principal habitats present within the site were identified and classified using the Heritage Council's A Guide to Habitats in Ireland (Fossitt, 2000).

Floral nomenclature follows *An Irish Flora* (Webb, Parnell & Doogue, 1996) for Latin names and the *Census Catalogue of the Flora of Ireland* (Scannell & Synnott, 1987) for common names. Nomenclature for horticultural species follows the Royal Horticultural Society's *Encyclopaedia of Garden Plants* (Brickell, 1998).

Faunal identifications were confirmed using the following sources:

- *The Macmillan Guide to Birds of Britain & Europe*, Macmillan 1998,
- *The Complete Guide to Ireland's Birds* (2002), Dempsey E. & O'Cleary. M. Gill & Macmillan.
- *Exploring Irish Mammals*, Dúchas The Heritage Service 2001.

As opposed to floral investigations, the surveying of faunal usage of subject lands cannot be based upon direct sightings alone. The presence of fauna is substantiated through the detection of field signs such as tracks, habitats, markings, feeding signs, and droppings, as well as by direct observation. Likewise, bird species present on site are recorded along with any notable

avifauna habitats, droppings, or tracks. The likely species were assessed in relation to the habitats present within the site.

Ecological evaluation of the site and the assessment of significance of impacts follows guidance provided by the Institute for Ecology and Environmental Assessment and the Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000).

Designated areas and protected species

The nearest ecologically designated site is at the Grand Canal which is a proposed Natural Heritage Area. Proposed NHAs (pNHAs) are designated for their natural heritage value and are considered to be of conservation importance at a national level. pNHA's are offered legal protection under the Wildlife (Amendment) Act 2000, once their boundaries have been finalised and they have been formally adopted. This process of formal adoption for pNHAs is still on-going, however until such time pNHAs are offered protection under planning legislation, Planning Authorities are required to take these designated areas into consideration in planning decisions.

The Grand Canal pNHA is located approximately 1.6km north of the site. The site does appear to be hydraulically-linked to the Canal. The designation has been made on the basis of the presence of several important habitats including calcareous grassland, reedswamp, scrub and woodland as well as protected species such as otters. None of these habitats will be affected by the development at the proposed site.

5.2.2 RECEIVING ENVIRONMENT

The study area is almost entirely made up of agricultural grassland that was previously used for grazing livestock (cattle recorded grazing on site in 2005 but not in early 2006). This habitat type is generally of little or low ecological value, aside from the certain aspects and ecological functions identified below as being of ecological interest.

Whilst there are a few residential buildings surrounding the site of various ages, sizes and designs, their ecological importance is limited to being a potential roost and breeding sites for bats and birds.

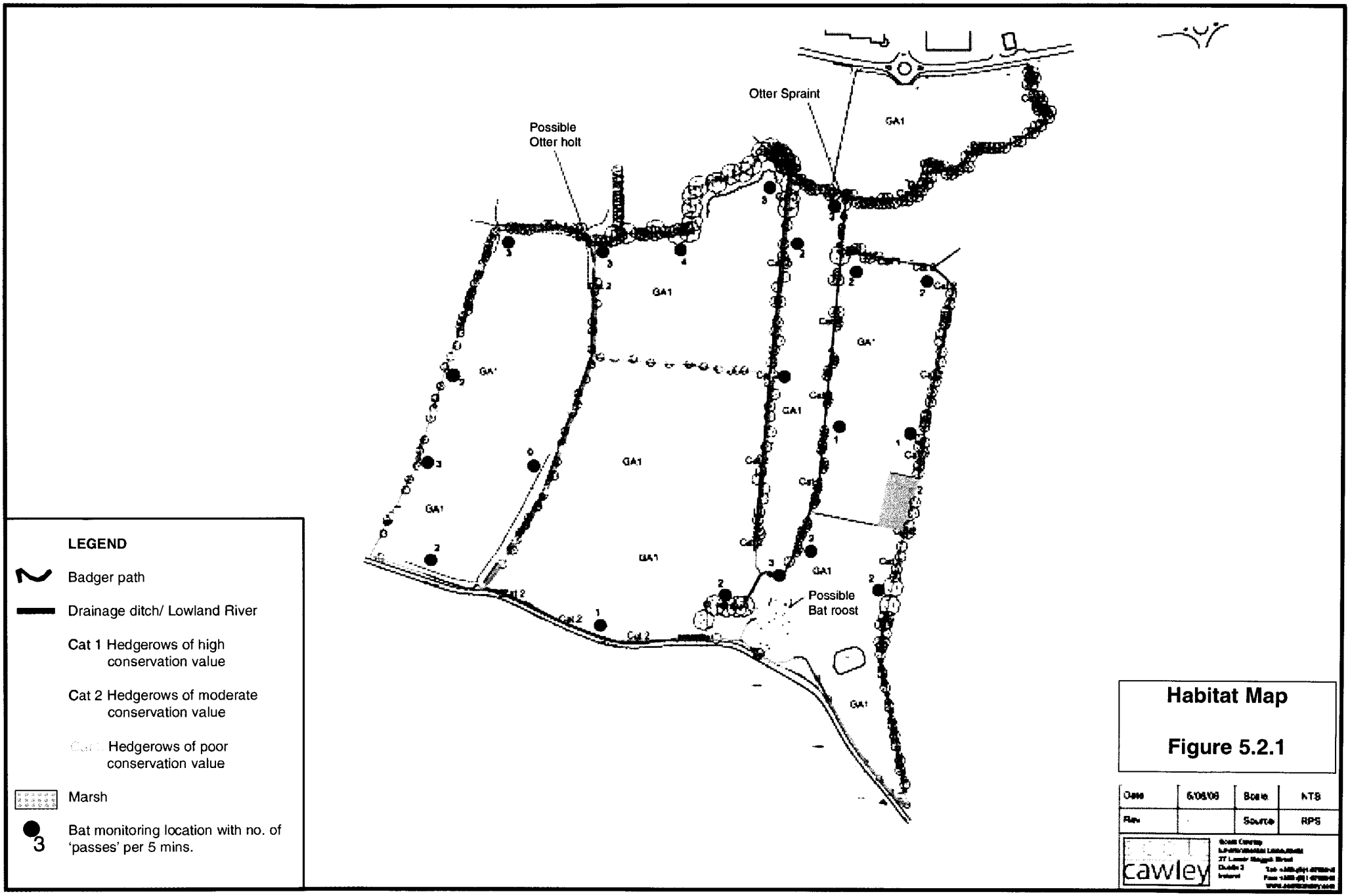
Field boundaries throughout the study area are formed by hedgerows that are of varying ecological quality, ranging from severely degraded and species-poor hedgerows to moderately species-rich mature hedgerows.

Habitats

This section describes the habitats that have been recorded in the study area. There is a relatively low diversity of habitats within the study area. The habitat types identified during the survey include the following categories:

- Grassland and Marsh Habitat;
- Woodland habitat;
- Freshwater habitat.

Figure 5.2.1 illustrates all habitat types present within the study area.


Otter Spraint
Possible
Otter holt
GA1
Possible
Bat roost
LEGEND
Badger path
Drainage ditch/ Lowland River
Cat 1 Hedgerows of high conservation value
Cat 2 Hedgerows of moderate conservation value
Hedgerows of poor conservation value
Marsh
Bat monitoring location with no. of 'passes' per 5 mins.
Habitat Map
Figure 5.2.1
Date
Scale
NTS
Rev
Source
RPS
cawley

Grassland and Marsh Habitat

Improved agricultural grassland (GA1)

Grassland habitat takes up the vast majority of the areas surveyed, in the form of typical improved agricultural grassland (GA1). This habitat occurs across the majority of the study area and has been used for cattle grazing. This type of grassland is characterised by open fields that contain a range of grass and broad-leaved species. Key species include meadow grasses (*Poa pratensis, P. annua*), ryegrass (*Lolium perenne*), crested dog's tail (*Cynosurus cristatus*), cock's foot (*Dactylus glomerata*) and broad-leaved species such as dandelion (*Taraxacum officinale*), creeping thistle (*Cirsium arvense*), spear thistle (*C. vulgare*), common nettle (*Urtica dioica*), ribwort plantain (*Plantago lanceolata*), broad-leaved dock (*Rumex obtusifolius*), creeping buttercup (*Ranunculus repens*), greater willowherb (*Epilobium hirsutum*) and common knapweed (*Centaurea nigra*).

All of these species are typical of agricultural grassland which experiences human influence in the form of grazing, mowing, fertilisation, planting and tilling. They offer a food source to birds (particularly crow (*Corvidae*) species) and to a range of invertebrates that feed on cattle dung. Overall, this habitat is of moderate ecological value and is well represented in the locality and throughout Ireland.

Woodland Habitat

There are no significant areas of woodland within the site, as is normally understood by the term "woodland". However, hedgerows (WL1) fall under this type of land-use. For the purposes of describing their importance in ecological terms, the hedgerows are rated from 1-3 with 1 = high conservation value, 2 = moderate conservation value and 3 =low conservation value. The criteria used for the classification system is reproduced below from the National Road Authority's *Guidelines for the Assessment of Ecological Impacts of National Road Schemes.*

Category 1: High Value, Local Importance

- Average shrub canopy height over 5m (note: a continuous line of mature trees over 5m is normally referred to as a treeline)
- Average width at ground level over 4m
- Dense ground cover
- Mature standard trees more than 5 per 50m length
- Gaps less than 10% per 50m length
- End connections to greater than 4 other hedges
- Dominant tree and shrub species mainly native
- Diversity of greater than 8 tree and shrub species
- Typical diverse woodland ground flora present
- Associated stream or drain with permanent water

Category 2: Moderate Value, Local Importance

- Average canopy height 2 to 5m
- Average width at ground 2 to 4m
- Patchy ground cover
- Mature standard trees 1 to 5 per 50m length
- Gaps between 10-30% per 50m length
- End connections to 2 to 4 other hedges
- Dominant tree and shrub species mixed native and non-native
- Diversity of 5 to 8 tree and shrub species
- Some woodland ground flora species present
- Parallel stream or drain with seasonal water only

Category 3: Low Value, Local Importance

- Average canopy height less than 2m
- Average width at ground less than 2m
- Little or no ground cover
- No mature standard trees
- Gaps more than 30% per 50m length
- End connections to less than 2 other hedges
- Dominant tree and shrub species mainly non-native
- Diversity of less than 5 tree and shrub species
- No woodland ground flora species present
- No parallel stream or drain

The hedgerows encountered in the site survey are described below.

Hedgerows (WL1) of high conservation value (Category 1)

Hedgerows bounding the watercourses in the northern half of the site and along the eastern boundary fall under this category. These are of high conservation value due to the relatively high species diversity, vertical composition, thickness and age. They generally comprise of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus agg.*) with some larger ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*). Large mature trees offer good nesting and refuge habitat for birds and bat species as well as providing fruit and insects that are preyed upon by these fauna. The hedgerows to the north and east have an established ground flora at its edge and include lords and ladies (*Arum maculatum),* lesser cellandine (*Ranunculus ficaria*), germander speedwell (*Veronica chamaedrys*) and dog violet (*Viola riviana*) and primrose (*Primula vulgaris*). See photograph 5.2.1 below.



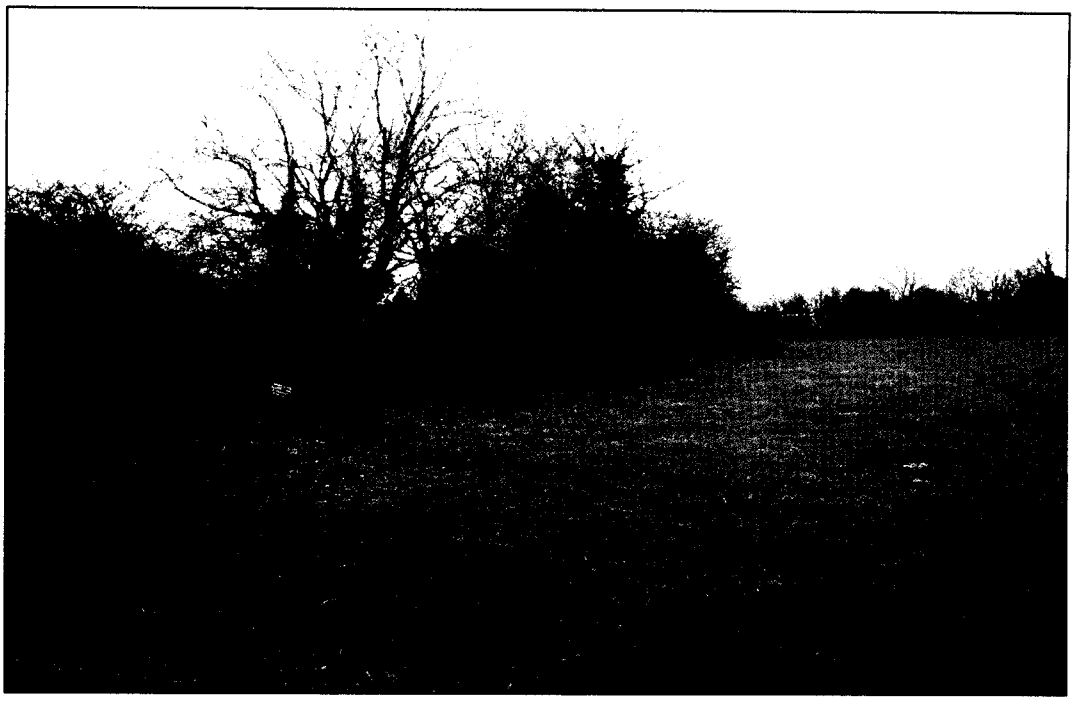
Photograph 5.2.1: Category 1 hedgerow on the left with mature trees in north east corner of site.

Baseline data collected for a neighbouring site also includes hogweed (*Brachypodium sylvaticum*), herb robert (*Geranium robertanium*), wood avens (*Geum urbanum*), bush vetch (*Vicia sepium*), hart's tongue fern (*Phylitis scolopendium*) and meadowsweet (*Filipendula ulmaria*).

Hedgerows (WL1) of moderate conservation value (Category 2)

There are several hedgerows of this category in the study area, principally in the western and mid to south portion of the site. These are of moderate conservation value due to the relatively high species diversity, vertical composition, thickness and age. They generally comprise of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus agg.*) with some ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*). They offer good nesting habitat for birds as well as providing fruit and supporting insects.

These differ from the category 1 hedgerow in that they are generally more 'gappy' and thinner in nature and are less species diverse. They are composed almost entirely of hawthorn, blackthorn and bramble with elder or ash found in low frequency of occurrence. Despite their sub-optimal structure they still perform valuable ecological functions as food sources and wildlife corridors and are found occupied by a broad range of bird species and alongside rabbits. See photograph 5.2.2.



Photograph 5.2.2: Example of Category 2 hedgerow.

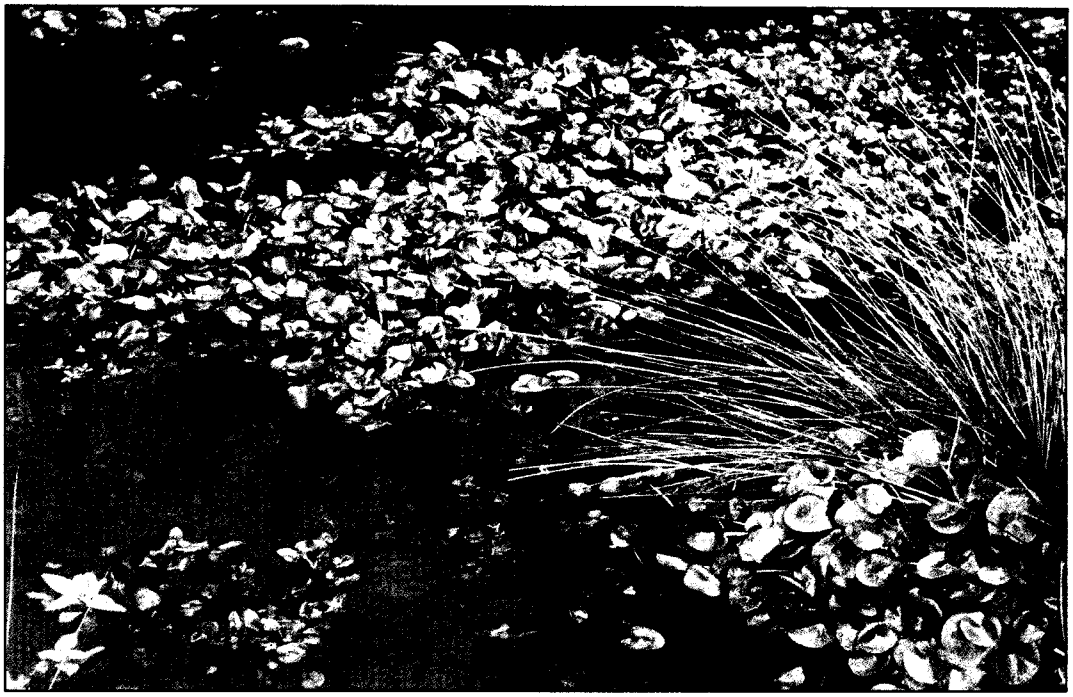
Hedgerows (WL1) of poor conservation value (Category 3)

These types of hedgerows are often broken lines of hawthorn or heavily managed hedgerows that have little ecological value. Such a hedgerow is found bisecting a field from east to west in the middle of the site.

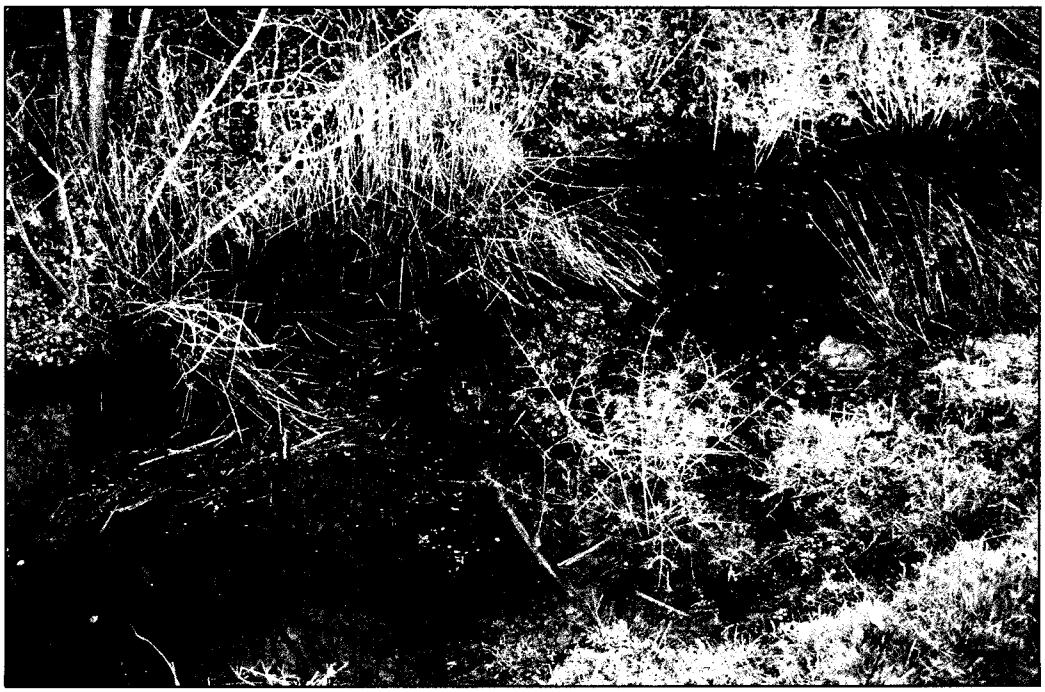
Freshwater

There are a series of connected drainage ditches/small streams that flow from south to north across the site in association with the hedgerows. These are of moderate ecological value and in places are heavily shaded by overhanging hedgerows. There was no noticeable in-stream vegetation where there were sections in shade. However, other drainage ditches were filled with Fool's watercress (*Apium nodiflorum*) and other emergent aquatic macrophytes such as flag iris (*Iris pseudacorus*).

A larger watercourse, a tributary of the Griffeen River, runs east-west through the northern portion of the site and is joined by another smaller watercourse that flows in from the west near the scrapyard. The stream is approximately 3m wide and up to 60cm deep in places and in some places is swift flowing. The substrate appears to be muddy with occasional patches of sand and gravel. Most of the watercourses in the northern portion of the site are shaded by hawthorn, ash and blackthorn riparian vegetation. Macrophytes were found to be growing in the stream where the wooded corridor opens up to allow light to penetrate. Aquatic macrophytes included soft rush (*Juncus effesus*), mare's tail (*Hippurus vulgaris*), fool's watercress, water mint (*Mentha aquatica*) and marsh marigold (*Caltha palustris*). See photographs 5.2.3 and 5.2.4 below.



Photograph 5.2.3: Marsh Marigold in the north-east corner of the site.



Photograph 5.2.4: Drainage ditch containing Mare's Tail

The semi-natural and undisturbed sections of this watercourse are ecologically important at a local level. The Griffeen River flows in the Liffey near Lucan and is an important sea trout spawning area according to the Eastern Regional Fisheries Board.

The site survey undertaken on 31st March 2006 noted the contamination of the river flowing from Baldonnell Aerodrome northward through the site. The

contaminant which was hydrocarbon-based, did not appear to be having any toxic effects on the watercourse fauna or flora but emitted a strong petroleum odour along its course.

Fauna

Detailed fauna assessments were carried out as part of this ecological assessment and specifically addressed use of the site by badgers, otters and bats.

Mammals

Badgers *(Meles meles)*
Evidence of badgers was present in terms of occasional feeding signs and well-used paths crossing the site in various locations as shown in Figure 5.2.1. It had previously been suspected that there may be a sett in the northern part of the site, in the location of the scrap yard. Dense vegetation prevented thorough survey of this area during the site visit. Two possible setts were identified close to the larger watercourse although the lack of other field signs evidence that they may be setts (no fresh digging, bedding or latrines nearby) and their waterside location may suggest more active use by otters (see later). No obvious badger setts were located within the site.

There are also old badger setts outside of the site boundary to the south, that have since been taken over by rabbits. Rabbits are abundant throughout the site.

Badgers, their breeding and resting sites are protected under the Wildlife Act (1976 as amended in 2000).

Otters (*Lutra lutra*)
There is evidence that otters are using the site for resting and commuting. Evidence on site includes an otter spraint (dropping) on a corrugated iron sheet in the water course in the north east corner of the site and a suspected otter holt on the northern site boundary adjacent to the watercourse near the scrapyard. The holt has a single entrance that is 2.5m above the stream level. There were no spraints around the site entrance that would usually suggest occupancy and no prints or other field signs nearby. However, detecting use of otter holts is often difficult and can only be confirmed by regular monitoring. Otters are thought to be using the drainage ditches as corridors to allow movements to the golf course and to other areas where they may be feeding.

Otters, their breeding and resting sites are protected under the EC Habitats Directive and under the Wildlife (Amendment) Act 2000. They are particularly sensitive to human disturbance and development pressures.

Bats
The stone farm buildings to the south of the site are regarded as potential bat roosts. The timing of the earlier surveys (Winter-early spring) prevented any bat surveys being carried out and this was remediated by undertaking a survey in early May 2006.

The methodology used to assess use of the site by bats involved bat surveyors measuring the frequency of encounters with bats over a five minute period in various locations around the site. Figure 5.2.1 shows these locations and the numbers of encounters or "passes". Two bat surveyors were used to cover the

site, each using heterodyne ultrasonic bat detectors to record the numbers and species of bats using the site.

The species of bats encountered included common and soprano pipistrelle bats (*Pipistrellus pipistrellus* and *P. pygmaeus*) and Leisler's bat (*Nyctalus leislerei*). Both pipistrelle species were noted commuting along the Category 2 and Category 3 hedgerows from south to north along the hedgerows aligned in this direction. They were also feeding along the Category 1 hedgerows near the watercourse and generally there were more "passes" encountered along these denser hedgerows.

Leisler's bats usually feed much higher and are the only bat to feed over open fields and parkland away from cover. They were recorded flying across the site in the southern portion near the farm buildings and also in the north west corner but could not be recorded visually.

Monitoring of the farm buildings during the emergence period did not conclusively reveal use of the building by bats although there were numerous possible access/exit points and coverage of all of the building could not be achieved. Pipistrelle bats were recorded in the vicinity of the buildings during this time.

The bat surveys were regarded to provide a crude indication of the use of the site for feeding and commuting. However, they were carried out early in the year and during cool conditions that are not optimum for bat feeding surveys. Therefore the results of the surveys should be treated with a degree of caution.

Currently there are nine species of bat known to breed in Ireland. All nine species and their roost sites are strictly protected under both European and national legislation as described below.

Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna 1992 (Council Directive 92/43/EEC)

The Habitats Directive offers legal protection to all nine bat species that occur in Ireland and lists them under Annex IV of the directive as species of community interest, in need of strict protection.

Wildlife (Amendment) Act, 2000 (S.I. No. 38 of 2000)

All bat species occurring in Ireland are listed in Schedule V of the Wildlife Act 1976 (amended by the 2000 Act) as protected species. This legislation makes it illegal to kill or injure bats in the wild and makes it an offence to wilfully interfere with or to destroy their breeding and resting places.

European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997)

These regulations give effect to the above two strands of European and national legislation. All bat species occurring in Ireland are listed in the First Schedule of these regulations. This legislation makes it an offence to deliberately capture or kill bats in the wild, to deliberately disturb them particularly during the breeding, rearing, hibernation and migration seasons, or to cause the deterioration or destruction of their breeding and resting sites.

Furthermore as a signatory to the European Bats Agreement (Agreement on the Conservation of Bats in Europe) 1993, Ireland is required to protect their habitats, requiring the identification and protection from damage or disturbance, of important feeding areas. All Irish bat species are listed in Appendix II of the Bern Convention, as species requiring strict protection. Finally, all but two bat species in Ireland are listed as internationally important in the Irish Red Data Book (1993). Natterer's and the whiskered bat are both listed as indeterminate. Given the site's geographic location, nature of the habitats of the site and knowledge of the area it is likely that the site is being used by at least five out of the nine species known to breed in Ireland.

Other species

Other species commonly found this agricultural setting include fox (*Vulpes vulpes*), rabbit, hedgehog (*Erinaceus europaeus*), pygmy shrew, (*Sorex minutus*), wood mouse (*Apodemus sylvaticus*) and brown rat (*Rattus norvegicus*). It is highly likely that these species would make use of the grassland, woodland and freshwater habitats present within the study area. Hedgehog and pygmy shrew are protected under the *Wildlife (Amendment) Act 2000.*

Avifauna

The habitats within the study area support a range of commonly found passerine bird species including magpie (*Pica pica*), hooded crow (*Corvus corone*), blackbird (*Turdus merula*), song thrush (*T. philomelos*) robin (*Erithacus rubecula*), wren (*Troglodytes troglodytes*), blue tit (*Parus caeruleus*) and a range of other species frequently encountered in agricultural fields and hedgerows. Other species also seen on site include goldfinch (*Carduelis carduelis*) and snipe (*Gallinago gallinago*). A buzzard (*Buteo buteo*) was also seen hunting over the site and rested on an ash tree in the middle of the site for a period of 15 minutes. Buzzards are slowly spreading their range further south and along the east coast and are now frequently recorded in Co. Dublin and Wicklow.

Barn owls (Tyto alba) are known to be present in areas to the west of the site (*Doherty, pers, comm.*). The proposed development site would represent good hunting habitat but there are no suitable roosting structures within the site boundary. A possible barn owl pellet was recorded under a mature ash tree on the western boundary. However the pellet was in poor condition and could not be confirmed as being from an owl. No owl sightings were recorded in this area during the site surveys.

Aquatic Fauna

The drainage ditches did not appear to contain any macroinvertebrates or fish although no specific intrusive surveys were undertaken. The ditch would be expected to support a degree of macroinvertebrate life although on-site observations indicated that the water quality is threatened by upstream pollution by hydrocarbons.

Habitats in the Surrounding Area

The habitats surrounding the proposed development site include built environments and grassland. The surrounding habitats are of similarly low ecological value to those found within the proposed development site.

Evaluation of Habitats

Evaluation of habitats follows the *Heritage Council's Draft Habitat Survey Guidelines* (2005) and the *Institute for Ecology and Environmental Management's Draft Guidelines for Ecological Impact Assessment* (2005). The former criteria are set out below:

Table 5.2.1:Scheme for Ecological Evaluation of Sites (after Nairn and Fossitt, 2004)

Rating	Qualifying Criteria
A	Internationally important • Sites designated (or qualifying for designation) as SAC or SPA under the EU Habitats or Birds Directives. • Undesignated sites containing good examples of Annex I priority habitats under the EU Habitats Directive. • Major salmon river fisheries. • Major salmonid (salmon, trout or char) lake fisheries.
B	Nationally important • Sites or waters designated or proposed as an NHA or statutory Nature Reserves. • Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). • Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000. • Major trout river fisheries. • Water bodies with major amenity fishery value. • Commercially important coarse fisheries.
C	High value, locally important • Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. • Small water bodies with known salmonid populations or with good potential salmonid habitat. • Sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. • Large water bodies with some coarse fisheries value.
D	Moderate value, locally important • Sites containing some semi-natural habitat or locally important for wildlife. • Small water bodies with some coarse fisheries value or some potential salmonid habitat. • Any water body with unpolluted water (Q-value rating 4-5).
E	Low value, locally important • Artificial or highly modified habitats with low species diversity and low wildlife value. • Water bodies with no current fisheries value and no significant potential fisheries value.

The development site itself is not under any conservation designation and there are no designated areas immediately adjacent to the proposed development site which could be impacted upon by the proposed development.

The majority of the proposed development site is characterised by agricultural grassland with hedgerows of varying quality. The Category 1 hedgerows that are associated with the watercourse in the northern part of the site are the most important ecological feature on the site and provide feeding and refuge for bats and for otters. This habitat is therefore regarded to be of high value with local importance as protected species (otters and bats) are present. Hedgehog and pygmy shrew which could also be present within these are protected under the *Wildlife (Amendment) Act 2000.*

5.2.3 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park on the subject site which will be known as *'Profile Park'*. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.2.4 POTENTIAL IMPACT OF THE PROPOSAL

Impacts significance terminology follows nomenclature provided in the NRA Guidelines referred to earlier. See Table 5.2.2 below.

Table 5.2.2: NRA Impacts Significance Terminology

Impact	Site Category				
	A sites Internationally important	**B Nationally important**	**C High value, locally important**	**D Moderate value, locally important**	**E Low value, locally important**
Severe negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent beneficial impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor positive				Permanent impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

Construction Phase

The potential negative impacts associated with the construction phase of this proposed roads and infrastructure development will involve the physical and direct disturbance of most of the habitats within the proposed development site. Aspects of the construction phase that are likely to be *potential* sources of significant ecological impacts include:

- Vegetation Removal
- Topsoil stripping
- Use and storage of chemicals and fuels on site
- Culverting of watercourses
- Security lighting, noise and vibration.

Direct Impact
For the purposes of this assessment it is assumed that site clearance will involve removal of the hedgerows and grassland habitat within the entire site boundary. The loss of these hedgerows is regarded to be of major negative significance in the absence of any mitigation. It will remove feeding areas and cover for bats, otters and other fauna that currently use the hedgerows within the site.

Topsoil stripping will follow vegetation removal. In the absence of any controls in place, there is a potential risk of wind-blown soil and dust reaching the watercourses and causing adverse impacts downstream. Such impacts are usually temporary and intermittent unless soils are stored close to watercourses when such impacts can be more prolonged.

Materials, including fuels, concrete, cement, biocides etc when stored incorrectly or at inappropriate locations often pose a risk to watercourses. Abnormal events such as spillages and leaks may also give rise to pollution of water bodies.

The tributary of the Griffeen River that flows into the site from the east will require culverting as a result of the proposed roads and infrastructure development. This has the potential to adversely impact upon the aquatic fauna within and downstream of the culverted sections as well as the fauna that use the watercourse as a refuge and for feeding. The proposed works will require the removal of the possible otter holt. This will require derogation from the EC Habitats Directive as such works have to potential to constrain the territorial range of otters in this area. In the absence of any mitigation this impact is regarded to be moderately negative as the impact is localised upon the watercourses.

Indirect Impact
The accumulation of water on site during the construction works has the potential to lead to sediment being allowed to flow into the nearby watercourses unless controlled. This could have potential significant adverse effects upon aquatic fauna and flora both in the Griffeen River and downstream into the Liffey, although the effects will diminish with increasing distance as the dilution factor also increases.

Security lighting at the site perimeter and within the site, as well as machinery noise and vibration have the potential to disturb breeding birds and fauna within and off-site. Whilst insects are often attracted to lights, most bat species will not feed near bright lights and will not use commuting routes that are illuminated.

Cumulative Impact
The significance of the cumulative loss of hedgerows and grassland habitat in south west Dublin needs to be taken into account in this assessment. Whilst it is difficult to obtain quantitative data on the rate of habitat loss, the following ecological issues are deemed to be pertinent with regard to the proposed development.

Reduction of semi-natural habitat

- The cumulative loss of grassland and hedgerow habitat is regarded to be significant at a local level (ie southwest County Dublin) but not significant when assessed at a regional or national scale.
- The cumulative impacts upon protected species are manifested in the reduction.

Reduction of habitat for protected fauna

- Cumulative loss of feeding and refuge areas for bats, barn owls, badger and otters is regarded to be significant at a local level (i.e. SW Co. Dublin) and moderately significant when assessed at a regional or national scale. There is evidence locally that otters can tolerate well-designed business park environments but there is little research undertaken to inform how such developments affect their territorial ranges.

Operational Phase

The potential negative impacts associated with the operational phase of this proposed roads and infrastructure development are primarily associated with noise and disturbance issues. Aspects of the operational phase that are likely to be *potential* sources of significant ecological impacts include:

- Lighting of car park and environs
- Traffic and machinery noise
- Discharges of surface water

Direct Impact
There are no potential direct impacts within the site anticipated from the operation of the development. This assessment does not address future land-uses that may arise as a result of permitting access into this site.

Impacts caused by the site design may affect movements of otters and other fauna across the site. Otters usually follow watercourses and will prefer to travel over land than travel through culverted sections. This puts them at risk of collision with vehicles.

Indirect Impact
Potential indirect impacts could result from untreated surface water or spillages of contaminants entering the Griffeen River off-site unless suitably treated or controlled.

Vehicular movement and lighting around the site perimeter have a similar potential to cause off-site impacts such as those described earlier.

Cumulative Impact
There are no predicted cumulative impacts as a result of the operation of the proposed development.

5.2.5 REMEDIAL OR REDUCTIVE MEASURES

Mitigation by Reduction

Taking measures to limit the working area during the construction phase will reduce the impacts of the development on hedgerows and grassland that do not require removal. The construction area will be clearly delimited and machinery will operate only within the allocated area. This will result in seven hedgerows being affected within the site.

The length of watercourses to be culverted have been minimised by careful site design. Wherever possible within the site design, the existing watercourses and the riparian vegetation will be left untouched.

During dry windy days in the construction period dust preventative measures as outlined in Section 5.6 of this EIS will be implemented to prevent any dust blow to areas outside the delimited construction areas.

Any fuels which it is necessary to store on-site will be contained within specially constructed bunds to ensure that fuel spillages whether accidental or otherwise are fully contained. Such bund areas shall be roofed to exclude rainwater. A spill tray will be used when re-fuelling vehicles and machinery on-site.

An emergency spill response kit will be held on site with an absorbent material to deal with any accidental oil or petrol spills. This absorbent material will be properly disposed of after use.

Mitigation by Avoidance

The hedgerow and mature trees should not be cut or removed between the beginning of March through to the end of August to avoid negative impacts to nesting birds and mammals species.

There are no additional practical measures which can be implemented for the further avoidance of impacts on hedgehogs and pygmy shrew which are protected mammal species.

Mitigation by Remedy

In order to compensate for the loss of riparian vegetation, additional ash and hawthorn hedging will be planted to abut the riparian corridor. Relocation of hedgerow vegetation to suitable areas is a viable option and will be agreed with the contractor.

If it is proposed to landscape the area in association with the proposed design, then landscaping plans should have an emphasis on the use of native species as far as possible. Suggested landscaping planting in this regard is as follows:

Suggested Species for Planting

• Oak	*Quercus robur & Q. petrea*
• Ash	*Fraxinus excelsior*
• Silver Birch	*Betula pendula*
• Field Maple	*Acer campestre*
• Hawthorn	*Crataegus monogyna*
• Alder	*Alnus glutinosa*
• Goat Willow	*Salix caprea*
• Guelder Rose	*Viburnum opulus*
• Hazel	*Coryllus avellana*
• Blackthorn	*Prunus spinosa*
• Elder	*Sambucus nigra*
• Yew	*Taxus baccata*
• Buddleja	*Buddleja davidii*
• Holly	*Ilex aquifolium*
• Honeysuckle	*Lonicera periclymenum*
• Dogrose	*Rosa canina*
• Fieldrose	*Rosa arvensis*
• Ivy	*Hedera helix*

Non-native exotic species will not be included within the landscaping and in particular invasive species such as rhododendron, Japanese knotweed and cherry laurel will not be used.

Where roads pass over the larger watercourses in the northern portion of the site, separate dry 600mm diameter culverts will be provided to allow safe passage for wildlife under the roads. The invert level underpasses will be raised above the high water level to ensure that they remain dry.

5.2.6 PREDICTED IMPACT OF THE PROPOSAL

Taking the above mitigation measures into account, the following predicted impacts will apply.

Construction Phase

Direct Impact
The loss of hedgerow habitat may be compensated by replanting or relocation of hedgerows so that there is no net loss of hedgerow habitat. However, the ecological functions of the hedgerow will be diminished as the disturbance of habitats during construction will push otters, badgers and bats away from the site. The residual impacts of this disturbance is likely to be temporary but monitoring of bat, badger and otter activity will help to determine the level of impact prior to any further development of the site.

Indirect Impact
The careful control of the construction works (i.e. confining works to within the site boundary, clearly delimiting the boundary, the use of fuel bunds, spill trays and emergency response kits, dust preventative measures) will reduce any potential indirect construction related impacts on off-site areas.

Operational Phase

Direct Impact
It is possible following reinstatement of the site that flora and fauna will recolonise the area. This will be monitored by further surveys of bats, badger and otter activity to provide further information on the effects of such developments on these species.

There are not anticipated to be any significant impacts from the operation from the development.

Indirect Impact
Off-site impacts on the Griffeen will be effectively mitigated by proposed surface water attenuation and interception systems and are not deemed to be significant.

5.2.7 MONITORING

In order to identify any unforeseen effects during construction and operation of the proposed development, the following monitoring measures are proposed:

- Water Quality monitoring of any off-site discharges
- Monitoring of use of wildlife underpasses (quarterly for two years following completion)
- Monitoring for otter, bat and badger activity (twice per year in appropriate seasons)
- Annual monitoring of condition of planted or relocated hedgerow vegetation.

5.2.8 REINSTATEMENT

Reinstatement measures that would restore the site to pre-development conditions are not possible in this type of development. All proposed works are permanent and irreversible.

5.3 GEOLOGY, SOILS AND HYDROGEOLOGY

5.3.1 INTRODUCTION

This chapter describes the bedrock geology and soils at the proposed development site. The information is based on a desktop study, site walkover and trial pit investigation by a WYG hydrogeologist. This assessment of geology and soils has been undertaken in accordance with the *Draft Guidelines on the Information to be contained in Environmental Impact Statements* (EPA, 2002), the Institute of Geologists of Ireland guidelines for *Geology in Environmental Impact Statements* and also *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* (EPA, 2003).

Desk study information was attained from a number of sources including:

- Geological Survey of Ireland's Sheet 16 – Geology of Kildare - Wicklow (GSI, 1999).
- Geological Survey of Ireland's National Draft Bedrock Aquifer Map.
- Existing White Young Green (WYG) database.
- Ordnance Survey of Ireland (OSI) Discovery Series Map 50, 1:50,000.

The impact of construction and operation of the proposed development at the site on the underlying soils and geology is discussed and evaluated. Potential impacts are noted and mitigation measures are proposed.

5.3.2 RECEIVING ENVIRONMENT

Bedrock Geology

Regional Geology

The Geological Survey of Ireland's Sheet 16 – Wicklow - Kildare (GSI, 1999) provided an illustration of geology of this area of Co. Dublin. The bedrock of the Dublin City region is mainly composed of Calp Limestone and Shale. To the south-east of Dublin city lie the Leinster Granite plutons, while the southwest is dominated by siltstones, muddy limestones, greywackes and shales. Directly north and west of the city there are areas comprising of Waulsortian limestones around Lucan and Blanchardstown. The regional geology is shown on figure 5.3.1.

Local Geology

The bedrock geology of the site location is Calp which reportedly consists of dark grey to black limestones and shales. The bedrock in this area is shallow, ranging from 3 – 5m below ground level.

Quaternary Geology

Twenty-nine trial pits were excavated across the site in March 2006 to depths ranging from 1.5m below ground level (bgl) to 3.75m bgl. For the majority of the site quaternary deposits overlie the limestone bedrock. These deposits range from sandy gravely clays to gravely clays and in general are termed Glacial drift deposits. The depth of these deposits varied from 1.5m bgl to 3.5m bgl. Below this, a layer of fractured limestone was encountered becoming competent limestone with depth.

On the eastern side of the site an area of land was known to have received fill material in the past. There is a water treatment facility managed by Baldonnel

Aerodrome in this area. This infilled area was investigated more comprehensively than the other areas of the site in order to determine the content and extent of the waste material. The material consisted largely of construction and demolition wastes and was found to persist to at least 3.5m bgl in many of the excavations. This area has been identified separately on the site layout plan (see figure 5.3.2). Full details of the trial pit logs are presented in Appendix B.

Figure 5.3.1: Regional Geology

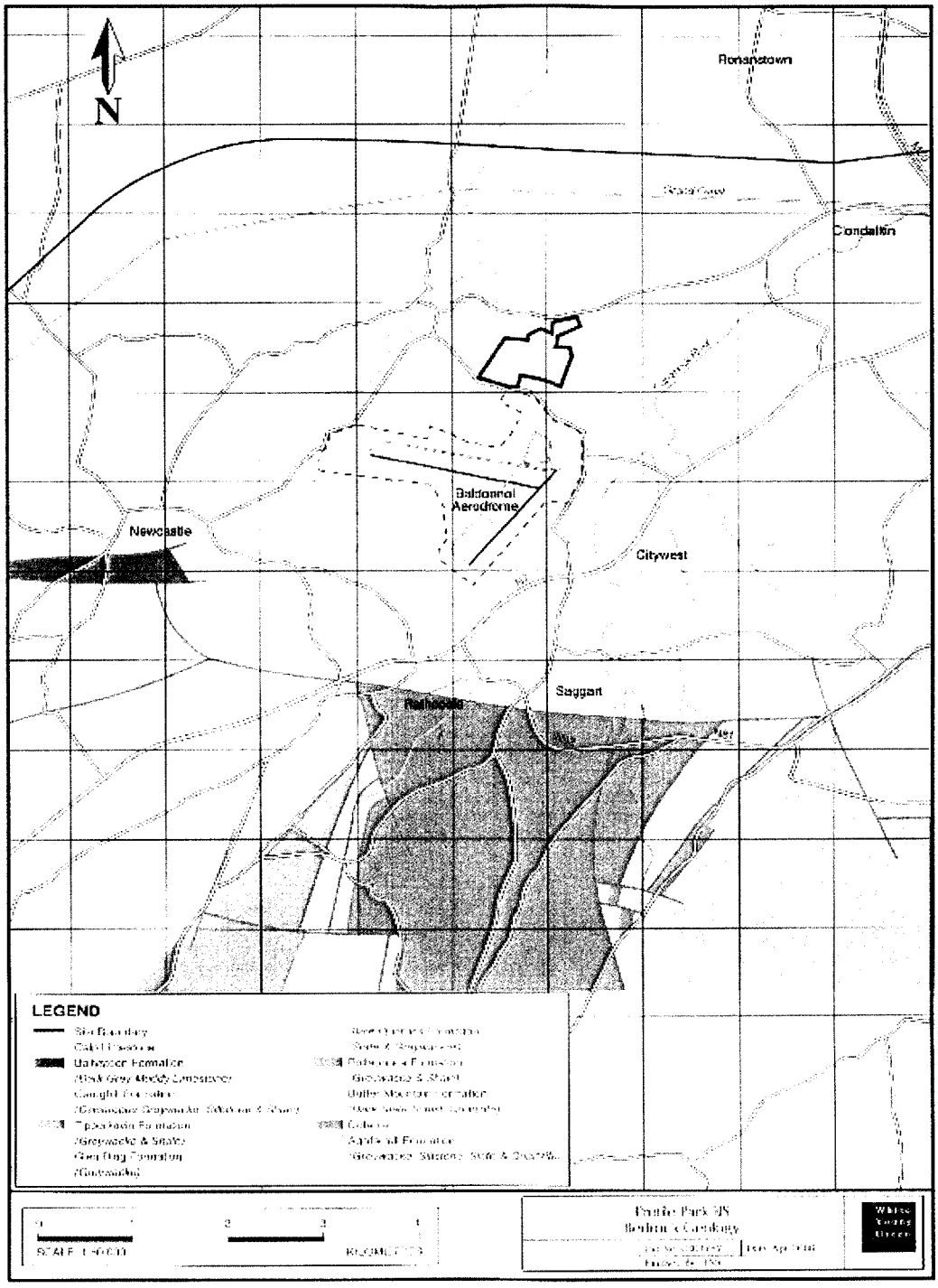
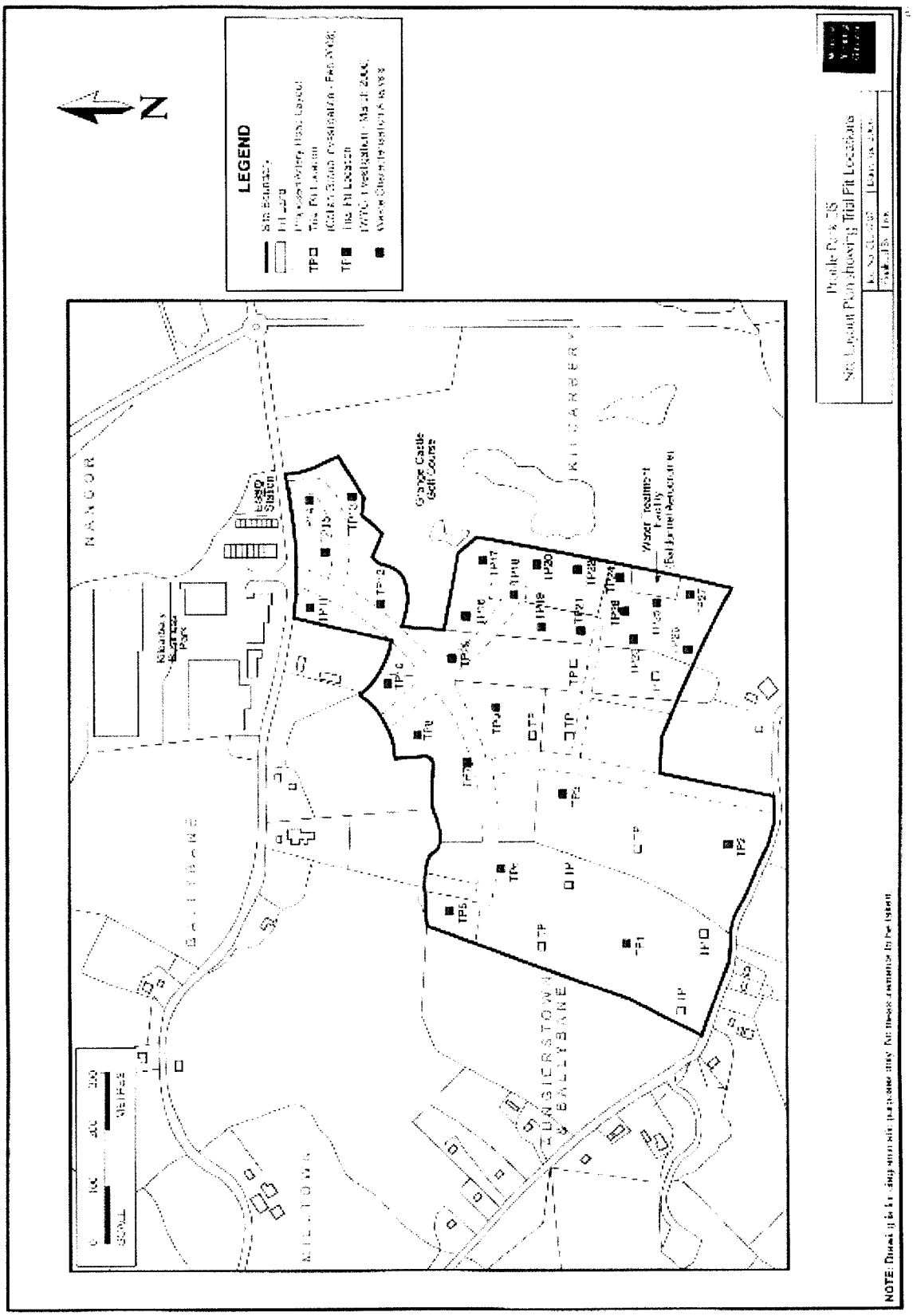


Figure 5.3.2: Site Layout Plan Showing Trial Pit Locations



Hydrogeology

There was no borehole drilling undertaken during the investigation. The information relating to the hydrogeological setting at the site is derived from trial pit information and a desk based study using the Geological Survey of Ireland (GSI) database.

Previous studies carried out in the area surrounding the site has indicated that the groundwater table is within the weathered limestone bedrock 1m to 2m bgl. The recent trial pit investigation carried out on the site encountered groundwater inflows between 1m and 3.5m bgl.

The Griffeen River drains parts of the site and the River Liffey lies approximately 4.5km to the north of the site. Groundwater flow on the site will be influenced by topographic gradient and regional groundwater flows would be expected to flow to the north or northeast either towards these rivers or sub-parallel to the river flow direction.

Aquifer Classification

The Geological Survey of Ireland has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification depends on a number of parameters including, the areal extent (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater throughput (Mm^3/d). There are 3 main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

Information from the GSI's National Draft Bedrock Aquifer Map which is shown on Figure 5.3.3 indicates that the site lies on an area which is classified as Locally Important Aquifer (Lm), i.e. bedrock which is moderately productive only in local zones.

Aquifer Vulnerability

The vulnerability of an aquifer to contamination is determined by the nature and thickness of the overburden material overlying it. The classification guidelines, as published by the GSI, are given in Table 5.3.1 below. The groundwater protection scheme for Co. Dublin is not yet completed. As such the vulnerability of the site has been determined from Table 5.3.1.

Figure 5.3.3: Bedrock Aquifer Map

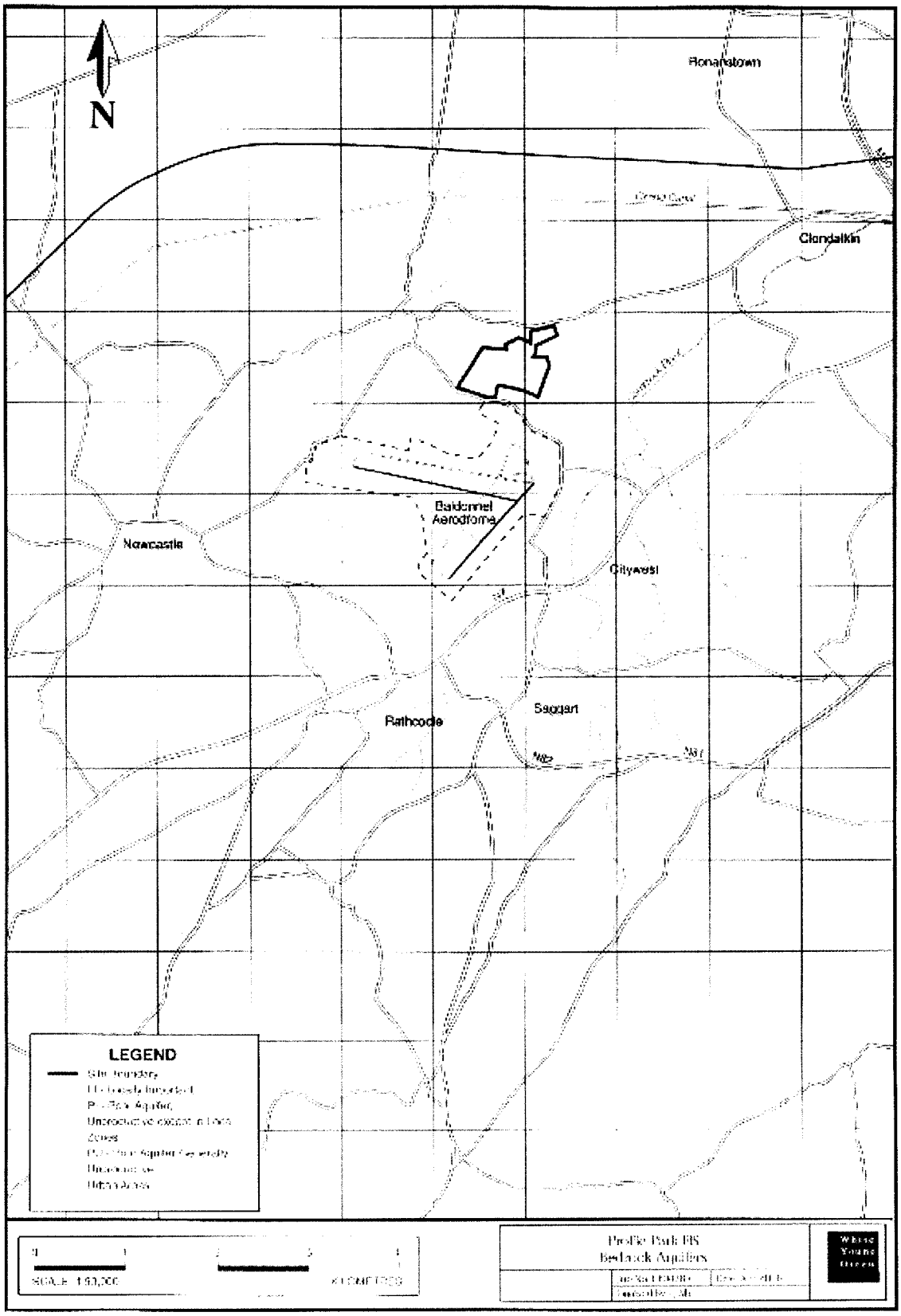


Table 5.3.1:GSI Vulnerability Mapping Guidelines (from Daly & Warren 1997)

Vulnerability Rating	Hydrogeological Requirements				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Recharge Type
	high permeability (sand/gravel)	moderate permeability (sandy till)	low permeability (clayey till, clay, peat)	(sand & gravel aquifers only)	
Extreme	0-3.0m	0-3.0 m	0-3.0m	0-3.0m	point (>30 m radius)
High	>3.0	3.0-10.0m	3.0-5.0m	>3.0m	diffuse
Moderate	N/A	>10m	5.0-10.0m	N/A	diffuse
Low	N/A	N/A	>10.0m	N/A	diffuse
Notes: i)N/A =not applicable ii) Precise permeability values cannot be given at present iii) Release point of contaminants is assumed to be 1-2 m below ground surface					

As the table above indicates, the less permeable and thicker the overburden overlying an aquifer is, the lower the vulnerability of the aquifer to contamination.

The GSI Groundwater Protection Scheme indicates therefore that the vulnerability across the development area is likely to range from high (H) to extreme (E).

Composition and Extent of Waste Material

Waste material was encountered in the eastern area of the map (see figure 5.3.2) which extended from the north as far as the water treatment facility. The depth of this material ranged from 2.50m to 3.75m in thickness and comprised gravely clays with cobbles and boulders of limestone and concrete. Wood was encountered in many of the trial pits in this area, in particular TP23 which had a layer of wood and branches approximately 0.5m in thickness. Bricks, plastics and some metals (wiring, hub cap etc.) were occasionally encountered. It is clear that this waste is derived from construction and demolition operations. At no point was any domestic type refuse encountered.

Three Waste Characterisation analyses were performed on arisings from three trial pits excavated in this area (TP16, TP22, and TP23). This analysis was carried out in line with the EPA guidance for Waste Characterisation. The form used in this analysis is presented in Appendix B. The overall results from this analysis indicate that the following materials make up the majority of waste in this part of the site.

- Unclassified Incombustibles (Stones, concrete, soil clasts) 79.7%
- Fine elements smaller than 20mm round mesh 16.8%
- Other unclassified combustibles (Wood, branches) 3.4%
- Other metal waste 0.04%
- Other glass waste 0.02%
- Other plastic waste 0.01%

As a general rule, land which contains more than 3% wood material is considered to pose a risk in terms of methane generation. The average wood component of the three waste characterisations was just above this value and therefore requires action.

Gas Monitoring

Soil samples obtained from the trial pits were analysed for the following gases: carbon monoxide, oxygen, VOCs (volatile organic compounds), hydrogen sulphide (H_2S) and methane (expressed as LEL, lower explosive limit). The results of this monitoring are presented in Appendix B.

In summary, the only area of land investigated which returned gas levels outside the ambient levels was the area of land which infilled. These gas levels correspond to the areas in which wood, wood derivatives and plastic materials were encountered. The degradation of these compounds leads to the generation of gases. Background levels of oxygen were measured at 20.9%. Oxygen levels were slightly reduced in many of the trial pits in the infilled area, the lowest being 18.2% in TP19. The reduced oxygen values reflect the presence of CO and methane. Although methane was detected, these were at very low levels and did not exceed the EPA recommended guideline of 1% LEL methane in any sample.

Soil Chemical Analysis

Soil samples were taken from various depths in trial pits across the site. The soils were analysed in ALcontol Laboratories, Dublin for metals, diesel range organics, mineral oils, volatile organic compounds and leachability. The full results from these analyses are presented in Appendix B.

In order to assess the soil analyses results with regard to potential human health risks, WYG have derived Threshold Screening Values (TSVs) in accordance with the UK framework outlined by the UK Environment Agency (EA) and the Department for Environment, Food and Rural Affairs (DEFRA). The most recent CLR (Contaminated Land Report) documents CLR7-10 (EA/DEFRA, 2002) set out the basis for this assessment.

Research by the EA is ongoing to produce toxicology reports (TOX series) for each of the contaminants identified within the CLR framework with the aim of producing published Soil Guideline Values (SGVs) using the Contaminated Land Exposure Assessment (CLEA) Model. To date, SGVs have been published for only a limited suite of contaminants, with current SGVs derived for four different land use scenarios namely:

- residential with plant uptake;
- residential without plant uptake;
- allotments; and
- commercial/industrial.

Since a retail/commercial development is proposed for the site, WYG TSVs (Issue 6f) applicable to commercial/industrial end use have been used for assessment of the risk for the site. Where SGVs have been published by the EA, these are adopted as the TSVs. For all other contaminants, TSVs for different land use scenarios have been derived by WYG in accordance with the CLR framework.

In the absence of SGVs or the TSVs derived by WYG, the Dutch Intervention Values (DIVs) have been quoted as guidance.

Metals

There were no exceedances of the respective TSVs for any of the metals analysed in this investigation. The area of land which received waste in the past returned higher concentrations in general but still fell within acceptable levels based on the commercial/industrial nature of the end use of the development. The results are displayed in Table 5.3.2 below.

Table 5.3.2: Soil Metal, DRO and Mineral Oil Concentrations, April 2006

Determinand	Units	Agricultural Land		Infilled Land		WYGE TSV*
		Min	Max	Min	Max	
Arsenic	mg/kg	<0.5	<0.5	<05	156	500
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	1400
Chromium	mg/kg	13	28	15	35	5000
Copper	mg/kg	21	41	7	89	8600
Lead	mg/kg	8	46	8	105	750
Mercury	mg/kg	<0.3	<0.3	<0.3	<0.3	480
Nickel	mg/kg	28	85	17	79	5000
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	8000
Zinc	mg/kg	50	134	58	996	46100
Boron	mg/kg	<1	<1	<1	<1	-
DRO	mg/kg	<1	<1	<1	<1	
Mineral Oil	mg/kg	<1	<1	<1	1	

* White Young Green Threshold Screening Values based on CLEA and Dutch Human Health Values

Diesel Range Organics

There were no detections of any diesel range organics in any of the standard soil analyses. There was one detection of trace concentrations of mineral oil (1 mg/kg) in TP22 which is located in the infilled area. The industry standard remediation guideline value for mineral oil is typically 100mg/kg and as such the detection in TP22 is insignificant.

Leachates

Leachate analysis on soil samples provides information on the maximum potential for a given sample of soil to contaminate groundwater. It should be noted that leachate analysis does not necessarily indicate that contamination is occurring. The EPA has derived Interim Guideline Values (IGVs) for the protection of groundwater. Leachate results have been compared to these EPA guideline values to give further indication of the soil quality at the site.

The leachate analysis was performed on 10 samples from 5 trial pits, 3 of which were located in the infilled area (TP19, TP22, and TP23). This analysis was performed to ascertain the potential for the material to contaminate groundwater. The results of the leachate analysis are displayed in Table 5.3.3 below.

Table 5.3.3: Soil Leachate Concentrations, April 2006

Determinand	Units	Agricultural Land		Infilled Land		IGV*
		Min	Max	Min	Max	
Dissolved Arsenic	mg/l	<0.001	0.012	0.002	0.006	0.01
Dissolved Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	0.005
Dissolved Chromium	mg/l	0.002	0.003	0.003	0.005	0.03
Dissolved Copper	mg/l	0.005	0.009	0.006	0.020	0.03
Dissolved Lead	mg/l	0.004	0.174	<0.001	0.007	0.01
Dissolved Mercury	mg/l	<0.00005	0.00012	<0.00005	0.00012	0.001
Dissolved Nickel	mg/l	0.001	0.002	0.003	0.009	0.02
Dissolved Selenium	mg/l	0.001	0.003	0.002	0.006	-
Dissolved Zinc	mg/l	0.029	0.037	0.020	0.035	0.1
Dissolved Boron	mg/l	0.008	0.088	0.007	0.061	1
Dissolved DRO	mg/l	<0.01	<0.01	<0.01	4.87	0.01
Dissolved Mineral Oil	mg/l	<0.01	<0.01	<0.01	0.97	0.01

*Interim Guideline Values for groundwater, EPA.

The results of the leachate analyses on the soils at the site indicate that for the most part, there is no risk of contamination of groundwater from the overburden. There were however two trial pits which were an exception to this, TP9 and TP19. The leachate results for lead in TP9 (0.174mg/l) exceeded the IGV of 0.01mg/l. This result is surprising given the visual observation of the sample, the absence of any obvious source, and the soil quality of the surrounding agricultural land. As such this value is considered anomalous. The leachate results for TP19 (4.87mg/l) for DRO and mineral oil (0.97mg/l) exceeded the respective IGV of 0.01mg/l and indicate an isolated pocket of hydrocarbon related contamination in the infilled land.

Volatile Organic Compounds

There were no detections of any volatile organic compounds in the soil samples sent for analysis.

Conclusions of Site Investigation

From a quality point of view, the soils present across much of the site are good. There are isolated elevated concentrations of lead, DRO, and mineral oil in the leachate analyses at 2 of the 29 locations. These are not considered to be significant due to the localised extent of the contamination and can easily be resolved by removal of the source material to a licensed facility for disposal.

The area of the site which has received waste in the past comprises mainly inert fill material and as such the results reflect this. While the concentrations of metals were higher in this area they were below the respective TSVs and as such do not pose a risk to the environment or human health.

The presence of wood material within this area may lead to methane generation. The gas monitoring undertaken indicated that there were some areas where there was some low level methane generation. Removal of the main area of the wood source (TP23, ~6% wood material) would be required in order to reduce further gas generation. This would reduce the average percentage of wood calculated at the site to below 3% which is the recommended industry standard action level.

5.3.3 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park, to be known as *'Profile Park'*, on the subject lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout, all on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.3.4 POTENTIAL IMPACTS OF THE PROPOSAL

Construction Phase

The construction phase will involve the disturbance and removal of topsoil and overburden. Site preparation works will involve site clearance, excavation and construction of roads and service lines. This will have a direct impact on the soils present at the site. However, as the soils are of no conservation value, this impact is not considered to be significant.

There is an increased risk of groundwater contamination resulting from spills or leaks from machinery or storage areas due to bedrock being exposed during overburden removal.

An area of the site has received infill waste in the past. This material largely consisted of construction and demolition waste with some wood. The majority of the wood encountered during the investigation was found in TP23. Results to date suggest that this material is producing low levels of methane.

The trial pit investigation across the rest of the site has proven that the overburden is glacial till and free from contamination. However, in the event of excavation operations discovering material which appears contaminated, this material should be stockpiled, analysed and disposed of if necessary to a licensed facility under the supervision of a qualified scientist.

There is the potential for dust generation during the construction phase of the development.

Operational Phase

The operational phase of the development will not involve unlicensed direct emissions to the soil or groundwater environment. Any discharges to groundwater of surface waters will require a permit or licence from the local authority or EPA.

There will be increased volumes of traffic on the site as a result of the development which will lead to increased risk of leakage of fuels from vehicles which have the potential to impact on the underlying aquifer.

5.3.5 REMEDIAL OR REDUCTIVE MEASURES

The remedial (or mitigation) measures proposed are put forward to address the potential impacts on the soils and groundwater at the site resulting from the construction and operation of the roads and services which will facilitate the future business park development.

It is advisable to remove the areas containing wood material in order to reduce methane gas generation. The area at TP23 should be excavated and screened for wood materials. This area can be extended during the removal works depending on visual observations of wood content.

In order to provide further assurance that there will be negligible methane generation from the fill material, a network of up to 6 gas monitoring wells could be installed across the infilled area in order to monitor during the construction phase.

Removal of the soils found in TP19 should be carried out in order to remove the isolated hydrocarbon contamination.

The construction works will involve the disturbance of soils at the site. This disturbance should be kept to a minimum. Where disturbance is unavoidable, the material should either be stored in stockpiles prior to reuse at the site or removed from the site. These stockpiles should be managed in a way to prevent negative impacts to the surrounding environment. The investigation across the site has indicated areas where fill material exists. However, should fill material that is not suitable for reuse be encountered during the construction phase, it should be transported offsite to be dealt with in an appropriate facility.

The excavation of soils during the initial stage of the development will be limited to the installation of services at the site and as such will not be deeper than 2-3m below ground level. Foundations for buildings are likely to extend deeper.

Dust generation should be mitigated against by dampening down construction areas during dry and windy weather conditions.

Any fuels or chemicals stored on the site during the construction or operation phases should be stored in appropriately bunded areas. Drainage from hardstanding areas on the site should incorporate interceptors to prevent contamination of surface water bodies in the event of leaks or spillages.

Facilities to store sewage during the construction phase should be provided and maintained appropriately. There should be no discharge to ground.

Good management practices in accordance with the CIRIA guide for environmental good practice on site during the construction and operation phases will mitigate against any spillages or leakages from vehicles or machinery.

5.3.6 PREDICTED IMPACT OF THE PROPOSAL

The proposal for the development of roads and services and the associated development of Profile Park will involve the disturbance and the removal of soils from the site. This will be mitigated against by keeping earth movements to a minimum and following the proposed mitigation measures listed above. This will result in no residual impacts on the environment.

The removal of the two localised areas containing wood and hydrocarbon compounds will improve the condition of the site prior to development.

5.3.7 MONITORING

There is no requirement for future monitoring of soil or groundwater quality for this stage of the development.

Information to date suggests that very low level methane is being generated in the infilled area. As such, it may be deemed necessary to install up to 6 gas monitoring boreholes across the infilled area in order to confirm that the material is not producing significant levels of methane.

Depending on the specific industries located at the development, some monitoring of groundwater quality may be required. This will be outlined within IPPC licenses or County Council requirements for any facilities which have gained permission to discharge to ground.

5.3.8 REINSTATEMENT

There are no re-instatement requirements envisaged for the construction of the roads and services and the associated business park development.

5.4 WATER – SUPPLY, SURFACE & EFFLUENT

Introduction

This section of the EIS was completed by Doherty Finegan Kelly Consulting Engineers. It assesses the impact of the proposed Business Park on the receiving wastewater infrastructure and the water supply environment. The lands which are the subject of this EIS are located in the townland of Ballybane.

The effects of the development on water are examined under the following headings:

5.4.1 Surface Water Drainage
5.4.2 Water Supply
5.4.3 Foul Drainage

The assessment of the potential impact of the proposed development, for both the construction and operational phases, on the receiving wastewater infrastructure and the water environment was carried out according to the methodology specified by the Environmental Protection Agency (EPA)[1, 2].

5.4.1 SURFACE WATER DRAINAGE

5.4.1.1 RECEIVING ENVIRONMENT

The site is currently greenfield. A tributary of the Griffeen River flows through the subject site and then joins the Griffeen within Grange Castle Business Park. The Griffeen eventually joins the River Liffey in Lucan, Co. Dublin.

There are additional smaller ditches and watercourses within the subject lands, which all ultimately discharge to the stream.

The section of the stream immediately downstream of the site has been upgraded in the recent past to alleviate any local restrictions on capacity.

5.4.1.2 CHARACTERISTICS OF THE PROPOSAL

The site storm water systems are shown on Doherty Finegan Kelly drawings 04173/200-204. The system shall be designed in conformance with the requirements of South Dublin County Council (SDCC) and the Greater Dublin Strategic Drainage Study (GDSDS).

The main tributary of the Griffeen River runs along the boundary of these lands, and will not be disturbed by the development. It is proposed to culvert the other existing ditches on the site, where they pass under the road network.

The proposed surface water drainage system will consist of gravity sewers, which will drain to the north of the site, where they will discharge to the stream. Due to the topography of the lands it is necessary that three surface sewer networks be provided for the development with three separate outfalls to the stream.

It is proposed that the surface water run-off from all individual sites within the business park will be attenuated within the curtilage of each site. The surface water run-off from the estate roads etc will be attenuated before discharge to the Griffeen River, the attenuated water being stored in oversized pipes.

Within the individual sites permeable paving etc. will be used, where appropriate, to allow the surface water to percolate into the ground, thus reducing the total volume being discharged to the surface water drainage system.

The details of the three network catchments and sub-catchments are outlined in Table 5.4.1. The allowable runoff (permissible outflows) from the development has been calculated for the various catchments and sub catchments using the GDSDS document. The catchments have been designed using the Qbar equation

$$Qbar = 0.00108 \times (AREA)^{0.89} (SAAR)^{1.17} (SOIL)^{2.17}$$

Table 5.4.1 –Surface Water Catchment Details

Network	Catchment Area (Ha)	Attenuated Sites (Ha)	Roads and Footpaths (Ha)	Landscaped Areas (Ha)	Runoff (ltrs/sec)	Attenuation *
Network A (discharging at MH 14.0)	22.78	20.57	1.13	1.08	96	375
Network B (discharging at MH 25.0)	13.25	10.76	1.27	1.22	56	422
Network C (discharging at MH 30.0)	3.81	3.21	.3	.3	16	104

* The attenuation volume covers the run-off from roads and footpaths only. The run-off from the individual sites is stored within the site curtailage.

Peak flows will be routed through storage structures, both within individual sites and on the roads network, to control the final outflow rate. The storage structures and their outlet controls are sized to ensure that future peak flow rates to the natural watercourses do not exceed the figures within the GDSDS document.

Pipelines will be designed to provide self-cleansing velocities in accordance with BS EN 752. Pipelines will generally consist of pre-cast concrete flexibly jointed pipes. Pre-cast concrete manholes and trapped gully chambers will be used throughout the site. Manhole covers and gully gratings shall be installed to suit loading requirements in accordance with BS EN 124. The gravity drainage systems proposed will be laid in accordance with IS 6 and more particularly, with the Building Regulations Section H. All works within public areas will be constructed to the requirements of the Local Authority.

At each discharge location a Class 1 Bypass Petrol Interceptor will be provided. This petrol interceptor will be sized and selected in accordance with IS EN 858 Parts 1 and 2.

Network A consists of two catchment areas and drains the western section of the business park. This network will outfall to the existing stream at the north of the site at MH14.0. in a 375 mm diameter pipe laid at a gradient of 1:160. The main

catchment drains Road 6 within the business park, as well as the individual sites located off this road. It is envisaged that this road will eventually connect to the Baldonnell Road at the southern boundary of the site. The secondary catchment will drain a future road running parallel to and to the West of Road 6. This road is not part of this planning application. Network A will be constructed under phase 1 of the development.

Network B consists of a main catchment and a secondary catchment and drains the main eastern section of the business park. This network will outfall to the existing stream at the north of the site at MH25.0 in a 300 mm diameter pipe laid at a gradient of 1:160. The main catchment drains Roads 5 and 7 within the business park, as well as the individual sites located off these roads. The smaller sub catchment drains Road 4 to the north of the internal roundabout, as well as the individual sites located off this road. It is envisaged that Road 4 will eventually be connected to a road network within the lands to the north of this site, but this road network will have its own surface water drainage network. Network B will be constructed under phase 1 of the development.

Network C consists of a single catchment and drains the north eastern section of the site, which is located to the north of the Griffeen tributary. This network will outfall to the existing stream at MH30.0 in a 225 mm diameter pipe laid at a gradient of 1:200. The catchment drains Road 2, which is the main entrance dual carriageway to the business park, as well as the sites located off this road. Network C will be constructed under phase 1 of the development.

Silt storage is provided prior to the outflow point from the attenuation storage pipes under the roadway and the oil storage volume within the interceptor unit, to ensure that best practices to remove any traces of hydrocarbon contamination (from vehicular or fuel storage/loading areas) are applied prior to discharge off-site.

A summary of the design criteria and design assumptions are as follows:

The drainage system has been designed for the current phase of development only, which includes a total area of 39.84 Ha (398,400m^2) approximately.

Rainfall data utilised for calculation purposes is that obtained from Met Éireann (The Irish Meteorological Service) for Baldonnel (Military) Areodrome. A 10% increase factor for climate change has been included in calculations as recommended by the Greater Dublin Strategic Drainage Study. This provides for the following:

- Annual rainfall = 801mm
- RP5 60 min = 18.7mm
- RP5 2d = 65.3mm
- System variables selected:
- Global time of entry (Te) = 2 minutes;
- Volumetric runoff coefficient, Cv = 1.0 for all paved or roofed areas;
- Linear measure of effective roughness, ks = 0.6mm for all gravity pipelines.

Allowable outflow rates, following attenuation, have been assessed based on an outflow of 2 l/s per hectare with growth factors of 2.1 and 2.6 for the 30 year and 100 year return periods respectively; in accordance with the Greater Dublin Strategic Drainage Study.

Attenuation volumes have been estimated on a quantitative basis for the critical storm at both the 30 year and 100 year return periods. The 30 year storage volume will be contained within oversized surface water pipes and the 100 year volume will be allowed to cause flooding of the manholes (and the internal estate roads adjacent to the outfall where necessary).

5.4.1.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

As a result of the construction works, some silt loads might be anticipated on the existing watercourses in rainy periods at construction stage.

Operational Phase

The increased area of roads, footpaths etc proposed for the Phase 1 development will result in an increase in surface water run-off from the subject lands. There is potential for disturbance to the watercourse due to uncontrolled run-off discharge. This could change the character of the river and have adverse impacts on flora and fauna associated with it.

There is a possibility for oil spillages both during construction and following completion of the Phase 1 development. Such spillages could pollute the existing watercourses.

'Do-Nothing' Impact

If the development does not proceed, there would be no change to the existing situation on the currently undeveloped lands, vis-à-vis surface water run-off.

5.4.1.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Siltation and groundwater control ponds and underground structures will be utilised at construction stage in order to minimise the impact of the construction operations on the receiving environment.

Normal post-construction reinstatement will take place. In the case of works in public areas this will be to the specification and approval of the relevant Local Authority.

Oil interceptors which will be provided as part of the development will be utilised at the construction stage to prevent contamination of the watercourses.

Operational Phase

In order to mitigate against any impact of development of the lands on the stream, it is proposed to design the surface drainage system in line with current best management practice (i.e. the GDSDS). These measures will include as follows:

- Attenuation of storm water discharging from each phase of development to reduce peak flows and mitigate against possible down stream flooding. Attenuation will be controlled by hydro brakes or other approved systems.

- Provision of petrol interceptors within the site to reduce the possible effects of oil spillage's, siltation and "first flush" pollution of the outfall watercourse.

The storage structures, outflow control systems and oil interceptors will require periodic maintenance. Telemetry systems will also be installed within these structures to warn of oil spillages and possible flooding. The monitoring of this telemetry along with the maintenance of the structures will be carried out, as required, by the development management company.

5.4.1.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

Pipeline and drainage element construction will be carried out simultaneously with the earthworks/access roads construction. Both sets of works will be phased to suit the overall development programme. As retention structures form an integral part of the scheme design, minimal effect is anticipated on stream flows downstream of the subject development.

Operational Phase

Because of the use of attenuation and petrol interceptors, there should be no appreciable impact on the stream from the operation of the completed development.

'Worst Case' Impact

If the remedial and reductive measures set out above failed, uncontrolled storm discharges from the proposed significantly increased hardstanding area of the roads infrastructure would result in short pulses of high water volumes down the existing stream, which could eventually change the character of the stream and impact upon the adjacent lands in the Lucan area. However, the full implementation of proposed remedial and reductive measures will ensure that such a scenario will not arise.

5.4.1.6 MONITORING

Monitoring measures, where required, are outlined in Section 5.4.1.4 above.

5.4.1.7 REINSTATEMENT

Normal post-construction reinstatement will take place. In the case of works in public areas this will be to the specification and approval of the relevant Local Authority.

5.4.2 WATER SUPPLY

5.4.2.1 RECEIVING ENVIRONMENT

The water supply to the site will be provided from the 700mm diameter trunk main [the Low Level Lucan/Palmerstown Water Supply Scheme] which passes across the northern edge of the site within a 15m wide wayleave. This watermain is connected to the Belgard reservoir and has sufficient pressure to service this development.

5.4.2.2 CHARACTERISTICS OF THE PROPOSAL

The water supply network for this proposed development is shown on Doherty Finegan Kelly drawings 04173/300-304.

The water supply system proposed to be constructed as part of this development has been designed to cater for the entire Masterplan development. Table 5.4.2 contains preliminary estimates of the anticipated water supply demand for the Masterplan development.

It should be noted that the land uses indicated in the table below are preliminary estimates of land use only. All future uses proposed on the lands will be subject to planning approval.

Table 5.4.2 – Masterplan Water Supply Demand

Use Category	Total Floor Area (m^2)	Total Occupancy (persons)	Total Daily Flow (ltrs/pers/day)	Total Daily Demand (ltrs/day)	Average Flow (8 hour day) (ltrs/sec)
Neighbourhood Service Centre/SME's	19,365	645	45	29,025	1.01
Offices	20,640	1,376	45	61,920	2.15
Retail Warehouse	29,685	990	45	44,550	1.55
Showrooms	17,423	581	45	26,145	0.91
General Industry	28,329	944	45	42,480	1.48
Logistics	70,823	2,361	45	106,425	3.69
Retained lands *	14,590	486	45	21,870	0.76
Existing house site *	30,280	1,009	45	45,405	1.58
Other lands to the north of the site *	46,257	3,084	45	138,780	4.82
Total	277,392	11,476	45	516,600	17.95

* These areas are not covered by this planning application, but they are covered by the Masterplan and the water supply network has to be designed to cater for these flows.

The full Masterplan water demand of approx 517 m^3 per day will not occur until completion of the Masterplan development. As a consequence, a "growing demand" profile will be experienced during development of the Masterplan. The full water demand is confirmed to be within the capacity of the local system. The peak flow from the Masterplan development is anticipated as 3 times the average flow and equates to 53.85 litres per second.

The occupancy rates for the individual units are based on the values in Table 5.4.3 The daily flow rates for each of the unit types are again extracted from Table 3 of the Wastewater Treatment Manuals - Treatment Systems for Small Communities, Business, Leisure Centres and Hotels published by the Environmental Protection Agency 1999.

Table 5.4.3– Unit Occupancy Rates

Use Category	Occupancy Rate
Neighbourhood Service Centre/SME's	1/30 m^2
Offices	1/15 m^2
Retail Warehouse	1/30 m^2
Showroom	1/30 m^2
General Industry	1/30 m^2
Logistics	1/30 m^2
Retained lands	1/30 m^2
Existing house site	1/30 m^2
Other lands to the north of the site	1/15 m^2

Water pipeline construction will take place as part of the general earthworks/site infrastructure works. Such works will therefore be phased to suit the overall phased building programme.

5.4.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

Possible effects that can be expected on the existing watermain network include:

- Construction stage impacts when installing new pipelines.
- Additional demand on the local water supply.

The proposed development will not affect the existing network until a connection is made. At this stage there is the possibility of contamination of the existing water supply caused by the construction work.

Operational Phase

Once occupied, the development will result in an increase in the water demand on the existing watermain network. It is proposed to provide a minimum of 24 hours storage within each unit

'Do-Nothing' Impact

If the development on the subject lands does not proceed, there would be no change to the existing situation vis-à-vis water supply.

5.4.2.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

All pipe work will be cleaned and tested in accordance with the requirements of the Local Authorities, prior to connection to the existing watermain network. All connections to the existing network will be carried out under Local Authority supervision. This should limit the possibility of contamination from unclean pipe work and should also limit the likelihood of leaks.

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

Operational Phase

Water usage will be monitored by bulk water meters to be installed on the supply pipes to the individual sites in the business park. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

5.4.2.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

If the remedial measures detailed above are implemented, there would be no significant adverse direct or indirect impacts as a result of water supply connections during the construction phase of the development.

Operational Phase

The operation of the overall Masterplan development is likely to result in the increase in the quantity of water being used within the existing Local Authority watermain network by a peak rate of 53.85 litres per second. This equates to the daily demand of 517 m^3. Adequate capacity is available within the existing network for the Masterplan development. The demand on the existing network will also experience a growing profile as outlined above.

'Worst Case' Impact

The worst case scenario is that a previously installed section of the watermain might be damaged during later excavation works, leading to the escape of water from the main and the possible contamination of the fresh water supply. There are sufficient valves provided on the watermain, however, to permit any damaged section of main to be isolated and repaired.

5.4.2.6 MONITORING

Water usage will be monitored by bulk water meters to be installed on the supply pipes to the individual sites in the business park. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

5.4.2.7 REINSTATEMENT

Normal post construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

5.4.3 FOUL DRAINAGE

5.4.3.1 RECEIVING ENVIRONMENT

All wastewater from the area is treated at the Ringsend Wastewater Treatment Plant (WWTP) which has the capacity to treat a population equivalent of 1.7 million. This equates to a volumetric treatment capacity of 382,500 m^3/day and a BOD mass treatment capacity of 110,500 kg/day.

5.4.3.2 CHARACTERISTICS OF THE PROPOSAL

The site foul sewer network is shown on Doherty Finegan Kelly drawings 04173/250-255.

The effluent from this site will discharge to a pumping station within Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend.

The proposed development is likely to comprise a mixture of building uses, i.e. retail, office, retail warehouse, logistics, showrooms and general industry. The effluent to be discharged from the site will, therefore, generally be domestic standard wastewater. Any effluent produced on the site, which is lower than this standard, will be treated to bring it up to domestic standard.

The drainage scheme serving the different elements of the development is proposed to be constructed to Local Authority requirements for taking in charge; however, the scheme is intended to remain in private ownership under the maintenance and control of a management company.

The effluent from the site will discharge to a manhole located at the north western corner of the site (FSMH16.0). It will be conveyed from there to the pumping station along a 15m wide wayleave passing through the proposed new Milltown Business Park (in the ownership of SDCC), and then along the line of the new entrance road into Grange Castle Business Park.

The gravity drainage system proposed will be constructed with uPVC or concrete pipes laid in accordance with IS 6 and, more particularly, the Building Regulations, Section H. All works within public areas will be constructed in accordance to the requirements of the Local Authority.

In order to design the sewers that will be constructed as part of the application it is necessary to estimate the likely possible occupancy rates for the full Masterplan development with resulting effluent. Table 5.4.4 contains a summary of the predicted occupancy, average and peak flow rates resulting from the entire Masterplan development. The peak flow from the Masterplan development is anticipated as 4 times the average flow and equates to 71.8 litres per second.

Table 5.4.4 – Masterplan Effluent Generation

Use Category	Total Floor Area (m^2)	Total Occupancy (persons)	Total Daily Flow (ltrs/pers/day)	Total Daily Demand (ltrs/day)	Average Flow (8 hour day) (ltrs/sec)	Design Flow (4 x DWF) (ltrs/sec)
Neighbourhood Service Centre/SME's	19,365	645	45	29,025	1.01	4.04
Offices	20,640	1,376	45	61,920	2.15	8.6
Retail Warehouse	29,685	990	45	44,550	1.55	6.2
Showrooms	17,423	581	45	26,145	0.91	3.64
General Industry	28,329	944	45	42,480	1.48	5.92
Logistics	70,823	2,361	45	106,425	3.69	14.76
Retained lands *	14,590	486	45	21,870	0.76	3.04
Existing house site *	30,280	1,009	45	45,405	1.58	6.32
Other lands to the north of the site *	46,257	3,084	45	138,780	4.82	19.28
Total	277,392	11,476	45	516,600	17.95	71.8

* These areas are not covered by this planning application, but they are covered by the Masterplan and the foul sewer has to be designed to cater for these flows.

The occupancy rates for the individual units are based on the values in Table 5.4.5. The daily flow rates for each of the unit types are again extracted from Table 3 of the Wastewater Treatment Manuals - Treatment Systems for Small Communities, Business, Leisure Centres and Hotels published by the Environmental Protection Agency 1999.

Table 5.4.5 – Unit Occupancy Rates

Use Category	Occupancy Rate
Neighbourhood service centre/SME's	1/30 m^2
Offices	1/15 m^2
Retail Warehouse	1/30 m^2
Showroom	1/30 m^2
General Industry	1/30 m^2
Logistics	1/30 m^2
Retained lands	1/30 m^2
Existing house site	1/30 m^2
Other lands to the north of the site	1/15 m^2

Following the estimation of flows from each building, the sewer networks were designed in accordance with BS8301 and South Dublin County Council requirements.

5.4.3.3 POTENTIAL IMPACT OF THE PROPOSAL

There are three potential impacts that require consideration in regard to the provision of a foul sewerage system to serve the proposed development:

- Pipeline construction activity.
- Additional demands on the existing pipe network.
- Possible pollution of ground water from pipe breakages or leaks.

Construction Phase

The construction of the proposed sewer network should not affect the existing network until the final connection is made. At this point, there is the possibility of debris and building rubble falling into the existing sewer. There are also the inherent safety and health problems associated with construction works occurring in close proximity to a live foul sewer.

The presence of significant numbers of workers on the overall subject lands over the phased construction period will lead to the generation of foul sewage associated with temporary showers, toilets, canteen and washing facilities.

Operational Phase

Once effluent is discharged from the completed and operational development it will result in an increase in the hydraulic loading within the existing sewer network and a reduction in the capacities of the existing sewer system.

There is a possibility of untreated effluent discharging to the water table if pipes are broken or not laid properly during construction.

'Do-Nothing' Impact

If the development were not to proceed, there would be no change to the existing situation on the site vis-à-vis foul drainage.

5.4.3.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Temporary, chemical or waterborne facilities will be provided by the contractors for the duration of the construction phase, involving off-site disposal or temporary connection to the public sewer.

The construction of the sewer network within the subject lands will be carried out as part of the overall earthworks, roads and infrastructure development, which will be carried out in a phased manner to match the overall phased development of the subject lands. This could result in the discharge of silt to existing watercourses. Mitigation measures, as detailed in section 5.4.2, concerning surface water will be carried out to minimise this potential impact.

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

Fauna investigations of the site have revealed that otters traverse the site along the watercourse which runs in an east west direction across the northen portion of the site. See section 5.2 for details. In order to mitigate any potential negative impact to otters as a result of the proposed development, a dry culvert will be provided where the road network crosses this watercourse to faciliate the movement of otters across the site. The design of the culvert is in accordance with the Ecologists advice.

Operational Phase

In order to mitigate against the possibility of leakage of effluent into the ground water, all sewers will be inspected by C.C.T.V. camera and tested in accordance with Local Authority requirements, prior to the discharge of foul effluent to the public sewer system. Connections made to the public sewer will also be carried out in the presence of Local Authority Representatives.

As this is a significant project, with a phased construction period of some 5 - 10 years for the Masterplan development, the demand being placed on existing and proposed drainage facilities will grow to the maximum anticipated over a relatively long period. Thus, any network improvements required can be considered and provided for in stages.

No specific monitoring of the type of effluent discharged is anticipated at this point; however, some future occupiers of the proposed development scheme may require discharge licences for specific processes in due course.

5.4.3.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

If the remedial measures detailed above are implemented, there would be no significant adverse direct or indirect impacts as a result of foul drainage during the construction phase of the development.

Operational Phase

The operation of the overall Masterplan development is likely to result in the increase in the quantity of effluent within the existing Local Authority sewer network. Recently completed upgrading works of the Municipal network will ensure adequate capacity is available for the development.

As a consequence, the predicted impact of the proposed development, in terms of Foul Drainage is assessed as being slight.

'Worst Case' Impact

The worst case scenario would be a sewer blockage or spillage giving rise to contamination. However, the design, installation and inspection of the scheme will be to such a standard as to guarantee that this is not a realistic scenario.

5.4.3.6 MONITORING

No monitoring is proposed in this instance.

5.4.3.7 REINSTATMENT

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

5.5 AIR

5.5.1 NOISE

Introduction

This section of the EIS will assess and describe the noise impacts associated with the proposed Profile Park Business Park development on its surrounding environment. The noise assessment has been made using the following methodologies:

- A baseline survey at the noise sensitive locations at the proposed development has been conducted. The survey was carried out in accordance with ISO 1996: Acoustics: 'Description and measurement of environmental noise'.
- Construction noise impacts have been assessed in accordance with BS5228 'Noise and Vibration Control of Construction and Open Sites' (1997).
- Guidance relating to the operation of the site has been made with reference to the EPA: Guidance note for noise in relation to scheduled activities and W.H.O guidelines.

Particular attention is focused on sensitive receptors, such as residential properties adjacent to the site, and to the extent of the exposure of these receptors to noise derived as a result of the proposed development.

5.5.2 RECEIVING ENVIRONMENT

The proposed development is situated midway between the N4 and the N7 national roads and in West County Dublin. The receiving environment is semi-rural in nature in a satellite area of West County Dublin. The existing acoustic environment is dominated by traffic along local roads and by air traffic from Baldonnel Aerodrome. In the absence of passing traffic, noise from the N7 makes up the background noise.

Baseline Survey

A baseline noise survey was carried out on the 29th and 30th of March 2006 at 4 noise sensitive locations in the area of the proposed development. Measurements were made for a period of 15 minutes during the survey.

All measurements were carried out in accordance with ISO 1996: 'Acoustics-Description and measurement of environmental noise'. Measurements were made at a height of 1.5m above ground level. All measurements were free field, and were positioned 1-2m from reflecting surfaces.

The equipment used during this survey was a Type 1, Brüel and Kjaer 2250 sound level meter. Before and after the survey the measurement apparatus was checked and calibrated to an accuracy of +/- 0.3dB using a Brüel and Kjaer 4231 calibrator.

The weather conditions were dry and mild with overcast conditions. Wind speeds were below 5m/s during all measurements.

Five environmental noise parameters were measured which are defined below.

LAeq is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value.

LAmax is the maximum A-weighted sound level measured during the sample period.

LAmin is the minimum A-weighted sound level measured during the sample period.

LA10 is the A-weighted sound level that is exceeded for 10% of the sample period and is used to quantify traffic noise.

LA90 is the A-weighted sound level that is exceeded for 90% of the sample period and is used to quantify background noise.

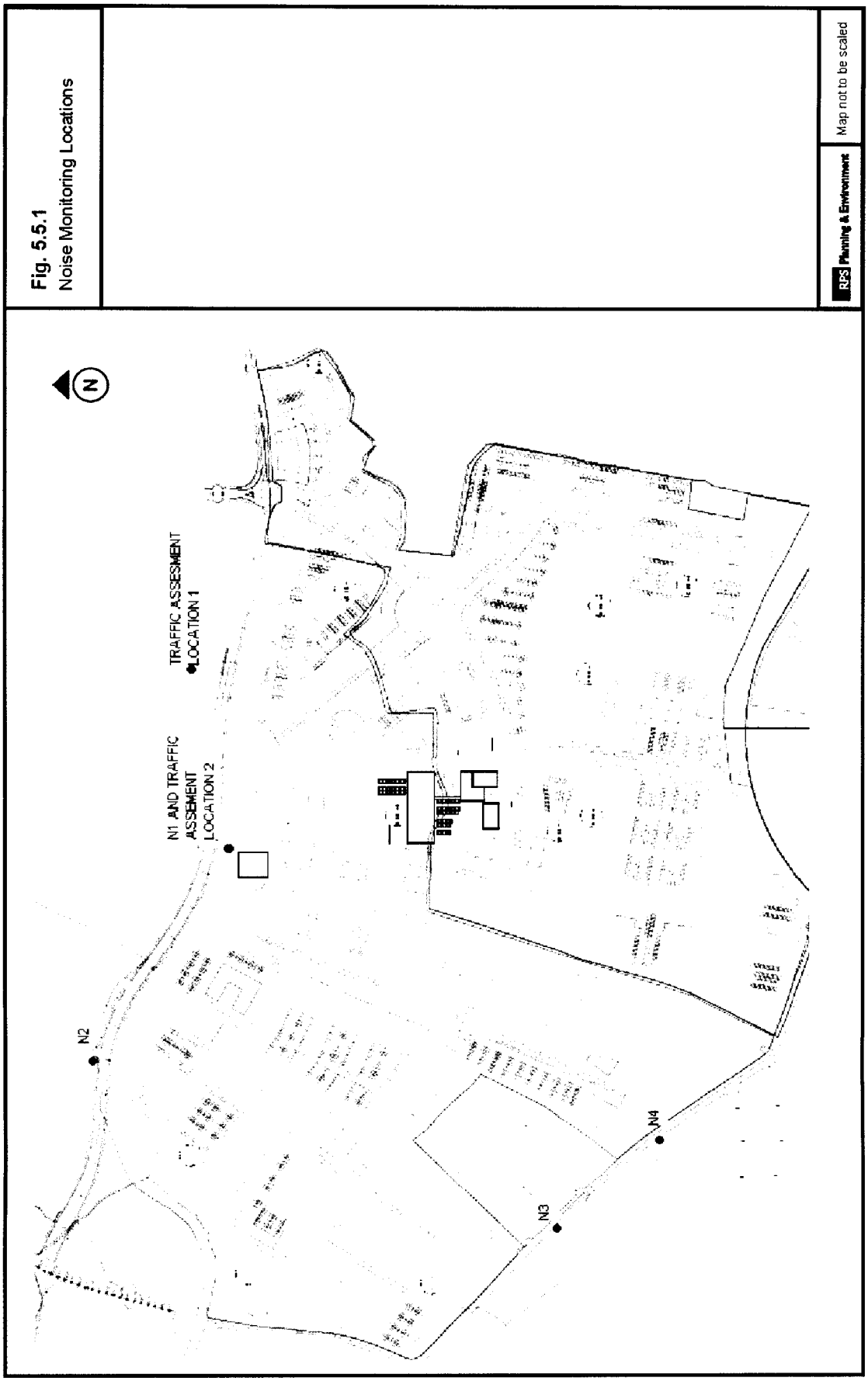
A-weighting is the process by which noise levels are corrected to account for the non-linearity of human hearing. All noise levels quoted are relative to a sound pressure of 2x10-5 Pa.

A description of the noise monitoring locations is presented in Table 5.5.1 below and their locations are shown on Figure 5.5.1.

Table 5.5.1: Noise monitoring locations

Position No.	Description
N1	Residential property north of site, opposite Ballygowan facility
N2	Residential property north of site, opposite side of Road
N3	Timber gated House, west of site, on road to Baldonnel
N4	Residential Property adjacent to Baldonnel Aerodrome, Southwest of site.

Figure 5.5.1: Noise Monitoring Location Map



Survey Results

The results of the noise surveys carried out are included in Table 5.5.2 below. The locations of these sites can be seen in figure 5.5.1.

Table 5.5.2: Summary of baseline noise measurements made on 29th and 30th March 2006

Location	Time	LAeq	LAmax	LAmin	LA10	LA90
N1	11:20	68.1	83.4	44.6	72.7	50.3
	11:36	67.7	83.5	42.1	72.4	48.7
	14:55	68	84.3	42.1	72.4	48.7
	23:00	61.6	78.7	35.5	64.4	39.7
N2	11:53	71.4	58.9	41.3	75.6	50.4
	12:14	72.7	89.9	38.3	76.8	47.0
	14:35	67.8	85.1	40.8	72.0	47.5
	22:43	63.3	78.6	37.8	68.7	41.6
N3	12:33	68.9	88.9	38.6	69.7	42.2
	12:55	68.3	89.2	35.0	67.9	38.2
	13:49	68.9	88.7	36.2	70.3	40.1
	22:02	62.8	86.6	40.3	57.7	42.3
N4	13:13	67.7	88.0	35.0	66.3	38.8
	13:32	66.8	86.5	35.6	65.5	38.9
	14:12	67.2	90.5	36.3	64.8	39.8
	22:20	61.0	87.4	40.0	48.8	41.7

Location N1

Daytime noise levels at this location were dominated by very heavy passing road traffic and frequent over-light by low level aircraft and helicopters from Baldonnel. Very busy traffic using Kilcarbery Business Park formed the majority of the road traffic.

Night time noise was dominated by infrequent passing road traffic, foliage noise, and once again, aircraft passing overhead from Baldonnel.

Location N2

Daytime noise levels in this area were dominated by heavy passing traffic. Guard dogs in the property barked continuously during all daytime surveys. Frequent air traffic from Baldonnel once again contributed to the noise climate at this location.

During the night time period, road traffic and air traffic were less frequent but remained the dominant noise sources, foliage noise contributed to a lesser degree.

Location N3

Sustained frequent road traffic dominated the noise climate in this area during the day. The impact from air traffic was proportionally higher in this location as it is on a direct flight path to Baldonnel.

During the night period, a barking guard dog was noted, as were infrequent passing traffic and decreased air traffic. In quiet periods background road traffic noise was audible from the surrounding busier roads.

Location N4

This location is adjacent to Baldonnel and as such, the daytime noise climate was largely affected by aircraft noise. Frequent passing road traffic remained the most dominant noise source at this receptor none the less.

The night period showed less air traffic and less road traffic, while these remained the principle noise sources in the area. Foliage noise and background road traffic noise from the surrounding busier roads was audible in lull periods.

Noise criteria

In order to assess the operating levels of the site, the following criteria and regulatory bodies have been referenced which may be considered applicable to the operation of the facility in question:

Environmental Protection Agency EPA: Guidance note for noise in relation to scheduled activities

This document states that ideally, if the total noise level from all noise sources is taken into account, the noise level at the sensitive locations should be kept below an LAeq value of 55dB (A) by daytime. At night, to avoid disturbance, the noise level at noise sensitive locations should not exceed an LA eqT value of 45dB (A). Audible tones and impulsive noise at sensitive locations at night should be avoided. In some particularly quiet areas, such as pastoral, rural settings, where background noise levels are very low, lower noise limits may be more appropriate.

Environmental Protection Agency (EPA): Guidance notes for noise

This document suggests the usual range of values allowed for industrial activities is 45dBLAeq at night, and 55dBLAeq during the day. These values relate to noise levels at the nearest noise sensitive locations or at the boundary of the premises.

World Health Organisation (WHO) Guidelines for Community Noise 1999

This document recommends that to protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. At night time, outside sound levels about 1m from facades of living spaces should not exceed 45dB LAeq so that people may sleep with bedroom windows open.

In summary, operational noise levels for the facility should be limited to 55dB LAeq during day time hours and 45dB LAeq during night time hours in line with the above guidance documents.

5.5.2 POTENTIAL IMPACT OF THE PROPOSAL

The proposed site is located on lands midway between N7 and the N4, near Clondalkin in northwest Dublin. The development comprises the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

"Do Nothing" Impact

If the proposal were not to go ahead there would be no noise impact from this proposed facility. However as this area has seen considerable development over the last number of years it is likely that noise from traffic will increase in the future. Baseline noise surveys have indicated quite heavy road traffic and aviation traffic noise in the area at present.

Predicted Impact

The predicted noise impact of this development will occur during both the construction and operational phases of the project.

Construction phase

The construction phase of the proposed development has the potential to increase noise levels at noise sensitive locations surrounding the development site. Impact from the construction phase will depend on the number and type of equipment used during the development. The construction stage of the project will include the construction of the internal roads as outlined above. It is envisaged that construction works associated with the site development will involve some if not all of the following pieces of machinery during site preparation and construction works;

- Dozer
- Tracked Excavator
- Dump Trucks
- Standby Generator
- Road Sweeper
- Road Lorries
- Rock crusher

Predicted noise levels have been estimated using the methodology described in BS: 5228: Noise and Vibration on construction and open sites. Predictions are based on a LAeq1hour value with all machinery listed below operating for a continual period of 1 hour. This may be considered a worst-case scenario as machinery may not work simultaneously. Additionally, calculations are based on

minimum distances between site activities and the nearest noise sensitive locations.

In Ireland, there are no statutory guidelines relating to noise limits for construction activities. These are generally controlled by local authorities and commonly refer to limiting working hours to prevent a noise nuisance. A publication from the National Road Authority (NRA) 'Guidelines for the treatment of noise and vibration in national road schemes' 2004, has outlined recommended noise levels for construction noise.

Although these refer to road projects, they have been developed in line with typical construction noise limits on general construction projects used previously in Ireland. The limits outlined represent a reasonable compromise between the practical limitations during a construction project and the need to ensure an acceptable ambient noise level for local residents. As a result, these limits have become the most acceptable standard for construction noise limits for EIS assessments to date. Considering the high baseline noise levels measured at this site, these values are considered a reasonable target. Table 5.5.3 below details these recommended limits.

Table 5.5.3: Maximum permissible noise levels at the façade of dwellings during construction

Days and Times LAeg (1hr)	LAeq (1Hr) dB	LpA (max) slow dB
Monday to Friday 07:00 to 19:00hrs	70	80[2]
Monday to Friday 19:00 to 22:00hrs	60[2]	65[2]
Saturday 08:00 to 16:30hrs	65	75
Sundays and Bank Holidays 08:00 to 16:30hrs	60[2]	65[2]

[2]Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority

The National Roads Authority considers that the noise levels in Table 5.5.3 above are typically deemed acceptable. However the NRA stipulates that: "these values are indicative only, it may be appropriate to apply more stringent limits in areas where pre-existing noise levels are low". As stated above, the baseline levels obtained during the survey are not low and hence Table 5.5.3 is considered appropriate.

Table 5.5.4 below summarises the calculated noise levels, which would be expected at the noise sensitive locations as described in Table 5.5.1.

The nature of the construction period and the variety of machinery used should ensure that no construction activity is operational for long periods in a single area. This will therefore result in short term impacts, as construction will migrate in natural progression ensuring noise receptors are not subject to constant stationary noise sources during the construction phase. The noise impact of the plant used during the construction phase has been assessed in Table 5.5.4

below for distances of 150m, 250m and 350m, to assess the effect on properties within these distance bands.

Table 5.5.4: Construction noise level predictions

BS5228 Calculations		Estimated Construction noise levels at varying distances LAeq 1 hour	
Plant	**150m**	**250m**	**350m**
2 x road sweeper	48	42	38
2 x Dozer	58	52	48
2 x Dumper truck	54	48	44
2 x road lorry	58	52	48
2 x Asphalt spreader	48	42	38
2 x JCB	48	42	38
2 x Tracked Excavator	55	53	49
2x standby generator	38	35	31
Combined Level LAeq 1hour	64	59	55

The result of the construction noise predictions in table 5.5.4 above, indicate that noise levels during this phase of the development will be well within the guidance levels detailed in Table 5.5.3 and are also similar to existing baseline levels, therefore resulting in a moderate short term impact.

Operational Phase

The operational phase of the proposed development has the potential to increase noise levels at noise sensitive locations surrounding the development site. A number of noise sensitive locations (houses) are distributed around the site.

Impact from the operation of the site will depend on the road traffic numbers using the development, and the nature of the industry carried out in the business park.

Traffic Noise

The potential noise impacts from this proposed development during its operational phase will primarily be as a result of increased traffic flows along existing routes within and surrounding the development as a result of the operation of the various businesses operating within the facility. The greatest potential increase in traffic noise will be along the entrance road to the site. Traffic flow predictions have been provided by the traffic consultants in order to assess the impact of traffic flows on noise levels in the surrounding environment. From the projected flow analysis resulting from the development, the majority of site traffic (90%) will enter and exit the site from the eastern Nangor Road side, while the remaining 10% will enter and exit the site from the west of the site entrance along the Nangor Road.

No noise sensitive locations are distributed along the Nangor Road to the east of the site entrance in the surrounding vicinity of the development site. Traffic noise levels are predicted to increase by 3 to 4dB between the 'do nothing' and 'do something' scenarios along this section of the road.

The nearest noise sensitive properties to the site entrance are located along the Nangor Road to the west of the site entrance. Two of the nearest properties to the site entrance have been assessed as part of the traffic noise (TN) impact with reference to the Calculation of Road Traffic Noise 1998 (CRTN) prediction methodology based on the traffic flow information provided by the traffic consultants.

TN 1: Is a noise sensitive property located along the western side of the site entrance along the Nangor Road approximately 30m from the road edge.

TN 2: Is a noise sensitive property located along the western side of the site entrance along the Nangor Road approximately 11m from the road edge.

Table 5.5.6: Results of Road Noise Traffic Study in L_{A10} 1 Hour Values

	2007 Do Nothing	2007 Do Something	Increase in Noise Levels	2020 Do Nothing	2020 Do Something	Increase in Noise Levels
Location TN1 L_{A10} 1 hour dB values						
Am Peak	73	76	+2 dB	75	76	+1 dB
Pm Peak	73	75	+2 dB	74	76	+2 dB
Location TN2 L_{A10} 1 hour dB values						
Am Peak	78	80	+2 dB	79	80	+1 dB
Pm Peak	77	80	+2 dB	79	80	+2 dB

From the table above, traffic noise levels are predicted to be 73 dB LA10 1 hour at the nearest property to the site entrance (TN1) at a distance of 30m from the road during the 'Do Nothing' scenario in 2007, i.e. without the development in place. During the operation of the proposed site, the 'do something' scenario, these values will increase to 75 - 76dB LA10 1 hour resulting in an overall noise level increase of 2dB. In terms of significance, this is considered to be of minor significance. During the year 2020 noise levels are predicted to increase by 1 to 2 dB between the 'do nothing' and 'do something' scenarios at this location.

At the TN2 property, noise levels are similarly predicted to increase by the same margin.

Increases in noise levels is dependant on subjective responses by individuals, however based on acoustic principles and environmental studies, the Institute of Environmental Management and Assessment (IEMA) and the Institute of Acoustics (IOA) have summarised guidelines for categorising noise level changes. Table 5.5.7 below summarises related impacts to changes in noise levels.

Table 5.5.7: Recommended Impact Categories for Changes in Noise Levels

Noise Change dB	Category
0	No Impact
0.1-2.9	Slight Impact
3.0-4.9	Moderate Impact
5.0-4.9	Substantial Impact
10+	Severe Impact

From Table 5.5.7 above, the change in noise levels associated with the increased development traffic at properties along the Nangor Road will be of slight impact to the west and of moderate impact to the east of the site entrance.

Building Services Plant

With the construction of a high number of large buildings there is potential for noise disturbance due to air conditioning units, fans, etc. There is also a provision for an admin/office buildings and associated car parking and building services and amenities, which will also harbour noise sources such as air conditioning units, fans etc. The semi-rural, sparsely populated nature of the area means that these sources could hold potential nuisance for pre-existing properties, particularly in the case of night time operations.

As discussed in the section entitled "noise criteria" the usual range of values allowed for Industrial activities is 45dB LAeq at night and 55dB LAeq during the day at the nearest residence or at the boundary of the site. The operation of all building services plant will be required to maintain noise levels below the above-mentioned criteria. It is not envisaged that there will be any significant noise impact from building services plant. The operation of all building services plant should be designed such that the total noise from all such plant will not exceed the 45-55dB limits at the nearest noise sensitive locations to the site. As the baseline noise climate is in excess of this in the Do Nothing scenario, it is not expected that this aspect of the facility will cause any noise nuisance.

5.5.3 REMEDIAL OR REDUCTIVE MEASURES

Noise from the construction phase of the project will result in increased noise levels at the nearest noise sensitive properties during this stage of the development. Noise during the operational phase of the development is predicted to be minor with road traffic being the largest contributor.

Construction Phase

With regard to construction activities, all plant items used during the construction phase should comply with standards outlined in 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1998. Reference should be made to BS5228: Noise control on construction and open sites, which offers guidance on the control of noise from construction activities.

It is proposed that various practices be adopted during construction, including:

- Limiting the hours during which site activities, which may give rise to a noise nuisance are permitted by the local authority.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These will include:

- Selection of plant with low inherent potential for generation of noise and/or vibration.
- Siting of plant away from sensitive receptors where possible.
- Erection of temporary screens around noisy items of plant where possible and or at the site boundary.
- Erection of temporary screens around noisy items of plant and around the site perimeter.

Operational Phase

Building services plant

The operational phase of the development is not anticipated to significantly increase noise on its surrounding environment. With regards to noise from possible services plant there are various practicable measures, which may be taken to ensure noise will not cause any disturbance to nearby residences:

- Siting of extraction fans at roof level to reduce ground level noise disturbance
- Duct Mounted attenuators on the atmosphere end of all acoustically offending air moving plant
- Splitter attenuators or acoustic louvres providing free ventilation to internal plant areas

5.5.4 PREDICTED IMPACTS OF THE PROPOSAL

Construction Phase

Due to the nature of the activities undertaken on a large construction site, there is potential for generation of high levels of noise, if noise control measures above are not adhered to. Therefore, it is usual to limit the times during which it is permissible to carry out noisy construction work in order to minimise the impact on nearby noise sensitive locations.

Predicted noise levels for this phase of the development are within recommended limits. Permissible construction times and durations will be set down by the Local Authority. Hence the noise and vibration impact of this phase of the development should be kept to a minimum.

Operational Phase

Noise impacts as a result of the operational stage of the development are not anticipated to be significant if control measures as described in this document are adhered to. In this setting, building services plant noise, when managed as described above will not cause significant noise disturbance and will be within the limits outlined in the section entitled "noise criteria" above.

Noise resulting from development related traffic is not predicted to lead to any significant impact at the nearest noise sensitive locations to the proposed site.

5.5.5 MONITORING

In the event of a perceived noise nuisance during the construction or operation of this facility, noise assessments should be carried out in accordance with:

ISO 1996: Acoustics: 'Description and measurement of environmental noise'.

BS5228 'Noise and Vibration Control of Construction and Open Sites' (1997).

EPA: Guidance note for noise in relation to scheduled activities and W.H.O guidelines.

These assessments should be carried out by an Acoustic Engineer.

5.5.6 REINSTATEMENT

Reinstatement measures are not applicable in this instance.

5.6 CLIMATE

5.6.1 Introduction

This section of the EIS describes the impact to air quality associated with the proposed Profile Park business park development at Grange Castle, Dublin 22. This section should be read in conjunction with the site layout plans and project description sections of this EIS. This assessment was prepared in accordance with the "Guidelines on the information to be contained in Environmental Impact Statements" (EPA 2002) and the "Advice Notes on Current Practice" Project Type 28 - Urban development.

This study will identify, describe and assess the impact of the development in terms of its impact on air quality. Particular attention will be focused on sensitive receptors, such as residential areas adjacent to the site, and to the extent of the exposure of these receptors to both airborne pollutants derived as a result of the development.

5.6.2 RECEIVING ENVIRONMENT

The proposed site of the development is located in Grange Castle, Dublin 22, and is situated less than 15km from Dublin City Centre and approximately 2.5 km west of Clondalkin village. The site is approximately 4km west of the M50, approximately 2km north of the N7 and 3.5km south of the N4. It is adjacent to Dublin's new Outer Ring Road, Phase 1 of which is now complete and links the area directly to the N7, and will shortly reach the N4.

The area also has existing business parks in the vicinity, including Grange Castle Business Park and Kilcarbery Park. These parks contain a number of industries that may have an impact on existing air quality. The main potential source is a large pharmaceutical plant to the north of the site, however, this facility is regulated by the EPA to ensure emissions to atmosphere do not have an impact to atmosphere.

The M50 to the west, the N7 to the south and the N4 to the north of Grange Castle are busy with traffic and frequently congested. In addition, there is some traffic congestion on the other regional and third class roads in the area. The level of traffic on the roads is likely to generate traffic derived pollutants nitrogen oxides and benzene from vehicle exhausts.

There is a railway line approximately 2km to the north of the development which runs from Dublin to the south and west as well as serving suburban trains, which carry diesel-powered engines and this may affect local air quality.

As part of the Framework Directive 96/62/EC on air quality monitoring, assessment and management, with particular reference on air quality standards laid down by the directive, four air quality zones have been defined for Ireland. These zones are as follows:

- Zone A - Dublin City and Environs
- Zone B - Cork City and Environs
- Zone C - 16 Urban areas with populations greater than 15,000 (includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee and Dundalk)
- Zone D – the remainder of the country

These zones have been defined to meet criteria for air quality monitoring and management as described by directive 96/62/EC and its "daughter directives". The proposed development lies in Zone A so background air quality is referenced from the Air Quality Monitoring Report 2004 results for Ballyfermot (Public Library) and Phoenix Park (Ordnance Survey buildings), which are the closest Zone A stations to the proposed development. Where results for these stations are unavailable, Dublin City Centre data is employed. All results are compared to the limit values defined in the National Air Quality Standards Regulations 2002 (S.I No. 271 of 2002).

Baseline Air Quality

A total of six sample locations were chosen to represent the baseline air quality in the vicinity of the proposed development. These locations are listed in Table 5.6.1.

Table 5.6.1: Description of Air Monitoring Locations

Reference	Description
A1	Northern Boundary of site on Nangor Road
A2	NW corner of site at Nangor Road Junction
A3	SW corner of site
A4	Southern Boundary of site
A5	SE corner of site
A6	NE corner of site on Nangor Road at boundary to Golf Club

As a result of the existing site conditions and the potential for traffic derived pollution, the following parameters were monitored:

NO_2 (Nitrogen Dioxide)

Nitrogen dioxide is classed as both a primary pollutant and a secondary pollutant. As a primary pollutant NO_2 is emitted from all combustion processes (such as a gas/oil fired boiler or a car engine). Potentially the main sources of primary NO_2 for the proposed development will be from heating-related emissions and vehicle exhausts.

As a secondary pollutant NO_2 is derived from atmospheric reactions of pollutants that are themselves, derived mainly from traffic sources (e.g. volatile organic compounds). Secondary pollution is usually derived from regional sources and may be used as an indicator of general air quality in the region. Nitrogen Dioxide has been shown to reduce the pulmonary function of the lungs. Long-term exposure to high concentrations of NO_2 can cause a range of effects, primarily in the lungs, but also in the liver and blood.

At each of the sites, levels of NO_2 were measured using diffusion tubes, which were left on site for a 14-day period. The tubes were then analysed using UV spectrophotometry, at a UKAS accredited laboratory (Gradko International, Winchester), giving an average concentration over the period. The results are presented in Table 5.6.2.

Table 5.6.2: Average NO_2 concentrations at each location as measured by passive diffusion tubes.

Location	Sampling Period	Average NO_2 ($\mu g/m^3$)
A1	23/03/06 – 04/04/06	13.57
A2	23/03/06 – 04/04/06	19.05
A3	23/03/06 – 04/04/06	14.80
A4	23/03/06 – 04/04/06	13.43
A5	23/03/06 – 04/04/06	16.17
A6	23/03/06 – 04/04/06	16.17
Limit Value	-	40(1)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)

The results of the NO_2 monitoring indicate similar concentrations at each location indicating a uniform air quality. The concentrations are typical of those experienced adjacent to relatively busy roadways and are all below the EU limit value. The results suggest that the main source of NO_2 in the area is from road traffic. The levels detected for 2004 in the national monitoring network are presented in Table 5.6.3 below. The annual average for Ballyfermot is slightly higher than the levels determined in the site baseline survey. This is probably due to increased vehicle numbers and congestion in the suburban area compared to the more rural site area.

Table 5.6.3: National NO_2 monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA)

Station	Annual Average NO_2 ($\mu g/m^3$)	Maximum 1-hour Average NO_2 ($\mu g/m^3$)
Ballyfermot	23	138
Limit	40	200

SO_2 (Sulphur Dioxide)

Sulphur dioxide is classed as a primary pollutant principally emitted from the combustion of fossil fuels (diesel, coal, oil, etc.) SO_2 is emitted from boilers and heating units. As traffic based pollutant, SO_2 is mainly emitted from vehicles running on diesel fuel, which will include most light goods vehicles (LGVs) and heavy goods vehicles (HGVs). SO_2 emissions from domestic heating may be significant as SO_2 is a major constituent of sulphurous smog. However, in recent years the government has significantly reduced the importance of SO_2 as an air pollutant with the introduction of smokeless fuel.

In addition, future EU legislation will attempt to minimise and eliminate the sulphur content in motor fuels. Consequently, concentrations of SO_2 in major urban areas are typically low and this is likely to decrease in future years with the broadening of the ban on non-smokeless fuels and the introduction of new EU fuel directives. Sulphur Dioxide is a known contributor to respiratory illness and respiratory symptoms. People with asthma are the most susceptible in the community to elevated SO_2 levels.

At each of the sites, the air was monitored for sulphur dioxide over a 14-day period, using SO_2 diffusion tubes. The sample tubes were analysed for SO_2 at a

UKAS accredited laboratory (Gradko International, Winchester). The results are presented in Table 5.6.4.

Table 5.6.4: Average SO_2 concentrations at each location as measured by passive diffusion tubes.

Location	Sampling Period	Average $SO_2(\mu g/m^3)$
A1	23/03/06 – 04/04/06	2.58
A2	23/03/06 – 04/04/06	5.16
A3	23/03/06 – 04/04/06	4.30
A4	23/03/06 – 04/04/06	1.72
A5	23/03/06 – 04/04/06	1.72
A6	23/03/06 – 04/04/06	1.72
Limit Value	-	20(1)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)

The results from the SO_2 monitoring indicate low levels of SO_2 in the area and all levels are within the EU limit. This is typical of areas in the Dublin conurbation where there is currently a ban on smokeless fuel – the major source of SO_2. The levels detected at Ballyfermot in 2004 are presented in Table 5.6.5 and indicate an annual average similar to that determined in the site baseline survey.

Table 5.6.5: National SO_2 monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average SO_2 ($\mu g/m^3$)	Maximum 1-hour Average SO_2 ($\mu g/m^3$)
Ballyfermot	3	97
Limit	20	350

Benzene

The sources associated with individual volatile organic compounds (VOC's) tend to be dependent on the land use and nature of any industries in the sample region. Benzene and other aromatic compounds and alkanes are most likely derived from petrol driven vehicle exhausts. Benzene is a known carcinogen, poisonous by inhalation and a severe eye and moderate skin irritant.

The EPA monitoring station in Winetavern Street in Dublin City Centre is the only Zone A reference in the network for benzene. The 2004 results for Winetavern Street are presented in Table 5.6.6. The results indicate benzene levels in Dublin City Centre are lower than the appropriate limit. The levels of benzene at the site of the proposed development would be expected to be lower than those determined in the city centre.

Table 5.6.6: National Benzene monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average ($\mu g/m^3$)
Winetavern Street	1.3
Limit	5(1)

Note: (1) EU Ambient Air Standard (2000/69/EC) (as an annual average)

Carbon Monoxide

Carbon Monoxide is a primary pollutant that is a by-product of any combustion of carbon-based fuels such as from vehicular exhausts. Carbon monoxide is the product of incomplete combustion of the fuel. Carbon Monoxide is an intense poison on inhalation. No site specific CO monitoring was carried out but data is referenced from the Winetavern Street monitoring station in Dublin City Centre for 2004 in Table 5.6.7. The results indicate that levels of Carbon Monoxide in this Zone A area are relatively low and do not exceed the ambient air quality limit.

Table 5.6.7: National CO monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Mean 8-Hour (mg/m^3)	Max 8-Hour (mg/m^3)
Winetavern Street	0.3	4.2
Limit	-	10(1)

Note: (1) EU Ambient Air Standard (2000/69/EC) (as an 8-hour rolling average)

Particulate Matter PM_{10}

PM_{10} may be emitted as a primary pollutant from road vehicle exhausts, which is the main source in urban areas. Point sources such as combustion, i.e. domestic fires, industrial boilers etc. are also primary sources of PM_{10}. PM_{10} may also be formed as secondary pollutants from the condensation or reaction of chemical vapours in the atmosphere. Health effects associated with PM_{10} in the long term include chronic effects such as increased rates of bronchitis and reduced lung function.

No site specific PM_{10} monitoring was carried out but data is referenced from the Phoenix Park and Ballyfermot monitoring stations for 2004 in Table 5.6.8. The results indicate a low annual average but show that there are some exceedences of the daily limit. In the Phoenix Park there were 2 days in 2004 that exceeded the limit and in Ballyfermot there were 5 days. The PM_{10} levels at the site of the proposed development would be expected to be similar or lower than those outlined in Table 5.6.8.

Table 5.6.8: National PM_{10} monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average PM_{10} ($\mu g/m^3$)	Maximum 24-hour Average PM_{10} ($\mu g/m^3$)
Phoenix Park	12	71
Ballyfermot	14	112
Limit	40(1)	50(2)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)
(2) EU Ambient Air Standard (1999/30/EC) (as a 24-hour average)

Assessment Criteria

The EU has introduced several measures to address the issue of air quality management. In 1996 Environmental Ministers agreed a Framework Directive on ambient air quality assessment and management (Council Directive 96/62/EC). As part of the measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, 1999/30/EC, has set limit values for sulphur dioxide, lead, PM_{10} and nitrogen dioxide and is detailed in Table 5.6.9. EU Council Directive 2000/69/EC defines limit values for both carbon monoxide and benzene in ambient air and is presented in Table 5.6.10.

The National Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) transpose those parts of the "Framework" Directive 92/30/EC on ambient air quality assessment and management not transposed by Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 2002 Regulations also transpose, in full, the 1st two "Daughter" Directives 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air and 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.

Table 5.6.9: EU Ambient Air Standard 1999/30/EC.

Pollutant	Regulation	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	1999/30/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	50% until 2001 reducing linearly to 0% by 2010	200 $\mu g/m^3$ NO_2
		Annual limit for protection of human health	50% until 2001 reducing linearly to 0% by 2010	40 $\mu g/m^3$ NO_2
		Annual limit for protection of vegetation	None	30 $\mu g/m^3$ NO + NO_2
Lead	1999/30/EC	Annual limit for protection of human health	100% until 2001 reducing linearly to 0% by 2005	0.5 $\mu g/m^3$
Sulphur Dioxide	1999/30/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	43% until 2001 reducing linearly until 0% by 2005	350 $\mu g/m^3$
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	None	125 $\mu g/m^3$
		Annual & Winter limit for the protection of ecosystems	None	20 $\mu g/m^3$
Particulate Matter Stage 1	1999/30/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50% until 2001 reducing linearly to 0% by 2005	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health	20% until 2001 reducing linearly to 0% by 2005	40 $\mu g/m^3$ PM_{10}
Particulate Matter Stage 2	1999/30/EC	24-hour limit for protection of human health - not to be exceeded more than 7 times/year	To be derived from data and to be equivalent to Stage 1 limit value	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health	50% until 2005 reducing linearly to 0% by 2010	20 $\mu g/m^3$ PM_{10}

Table 5.6.10: EU Ambient Air Standard – 2000/69/EC

Pollutant	Regulation	Limit Type	Margin of Tolerance	Value
Benzene	2000/69/EC	Annual limit for protection of human health	100% until 2003 reducing linearly to 0% by 2010	5 $\mu g/m^3$
Carbon Monoxide	2000/69/EC	8-hour limit (on a rolling basis) for protection of human health	50% until 2003 reducing linearly to 0% by 2005	10 mg/m^3

Climate

The 30-year average meteorological data from the nearest meteorological station at Baldonnell Aerodrome. Located immediately south of the site are listed in Table 5.6.11 below.

Table 5.6.11: 30-year Average Meteorological Data from Casement Aerodrome (Annual Values).

Parameter	30-year Average
Mean Temperature (^{0}C)	9.3
Mean Relative Humidity at 0900UTC (%)	83
Mean Daily Sunshine Duration (hours)	3.64
Mean Monthly Total Rainfall (mm)	711.4
Mean Wind Speed (knots)	11.0

The prevailing wind in Ireland is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain. Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

The site of the proposed development would have similar climate patterns to those determined from Baldonnell Aerodrome listed above, due to the proximity of locations.

5.6.3 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of the current planning application consists of the provision of roads and services infrastructure to facilitate the future development of a business park, which will be known as '*Profile Park*' on the site. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.6.4 POTENTIAL IMPACTS OF THE PROPOSAL

Construction Phase

Construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction.

The potential impact from dust also depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and as such any impacts from dust deposition will typically be close to the source.

Operation Phase

There are no details of specific operations that will be located in the park but an assessment has been carried out based on the scheduled land uses. Regarding operations at the proposed development, the activities to be located in the development are planned for commercial, retail and light industrial uses. As a result, there are no major scheduled emissions (i.e. through stacks, vents, etc.) planned for the development and site activities are unlikely to cause any deterioration in local air quality.

There are relatively high volumes of traffic on the adjoining roads currently in the area of the proposed development. This is shown in the levels of traffic derived pollutants determined in the baseline period (nitrogen dioxide). However, it should be noted that these levels of pollutants are within the relevant limits. Any alterations to the existing traffic scenario, i.e. traffic volumes and/or a significant drop in vehicle speed (to gridlock speeds) may cause a significant variation in the pollutant concentrations.

Climate

There is a potential for impacts to climate as a result of any development that requires fuel and energy. These impacts are the generation of greenhouse gas emissions (principally carbon dioxide) from the on-site heating systems and the energy source, which may be located a considerable distance from the site.

The space heating for the development may be natural gas, fuel oils or solid fuel (fuel oils are regarded as the worst polluters where natural gas is considered the "cleanest" fossil fuel). The domestic heating system may effect emissions to atmosphere of carbon monoxide, sulphur dioxide, oxides of nitrogen and particulates.

Do-nothing Scenario

The baseline survey results suggest that air quality in the vicinity of the proposed development is good and shows typical levels for a rural/suburban interface area with all pollutants within the relevant EU limits at all locations. The air quality may improve slightly in future years due to improvements in engine technology and greater controls on petrol, diesel, coal and gas composition and purity.

If the proposed development were not to take place, the current air pollutant concentrations will remain unchanged followed by potential decreases in future years for the reasons outlined above.

5.6.5 AVOIDANCE REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction.

The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and as such any impacts from dust deposition will typically be within several hundred metres of the construction area.

In order to ensure that no dust nuisance occurs, a series of measures will be implemented. Site roads will be regularly cleaned and maintained as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface. Any un-surfaced roads will be restricted to essential site traffic only. Furthermore, any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.

Vehicles using site roads shall have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road and on hard surfaced roads that site management dictates speed will be restricted to 20 km per hour.

It is recommended that vehicles exiting the site shall make use of a wheel wash facility, preferably automatic, prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.

Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

As part of the construction strategy a "Construction Dust Minimisation Plan" will be formulated as part of the construction contract. The UK British Research Establishment (BRE) document "Control of Dust from Construction and Demolition Activities" (February 2003) is a best practice guidance document for such plans.

Operational phase

For the majority of vehicle-generated pollutants, emissions rise as speed drops. Emissions are also higher under stop-start conditions when compared with steady speed driving. The free flow of the traffic in the vicinity of proposed development is essential in order to minimise the generation of traffic related pollutants.

Climate

All space heating and energy requirements for the proposed development should be designed in accordance with best practice. The Building Regulations 2002 "Technical Guidance Document Part L – Conservation of Fuel and Energy Dwellings" should be used as a reference for best practice in order to reduce the impact of the proposed development on greenhouse gas emissions.

5.6.7 PREDICTED IMPACTS OF THE PROPOSAL

Construction Phase

If a satisfactory environmental impact minimisation plan is implemented, the effect of construction on air quality will not be significant. The main environmental nuisance associated with construction activities is dust. However, if the construction contractor adheres to good working practices and dust mitigation measures the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance. A series of such good working practices and mitigation measures are outlined in this chapter.

Operational Phase

Summary traffic flow information was obtained from the traffic section of the Statement and has been used to assess whether any significant impact on sensitive receptors may occur as a result of traffic alterations in the area. The traffic section of the report has generated AM (morning) and PM (evening) peak traffic counts as a result of the proposed development. The traffic section predicts total morning peak two way trips of 1,505 and total evening peak two way trips of 2,039 in 2020 as a result of the traffic for the proposed development. A modelling assessment has been carried out to determine the potential increase in ambient pollutant concentrations as a result of these traffic volumes onto the current road network.

A prediction of the increased ground level concentrations of traffic-derived pollutants was carried out using US EPA approved refined air quality modelling software, CAL3QHCR (CALINE dispersion model). The CAL3QHCR model which incorporates the Industrial Source Complex (ISC) mixing height algorithm and it also has the additional enhancement where it incorporates the Discrete Parcel Method to account for NO to NO_2 conversion. Tier I approach of the CAL3QHCR model was used where a full year of hourly meteorological data and one hour of emissions traffic volume is required. Using this approach is considered to be a worst-case situation for predicting daily and annual average concentrations of the individual pollutants because peak hour traffic conditions are assumed for the entire modelling period.

The emission factors used for NO_2, PM_{10}, VOC, CO, and Benzene for the modelling scenario were derived from the speed dependent emission equations formulated in the 2003 EFT2e. The Emission Factor Toolkit allows the calculation of emission rates in grams/vehicle per kilometre. It incorporates national fleet composition data for motorways, urban and rural roads, fleet composition based on European emission standards from pre-Euro I to Euro IV, speed related emission functions and scaling factors for reductions in emissions in future years. Traffic speeds have been assumed at worst case, i.e. 50km/hr to represent slow moving traffic conditions in 2006. Emissions are higher under

slower traffic conditions so these emission factors are considered a worst case estimation.

The most important parameters governing dispersion in the atmosphere are wind speed, wind-direction and the stability or turbulence of the atmosphere. These parameters along with the ambient temperature and inferred mixing heights for each hour were included in the modelling using data from the nearest met station (Dublin Airport). Five years worth of hourly sequential meteorology data representative of the area (2001 to 2005 for Dublin Airport) was used for the operation of the atmospheric dispersion model. The 2002 meteorological data was determined as the worst case year and was employed in the model to generate highest levels of pollutant concentrations.

The modelling approach has taken a number of conservative approaches to the input data to allow a margin of tolerance in the results and ensure a worst-case scenario of predicted results. These approaches include the use of the evening peak hour traffic flows and the emission factors are calculated for lower speeds where emissions are greater. As such, it can be assumed, with some confidence, that if the model predicts that there will be no significant impact on air quality, there will be no significant actual impact on air quality from traffic derived pollution.

The results of the modelling are presented in Table 5.6.12. The results for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality. The existing backgrounds (taken from Ballyfermot and the city centre) are relatively low and the increased pollution as a result of the evening peaks of traffic from the proposed development does not lead to breaches of the relevant air quality limits.

Table 5.6.12: Predicted increases in traffic derived pollution as a result of traffic from the proposed development in the evening peak hour.

Parameter	Averaging Value	Predicted Increase	Background	Increase and Background	Limit
CO (mg/m^3)	8-hour Average	0.14	0.3	0.44	10
Benzene ($\mu g/m^3$)	Annual Average	0.06	1.3	1.36	5
NO_2 ($\mu g/m^3$)	Annual Average	3.65	23	26.65	40
	Max 1-hour Average	19	138	157	200
PM_{10} ($\mu g/m^3$)	Annual Average	0.77	14	14.77	40
	Max 24-hour Average	3.18	14	17.18	50

Once significant consideration is given to the environmental impact of greenhouse gas emissions at the design stage and the heating and energy system are operated in accordance with principles of best practice or within consent conditions, the effect of a domestic heating system and energy supply are not considered to be significant. The use of natural gas will significantly

reduce the potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Worst Case Scenario

For traffic-derived pollutants, the "worst-case" scenario consists of gridlock conditions in the vicinity of the development as presented in Table 5.6.12 above. The refined predictive model employed has been set up to generate worst-case scenario predictions for air quality. If this model indicates that pollutant levels will not breach the EU limits, then it can be assumed with some confidence that a project will not produce air pollution problems if none are identified by this method. There are no predicted breaches of EU legislation from the proposed traffic increase on top of the existing backgrounds. As a result of these model predictions it may be concluded that the worst-case impact of the traffic alterations associated with the proposed development are predicted to be insignificant.

5.6.8 MONITORING

In the event that dust from the proposed development is creating an environmental nuisance during the construction phase of the development, an ambient dust deposition survey is recommended. This survey should be carried out by qualified consultants using EPA approved Bergerhoff gauges. The requisite number of gauges should be placed at the nearest sensitive receptors to the construction works and at key locations along the proposed haul routes. Monitoring should be carried out at monthly intervals for the duration of the construction phase.

The TA Luft (German Government "Technical Instructions on Air Quality") states a guideline of 350 $mg/m^2/day$ for the deposition of non-hazardous dusts. This value should be used to determine the impact of construction dust as an environmental nuisance should the need arise.

5.6.9 REINSTATEMENT

Resinstatement measures are not applicable in this instance.

5.7 LANDSCAPE AND VISUAL APPRAISAL

5.7.1 INTRODUCTION

The landscape and visual impact assessment of the proposed development will examine the existing landscape in terms of its visibility and scenic quality. The impact of the proposed development in general terms on that character is assessed, including views into and out from the site. Further consideration will be given to the effects of the proposed development on existing vegetation.

In determining the impact, consideration is given to reducing any significant impact associated with the development proposal and accordingly mitigation measures are considered.

Landscape and Visual Assessment Methodology

The assessment of the impact on the visual character of the site as a result of the proposed development is based on the guidelines laid down by the Environmental Protection Agency (EPA) in the Advice Notes on Current Practice in the preparation of Environmental Impact Statements (2003).

The assessment was conducted as follows:
1. Site survey to determine the character of the site and its surrounding area.
2. Assessing the proposed development through layout plans and sections to determine the impacting features.
3. Evaluating these impacts on the landscape in accordance with EPA guidelines.

The following definitions are used in the visual assessment:

Extent of visual impact

No Impact:	There is no change to views in the visual landscape.
Imperceptible Impact:	In this situation the proposal is adequately screened due to the existing landform, vegetation or constructed features.
Slight Impact:	In this situation the affected view forms only a small element in the overall visual composition, or changes the view in a marginal manner.
Moderate Impact:	In this situation the proposal affects an appreciable segment of the overall visual composition, or where there is an intrusion into the foreground of a view.
Significant Impact:	In this situation the proposal affects a significant segment of the overall visual composition, or where views are so affected that they form a new element in the physical landscape.
Profound Impact:	Is one where the view is entirely altered, obscured or affected.

Quality of visual impact

Neutral Impact:	Will neither detract nor enhance the landscape character or viewpoint.
Positive Impact:	Will improve or enhance the landscape character or viewing.
Negative Impact:	Will disimprove or detract the quality of the landscape.

Duration of visual impact

Temporary:	Impacts lasting one year or less.
Short-term:	Impacts lasting one to seven years.
Medium-term:	Impacts lasting seven to twenty years.
Long-term:	Impacts lasting twenty to fifty years.
Permanent:	Impacts lasting over fifty years.

5.7.2 THE RECEIVING ENVIRONMENT

Landscape Character/Context

The landscape in the site area is composed of medium sized agricultural fields which are bounded by hedgerows. The landscape character of the area is one of open, large scale, rural setting at present, but on the fringe of development, as indicated by the presence nearby of Grange Castle International Business Park and Kilcarbery Business Park to the north and large scale residential housing to the east. One is conscious of development taking place to the landscape setting in the environs of the site.

The eastern boundary of the site is defined by the presence of the local authority golf club and grounds, Grange Castle Golf Club. The northern and north-western boundary is indicated by the meandering profile of the Old Nangor Road. The remaining boundaries, to the south and west, are defined by fringe hedgerows and trees and the local roads serving the village of Newcastle and Baldonnell Aerodrome. Internal field boundaries are formed by open drainage ditches with associated trees and hedgerows.

The landscape character of the site is essentially agricultural. The existing pattern of field hedgerows with some mature trees is the main defining feature of the landscape area. The area is one which has undergone considerable change in recent times. The recently constructed surroundings have changed and are constantly changing the landscape character to one of a commercial suburban setting. It can therefore be considered in transition between agriculture and industrial/commercial uses.

Development Plan Context

There are no particular landscape designations associated with the subject site. There are no listed views in the environs of the site. The relevant Development Plan provisions pertaining to the site are as follows:

1. The inclusion of the subject site and Grange Castle to the north in the South County Development Plan 2004 as an area which has the zoning objective E to provide "enterprise and employment related uses" by means of commercial development;
2. The key strategic position of the site to the south of the existing Grange Castle International Business Park;
3. The proximity of the site to a large residential catchment area;
4. The proximity of the site to existing (and permitted) high quality commercial and leisure facilities.

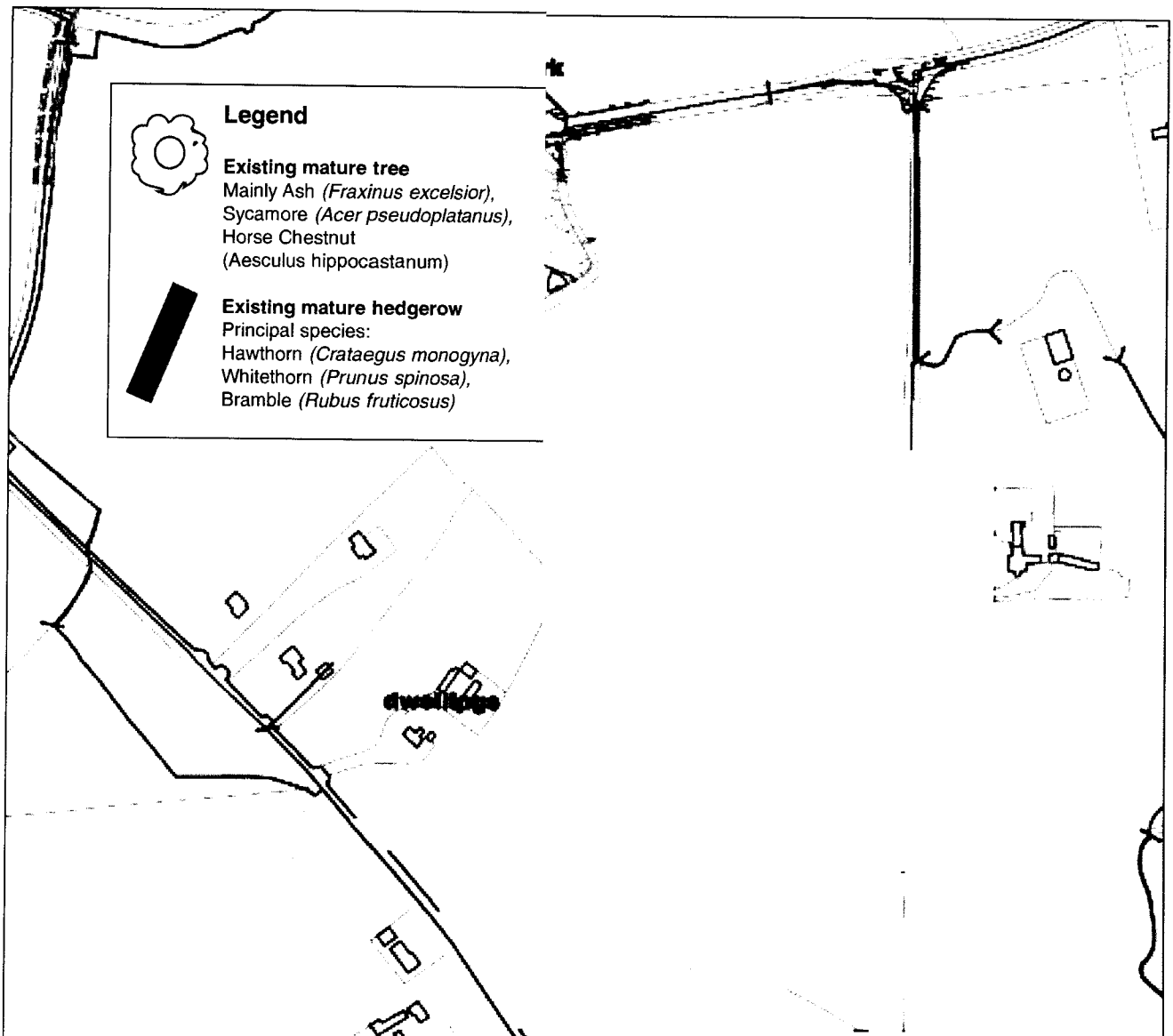
Existing Landscape Features and Vegetation

The site is situated in a landscape characterised by even flat landforms with elevations between 72.5 and 83.5m OD. The local topography falls gradually south to north. There are no exceptional or unique landscape features on the site.

The existing mature hedgerows and trees within the site and particularly on the northern and southern boundaries contribute to a sense of landscape maturity within the overall development area. These hedgerows form and frame the site of the proposed business park. They are native hedgerows consisting, in the main, of ash, hawthorn (*Crataegus monogyna*), Whitethorn (*Prunus spinosa*), bramble and briar (*Rubus* spp.). Internally, there are five large sized fields laid out in a north-south orientation. These fields are themselves bounded by hedgerows of a similar composition which have been managed over the years and there is evidence of coppice management. Some mature trees, principally ash, punctuate this hedgerow pattern.

The principal mature trees on the site are on the southern boundary and primarily comprise Ash (*Fraxinus excelsior*), Horse Chestnut (*Aesculus hippocastanum*) and Sycamore (*Acer pseudoplatanus*).

See figure 5.7.1 for plan of Existing Vegetation and Topography.



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Project Title:

PROFILE PARK
LANDSCAPE AND VISUAL ASSESSMENT

Client:
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Drawn by: **MB** Approved by: **TM**

Figure 5.7.1 Existing Vegetation and Topography Plan

Project Planner:
RPS Planning & Environment Ltd

Scale:	**NTS**	Revision
Date:	May 2006	**0**

Existing Views

This section of the report assesses the visibility of the site from within the overall business park area and from surrounding areas. The main views within the site are confined to the general site area and are composed of views of agricultural pasture and new development.

The key viewing areas into the site are classified as follows:
1. Views from roadways and adjoining dwellings.
2. Views from within the site.
3. Views from local amenities.

Views from roadways and adjoining dwellings

The site is occasionally visible from the Old Nangor Road to the north due to the fragmented hedgerow flanking the southern roadside verge. This view is across farmland. This visibility into the site is divided due to the alignment of the hedgerows within the site, running in a north-south direction, thereby providing uninterrupted views across most of the site.

The main landscape feature is the presence of the Dublin Mountains in the background, approximately 10 kilometres in the distance. This landscape element is significant as it provides topographical relief to a relatively flat domain.

There is also some visibility into the site from the local road serving Baldonnell Aerodrome, which bounds the southern side of the site. These views are restricted, however, due to presence of uniform mature hedgerows along the roadside verges, which vary in height from 4-7 metres.

There are also a number of dwellings located along the main roadways, which are interspersed with commercial developments. Ten dwellings are likely to be affected; five are located along each of the Nangor Road and the road to the south of the development. These dwellings have potential visibility to the subject site, limited only by garden and boundary planting.

Views within the site

The views from within the site may be categorised into two distinct aspects: views to the north consisting of commercial elements and views to the south composed of a rural landscape.

The views to the north are defined by a skyline consisting primarily of the commercial components of the Wyeth and Takeda buildings and the lower, but closer, industrial / warehouse buildings in Kilcarbery Business Park. These are two substantial building masses which are easily identifiable on the distant horizon.

The views to the south are more pastoral in content. There are sweeping areas of grassland framed by hedgerows and backdropped by the Dublin Mountains. Dwellings and buildings are scarce in the views due to the screening effects of existing vegetation and topography. The view is characterised by the rural landscape of South County Dublin.

Views from local amenities

The principal amenity in the vicinity of the development site is the public golf course which borders the site to the east. Views from the golf course are currently restricted by existing mature tree and hedgerow and by additional boundary planting on the golf course lands.

Significance of Local and Site Landscape Amenities

There are no existing landscape features on the site or in the environs of any particular note.

5.7.3 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, which will be known as 'Profile Park' on the subject lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

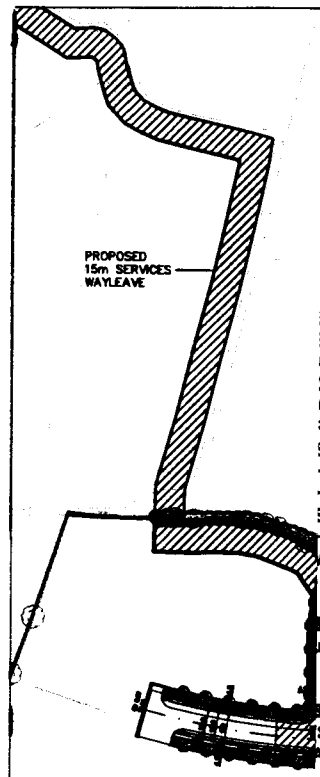
It is proposed that there will be high quality streetscapes within the site to accommodate future commercial development. All streetscapes have been designed to a high landscape standard (see figure 5.7.2).

The layout of the scheme has been designed to provide a variety of elevations to the streets. The soft landscape treatment to the proposed streets is a combination of semi-mature street trees, grass verges, mounding and groundcover shrub planting. This treatment will create a structure within the site and reinforce the hierarchy of the streets with size and intensity of planting typologies.

Throughout the site, there is a landscape buffer strip to the road reservation edge of 5 metres on the main avenues and 3 metres on secondary roads. This allows for tree and shrub planting and earth mounding to create screening to the sites to the rear, as well as form a structure to the business park. There are four proposed typologies of planting, as follows:

1. **Entrance Area and Entrance Road**: Large avenue trees (Norway Maple – *Acer platanoides* 'Emerald Queen') will be planted in the 5-metre strip to define the entrance area and street, with groundcover shrub planting to a maximum of 1.5 metres and asymmetrical earth mounding. A second, smaller tree (Upright Rowan – *Sorbus aucuparia* 'Asplenifolia') would be planted in the central median (see Sections A-A/B-B – figure 5.7.3);

2. **Main Avenue:** The main roads through the site will be defined with a double avenue of trees planted in a 5-metre wide landscape reservation strip, composed of an outer line of Norway Maple and an inner line of Upright Rowan (see Section C-C – figure 5.7.3). The groundcover and mounding detail will also be continued;



legend

Primary Avenue Tree
Acer platanoides 'Emerald Queen'
Norway Maple

Secondary Avenue Tree
Sorbus aucuparia 'Asplenifolia'
Upright Mountain Ash

Woodland screen planting
Scots Pine (*Pinus sylvestris* 15%)
European Larch (*Larix decidua* 10%)
Ash (*Fraxinus excelsior* 10%)
Common Oak (*Quercus robur* 10%)
Alder (*Alnus glutinosa* 5%)
Rowan (*Sorbus aucuparia* 5%)
Silver Birch (*Betula pendula* 5%)
Holly (*Ilex aquifolium* 20%)
Hawthorn (*Crataegus monogyna* 10%)
Blackthorn (*Prunus spinosa* 5%)
Hazel (*Corylus avellana* 5%)
Wild rose (*Rosa canina, R. rugosa* 5%)

Shrub planting
Under Avenue Trees

Specific Landscape Measure
Subject to approval of Planning Authority. See text of report for details

Existing Hedgerow / Trees

Existing Hedgerow / Trees to be removed due to development.
All other trees / hedgerows retained

Existing Contour

Existing Ditch

Site Boundary

Road details see engineer's drawings

Revision

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44/45 Clontarf Road,
Dublin 3. Ireland
Tel +353 1 8540080
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murray & associates
Architecture

Title:
PARK
PE AND VISUAL ASSESSMENT

LTD.

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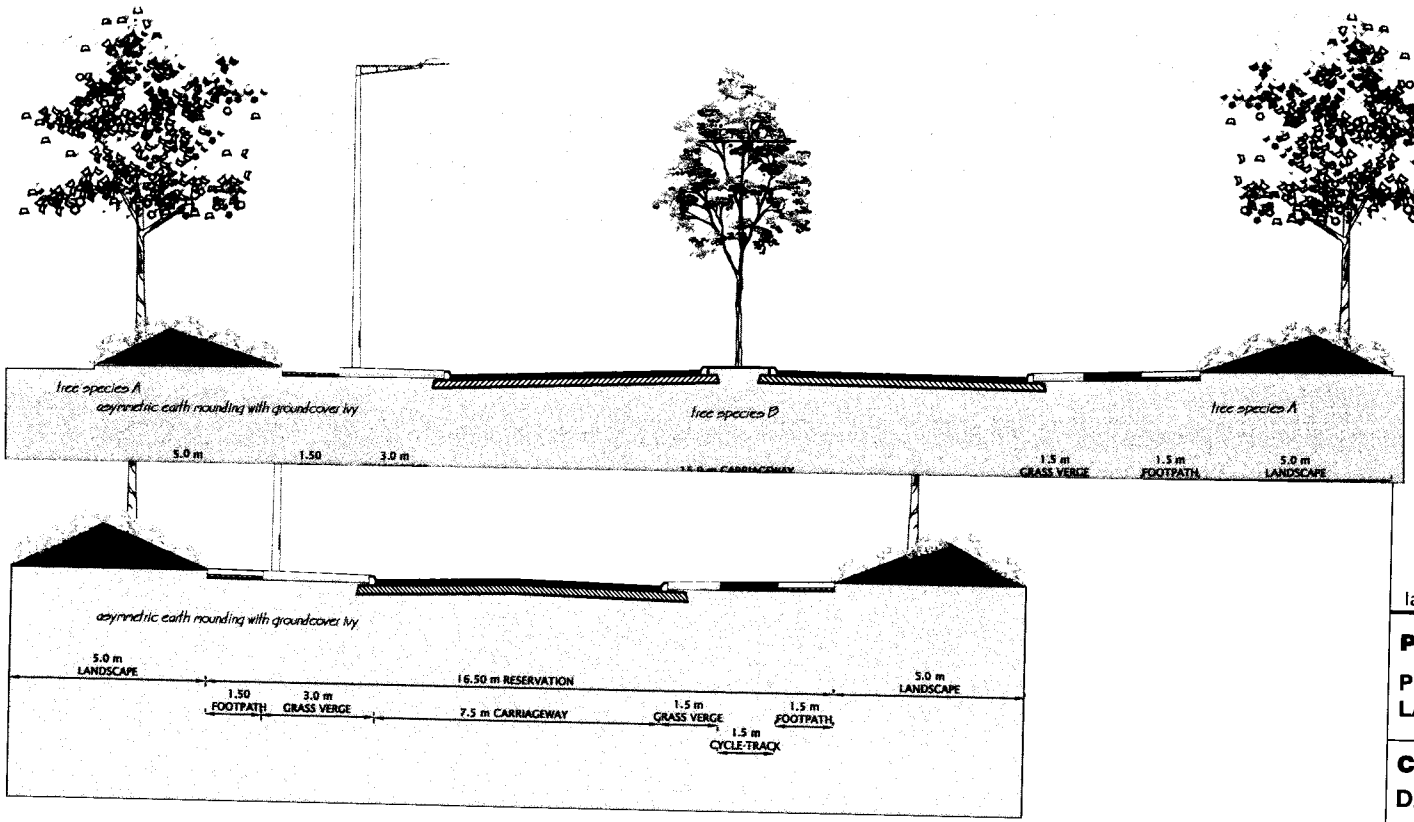
MB Approved by: **TM**

5.7.2 Landscape Masterplan

Planner:
ning & Environment Ltd.

NTS	Paper Size:	Revision:
June 2006	**A3**	**D**

SECTION A-A - ENTRANCE AVENUE



mail@murray-associates.com
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murray & associates
landscape architecture

Project Title:

PROFILE PARK
LANDSCAPE AND VISUAL ASSESSMENT

Client:

DASNOC LIMITED

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Drawn by: **MB** Approved by: **TM**

Landscape Sections

Figure 5.7.3

Project Planner:

RPS Planning & Environment Ltd.

Scale:	Paper Size:	Revision:
1:200	**A3**	**A**
Date: **July 2006**		

3. **Typical Secondary Road:** The majority of secondary roads will be more open in character, with future buildings set back within sites and the 3-metre wide, mounded landscape strip planted with Norway Maple trees to form an avenue and groundcover shrubs;

4. **Service/Neighbourhood Centre Cluster:** In the later design of the site, the secondary streets could have two separate urban design characters. The second of these would form an urban street, with future retail buildings close to the path edge. In this case, planting of Norway Maple trees would form a single avenue in predominantly paved environs;

5.7.4 POTENTIAL IMPACT OF THE PROPOSAL

The potential landscape and visual effects are discussed in this section in terms of the effects which may arise. The potential effects allow for the important effects to be identified, and described in detail in order to determine the degree of effects which will be mitigated by landscape works.

This section assesses the impacts likely to be caused by the proposed roads and services development only. It is recognised that future build out of the site will occur, but the nature and form of this development has not been designed in detail, and therefore cannot be assessed at this time.

It is assumed that the traffic using these roads will be a mix of vehicles, including HGVs. The largest vehicles using the site will be 4-5 metres in height, and the visual assessment will be based on this height.

Existing Landscape Features and Existing Vegetation

The primary landscape features on the subject site are the existing mature hedgerows and trees. The proposed development will essentially change the agricultural pattern of the subject site to a commercial development. The proposed development will entail the construction of roads and services on the subject site which will result in the removal of 400 metres of existing hedgerows and trees within the site. Future development within the site may also result in the removal of existing site vegetation. Boundary hedgerows and trees can be largely retained. All existing drains and watercourses will be retained, except for a 25-metre section of a watercourse in the north of the site which will be culverted. This generates a slight negative landscape impact as this represents a small percentage (<10%) of the entire site vegetation and these features are not unique or valuable from an amenity or landscape point of view.

Views

The proposed development of roads and services with tree planting to either side of each road would have a relatively low visual weight, compared with the extent of the site. Traffic would be partially screened by the proposed trees, but the movement of traffic increases its visibility.

Views from roadways and adjoining dwellings

At the nearest point, the proposed roads are located 200-300 metres to the south or south-east of the existing dwellings along the Nangor Road. The effect on views from these dwellings would be moderately negative as the proposed development would contrast with the existing landscape and result in reducing the quality of the views of the Dublin Mountains from these dwellings. The effect

of the development on the visual quality of the agricultural landscape in the fore- and middle-ground of the views would be slightly negative.

At the nearest point, the proposed roads are located 175 metres north-west of Kilbride House in the south-east of the site and between 340 metres and 770 metres from dwelling to the west of the site. Views from Kilbride House to the north of the agricultural landscape in the fore and middle ground would be moderately negatively affected. Impacts to views from other dwellings would be slight and negative, due to the distance from the proposed roads and the existing mature boundary vegetation. Long distance views to the industrial buildings to the north-east of the site would be partially blocked although this would not counter-balance the negative effects.

Views from the roadway to the west of the site would also be slightly negatively affected.

Views from within the site
The views from the site are views across agricultural fields to the south, and the view to the north towards Grange Castle International Business Park and Kilcarbery Business Park. The site development will generate a moderate change to the character of the existing views. Given the existing quality of the views in this location, there will be moderate visual effects to the existing views in this area, particularly to the south.

Views from local amenities
Views from the public golf course east of the site are currently partially restricted by existing mature trees and hedgerows and by additional boundary planting on the golf course lands. The potential impact to views from the course is slight in extent due to the nature of the proposed development and its likely relatively low visibility from the course.

5.7.5 REMEDIAL OR REDUCTIVE MEASURES

The scheme of landscape works for the proposed development can be defined in the following areas:

1. Main roadways and entrance spaces
2. Boundary treatments

The details of the landscape scheme are illustrated on figure 5.7.2.

The planting scheme for the site takes account of the native species already in the area as these would be the most useful for local wildlife. In the detailed design phase, preference should be given to the planting of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*) and willow (*Salix* spp.) as these are the principal native species in this part of County Dublin. Other occasional species include oak (*Quercus robur*), alder (*Alnus glutinosa*), birch (*Betula* spp.), rowan (*Sorbus aucuparia*), holly (*Ilex aquifolium*), crab apple (*Malus sylvestris*) and wild roses (*e.g.* dog rose, *Rosa canina*).

Roadways and Entrance Spaces

The main roadways will be developed for cycling and pedestrian access, and are proposed to be defined by strong lines of semi mature standard trees, as described in Section 5.7.3. It is envisaged that the footpaths will be developed with a high quality pavement. The ancillary roadways have been developed using street trees, with a species composition that relates to each individual roadway.

At the entrances to the proposed development and at junctions within the site, it is proposed to implement Specific Landscape Measures (SLMs). It is intended that these spaces would create a visual break in the external environment and therefore give visual interest. These spaces could then be further aesthetically enhanced by tree and shrub planting, lighting, site furniture, water features and/or sculptural features. These would enhance the amenity value of the site and would be designed in detail at a later stage, as part of the urban design process for the future business park.

Boundary Treatments

The boundaries of the proposed development site are proposed to be planted with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings.

The following species mix is proposed, as follows:

Native Tree and Shrub Screen Planting mix

Scots Pine (*Pinus sylvestris* 15%), European Larch (*Larix decidua* 10%), Ash (*Fraxinus excelsior* 10%), Common Oak (*Quercus robur* 10%), Alder (*Alnus glutinosa* 5%), Rowan (*Sorbus aucuparia* 5%), Silver Birch (*Betula pendula* 5%), Holly (*Ilex aquifolium* 20%), Hawthorn (*Crataegus monogyna* 10%), Blackthorn (*Prunus spinosa* 5%), Hazel (*Corylus avellana* 5%) and wild rose (*Rosa canina, R. rugosa* 5%).

The screening mix will be planted along the boundaries with existing dwellings in a 5m band and in an 8m band along the golf course boundary to ensure that the proposed development is screened in views. This will have the effect of enhancing the screening and aesthetic value of the existing hedgerows by introducing additional native deciduous and evergreen trees. It will not be planted along the southern boundary of the site to the north of Kilbride House, due to external constraints. Massed plantings will be planted as bare root whips / transplants, with container-grown evergreen trees/shrubs.

5.7.6 PREDICTED IMPACT OF THE PROPOSAL

The predicted landscape and visual effects are the residual effects of the proposed development on the landscape and visual environment, after consideration of mitigation measures.

Existing Landscape Features and Existing Vegetation

Construction stage

Site clearance works would result in the removal of 400m of existing hedgerows and trees from the interior of the site in the initial stages of construction. This would result in a slight, permanent landscape impact. However, following planting of streets and boundaries as described in section 5.7.5, the overall effect on landscape vegetation would be positive.

Operational Stage

In the operational stage the landscape measures and planting proposed in section 5.7.5 for the site will establish and mature. This will result in a change to the landscape character from agricultural to infrastructural/commercial. In the wider landscape context, this is a continuation of an established pattern on adjacent lands. Additional distinct landscape features such as water features, tree and shrub plantings, sculpture, etc. would have a positive impact on the landscape amenity value of the site and the overall amount of significant tree cover would be increased.

Views

Construction stage

There may be some slight visibility of the construction works in the wider landscape, and the completed infrastructure during the establishment stage of the scheme. The subject site is not particularly visible in the wider landscape area and these effects will be generally slight. Views from adjacent dwellings will be primarily negatively affected to a slight extent.

Operational stage

Views from roadways and adjoining dwellings

The predicted effect on views from dwellings along the Nangor Road would be moderately negative as the proposed commercial development cannot be screened from view with screen planting within the site but the views of the Dublin Mountains from these dwellings would be partially blocked and the visual quality and context of the landscape is reduced.

Views from Kilbride House to the north would be moderately negatively affected as the proposed roads would be visible in the landscape and the visual quality of the landscape is reduced. Impacts to views from other dwellings to the west of the site would be negligible, due to the distance from the proposed development and the existing mature boundary vegetation, augmented with screen planting.

Views from the roadway to the west of the site would also be slightly negatively affected.

Views from within the site

The views from the site are views across agricultural fields to the south, and the view to the north towards Grangecastle International Business Park and Kilcarbery Business Park. The site development will generate a moderate change to the character of the existing views. New landscape features will create a distinct, visually interesting landscape setting. However, removal of the agricultural landscape will result in slight negative impact overall.

Views from local amenities
The predicted impact to views from the Grange Castle Golf Course is slight in extent as the proposed development will be screened from the course and will have only a slight effect on approaches to the course and the landscape setting.

5.7.7 MONITORING

The landscape development of the site will be carried out as follows:

Construction stage

All mature trees, hedgerows or bushes to be retained should be appropriately fenced for protection. Where trees will be interfered with by construction works, an Arborist should monitor the site works.

For the retention of all other landscape qualities, including topsoil stripping and storage, instructions should be submitted to all contractors to maintain good practice while manoeuvring vehicles or materials within the vicinity of, or on, the site. Monitoring should occur by site inspections from an appointed Landscape Architect.

The landscape works construction stage will entail the monitoring of the topsoil stripping and the establishment of the main structural planting on the street areas.

Operation stage

Following completion of the works, there will be an ongoing programme of landscape management for the site, which will be overseen by a Landscape Manager or Landscape Architect.

5.7.8 REINSTATEMENT

The proposed landscape development works in the form of contouring, shrub and tree planting will form the reinstatement of the site following the completion of the main building works. These works will be carried out by a landscape contractor and will be supervised by the appointed Landscape Architect.

5.8 MATERIAL ASSETS

5.8.1 TRAFFIC AND TRANSPORTATION

5.8.2 INTRODUCTION

The development that is the subject of the current planning application consists of the provision of roads and services infrastructure, which will accommodate the future development of a business park on the subject site. The future land uses proposed on the site include industrial, office, retail, and neighbourhood centre uses including shops, cafes, crèche etc. Vehicular access to the site is proposed via the Nangor Road Regional Road R134, which has access to the Outer Ring Road R136. When completed, the Outer Ring Road will connect the N4 to the N7 and N81. Pedestrian and cycle access will be provided throughout the site and will connect with the Nangor Road which is to be upgraded to provide for these modes of travel.

This section of the EIS addresses the existing transportation environment in the vicinity of the proposed development, the traffic generation, parking and public transportation requirements of the development and the transportation impact on the surrounding road network.

The transportation impact of the proposed development has been assessed using widely accepted methods including the T.R.I.C.S. database (based on surveys in the UK and Ireland, which is widely used for trip estimation in Ireland). Consideration has been given to access to/from and within the site for all users (cars, pedestrians, cyclists and public transport users).

The parking requirements for the development have been considered with reference to the South Dublin County Council Development Plan 2004 – 2010.

5.8.3 RECEIVING ENVIRONMENT

Site Description and Location

The Kilcarbery area is strategically located from a transportation point of view on the western fringe of the Greater Dublin Area, approximately 13km west of Dublin City Centre and 2.5 km west of Clondalkin Village.

The subject site is located on the southern side of the Nangor Road, west of the Outer Ring Road. The site is currently agricultural / undeveloped lands.

To the north is Grange Castle Business Park, to the east of the site is a golf course and further east is the established residential area of Clondalkin. To the south is Baldonnell Military Aerodrome and to the west are primarily agricultural lands. Refer to Figure 5.8.1 Site Location - Regional Context and Figure 5.8.2 Site Location - Local Context.

Figure 5.8.1: Site Location – Regional Context

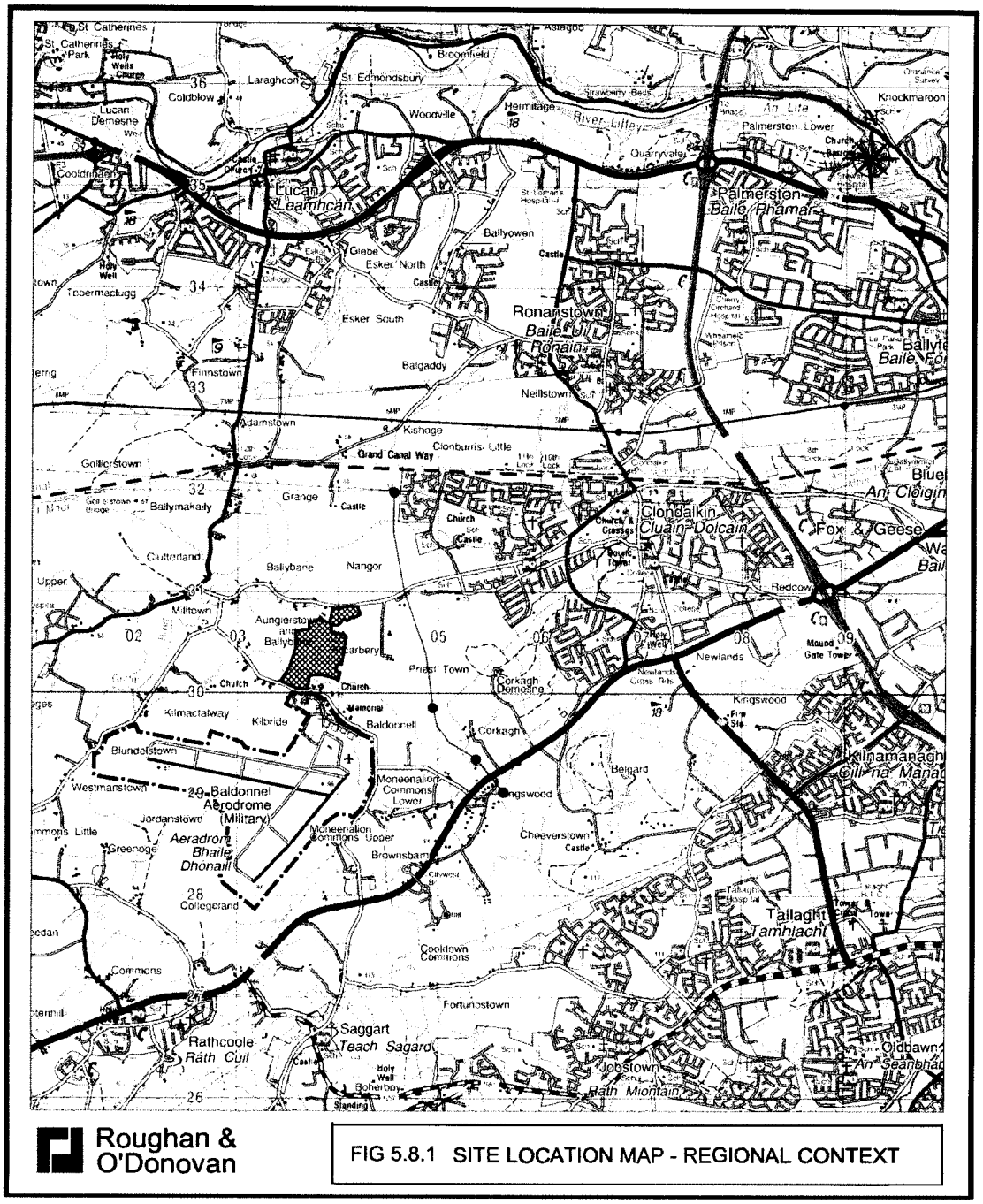
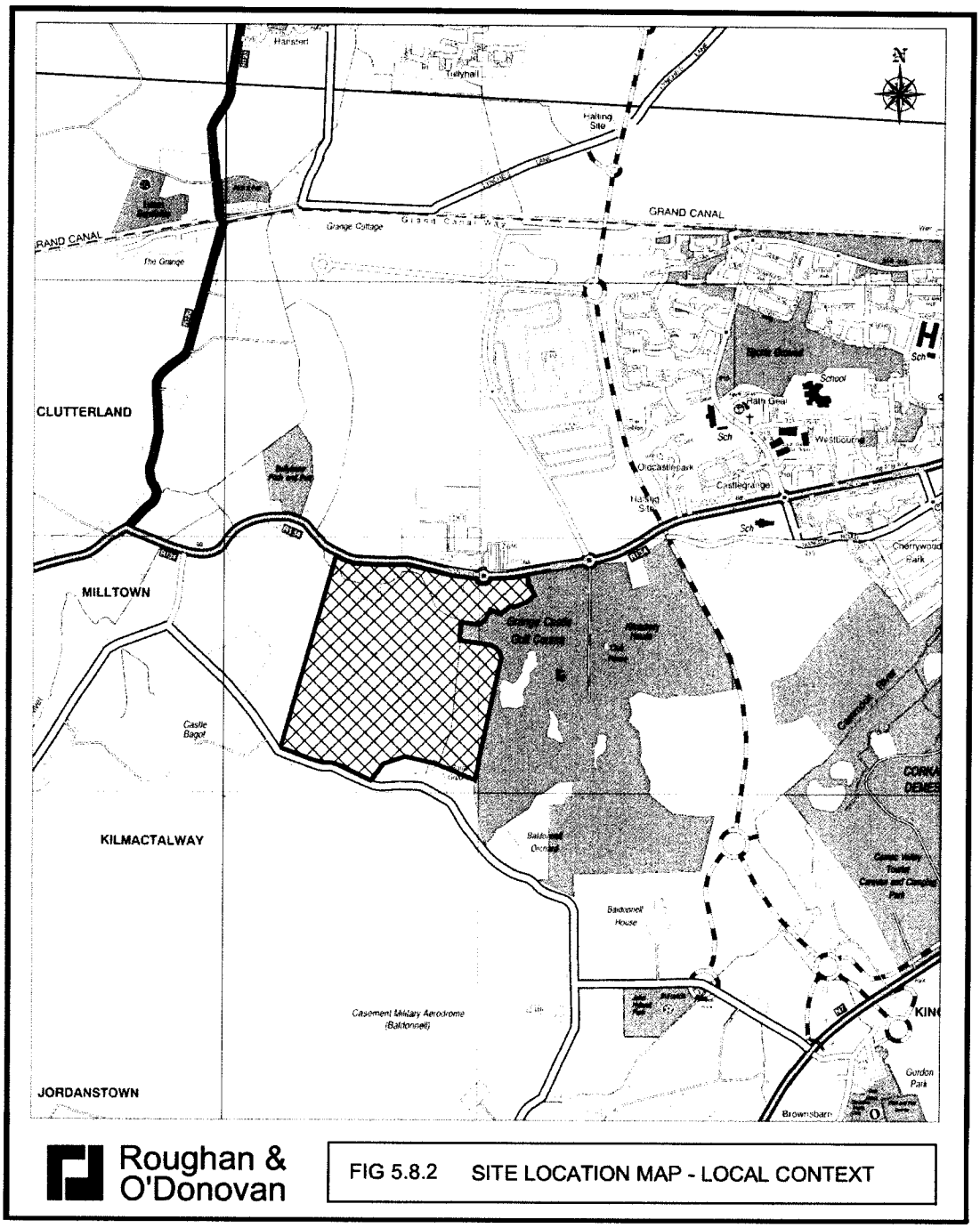


Figure 5.8.2: Site Location – Local Context



Transportation Policies

The transportation strategies 'Transport 21' and 'A Platform for Change, 2000-2016, prepared by the Dublin Transportation Office (DTO) and approved by the Government, contain proposals for a high-capacity public transport network throughout Dublin. The aim is to achieve a substantial share of the transport market in Dublin for public transport services. The land use and development control policies of the local authorities are expected to be coordinated with the transport policy through an emphasis on development of sites that are easily accessible by public transport.

It is an objective of South Dublin County Council to *'promote ease of movement within, and access to South Dublin, by integrating land use planning with a high quality, sustainable and integrated transport system for people and goods within the County.'*

The proximity of the site to the future QBC along the northern boundary of the site on the Nangor Road will encourage travel to the site by bus. In addition the orbital bus priority on the Outer Ring Road will also encourage travel by bus.

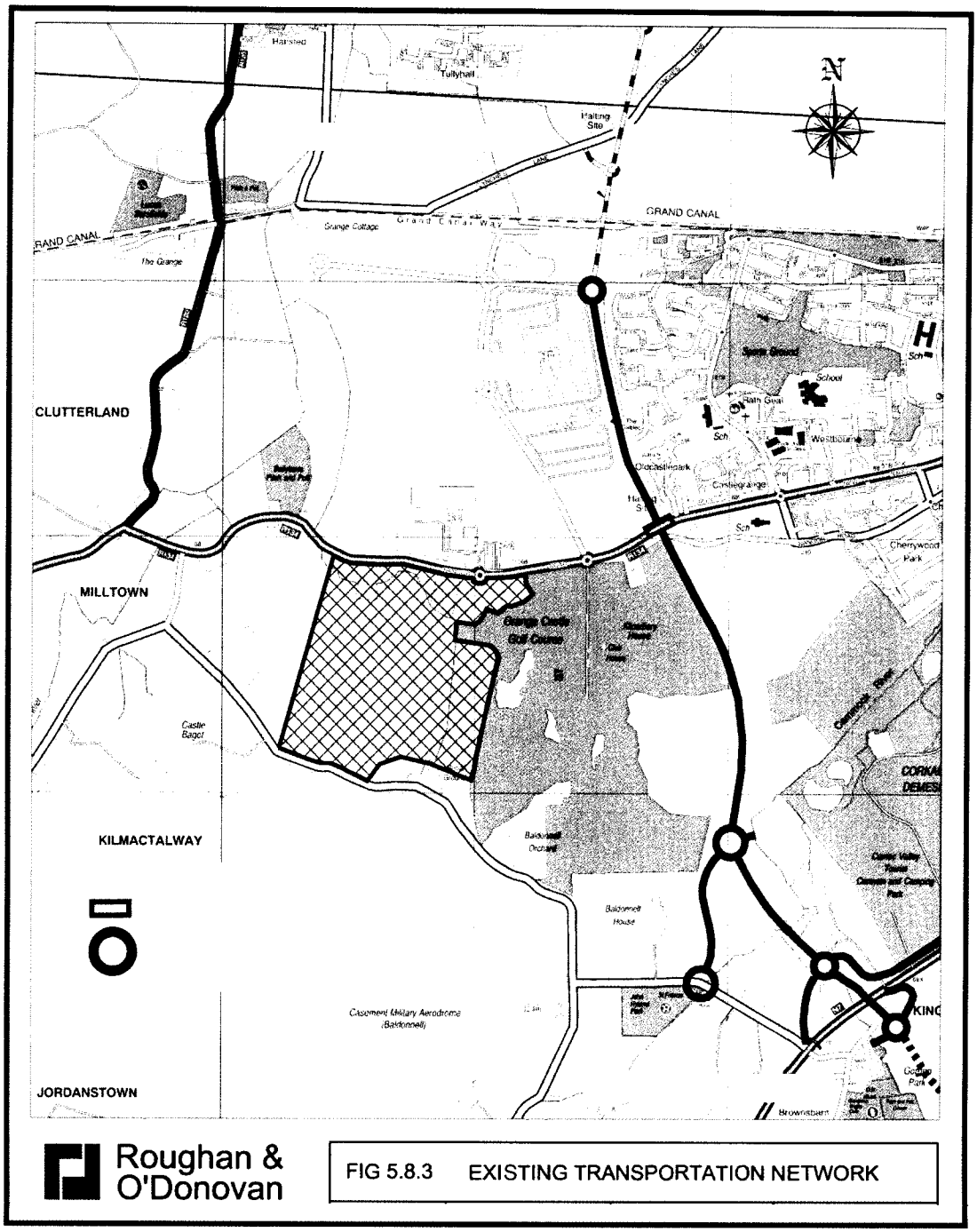
Existing Road Network

The site is situated between the N4 and N7 National Primary Routes and approximately 5km west of the M50 Motorway. The M50 is an orbital ring road around Dublin City with interchanges at all radiating National Primary Roads from the N1 to the North and the M11 to the South.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has seen steady improvements over recent years, and is a wide single carriageway with dedicated bus lanes in each direction extending as far out as the Kilcarbery Park roundabout. The Nangor Road along the northern boundary of the site and to the west is of lower standard in terms of alignment and cross-sections, but will soon be upgraded and widened to include bus lanes in each direction.

The Outer Ring Road Phase 1 was opened from the N7 as far as Grange Castle Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction. Refer to Figure 5.8.3 Existing Transportation Network.

Figure 5.8.3: Existing Transportation Network



Proposed Road Improvements

Phase 2 of the Outer Ring Road, which will see a local road link from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road, which commenced construction in 2005 and is due to be completed by mid 2007. With completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and the N7. Phase 3 of the Outer Ring Road, continuing south from the N7 to the N81 Blessington Road is progressing through the planning and design process and construction is expected to commence this year.

The upgrading of the N7 to dual three-lane standard from Dublin to Naas has commenced and is anticipated to be complete by the end of 2006. Improvements are also planned to the N4 to bring it to dual three-lane standard as far as the Leixlip Interchange from the M50 / N4 Interchange within three years.

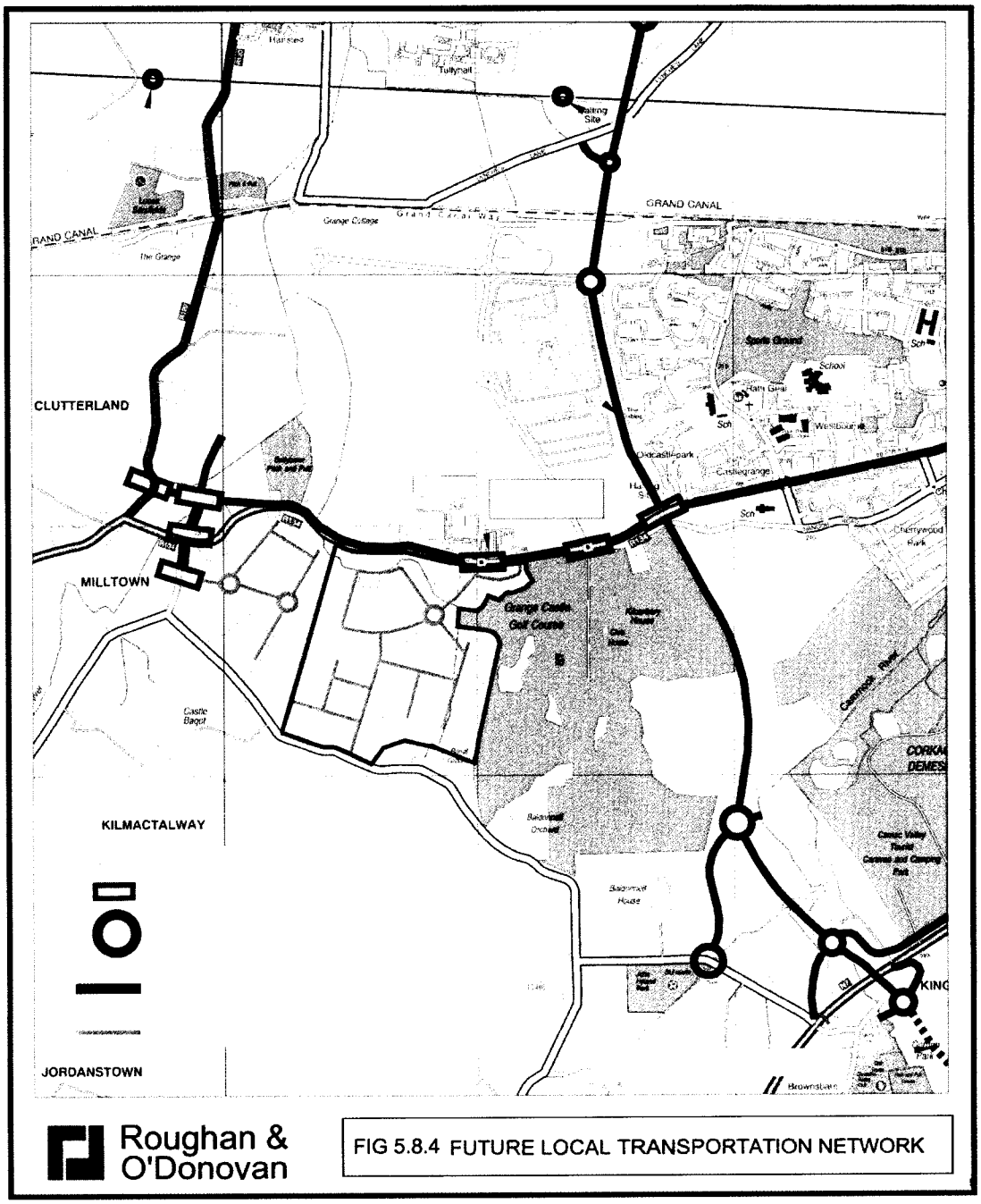
The Nangor Road west of the Outer Ring Road will be upgraded and widened to include bus lanes in each direction. Two of the existing roundabout junctions will be upgraded to traffic signal control to facilitate the Quality Bus Corridor (QBC) along this route.

Proposed road infrastructure identified in Transport 21, which will have a positive impact on the road network in the area include the following (completion dates):

- Dublin Port Tunnel (2006)
- M50 upgrade phase 1. These upgrades will provide essentially 'free flow' interchanges at the N4 and N7 (2008).
- M50 upgrade phase 2 Upgrading remainder of the M50 including the interchanges and widening to 3 lanes between the M1 interchange and Scholarstown interchange (2010)

Refer to Figure 5.8.4 Future Transportation Network.

Figure 5.8.4: Future Transportation Network



Existing Traffic Conditions

The existing road network adjacent the subject site is operating well within its capacity, however no traffic surveys have been undertaken on the surrounding road network as traffic conditions are expected to change significantly as a result of extensive development within the area and the completion of the Outer Ring Road. Instead, the estimated future traffic flows on the surrounding road network were obtained from South Dublin County Council, which were undertaken as part of the Nangor Road Improvement Scheme. These traffic flows take account of proposed transportation Infrastructural improvements and development of zoned lands. This traffic data was used for base years 2007 and 2020 to assess the

impacts of the proposed development on the surrounding road network. Refer to Figures 5.8.5 and 5.8.6 2007 Base Year Traffic Flows – Weekday AM & PM Peak Hour Traffic.

Figure 5.8.5: Base Year Traffic Flows Weekday AM Peak Hour

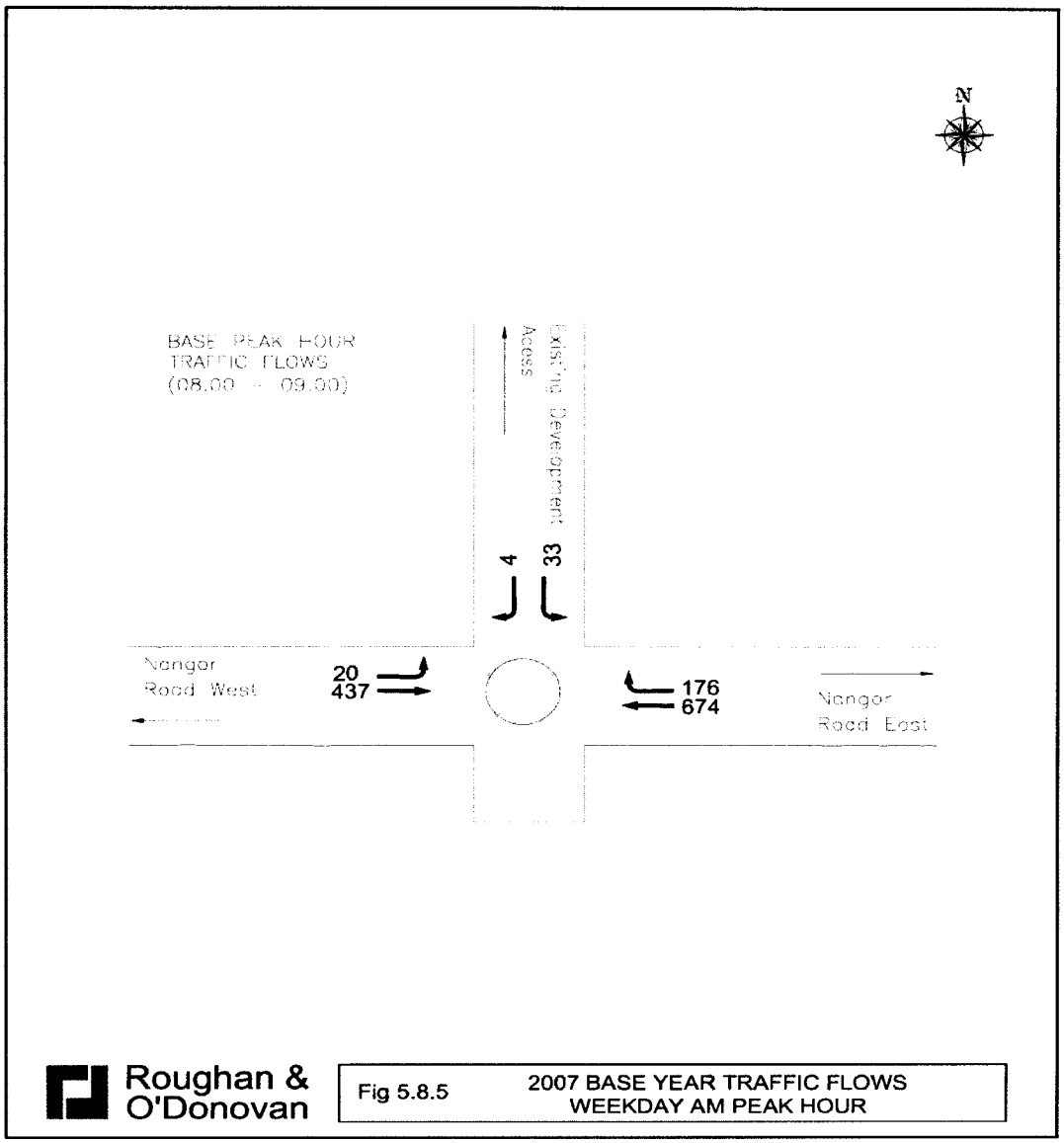
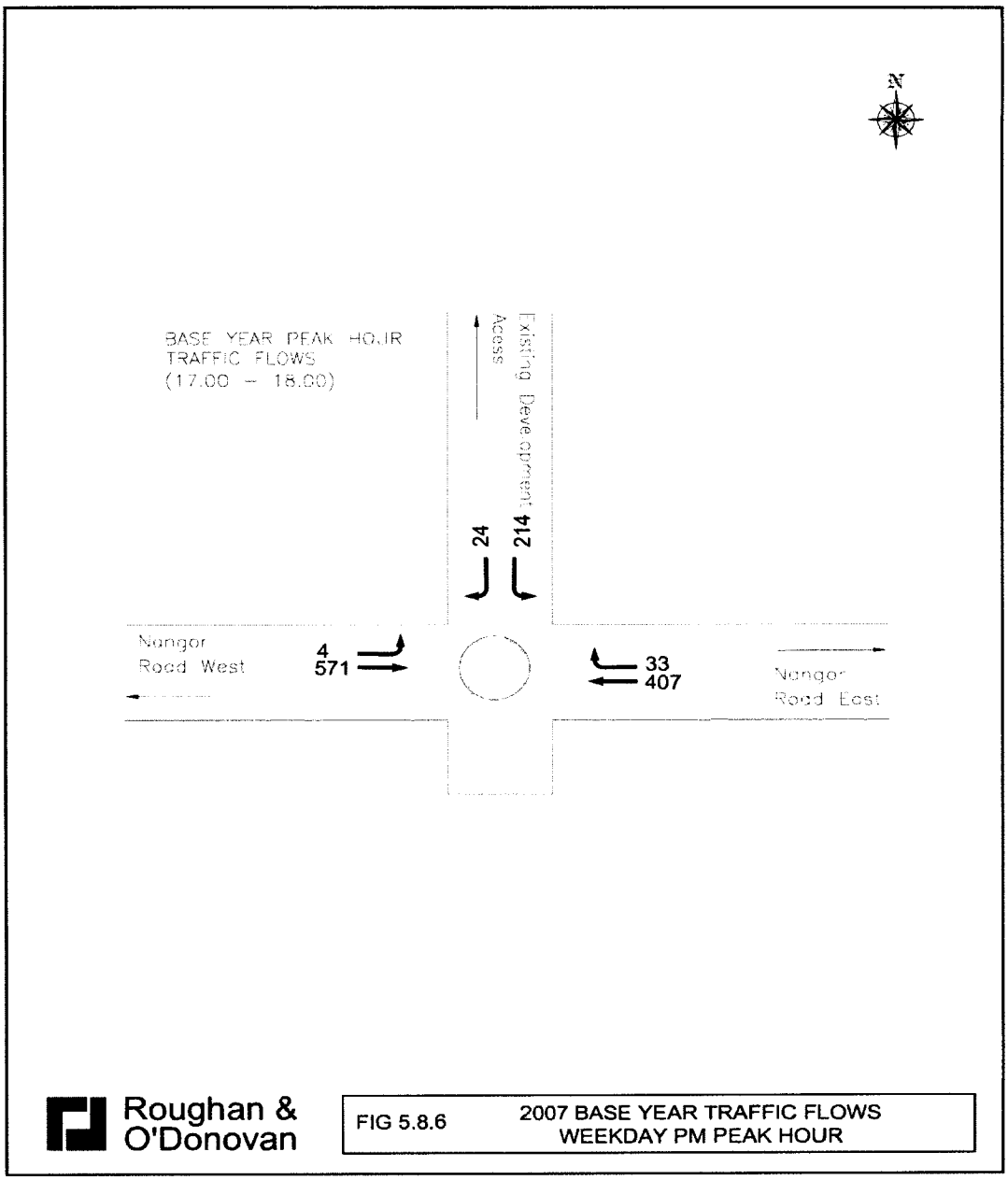


Figure 5.8.6: 2007 Base Year Traffic Flows Weekday PM Peak Hour



Public Transport Accessibility

Currently the Dublin Bus Route No. 68 operates along the Nangor Road at the northern boundary of the subject site. Approximately 1.5km east of the site the Dublin Bus Route Nos. 51B, 51X and 210 operate along the Nangor Road. Clondalkin Village 3km east of the site is served by the Dublin Bus Route Nos. 69, 76, 76A and 76B.

The Quality Bus Network (QBN) in the area continues to expand with dedicated bus lanes on the Nangor Road east of the Kilcarbery Park Roundabout and the Outer Ring Road. It is noted that these Quality Bus Corridors are not yet operational but they are likely to be operational by the time the subject site is developed.

The main intercity railway line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, runs to the north of the subject site. Intercity services are mainly to Cork and Limerick / Shannon, with the commuter service to Kildare. The nearest station is Clondalkin Station which is located approximately 3km northeast of the site and is served by 15 suburban commuter trains in each direction during weekdays.

Proposed Public Transport Infrastructure

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme within the vicinity of the site including:

- Outer Ring Road QBC – Phase 1 N7 to Adamstown Roundabout complete Phase 2 connecting to the N4 under construction
- Nangor Road QBC West of Outer Ring Road currently at design stage
- Naas Road QBC Kingswood to Bluebell - under construction.

These objectives form part of the extensive QBN that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 - 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, with better pedestrian and cycle facilities thereby encouraging commuters to use alternate modes of transport to private cars.

The Kildare Route Project is a railway improvement project for part of the Dublin to Hazelhatch railway line, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site, and additional railway tracks to allow for the separation of suburban, regional and intercity trains and the introduction of a new high capacity suburban service, which is expected to be complete by 2010.

Proposed public transport infrastructure identified in Transport 21, which will have a positive impact on the public transport infrastructure network in the area, include the following (completion dates):

- Dublin City Centre rail resignalling (2008)
- Opening of the new Dublin City Centre railway station (2009)
- Kildare rail upgrade (2010)
- Metro West Phase 1 Tallaght to Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)
- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extend Electrification to Hazelhatch (2015)
- Rail Interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015).

Refer to Figure 5.8.4 Future Local Transportation Network.

5.8.4 CHARACTERISTICS OF THE PROPOSAL

Introduction

The development which is the subject of the current planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park on the subject lands.

Broad assumptions, which can be made regarding likely future land uses within the buiness park at this time, are as follows:

General industry/logistics	39.00 acres,	78,914 sq.m gross floor area;
General Industry/enterprise	32.86 acres,	66,490 sq.m gross floor area;
Office	17.38 acres,	35,167 sq.m gross floor area;
Retail park	14.67 acres,	29,684 sq.m gross floor area;
Showroom	8.61 acres,	17,422 sq.m gross floor area;
Neighbourhood Centre	2.39 acres,	5,000 sq.m gross floor area.

Physical Infrastructure

The Spine Road within the proposed development will join the Nangor Road at the location of the existing roundabout providing access to the Kilcarbery Business Park. This junction will be modified to traffic signal control as part of the Nangor Road improvement scheme and will include a left-in slip lane to the site that will extend along the site frontage of the Nangor Road.

The Spine Road will be a dual carriageway road between Nangor Road and the roundabout within the site; with each carriageway to be 6.5m wide with two-lanes, separated by a 2.0m median. In addition the Spine Road will include a 1.5m wide cycle path on one side, and a 1.5m footpath on each side, plus verges for services and landscaping. The cycle path will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority to cyclists at the junctions.

Beyond the roundabout the Spine Road will reduce to be a 9.0m wide single carriageway with sufficient width to accommodate right turning vehicles. The cycle path and footpath conditions will be the same as those described above.

Vehicular access to the future proposed service / neighbourhood centre will be via a 6.0m wide carriageway with a 1.5m wide cycle path on one side and 1.5m wide footpaths on both sides. This road will be between the Nangor Road and will meet the Spine Road at a priority junction on the dual carriageway section of the Spine Road between the Nangor Road and the internal roundabout.

The remaining side roads will include 7.5m road carriageways, and a 1.5m cycle path on one side plus a 1.5m footpath on both sides. These roads will meet the Spine Road at the roundabout or at priority junctions in the single carriageway section of the Spine Road.

A second access will be provided at a later date by way of a priority junction onto Baldonnell Road half way along the southern site boundary following the realignment of the section of Baldonnell Road along the site boundary.

Pedestrian and cycle access to the site will be available at the northeastern corner via the site access roundabout or the neighbourhood centre link and northwestern corners via a pedestrian / cycle link only to Nangor Road. A north-south link road will connect the main access road to Baldonnell Road, with the adjoining development lands to the west of the site connected by a pedestrian and cycle only link.

Trip Generation

Trip generation is calculated by the number of trips per 100m^2 floor area (or other appropriate measure, such as number of residential apartments) based on surveys at similar sites, or by using the T.R.I.C.S. database from the UK and Ireland, which is widely used in Ireland for trip estimation for commercial uses (see TRICS Data and Trip Generation Rates attached in Appendix D).

Traffic Generation

Based on the preceding parameters, the predicted traffic flows in and out of the site are shown in Table 5.8.1 below.

As stated elsewhere in this Environmental Impact Statement, the land uses indicated in the table below are general assumptions only which have been used by the relevant specialists to undertake calculations to assess the impact of the proposed development. All future uses proposed on the site will be subject to planning approval.

Table 5.8.1: Predicted Traffic Generation of the Proposed Development

Use	AM Peak			PM Peak		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
General Industry / Logistics	234	44	278	44	284	328
General Industry / Enterprise	110	52	162	65	110	175
Office	329	38	367	51	267	319
Retail Warehousing	126	62	188	285	311	596
Showrooms	146	52	198	56	124	180
Neighbourhood Centre	52	35	88	126	126	252
Total	997	282	1,279	626	1.223	1.849

Based on the preceding parameters, the predicted HGV traffic flows in and out of the site are shown in Table 5.8.2 below.

Table 5.8.2: Predicted HGV Traffic Generation of the Proposed Development

Use	AM Peak			PM Peak		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
General Industry / Logistics	16	16	32	8	8	16
General Industry / Enterprise	40	32	72	32	32	64
Office	0	0	0	0	0	0
Retail Warehousing	3	3	6	0	3	3
Showrooms	3	5	8	0	0	0
Neighbourhood Centre	1	1	2	0	1	1
Total	63	57	120	40	44	84

Traffic Distribution

Considering the likely origins and destination of traffic to / from the subject site in the future and the capacity of the surrounding road network, vehicular traffic accessing the development has been split into:

- 60% to and from Nangor Road (the east);
- 10% to and from the Nangor Road (the west): and
- 30% to and from Baldonnell Road (to south).

These traffic flows are summarised on Figures 5.8.7 to 5.8.10 for the 2007 and 2020 post development scenarios.

Figure 5.8.7: 2007 Post Development Traffic Flows Weekday Am Peak Hour

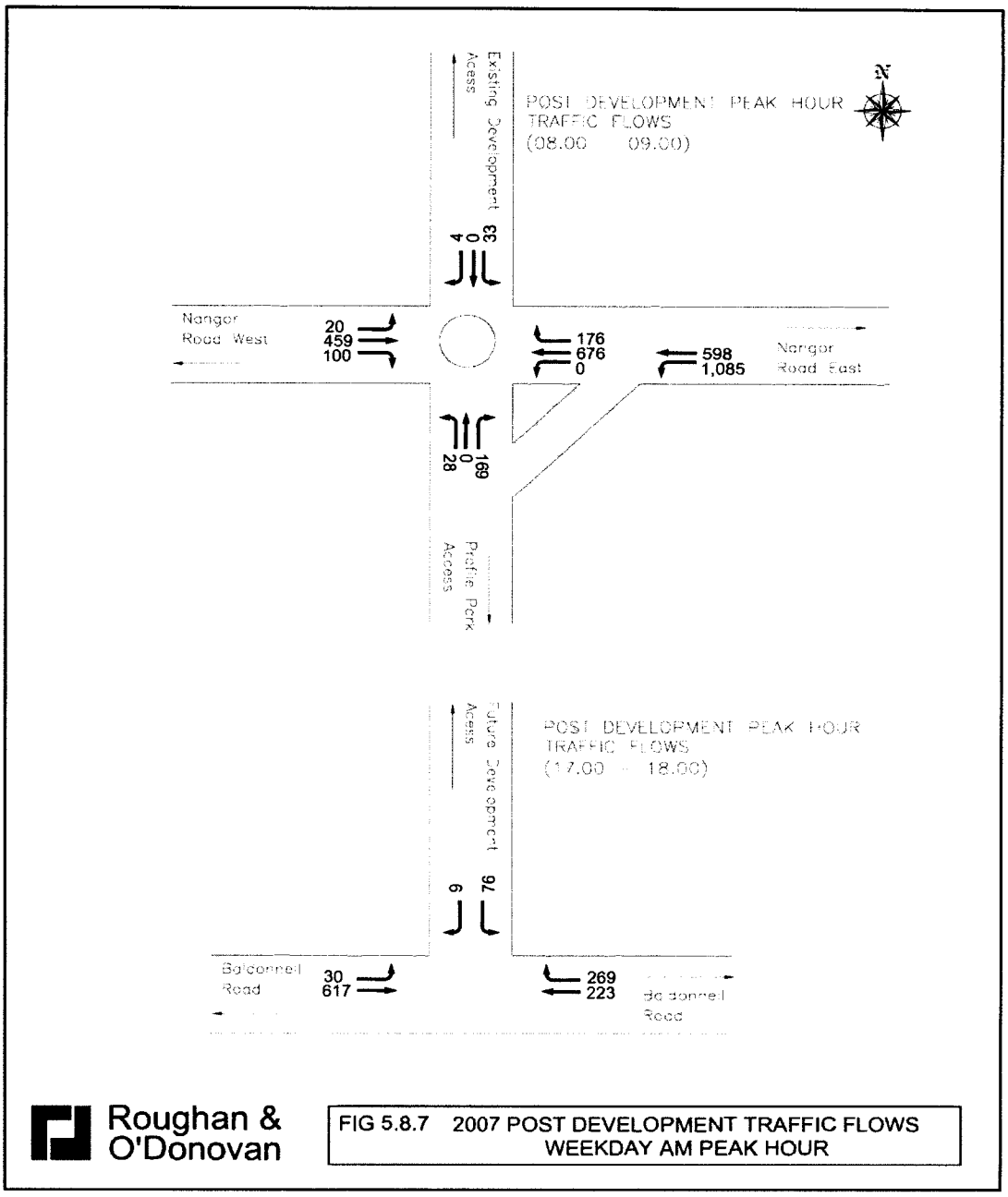


Figure 5.8.8: 2007 Post Development Traffic Flows Weekday PM Peak Hour

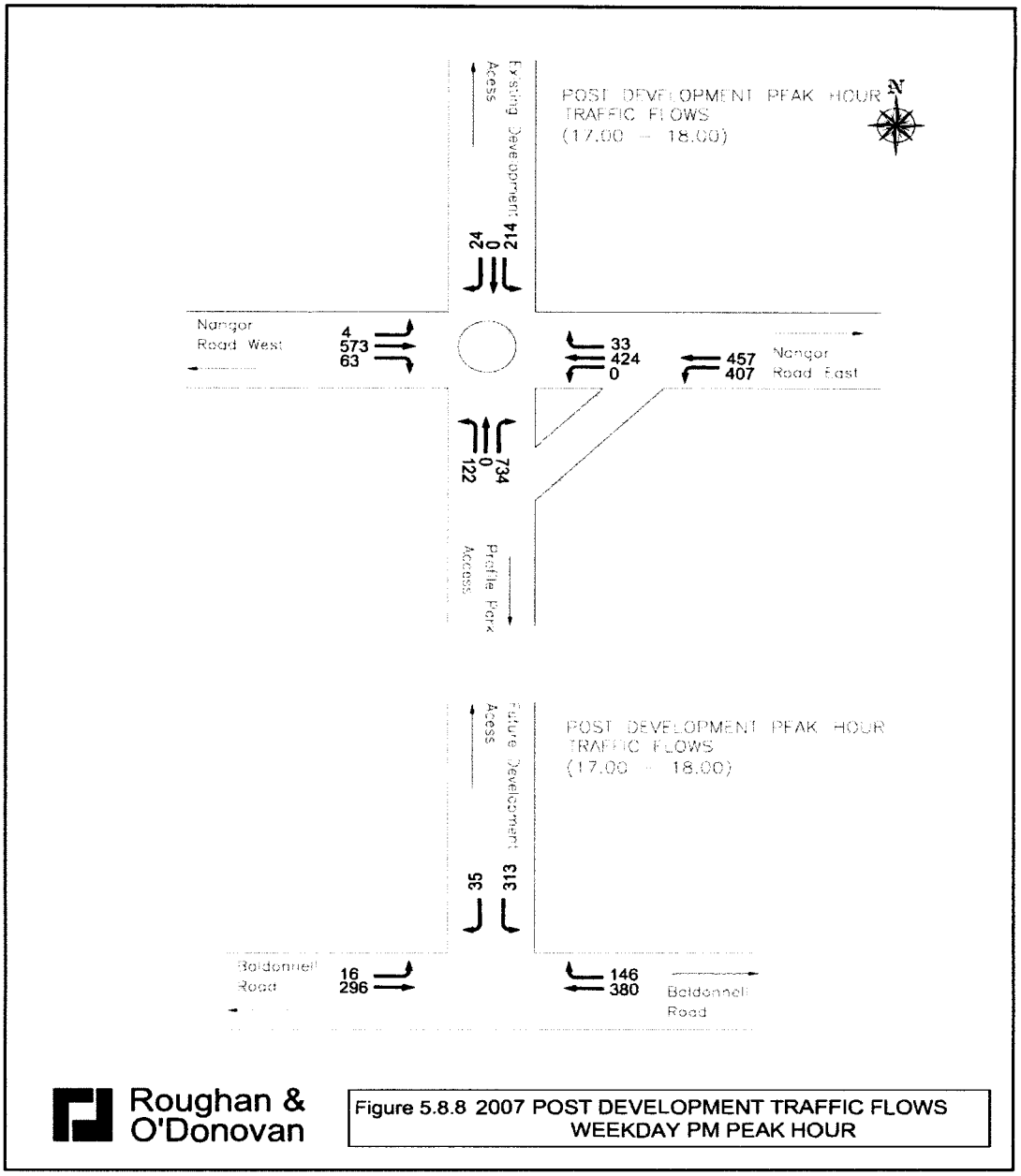


Figure 5.8.9: 2020 Post Development Traffic Flows Weekday AM Peak Hour

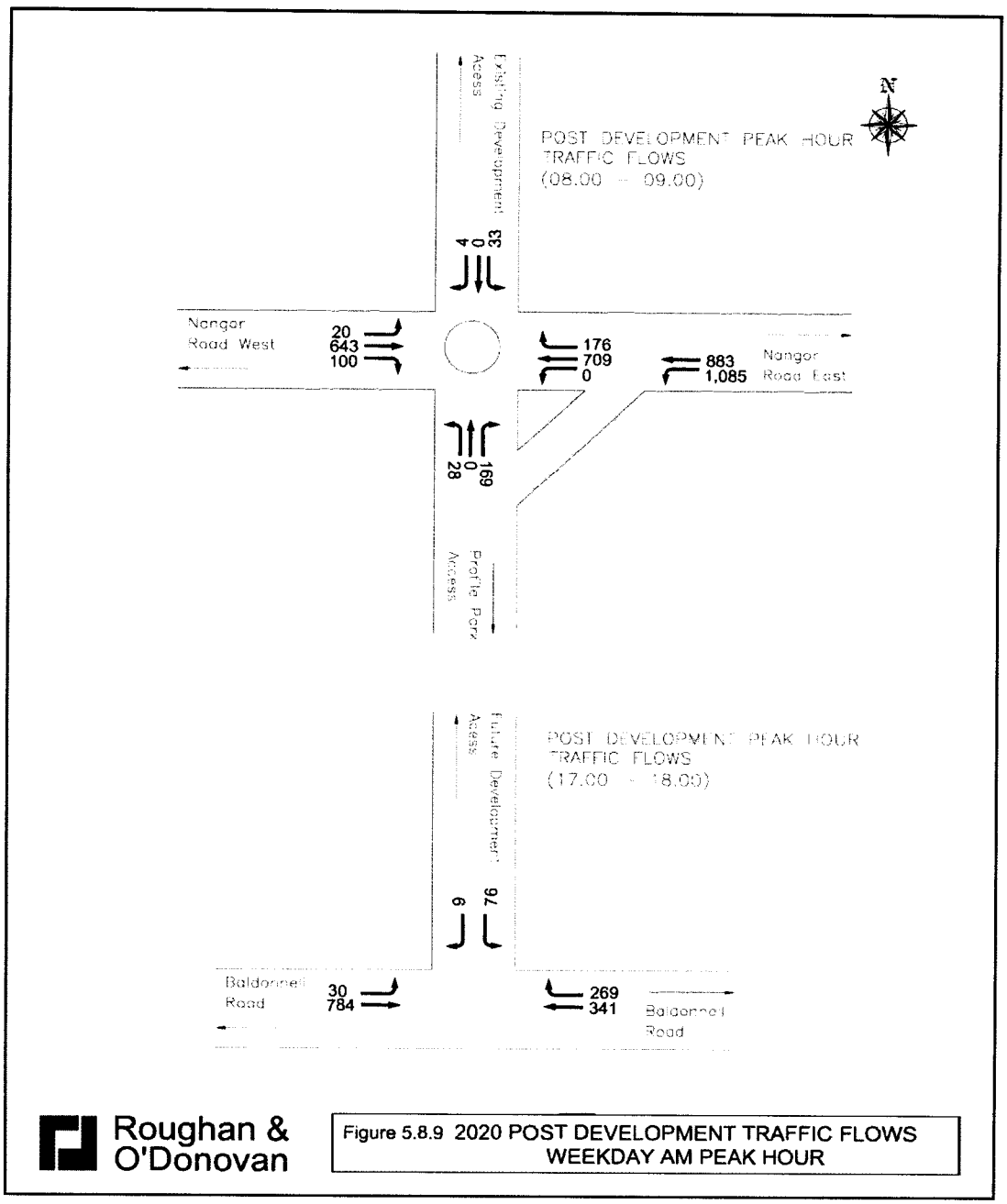
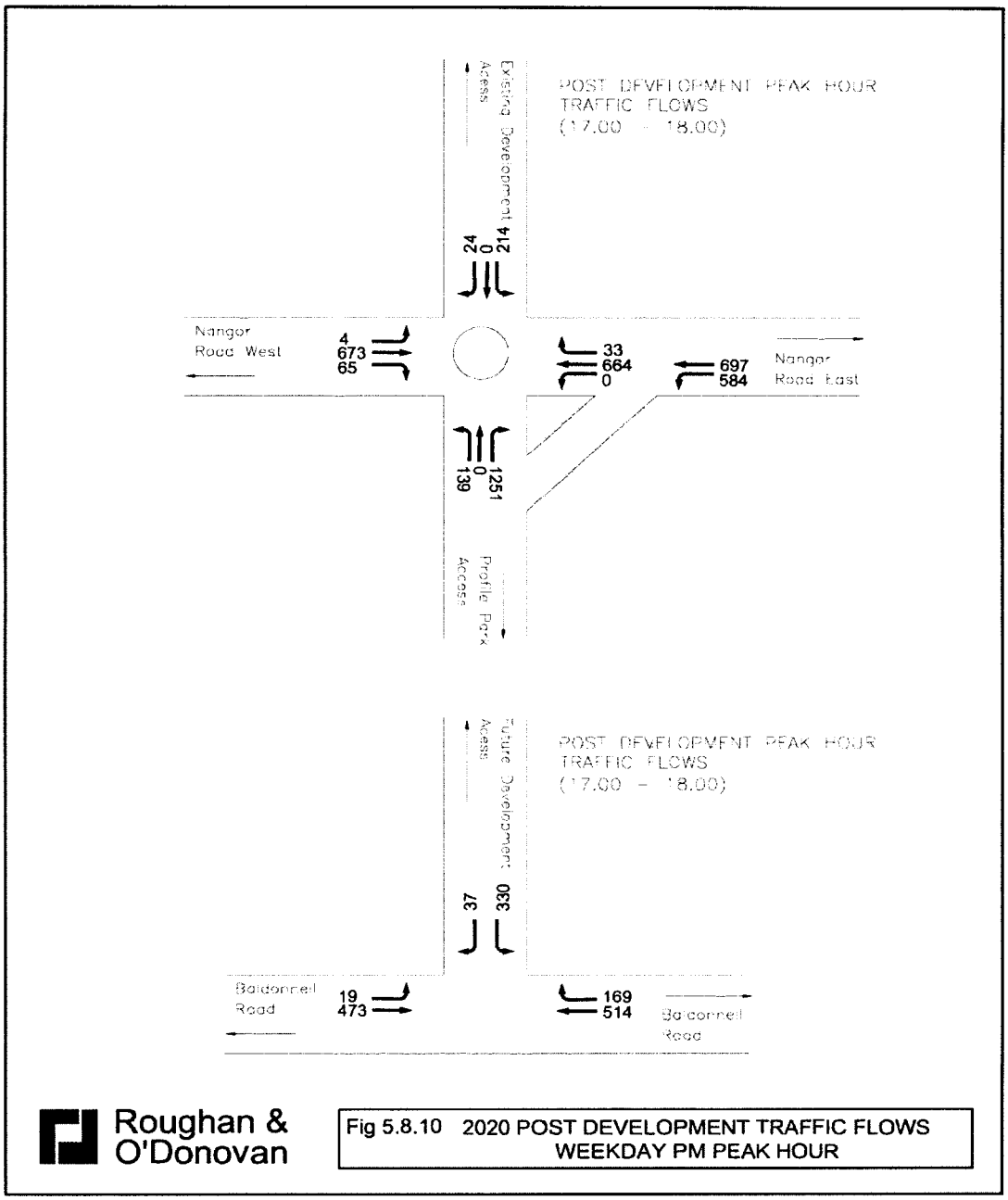


Figure 5.8.10: 2020 Post Development Traffic Flows Weekday PM Peak Hour



5.8.5 POTENTIAL IMPACT OF THE PROPOSAL

The potential transport impacts of this development are considered below.

Development Access; Safe access to junctions that, where possible, comply with the normal junction standards should serve new developments.

Trip Generation; The proposed development will generate a mixture of car trips as well as public transport, cycle and walk trips There will also be trips generated between the subject site and other lands within development, as workers visit the retail and service facilities proposed on the subject site (and vice-versa).

Traffic Impact; The traffic impact of this development is dependent on the interaction of the following:

- The existing traffic on the road network;
- Additional traffic generated or diverted by the development;
- Capacity of the road network.

These features will vary over different parts of the road network for different times of the day and different days of the week. In accordance with general practice, the traffic situation during the midweek morning and evening peaks has been selected to illustrate the traffic impact of this development, on the basis that traffic at these times of the week is most representative of the general peak traffic conditions on the network and also peak development traffic.

Typically, the main traffic impact of a traffic generating development is the imposition on the surrounding road network of traffic volumes, which could lead to congestion and delays where the capacity of nearby junctions is either being approached or exceeded. The scale of the impact can vary depending on the nature of the road network. In urban areas, the extent of the road network and the spread of trip origins and destinations are usually such that a variety of routes can be reached quickly, thus dissipating the impact.

Car Parking; A major consideration for any development is the adequate provision of parking spaces consistent with the transportation strategy for the development.

Cycle Parking and Facilities; Consideration should be given to the adequacy of the cycle parking provision and facilities consistent with the transportation strategy for the development.

Construction Traffic; The construction impacts of this development are dependent on the capacity of the surrounding road network and the adequacy to accommodate temporary car and truck parking and storage of materials.

5.8.6 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

A construction management plan will be prepared where construction traffic including both construction plant and materials deliveries will be programmed to avoid peak traffic conditions on the surrounding road network.

Operational Phase

The site of the proposed development is ideally situated for travel by public transport. The proposed public transport infrastructure improvements as described above will significantly improve the accessibility of the site by sustainable modes.

Access to public transport, provision of safe and convenient pedestrian and cycle links will encourage travel to the development by sustainable modes. The developer seeks to promote the use of public transport, cycling and walking and reduce the reliance on private car usage with the implementation of a mobility management plan, in compliance with South Dublin County Council's policies on sustainable development and as per the Dublin Transportation Office, 2000 –

2016 strategy, 'A Platform for Change'. The Mobility Management Plan for Profile Park is included in Appendix D.

5.8.7 PREDICTED IMPACT OF THE PROPOSAL

Operational Phase - Traffic Capacity

The forecast operational phase development flows are outlined in earlier sections, and summarised on Figures 5.8.5 to 5.8.10.

The performance of the site access junctions, were analysed using software ARCADY, OSCADY and PICADY designed by the Transport Research Laboratory (TRL) of the UK[1]. The results of the junction performance assessments are shown in Tables 5.8.3 – 5.8.5 (further details are attached in Appendix D).

Table 5.8.3 - Results of ARCADY Assessment - 2007 Site Access / Nangor Road / Kilcarbery Roundabout

	Max Ratio of Flow to Capacity (RFC)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – No Development	0.553	1.2	0.08
PM Peak – No Development	0.134	0.5	0.06
AM Peak – Post Development	0.559	1.3	0.08
PM Peak – Post Development	0.608	1.5	0.10

The junction analysis of the roundabout junction on the Nangor Road indicate that the junction will operate satisfactorily in the year 2007 with approximately 70% of the traffic from the overall development. It is expected that within the next two years this roundabout junction will be changed to a signalised junction as part of the Nangor Road Improvement Scheme and this is reflected in the junction assessment for the 2020 year scenario below.

Table 5.8.4 - Results of OSCADY Assessment - 2020 Proposed Signalised Site Access / Nangor Road / Kilcarbery Junction

	Max Degree of Saturation (DoS)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – Post Development	69.7%	6.4 (Nangor Rd –west)	0.34
PM Peak – Post Development	89.5%	18.1 (Profile Park)	0.82

[1] ARCADY in the instance of roundabout junctions, OSCADY for the traffic signal control junction of the Nangor Road Junction and PICADY for the priority junction on Baldonnell Road.

The junction analysis of the proposed signalised junction on the Nangor Road indicate that the junction will operate satisfactorily in the year 2020 with approximately 70% of the traffic from the overall development. Any additional traffic from the proposed development will result in over saturation of the junction and lead to excessive queuing. Therefore it is proposed that South Dublin County Council phase the completion of the proposed business park development to 70% until such a time as the Baldonnell Road access junction is provided.

Table 5.8.5: Results of PICADY Assessment 2020 Proposed Priority Junction on Baldonnell Road

	Max Ratio of Flow to Capacity (RFC)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – Post Development	0.768	3.2 (Profile Park)	0.14
PM Peak – Post Development	0.685	2.1 (Right turn into site)	0.09

The above analysis shows that the proposed Baldonnell Road priority junction will perform well within capacity during the 2020 post development scenario when 30% of the development traffic will access the site via Baldonnell Road.

Operational Phase - Car Parking Provision

The South Dublin County Development Plan 2004 – 2010 recommends parking provision rates as follows (Table 11.5 Parking Standards):

- Offices, Office based industry — 1 space per 40 sq.m gross floor area;
- Restaurant / Café — 1 space per 6 sq.m of public space;
- Retail Warehousing in industrial areas — 1 space per 35sq.m gross floor area;
- Shopping Centres and retail stores — 1 space per 20sq.m gross floor area;
- Warehousing — 1 space per 100sq.m gross floor area.

It is proposed to provide parking generally in accordance with the County Development Plan standards. However each individual site within Profile Park will require planning permission when the exact parking provision will be determined.

Construction Phase

The primary access point during construction is likely to be via the existing roundabout junction on Nangor Road.

A construction management plan will be prepared where construction traffic will be managed to avoid peak traffic conditions on the surrounding road network. Where possible, excavated material will be recycled / reused on site. During excavation and removal of this material from the site, road cleaning and wheel washing at vehicular accesses from the site will be carried out.

During construction it is considered that there will be adequate land within the curtilage of the site to accommodate temporary car and truck parking for construction staff and operations at the early stage of the programme, and at later stages there will be adequate car parking space available in the basements of the development.

5.8.8 MONITORING

No monitoring measures are proposed.

5.8.9 REINSTATEMENT

No reinstatement measures are proposed.

5.9 CULTURAL HERITAGE

5.9.1 INTRODUCTION

Cultural Heritage, in respect of a project, is assumed to include all humanly created features on the landscape, including portable artefacts, which might reflect the prehistoric, historic, architectural, engineering and/or social history of the area. The Cultural Heritage of the area of the proposed development was examined through an Archaeological, Architectural and Historical study. The Archaeological and Architectural studies involved a documentary/cartographic search and field inspection of the area, while the Historical study involved a documentary search.

Methodology

The Local History, Archaeological and Architectural Heritage Assessment components of the study comprise the results of a survey and evaluation of selected sites of historical, archaeological, architectural heritage potential within, and in the immediate environs of, the proposed development area. The work consists of the results of a desk-top survey and field inspection of the site and immediate surrounds.

(i) Paper Survey

As part of a documentary/cartographic search, the following principal sources were examined from which a list of sites and areas of Cultural Heritage interest/potential was compiled:

- Record of Monuments and Places – Co. Dublin.
- Archives of the Archaeological Survey of Ireland.
- Records of the National Museum of Ireland.
- Annual Archaeological Excavation Bulletin (up to 2002).
- Survey of the Architectural Heritage of South Dublin County (NIAH).
- Stereoscopic photographic coverage carried out by the Geological Survey of Ireland.
- Documentary and cartographic sources in South Dublin County Library (see Appendix 5.9.2).
- South Dublin County Development Plan 2004-2010.
- Grange Castle Master Plan 2005.

(ii) Field Inspection

From the preceding paper survey, a list of cultural heritage sites/sites of cultural heritage potential was compiled for inspection. The subject lands and a 200m area surrounding the boundaries of such lands was assessed for the presence of archaeological monuments and structures of architectural heritage potential by reference to map and aerial photographic sources. Detailed field surveys of the subject lands were undertaken in late November 2005 and late March/early April 2006.

An attempt was also made to identify previously unrecorded sites of cultural heritage potential within, and in the immediate environs of, the proposed development area.

Sites of cultural heritage potential identified on the basis of the paper survey were inspected in an attempt to confirm their locations on the ground and to determine, if possible, their likely extent.

Assessment of Impacts

The following table (based on NRA, 2003, 21) provides the baseline criteria used to describe the impacts that the proposed development will have on Cultural Heritage sites.

Table 5.9.1: Criteria Used to Determine Impacts on Cultural Heritage Sites

	Direct	Indirect
Severe	Cultural Heritage site is within a proposed development area. Construction work will entail the removal of part or the entire cultural heritage site.	Cultural Heritage site is within a proposed development area. Construction works will entail the destruction of the visual context of the site or isolate it from associated groups or features.
Potentially Severe	Cultural Heritage site is adjacent to a proposed development area. There is potential for related remains being affected by development works.	Cultural Heritage site is adjacent to a proposed development area. Construction works will greatly injure the visual context of the site or isolate it from associated groups or features.
Moderate	Existing access to a cultural heritage site will be severed. Development works will affect the context of a cultural heritage site.	N/A
No Predicted	The proposed development will have no predicted impact.	N/A

General Receiving Environment

The subject lands are located in the townland of Ballybane(O.S. 6" Map: Dublin Sheets 21), in the central western area of County Dublin, to the north of Baldonnell Military Aerodrome and c. 2.5km to the west of Clondalkin. The subject lands are generally bounded to the north by the R134 (Clondalkin – Milltown) road, to the south by a minor road which links the R134 road to the N7, to the east by golf course lands and to the west by agricultural lands.

The lands are comprised of 5 fields with a series of open drains/streams flowing in a general northerly direction through the centre. The subject lands are under grass, with those to the south used for pasture, and generally fall from south to north.

5.9.2 LOCAL HISTORY

5.9.2.1 RECEIVING ENVIRONMENT

The subject development lands are located in the townland of Ballybane and the parish of Kilbride and in the barony of Newcastle. The name Kilbride is an Anglicisation of Cill Bríde – (St.) Brigid's Church and takes its name from a former parish church to the south/southeast of the subject lands (see Site CH-2; Section 5.9.3.1).

In the seventeenth century this parish consisted of the townlands of Baldonan and Kilbride but it now contains the townlands of Baldonnell Little, Lower and Upper, Kilbride and Kilcarbery.

Following the Anglo-Normans Invasions, the lands of Kilbride were held under the Crown, for the service of a foot sergeant on payment of five shillings, by the Comyns, and formed part of the manor of Balgriffin. In about 1270 the Comyns' property was temporarily in the hands of the King, and the escheator accounted for rents received from the betaghs of Kilbride. A castle (see Site CH-1; Section 5.9.3.1) was built before the sixteenth century, and was leased in 1537 to John Gibbons, with a reversion to Chief Justice Aylmer, and in 1570 to Thomas Bathe, whose family acquired the manor of Balgriffin. In the early part of the sixteenth century the Bathes were still in possession of the Kilbride lands, but at the time of the Restoration they had been succeeded by the family of Carberry, from whom the adjacent townland of Kilcarbery takes its name, while the Luttrells appear as owners of Baldonan.

Nothing much is known of the history of the parish church (see Site CH-2; Section 5.9.3.1), except that it formed a portion of the corps of the Dean of St. Patrick's Cathedral. In 1547 it was described as an old chapel and had an associated cottage.

Lewis, writing in 1837, notes that the parish of Kilbride "is a vicarage in the diocese of Dublin, and forms part of the union of Clondalkin. The church is in ruins. In the R.C. divisions it is united to Lucan, Palmerstown, and Clondalkin" (Ryan, 2001, 185).

The eastern boundary of the parish of Kilbride serves as a townland boundary, as does much of the western boundary. This latter boundary also serves as a parish boundary.

5.9.2.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park on the subject lands, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary

works, on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

Changes to the existing topography by developments of this kind can have the ability to remove the 'sense of place' to areas where previous historical events took place. Furthermore, the securing of boundaries and extinguishing of 'rights of way' can also impact on places of historical activity.
There are no historic events associated within the proposed development area that require consideration in the undertaking of the overall design and boundaries of the development.

Operational Stage

Potential adverse impacts with respect to historical events are not anticipated during the operational lifetime of the development.

'Do-Nothing' Scenario

In historical terms, the site will remain as it is and no impacts will occur.

5.9.2.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Stage

It is not considered that potential adverse impacts with respect to events of historical interest will occur as a result of the development of the site. Consequently, no remedial measures are deemed necessary.

Operational Phase

Potential adverse impacts with respect to events of historical interest are not anticipated during the operational lifetime of the development. Therefore no remedial measures are deemed necessary.

5.9.2.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Stage

There are no predicted impacts with respect to historical events associated with the proposed development.

Operational Phase

There are no predicted adverse impacts with respect to historical events once the development has become operational.

'Worst Case' Scenario

No 'worst case' scenario is envisaged

5.9.2.6 MONITORING

It is not envisaged that monitoring measures are required.

5.9.2.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

5.9.3 ARCHAEOLOGY

5.9.3.1 RECEIVING ENVIRONMENT

The area examined included the proposed development site, as well as an area of c. 200m surrounding the defined boundaries of the site, where possible.

The area under assessment is part of a landscape which is rich in historical and archaeological material. The general region has attracted settlement from early times as evidenced by the presence of monuments dating back to the prehistoric period. Continuity of settlement is illustrated by artefacts dating to the Neolithic and by identified monuments ranging from Neolithic to Medieval and Post-Medieval remains.

The siting preferences of particular monument types are well documented. Broadly speaking, the general landscape of the proposed development area offers a potential setting for the discovery of archaeological sites and remains, as follows:

- The subject lands and surrounding landscape offer many opportunities for the location of Fulachta Fiadh (prehistoric cooking sites). These sites are location specific, generally located close to rivers and streams or in wet marshy areas, and sometimes occur in groups.

- The general rolling nature of the landscape is a favoured position for the location of prehistoric burial sites, ringforts and enclosure sites in the general region surrounding the subject development lands.

There are no previously recorded archaeological sites identified, on the basis of the Paper Survey, within the subject development lands. Furthermore, cartographic and aerial photographic research does not indicate any topographical features within the subject lands which might be of archaeological interest/potential. There are, however, two archaeological sites located within the defined study area (subject lands + 200m surrounding area) outside the south-eastern boundary of the subject lands. The locations of these sites are indicated in Fig. 5.9.1 and are described as follows:

SITE CH-1

Townland	Classification	SMR No.:	Protection[1]
Kilbride	Castle (site of)	DU 021:004	RMP

[1] Note: See Appendix C for information relating to Statutory Protections

Description

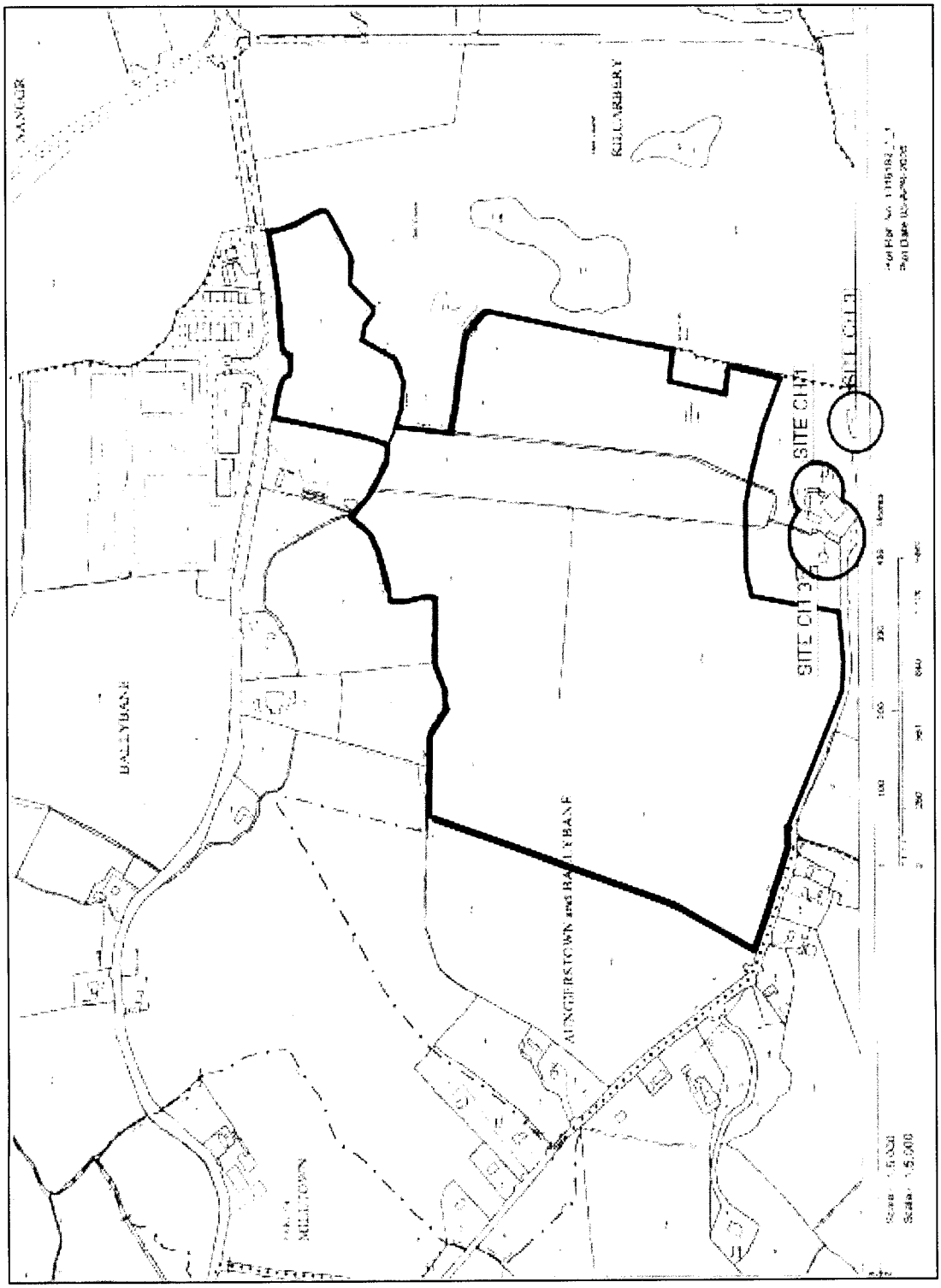
Kilbride Castle was built before the sixteenth century (Ball, vi, 68) and was leased in 1537 to John Gibbons and in 1570 to Thomas Bathe. The castle was subsequently occupied by Francis Carberry, who was succeeded by his widow, and later by Alderman John Carberry.

No visible traces of the castle remain, which was probably a tower house. The site is presently occupied by farm buildings (see photograph 5.9.1 below). An

inspection of the site in 1986 by the Archaeological Survey of Ireland did not note any cut-stone in the then unplastered walls of the farm buildings, although it is likely that these walls were built using material from the castle.

The site of the castle is marked on the O.S. 6" maps (Dublin Sheet 21) of 1837 and 1937.

Figure 5.9.1: Location of Archaeological Sites



Photograph 5.9.1 Outbuildings in general location of site CH-1



SITE CH-2

Townland	Classification	SMR No.:	Protection
Kilbride	Ecclesiastical Complex	DU 021:005	RMP & RPS

Description

This complex comprises three separate elements, namely a Church and Graveyard (SMR: DU021:00501), an Enclosure (SMR: DU021:00502) and Earthworks (SMR: DU021:00503). The site is marked on both the 1837 and 1937 editions of the O.S. 6" Map – Dublin Sheet 21.

The church is located in a circular raised graveyard (see photograph 5.9.2 below), possibly the remains of an early ecclesiastical enclosure, at the edge of a broad-bottomed valley. The church remains comprise a small rectangular building with a north-west turret in ruinous condition. The church is built of randomly coursed masonry and was formerly entered through a now damaged, doorway in the west gable. There is an ambry in the east-end of the north wall. The east window has a southern jamb of tufa (internal dimensions.; L-5.8m; W-3.63m; Wall T-0.85m). There are remnants of another window in the western end of the southern wall. The north-west turret is entered through a linteled doorway of the church. It has a corbelled roof (L-1.35m; W-0.77m; H-1.78m). There are traces of a stairwell in the southern side.

Photograph 5.9.2 Site CH-2 viewed from the west.



5.9.3.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park on the subject lands, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.3.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development/Site Preparation Phase

There are no previously identified monuments or features of archaeological interest and/or potential located within the proposed development lands. The former castle remains (site CH-1) and ecclesiastical remains (site CH-2) are located at minimum distances of c. 100m and c. 120m, respectively, from the subject development lands (see Fig. 5.9.1). Consequently, these monuments do not have the ability to be directly impacted by the development proposals.

However, in general, ground reductions associated with developments of the kind proposed for the lands have the ability to uncover and disturb hitherto unrecorded subsurface features, deposits, structures and finds of archaeological

interest and potential. In this regard, it is noted that works associated with the development of the adjacent Grange Castle International Business Park uncovered a number of previously unrecorded archaeological sites and features, including a prehistoric ring-barrow burial site (Doyle, 2002a, 75-76), a medieval field system (Doyle, 2002b, 76), prehistoric and medieval features (McConway, 1998, 26; O'Brien, 1996, 26-7; Doyle, 2002c, 73-4) and a fulacht fiadh - prehistoric cooking site (Doyle, 2002d, 74-5). In addition, remains of a Neolithic house were excavated in the townland of Kishoge (O'Donovan, 2003, 125-6). Without specific mitigation strategies, such subsurface archaeological features which might exist within the boundaries of the subject lands would be disturbed and destroyed and not identified and recorded.

Operational Phase

There are no previously identified monuments or features of archaeological potential located within the subject lands. There are no extant remains of the former castle site (Site CH-1 above) located to the south/southeast of the subject lands. The site of the ecclesiastical remains (Site CH-2) are situated a minimum of c. 120m from the nearest boundary to the subject lands. Given this distance, and the low visual nature of the subject development, coupled with the fact that the views from the ecclesiastical remains towards the subject development lands are largely restricted by farm buildings, a house and associated boundaries (see site CH-3; Section 5.9.4.1 below) it is not considered that any visual impact will result on the setting of the monument. Consequently, potential adverse impacts with respect to the archaeological heritage are not anticipated during the operational phase of the proposed development.

'Do-Nothing' Scenario

In terms of Archaeological Heritage, the site will remain as it is and no impacts will occur.

5.9.3.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Phase

As noted above in Section 5.9.3.3 there is a possibility that undocumented sub-surface archaeological features and material might exist within the boundaries of the overall development lands. In addition, it is the policy of the Department of the Environment, Heritage and Local Government that developments of this scale should be subjected to some manner of archaeological intervention (Dept. of Arts, Heritage, Gaeltacht & the Islands, 1999). Consequently, it is recommended that the following general mitigation strategies should be considered with regard to the overall development of the subject lands.

All topsoil stripping / general ground surface reductions down onto the surface of the underlying sterile geological subsoils required of the development should be monitored, on a full-time basis, by a suitably qualified and experienced archaeologist. Although it is not a legal requirement for an archaeologist to obtain an excavation licence from the Department of the Environment, Heritage and Local Government in order to undertake such monitoring, it is suggested that such a licence be obtained. This would allow the archaeologist to investigate, almost immediately, any features of archaeological potential that might be uncovered during the course of the development works, thus minimising any potential delays to the project. In addition, it is recommended by the Department

of the Environment, Heritage and Local Government that archaeologists involved in the monitoring of large-scale developments obtain an excavation licence prior to the commencement of such works (Dept. of Arts, Heritage, Gaeltacht and the Islands, 1999, 28-9).

In the event of archaeological material being uncovered during the course of such monitoring, the archaeologist shall be empowered to have works ceased in the vicinity of such material pending the receipt of advise from the Heritage and Planning Division of the Department of the Environment, Heritage and Local Government (National Monuments Section). Likewise, should archaeological artifactual material be uncovered/recovered during such works, the requirements of the National Museum of Ireland with regard to such items should be implemented.

Following completion of all monitoring, and other possible archaeological investigations, the archaeologist shall prepare a report for submission to both the Planning Authority and the Department of the Environment, Heritage and Local Government.

Operational Phase

No remedial measures are deemed necessary.

5.9.3.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

There are no predicted impacts with respect to previously identified monuments. The requirement for an archaeologist to be present during all programmes of topsoil stripping / general ground surface reduction works will ensure that in the event of previously unidentified subsurface archaeological features being uncovered, appropriate measures can be implemented in consultation with the Department of the Environment, Heritage and Local Government. Likewise, should archaeological artifactual material be recovered during the course of such works, the requirements of the National Museum of Ireland, with regard to such items, can be implemented.

Operational Phase

There are no predicted impacts during the operational phase.

'Worst Case' Scenario

A 'worst-case scenario' with respect to archaeological heritage would arise where the development was permitted to commence without any archaeological mitigation requirements being included in a grant of planning permission, without the appointment of an archaeologist to undertake monitoring and/or without the attendance of such appointed archaeologist. In such scenarios, features or artefacts of archaeological interest uncovered during the process of topsoil stripping/general ground reduction works would, most likely, not be identified and recorded.

5.9.3.6 MONITORING

Monitoring of all topsoil stripping/general ground reductions onto the surface of the underlying subsoils should be undertaken by a suitably qualified archaeologist.

5.9.3.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

5.9.4 ARCHITECTURAL HERITAGE

5.9.4.1 RECEIVING ENVIRONMENT

There are no protected structures within the meaning of the Planning and Development Act, 2000 situated within the boundaries of the proposed development lands. The only structure listed in the South Dublin County Development Plan – Record of Protected Structures (RPS) as being situated within 200m of the boundaries of the subject site is Site CH-2 (see Section 5.9.3.1 above). Furthermore, there are no structures located within the overall subject landholding.

There is a modern dwelling with associated outbuildings located outside the central northern area of the subject lands. Following an inspection of these structures, it is not considered that they are of interest from an architectural heritage perspective. However, there is one complex of structures located outside and to the central southern area of the subject lands which are considered to be of architectural heritage interest and, thus, worthy of a brief description. The location of this complex is illustrated in Fig. 5.9.1 and is described as follows:

SITE CH-3

Townland	Classification
Kilbride	Dwelling, garage and farm buildings

Kilbride House, with associated structures, is located a minimum of c. 60m from the boundaries to the subject lands. The outbuildings, consisting of nineteenth century single and one-and-half storey gable-ended stone structures, as well as modern steel-framed barns, have already been mentioned with respect to Site CH-2. It is considered that some of these structures are built on the site of the former Kilbride Castle and that some of the stone used in the construction of the earlier outbuildings may be re-used from the former castle structure (see Section 5.9.3.1 above).

The house is situated in a private garden setting, fronting the road, and at a distance of c. 40m to the west of the outbuildings. It consists of a two-storey stone-faced structure with a partial single-storey and partial lean-to two-storey rear extension. There is a large modern brick-built, flat-roofed porch structure to the front, in which is set the entrance door. A central window on the first floor has been enlarged to accommodate a doorway leading onto the roof of the porch, which serves as a balcony. All the windows and doorway on the façade appear to be of a dark hardwood, indicating that they are replacements, although the windows reflect the probable nature of the originals. The hipped-roof is in slate with ridge tiles, and the two central chimneys are in brick.

There is a modern stone-faced double garage to the west of the house. The road frontage boundary consists of a modern stone wall, with end and gate pillars, all of which are topped with a cope-stone effect, while the western boundary to the garden is a modern metal fence (see photograph 5.9.3 below).

Photograph 5.9.3 Kilbride House (Site CH-3)



5.9.4.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.4.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

During the pre-development/site preparation phase of a project, the potential direct impacts on buildings and structures of architectural interest from a development of this kind include:

- The demolition or loss of a structure or site of architectural interest.
- The severance of other linked features such as gardens, paddocks or outbuildings.
- Alteration of the original landscape of the building or site.

There are no buildings located within the overall development site. Therefore, no direct impacts can occur. Furthermore, given the location of Site CH-1, it is not considered that any impacts will occur with respect to this complex of buildings.

Operational

During the operational phase of a project, the potential indirect impacts from a development of this kind include:

- Increased visual intrusion.
- Increased noise and vibration disturbance.
- Loss of amenity, especially where open to the public.

It is not considered that the development proposals under discussion have the ability to cause any major impacts during the operation phase of the project.

5.9.4.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Phase

The development of the subject lands will not cause any impacts with respect to structures of architectural heritage interest. Consequently, no pre-development remedial or reductive measures are required.

Operational Phase

It is not envisaged that any structures of architectural heritage interest will be adversely impact upon during the operational phase of the proposed development. Consequently, no remedial or reductive measures are proposed.

5.9.4.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

There are no predicted adverse impacts on any structures of architectural heritage.

Operational Phase

There are no predicted adverse impacts with respect to the architectural heritage of the environs of the project area during the operation phase of the development.

5.9.4.6 MONITORING

It is not envisaged that monitoring measures are required.

5.9.4.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

6.0 INTERACTIONS

In addition to the requirement to describe the likely significant effects of the proposed development on particular aspects of the environment, it is also a requirement to consider the interaction of those effects.

Human Beings and Material Assets

The development of the roads and services infrastructure, which is the subject of the current planning application, will not have a significant impact on employment levels in the locality having regard to the nature and scale of the development involved. However the proposed development will facilitate the development of a business park on the subject lands and as such, will introduce a new employment resource into the area.

Emissions from vehicles associated with the proposed development are not expected to have a significant impact on air quality in the general area.

Human Beings and Air

There is a potential for dust generation during construction and development works which under dry windy conditions could lead to localised dust nuisance for properties close to the development site. However, the implementation of proper on-site controls as proposed will ensure that no adverse impacts will accrue to local residents.

Human Beings/Cultural Heritage

The proposed development will be undertaken on a greenfield site, at some distance from recorded sites in the area. Consequently, it is highly unlikely that any construction work associated with the proposed development will reveal subsurface archaeological remains. However, periodic monitoring of the site will ensure that any soils, features, or deposits of an archaeological nature encountered during the construction phase are fully recorded.

Human Beings/Landscape

Existing residents, workers and visitors to the site will be aware of the change in the landscape from an agricultural setting to an infrastructural/commercial setting. However in the wider landscape context this is a continuation of the established pattern on adjacent lands. Additional planting on the site will result in an overall significant positive impact on the landscape.

Landscape/Flora and Fauna

The landscape works associated with the construction works will involve some disturbance to the flora and fauna of the site including the removal of portions of the existing hedgerows to facilitate the proposed road layout. This will have a localised impact on the flora and fauna of the site. Where such impacts are predicted appropriate mitigation measures will be undertaken to avoid significant or permanent negative impacts.

PLANNING AND DEVELOPMENT ACT, 2000,
PLANNING & DEVELOPMENT (AMENDMENT) ACT, 2002
EUROPEAN COMMUNITIES (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 1989 TO 1999,
PLANNING AND DEVELOPMENT REGULATIONS, 2001 & 2002

APPENDICES

South Dublin County Council
Planning Department - Registry
05. JUL 2006 SD 06 A 0568
Date Received | Register Reference

ENVIRONMENTAL IMPACT STATEMENT

Prepared for

DASNOC LIMITED

By

RPS Planning & Environment

Ordnance Survey Licence No. SU 0001006

July 2006

Appendix A

References

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APPENDIX B

SOILS AND GEOLOGY

Trial Pit Logs – Profile Park Investigation 21 – 24 March 2006

TP1

0 – 0.25	Mid brown slightly sandy, slightly silty CLAY.
0.25 – 0.7	Orange/brown slightly gravely CLAY. Gravels are medium fragments of limestone.
0.7 – 1.5	Grey gravely CLAY. Gravels are medium fragments of limestone.
1.5 -	Fractured LIMESTONE with minor calcite veining
	Groundwater ingress @ 1.5 mbgl

TP2

0 – 0.3	Mid brown slightly sandy, slightly silty CLAY.
0.3 – 0.8	Orange/brown slightly sandy CLAY.
0.8 – 1.3	Mid brown slightly gravely CLAY. Gravels are medium to coarse fragments of limestone.
1.3 – 2.5	Grey very gravely CLAY. Gravels are coarse to cobble sized fragments of limestone
2.5 -	Fractured LIMESTONE
	Dry

TP3

0 – 0.35	Mid brown slightly sandy, slightly silty CLAY.
0.35 – 1.05	Mid brown slightly sandy gravely CLAY
1.05 – 2.30	Grey/brown very gravely CLAY
2.3 -	Fractured LIMESTONE
	Groundwater ingress @ 2.3m bgl

TP4

0 – 0.30	Mid brown slightly sandy, slightly silty CLAY.
0.3 – 0.9	Mid brown slightly sandy gravely CLAY
0.9 – 1.6	Grey very gravely CLAY
1.6 -	Fractured LIMESTONE
	Dry

TP5

0 – 0.30	Mid brown slightly sandy CLAY.
0.3 – 0.9	Light brown to grey slightly sandy slightly gravely CLAY.
0.9 – 2.10	Grey very gravely CLAY. Gravels are coarse fragments of limestone
2.1 –	Fractured LIMESTONE with major calcite veining
	Groundwater ingress @ 2.25m bgl

TP6

0 – 0.35	Mid brown slightly sandy CLAY.
0.35 – 1.0	Mid brown slightly gravely CLAY.
1.0 – 1.8	Dark grey/black organic gravely CLAY with many rootlets and plant fragments. Gravels are fine to medium fragments of limestone.
1.8 – 2.0	Fractured LIMESTONE
	Groundwater ingress @ 2.0m bgl

TP7

0 – 0.35	Mid brown slightly sandy CLAY.
0.35 – 1.8	Mid brown slightly sandy gravely CLAY. Gravels are coarse with occasional boulders of limestone
1.8 –	Fractured LIMESTONE
	Groundwater ingress @ 1.8m bgl

TP8

0 – 0.30	Mid brown slightly sandy CLAY.
0.30 – 1.2	Light brown slightly gravely CLAY. Gravels are coarse with occasional boulders of limestone
1.2 – 2.0	Mid brown clayey GRAVEL. Gravel is very loose coarse limestone fragments
	Groundwater ingress @ 2.0m bgl. Trial pit very unstable

TP9

0 – 0.6	Light brown slightly sandy CLAY.
0.6 – 1.6	Mid brown slightly gravely CLAY. Gravels are coarse fragments of limestone
1.6 – 2.0	Brown/Gray clayey GRAVEL. Gravels are coarse fragments of limestone
2.0 – 2.3	Fractured LIMESTONE
	Groundwater ingress @ 2.2m bgl

TP10

0 – 0.4	Mid brown slightly sandy CLAY.
0.4 – 0.6	Light brown slightly sandy CLAY.
0.6 – 1.4	Brown gravely CLAY
1.4 – 2.2	Dark grey loose GRAVEL. Gravel is composed of limestone fragments.
2.2 – 2.4	Fractured LIMESTONE
	Groundwater ingress @ 2.4m bgl

TP11

0 – 0.5	Mid brown slightly sandy CLAY.
0.5 – 2.4	Mid brown very gravely CLAY.
2.4 – 3.0	Grey/Black clayey GRAVEL. Gravel is composed of limestone fragments
3.0 -	Fractured LIMESTONE
	Groundwater ingress @ 3.0m bgl

TP12

0 – 0.5	Mid brown slightly sandy CLAY.
0.5 – 1.8	Mid brown slightly gravely CLAY.
1.8 – 2.1	Grey slightly clayey GRAVEL. Gravel is composed of limestone fragments
2.1 – 2.35	Fractured LIMESTONE
	Groundwater ingress @ 2.30m bgl

TP13

0 – 0.4	Mid brown slightly sandy CLAY.
0.4 – 2.1	Mid brown very gravely CLAY. Gravels are coarse with many cobbles and occasional boulders of limestone.
2.1 – 2.4	Grey clayey GRAVEL. Gravels are coarse limestone fragments.
	Groundwater ingress @ 2.40m bgl. Pit becoming unstable from 2.0m.

TP14

0 – 0.8	Mid brown slightly sandy CLAY.
0.8 – 2.1	Mid brown gravely CLAY. Gravels becoming coarser with depth
2.1 – 2.5	Grey/brown clayey GRAVEL. Gravel is coarse fragments of limestone with occasional cobble and boulder sized gravels.
2.5 -	Fractured LIMESTONE
	Groundwater ingress @ 2.50m bgl

TP15

0 – 0.7	Mid brown slightly sandy CLAY.
0.7 – 2.2	Mid brown gravely CLAY. Gravels becoming coarser with depth.
2.2 – 2.5	Grey/brown clayey GRAVEL. Gravel is coarse fragments of limestone with occasional cobble and boulder sized gravels.
2.5 -	Fractured LIMESTONE.
	Dry

TP16

0 – 0.3	Mid brown slightly sandy gravely CLAY. Gravels are fragments of limestone and masonry.
0.3 – 0.8	Mid brown gravely CLAY. Gravels are composed of limestone, concrete and occasional brick fragments.
0.8 – 2.3	Brown/grey clayey GRAVEL. Gravel comprises limestone, concrete and slate fragments with occasional metal wiring, re-bar, wood and chip board fragments.
2.3 – 3.1	Grey mottled brown organic slightly gravely CLAY with many rootlets and occasional coarse gravels.
	Dry

TP17

0 – 0.2	Mid brown sandy gravely CLAY.
0.2 – 0.4	Mid brown very gravely CLAY. Gravels are composed of limestone, and concrete fragments.
0.4 – 0.8	Black clayey GRAVEL. Gravel comprises tarmac fragments.
0.8 – 2.8	Light brown clayey GRAVEL. Gravel consists of boulders of concrete and limestone with occasional concrete piping and copper wiring. Section of cable encountered at 0.8m bgl.
2.8 -	Fractured LIMESTONE.
	Groundwater inflows @ 2.8m bgl

TP18

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 0.7	Light brown gravely CLAY. Gravels are fine to coarse fragments of limestone, granite and concrete.
0.7 – 0.8	Grey gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete.
0.8 – 2.8	Brown gravely CLAY. Gravels are cobbles and boulders of limestone and concrete with rare plastic fragments and metal cans.
2.8 – 3.4	Grey mottled brown slightly gravely organic CLAY with many rootlets.
	Groundwater inflows @ 1.0m bgl but dry at base of trial pit.

TP19

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.0	Light brown gravely CLAY. Gravels are fine to coarse fragments of limestone, bricks and concrete.
1.0 – 1.7	Dark grey/black clayey GRAVEL. Gravel is coarse to cobble sized fragments of limestone, comprises occasional concrete boulders, and rare metal wheel hub cap.
1.7 – 2.0	Light brown gravely CLAY. Gravels are coarse fragments of limestone and masonry.
2.0 – 3.1	Grey mottled brown slightly gravely organic CLAY with many rootlets.
	Groundwater inflows @ 1.7m bgl causing instability.

TP20

0 – 0.2	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 2.3	Mid brown slightly sandy very gravely CLAY. Gravel is medium to cobble sized fragments of limestone, and concrete with occasional wood fragments (tree branches) and boulders or concrete
	Groundwater inflows @ 2.3m bgl causing instability.

TP21

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.0	Mid brown slightly sandy gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete with occasional wire and wood fragments.
1.0 – 2.0	Brown gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete with occasional wire and wood fragments.
2.0 – 2.2	Light grey slightly silty slightly gravely CLAY. Gravels are fine to medium (Possibly ash origin).
2.2 – 3.2	Brown gravely CLAY. Gravels are coarse fragments of limestone and concrete.
3.2 – 3.4	Dark grey/black gravely CLAY. Gravels are medium to coarse limestone fragments.
	Dry

TP22

0 – 0.4	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.4 – 2.2	Mid brown slightly sandy very gravely CLAY. Gravel is medium to cobble sized fragments of limestone, granite and concrete with occasional wood fragments (tree branch) and boulders of concrete. Rare metal and roof tiles (slate) were encountered.
2.2 – 3.6	Grey gravely CLAY. Gravels are medium to cobbles of limestone and concrete with rare boulders of limestone. Occasional plastic and wood fragments were encountered.
	Groundwater inflows @ 2.5 bgl causing instability.

TP23

0 – 0.2	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 1.2	Brown gravely CLAY. Gravels are medium to coarse fragments of limestone and concrete.
1.2 – 1.7	Layer of wood – branches and root fragments.
1.7 – 2.8	Grey/brown gravely CLAY. Gravel is medium to coarse fragments of limestone
2.8 – 3.4	Grey gravely CLAY. Gravels are medium to coarse fragments of concrete and limestone with many rootlets.

TP24

0 – 0.25	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.25 – 2.7	Mid brown very gravely CLAY. Gravels are coarse fragments of limestone and concrete with many cobbles and occasional boulders. Occasional wood, metal, piping, concrete and rare tarpaulin was encountered.
2.7 – 3.2	Dark grey gravely CLAY. Gravels are medium to coarse fragments of limestone.
	Major groundwater inflow @ 2.4m bgl – (from water treatment area). Slight odour.

TP25

0 – 0.35	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.35 – 1.1	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.1 – 1.2	Light brown slightly gravely CLAY with some organic matter. Gravels are fine to medium
1.2 – 2.4	Grey clayey GRAVEL. Gravel is medium to coarse fragments of limestone
2.4 -	Fractured LIMESTONE.
	Groundwater inflow @ 2.4m bgl

TP26

0 – 0.30	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.5	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.5 – 2.4	Grey clayey GRAVEL. Gravel is coarse limestone fragments
2.4 -	Competent LIMESTONE
	Groundwater inflow @ 2.4m bgl

TP27

0 – 0.30	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.6	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.6 – 1.7	Fractured LIMESTONE
1.7	Competent LIMESTONE.
	Dry

TP28

0 – 0.20	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 1.2	Mid brown gravely CLAY. Gravels are coarse to cobble sized fragments of limestone and concrete with occasional ceramic fragments and rare metal and plastic.
1.2 – 2.5	Grey gravely CLAY. Gravel is coarse to cobble sized fragments limestone and concrete. Section of disused plastic pip encountered at 2.3m bgl
2.5 – 2.6	Light grey sandy gravely CLAY. Gravels are coarse fragments of limestone.
3.0 – 3.75	Dark grey/black slightly gravely organic CLAY. Gravels are coarse to cobble sized fragments of limestone. Occasional fragments of wood (branches) were encountered.
3.75 -	Fractured LIMESTONE
	Groundwater inflow @ 3.75m bgl

TP29

0 – 0.70	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.7 – 1.5	Grey gravely CLAY. Gravels are fragments of limestone.
1.5 – 1.8	Fractured LIMESTONE
1.8	Competent LIMESTONE.
	Groundwater inflow @ 1.8m bgl

APPENDIX C

CULTURAL HERITAGE

C1 Abbreviations & Protections

SMR No. – Sites and **M**onuments **R**ecord Number.
This refers to the unique reference number of each individual archaeological monument, or monument element, as listed in the Sites and Monuments Record Archive of the Archaeological Survey of Ireland. The number comprises three elements. The first element consists of a two letter county code; the second element refers to the O.S. 6" map sheet on which the monument is located and the third element refers to the number of the site, as contained on the specific 6" map.

RMP - **R**ecord of **M**onuments and **P**laces.
Section 12 (1) of the National Monuments (Amendment) Act, 1994, provides that the Minister of the Environment, Heritage and Local Government shall establish and maintain a record of monuments and places where the Minister believes there are monuments, such record to be comprised of a list of monuments and relevant places and a map or maps showing each monument and relevant place of each county of the State. This is referred to as the *Record of Monuments and Places*, and monuments entered into it are referred to as *Recorded Monuments*.

Section 12 (3) of the 1994 Act provides that where the owner or occupier (other than the Minister) of a monument or place included in the Record, or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he or she shall give notice in writing of his proposal to carry out the work to the Minister of the Environment, Heritage and Local Government and shall not, except in cases of urgent necessity and with the consent of the Minister, commence work for a period of two months after having given the notice.

RPS – **R**ecord of **P**rotected **S**tructures.
This refers to a protection or mention in the County Development Plan.

C2 List of Consulted Sources

A. Cartographic

Origin	Scale	Sheet Ref.	Publication Date
Ordnance Survey	1:10,560 (6")	Dublin 21	1837
Ordnance Survey	1:10,560 (6")	Dublin 21	1937
Ordnance Survey	1:50,000	50	2005

B. Documentary
See Appendix A

APPENDIX D

TRAFFIC

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : J - RETAIL PARK - INCLUDING FOOD
VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	HC	HAMPSHIRE	1 days
04	**EAST ANGLIA**		
	NF	NORFOLK	1 days
05	**EAST MIDLANDS**		
	LN	LINCOLNSHIRE	1 days
06	**WEST MIDLANDS**		
	WK	WARWICKSHIRE	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	2 days
11	**SCOTLAND**		
	FI	FIFE	1 days
	HI	HIGHLAND	1 days
	SL	SOUTH LANARKSHIRE	5 days

Main parameter selection:

Parameter: Gross floor area
Range: 734 to 45000 (units: sqm)

Date Range: 01/01/97 to 18/06/05

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	3 days
Friday	7 days

Selected survey types:

Manual count	9 days
Directional ATC Count	5 days

TRIP RATE for Land Use 01 - RETAIL/J - RETAIL PARK - INCLUDING FOOD

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	5	22682	0.06	5	22682	0.11	5	22682	0.17
01:00 - 02:00	5	22682	0.03	5	22682	0.04	5	22682	0.07
02:00 - 03:00	5	22682	0.01	5	22682	0.04	5	22682	0.05
03:00 - 04:00	5	22682	0.01	5	22682	0.02	5	22682	0.03
04:00 - 05:00	5	22682	0.02	5	22682	0.03	5	22682	0.05
05:00 - 06:00	5	22682	0.08	5	22682	0.08	5	22682	0.16
06:00 - 07:00	5	22682	0.17	5	22682	0.16	5	22682	0.33
07:00 - 08:00	11	16857	0.64	11	16857	0.47	11	16857	1.11
08:00 - 09:00	14	15970	1.31	14	15970	0.88	14	15970	2.19
09:00 - 10:00	14	15970	2.02	14	15970	1.32	14	15970	3.34
10:00 - 11:00	14	15970	2.39	14	15970	1.95	14	15970	4.34
11:00 - 12:00	14	15970	2.60	14	15970	2.44	14	15970	5.04
12:00 - 13:00	14	15970	3.08	14	15970	2.95	14	15970	6.03
13:00 - 14:00	14	15970	3.13	**14**	**15970**	**3.26**	**14**	**15970**	**6.39**
14:00 - 15:00	14	15970	2.88	14	15970	3.01	14	15970	5.89
15:00 - 16:00	14	15970	2.84	14	15970	2.98	14	15970	5.82
16:00 - 17:00	14	15970	3.06	14	15970	3.10	14	15970	6.16
17:00 - 18:00	**14**	**15970**	**3.14**	14	15970	3.16	14	15970	6.30
18:00 - 19:00	14	15970	2.94	14	15970	3.07	14	15970	6.01
19:00 - 20:00	12	16122	2.40	12	16122	2.66	12	16122	5.06
20:00 - 21:00	12	16122	1.20	12	16122	1.89	12	16122	3.09
21:00 - 22:00	10	18147	0.69	10	18147	0.97	10	18147	1.66
22:00 - 23:00	7	20227	0.42	7	20227	0.59	7	20227	1.01
23:00 - 24:00	6	20410	0.18	6	20410	0.25	6	20410	0.43
Daily Trip Rates:			35.31			35.41			70.73

Parameter summary

Trip rate parameter range selected:	734 - 45000 (units: sqm)
Survey date date range:	01/01/97 - 18/06/05
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : A - OFFICE
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	2 days
02	**SOUTH EAST**		
	EX	ESSEX	1 days
	HF	HERTFORDSHIRE	1 days
	OX	OXFORDSHIRE	1 days
	SC	SURREY	3 days
	WS	WEST SUSSEX	5 days
03	**SOUTH WEST**		
	CW	CORNWALL	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	LE	LEICESTERSHIRE	3 days
08	**NORTH WEST**		
	LC	LANCASHIRE	1 days
09	**NORTH**		
	CB	CUMBRIA	1 days
	TV	TEES VALLEY	2 days
	TW	TYNE & WEAR	2 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	AS	ABERDEENSHIRE	2 days
	FI	FIFE	1 days
	PK	PERTH & KINROSS	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 408 to 175000 (units: sqm)

Date Range: 01/01/97 to 04/07/05

Selected survey days:

Monday	4 days
Tuesday	6 days
Wednesday	8 days
Thursday	10 days
Friday	2 days

Selected survey types:

Manual count	25 days
Directional ATC Count	5 days

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
00:30 - 01:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
01:00 - 01:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
01:30 - 02:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
02:00 - 02:30	5	5442	0.00	5	5442	0.01	5	5442	0.01
02:30 - 03:00	5	5442	0.00	5	5442	0.01	5	5442	0.01
03:00 - 03:30	5	5442	0.00	5	5442	0.01	5	5442	0.01
03:30 - 04:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
04:00 - 04:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
04:30 - 05:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
05:00 - 05:30	5	5442	0.01	5	5442	0.05	5	5442	0.06
05:30 - 06:00	5	5442	0.00	5	5442	0.04	5	5442	0.04
06:00 - 06:30	5	5442	0.05	5	5442	0.06	5	5442	0.11
06:30 - 07:00	5	5442	0.04	5	5442	0.04	5	5442	0.08
07:00 - 07:30	28	5008	0.25	28	5008	0.07	28	5008	0.32
07:30 - 08:00	28	5008	0.45	28	5008	0.07	28	5008	0.52
08:00 - 08:30	29	5468	0.94	29	5468	0.11	29	5468	1.05
08:30 - 09:00	**29**	**5468**	**1.05**	29	5468	0.12	**29**	**5468**	**1.17**
09:00 - 09:30	30	5319	0.70	30	5319	0.17	30	5319	0.87
09:30 - 10:00	30	5319	0.49	30	5319	0.20	30	5319	0.69
10:00 - 10:30	30	5319	0.26	30	5319	0.19	30	5319	0.45
10:30 - 11:00	30	5319	0.23	30	5319	0.19	30	5319	0.42
11:00 - 11:30	30	5319	0.19	30	5319	0.21	30	5319	0.40
11:30 - 12:00	30	5319	0.21	30	5319	0.23	30	5319	0.44
12:00 - 12:30	30	5319	0.25	30	5319	0.41	30	5319	0.66
12:30 - 13:00	30	5319	0.33	30	5319	0.43	30	5319	0.76
13:00 - 13:30	30	5319	0.40	30	5319	0.39	30	5319	0.79
13:30 - 14:00	30	5319	0.40	30	5319	0.31	30	5319	0.71
14:00 - 14:30	30	5319	0.30	30	5319	0.25	30	5319	0.55
14:30 - 15:00	30	5319	0.22	30	5319	0.24	30	5319	0.46
15:00 - 15:30	30	5319	0.16	30	5319	0.25	30	5319	0.41
15:30 - 16:00	30	5319	0.18	30	5319	0.27	30	5319	0.45
16:00 - 16:30	30	5319	0.18	30	5319	0.54	30	5319	0.72
16:30 - 17:00	30	5319	0.21	30	5319	0.62	30	5319	0.83
17:00 - 17:30	29	5468	0.16	**29**	**5468**	**0.95**	29	5468	1.11
17:30 - 18:00	29	5468	0.15	29	5468	0.67	29	5468	0.82
18:00 - 18:30	28	5417	0.05	28	5417	0.28	28	5417	0.33
18:30 - 19:00	28	5417	0.03	28	5417	0.17	28	5417	0.20
19:00 - 19:30	5	5442	0.03	5	5442	0.20	5	5442	0.23
19:30 - 20:00	5	5442	0.03	5	5442	0.19	5	5442	0.22
20:00 - 20:30	5	5442	0.02	5	5442	0.08	5	5442	0.10
20:30 - 21:00	5	5442	0.02	5	5442	0.07	5	5442	0.09
21:00 - 21:30	5	5442	0.04	5	5442	0.15	5	5442	0.19
21:30 - 22:00	5	5442	0.03	5	5442	0.14	5	5442	0.17
22:00 - 22:30	5	5442	0.00	5	5442	0.03	5	5442	0.03
22:30 - 23:00	5	5442	0.00	5	5442	0.02	5	5442	0.02
23:00 - 23:30	5	5442	0.00	5	5442	0.02	5	5442	0.02
23:30 - 24:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
Daily Trip Rates:			8.08			8.49			16.52

Parameter summary

Trip rate parameter range selected:	408 - 175000 (units: sqm)
Survey date date range:	01/01/97 - 04/07/05
Number of weekdays (Monday-Friday):	30
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : K - RETAIL PARK - EXCLUDING FOOD

VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	ES	EAST SUSSEX	1 days
	HC	HAMPSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
06	**WEST MIDLANDS**		
	ST	STAFFORDSHIRE	1 days
	WM	WEST MIDLANDS	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	5 days
	LC	LANCASHIRE	1 days
	MS	MERSEYSIDE	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 2057 to 35244 (units: sqm)

Date Range: 01/01/97 to 25/06/05

Selected survey days:

Monday	1 days
Thursday	3 days
Friday	11 days

Selected survey types:

Manual count	15 days
Directional ATC Count	0 days

TRIP RATE for Land Use 01 - RETAIL/K - RETAIL PARK - EXCLUDING FOOD

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	6	12889	0.13	6	12889	0.06	6	12889	0.19
08:00 - 09:00	14	11596	0.53	14	11596	0.26	14	11596	0.79
09:00 - 10:00	15	11054	1.06	15	11054	0.67	15	11054	1.73
10:00 - 11:00	15	11054	1.35	15	11054	1.12	15	11054	2.47
11:00 - 12:00	15	11054	1.49	15	11054	1.33	15	11054	2.82
12:00 - 13:00	15	11054	1.67	15	11054	1.58	15	11054	3.25
13:00 - 14:00	**15**	**11054**	**1.72**	**15**	**11054**	**1.72**	**15**	**11054**	**3.44**
14:00 - 15:00	15	11054	1.60	15	11054	1.63	15	11054	3.23
15:00 - 16:00	15	11054	1.49	15	11054	1.57	15	11054	3.06
16:00 - 17:00	15	11054	1.37	15	11054	1.47	15	11054	2.84
17:00 - 18:00	15	11054	1.20	15	11054	1.31	15	11054	2.51
18:00 - 19:00	15	11054	1.28	15	11054	1.33	15	11054	2.61
19:00 - 20:00	15	11054	0.89	15	11054	1.36	15	11054	2.25
20:00 - 21:00	9	12686	0.33	9	12686	0.58	9	12686	0.91
21:00 - 22:00	6	12889	0.19	6	12889	0.37	6	12889	0.56
22:00 - 23:00	2	17788	0.04	2	17788	0.21	2	17788	0.25
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			16.33			16.57			32.91

Parameter summary

Trip rate parameter range selected:	2057 - 35244 (units: sqm)
Survey date date range:	01/01/97 - 25/06/05
Number of weekdays (Monday-Friday):	15
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : F - WAREHOUSING (COMMERCIAL)

VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	BU	BUCKINGHAMSHIRE	1 days
	HF	HERTFORDSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	3 days
04	**EAST ANGLIA**		
	SF	SUFFOLK	1 days
06	**WEST MIDLANDS**		
	WO	WORCESTERSHIRE	2 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	GC	GLASGOW CITY	1 days
	SL	SOUTH LANARKSHIRE	1 days
12	**NORTHERN IRELAND**		
	NI	NORTHERN IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 950 to 55740 (units: sqm)

Date Range: 01/01/97 to 06/03/03

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	9 days
Friday	3 days

Selected survey types:

Manual count	16 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	1	7500	0.09	1	7500	0.08	1	7500	0.17
00:30 - 01:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
01:00 - 01:30	1	7500	0.01	1	7500	0.03	1	7500	0.04
01:30 - 02:00	1	7500	0.04	1	7500	0.07	1	7500	0.11
02:00 - 02:30	1	7500	0.03	1	7500	0.03	1	7500	0.06
02:30 - 03:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
03:00 - 03:30	1	7500	0.03	1	7500	0.01	1	7500	0.04
03:30 - 04:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
04:00 - 04:30	1	7500	0.05	1	7500	0.05	1	7500	0.10
04:30 - 05:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
05:00 - 05:30	1	7500	0.08	1	7500	0.07	1	7500	0.15
05:30 - 06:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
06:00 - 06:30	2	18844	0.06	2	18844	0.10	2	18844	0.16
06:30 - 07:00	2	18844	0.07	2	18844	0.07	2	18844	0.14
07:00 - 07:30	16	17995	0.05	16	17995	0.06	16	17995	0.11
07:30 - 08:00	16	17995	0.09	16	17995	0.04	16	17995	0.13
08:00 - 08:30	16	17995	0.08	16	17995	0.04	16	17995	0.12
08:30 - 09:00	16	17995	0.09	16	17995	0.04	16	17995	0.13
09:00 - 09:30	16	17995	0.08	16	17995	0.05	16	17995	0.13
09:30 - 10:00	16	17995	0.08	16	17995	0.05	16	17995	0.13
10:00 - 10:30	16	17995	0.06	16	17995	0.05	16	17995	0.11
10:30 - 11:00	16	17995	0.05	16	17995	0.05	16	17995	0.10
11:00 - 11:30	16	17995	0.06	16	17995	0.05	16	17995	0.11
11:30 - 12:00	16	17995	0.06	16	17995	0.05	16	17995	0.11
12:00 - 12:30	16	17995	0.05	16	17995	0.07	16	17995	0.12
12:30 - 13:00	16	17995	0.05	16	17995	0.05	16	17995	0.10
13:00 - 13:30	16	17995	0.09	16	17995	0.07	16	17995	0.16
13:30 - 14:00	**16**	**17995**	**0.16**	16	17995	0.11	**16**	**17995**	**0.27**
14:00 - 14:30	16	17995	0.07	**16**	**17995**	**0.12**	16	17995	0.19
14:30 - 15:00	16	17995	0.07	16	17995	0.10	16	17995	0.17
15:00 - 15:30	16	17995	0.05	16	17995	0.07	16	17995	0.12
15:30 - 16:00	16	17995	0.05	16	17995	0.07	16	17995	0.12
16:00 - 16:30	16	17995	0.05	16	17995	0.08	16	17995	0.13
16:30 - 17:00	16	17995	0.04	16	17995	0.08	16	17995	0.12
17:00 - 17:30	16	17995	0.04	16	17995	0.09	16	17995	0.13
17:30 - 18:00	16	17995	0.06	16	17995	0.08	16	17995	0.14
18:00 - 18:30	15	17183	0.04	15	17183	0.06	15	17183	0.10
18:30 - 19:00	15	17183	0.03	15	17183	0.04	15	17183	0.07
19:00 - 19:30	2	6775	0.03	2	6775	0.03	2	6775	0.06
19:30 - 20:00	2	6775	0.01	2	6775	0.04	2	6775	0.05
20:00 - 20:30	1	7500	0.05	1	7500	0.01	1	7500	0.06
20:30 - 21:00	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:00 - 21:30	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:30 - 22:00	1	7500	0.01	1	7500	0.03	1	7500	0.04
22:00 - 22:30	1	7500	0.07	1	7500	0.05	1	7500	0.12
22:30 - 23:00	1	7500	0.07	1	7500	0.04	1	7500	0.11
23:00 - 23:30	1	7500	0.04	1	7500	0.04	1	7500	0.08
23:30 - 24:00	1	7500	0.04	1	7500	0.04	1	7500	0.08
Daily Trip Rates:			2.71			2.73			5.47

Parameter summary

Trip rate parameter range selected:	950 - 55740 (units: sqm)
Survey date date range:	01/01/97 - 06/03/03
Number of weekdays (Monday-Friday):	16
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : C - INDUSTRIAL UNITS
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	4 days
	GS	GLOUCESTERSHIRE	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
	NF	NORFOLK	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	1 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	ER	EAST RENFREWSHIRE	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 620 to 34581 (units: sqm)

Date Range: 01/01/97 to 21/06/04

Selected survey days:

Monday	2 days
Tuesday	5 days
Wednesday	2 days
Thursday	5 days

Selected survey types:

Manual count	14 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNITS

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	0	0	0.00	0	0	0.00	0	0	0.00
00:30 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 01:30	0	0	0.00	0	0	0.00	0	0	0.00
01:30 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 02:30	0	0	0.00	0	0	0.00	0	0	0.00
02:30 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 03:30	0	0	0.00	0	0	0.00	0	0	0.00
03:30 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 04:30	0	0	0.00	0	0	0.00	0	0	0.00
04:30 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 05:30	0	0	0.00	0	0	0.00	0	0	0.00
05:30 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 06:30	1	22926	0.02	1	22926	0.09	1	22926	0.11
06:30 - 07:00	1	22926	0.03	1	22926	0.02	1	22926	0.05
07:00 - 07:30	14	15321	0.14	14	15321	0.03	14	15321	0.17
07:30 - 08:00	14	15321	0.18	14	15321	0.03	14	15321	0.21
08:00 - 08:30	**14**	**15321**	**0.20**	14	15321	0.03	14	15321	0.23
08:30 - 09:00	14	15321	0.17	14	15321	0.04	14	15321	0.21
09:00 - 09:30	14	15321	0.09	14	15321	0.03	14	15321	0.12
09:30 - 10:00	14	15321	0.06	14	15321	0.04	14	15321	0.10
10:00 - 10:30	14	15321	0.04	14	15321	0.05	14	15321	0.09
10:30 - 11:00	14	15321	0.05	14	15321	0.04	14	15321	0.09
11:00 - 11:30	14	15321	0.04	14	15321	0.05	14	15321	0.09
11:30 - 12:00	14	15321	0.05	14	15321	0.05	14	15321	0.10
12:00 - 12:30	14	15321	0.05	14	15321	0.07	14	15321	0.12
12:30 - 13:00	14	15321	0.06	14	15321	0.08	14	15321	0.14
13:00 - 13:30	14	15321	0.08	14	15321	0.06	14	15321	0.14
13:30 - 14:00	14	15321	0.08	14	15321	0.05	14	15321	0.13
14:00 - 14:30	14	15321	0.05	14	15321	0.07	14	15321	0.12
14:30 - 15:00	14	15321	0.04	14	15321	0.04	14	15321	0.08
15:00 - 15:30	14	15321	0.04	14	15321	0.06	14	15321	0.10
15:30 - 16:00	14	15321	0.04	14	15321	0.06	14	15321	0.10
16:00 - 16:30	14	15321	0.03	14	15321	0.12	14	15321	0.15
16:30 - 17:00	14	15321	0.03	14	15321	0.21	14	15321	0.24
17:00 - 17:30	14	15321	0.03	**14**	**15321**	**0.31**	**14**	**15321**	**0.34**
17:30 - 18:00	14	15321	0.04	14	15321	0.14	14	15321	0.18
18:00 - 18:30	14	15321	0.01	14	15321	0.07	14	15321	0.08
18:30 - 19:00	14	15321	0.01	14	15321	0.03	14	15321	0.04
19:00 - 19:30	2	17449	0.00	2	17449	0.03	2	17449	0.03
19:30 - 20:00	2	17449	0.01	2	17449	0.01	2	17449	0.02
20:00 - 20:30	2	17449	0.00	2	17449	0.01	2	17449	0.01
20:30 - 21:00	2	17449	0.00	2	17449	0.01	2	17449	0.01
21:00 - 21:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:30 - 22:00	2	17449	0.01	2	17449	0.00	2	17449	0.01
22:00 - 22:30	1	11972	0.00	1	11972	0.00	1	11972	0.00
22:30 - 23:00	1	11972	0.18	1	11972	0.01	1	11972	0.19
23:00 - 23:30	0	0	0.00	0	0	0.00	0	0	0.00
23:30 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			1.88			1.94			3.80

Parameter summary

Trip rate parameter range selected:	620 - 34581 (units: sqm)
Survey date date range:	01/01/97 - 21/06/04
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 14 - CAR SHOW ROOMS
Category : A - CAR SHOW ROOMS
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	KC	KENT	1 days
	SC	SURREY	1 days
	WS	WEST SUSSEX	3 days
03	**SOUTH WEST**		
	DV	DEVON	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	DS	DERBYSHIRE	1 days
	LE	LEICESTERSHIRE	3 days
06	**WEST MIDLANDS**		
	WM	WEST MIDLANDS	1 days
07	**YORKSHIRE & NORTH LINCOLNSHIRE**		
	WY	WEST YORKSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	3 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	3 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	EA	EAST AYRSHIRE	2 days
14	**REPUBLIC OF IRELAND**		
	IR	REPUBLIC OF IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 695 to 5058 (units: sqm)

Date Range: 01/01/97 to 06/07/05

Selected survey days:

Monday	4 days
Tuesday	3 days
Wednesday	3 days
Thursday	4 days
Friday	12 days

Selected survey types:

Manual count	26 days
Directional ATC Count	0 days

TRIP RATE for Land Use 14 - CAR SHOW ROOMS/A - CAR SHOW ROOMS

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	9	2700	0.41	9	2700	0.08	9	2700	0.49
08:00 - 09:00	**23**	**2445**	**1.05**	23	2445	0.37	23	2445	1.42
09:00 - 10:00	25	2324	0.79	25	2324	0.57	25	2324	1.36
10:00 - 11:00	26	2291	0.68	26	2291	0.67	26	2291	1.35
11:00 - 12:00	26	2291	0.64	26	2291	0.65	26	2291	1.29
12:00 - 13:00	26	2291	0.72	26	2291	0.79	**26**	**2291**	**1.51**
13:00 - 14:00	26	2291	0.72	26	2291	0.64	26	2291	1.36
14:00 - 15:00	26	2291	0.61	26	2291	0.68	26	2291	1.29
15:00 - 16:00	26	2291	0.66	26	2291	0.72	26	2291	1.38
16:00 - 17:00	26	2291	0.61	26	2291	0.78	26	2291	1.39
17:00 - 18:00	26	2291	0.40	**26**	**2291**	**0.89**	26	2291	1.29
18:00 - 19:00	22	2360	0.13	22	2360	0.39	22	2360	0.52
19:00 - 20:00	11	2539	0.05	11	2539	0.09	11	2539	0.14
20:00 - 21:00	0	0	0.00	0	0	0.00	0	0	0.00
21:00 - 22:00	0	0	0.00	0	0	0.00	0	0	0.00
22:00 - 23:00	0	0	0.00	0	0	0.00	0	0	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			7.48			7.30			14.79

Parameter summary

Trip rate parameter range selected:	695 - 5058 (units: sqm)
Survey date date range:	01/01/97 - 06/07/05
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : J - RETAIL PARK - INCLUDING FOOD
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	HC	HAMPSHIRE	1 days
04	**EAST ANGLIA**		
	NF	NORFOLK	1 days
05	**EAST MIDLANDS**		
	LN	LINCOLNSHIRE	1 days
06	**WEST MIDLANDS**		
	WK	WARWICKSHIRE	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	2 days
11	**SCOTLAND**		
	FI	FIFE	1 days
	HI	HIGHLAND	1 days
	SL	SOUTH LANARKSHIRE	5 days

Main parameter selection:

Parameter: Gross floor area
Range: 734 to 45000 (units: sqm)

Date Range: 01/01/97 to 18/06/05

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	3 days
Friday	7 days

Selected survey types:

Manual count	9 days
Directional ATC Count	5 days

TRIP RATE for Land Use 01 - RETAIL/J - RETAIL PARK - INCLUDING FOOD

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	5	12247	0.01	5	12247	0.02	5	12247	0.03
08:00 - 09:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
09:00 - 10:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
10:00 - 11:00	**6**	**13326**	**0.04**	**6**	**13326**	**0.03**	**6**	**13326**	**0.07**
11:00 - 12:00	6	13326	0.03	6	13326	0.02	6	13326	0.05
12:00 - 13:00	6	13326	0.03	6	13326	0.03	6	13326	0.06
13:00 - 14:00	6	13326	0.02	6	13326	0.03	6	13326	0.05
14:00 - 15:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
15:00 - 16:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
16:00 - 17:00	6	13326	0.01	6	13326	0.02	6	13326	0.03
17:00 - 18:00	6	13326	0.01	6	13326	0.01	6	13326	0.02
18:00 - 19:00	6	13326	0.01	6	13326	0.01	6	13326	0.02
19:00 - 20:00	4	12462	0.01	4	12462	0.00	4	12462	0.01
20:00 - 21:00	4	12462	0.00	4	12462	0.00	4	12462	0.00
21:00 - 22:00	2	18924	0.00	2	18924	0.00	2	18924	0.00
22:00 - 23:00	1	19128	0.01	1	19128	0.00	1	19128	0.01
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.25			0.24			0.51

Parameter summary

Trip rate parameter range selected:	734 - 45000 (units: sqm)
Survey date date range:	01/01/97 - 18/06/05
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : K - RETAIL PARK - EXCLUDING FOOD
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	ES	EAST SUSSEX	1 days
	HC	HAMPSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
06	**WEST MIDLANDS**		
	ST	STAFFORDSHIRE	1 days
	WM	WEST MIDLANDS	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	5 days
	LC	LANCASHIRE	1 days
	MS	MERSEYSIDE	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 2057 to 35244 (units: sqm)

Date Range: 01/01/97 to 25/06/05

Selected survey days:

Monday	1 days
Thursday	3 days
Friday	11 days

Selected survey types:

Manual count	15 days
Directional ATC Count	0 days

TRIP RATE for Land Use 01 - RETAIL/K - RETAIL PARK - EXCLUDING FOOD
OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	3	13810	0.01	3	13810	0.01	3	13810	0.02
08:00 - 09:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
09:00 - 10:00	7	10709	0.03	7	10709	0.03	7	10709	0.06
10:00 - 11:00	7	10709	0.02	7	10709	0.03	7	10709	0.05
11:00 - 12:00	**7**	**10709**	**0.04**	**7**	**10709**	**0.04**	**7**	**10709**	**0.08**
12:00 - 13:00	7	10709	0.02	7	10709	0.03	7	10709	0.05
13:00 - 14:00	7	10709	0.03	7	10709	0.02	7	10709	0.05
14:00 - 15:00	7	10709	0.03	7	10709	0.03	7	10709	0.06
15:00 - 16:00	7	10709	0.02	7	10709	0.02	7	10709	0.04
16:00 - 17:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
17:00 - 18:00	7	10709	0.00	7	10709	0.01	7	10709	0.01
18:00 - 19:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
19:00 - 20:00	7	10709	0.00	7	10709	0.01	7	10709	0.01
20:00 - 21:00	3	13810	0.00	3	13810	0.00	3	13810	0.00
21:00 - 22:00	3	13810	0.00	3	13810	0.00	3	13810	0.00
22:00 - 23:00	1	15750	0.00	1	15750	0.00	1	15750	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.24			0.26			0.49

Parameter summary

Trip rate parameter range selected:	2057 - 35244 (units: sqm)
Survey date date range:	01/01/97 - 25/06/05
Number of weekdays (Monday-Friday):	15
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : F - WAREHOUSING (COMMERCIAL)
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	BU	BUCKINGHAMSHIRE	1 days
	HF	HERTFORDSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	3 days
04	**EAST ANGLIA**		
	SF	SUFFOLK	1 days
06	**WEST MIDLANDS**		
	WO	WORCESTERSHIRE	2 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	GC	GLASGOW CITY	1 days
	SL	SOUTH LANARKSHIRE	1 days
12	**NORTHERN IRELAND**		
	NI	NORTHERN IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 950 to 55740 (units: sqm)

Date Range: 01/01/97 to 06/03/03

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	9 days
Friday	3 days

Selected survey types:

Manual count	16 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	**1**	**7500**	**0.09**	**1**	**7500**	**0.08**	**1**	**7500**	**0.17**
00:30 - 01:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
01:00 - 01:30	1	7500	0.01	1	7500	0.03	1	7500	0.04
01:30 - 02:00	1	7500	0.04	1	7500	0.07	1	7500	0.11
02:00 - 02:30	1	7500	0.03	1	7500	0.03	1	7500	0.06
02:30 - 03:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
03:00 - 03:30	1	7500	0.03	1	7500	0.01	1	7500	0.04
03:30 - 04:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
04:00 - 04:30	1	7500	0.05	1	7500	0.05	1	7500	0.10
04:30 - 05:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
05:00 - 05:30	1	7500	0.04	1	7500	0.07	1	7500	0.11
05:30 - 06:00	1	7500	0.03	1	7500	0.04	1	7500	0.07
06:00 - 06:30	2	18844	0.03	2	18844	0.03	2	18844	0.06
06:30 - 07:00	2	18844	0.04	2	18844	0.06	2	18844	0.10
07:00 - 07:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
07:30 - 08:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
08:00 - 08:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
08:30 - 09:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
09:00 - 09:30	14	18310	0.02	14	18310	0.03	14	18310	0.05
09:30 - 10:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
10:00 - 10:30	14	18310	0.03	14	18310	0.03	14	18310	0.06
10:30 - 11:00	14	18310	0.02	14	18310	0.03	14	18310	0.05
11:00 - 11:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
11:30 - 12:00	14	18310	0.03	14	18310	0.03	14	18310	0.06
12:00 - 12:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
12:30 - 13:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
13:00 - 13:30	14	18310	0.03	14	18310	0.02	14	18310	0.05
13:30 - 14:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
14:00 - 14:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
14:30 - 15:00	14	18310	0.03	14	18310	0.03	14	18310	0.06
15:00 - 15:30	14	18310	0.03	14	18310	0.02	14	18310	0.05
15:30 - 16:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
16:00 - 16:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
16:30 - 17:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
17:00 - 17:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
17:30 - 18:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
18:00 - 18:30	13	17396	0.02	13	17396	0.02	13	17396	0.04
18:30 - 19:00	13	17396	0.02	13	17396	0.02	13	17396	0.04
19:00 - 19:30	2	6775	0.03	2	6775	0.01	2	6775	0.04
19:30 - 20:00	2	6775	0.01	2	6775	0.02	2	6775	0.03
20:00 - 20:30	1	7500	0.05	1	7500	0.01	1	7500	0.06
20:30 - 21:00	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:00 - 21:30	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:30 - 22:00	1	7500	0.01	1	7500	0.03	1	7500	0.04
22:00 - 22:30	1	7500	0.07	1	7500	0.05	1	7500	0.12
22:30 - 23:00	1	7500	0.07	1	7500	0.04	1	7500	0.11
23:00 - 23:30	1	7500	0.04	1	7500	0.04	1	7500	0.08
23:30 - 24:00	1	7500	0.04	1	7500	0.04	1	7500	0.08
Daily Trip Rates:			1.59			1.59			3.18

Parameter summary

Trip rate parameter range selected:	950 - 55740 (units: sqm)
Survey date date range:	01/01/97 - 06/03/03
Number of weekdays (Monday-Friday):	16
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : C - INDUSTRIAL UNITS
OGVS

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	4 days
	GS	GLOUCESTERSHIRE	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
	NF	NORFOLK	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	1 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	ER	EAST RENFREWSHIRE	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 620 to 34581 (units: sqm)

Date Range: 01/01/97 to 21/06/04

Selected survey days:

Monday	2 days
Tuesday	5 days
Wednesday	2 days
Thursday	5 days

Selected survey types:

Manual count	14 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNITS

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	0	0	0.00	0	0	0.00	0	0	0.00
00:30 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 01:30	0	0	0.00	0	0	0.00	0	0	0.00
01:30 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 02:30	0	0	0.00	0	0	0.00	0	0	0.00
02:30 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 03:30	0	0	0.00	0	0	0.00	0	0	0.00
03:30 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 04:30	0	0	0.00	0	0	0.00	0	0	0.00
04:30 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 05:30	0	0	0.00	0	0	0.00	0	0	0.00
05:30 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 06:30	1	22926	0.01	1	22926	0.00	1	22926	0.01
06:30 - 07:00	**1**	**22926**	**0.02**	**1**	**22926**	**0.02**	**1**	**22926**	**0.04**
07:00 - 07:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
07:30 - 08:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
08:00 - 08:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
08:30 - 09:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
09:00 - 09:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
09:30 - 10:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
10:00 - 10:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
10:30 - 11:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
11:00 - 11:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
11:30 - 12:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
12:00 - 12:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
12:30 - 13:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
13:00 - 13:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
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15:00 - 15:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
15:30 - 16:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
16:00 - 16:30	13	15818	0.00	13	15818	0.01	13	15818	0.01
16:30 - 17:00	13	15818	0.00	13	15818	0.01	13	15818	0.01
17:00 - 17:30	13	15818	0.00	13	15818	0.00	13	15818	0.00
17:30 - 18:00	13	15818	0.00	13	15818	0.00	13	15818	0.00
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19:00 - 19:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
19:30 - 20:00	2	17449	0.01	2	17449	0.00	2	17449	0.01
20:00 - 20:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
20:30 - 21:00	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:00 - 21:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:30 - 22:00	2	17449	0.00	2	17449	0.00	2	17449	0.00
22:00 - 22:30	1	11972	0.00	1	11972	0.00	1	11972	0.00
22:30 - 23:00	1	11972	0.00	1	11972	0.00	1	11972	0.00
23:00 - 23:30	0	0	0.00	0	0	0.00	0	0	0.00
23:30 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.23			0.22			0.44

Parameter summary

Trip rate parameter range selected:	620 - 34581 (units: sqm)
Survey date date range:	01/01/97 - 21/06/04
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 14 - CAR SHOW ROOMS
Category : A - CAR SHOW ROOMS
OGVS

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	KC	KENT	1 days
	SC	SURREY	1 days
	WS	WEST SUSSEX	3 days
03	**SOUTH WEST**		
	DV	DEVON	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	DS	DERBYSHIRE	1 days
	LE	LEICESTERSHIRE	3 days
06	**WEST MIDLANDS**		
	WM	WEST MIDLANDS	1 days
07	**YORKSHIRE & NORTH LINCOLNSHIRE**		
	WY	WEST YORKSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	3 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	3 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	EA	EAST AYRSHIRE	2 days
14	**REPUBLIC OF IRELAND**		
	IR	REPUBLIC OF IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 695 to 5058 (units: sqm)

Date Range: 01/01/97 to 06/07/05

Selected survey days:

Monday	4 days
Tuesday	3 days
Wednesday	3 days
Thursday	4 days
Friday	12 days

Selected survey types:

Manual count	26 days
Directional ATC Count	0 days

TRIP RATE for Land Use 14 - CAR SHOW ROOMS/A - CAR SHOW ROOMS
OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	**8**	**2936**	**0.04**	8	2936	0.02	**8**	**2936**	**0.06**
08:00 - 09:00	19	2643	0.02	**19**	**2643**	**0.03**	19	2643	0.05
09:00 - 10:00	19	2643	0.02	19	2643	0.02	19	2643	0.04
10:00 - 11:00	20	2584	0.01	20	2584	0.02	20	2584	0.03
11:00 - 12:00	20	2584	0.01	20	2584	0.01	20	2584	0.02
12:00 - 13:00	20	2584	0.03	20	2584	0.02	20	2584	0.05
13:00 - 14:00	20	2584	0.02	20	2584	0.02	20	2584	0.04
14:00 - 15:00	20	2584	0.01	20	2584	0.01	20	2584	0.02
15:00 - 16:00	20	2584	0.02	20	2584	0.01	20	2584	0.03
16:00 - 17:00	20	2584	0.01	20	2584	0.02	20	2584	0.03
17:00 - 18:00	20	2584	0.00	20	2584	0.00	20	2584	0.00
18:00 - 19:00	17	2682	0.00	17	2682	0.00	17	2682	0.00
19:00 - 20:00	9	2749	0.00	9	2749	0.00	9	2749	0.00
20:00 - 21:00	0	0	0.00	0	0	0.00	0	0	0.00
21:00 - 22:00	0	0	0.00	0	0	0.00	0	0	0.00
22:00 - 23:00	0	0	0.00	0	0	0.00	0	0	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.19			0.18			0.37

Parameter summary

Trip rate parameter range selected:	695 - 5058 (units: sqm)
Survey date date range:	01/01/97 - 06/07/05
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

Roughan & O'Donovan Consulting Engineers

Profile Park
Traffic Assessment

		Made:	KD	04/05/2006
ROD Ref:	5.311	Checked:	JB	
		Approved:	KD	

Use		Scale	1 acre =
Neighbourhood Centre	2.47 acres	4,998 sqm	4046.856 sqm
Office	10.20 acres	20,639 sqm	
Retail park	14.67 acres	29,684 sqm	Plot ratio = 0.5
General Industry/enterprise	39.96 acres	80,856 sqm	
General industry/logistics	39.00 acres	78,914 sqm	
Showroom	8.61 acres	17,422 sqm	

AM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips* Inbound (veh/hr)	No. Trips* Outbound (veh/hr)	No. Trips* Two-way (veh/hr)
Neighbourhood Centre	1.31	0.88	52	35	88
Office	1.99	0.23	329	38	367
Retail park	0.53	0.26	126	62	188
General Industry/enterprise	0.17	0.08	110	52	162
General industry/logistics	0.37	0.07	234	44	278
Showroom	1.05	0.37	146	52	198
Total Trips			*997*	*282*	*1,279*

* 20% reduction due to dual use / multi purpose trips and implementation of the Mobility Management Plan

PM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips* Inbound (veh/hr)	No. Trips* Outbound (veh/hr)	No. Trips* Two-way (veh/hr)
Neighbourhood Centre	3.14	3.16	126	126	252
Office	0.31	1.62	51	267	319
Retail park	1.2	1.31	285	311	596
General Industry/enterprise	0.1	0.17	65	110	175
General industry/logistics	0.07	0.45	44	284	328
Showroom	0.4	0.89	56	124	180
Total Trips			*626*	*1,223*	*1,849*

* 20% reduction due to dual use / multi purpose trips and implementation of the Mobility Management Plan

TRICS rates for vehicles used for the following uses:

Neighbourhood Centre	- retail park including food
Office	- office
Retail park	- retail park excluding food
General Industry/enterprise	- warehousing (commercial)
General industry/logistics	- industrial units
Showroom	- car show rooms

Roughan & O'Donovan Consulting Engineers

Profile Park
Traffic Assessment - HGVs

		Made:	KD	28/04/2006
ROD Ref:	5.311	Checked:	JB	
		Approved:	KD	

Use		Scale	1 acre =
Neighbourhood Centre	2.47 acres	4,998 sqm	4046.856 sqm
Office	10.20 acres	20,639 sqm	
Retail park	14.67 acres	29,684 sqm	
General Industry/enterprise	39.96 acres	80,856 sqm	
General industry/logistics	39.00 acres	78,914 sqm	
Showroom	8.61 acres	17,422 sqm	

AM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips Inbound (veh/hr)	No. Trips Outbound (veh/hr)	No. Trips Two-way (veh/hr)
Neighbourhood Centre	0.02	0.02	1	1	2
Office	0	0	0	0	0
Retail park	0.01	0.01	3	3	6
General Industry/enterprise	0.05	0.04	40	32	73
General industry/logistics	0.02	0.02	16	16	32
Showroom	0.02	0.03	3	5	9
Total			*64*	*57*	*121*

PM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips Inbound (veh/hr)	No. Trips Outbound (veh/hr)	No. Trips Two-way (veh/hr)
Neighbourhood Centre	0.01	0.01	0	0	1
Office	0	0	0	0	0
Retail park	0	0.01	0	3	3
General Industry/enterprise	0.04	0.04	32	32	65
General industry/logistics	0	0	0	0	0
Showroom	0	0	0	0	0
Total			*33*	*36*	*69*

TRICS rates for vehicles used for the following uses:

Neighbourhood Centre	- retail park including food
Office	- office
Retail park	- retail park excluding food
General Industry/enterprise	- warehousing (commercial)
General industry/logistics	- industrial units
Showroom	- car show rooms

Profile Park
Proposed Commercial Development

Mobility Management Plan

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1.0 INTRODUCTION

The development that is the subject of the current planning application consists of the provision of roads and services infrastructure, which will accommodate the future development of a business park on the subject site. The future land uses proposed on the site include industrial, office, retail, and neighbourhood centre uses including shops, cafes, crèche etc. Vehicular access to the site is proposed via the Nangor Road Regional Road R134, which has access to the Outer Ring Road R136. When completed, the Outer Ring Road will connect the N4 to the N7 and N81. Pedestrian and cycle access will be provided throughout the site and will connect with the Nangor Road which is to be upgraded to provide for these modes of travel.

This Mobility Management Plan has been prepared in support of the planning application for the proposed development.

1.1 Background to Mobility Management Plans

Road traffic growth is having a damaging effect on the environment, the economy and public health. A key contributor to this is the number of people commuting to work in a 'driver only car'. The impact that new developments have on the local road network can be reduced through the preparation and implementation of a mobility management plan. A mobility management plan assesses a development in terms of its accessibility by all modes of transport and makes recommendations that encourage and makes it easier for staff and visitors to travel to the workplace by public transport, car sharing, walking or cycling. The transportation policies and objectives of South Dublin County Council reflect the central elements of the Dublin Transportation Office (DTO) strategy. The DTO strategy outlined in 'A Platform for Change: An Integrated Transportation Strategy for the Greater Dublin Area 2000-2016' is to support and compliment the strategic land use planning framework for the Greater Dublin Area. The DTO Strategy has two interdependent elements: infrastructure and service improvements and demand management. The DTO Strategy on demand management is:

"To reduce the growth in travel through the application of land use and other policies while maintaining economic progress, and which is designed to encourage a transfer of trips, especially at peak periods, from the private car to sustainable modes of transport (such as public transport, cycling and walking)."

The DTO considers mobility management to be a suitable mechanism by which new developments can support the objectives of sustainable development and the achievement of reduced car dependency.

1.2 Structure of this Mobility Management Plan

It is intended that this report will provide a review of the existing transport options at the site of the proposed development together with direction to the developer, the Local Authority and public transport agencies on ways to best achieve an improved modal split for the journey to work, and minimise the traffic impact as a result of encouraging greater use of public transport, cycling and walking.

This mobility management plan is divided into the following principal sections:

- Objects and scope of the Mobility Management Plan;
- Existing transport infrastructure available in the vicinity of the site;

- Current commuter trends in the Dublin area;
- Recommendations to encourage greater use of more sustainable modes of transport by the future office employees at the site; and
- Likely commuter trends of the employees at the proposed development.

2.0 OBJECTIVES AND SCOPE OF THE MOBILITY MANAGEMENT PLAN

2.1 Objectives

The purpose of the Mobility Management Plan is to assist the Development Managers and 'unit end users' to minimise the amount of road traffic the development will generate. It encourages and makes it easier for staff of incoming companies and people visiting the site to travel by public transport, cycle, walk and car share. It particularly focuses upon journeys to work made by staff and their business trips.

Target modal splits have been identified for each mode of transport, and associated mobility management proposals are identified to enable these targets to be achieved. Thus the plan will make a direct contribution to reducing the traffic impact of the proposed development.

2.2 Scope

The Mobility Management Plan is a strategy consisting of a package of both physical measures and good working practices and policies that will be put in place once the commercial development is operational.

3.0 TRANSPORTATION INFRASTRUCTURE

This Section outlines how the transport infrastructure available in the vicinity of the site will support the objectives of this Mobility Management Plan.

3.1 Road Network

The site is situated between the N4 and N7 National Primary Routes and approximately 5km west of the M50 Motorway. The M50 is an orbital ring road around Dublin City with interchanges at all radiating National Primary Roads from the N1 to the North and the M11 to the South.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has seen steady improvements over recent years, and is a wide single carriageway with dedicated bus lanes in each direction extending as far out as the Outer Ring Road. The Nangor Road along the northern boundary of the site and to the west is of lower standard in terms of alignment and cross-sections, but will soon be upgraded and widened to include bus lanes in each direction.

The Outer Ring Road Phase 1 was opened from the N7 as far as Grange Castle Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction. Phase 2 of the Outer Ring Road, will see a local road link from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road. With completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and

the N7. Phase 3 of the Outer Ring Road, will extend south from the N7 to the N81 Blessington Road.

3.2 Public Transport Services

Public Transport Accessibility

Currently the Dublin Bus Route No. 68 operates along the Nangor Road at the northern boundary of the site. Approximately 1.5km east of the site the Dublin Bus Route Nos. 51B, 51X and 210 operate along the Nangor Road. Clondalkin Village 3km east of the site is served by the Dublin Bus Route Nos. 69, 76, 76A and 76B.

The Quality Bus Network in the area continues to expand with dedicated bus lanes on the Nangor Road east of the site and the Outer Ring Road.

The main intercity railway line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, runs to the north of the subject site. Intercity services are mainly to Cork and Limerick / Shannon, with the commuter service to Kildare. The nearest station is Clondalkin Station which is located approximately 3km northeast of the site and is served by 15 suburban commuter trains in each direction during weekdays.

Proposed Public Transport Infrastructure

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme) within the vicinity of the site including:

- Outer Ring Road QBC – Phase 1 N7 to Adamstown roundabout complete - Phase 2 connecting to the N4 under construction
- Nangor Road QBC west of Outer Ring Road currently at design stage
- Naas Road QBC Kingswood to Bluebell under construction.

These objectives form part of the extensive QBN (Quality Bus Network) that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 - 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, with better pedestrian and cycle facilities thereby encouraging commuters to use alternate modes of transport to private cars.

The Kildare Route Project is a railway improvement project for part of the Dublin to Hazelhatch railway line, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site, and additional railway tracks to allow for the separation of suburban, regional and intercity trains and the introduction of a new high capacity suburban service, which is expected to be complete by 2010.

Proposed public transport infrastructure identified in Transport 21, which will have a positive impact on the public transport infrastructure network in the area, include the following (completion dates):

- Dublin City Centre rail resignalling (2008)
- Opening of the new Dublin City Centre railway station (2009)
- Kildare rail upgrade (2010)
- Metro West Phase 1 Tallaght to Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)

- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extend Electrification to Hazelhatch (2015)
- Rail Interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015).

3.3 Cycle Facilities

There is a good cycle track network on the existing roads in the vicinity of the site with the recently improved Nangor Road and Outer Ring Road Phase 1 which include cycle tracks that form part of the extensive and emerging cycle path network in the area.

The developing cycle route network will increase the attractiveness of cycling for people working in the development. Commitments by the developers to provide secure and sheltered cycle parking throughout the development will serve to complement the efforts of the local authority in promoting and sustaining cycling.

Cycle access to the site will be available at the northeastern corner via the site access roundabout or the neighbourhood centre link and northwestern corners via a pedestrian / cycle link only to Nangor Road. A north-south link road will connect the main access road to Baldonnell Road, with the adjoining development lands to the west of the site connected by a pedestrian and cycle only link.

The internal roads within the site will have cycle paths on one side and will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority to cyclists at the junctions.

Secure sheltered cycle parking will be provided at appropriate locations adjacent to the main building entrances and changing and shower facilities will be available for use by cyclists where practicable.

3.4 Pedestrian Facilities

There are well-established footpaths along the roads to the east of the site, while the roads to the west are generally rural roads without dedicated pedestrian facilities, although there are proposals to upgrade the Nangor Road west of the main site access which will further improve pedestrian access.

People are typically prepared to walk up to 30 minutes to work. Special attention was given to creating a high quality safe walking environment, where pedestrian routes should be:

- Comfortable – provide a good surface without puddles and trips;
- Convenient – provide continuous footpaths;
- Convivial – be safe to use, and free from litter;
- Conspicuous – routes should be open to view, clearly signed and lit, assisting to improve perceptions of personal security; and
- Connected – direct routes reflecting desire lines where possible. They should link the main starting points with the destinations.

The internal roads on the site will have footpaths included on both sides with street lighting and landscaping of a high standard to make walking to and from the site more secure and attractive for people working there.

4.0 TRANSPORT MODAL SPLITS

4.1 Existing Modal Splits

The modal split of employees cannot be anticipated at this stage, although looking at modal splits for other similar sites a high portion of staff will commute to the development by car. The following modal split is a worst case assumption based on the location of the site and the existing availability of alternative modes of transport but without the expected improvements to the public transport network as described in Section 3 and the introduction of a Mobility Management Plan.

Table 1: Modal Split – Existing

Mode of Travel	*2006*
	%
Car Driver	70
Car Passenger	10
Bus & Rail	16
Walk	2
Cycle	2

4.2 External Factors which may Influence Modal Choice

A number of developments are likely to have a significant impact on the journey to work practices of the future workforce, on the site:

- Further development of the Quality Bus Network, and improved bus services for the area provided by Dublin Bus and the private sector, especially along the Nangor Road and Outer Ring Road QBC's;
- Completion of the Kildare Route Project, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site.
- Further development of the cycle track network and improved pedestrian facilties.

It is important to note that proposed changes to the public transport system such as integrated ticketing and co-ordination of timetables have yet to be implemented. It is expected that these measures will remove some of the barriers currently dissuading potential passengers from using public transport.

5.0 MOBILITY MANAGEMENT PLAN

This section outlines a series of recommendations to help achieve and maintain the 'Target Modal Split', throughout the life of the development.

5.1 Mobility Plan Administration

A Mobility Management Plan Co-ordinator is required to administer, implement, monitor and review the Mobility Management Plan. The Plan Co-ordinator should liaise with the management companies from adjacent developments, the Local Authority, and public transport operators.

5.2 Mobility Plan Details

Car travel is comfortable and convenient and inevitably an attractive mode of transport. There are a number of measures that will be undertaken by the development managers and 'unit end users' to help reduce car travel as outlined below. The Plan Co-ordinator will play a key role in encouraging and enabling companies locating within the development to adopt these recommendations. These are set out under the following general headings:

A. Travel awareness
B. Travel database
C. Public transport
D. Car sharing scheme
E. Cycling
F. Walking
G. Working practices
H. Car parking management
I. Policies on car use

(A) Travel Awareness

It will be the responsibility of the Plan Co-ordinator to make all staff and visitors aware of the environmental consequences of their travel choices. Consideration will be given to the various media for communicating the Mobility Management Plan to staff and visitors. Ideas include a Mobility Management Plan Newsletter or Website. These will provide details of the Mobility Management Plan and information on public transport services, car sharing, etc.

(B) Travel Database

The Plan Co-ordinator will produce and maintain a staff travel database. This will contain information relating to the travel patterns of employees to the site. It is envisaged that once the development is occupied, the Plan Co-ordinator would distribute a Travel Survey Questionnaire for the occupants to then forward to their own employees. The survey would provide details of the following:

- staff profile;
- home location;
- normal working hours;
- mode of travel to work;
- route taken to work;
- interest in car sharing;
- home to work journey time;
- distance home to work;
- car ownership;
- work related travel throughout the day;
- reasons for not car sharing, using public transport, cycling, walking or motorcycling;
- measures that would encourage the use of public transport, cycling, walking or motorcycling;
- estimates of public transport journey times and cost.

The availability of this data will assist in more accurately defining travel requirements for the site, and in defining the specific measures that would maximise the success of the Plan. This survey should be repeated annually, with published

results in a report highlighting any changes. In addition the Plan Co-ordinator would carry out further on-site data collection, which will include surveys to measure car park and cycle facility use. This data will complement the information provided in the staff survey questionnaires and will provide guidance on how the Plan could be improved or modified.

(C) Public Transport

It is anticipated that the management company will provide a shuttle bus service to and from appropriate locations so as to improve the accessibility of the development by public transport. In particular, a shuttle bus services could operate between the site and the nearest rail station on the Kildare Line, and to other public transport nodes such as Clondalkin Village.

The Plan Co-ordinator will enable the management company to promote a public transport culture amongst staff and visitors. Poor or insufficient access to information can be a major barrier to public transport use. Making people aware of travel alternatives will form a key element to the Mobility Management Plan. It will be the responsibility of the Plan Co-ordinator to regularly liaise with public transport operators to ensure that visitors and employees are provided with up to date public transport information to help maximise patronage. This includes timetable information, fares, bus stop location and route planning and the provision of annual and monthly public transport tickets to employees, which has tax benefits for both the employer and employee.

This information will be on permanent display at prominent locations throughout the development and included on a Mobility Management Plan Newsletter / Website which will be provided to all occupants of the development.

(D) Car Sharing Scheme

Using the Travel Database the Plan Co-ordinator will set a staff car-sharing scheme. This will involve preparing a car-sharing database or list, regularly updated, of those wishing to car share and the locations from which they travel.

Experience has shown that one of the issues that currently prevents car sharing is the lack of flexibility should an emergency occur at home. To overcome this obstacle a guaranteed ride home service could be provided in such circumstances. This could be from a colleague or through a company-paid / reimbursed taxi ride. A contract with a local taxi firm could be negotiated, allowing business related trips to be invoiced directly to the company.

It would also be possible for a car-sharing database to be developed for individual companies within the development or Profile Park as a whole, which would involve a number of companies within the park and allow car sharing to occur on a wider basis between various organisations.

(E) Cycling

In addition to providing 'bicycle friendly' facilities such as cycle parking, showers, changing rooms and lockers, the Plan Co-ordinator will promote cycling in a number of other ways. In order to encourage more staff to cycle to work, the Mobility Management Plan newsletter or website could set up a bicycle user group, provide information on the cycle facilities in the area and raise awareness amongst staff of the health benefits of cycling.

(F) Walking

Similar to cycling, the Plan Co-ordinator will encourage more staff to walk to work by raising awareness of the health benefits of walking.

(G) Working practices

Other initiatives the management company could use to encourage the staff to adopt more sustainable travel habits may include:

- Only paying user mileage on business journeys where no alternative is realistic by other means of travel.
- Introducing flexitime. This can help reduce congestion as not everyone is arriving and leaving the site at the same time. Flexitime can also help cyclists and walkers by allowing them to make trips in daylight during winter months or before bad weather sets in.
- Investigate the scope for introducing a home working scheme.

If reasonable, the introduction of pool cars. This would allow the staff that need to use a car in the course of their business to walk, cycle or use public transport to get to and from work.

(H) Car park management

Where there is free and plentiful car parking it is difficult to persuade people to try the other alternatives available. A car parking management plan should be produced to review the allocation of car parking spaces and the introduction of controls. The underlying assumption will be that the supply of car parking spaces is controlled and that they are allocated according to need. Should car-parking charges be introduced, the revenue raised should be used to subsidise other elements of this Mobility Plan.

(I) Policies on car use

Many companies provide company cars, car loans and car allowances as benefits for employees. Staff should be dissuaded from car travel by limiting provision of subsidised cars. For example, they should only pay car loans to those employees who need to use a car as part of their job. Similarly, staff may only qualify for these loans if they buy low emission fuel-efficient cars. Staff may also only qualify for car mileage payments if use of a car is essential for their trip / journey. Car mileage should also only be paid at a flat rate so as not to encourage staff to drive larger less fuel-efficient vehicles.

5.3 Mobility Plan Monitoring and Assessment

To enable the success of the various measures included in the Mobility Management Plan to be assessed and to help identify those measures that are performing most effectively, the Plan Co-ordinator will be responsible for ongoing monitoring and regular staff surveys. The monitoring should include items such as:

- Review the ongoing implementation of the Mobility Management Plan measures;
- Level of usage of cycle stands and lockers to determine demand;

- Car park surveys to establish car usage by employees and overall car parking demands; and
- Updated employee surveys to establish effective comparisons from earlier surveys, for example on mode of travel to the site.

A website could be established to post this information, which could then be accessed by all employers and employees. Future strategies can then be developed between the occupiers, the Local Authority and public transport operators.

6.0 Target Modal Split

Efforts can be made to reduce the reliance on car travel to the site. Table 2 shows the existing and target modal splits for the centre.

Table 2: Modal Split Targets for the Proposed Development

Mode of Travel	2006 – Existing Split	2008 – Target split with implementation of the MMP
	%	%
Car Driver	70	55
Car Passenger	10	15
Bus & Rail	16	22
Walk	2	4
Cycle	2	4

The targets for public transport, walking and cycling as commuter travel choices are based on the expectation of improvements to the public transport infrastructure and pedestrian / cycle facilities and the implementation of the Mobility Management Plan. These modes of transport will become more attractive to a larger number of staff who are likely to choose to live relatively close to their workplace.

Considering the efforts in Dublin to encourage drivers not to travel to work by car, and on the basis that the local authorities and public transport agencies are making substantial investments in the facilities for alternative modes of transport, the proposed modal split targets are considered realistic and achievable.

Chapter 5 outlines a series of recommendations to help achieve and maintain the 'Target Modal Split'.

7.0 Summary

This Mobility Management Plan identifies measures that will be introduced once the development is operational. These measures will be administered by the Mobility Management Plan Co-ordinator in co-operation with the management company, the Local Authority and public transport provider and include the following measures:

- Appoint a Mobility Management Plan Co-ordinator to administer, implement, monitor and review the Mobility Management Plan;
- Provide a shuttle bus service to and from appropriate locations so as to improve the accessibility of the development by public transport;

- Produce a Newsletter or Website to promote the Mobility Management Plan;
- Supply of information on public transport including timetable information, fares, bus stop location and route planning;
- Provision of annual and monthly public transport tickets to employees, which has tax benefits for both the employer and employee.
- Examining the feasibility of setting up a car-sharing scheme, either within each individual company or within Profile Park as a whole, to include a car-sharing database and providing facilities to match trip mates;
- Promoting the use of cycling among staff by providing secure sheltered cycle parking both at ground level and within the car park and providing showers and changing rooms for cyclists;
- Examining the feasibility of introducing a flexitime system for employees and investigate the scope for introducing a home working scheme of the each individual company.

Target modal splits for each mode of transport have been identified in this Mobility Management Plan. It has been estimated that without proactive measures to promote travel to work by non-car modes of transport, that approximately 70% of the workforce at the proposed development would be likely to drive to work. To improve on this projection, and to reduce the traffic impact of the development, a target modal split has been set at 55% car drivers, increasing the car expected car occupancy from 1.14 to 1.26 and increase the share by other modes from 20% to 30% by public transport, cycling and walking. Considering the widespread publicity in Dublin to encourage drivers not to travel to work by car, and on the basis that the local authorities and public transport agencies are making substantial investments in the facilities for alternative modes of transport, the proposed modal split targets are considered realistic and achievable.

Appendix F – Risk Ratings

Contaminated Land Risk Definitions

The following methodology is based on the methodology presented in CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice 2001. It requires the classification of the:

- Magnitude of the potential consequence (severity) of the Risk occurring: and
- Magnitude of the Probability (likelihood) of the Risk occurring.

The classifications are then compared to indicate the risk presented by each pollutant linkage.

Consequence to Receptor Definition Matrix

	Human Health	Controlled Waters	Buildings/Services
Severe Consequence	Acute or chronic permanent impact on human health.	Sensitive controlled water pollution ongoing, or just about to occur.	Catastrophic collapse
Medium Consequence	Chronic permanent impact on human health	Gradual pollution of sensitive controlled water	Degradation of materials
Mild Consequence	Chronic temporary impact on human health	Gradual pollution of non-sensitive controlled water	Damage to building rendering it unsafe.to occupy (eg foundation damage resulting in instability).
Minor Consequence	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc).	Slight discoloration of water	Easily repairable effects of damage to buildings, structures and services, i.e discoloration of concrete

Probability Definitions

Probability	Definition in Context
Higher	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution. Positive evidence of source, pathway and receptor.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term. Suspect source, pathway, and receptor
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term No evidence of hazard, pathway, and receptor

Standard Risk Matrix

		Consequence/Magnitude of impact			
		Severe	Medium	Mild	Minor
Probability	**High**	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Classified risks and likely action

Significance Level	Definition/Comments
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required. Demonstrable contaminated land situation, highest threat & liability level, urgent action recommended.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term. Likely contaminated land situation, risk assessment and action recommended.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, if is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term. Plausible contaminated land situation, risk assessment and possible action recommended.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. Unlikely contaminated land situation, possible risk assessment and possible action.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe. Negligible risk, no action recommended except vigilance for changes in conditions.

Appendix G – Geotechnical Environmental Services Ltd Factual Report

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

PROPOSED DEVELOPMENT SITE
PROFILE PARK
GRANGE CASTLE
DUBLIN

GROUND INVESTIGATION

FACTUAL REPORT

REPORT No. 002/ROI/21

MARCH 2021

CLIENT: PINNACLE CONSULTING ENGINEERS

GEO-ENVIRONMENTAL ENGINEER: DELTA-SIMONS

DOCUMENT CONTROL SHEET

CLIENT	PINNACLE CONSULTING ENGINEERS
PROJECT TITLE	PROPOSED DEVELOPMENT SITE PROFILE PARK, GRANGE CASTLE, DUBLIN
CONSULTING ENGINEER	DELTA SIMONS
REPORT No.	002/ROI/21

REV.	STATUS	AUTHOR(S)	REVIEWED & APPROVED BY	ISSUE DATE
0	FINAL	 ROBERT BARRY BSc, MSc, C. Eng, C. Geol, FGS, MIMMM	 ROBERT BARRY BSc, MSc, C. Eng, C. Geol, FGS, MIMMM	31/03/2021

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1.0 INTRODUCTION

On the instruction of Delta-Simons (the Geo-Environmental Engineer), acting on behalf of Pinnacle Consulting Engineers (the Client), Geotechnical Environmental Services Limited (GES) were appointed to undertake a ground investigation to assess the ground and ground water conditions in relation to a proposed development at Profile Park, Grange Castle, Dublin (Appendix 1).

The ground investigation comprised the following:

- 12 No. boreholes, excavated in soil to a maximum depth of 4.4m below existing ground level (begl), with associated in-situ testing and sampling.
- 4 No. windowless sampler boreholes, excavated in soil to a maximum depth of 3.3m below existing ground level (begl), with associated in-situ testing and sampling.
- 11 No. trial pits excavated to a maximum depth of 3.0m begl with associated sampling.
- 4 No. samples from existing spoil heaps.
- The installation of 10 No. combined gas/groundwater monitoring standpipes.
- 6 No. dynamic cone penetrometer (DCP) tests.
- Post fieldwork monitoring of ground gas emissions/groundwater levels and groundwater sampling.
- Geotechnical, geochemical, and environmental laboratory testing.
- Factual reporting.

The Specification for the investigation was the "Specification and Related Documents for Ground Investigation in Ireland" published by Engineers Ireland (2016), with information, amendments, and additions as advised by the Engineer.

Soil and rock descriptions were undertaken in accordance with British Standard BS5930 Code of Practice for Site Investigation:2015+A1:2020. which incorporates guidance presented in BS EN ISO 14688-1:2002+A1:2013, BS EN ISO 14688-2:2004+A1:2013 and BS EN ISO 14689-1, 2018.

The following provides additional clarification of the terminology that has been used:

- Silty CLAY/clayey SILT – used where it is considered that the secondary fraction is important and hence significantly modifies the appearance and/or behaviour of the principal.
- Fine grained (clays/silts) soils plotting on or just below the A-line on a plasticity chart are classified as clays.
- Fine grained soils with less than 35% sand and/or gravel sized particles are classified as slightly sandy and/or slightly gravelly.
- Fine grained soils with between 35% and 65% sand or gravel sized particles are classified as sandy or gravelly ("and" only in theory).
- Fine grained soils with greater than 65% sand or gravel sized particles are classified as very sandy or very gravelly.
- Coarse soils (sands/gravels) with less than 5% clay or silt and/or less than 5% sand or gravel are classified as slightly clayey or slightly silty and/or slightly sandy or slightly gravelly.
- Coarse soils with between 5% and 20% clay or silt and/or between 5% and 20% sand or gravel are classified as clayey or silty and/or sandy or gravelly.
- Coarse soils with greater than 20% clay or silt or greater than 20% sand or gravel are classified as very clayey or very silty and/or very sandy or very gravelly.

As noted in BS5930:2015+A1:2020 Clause 33.4.4.2, Table 15, the classification of very coarse soils (cobbles and boulders) requires a very large sample (circa 1000kg). Accordingly, it is not possible to recover representative samples from boreholes and conventional trial pits to quantify cobble and boulder content as above. Therefore, the exploratory hole logs presented in this report simply make reference to the presence or otherwise of cobbles and boulders with no attempt to classify the % content.

2.0 AIMS AND OBJECTIVES OF THE INVESTIGATION

The investigation was designed with the objective of obtaining the following information:

- An overview of the ground and groundwater conditions present in relation to foundation design.
- An assessment as to the potential aggressiveness of the soils encountered toward buried concrete.
- An assessment as to the presence or otherwise of soil and groundwater contamination.
- An assessment as to the presence or otherwise of ground gases.

This report provides a factual account of the site works undertaken, ground and groundwater conditions encountered, soil gas emissions and laboratory test results obtained.

The contents of the report assume that the data obtained is representative of the site area.

3.0 SITE WORKS

3.1 Introduction

Site works were undertaken during the period 17th-24th February 2021, under the supervision of a geo-environmental engineer from GES.

Ground levels and co-ordinates as noted on the borehole logs are related to Ordnance Datum and Irish Grid, respectively.

An exploratory hole location plan is included in Appendix 1.

3.2 Boreholes

12 No. boreholes (BH01-BH12) were excavated to a maximum depth of depth of 4.4m begl by means of a CME-55 drill rig using a combination of continuous flight auger (CFA) drilling and percussion sampling techniques to form a hole of 150mm diameter.

4 No. windowless sampler boreholes (WS01-WS04) were excavated to a maximum depth of 3.3m by means of a Dando Terrier 2002 drill rig using percussion sampling techniques.

The windowless sampler boreholes were excavated at a diameter of 101mm to produce continuous soil samples, retained in 1.0m long pvc liners, of 87mm diameter. Temporary steel casing of 113mm diameter was simultaneously installed to depth of 1.0m begl to ensure the integrity of the borehole sidewalls as progressed through the strata encountered.

The boreholes were excavated to facilitate the collection of representative soil samples for detailed geotechnical description, geotechnical, geochemical and environmental laboratory testing.

In-situ testing took the form of the Standard Penetration Test (SPT), using a split barrel sampler, to allow measurement of the soil penetration resistance N to be determined under dynamic loading.

Details of groundwater strikes as encountered during boring operations (if applicable) are noted on the borehole logs.

The borehole logs and a composite plot of SPT N Values v Reduced Levels are included in Appendix 2.

3.3 Standpipes

Combined gas/groundwater monitoring standpipes were installed in boreholes BH01, BH03, BH05, BH08, BH10-BH12 and WS01-WS03 as per the instructions of the Engineer's site representative.

Each standpipe comprised 50mm i.d. (HDPE) well casing and well screen sections with associated gravel filter pack, bentonite pellet seal, push fit base cap, geotextile filter sock, gas bung, cement/bentonite grout seals and flush trafficable steel head cover.

Specific details of each standpipe installation are presented on an instrumentation log that accompanies the relevant borehole log as included in Appendix 2.

3.4 Trial Pits

11 No. trial pits (TP01-TP11) were excavated to a maximum depth of 3.0m begl by means of a tracked excavator to provide an assessment of the near surface ground and groundwater conditions.

The trial pit logs, along with photographs of the excavations and resulting spoil are included in Appendix 3.

3.5 Spoil Heaps

4 No. spoil heaps (SP01-SP04) as present on the site were sampled by means of the tracked excavator.

Logs describing the findings, along with photographs of the spoil heaps, are included in Appendix 3.

3.6 Dynamic Cone Penetrometer Testing

6 No. DCP tests (DCP01-DCP06) were undertaken in order that an assessment could be made of the strength of the soils present to a maximum depth of 1.0m begl, i.e. anticipated sub-grade.

The data relating to the cone penetration rate and the conversion to equivalent California Bearing Ratio (CBR) values is presented in Appendix 4.

The DCP locations are referenced as chainages in Appendix 4, i.e. Chainage 1.000 relates to the DCP test undertaken at location DCP01, Chainage 2.000 relates to the DCP test undertaken at location DCP2, etc.

The data was assessed using the UK DCP software as developed by the Transport Research Laboratory (TRL) and as described in TRL Project Report PR/INT/278/04.

3.7 Soil and Groundwater Sampling

Soil samples for detailed geotechnical description, geotechnical, geochemical, and environmental laboratory testing were collected in the following:

- PVC "jar bags" of approximately 1kg capacity.
- PVC "bulk bags" of approximately 10kg capacity.
- 1kg capacity plastic tubs.
- 250g capacity amber glass jars.
- 60g capacity amber glass vials.

Environmental soil sampling was undertaken with reference to guidance presented in British Standard BS10175:2011+A2:2017, British Standard Code of Practice for Investigation of Potentially Contaminated Sites.

Groundwater samples for environmental laboratory testing were collected in the following:

- 2 x 1000ml capacity glass bottle.
- 2 x 500ml capacity plastic bottle.
- 2 x 40ml capacity glass vials.
- 1 x 125ml capacity plastic bottle with sodium hydroxide (NaOH) preservative.
- 1 x 125ml capacity plastic bottle with nitric acid (HNO_3) preservative.
- 1 x 125ml capacity plastic bottle with sulphuric acid (H_2SO_4) preservative.

To maintain sample integrity, and in an attempt to avoid deviation, samples were transported to the laboratory of Chemtest Limited, Newmarket, England in cool boxes containing ice packs.

3.8 Gas Monitoring

Measurement of soil gas emissions took place on 3 No. occasions after the completion of site works and installation/development of the combined gas/groundwater monitoring standpipes.

Ground gases monitored, using a Gas Data LMS xi G3 gas meter, were:

- Methane (CH_4).
- Carbon Dioxide (CO_2).
- Oxygen (O_2).
- Carbon Monoxide (CO).
- Hydrogen Sulfide (H_2S).

The following additional measurements were also collected during the gas monitoring rounds:

- Flow rate (in l/hr).
- Atmospheric pressure (in mb).
- Water level in borehole.

The results obtained are included in Appendix 7.

4.0 LABORATORY TESTING

4.1 Geotechnical and Geochemical Laboratory Testing

Selected soil and weathered rock samples were tested at the laboratories of Queen's University, Belfast and Chemtest Limited, Newmarket, England.

Laboratory testing was scheduled by Delta-Simons and comprised the following:

- Natural moisture content.
- Atterberg Limits.
- Particle size distribution (wet sieve and hydrometer).
- pH.
- Water soluble sulfate.

Laboratory testing was undertaken in accordance with guidance presented in British Standard BS1377:1990, Methods of Test for Soils for Civil Engineering Purposes and Building Research Establishment (BRE) Special Digest 1 (2005).

The results obtained and composite plots of A-Line data and PSD graphs are included in Appendix 5.

4.2 Environmental Laboratory Testing

Selected environmental soil and groundwater samples (2 No. rounds of groundwater sampling and testing) were tested at the laboratory of Chemtest Limited, Newmarket, England.

Laboratory testing was scheduled by Delta-Simons and comprised the following.

- Metals to low level (As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn).
- Speciated (16) PAHs.
- Coronene.
- VOCs.
- SVOCs.
- PCB (7 congeners).
- Asbestos Screen.
- TPH-CWG incl. BTEX & MTBE.
- Water Soluble Sulfate.
- Free Cyanide.
- pH.
- Waste Acceptance Criteria (WAC) 2 batch eluate suite and + total solid suite).

Details of the testing scheduled, and associated results, are included in Appendix 6.

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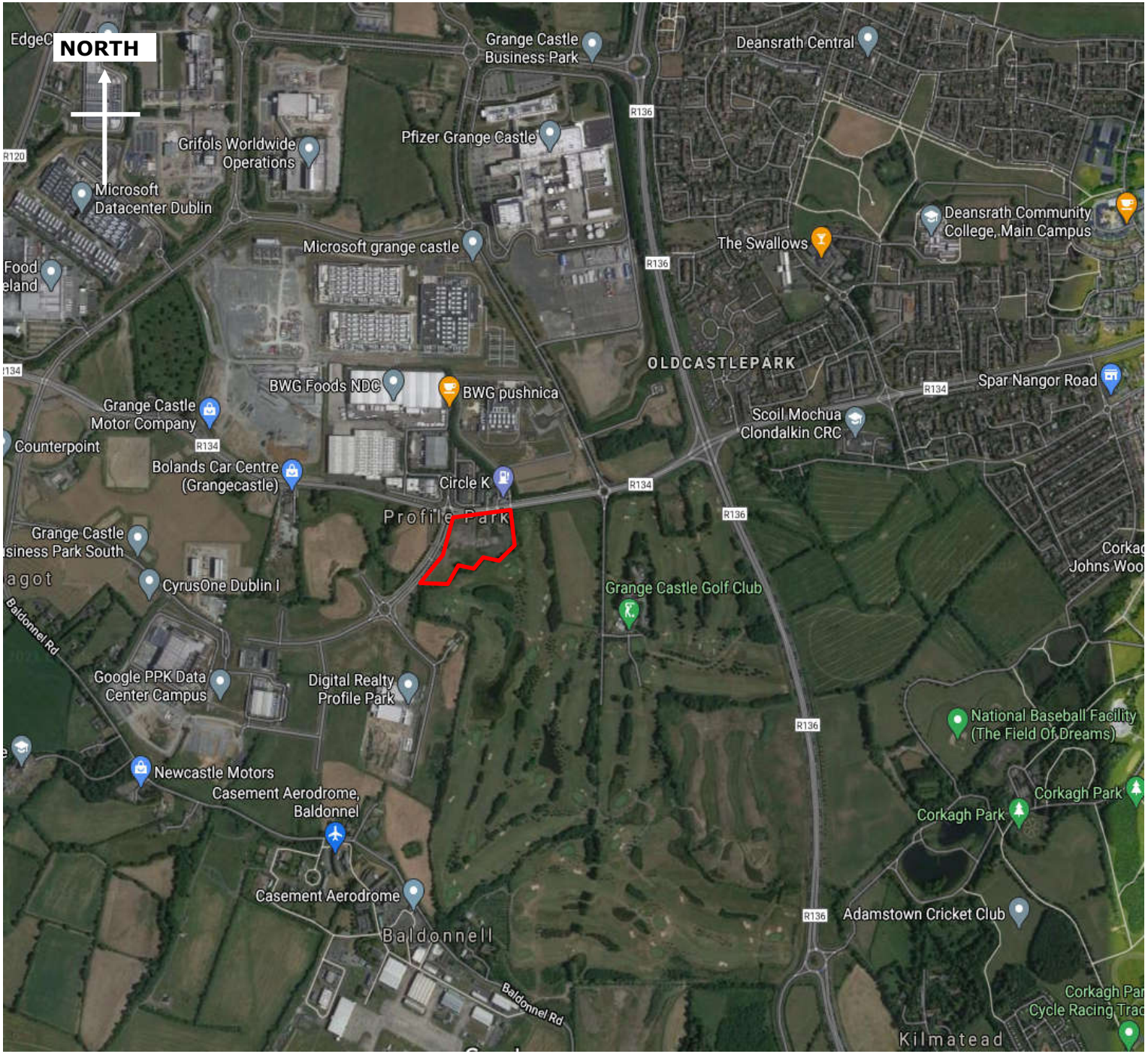
GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 1

SITE AND EXPLORATORY HOLE LOCATION PLANS



GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Title: Site Location Plan

Project Name:
Proposed Development Site
Profile Park, Grange Castle, Dublin

Figure No.: 1	Report No. 002/ROI/21

Client: Pinnacle Consulting Engineers

Geo-Environmental Engineer: Delta-Simons

Drawn by: EB	Date: 22/03/2021
Reviewed by: RB	Date: 22/03/2021

Key/Symbols:

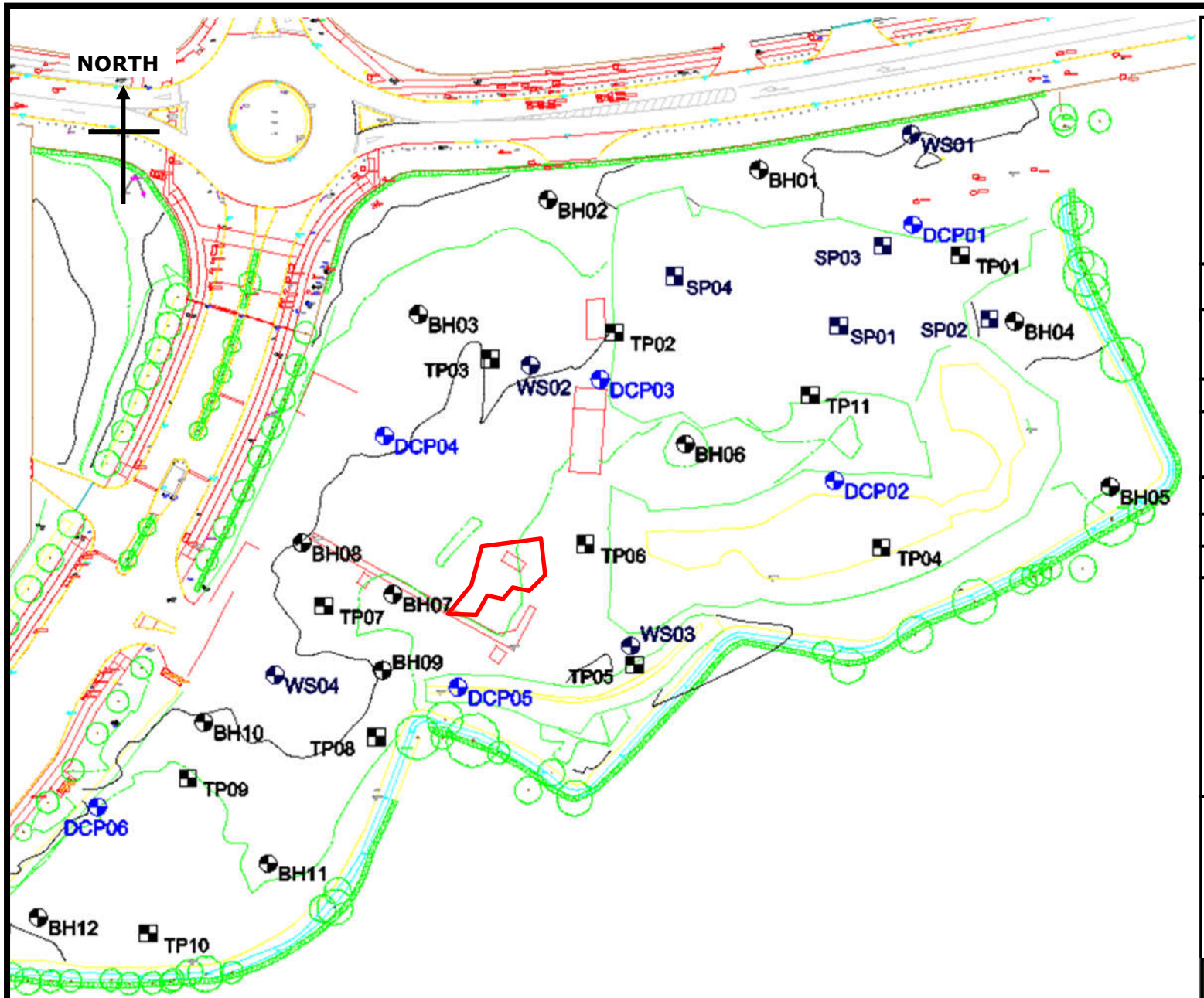
Approximate Site Location

Notes:

Geotechnical Environmental Services Limited

The Old Mill,
22A Kilmoyle Road,
Ballybogey,
Co Antrim.
BT53 6NR.

Tel: 0044 (0)28 2074 2066
Fax: 0044 (0)28 2074 2829
info@geospecialists.co.uk



GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Title: Exploratory Hole Location Plan

Project Name:
Proposed Development Site
Profile Park, Grange Castle, Dublin

Figure No.: 2	Report No. 002/ROI/21

Client: Pinnacle Consulting Engineers

Geo-Environmental Engineer: Delta-Simons

Drawn by: EB	Date: 22/03/2021
Reviewed by: RB	Date: 22/03/2021

Key/Symbols:

- BH02 Approximate borehole location
- WS02 Approximate WS borehole location
- DCP02 Approximate DCP location
- TP02 Approximate trial pit location
- SP02 Approximate spoil heap location

Notes:

Geotechnical Environmental Services Limited

The Old Mill,
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Ballybogey,
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Tel: 0044 (0)28 2074 2066
Fax: 0044 (0)28 2074 2829
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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 2

BOREHOLE LOGS; COMPOSITE PLOT OF SPT N VALUES v REDUCED LEVELS

GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH01

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 3.0m depth.

Casing Diameter
Borehole diam. 150mm to 3.00m

Ground Level (mOD)
75.79

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704050 E 730868 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.35)	FILL: Grey HARDCORE.		
0.35	DS1				75.44	0.35	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing roots and rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.1ppm					(1.05)			
1.00-1.45	SPT N=14		DRY	2,2/3,3,4,4					
1.00	BS1								
1.00	ES2 0.1ppm								
1.00-1.45	DS2								
1.40	DS3				74.39	1.40	Firm to stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.40)			
1.80	DS4				73.99	1.80	Firm to stiff light brown slightly sandy silty CLAY.		
2.00-2.45	SPT N=14		DRY	3,4/3,4,3,4		(0.50)			
2.00	ES3 0.1ppm								
2.00-2.45	DS5								
2.30	DS6				73.49	2.30	Firm to stiff thinly laminated light grey brown slightly sandy silty CLAY.		
2.37	WS1					(0.50)			
2.50	WS2								
2.80	DS7				72.99	2.80	Stiff friable brown grey slightly sandy silty CLAY.		▼1
				Steady(1) at 2.90m, no rise after 20 mins.		(0.40)			
3.00	ES4 0.0ppm								
3.00-3.45	DS8				72.59	3.20	Very stiff friable dark brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
3.00-3.45	SPT N=22		2.90	3,3/4,4,7,7					
3.20	DS9					(0.60)			
3.50	ES5 0.0ppm								
3.80	DS10				71.99	3.80	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
3.90-3.98	SPT 25*/50 50/30		2.40	25/50		(0.18)			
3.90-3.98	DS11			Borehole terminated due to refusal on suspected bedrock. 23/02/2021:2.40m	71.81	3.98	Complete at 3.98m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial. No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH01

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH01

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704050 E 730868 N

Ground Level (mOD)
75.79

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			75.69	0.10	Concrete
					Bentonite Seal
			74.79	1.00	
	▼1				Slotted Standpipe
			72.29	3.50	
					Bentonite Seal
			71.81	3.98	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
23/02/21		2.90		Steady				2.90	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
23/02/21							3.98		2.40	73.39

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		2.37	73.42	
24/03/21		2.50	73.29	
31/03/21		2.55	73.24	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH02

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 4.0m depth.

Casing Diameter
150mm cased to 4.00m

Ground Level (mOD)
75.41

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (Handheld GPS)
704003.57 E 730861 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.	75.36	0.05 (0.10)	FILL: Grey HARDCORE.		
0.05	DS1				75.26	0.15	MADE GROUND: Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.15	DS2								
0.50	ES3 0.1 ppm					(1.25)	Soft friable light brown slightly sandy slightly gravelly silty CLAY containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=13		DRY	1,1/2,2,5,4					
1.00	BS1								
1.00	ES4 0.1 ppm								
1.00-1.45	DS3								
1.40	DS4				74.01	1.40	Firm to stiff friable dark brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.30)			
1.70	DS5				73.71	1.70	Stiff friable light grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.00-2.45	SPT N=19		2.40	2,2/2,5,6,6		(0.80)			
2.00	ES2 0.1 ppm								
2.00-2.45	DS6								▼1
2.50	DS7			Steady(1) at 2.50m, rose to 2.30m in 20 mins.	72.91	2.50	Grey brown silty sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.		▽1
						(0.30)			
2.80	DS8				72.61	2.80	Stiff to very stiff friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
3.00-3.39	SPT 50/240		2.30	3,4/17,13,15,5		(0.75)			
3.00	ES1 0.1 ppm								
3.00-3.39	DS9								
3.55	DS10				71.86	3.55	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.50)			
4.00-4.12	SPT 25*/60 50/60		2.30	25/50	71.36	4.05	Suspected weathered MUDSTONE: Recovered as grey fine to coarse angular GRAVEL sized fragments.		
4.00	ES5 0.1 ppm				71.29	4.12			
4.00-4.12	DS11						Complete at 4.12m		
4.05	DS12			Borehole terminated due to refusal on suspected bedrock. 23/02/2021:2.30m					

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH02

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH03

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 4.0m depth.

Casing Diameter
Borehole diam. 150mm to 4.00m

Ground Level (mOD)
74.87

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703974 E 730836 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	BS1			0.0ppm=PID reading.		(0.40)	FILL: HARDCORE.		
0.40	DS1				74.47	0.40			
0.50	ES1 0.1 ppm						MADE GROUND: Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.90)			
1.00-1.45	SPT N=19		DRY	3,3/3,5,5,6					
1.00	ES2 0.1 ppm								
1.00-1.45	DS2				73.57	1.30			
1.30	BS2						Stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.30	DS3								
1.41	WS1								
1.69	WS2					(0.90)			
2.00-2.45	SPT N=27		DRY	6,7/5,7,7,8					
2.00	ES3 0.1 ppm								
2.00-2.45	DS4				72.67	2.20			
2.20	DS5						Very stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.55)			
2.75	DS6				72.12	2.75			
3.00-3.39	SPT 25*/130 50/260		DRY	12,13/18,14,12,6			Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		▼1
3.00	ES4 0.1 ppm								
3.00-3.39	DS7								▽1
				Steady(1) at 3.60m, rose to 3.10m in 20 mins.		(1.60)			
4.00-4.40	SPT 50/250		3.60	4,15/14,12,12,12					
4.00	ES5 0.1 ppm								
4.00-4.40	DS8				70.52	4.35			
4.35	DS9			Borehole terminated due to refusal on suspected bedrock. 23/02/2021:3.60m	70.47	4.40	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
							Complete at 4.40m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial. No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH03

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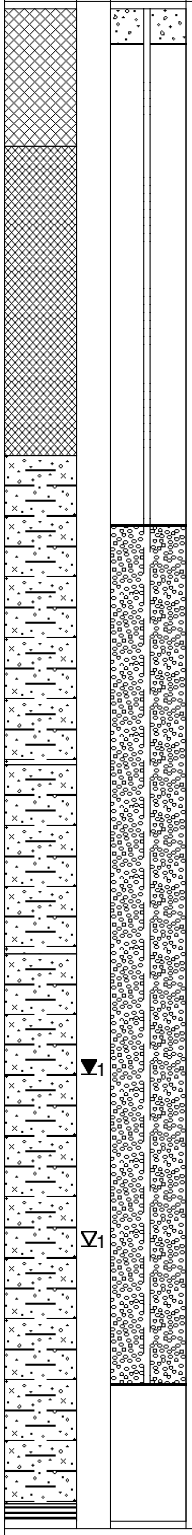
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	BH03

Installation Type	Dimensions	Client	Job Number
Single Installation	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 150 mm	Pinnacle Consulting Engineers	002.ROI21

Location	Ground Level (mOD)	Geo-Environmental Engineer	Sheet
703974 E 730836 N	74.87	Delta-Simons	1/1



Instr (A)	Level (mOD)	Depth (m)	Description
	74.77	0.10	Concrete
			Bentonite Seal
	73.37	1.50	
			Slotted Standpipe
	70.87	4.00	
			Bentonite Seal
	70.47	4.40	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
23/02/21		3.60		Steady				3.10	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
23/02/21							4.40		3.60	71.27

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		1.41	73.46	
24/03/21		1.69	73.18	
31/03/21		1.70	73.17	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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ENVIRONMENTAL SERVICES
LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH04

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 3.0m depth.

Casing Diameter
Borehole diam. 150mm to 3.00m

Ground Level (mOD)
74.82

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704107 E 730834 N

Dates
24/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.	74.77	0.05	TOPSOIL.		
0.05	DS1					(0.50)	Firm dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		▼1
0.50	ES1 0.2 ppm			Steady(1) at 0.50m, no rise after 20 mins.	74.27	0.55			
0.55	DS2						Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=49		0.50	1,3/7,9,12,21		(0.85)			
1.00	ES2 0.1 ppm								
1.00-1.45	DS3								
1.40	DS4				73.42	1.40	Firm to stiff friable dark grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.40)			
1.80	DS5				73.02	1.80	Stiff friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.35)			
2.00-2.45	SPT N=41		0.50	10,15/13,12,7,9	72.67	2.15	Dense grey clayey sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.		
2.00	ES3 0.3 ppm					(0.35)			
2.00-2.45	DS6								
2.15	DS7								
2.50	DS8			Groundwater perched on upper surface of clay strata.	72.32	2.50	Very stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.40)			
2.90	DS9				71.92	2.90	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
3.00-3.14	SPT 25*/70 50/70		0.50	25/50 Borehole terminated due to refusal on suspected bedrock. 24/02/2021:0.50m		(0.15)			
3.00	ES4 0.1 ppm				71.77	3.05	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
3.00-3.14	DS10				71.68	3.14			
3.05	DS11						Complete at 3.14m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH04

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Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH05

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 3.0m depth.

Casing Diameter
Borehole diam. 150mm to 3.00m

Ground Level (mOD)
74.29

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704128 E 730797 N

Dates
24/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.30)	TOPSOIL.		
0.30	DS1				73.99	0.30			
0.37	WS1					(0.30)	Firm friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.2 ppm				73.69	0.60			
0.60	DS2						Firm friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		▼1
1.00-1.45	SPT N=14		DRY	3,4/3,4,3,3,4		(1.10)			
1.00	BS1								
1.00	ES2 0.1 ppm								
1.00-1.45	DS3								
1.13	WS2								
1.70	DS4				72.59	1.70	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.00-2.45	SPT N=12		2.20	3,4/3,3,3,3,3		(0.50)			
2.00	ES3 0.1 ppm				72.09	2.20			▽1
2.00-2.45	DS5			Steady(1) at 2.20m, rose to 0.80m in 20 mins.			Medium dense grey brown clayey sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.		
						(0.50)			
2.70	DS6				71.59	2.70			
						(0.25)	Stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.95	DS7				71.34	2.95			
3.00-3.38	SPT 50/230		0.80	8,8/13,17,18,2		(0.35)	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
3.00	ES4 0.1 ppm				70.99	3.30			
3.00-3.38	DS8				70.91	3.38	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
				Borehole terminated due to refusal on suspected bedrock. 24/02/2021:0.80m			Complete at 3.38m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH05

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH05

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704128 E 730797 N

Ground Level (mOD)
74.29

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.19	0.10	Concrete
					Bentonite Seal
	▼1		73.29	1.00	
					Slotted Standpipe
	▽1		71.29	3.00	
					Bentonite Seal
			70.91	3.38	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
24/02/21		2.20		Steady				0.80	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
24/02/21							3.38		0.80	73.49

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		0.37	73.92	
24/03/21		1.13	73.16	
31/03/21		1.13	73.16	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	BH06

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.8m depth.	Borehole diam. 150mm to 2.80m	74.14	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 704034 E 730807 N	**Dates** 23/02/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.			MADE GROUND: Grey brown clayey sandy fine to coarse GRAVEL with cobble content. Gravel is sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm					(0.95)			
					73.19	0.95			
0.95	DS1						Soft friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=6		DRY	2,2/2,2,1,1					
1.00	ES2 0.1 ppm								
1.00-1.45	DS2								
						(1.30)			
2.00-2.45	SPT N=14		DRY	1,1/1,3,4,6					
2.00	ES3 0.1 ppm								
2.00-2.45	DS3				71.89	2.25			
2.25	DS4					(0.35)	Firm friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.60	DS5			Steady(1) at 2.60m, no rise after 20 mins.	71.54	2.60			▼1
2.70-2.81	DS6					(0.21)	Completely weathered MUDSTONE: Encountered insitu as stiff slightly sandy gravelly silty CLAY.		
2.70-2.81	SPT 25*/70 50/40		2.60	25/50 Borehole terminated due to refusal on suspected bedrock. 23/02/2021:2.60m	71.33	2.81	Complete at 2.81m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By
1:40	GM

Figure No. 002.ROI21.BH6

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH07

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.0m depth.

Casing Diameter
Borehole diam. 150mm to 2.00m

Ground Level (mOD)
73.92

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (Handheld GPS)
703969 E 730773 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.30)	FILL: Grey brown clayey sandy HARDCORE with cobble content.		
0.30	DS1				73.62	0.30	MADE GROUND: Soft to firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing plastic remnants. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm					(0.65)			
					72.97	0.95	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.95	DS2								
1.00-1.45	SPT N=18		DRY	5,6/5,5,4,4					
1.00	ES2 0.1 ppm								
1.00-1.45	DS3					(1.00)			
1.75	ES3 0.1 ppm								
					71.97	1.95			▼1
1.95	DS4			Steady(1) at 1.95m, no rise after 20 mins.		(0.21)	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
2.00-2.46	DS5				71.76	2.16			
2.00-2.15	SPT 25*/120 50/30		1.35	12,13/50 Borehole terminated due to refusal on suspected bedrock. 23/02/2021:1.35m			Complete at 2.16m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)
1:40

Logged By
GM

Figure No.
002.ROI21.BH07

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH08

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 2.0m depth.

Casing Diameter
Borehole diam. 150m to 2.00m

Ground Level (mOD)
74.62

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703948 E 730785 N

Dates
24/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.20)	FILL: Grey HARDCORE.		
0.20	DS1				74.42	0.20	Firm friable grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm					(0.55)			
0.75	DS2				73.87	0.75	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=16		DRY	2,2/3,4,4,5		(0.55)			
1.00	ES2 0.1 ppm								
1.00-1.45	DS3				73.32	1.30	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.30	DS4					(0.75)			
2.00-2.45	SPT N=41		DRY	4,6/7,7,12,15	72.57	2.05	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
2.00-2.45	DS5					(0.40)			
2.05	DS6				72.17	2.45	Complete at 2.45m		
2.35	DS7			Borehole terminated due to refusal on suspected bedrock. 24/02/2021:DRY					

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
Insufficient water in standpipe for groundwater sample.

Scale (approx)
1:40

Logged By
GM

Figure No.
002.ROI21.BH08

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH08

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703948 E 730785 N

Ground Level (mOD)
74.62

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.52	0.10	Concrete
					Bentonite Seal
			74.12	0.50	
					Slotted Standpipe
			72.62	2.00	
					Bentonite Seal
			72.17	2.45	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)
					5 min	10 min	15 min	20 min	

Groundwater Observations During Drilling

Date	Start of Shift					End of Shift				
	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
24/02/21							2.45		DRY	

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A]			Remarks
	Time	Depth (m)	Level (mOD)	
05/03/21		1.96	72.66	Insufficient water for groundwater sample.
24/03/21		1.97	72.65	
31/03/21		1.98	72.64	Insufficient water for groundwater sample.

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	BH09

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.5m depth.	Borehole diam. 150mm to 2.50m	74.56	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 703966 E 730756 N	**Dates** 23/02/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.			FILL: Grey brown clayey sandy HARDCORE with cobble content. Also containing red brick remnants.		
0.50	ES1 0.1 ppm					(0.95)			
					73.61	0.95			
0.95	DS1						Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=21		DRY	4,5/5,5,5,6					
1.00	ES2 0.1 ppm								
1.00-1.45	DS2								
						(1.55)			
2.00-2.45	SPT N=17		DRY	2,2/4,3,4,6					
2.00	ES3 0.1 ppm								
2.00-2.45	DS3								
					72.06	2.50			▽1
2.50	DS4			Seepage(1) at 2.50m.	71.96	(0.10) 2.60	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
2.50-2.60	DS5			25/50			Complete at 2.60m		
2.50-2.60	SPT 25*/50 50/50			Borehole terminated due to refusal on suspected bedrock. 23/02/2021:2.50m					

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By
1:40	GM

Figure No. 002.ROI21.BH08

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH10

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 2.0m depth.

Casing Diameter
Borehole diam. 150mm to 2.00m

Ground Level (mOD)
74.55

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703926 E 730745 N

Dates
22/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.	74.50	0.05	FILL: Grey HARDCORE.		
0.05	DS1					(0.75)	MADE GROUND: Firm friable grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm								
0.80	DS2				73.75	0.80	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=21		DRY	3,4/5,5,5,6					
1.00	ES2 0.1 ppm								
1.00-1.45	DS3					(1.10)			
1.50	ES3 0.1 ppm								
1.90	DS4				72.65	1.90	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
2.00-2.33	SPT 50/180		DRY	6,11/15,18,17		(0.43)			
2.00-2.33	DS5								
				Borehole terminated due to refusal on suspected bedrock. 22/02/2021:DRY	72.22	2.33	Complete at 2.33m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
No water in standpipe for groundwater sample.

Scale (approx)
1:40

Logged By
GM

Figure No.
002.ROI21.BH10

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH10

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703926 E 730745 N

Ground Level (mOD)
74.55

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.45	0.10	Concrete
					Bentonite Seal
			74.05	0.50	
					Slotted Standpipe
			73.05	1.50	
					Bentonite Seal
			72.22	2.33	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)
					5 min	10 min	15 min	20 min	

Groundwater Observations During Drilling

Date	Start of Shift					End of Shift				
	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
22/02/21							2.33		DRY	

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A]			Remarks
	Time	Depth (m)	Level (mOD)	
05/03/21		DRY		
24/03/21		DRY		
31/03/21		DRY		

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH11

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 3.6m depth.

Casing Diameter
Borehole diam. 150mm to 3.60m

Ground Level (mOD)
74.23

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703941 E 730713 N

Dates
22/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
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Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.	74.18	0.05	FILL: HARDCORE.		
0.05	DS1					(0.55)	MADE GROUND: Firm friable grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm				73.63	0.60			
0.60	DS2						Firm friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=29		DRY	2,3/6,7,8,8					
1.00	ES2 0.1 ppm								
1.00-1.45	DS3								
1.14	WS1					(1.60)			
1.18	WS2								
2.00	ES3 0.1 ppm			Seepage(1) at 2.00m.					▽1
2.00-2.45	DS4				72.03	2.20			
2.00-2.45	SPT N=35		DRY	3,7/13,8,6,8			Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.20	DS5					(0.60)			
2.80	DS7				71.43	2.80	Stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
3.00-3.45	SPT N=35		DRY	6,8/7,7,9,12					
3.00	ES4 0.1 ppm								
3.00-3.45	DS6					(0.90)			
3.60-3.88	SPT 50/130		DRY	10,11/25,25	70.53	3.70			
3.60-3.88	DS8					(0.18)	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
3.70	DS9				70.35	3.88			
				Borehole terminated due to refusal on suspected bedrock. 22/02/2021:DRY			Complete at 3.88m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH11

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH11

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703941 E 730713 N

Ground Level (mOD)
74.23

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.13	0.10	Concrete
					Bentonite Seal
			73.23	1.00	
	▽1				Slotted Standpipe
			71.23	3.00	
					Bentonite Seal
			70.35	3.88	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
22/02/21		2.00		Seepage					

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
22/02/21							3.88		DRY	

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		1.14	73.09	
24/03/21		1.18	73.05	
31/03/21		1.18	73.05	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH12

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 3.0m depth.

Casing Diameter
Borehole diam. 150mm to 3.00m

Ground Level (mOD)
73.58

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703890 E 730701 N

Dates
22/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.45)	MADE GROUND: Soft friable grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.25	ES1 0.1 ppm				73.13	0.45			
0.45	DS1						Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.75	ES2 0.1 ppm								
1.00-1.45	SPT N=16		DRY	3,4/4,4,4,4		(1.55)			
1.00-1.45	DS2								
1.45	WS1								▼2
1.49	WS2								
1.50	ES3 0.1 ppm								▽1
2.00	DS3			Seepage(1) at 2.00m.	71.58	2.00			
2.00-2.45	DS4						Firm to stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.00-2.45	SPT N=28		2.00	6,6/9,6,6,7		(0.70)			
2.50	ES4 0.1 ppm								▽2
2.70	DS5			Steady(2) at 2.70m, rose to 1.60m in 20 mins.	70.88	2.70	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
3.00-3.40	SPT 50/250		1.60	5,9/8,10,15,17		(0.70)			
3.00-3.45	DS6								
				Borehole terminated due to refusal on suspected bedrock. 22/02/2021:1.60m	70.18	3.40	Complete at 3.45m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH12

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH12

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703890 E 730701 N

Ground Level (mOD)
73.58

Geo-Environmental Engineer
Delta-Simons

Sheet
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Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			73.48	0.10	Concrete
					Bentonite Seal
			72.58	1.00	
	▼2				Slotted Standpipe
	▽1				
	▽2		71.08	2.50	
					Bentonite Seal
			70.18	3.40	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
22/02/21		2.00		Seepage					
22/02/21		2.70		Steady				1.60	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
22/02/21							3.40		1.60	71.98

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		1.46	72.12	
24/03/21		1.49	72.09	
31/03/21		1.50	72.08	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	WS01

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Dando Terrier 2002 Drill Rig. Percussion sampling to 2.9m depth.	113mm cased to 1.00m Borehole diam. 101mm to 2.90m	75.64	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 704084 E 730876 N	**Dates** 23/02/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.25)	FILL: Grey HARDCORE containing red brick and concrete remnants. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.25	DS1				75.39	0.25			
0.50	ES1 0.1 ppm					(0.60)	Suspected MADE GROUND: Firm grey brown slightly sandy silty CLAY containing decayed roots and rootlets.		
					74.79	0.85			
0.85	DS2			Steady(1) at 0.90m, no rise after 20 mins.		(0.25)	Suspected MADE GROUND:Firm grey brown slightly sandy silty CLAY.		▼1
1.00	ES2 0.1 ppm				74.54	1.10			
1.00-1.45	DS3						Suspected MADE GROUND: Firm to stiff grey brown with orange mottling slightly sandy silty CLAY.		
1.00-1.45	SPT N=18		0.90	1,2/3,4,5,6					
1.10	DS4					(0.70)			
					73.84	1.80			
1.80	DS5						Stiff to very stiff friable light grey brown slightly sandy silty CLAY.		
2.00-2.45	SPT N=23		1.90	5,4/3,5,4,11		(0.60)			
2.00	ES3 0.1 ppm								
2.00-2.45	DS6				73.24	2.40			
2.40	DS7						Completely weathered MUDSTONE: Encountered insitu as soft silty CLAY.		
2.46	WS1					(0.40)			
2.51	WS2				72.84	2.80			
2.80	DS8						Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
2.90-3.25	SPT 50/200		2.00	13,12/19,31		(0.45)			
2.90-3.30	DS9								
3.00	ES4 0.1 ppm				72.39	3.25			
				23/02/2021:2.00m			Complete at 3.30m		
				Borehole terminated due to refusal on suspected bedrock.					

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)	Logged By
1:40	GM

Figure No.
002.ROI21.WS01

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS01

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704084 E 730876 N

Ground Level (mOD)
75.64

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			75.54	0.10	Concrete
					Bentonite Seal
			75.14	0.50	
	▼1				
					Slotted Standpipe
			73.14	2.50	
					Bentonite Seal
			72.34	3.30	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
23/02/21		0.90		Steady				0.90	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
23/02/21							3.25		2.00	73.64

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		2.41	73.23	
24/03/21		2.50	73.14	
31/03/21		2.50	73.14	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	WS02

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Dando Terrier 2002 Drill Rig. Percussion sampling to 2.9m depth.	Borehole diam. 101mm to 2.90m	74.66	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 703999 E 730824 N	**Dates** 24/02/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.	74.56	(0.10) 0.10	FILL: Grey HARDCORE.		
0.10	DS1					(0.35)	MADE GROUND: Grey sandy fine to coarse GRAVEL with cobble content. Also containing red brick and concrete remnants. Gravel is sub-angular to sub-rounded.		
0.45	DS2				74.21	0.45			
0.50	ES1 0.1 ppm					(0.25)			
0.70	DS3				73.96	0.70	Firm grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.75	BS1								
1.00-1.45	SPT N=13		DRY	2,2/3,4,3,3			Firm grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	ES2 0.1 ppm					(1.05)			
1.00-1.45	DS4								
1.05	WS1								
1.43	WS2								
					72.91	1.75			
1.75	DS5						Firm to stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.00-2.45	SPT N=19		1.75	1,2/2,3,5,9		(0.65)			
2.00	ES3 0.5 ppm								
2.00-2.45	DS6								
2.40	DS7				72.26	2.40	Very stiff grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.40	ES4 0.3 ppm								
						(0.80)			
2.90-3.25	SPT 50/200		2.25	8,8/12,16,22					
2.90-3.25	DS8								
3.20	DS9				71.46	3.20	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
				Borehole terminated due to refusal on suspected bedrock.	71.41	3.25	Complete at 3.25m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)	Logged By
1:40	GM

Figure No. 002.ROI21.WS02

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS02

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 101 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703999 E 730824 N

Ground Level (mOD)
74.66

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.56	0.10	Concrete
					Bentonite Seal
			73.66	1.00	
					Slotted Standpipe
			72.16	2.50	
					Bentonite Seal
			71.41	3.25	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		1.10	73.56	
24/03/21		1.43	73.23	
31/03/21		1.42	73.24	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS03

Boring Method
Dando Terrier 2002 Drill Rig. Percussion sampling to 2.8.0m depth.

Casing Diameter
113mm cased to 1.00m
Borehole daim. 101mm to 2.80m

Ground Level (mOD)
73.91

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704022 E 730762 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.30)	MADE GROUND: Soft friable brown slightly sandy slightly gravelly silty CLAY. Also containing plastic remnants.		
0.20 0.30	ES1 0.2 ppm DS1				73.61	0.30	Gravel is fine to coarse, sub-angular to sub-rounded.		
0.75	ES2 0.1 ppm						Firm friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45 1.00-1.45 1.05 1.09	SPT N=13 DS2 WS1 WS2	1.00	DRY	2,3/3,3,3,4		(1.80)			▼2
1.50	ES3 0.1 ppm								▼1
2.00-2.45 2.10	DS3 DS4			Steady(1) at 2.00m, no rise after 20 mins.	71.81	2.10	Firm friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.00-2.45	SPT N=14	1.00	2.00	2,3/3,3,3,5		(0.55)			
2.50	ES4 0.1 ppm				71.26	2.65			▽2
2.65 2.80-3.02	DS5 DS6			Steady(2) at 2.65m, rose to 1.20m in 20 mins.		(0.37)	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
2.70-3.02	SPT 25*/100 50/220	1.00	1.20	13,12/14,16,20 Borehole terminated due to refusal on suspected bedrock. 23/02/2021:1.20m	70.89	3.02	Complete at 3.02m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

Logged By
GM

Figure No.
002.ROI21.WS03

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS03

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704022 E 730762 N

Ground Level (mOD)
73.91

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			73.81	0.10	Concrete
					Bentonite Seal
	▼2		72.91	1.00	
	▼1				Slotted Standpipe
	▽2		71.41	2.50	
					Bentonite Seal
			70.89	3.02	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
23/02/21		2.00	1.00	Steady				2.00	
23/02/21		2.65	1.00	Steady				1.20	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
23/02/21							3.02	1.00	1.20	72.71

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		0.33	73.58	
24/03/21		1.09	72.82	
31/03/21		1.09	72.82	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS04

Boring Method
Dando Terrier 2002 Drill Rig. Percussion sampling to 2.0m depth.

Casing Diameter
Borehole diam. 101mm to 2.00m

Ground Level (mOD)
74.74

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703942 E 730755 N

Dates
24/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.60)	FILL: Grey HARDCORE containing red brick and wood remnants.		
0.50 0.60	ES1 0.2 ppm BS1				74.14	0.60 (0.45)	MADE GROUND: Stiff friable grey brown slightly sandy silty CLAY containing rootlets.		
1.00-1.45 1.00 1.00-1.45 1.05 1.45	SPT N=22 ES2 0.1 ppm DS1 DS2 DS3		DRY	3,4/5,5,6,6	73.69	1.05 (0.40)	Stiff friable light brown slightly sandy slightly gravelly silty CLAY containing rootlets.		
1.80	DS4				73.29	1.45 (0.35)	Very stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.00-2.42 2.00 2.00-2.42	SPT 50/270 ES3 0.1 ppm DS5		DRY	6,7/9,10,16,15	72.94	1.80 (0.62)	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
				Borehole terminated due to refusal on suspected bedrock. 24/02/2021:DRY	72.32	2.42	Complete at 2.42m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)
1:40

Logged By
GM

Figure No.
002.ROI21.WS04

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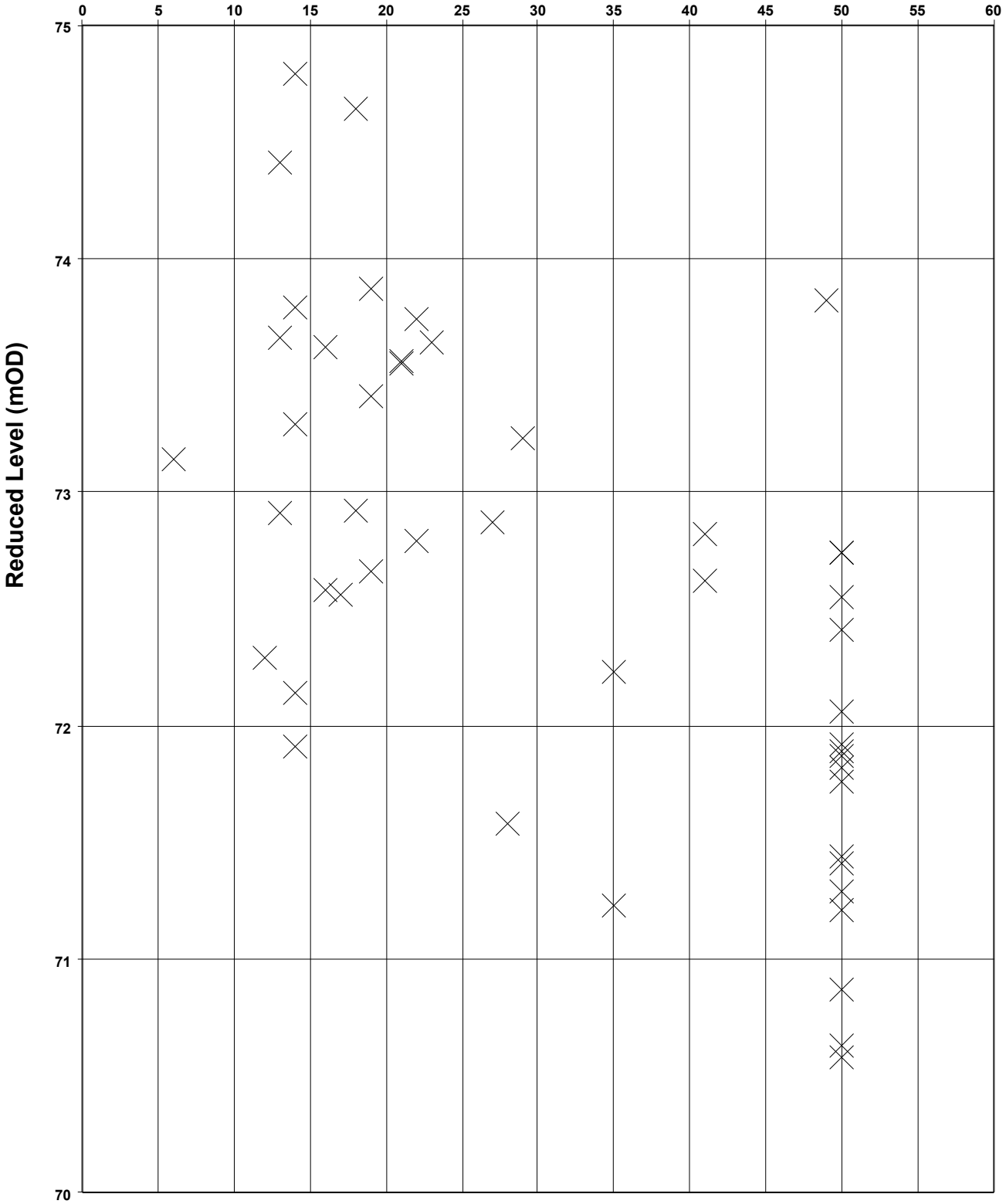
SPT N Value



GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED	**Title** Coomposite Plot of SPT N Value vs Reduced Level (mOD)			
Site Proposed Development Site, Profile Park, Grange Castle, Dublin	**Date Drawn** 02/04/2021	**Date Checked** 02/04/2021	**Sheet** 1 / 1	**Job Number** 002.ROI21
Client Pinnacle Consulting Engineers	**Drawn By** EB	**Checked By** RB	**Scale** N/A	**Figure No.** 3

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 3

TRIAL PIT AND SPOIL HEAP LOGS; PHOTOGRAPHS OF EXCAVATIONS, RESULTING SPOIL AND REINSTATEMENTS

GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.25)	FILL: Grey HARDCORE.		
0.20	ES1 0.1 ppm				0.25			
0.25	DS1					Suspected MADE GROUND: Firm friable light brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES2 0.1 ppm				(0.55)			
0.80	DS2				0.80			
					(0.35)	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.15	DS3				1.15			
1.50	BS1					Firm to stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.50	ES3 0.1 ppm				(1.15)			
2.30	DS4		Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY		2.30 2.35	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
						Complete at 2.35m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP01

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.15) 0.15	FILL: Grey HARDCORE.		
0.15	DS1					MADE GROUND: Firm friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing timber, wire, tarmac and concrete remnants. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	BS1							
0.50	ES1 0.1 ppm							
					(1.45)			
1.00	ES2 0.1 ppm							
					1.60	Suspected MADE GROUND: Firm friable brown with orange mottling slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.60	BS2							
1.60	DS2							
2.00	ES3 0.1 ppm							
					(1.40)			
			Seepage(1) at 2.80m. Seepage from gravel surround to suspected service at 2.8m depth. Pit side walls stable. 17/02/2021:2.90m					▽1
3.00	ES4 0.1 ppm				3.00	Complete at 3.00m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP02

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.45)	FILL: Grey HARDCORE containing wire rebar and geotextile membrane.		
0.25	ES1 0.1 ppm				0.45			
0.45	DS1				(0.45)	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.75	ES2 0.1 ppm				0.90			
0.90	DS2					Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	BS1							
1.50	ES3 0.1 ppm				(1.70)			
2.50	ES4 0.1 ppm		Trial pit terminated due to refusal on boulder obstruction. 17/02/2021:DRY		2.60	Complete at 2.60m		
			Pit side walls stable.					

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP03

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.25)	TOPSOIL.		
0.25	DS1				0.25	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm				(0.45)			
0.70	DS2				0.70	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	BS1							
1.00	ES2 0.1 ppm				(1.20)			
1.90	DS3		Seepage(1) at 1.90m. Pit side walls stable to 1.9m depth. Relatively stable below 1.9m.		1.90	Soft friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		▽1
2.00	BS2				(0.90)			
2.00	ES3 0.2 ppm				2.80	Complete at 2.80m		
			17/02/2021:DRY					

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP04

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP05

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		0.07	FILL: Grey HARDCORE.		
0.07	DS1				(0.43)	Firm friable brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.25	ES1				0.50			
0.50	BS1					Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	DS2							
1.00	ES2				(1.20)			
					1.70			▽1
1.70	DS3		Seepage(1) at 1.70m.			Firm friable dark grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
					(0.50)			
2.20	DS4				2.20			
			Trial pit terminated due to refusal on suspected bedrock. 02/03/2021:DRY		2.30	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
			Pit side walls stable.			Complete at 2.30m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP05

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP06

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.07	DS1		0.0ppm=PID reading. Seepage(1) at 0.20m.		(0.20) 0.20	FILL: Grey HARDCORE.		▽1
0.50 0.50	BS1 ES1 0.1 ppm					Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	ES2 0.1 ppm				(1.70)			
1.90 2.00 2.10	DS2 ES3 0.1 ppm DS3				1.90 (0.20) 2.10 (0.15) 2.25	Firm friable dark grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
			Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY			Completely weathered MUDSTONE: Encountered insitu as stiff slightly sandy gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.. Complete at 2.25m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP06

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP07

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.			MADE GROUND: Grey clayey sandy fine to coarse GRAVEL with cobble content. Also containing rebar, wire, tarmac and red brick remnants. Gravel is sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm				(1.10)			
1.10	BS1				1.10			
1.10	DS1				(0.30)	Firm to stiff friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.20	ES2 0.1 ppm				1.40			
1.40	DS2				(0.25)	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
			Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY		1.65	Complete at 1.65m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP07

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP08

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.50)	MADE GROUND: Grey clayey sandy fine to coarse GRAVEL with cobble content. Also containing plastic remnants. Gravel is sub-angular to sub-rounded.		
0.25	ES1 0.2 ppm				0.50			
0.50	DS1				(0.60)	Soft to firm friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	ES2 0.2 ppm				1.10			
1.10	BS1					Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.10	DS2				(1.20)			
2.00	ES3 0.1 ppm							
2.30	BS2				2.30			
2.30	DS3				(0.40)	Firm to stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.50	ES4 0.1 ppm				2.70			
2.70	DS4		Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY		2.75	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
						Complete at 2.75m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP08

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP09

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.50)	MADE GROUND: Grey clayey sandy fine to coarse GRAVEL with cobble content. Also containing metal, plastic and tarmac remnants. Gravel is sub-angular to sub-rounded.		
0.25	ES1 0.2 ppm				0.50			
0.50	DS1				(1.10)	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	BS1							
1.00	ES2 0.2 ppm							
1.60	DS2				1.60 (0.15) 1.75	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
			Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY			Complete at 1.75m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP09

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.70)	MADE GROUND: Soft friable brown slightly sandy slightly gravelly silty CLAY. Also containing plastic remnants. Gravel is sub-angular to sub-rounded.		
0.50	ES1 0.2 ppm				0.70			
0.70	DS1					Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	BS1							
1.00	ES2 0.2 ppm				(1.50)			
2.00	ES3 0.1 ppm				2.20			
2.20	BS2				(0.20)			
2.20	DS2				2.40	Firm friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.30	ES4 0.1 ppm				2.45			
2.40	DS3		Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY			Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
						Complete at 2.45m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP10

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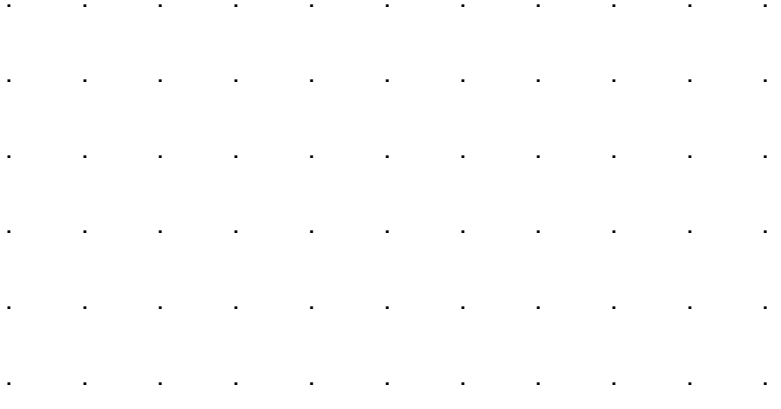
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP11

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.40)	MADE GROUND: Grey clayey sandy fine to coarse GRAVEL with cobble content. Also containing metal and rebar remnants. Gravel is sub-angular to sub-rounded.		
0.25	ES1 0.1 ppm				0.40			
0.40	DS1					Stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.75	ES2 0.1 ppm							
1.00	BS1				(2.00)			
1.50	ES3 0.1 ppm							
2.00	BS2							
2.40	DS2				2.40			
2.50	ES4				(0.40)	Stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
					2.80			
			Pit side walls stable. 17/02/2021:DRY			Complete at 2.80m		

Plan



Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP11

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	SP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00 0.00	DS1 ES1 0.1 ppm		0.0ppm=PID reading. 17/02/2021:DRY		(0.50) 0.50	MADE GROUND: Soft friable black slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded. Complete at 0.50m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.SP1

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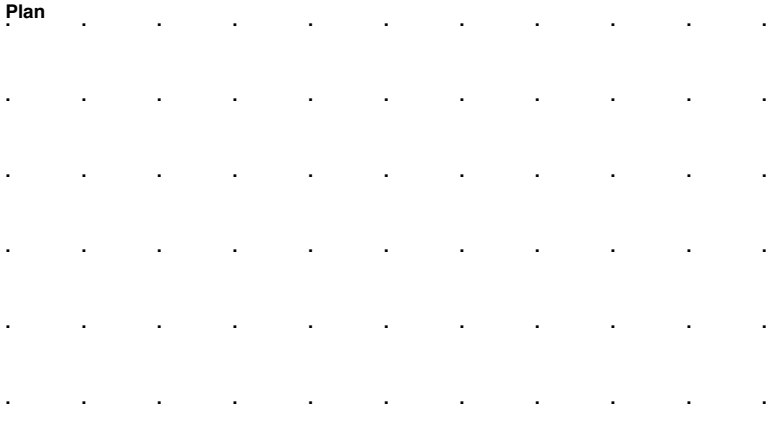
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	SP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00 0.00	DS1 ES1 0.1 ppm		0.0ppm=PID reading. 17/02/2021:DRY		(0.50) 0.50	MADE GROUND: Black clayey sandy fine to coarse GRAVEL. Gravel is fine to coarse, sub-angular to sub-rounded. Complete at 0.50m		

Plan



Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.SP2

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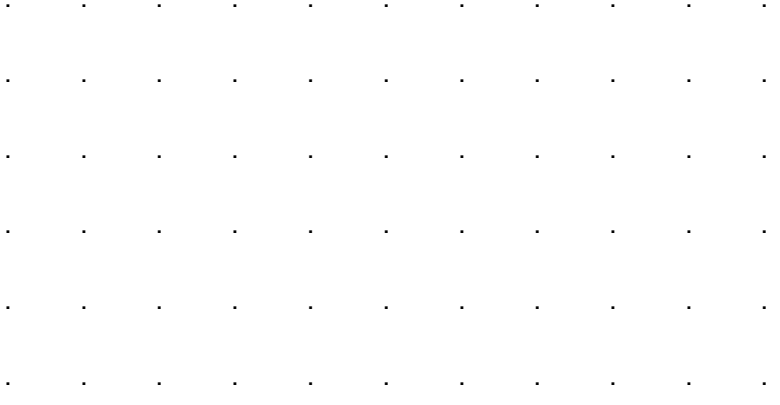
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	SP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00 0.00 0.00	DS1 ES1 0.1 ppm ES2 0.1 ppm		0.0ppm=PID reading. 17/02/2021:DRY		(0.50) 0.50	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded. Complete at 0.50m		

Plan



Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.SP3

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	SP04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00 0.00	DS1 ES1 0.1 ppm		0.0ppm=PID reading. 17/02/2021:DRY		(0.50) 0.50	MADE GROUND: Grey sandy fine to coarse GRAVEL containing tarmac remnants. Gravel is sub-angular to sub-rounded. Complete at 0.50m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.SP4

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TP01



TP01 Side Wall



TP01 Spoil



TP01 Reinstatement



TP02



TP02 Side Wall



TP02 Spoil



TP02 Reinstatement



TP03



TP03 Side Wall



TP03 Spoil



TP03 Reinstatement



TP04



TP04 Side Wall



TP04 Spoil



TP04 Reinstatement



TP05



TP05 Side Wall



TP05 Spoil



TP05 Reinstatement



TP06



TP06 Side Wall



TP06 Spoil



TP06 Reinstatement



TP07



TP07 Side Wall



TP07 Spoil



TP07 Reinstatement



TP08



TP08 Side Wall



TP08 Spoil



TP08 Reinstatement



TP09



TP09 Side Wall



TP09 Spoil



TP09 Reinstatement



TP10



TP10 Side Wall



TP10 Spoil



TP10 Reinstatement



TP11



TP11 Side Wall



TP11 Spoil



TP11 Reinstatement



SP01



SP01 Side Wall



SP01 Spoil



SP02



SP02 Side Wall



SP02 Spoil



SP03



SP03 Side Wall



SP03 Spoil



SP04



SP04 Side Wall



SP04 Spoil

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 4

DYNAMIC CONE PENTROMETER TEST DATA AND EQUIVALENT CBR VALUES

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	1.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted

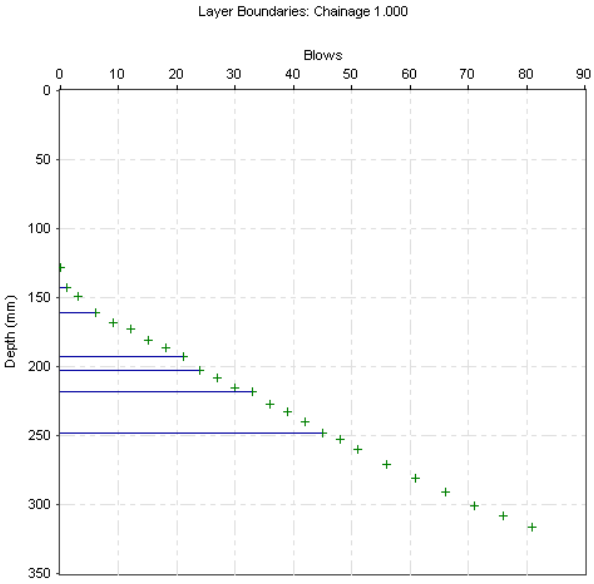
No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	165	0.00					
2	1	1	180	15.00					
3	2	3	186	3.00					
4	3	6	198	4.00					
5	3	9	205	2.33					
6	3	12	210	1.67					
7	3	15	218	2.67					
8	3	18	223	1.67					
9	3	21	230	2.33					
10	3	24	240	3.33					
11	3	27	245	1.67					
12	3	30	252	2.33					
13	3	33	255	1.00					
14	3	36	264	3.00					
15	3	39	270	2.00					
16	3	42	277	2.33					
17	3	45	285	2.67					
18	3	48	290	1.67					
19	3	51	297	2.33					
20	5	56	308	2.20					
21	5	61	318	2.00					
22	5	66	328	2.00					
23	5	71	338	2.00					
24	5	76	345	1.40					
25	5	81	353	1.60					

UK DCP V3.1

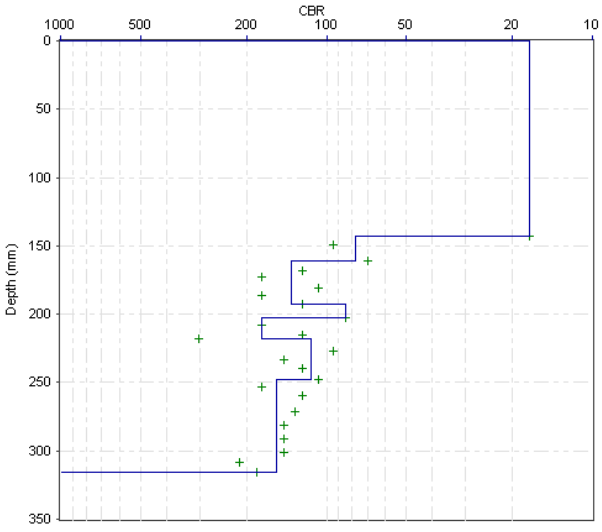
DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	1.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	15.00	17	143	143	Subgrade	--	--	--	--
2	3.60	78	18	161	Subgrade	--	--	--	--
3	2.13	136	32	193	Subgrade	--	--	--	--
4	3.33	85	10	203	Subgrade	--	--	--	--
5	1.67	176	15	218	Subgrade	--	--	--	--
6	2.50	115	30	248	Subgrade	--	--	--	--
7	1.89	154	68	316	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.61	1.61
Pavement Strength	--	1.61	1.61

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km): 2.000
Direction:
Location/Offset: Lay-by / other
Cone Angle: 60 degrees
Zero Error (mm): 37
Test Date: 18/02/2021

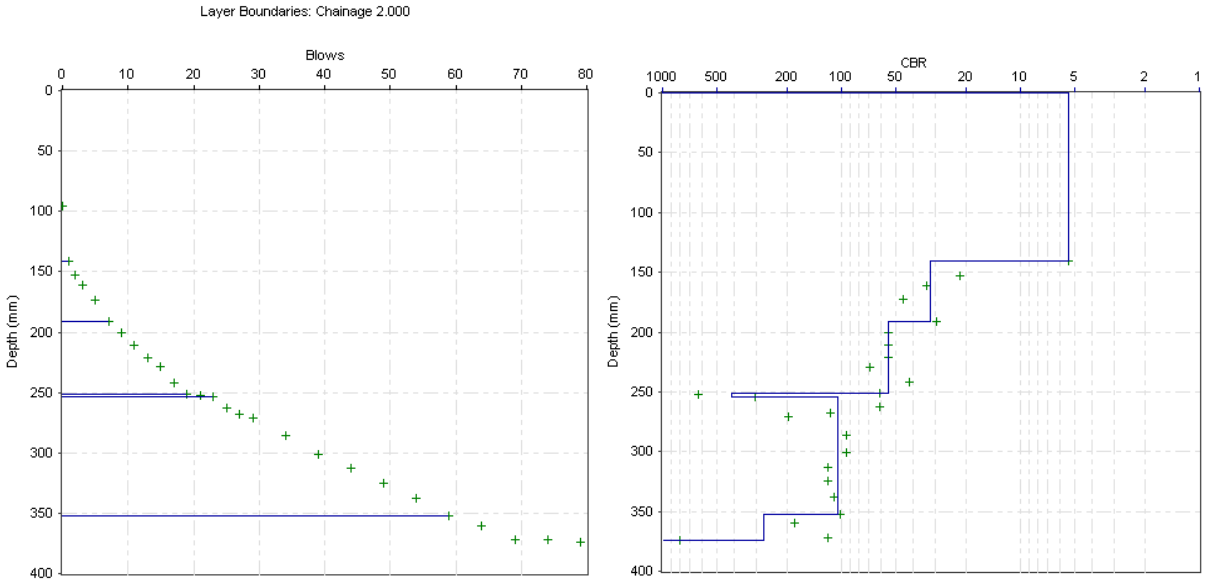
Surface Type: Unpaved
Thickness (mm): 0
Base Type:
Thickness (mm):
Surface Moisture: Unknown
Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	133	0.00	26	5	74	409	0.00
2	1	1	178	45.00	27	5	79	411	0.40
3	1	2	190	12.00					
4	1	3	198	8.00					
5	2	5	210	6.00					
6	2	7	228	9.00					
7	2	9	238	5.00					
8	2	11	248	5.00					
9	2	13	258	5.00					
10	2	15	266	4.00					
11	2	17	279	6.50					
12	2	19	288	4.50					
13	2	21	289	0.50					
14	2	23	291	1.00					
15	2	25	300	4.50					
16	2	27	305	2.50					
17	2	29	308	1.50					
18	5	34	323	3.00					
19	5	39	338	3.00					
20	5	44	350	2.40					
21	5	49	362	2.40					
22	5	54	375	2.60					
23	5	59	389	2.80					
24	5	64	397	1.60					
25	5	69	409	2.40					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	2.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	45.00	5	141	141	Subgrade	--	--	--	--
2	8.33	32	50	191	Subgrade	--	--	--	--
3	5.00	55	60	251	Subgrade	--	--	--	--
4	0.75	409	3	254	Subgrade	--	--	--	--
5	2.72	105	98	352	Subgrade	--	--	--	--
6	1.10	273	22	374	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	0.69	0.69
Pavement Strength	--	0.69	0.69

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

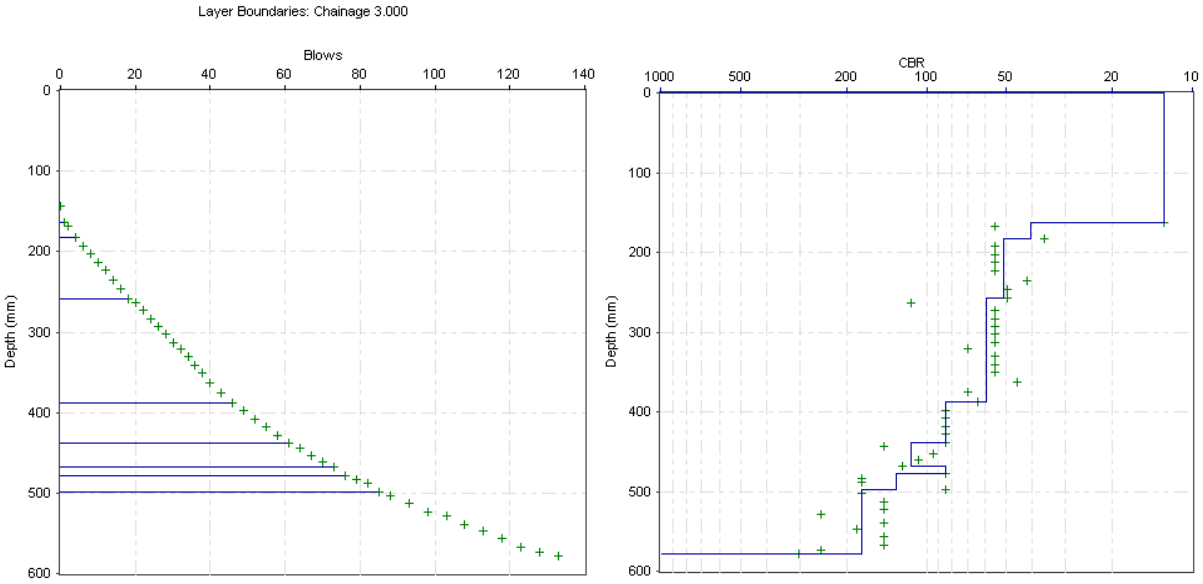
Chainage (km):	3.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	180	0.00	26	3	52	445	3.33
2	1	1	200	20.00	27	3	55	455	3.33
3	1	2	205	5.00	28	3	58	465	3.33
4	2	4	220	7.50	29	3	61	475	3.33
5	2	6	230	5.00	30	3	64	481	2.00
6	2	8	240	5.00	31	3	67	490	3.00
7	2	10	250	5.00	32	3	70	498	2.67
8	2	12	260	5.00	33	3	73	505	2.33
9	2	14	273	6.50	34	3	76	515	3.33
10	2	16	284	5.50	35	3	79	520	1.67
11	2	18	295	5.50	36	3	82	525	1.67
12	2	20	300	2.50	37	3	85	535	3.33
13	2	22	310	5.00	38	3	88	540	1.67
14	2	24	320	5.00	39	5	93	550	2.00
15	2	26	330	5.00	40	5	98	560	2.00
16	2	28	340	5.00	41	5	103	566	1.20
17	2	30	350	5.00	42	5	108	576	2.00
18	2	32	358	4.00	43	5	113	584	1.60
19	2	34	368	5.00	44	5	118	594	2.00
20	2	36	378	5.00	45	5	123	604	2.00
21	2	38	388	5.00	46	5	128	610	1.20
22	2	40	400	6.00	47	5	133	615	1.00
23	3	43	412	4.00					
24	3	46	425	4.33					
25	3	49	435	3.33					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	3.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	20.00	13	163	163	Subgrade	--	--	--	--
2	6.67	41	20	183	Subgrade	--	--	--	--
3	5.36	51	75	258	Subgrade	--	--	--	--
4	4.64	60	130	388	Subgrade	--	--	--	--
5	3.33	85	50	438	Subgrade	--	--	--	--
6	2.50	115	30	468	Subgrade	--	--	--	--
7	3.33	85	10	478	Subgrade	--	--	--	--
8	2.22	130	20	498	Subgrade	--	--	--	--
9	1.67	176	80	578	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.41	1.41
Pavement Strength	--	1.41	1.41

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

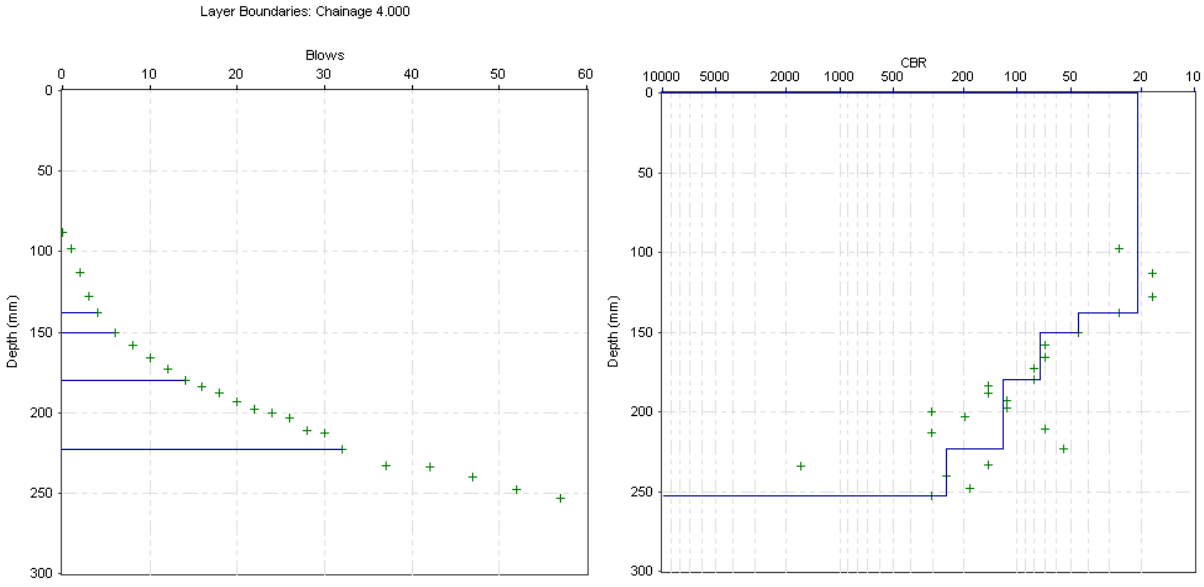
Chainage (km):	4.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	125	0.00					
2	1	1	135	10.00					
3	1	2	150	15.00					
4	1	3	165	15.00					
5	1	4	175	10.00					
6	2	6	187	6.00					
7	2	8	195	4.00					
8	2	10	203	4.00					
9	2	12	210	3.50					
10	2	14	217	3.50					
11	2	16	221	2.00					
12	2	18	225	2.00					
13	2	20	230	2.50					
14	2	22	235	2.50					
15	2	24	237	1.00					
16	2	26	240	1.50					
17	2	28	248	4.00					
18	2	30	250	1.00					
19	2	32	260	5.00					
20	5	37	270	2.00					
21	5	42	271	0.20					
22	5	47	277	1.20					
23	5	52	285	1.60					
24	5	57	290	1.00					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	4.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	12.50	21	138	138	Subgrade	--	--	--	--
2	6.00	45	12	150	Subgrade	--	--	--	--
3	3.75	75	30	180	Subgrade	--	--	--	--
4	2.39	120	43	223	Subgrade	--	--	--	--
5	1.20	249	30	253	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.72	1.72
Pavement Strength	--	1.72	1.72

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

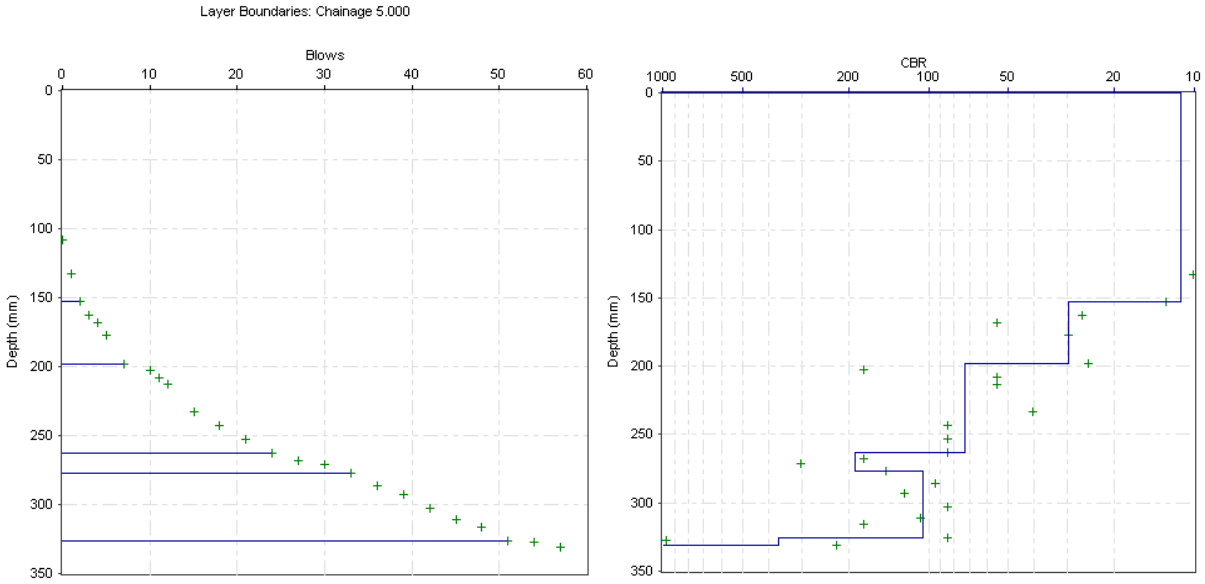
Chainage (km):	5.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	145	0.00					
2	1	1	170	25.00					
3	1	2	190	20.00					
4	1	3	200	10.00					
5	1	4	205	5.00					
6	1	5	214	9.00					
7	2	7	235	10.50					
8	3	10	240	1.67					
9	1	11	245	5.00					
10	1	12	250	5.00					
11	3	15	270	6.67					
12	3	18	280	3.33					
13	3	21	290	3.33					
14	3	24	300	3.33					
15	3	27	305	1.67					
16	3	30	308	1.00					
17	3	33	314	2.00					
18	3	36	323	3.00					
19	3	39	330	2.33					
20	3	42	340	3.33					
21	3	45	348	2.67					
22	3	48	353	1.67					
23	3	51	363	3.33					
24	3	54	364	0.33					
25	3	57	368	1.33					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	5.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	22.50	11	153	153	Subgrade	--	--	--	--
2	9.00	30	45	198	Subgrade	--	--	--	--
3	3.82	73	65	263	Subgrade	--	--	--	--
4	1.56	189	14	277	Subgrade	--	--	--	--
5	2.72	105	49	326	Subgrade	--	--	--	--
6	0.83	366	5	331	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.32	1.32
Pavement Strength	--	1.32	1.32

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km): 6.000
Direction:
Location/Offset: Lay-by / other
Cone Angle: 60 degrees
Zero Error (mm): 37
Test Date: 18/02/2021

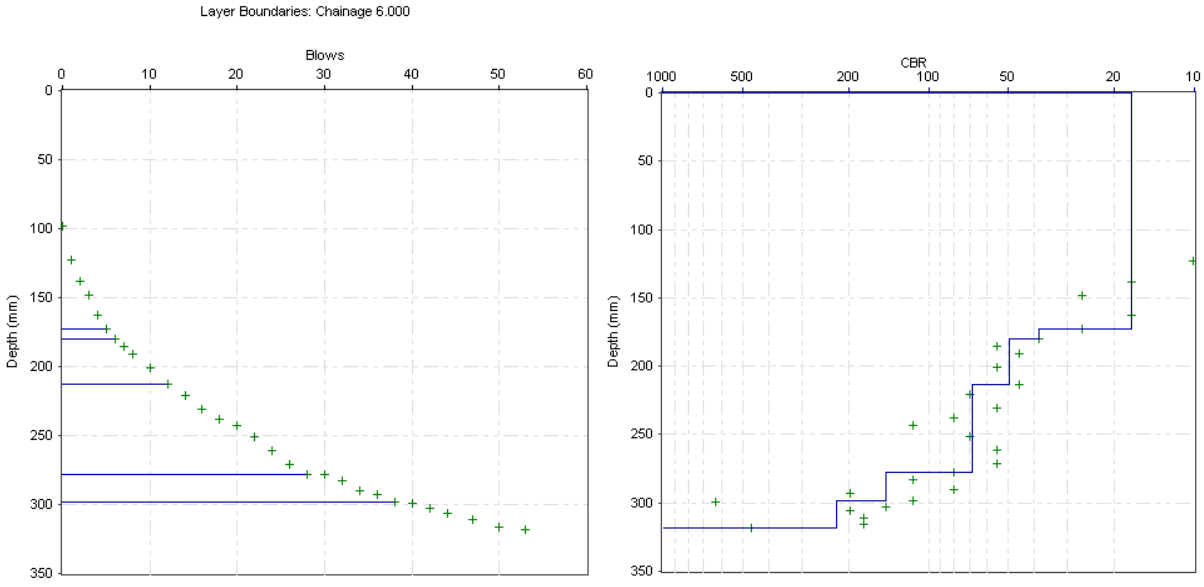
Surface Type: Unpaved
Thickness (mm): 0
Base Type:
Thickness (mm):
Surface Moisture: Unknown
Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	135	0.00	26	2	42	340	2.00
2	1	1	160	25.00	27	2	44	343	1.50
3	1	2	175	15.00	28	3	47	348	1.67
4	1	3	185	10.00	29	3	50	353	1.67
5	1	4	200	15.00	30	3	53	355	0.67
6	1	5	210	10.00					
7	1	6	217	7.00					
8	1	7	222	5.00					
9	1	8	228	6.00					
10	2	10	238	5.00					
11	2	12	250	6.00					
12	2	14	258	4.00					
13	2	16	268	5.00					
14	2	18	275	3.50					
15	2	20	280	2.50					
16	2	22	288	4.00					
17	2	24	298	5.00					
18	2	26	308	5.00					
19	2	28	315	3.50					
20	2	30	315	0.00					
21	2	32	320	2.50					
22	2	34	327	3.50					
23	2	36	330	1.50					
24	2	38	335	2.50					
25	2	40	336	0.50					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	6.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	15.00	17	173	173	Subgrade	--	--	--	--
2	7.00	39	7	180	Subgrade	--	--	--	--
3	5.50	50	33	213	Subgrade	--	--	--	--
4	4.06	69	65	278	Subgrade	--	--	--	--
5	2.00	145	20	298	Subgrade	--	--	--	--
6	1.33	223	20	318	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.61	1.61
Pavement Strength	--	1.61	1.61

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Tests Summary Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Test Details					Upper Layers			Test Layers			Pavement Strength	
No.	**Test Date**	**Chainage (km)**	**Location**	**Offset (m)**	**Surface Type**	**Surface Moisture**	**Base Type**	**Base Thickness (mm)**	**Sub-base Thickness (mm)**	**Subgrade CBR (%)**	**SN**	**SNP**
1	18/02/2021	1.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	17	--	1.61
2	18/02/2021	2.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	5	--	0.69
3	18/02/2021	3.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	13	--	1.41
4	18/02/2021	4.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	21	--	1.72
5	18/02/2021	5.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	11	--	1.32
6	18/02/2021	6.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	17	--	1.61

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 5

GEOTECHNICAL AND GEOCHEMICAL LABORATORY TEST RESULTS; COMPOSITE A-LINE PLOT; COMPOSITE PLOT OF PSD GRAPHS

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 1 / 2

DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425μm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Modified Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %							
BH01	1.40	DS3	19	96	20	40	19	21	0.05	0.00	CI	Firm to stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH02	1.70	DS5	14	57	25	32	17	15	0.53	-0.20	CL	Stiff friable light grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH03	2.75	DS6	7	48	14	25	15	10	-0.10	-0.84	CL	Very stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH04	0.55	DS2	27	72	38	43	22	21	0.76	0.24	CI	Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.
BH04	1.80	DS5	12	40	30	30	16	14	1.00	-0.29	CL	Stiff friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH05	0.60	DS2	12	62	19	45	22	23	-0.13	-0.43	CI	Firm friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH05	1.70	DS4	12	65	18	38	19	19	-0.05	-0.37	CI	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH06	1.00	DS2	17	66	26	32	16	16	0.63	0.06	CL	Soft friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH07	1.00	DS3	13	41	32	31	16	15	1.07	-0.19	CL	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH08	0.75	DS2	26	83	31	50	24	26	0.27	0.08	CI/CH	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH08	1.30	DS4	22	80	28	41	21	20	0.35	0.05	CI	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH09	0.95	DS1	18	69	26	40	19	21	0.33	-0.05	CI	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH10	1.00	DS3	16	78	21	41	20	21	0.05	-0.19	CI	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH11	0.60	DS2	25	85	29	41	22	19	0.37	0.16	CI	Firm friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH11	2.20	DS5	11	51	22	33	16	17	0.35	-0.29	CL	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH12	0.45	DS1	12	40	30	34	17	17	0.76	-0.29	CL	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP01	0.80	DS2	22	84	26	39	20	19	0.32	0.11	CI	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP01	1.15	DS3	20	75	27	39	20	19	0.37	0.00	CI	Firm to stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 & 5.2 Sample preparations

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index. Modified liquidity index based on natural moisture content

Remarks :

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 2 / 2

DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425μm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Modified Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %							
TP02	1.60	BS2	20	68	29	34	17	17	0.71	0.18	CL	Suspected MADE GROUND: Firm friable brown with orange mottling slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
TP02	3.00	ES4	18	48	38	39	20	19	0.95	-0.11	CI	Suspected MADE GROUND: Firm friable brown with orange mottling slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
TP03	0.90	DS2	53	61	87	34	18	16	4.31	2.19	CL	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP04	0.70	DS2	14	60	23	35	17	18	0.33	-0.17	CL/CI	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP05	0.50	DS2	14	51	27	30	16	14	0.79	-0.14	CL	Firm friable brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
TP05	1.70	DS3	14	42	33	30	16	14	1.21	-0.14	CL	Firm friable dark grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
TP06	1.90	DS2	19	51	37	34	18	16	1.19	0.06	CL	Firm friable dark grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP08	1.10	DS2	20	61	33	34	17	17	0.94	0.18	CL	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP09	0.50	DS1	20	76	26	41	21	20	0.25	-0.05	CI	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP10	0.70	DS1	14	60	23	35	17	18	0.33	-0.17	CL/CI	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP11	0.40	DS1	9	53	18	28	15	13	0.23	-0.43	CL	Stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP11	2.40	DS2	13	61	21	34	15	19	0.32	-0.11	CL	Stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 & 5.2 Sample preparations

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index. Modified liquidity index based on natural moisture content

Remarks :

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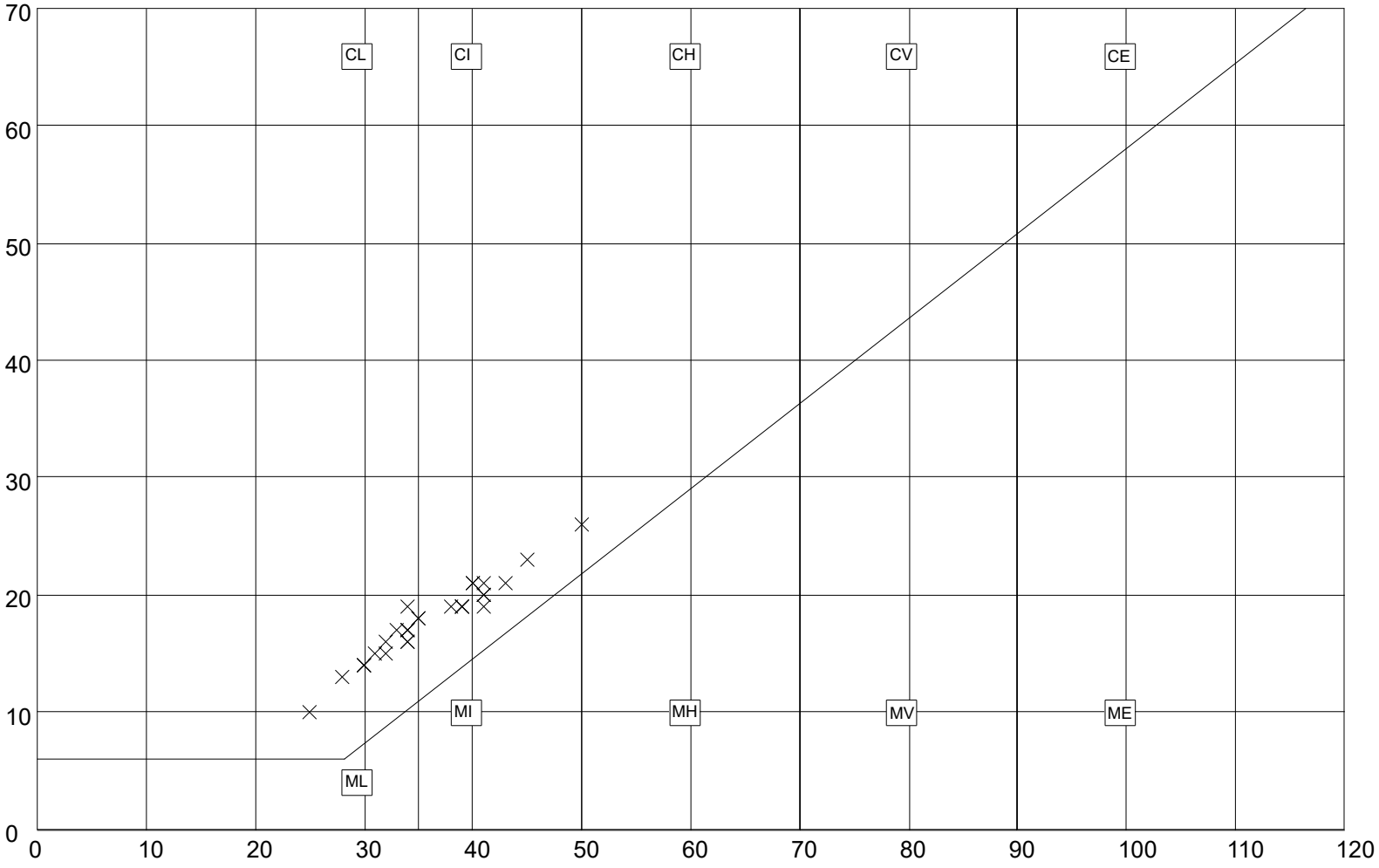

Plasticity Index %

Liquid Limit %

GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site Proposed Development Site, Profile Park, Grange Castle, Dublin			
Title Composite A-Line Plot			
Drawn EB	**Checked** RB	**Approved** RB	**Job No.** 002.ROI21
Date 02/04/2021	**Date** 02/04/2021	**Date** 02/04/2021	**Figure No.** 4

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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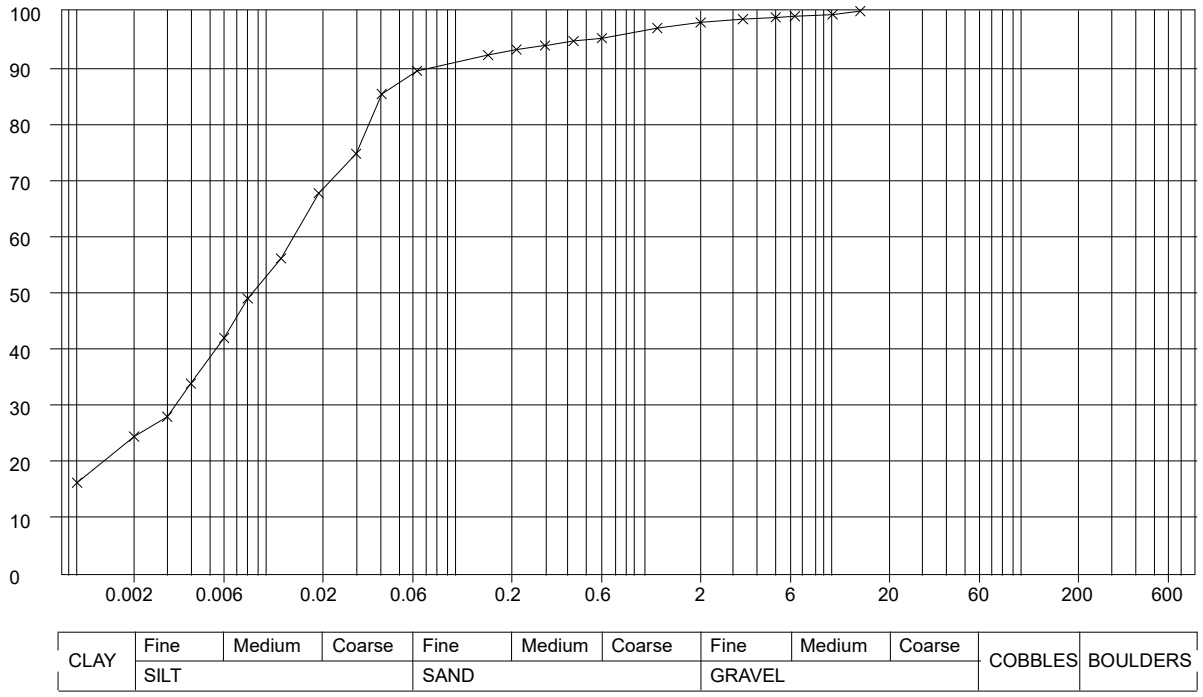
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH01	2.30	DS6	Firm to stiff thinly laminated light grey brown slightly sandy silty CLAY.



Grading Analysis	
D85	40.7 µm
D60	14.4 µm
D10	<1.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	2.0%
Sand	9.1%
Silt	64.4%
Clay	24.5%

Sieve / Particle Size	% Passing
14 mm	100.0
10 mm	99.4
6.3 mm	99.1
5 mm	98.9
3.35 mm	98.6
2 mm	98.0
1.18 mm	97.0
600 µm	95.2
425 µm	94.7
300 µm	93.9
212 µm	93.2
150 µm	92.2
63 µm	89.4
41 µm	85.3
30 µm	74.7
19 µm	67.7
12 µm	56.1
8 µm	49.0
6 µm	42.0
4 µm	33.9
3 µm	28.0
2 µm	24.5
1 µm	16.3

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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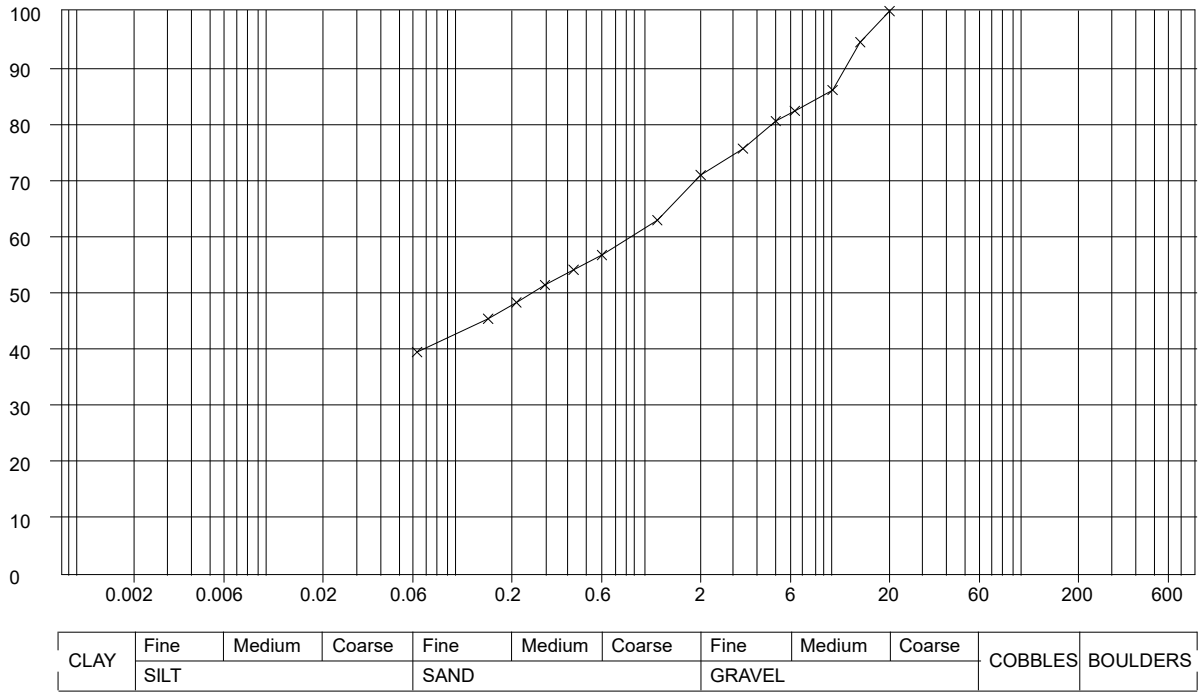
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH01	3.90 - 3.98	DS11	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	94.5
10 mm	86.0
6.3 mm	82.3
5 mm	80.5
3.35 mm	75.6
2 mm	70.9
1.18 mm	62.9
600 µm	56.7
425 µm	54.1
300 µm	51.4
212 µm	48.3
150 µm	45.4
63 µm	39.5

Grading Analysis	
D85	9.0 mm
D60	908.7 µm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	29.1%
Sand	31.4%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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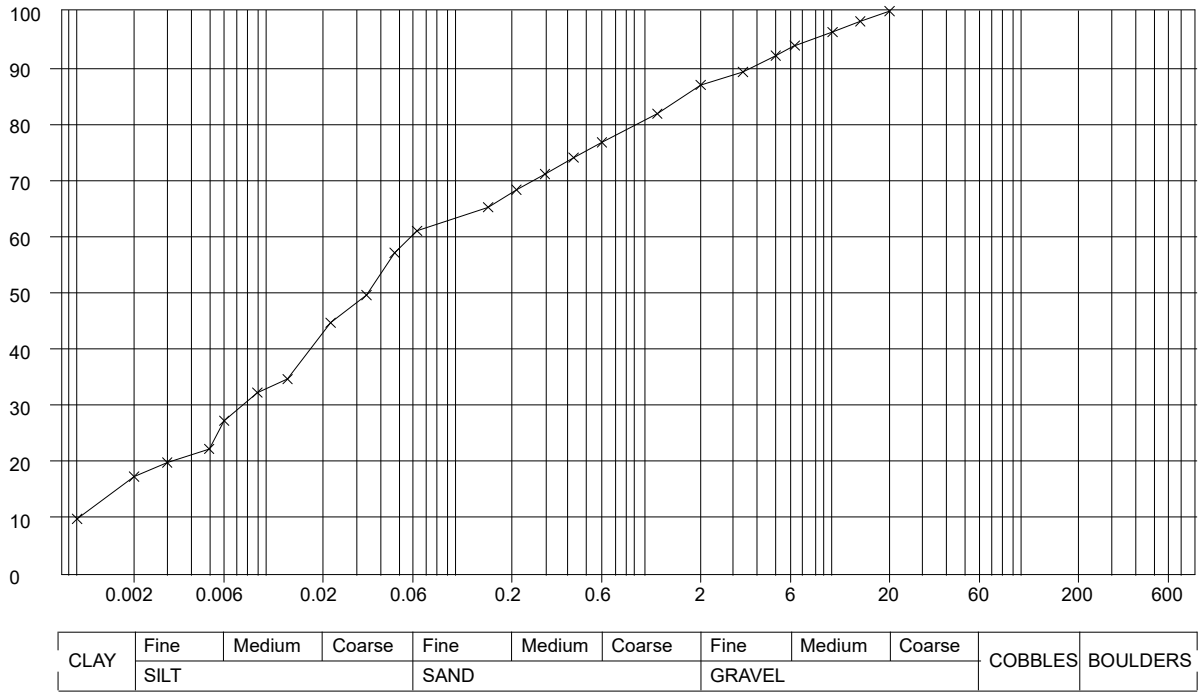
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	1.00 - 1.45	DS3	Soft friable light brown slightly sandy slightly gravelly silty CLAY containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	98.2
10 mm	96.3
6.3 mm	93.9
5 mm	92.1
3.35 mm	89.2
2 mm	86.9
1.18 mm	81.8
600 µm	76.7
425 µm	74.0
300 µm	71.1
212 µm	68.3
150 µm	65.2
63 µm	61.0
48 µm	57.1
34 µm	49.6
22 µm	44.7
13 µm	34.7
9 µm	32.3
6 µm	27.3
5 µm	22.3
3 µm	19.9
2 µm	17.4
1 µm	9.9

Grading Analysis	
D85	1.7 mm
D60	59.2 µm
D10	1.0 µm
Uniformity Coefficient	58.4

Particle Proportions	
Cobbles + Boulders	-
Gravel	13.1%
Sand	26.6%
Silt	42.9%
Clay	17.4%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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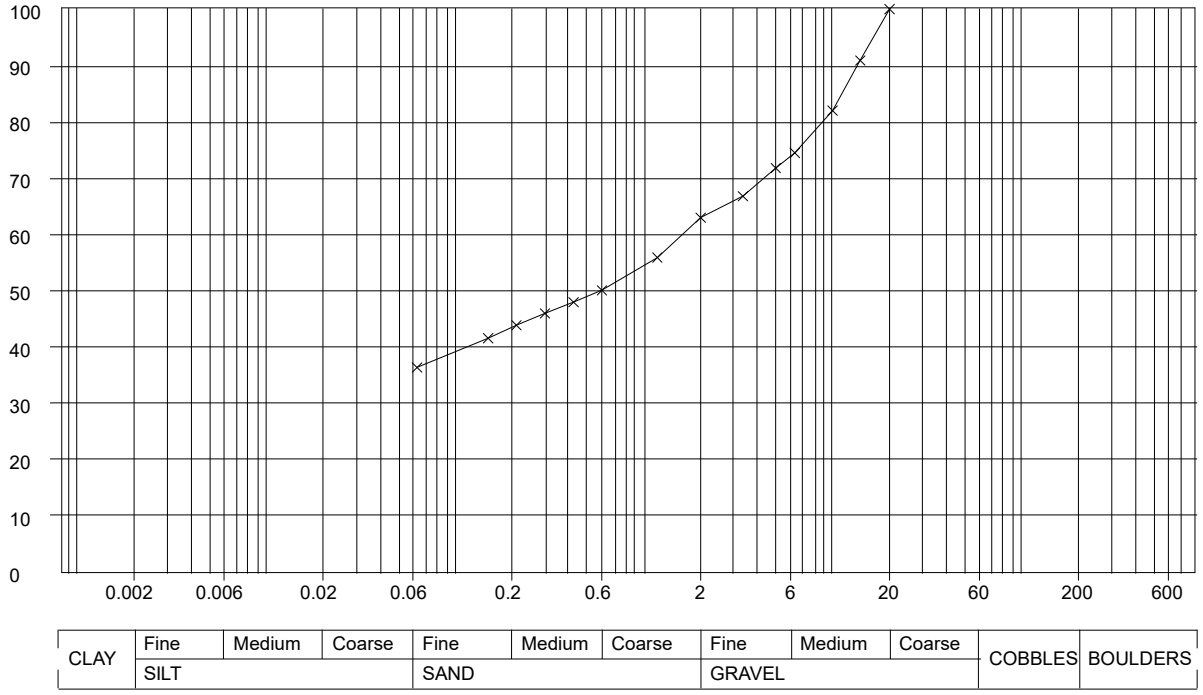
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	4.05	DS12	Completely weathered MUDSTONE: Encountered in situ as stiff silty CLAY.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	90.9
10 mm	82.0
6.3 mm	74.5
5 mm	71.8
3.35 mm	66.8
2 mm	63.0
1.18 mm	55.9
600 µm	50.1
425 µm	48.0
300 µm	46.0
212 µm	43.9
150 µm	41.6
63 µm	36.4

Grading Analysis	
D85	11.3 mm
D60	1.7 mm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	37.0%
Sand	26.6%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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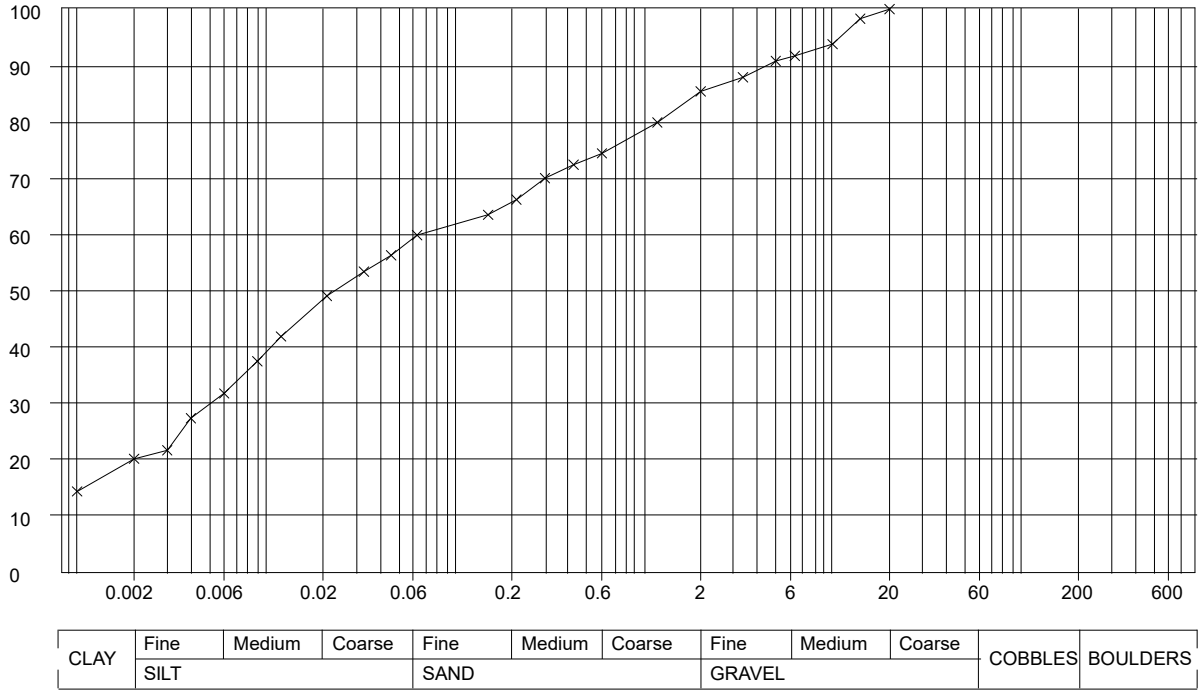
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH04	0.55	DS2	Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.



Grading Analysis	
D85	1.9 mm
D60	65.4 µm
D10	<1.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	14.6%
Sand	26.1%
Silt	39.1%
Clay	20.2%

Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	98.3
10 mm	93.8
6.3 mm	91.7
5 mm	90.8
3.35 mm	87.9
2 mm	85.4
1.18 mm	79.9
600 µm	74.4
425 µm	72.4
300 µm	70.0
212 µm	66.2
150 µm	63.5
63 µm	59.9
46 µm	56.3
33 µm	53.4
21 µm	49.1
12 µm	41.9
9 µm	37.5
6 µm	31.8
4 µm	27.4
3 µm	21.7
2 µm	20.2
1 µm	14.4

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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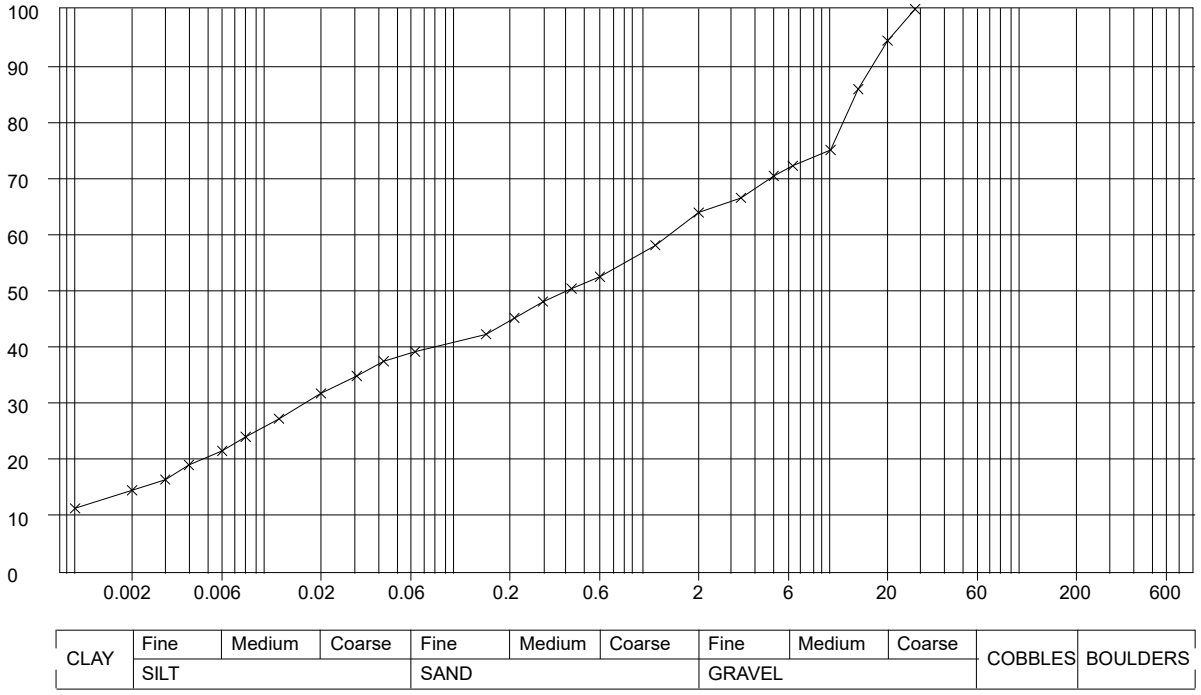
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	0.60	DS2	Firm friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	94.4
14 mm	85.8
10 mm	75.0
6.3 mm	72.2
5 mm	70.4
3.35 mm	66.5
2 mm	63.9
1.18 mm	58.1
600 µm	52.5
425 µm	50.4
300 µm	48.1
212 µm	45.2
150 µm	42.3
63 µm	39.2
43 µm	37.5
31 µm	34.9
20 µm	31.8
12 µm	27.3
8 µm	24.1
6 µm	21.6
4 µm	19.1
3 µm	16.5
2 µm	14.6
1 µm	11.4

Grading Analysis	
D85	13.7 mm
D60	1.4 mm
D10	<1.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	36.1%
Sand	24.9%
Silt	24.4%
Clay	14.6%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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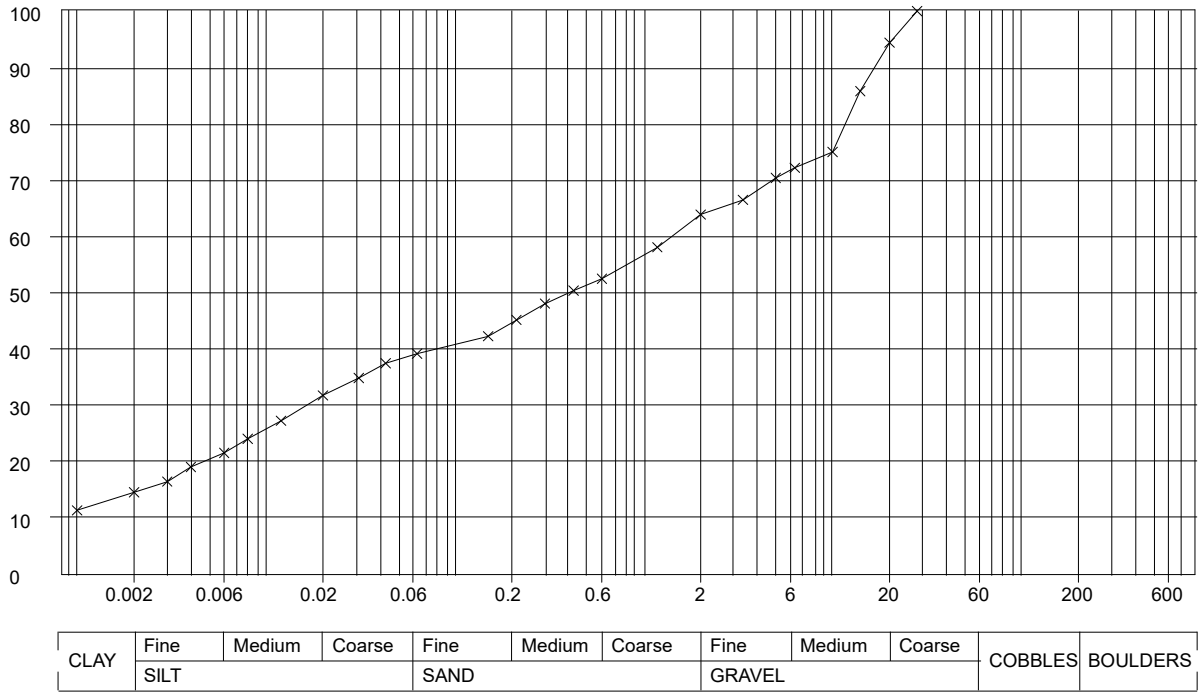
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	1.00	BS1	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	94.4
14 mm	85.8
10 mm	75.0
6.3 mm	72.2
5 mm	70.4
3.35 mm	66.5
2 mm	63.9
1.18 mm	58.1
600 µm	52.5
425 µm	50.4
300 µm	48.1
212 µm	45.2
150 µm	42.3
63 µm	39.2
43 µm	37.5
31 µm	34.9
20 µm	31.8
12 µm	27.3
8 µm	24.1
6 µm	21.6
4 µm	19.1
3 µm	16.5
2 µm	14.6
1 µm	11.4

Grading Analysis	
D85	13.7 mm
D60	1.4 mm
D10	<1.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	36.1%
Sand	24.9%
Silt	24.4%
Clay	14.6%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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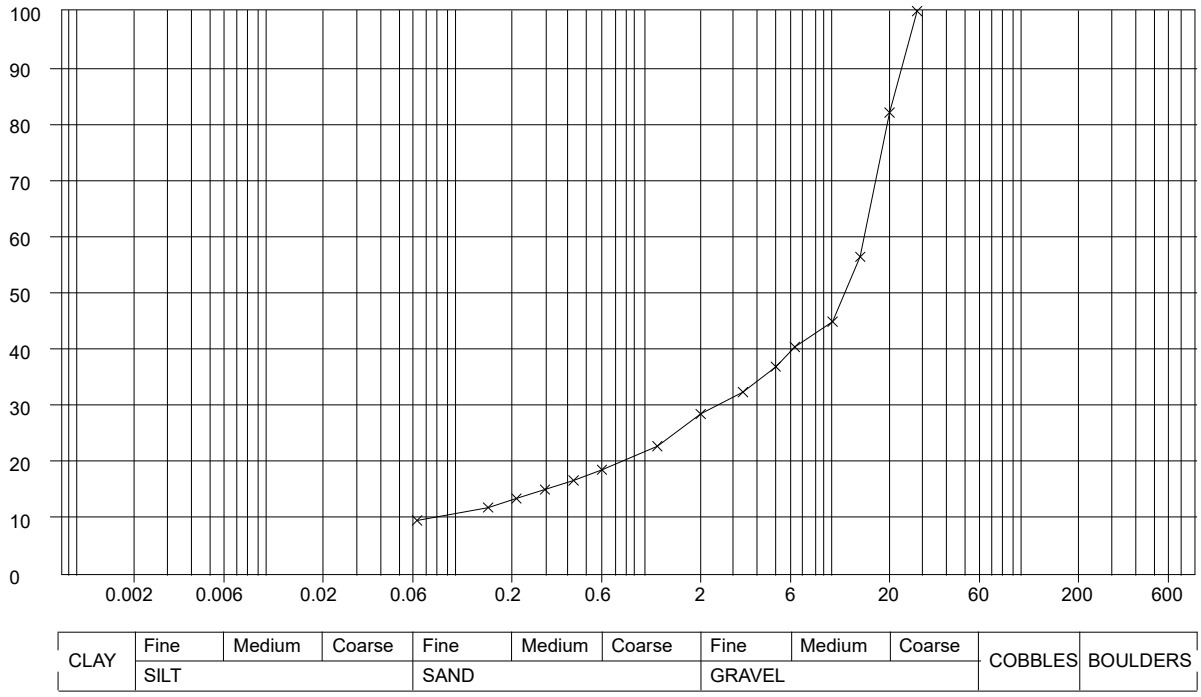
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	2.00 - 2.45	DS5	Medium dense grey brown clayey sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	82.0
14 mm	56.4
10 mm	44.9
6.3 mm	40.4
5 mm	36.9
3.35 mm	32.4
2 mm	28.5
1.18 mm	22.8
600 µm	18.6
425 µm	16.7
300 µm	15.1
212 µm	13.5
150 µm	11.9
63 µm	9.6

Grading Analysis	
D85	21.3 mm
D60	14.8 mm
D10	78.1 µm
Uniformity Coefficient	190.0

Particle Proportions	
Cobbles + Boulders	-
Gravel	71.5%
Sand	18.9%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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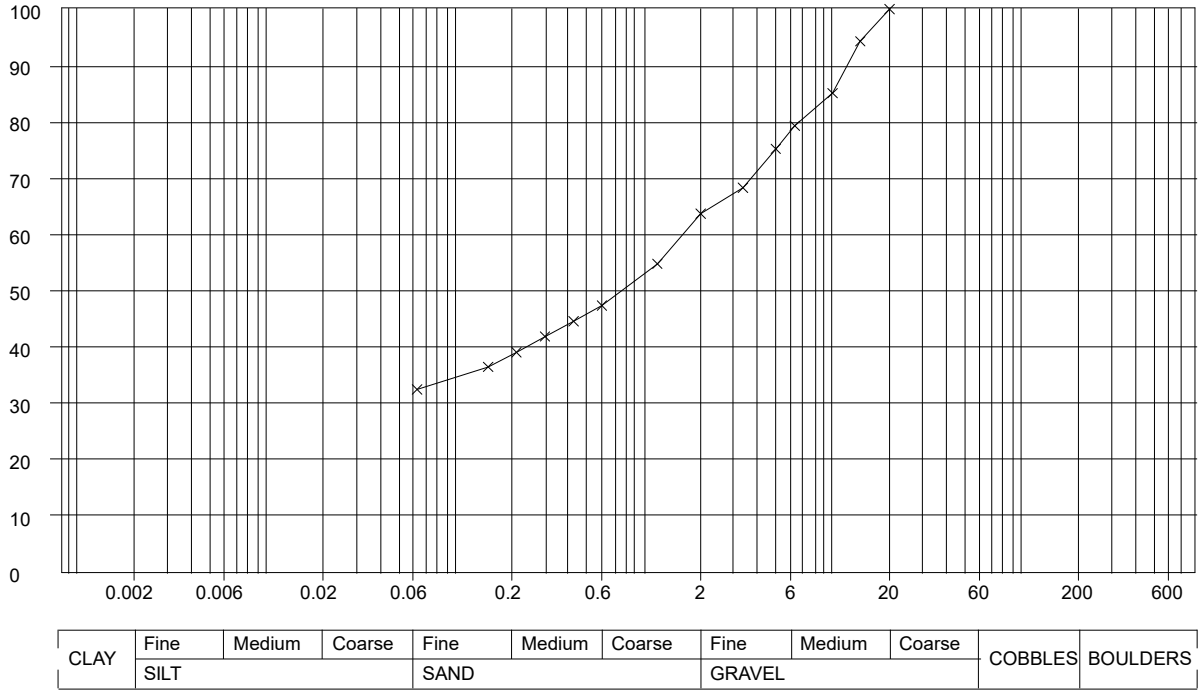
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	2.95	DS7	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	94.3
10 mm	85.1
6.3 mm	79.3
5 mm	75.2
3.35 mm	68.3
2 mm	63.7
1.18 mm	54.8
600 µm	47.4
425 µm	44.6
300 µm	41.9
212 µm	39.1
150 µm	36.5
63 µm	32.5

Grading Analysis	
D85	9.9 mm
D60	1.7 mm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	36.3%
Sand	31.2%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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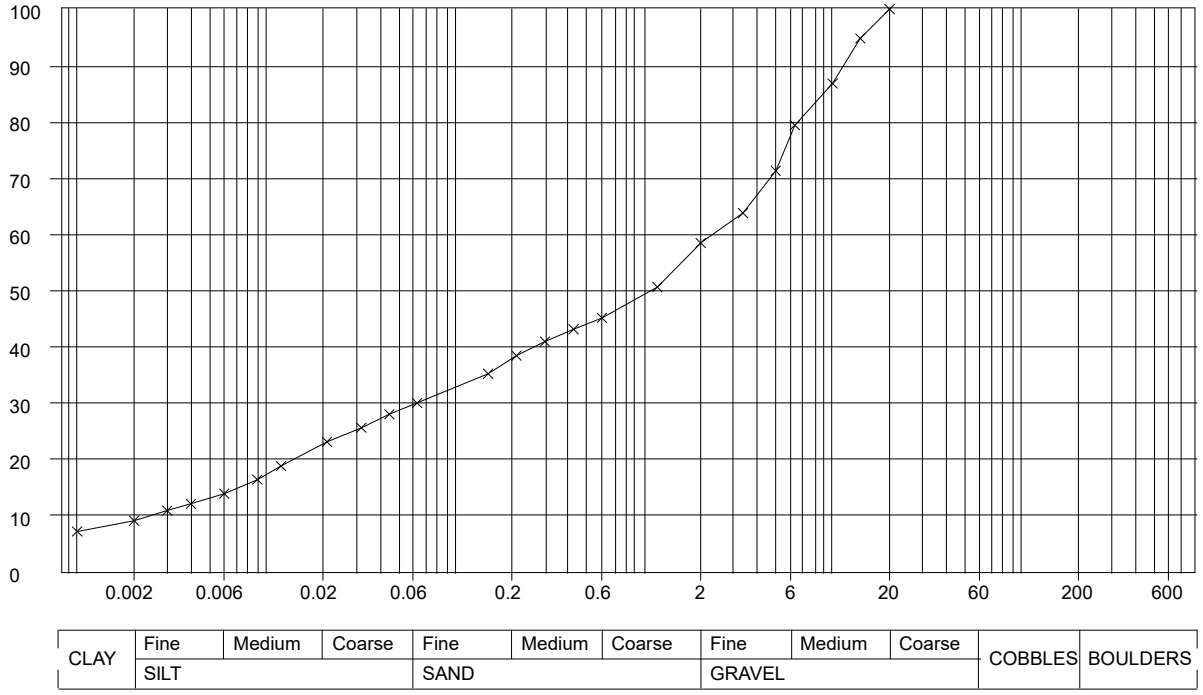
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH06	2.70 - 2.81	DS6	Completely weathered MUDSTONE: Encountered insitu as stiff slightly sandy gravelly silty CLAY.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	94.8
10 mm	86.8
6.3 mm	79.4
5 mm	71.3
3.35 mm	63.8
2 mm	58.5
1.18 mm	50.7
600 µm	45.2
425 µm	43.2
300 µm	41.0
212 µm	38.5
150 µm	35.3
63 µm	30.1
45 µm	28.1
32 µm	25.7
21 µm	23.2
12 µm	18.9
9 µm	16.5
6 µm	14.0
4 µm	12.2
3 µm	11.0
2 µm	9.2
1 µm	7.3

Grading Analysis	
D85	9.1 mm
D60	2.4 mm
D10	2.4 µm
Uniformity Coefficient	974.5

Particle Proportions	
Cobbles + Boulders	-
Gravel	41.5%
Sand	28.7%
Silt	20.6%
Clay	9.2%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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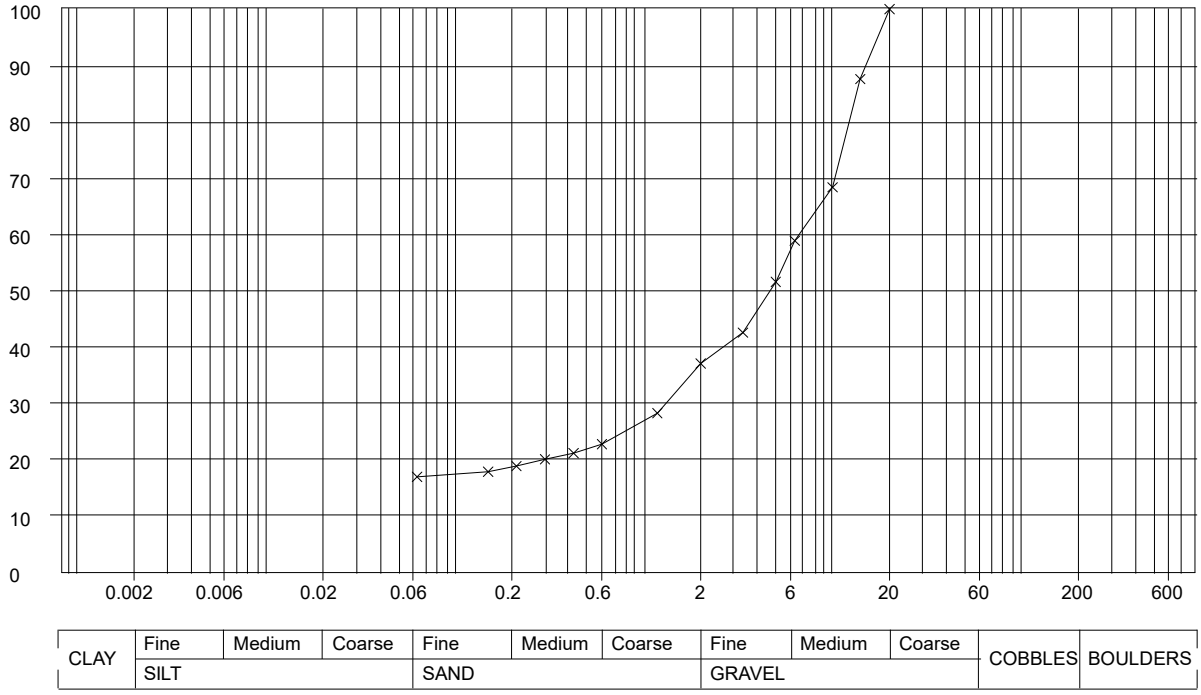
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH08	2.35	DS7	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	87.6
10 mm	68.4
6.3 mm	58.9
5 mm	51.6
3.35 mm	42.6
2 mm	37.1
1.18 mm	28.3
600 µm	22.8
425 µm	21.2
300 µm	20.1
212 µm	18.9
150 µm	17.9
63 µm	17.0

Grading Analysis	
D85	13.5 mm
D60	6.7 mm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	62.9%
Sand	20.1%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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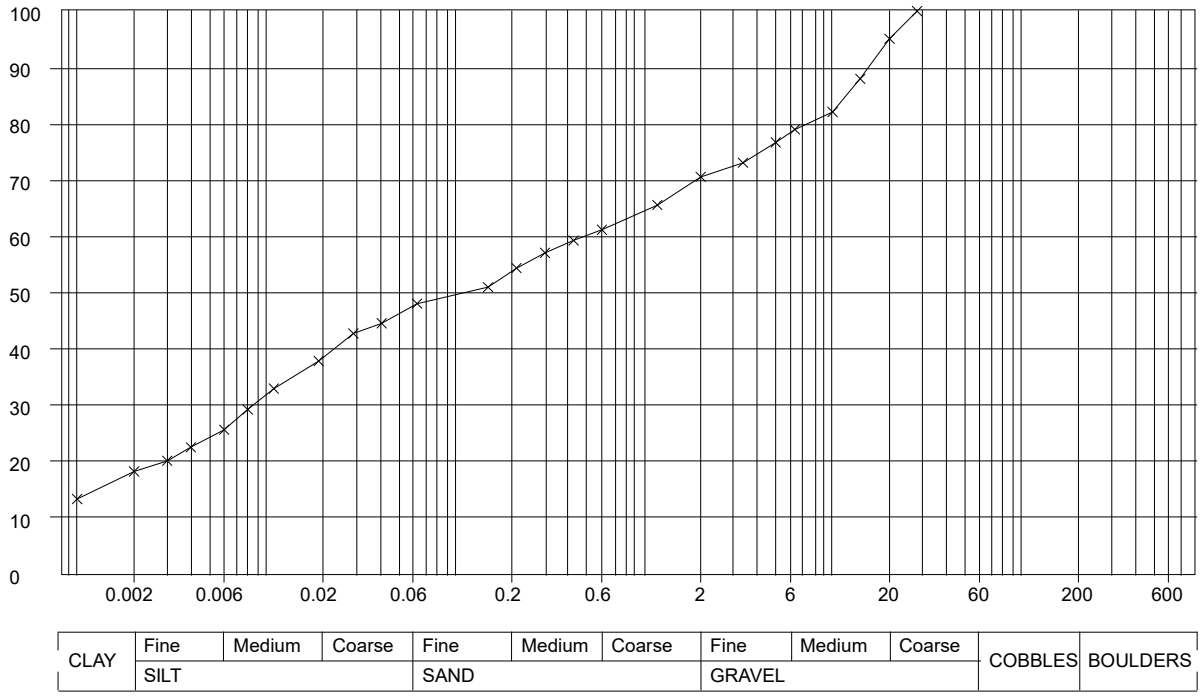
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH09	2.00 - 2.45	DS3	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	95.1
14 mm	88.0
10 mm	82.1
6.3 mm	79.0
5 mm	76.7
3.35 mm	73.1
2 mm	70.6
1.18 mm	65.6
600 µm	61.2
425 µm	59.3
300 µm	57.1
212 µm	54.4
150 µm	51.0
63 µm	48.1
41 µm	44.6
29 µm	42.8
19 µm	37.9
11 µm	33.0
8 µm	29.3
6 µm	25.7
4 µm	22.6
3 µm	20.2
2 µm	18.3
1 µm	13.4

Grading Analysis	
D85	12.0 mm
D60	489.5 µm
D10	<1.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	29.4%
Sand	22.9%
Silt	29.4%
Clay	18.3%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

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ENVIRONMENTAL SERVICES
LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

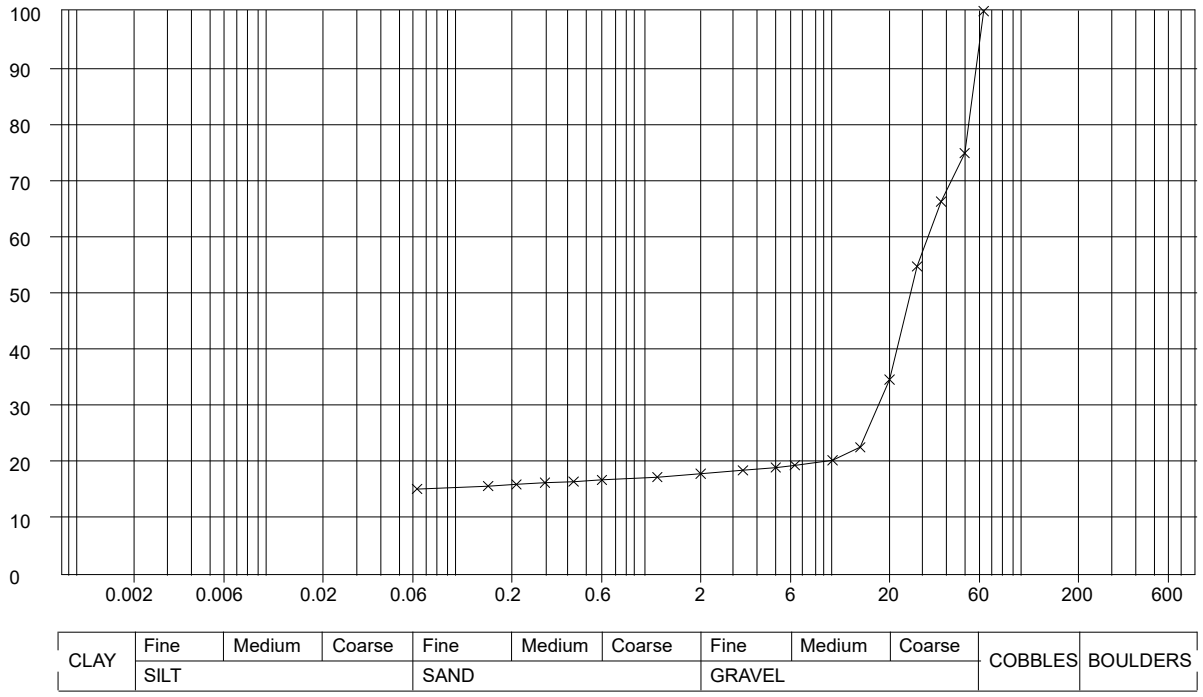
Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 13/14

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP01	2.30	DS4	Completely weathered MUDSTONE: Encountered insitu as still silty CLAY.



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	74.8
37.5 mm	66.2
28 mm	54.7
20 mm	34.6
14 mm	22.6
10 mm	20.3
6.3 mm	19.4
5 mm	19.0
3.35 mm	18.5
2 mm	17.9
1.18 mm	17.3
600 µm	16.8
425 µm	16.5
300 µm	16.3
212 µm	16.0
150 µm	15.7
63 µm	15.2

Grading Analysis	
D85	55.3 mm
D60	32.4 mm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	5.3%
Gravel	76.8%
Sand	2.7%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

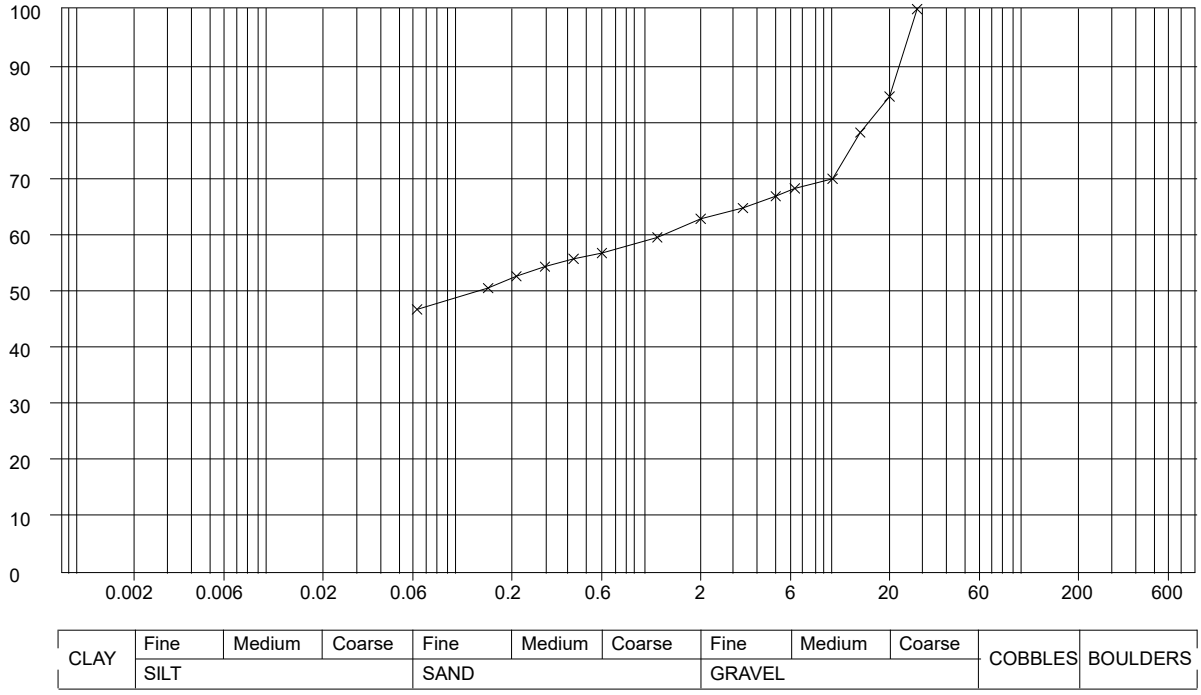
Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 14/14

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP06	2.10	DS3	Completely weathered MUDSTONE: Encountered insitu as stiff slightly sandy gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded..



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	84.5
14 mm	78.1
10 mm	69.9
6.3 mm	68.2
5 mm	66.8
3.35 mm	64.7
2 mm	62.8
1.18 mm	59.5
600 µm	56.7
425 µm	55.7
300 µm	54.3
212 µm	52.6
150 µm	50.5
63 µm	46.7

Grading Analysis	
D85	20.3 mm
D60	1.3 mm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	37.2%
Sand	16.1%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

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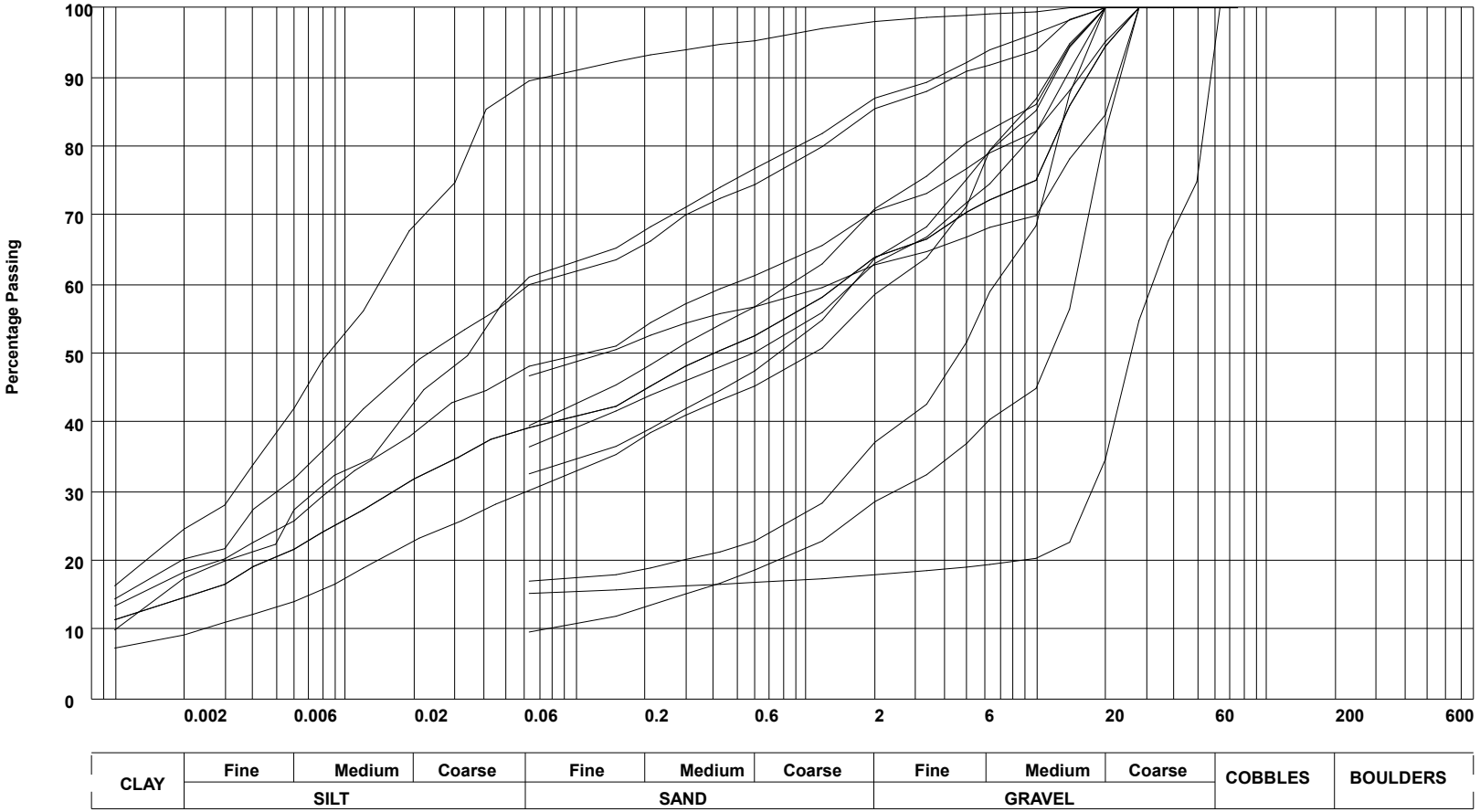

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Site Proposed Development Site, Profile Park, Grange Castle, Dublin			
Title Composite Plot of PSD Graphs			
Drawn EB	**Checked** RB	**Approved** RB	**Job No.** 002.ROI21
Date 02/04/2021	**Date** 02/04/2021	**Date** 02/04/2021	**Figure No.** 5

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Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-06865-1
Initial Date of Issue:	10-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	04-Mar-2021
Order No.:		**Date Instructed:**	04-Mar-2021
No. of Samples:	17		
Turnaround (Wkdays):	5	**Results Due:**	10-Mar-2021
Date Approved:	10-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865
Quotation No.:		**Chemtest Sample ID.:**			1154049	1154050	1154051	1154052	1154053	1154054	1154055	1154056	1154057	1154058	1154059
Order No.:		Client Sample Ref.:			DS2	DS4	DS8	DS11	DS2	DS5	DS2	DS3	DS7	DS2	DS3
		Client Sample ID.:			BH01	BH01	BH01	BH02	BH05	BH05	BH07	BH08	BH08	BH09	BH11
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			1.00	1.80	3.00	4.05	0.60	2.00	0.95	1.00	2.15	1.00	1.00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**											
Moisture	N	2030	%	0.020	10	18	18	8.4	20	12	8.8	9.2	12	13	23
pH	U	2010		4.0	[A] 9.1	[A] 8.2	[A] 8.1	[A] 9.1	[A] 8.0	[A] 9.2	[A] 9.3	[A] 9.3	[A] 9.0	[A] 8.8	[A] 8.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.035	[A] 0.035	[A] 0.012	[A] 0.088	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.031	[A] 0.11	[A] 0.16

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06865	21-06865	21-06865	21-06865	21-06865	21-06865
Quotation No.:		**Chemtest Sample ID.:**			1154060	1154061	1154062	1154063	1154064	1154065
Order No.:		Client Sample Ref.:			DS1	DS3	DS2	DS2	DS3	DS1
		Client Sample ID.:			BH12	TP01	TP04	TP06	TP08	TP11
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.45	1.15	0.70	0.90	2.30	0.40
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Moisture	N	2030	%	0.020	15	13	12	46	11	9.7
pH	U	2010		4.0	[A] 8.8	[A] 8.9	[A] 8.9	[A] 8.0	[A] 8.8	[A] 8.7
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.022	[A] 0.023	[A] 0.021	[A] 0.028	[A] 0.075	[A] 0.077

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1154049	DS2	BH01			A	Plastic Bag
1154050	DS4	BH01			A	Plastic Bag
1154051	DS8	BH01			A	Plastic Bag
1154052	DS11	BH02			A	Plastic Bag
1154053	DS2	BH05			A	Plastic Bag
1154054	DS5	BH05			A	Plastic Bag
1154055	DS2	BH07			A	Plastic Bag
1154056	DS3	BH08			A	Plastic Bag
1154057	DS7	BH08			A	Plastic Bag
1154058	DS2	BH09			A	Plastic Bag
1154059	DS3	BH11			A	Plastic Bag
1154060	DS1	BH12			A	Plastic Bag
1154061	DS3	TP01			A	Plastic Bag
1154062	DS2	TP04			A	Plastic Bag
1154063	DS2	TP06			A	Plastic Bag
1154064	DS3	TP08			A	Plastic Bag
1154065	DS1	TP11			A	Plastic Bag

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

GEOTECHNICAL
ENVIRONMENTAL SERVICES
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APPENDIX 6

ENVIRONMENTAL LABORATORY TEST RESULTS

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-06868-1
Initial Date of Issue:	10-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Robert Barry Erin Barry Grant McCullough
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	04-Mar-2021
Order No.:		**Date Instructed:**	04-Mar-2021
No. of Samples:	13		
Turnaround (Wkdays):	5	**Results Due:**	10-Mar-2021
Date Approved:	10-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:		Client Sample Ref.:			ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
		Client Sample ID.:			BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:							COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A					-		-	
Asbestos Identification	U	2192		N/A					No Asbestos Detected		No Asbestos Detected	
ACM Detection Stage	U	2192		N/A					-		-	
Moisture	N	2030	%	0.020	11	21	19	11	11	19	16	12
pH	M	2010		4.0	8.7	8.2	9.8		9.0		8.4	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	0.033	0.18		0.16		< 0.010	
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50		< 0.50		< 0.50	
Arsenic	M	2450	mg/kg	1.0	15	16	15		19		13	
Cadmium	M	2450	mg/kg	0.10	1.1	2.3	1.8		1.8		1.8	
Chromium	M	2450	mg/kg	1.0	11	21	19		11		17	
Copper	M	2450	mg/kg	0.50	61	57	59		54		85	
Mercury	M	2450	mg/kg	0.10	< 0.10	0.18	0.12		< 0.10		< 0.10	
Nickel	M	2450	mg/kg	0.50	28	46	44		42		44	
Lead	M	2450	mg/kg	0.50	20	100	36		15		26	
Selenium	M	2450	mg/kg	0.20	0.23	0.85	0.88		2.7		0.84	
Zinc	M	2450	mg/kg	0.50	41	110	83		65		91	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	41	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	28	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	17	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	19	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	1.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	42	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	44	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	150	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited					Chemtest Job No.:	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:					Chemtest Sample ID.:	1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:					Client Sample Ref.:	ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
					Client Sample ID.:	BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
					Date Sampled:	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
					Asbestos Lab:					COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Acenaphthylene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	0.61	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	1.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	1.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	0.75	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10		< 0.10	< 0.10	0.73	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2700	mg/kg	0.10		< 0.10				< 0.10		< 0.10	
Total Of 16 PAH's	M	2700	mg/kg	2.0			< 2.0	5.0	< 2.0		< 2.0		< 2.0
Total Of 17 PAH's	N	2700	mg/kg	2.0		< 2.0				< 2.0		< 2.0	
Dichlorodifluoromethane	U	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Chloromethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Vinyl Chloride	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Bromomethane	M	2760	µg/kg	20		< 20	< 20			< 20		< 20	
Chloroethane	U	2760	µg/kg	2.0		< 2.0	< 2.0			< 2.0		< 2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloroethene	M	2760	mg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Trans 1,2-Dichloroethene	M	2760	mg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0		< 5.0	< 5.0			< 5.0		< 5.0	
Trichloromethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Tetrachloromethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Benzene	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dichloroethane	M	2760	µg/kg	2.0		< 2.0	< 2.0			< 2.0		< 2.0	
Trichloroethene	N	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:		Client Sample Ref.:			ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
		Client Sample ID.:			BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:							COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0			< 5.0		< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10			< 10		< 10	
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10			< 10		< 10	
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10			< 10		< 10	
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0		< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10			< 10		< 10	
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0			< 5.0		< 5.0	
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0		< 2.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50			< 50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50			< 50		< 50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0		< 2.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited			**Chemtest Job No.:**		21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:			**Chemtest Sample ID.:**		1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:			Client Sample Ref.:		ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
			Client Sample ID.:		BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
			Date Sampled:		23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
			Asbestos Lab:						COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:		Client Sample Ref.:			ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
		Client Sample ID.:			BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:							COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
PCB 28	U	2815	mg/kg	0.010					< 0.010			
PCB 52	U	2815	mg/kg	0.010					< 0.010			
PCB 90+101	U	2815	mg/kg	0.010					< 0.010			
PCB 118	U	2815	mg/kg	0.010					< 0.010			
PCB 153	U	2815	mg/kg	0.010					< 0.010			
PCB 138	U	2815	mg/kg	0.010					< 0.010			
PCB 180	U	2815	mg/kg	0.010					< 0.010			
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10					< 0.10			

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-	-	-	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	
ACM Detection Stage	U	2192		N/A	-	-	-	-	
Moisture	N	2030	%	0.020	5.6	19	18	19	18
pH	M	2010		4.0	9.0	8.7	8.7	11.3	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.065	0.011	< 0.010	0.77	
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Arsenic	M	2450	mg/kg	1.0	20	14	18	27	
Cadmium	M	2450	mg/kg	0.10	0.63	1.7	4.5	0.51	
Chromium	M	2450	mg/kg	1.0	8.9	18	24	17	
Copper	M	2450	mg/kg	0.50	72	230	250	110	
Mercury	M	2450	mg/kg	0.10	< 0.10	0.11	0.11	< 0.10	
Nickel	M	2450	mg/kg	0.50	20	49	93	25	
Lead	M	2450	mg/kg	0.50	14	44	35	19	
Selenium	M	2450	mg/kg	0.20	0.63	0.78	0.99	< 0.20	
Zinc	M	2450	mg/kg	0.50	42	84	120	50	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	48	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	34	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	31	8.2	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	8.8	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	48	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	110	65	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	2.9	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	20	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	190	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	210	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	120	270	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Coronene	N	2700	mg/kg	0.10					
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Total Of 17 PAH's	N	2700	mg/kg	2.0					
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bromomethane	M	2760	µg/kg	20	< 20	< 20	< 20	< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloroethene	M	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Trans 1,2-Dichloroethene	M	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		Chemtest Sample ID.:			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10	< 10	< 10	
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		Chemtest Sample ID.:			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
PCB 28	U	2815	mg/kg	0.010		< 0.010			
PCB 52	U	2815	mg/kg	0.010		< 0.010			
PCB 90+101	U	2815	mg/kg	0.010		< 0.010			
PCB 118	U	2815	mg/kg	0.010		< 0.010			
PCB 153	U	2815	mg/kg	0.010		< 0.010			
PCB 138	U	2815	mg/kg	0.010		< 0.010			
PCB 180	U	2815	mg/kg	0.010		< 0.010			
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10		< 0.10			

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-06872-1
Initial Date of Issue:	13-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	04-Mar-2021
Order No.:		**Date Instructed:**	04-Mar-2021
No. of Samples:	8		
Turnaround (Wkdays):	7	**Results Due:**	12-Mar-2021
Date Approved:	13-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154089								
Sample Ref:	ES2						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH01								
Top Depth(m):	1.00								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.5	3	5	6
Loss On Ignition	2610	M	%			5.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.033	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0004	0.0010	0.0043	0.5	2	25
Barium	1455	U	0.022	0.011	0.043	0.12	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	0.0007	< 0.0005	0.0059	0.5	10	70
Copper	1455	U	0.0063	0.0041	0.012	0.0066	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0027	0.0041	0.0052	0.040	0.5	10	30
Nickel	1455	U	0.0053	0.0033	0.010	0.035	0.4	10	40
Lead	1455	U	0.0008	0.0006	0.0015	0.0063	0.5	10	50
Antimony	1455	U	0.0006	< 0.0005	0.0013	0.0007	0.06	0.7	5
Selenium	1455	U	0.0010	< 0.0005	0.0020	0.0010	0.1	0.5	7
Zinc	1455	U	0.004	< 0.003	0.008	0.004	4	50	200
Chloride	1220	U	1.6	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.65	0.73	1.3	7.2	10	150	500
Sulphate	1220	U	8.9	< 1.0	17	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	230	130	460	1400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	14	4.4	< 50	55	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	18

Leachate Test Information	
Leachant volume 1st extract/l	0.311
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.183

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154090								
Sample Ref:	ES2						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH02								
Top Depth(m):	1.00								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			2.0	3	5	6
Loss On Ignition	2610	M	%			6.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			130	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0080	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0004	0.0004	0.0007	0.0043	0.5	2	25
Barium	1455	U	0.018	< 0.005	0.036	0.014	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0035	0.0026	0.0068	0.0026	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0007	0.0012	0.0013	0.012	0.5	10	30
Nickel	1455	U	0.0014	0.0013	0.0028	0.013	0.4	10	40
Lead	1455	U	< 0.0005	0.0010	< 0.0005	0.0092	0.5	10	50
Antimony	1455	U	0.0006	0.0005	0.0012	0.0054	0.06	0.7	5
Selenium	1455	U	0.0005	< 0.0005	0.0010	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.005	< 0.003	0.010	0.004	4	50	200
Chloride	1220	U	6.5	2.1	13	24	800	15000	25000
Fluoride	1220	U	0.69	0.86	1.3	8.4	10	150	500
Sulphate	1220	U	120	18	240	260	1000	20000	50000
Total Dissolved Solids	1020	N	310	91	590	1100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	11	4.2	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	21

Leachate Test Information	
Leachant volume 1st extract/l	0.303
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.131

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154091								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH03								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.3	3	5	6
Loss On Ignition	2610	M	%			5.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				10.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.023	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.020	0.015	0.039	0.15	0.5	2	25
Barium	1455	U	0.031	0.016	0.061	0.17	20	100	300
Cadmium	1455	U	0.0053	0.0013	0.010	0.014	0.04	1	5
Chromium	1455	U	0.011	0.0044	0.021	0.047	0.5	10	70
Copper	1455	U	0.13	0.060	0.25	0.061	2	50	100
Mercury	1455	U	0.00020	0.00006	0.00038	0.00065	0.01	0.2	2
Molybdenum	1455	U	0.027	0.0068	0.053	0.077	0.5	10	30
Nickel	1455	U	0.049	0.024	0.096	0.25	0.4	10	40
Lead	1455	U	0.016	0.011	0.030	0.11	0.5	10	50
Antimony	1455	U	0.014	0.0082	0.028	0.084	0.06	0.7	5
Selenium	1455	U	0.027	0.014	0.053	0.14	0.1	0.5	7
Zinc	1455	U	0.024	0.016	0.048	0.17	4	50	200
Chloride	1220	U	8.2	5.6	16	57	800	15000	25000
Fluoride	1220	U	0.35	0.26	< 1.0	2.6	10	150	500
Sulphate	1220	U	63	18	120	200	1000	20000	50000
Total Dissolved Solids	1020	N	200	110	390	1100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	38	20	75	210	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	20

Leachate Test Information	
Leachant volume 1st extract/l	0.307
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.081

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154092								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH04								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.83	3	5	6
Loss On Ignition	2610	M	%			3.0	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.095	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	0.0002	< 0.0002	0.0021	0.5	2	25
Barium	1455	U	0.017	0.006	0.035	0.073	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0008	0.0006	0.0016	0.0007	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.093	0.057	0.18	0.60	0.5	10	30
Nickel	1455	U	0.0008	< 0.0005	0.0015	0.0006	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0017	0.0012	0.0034	0.012	0.06	0.7	5
Selenium	1455	U	0.0042	0.0029	0.0083	0.030	0.1	0.5	7
Zinc	1455	U	0.003	< 0.003	0.007	< 0.003	4	50	200
Chloride	1220	U	5.6	1.9	11	22	800	15000	25000
Fluoride	1220	U	0.60	0.39	1.2	4.1	10	150	500
Sulphate	1220	U	130	19	260	280	1000	20000	50000
Total Dissolved Solids	1020	N	290	91	580	1100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	4.1	< 2.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	10

Leachate Test Information	
Leachant volume 1st extract/l	0.330
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.148

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154093								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH05								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	24-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.4	3	5	6
Loss On Ignition	2610	M	%			4.6	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.012	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0009	0.0012	0.0018	0.011	0.5	2	25
Barium	1455	U	< 0.005	< 0.005	< 0.0005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	0.0009	0.0011	0.0017	0.011	0.5	10	70
Copper	1455	U	0.0063	0.0048	0.012	0.0038	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0006	0.0007	0.0011	0.0069	0.5	10	30
Nickel	1455	U	0.0035	0.0032	0.0069	0.032	0.4	10	40
Lead	1455	U	0.0024	0.0031	0.0047	0.030	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.010	0.012	0.020	0.11	4	50	200
Chloride	1220	U	2.8	2.5	< 10	25	800	15000	25000
Fluoride	1220	U	0.35	0.35	< 1.0	3.5	10	150	500
Sulphate	1220	U	4.9	< 1.0	< 10	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	29	120	300	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	11	4.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	18

Leachate Test Information	
Leachant volume 1st extract/l	0.311
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.105

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154094								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	WS01								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	24-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.6	3	5	6
Loss On Ignition	2610	M	%			5.8	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.013	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0035	0.0020	0.0068	0.021	0.5	2	25
Barium	1455	U	0.027	0.012	0.053	0.13	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0074	0.0034	0.015	0.0050	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0039	0.0042	0.0077	0.042	0.5	10	30
Nickel	1455	U	0.0053	0.0029	0.011	0.031	0.4	10	40
Lead	1455	U	0.0015	< 0.0005	0.0029	0.0010	0.5	10	50
Antimony	1455	U	0.0011	< 0.0005	0.0021	0.0007	0.06	0.7	5
Selenium	1455	U	0.0009	< 0.0005	0.0018	0.0006	0.1	0.5	7
Zinc	1455	U	0.006	< 0.003	0.011	0.004	4	50	200
Chloride	1220	U	9.7	1.6	19	21	800	15000	25000
Fluoride	1220	U	0.48	0.48	< 1.0	4.8	10	150	500
Sulphate	1220	U	19	1.8	37	30	1000	20000	50000
Total Dissolved Solids	1020	N	290	160	580	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	20	7.9	< 50	87	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	16

Leachate Test Information	
Leachant volume 1st extract/l	0.316
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.118

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154095								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	WS02								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	24-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.81	3	5	6
Loss On Ignition	2610	M	%			4.1	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0070	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0009	0.0005	0.0017	0.0048	0.5	2	25
Barium	1455	U	0.014	0.007	0.027	0.070	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0046	0.0025	0.0091	0.0030	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0021	0.0024	0.0042	0.024	0.5	10	30
Nickel	1455	U	0.0041	0.0026	0.0080	0.027	0.4	10	40
Lead	1455	U	0.0006	< 0.0005	0.0011	< 0.0005	0.5	10	50
Antimony	1455	U	0.0008	< 0.0005	0.0015	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0006	< 0.0005	0.0012	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.010	< 0.003	0.020	0.006	4	50	200
Chloride	1220	U	2.1	1.9	< 10	19	800	15000	25000
Fluoride	1220	U	0.25	0.29	< 1.0	2.9	10	150	500
Sulphate	1220	U	20	4.3	39	53	1000	20000	50000
Total Dissolved Solids	1020	N	200	98	380	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	16	5.8	< 50	65	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	19

Leachate Test Information	
Leachant volume 1st extract/l	0.309
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.113

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154096								
Sample Ref:	ES1								
Sample ID:									
Sample Location:	WS04								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	24-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			0.51	3	5	6
Loss On Ignition	2610	M	%			2.3	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			84	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				10.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.048	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.028	0.066	0.055	0.60	0.5	2	25
Barium	1455	U	0.007	< 0.005	0.015	0.012	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	0.0006	< 0.0005	0.0011	0.0009	0.5	10	70
Copper	1455	U	0.0068	0.0011	0.014	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.023	0.0020	0.046	0.054	0.5	10	30
Nickel	1455	U	0.0075	0.0010	0.015	0.020	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0028	0.0010	0.0055	0.013	0.06	0.7	5
Selenium	1455	U	0.0009	< 0.0005	0.0018	0.0014	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	9.9	1.2	20	26	800	15000	25000
Fluoride	1220	U	0.65	0.21	1.3	2.8	10	150	500
Sulphate	1220	U	64	6.3	130	160	1000	20000	50000
Total Dissolved Solids	1020	N	160	53	310	700	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	4.8	2.8	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	4.9

Leachate Test Information	
Leachant volume 1st extract/l	0.341
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.283

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	21-06432-1
Initial Date of Issue:	09-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	01-Mar-2021
Order No.:		**Date Instructed:**	02-Mar-2021
No. of Samples:	14		
Turnaround (Wkdays):	5	**Results Due:**	08-Mar-2021
Date Approved:	09-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-		-		-		-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	
ACM Detection Stage	U	2192		N/A	-		-		-		-	
Moisture	N	2030	%	0.020	7.0	10	11	11	11	11	4.9	11
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	1.1		0.37		0.068		0.16	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Arsenic	U	2450	mg/kg	1.0	23		16		44		29	
Cadmium	U	2450	mg/kg	0.10	2.5		0.89		0.93		0.70	
Chromium	U	2450	mg/kg	1.0	15		18		22		27	
Copper	U	2450	mg/kg	0.50	26		18		27		35	
Mercury	U	2450	mg/kg	0.10	< 0.10		< 0.10		0.23		< 0.10	
Nickel	U	2450	mg/kg	0.50	43		26		36		38	
Lead	U	2450	mg/kg	0.50	24		15		50		24	
Selenium	U	2450	mg/kg	0.20	1.8		0.25		0.20		< 0.20	
Zinc	U	2450	mg/kg	0.50	63		49		72		71	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.5	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.34	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.5	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.9	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.95	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	10	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Chloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Bromomethane	U	2760	µg/kg	20	< 20		< 20		< 20		< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1-Dichloroethene	U	2760	mg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Trans 1,2-Dichloroethene	U	2760	mg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0		< 5.0	
Trichloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Benzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Dibromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0		< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10		< 10		< 10	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Toluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10		< 10		< 10	
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10		< 10		< 10		< 10	
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10		< 10		< 10		< 10	
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0		< 5.0	
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
o-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Styrene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Bromobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50		< 50		< 50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50		< 50		< 50		< 50	
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Phenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Isophorone	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Naphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Acenaphthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Fluorene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Azobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Phenanthrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		1.6		< 0.50	
Anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Carbazole	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		2.4		< 0.50	
Pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		2.1		< 0.50	
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		1.5		< 0.50	
Chrysene	U	2790	mg/kg	0.50	< 0.50		< 0.50		1.5		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		1.3		< 0.50	
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50		< 0.50		0.73		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
ACM Type	U	2192		N/A	-		-		-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	
ACM Detection Stage	U	2192		N/A	-		-		-	
Moisture	N	2030	%	0.020	12	13	13	12	18	13
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.29		< 0.010		< 0.010	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Arsenic	U	2450	mg/kg	1.0	21		30		17	
Cadmium	U	2450	mg/kg	0.10	1.4		1.9		1.6	
Chromium	U	2450	mg/kg	1.0	15		24		18	
Copper	U	2450	mg/kg	0.50	24		30		26	
Mercury	U	2450	mg/kg	0.10	< 0.10		< 0.10		0.10	
Nickel	U	2450	mg/kg	0.50	38		48		37	
Lead	U	2450	mg/kg	0.50	24		32		30	
Selenium	U	2450	mg/kg	0.20	0.68		0.86		0.66	
Zinc	U	2450	mg/kg	0.50	65		96		78	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Chloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Bromomethane	U	2760	µg/kg	20	< 20		< 20		< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1-Dichloroethene	U	2760	mg/kg	1.0	< 1.0		< 1.0		< 1.0	
Trans 1,2-Dichloroethene	U	2760	mg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0	
Trichloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Benzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Dibromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10		< 10	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Toluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10		< 10	
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10		< 10		< 10	
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10		< 10		< 10	
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0	
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
o-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Styrene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Bromobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50		< 50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50		< 50		< 50	
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Phenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Isophorone	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Naphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Acenaphthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Fluorene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Azobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Phenanthrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Carbazole	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Chrysene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	

Test Methods

SOP	Title	Parameters included	Method summary
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-06438-1
Initial Date of Issue:	10-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	01-Mar-2021
Order No.:		**Date Instructed:**	02-Mar-2021
No. of Samples:	3		
Turnaround (Wkdays):	7	**Results Due:**	10-Mar-2021
Date Approved:	10-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06438								
Chemtest Sample ID:	1151974								
Sample Ref:	ES1								
Sample ID:	BH06								
Sample Location:									
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			2.2	3	5	6
Loss On Ignition	2610	M	%			3.5	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			14	100	--	--
pH	2010	M				9.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.026	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0019	0.0008	0.0039	0.0091	0.5	2	25
Barium	1455	U	0.053	0.011	0.11	0.16	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0010	0.0007	0.0020	0.0012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.14	0.025	0.27	0.38	0.5	10	30
Nickel	1455	U	0.0019	0.0005	0.0039	0.0071	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0009	0.0008	0.0017	0.0077	0.06	0.7	5
Selenium	1455	U	0.0084	0.0019	0.017	0.027	0.1	0.5	7
Zinc	1455	U	0.005	< 0.003	0.010	0.006	4	50	200
Chloride	1220	U	12	< 1.0	24	14	800	15000	25000
Fluoride	1220	U	0.23	0.26	< 1.0	2.6	10	150	500
Sulphate	1220	U	1300	140	2500	2700	1000	20000	50000
Total Dissolved Solids	1020	N	1400	280	2800	4200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	4.3	2.7	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	8.8

Leachate Test Information	
Leachant volume 1st extract/l	0.333
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.208

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06438								
Chemtest Sample ID:	1151975								
Sample Ref:	ES1								
Sample ID:	BH09								
Sample Location:									
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.6	3	5	6
Loss On Ignition	2610	M	%			3.7	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			270	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			88	100	--	--
pH	2010	M				9.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.036	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0029	0.0031	0.0058	0.031	0.5	2	25
Barium	1455	U	0.052	0.061	0.10	0.60	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0088	0.0019	0.018	0.027	0.5	10	70
Copper	1455	U	0.012	0.0028	0.023	0.014	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.035	0.0040	0.070	0.077	0.5	10	30
Nickel	1455	U	0.018	0.0036	0.036	0.053	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0030	0.0015	0.0059	0.017	0.06	0.7	5
Selenium	1455	U	0.0043	0.0019	0.0085	0.022	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	23	3.7	46	60	800	15000	25000
Fluoride	1220	U	0.33	0.20	< 1.0	2.1	10	150	500
Sulphate	1220	U	140	28	270	410	1000	20000	50000
Total Dissolved Solids	1020	N	310	120	610	1400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	7.5	4.4	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	11

Leachate Test Information	
Leachant volume 1st extract/l	0.328
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.205

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06438								
Chemtest Sample ID:	1151976								
Sample Ref:	ES1								
Sample ID:	BH10								
Sample Location:									
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	22-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.2	3	5	6
Loss On Ignition	2610	M	%			3.5	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			44	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			46	100	--	--
pH	2010	M				9.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.036	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0035	0.0046	0.0070	0.044	0.5	2	25
Barium	1455	U	0.019	0.006	0.038	0.077	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0017	0.0007	0.0034	0.0020	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.037	0.0053	0.073	0.089	0.5	10	30
Nickel	1455	U	0.0012	< 0.0005	0.0023	0.0014	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0023	0.0013	0.0046	0.014	0.06	0.7	5
Selenium	1455	U	0.0009	< 0.0005	0.0018	0.0010	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	23	1.9	46	44	800	15000	25000
Fluoride	1220	U	0.66	0.44	1.3	4.7	10	150	500
Sulphate	1220	U	220	28	440	500	1000	20000	50000
Total Dissolved Solids	1020	N	360	98	730	1300	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	5.0	< 2.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	7.6

Leachate Test Information	
Leachant volume 1st extract/l	0.336
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.204

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	21-05529-1
Initial Date of Issue:	01-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Robert Barry Erin Barry Grant McCullough
Project	20146NI Grange Castle, Dublin
Quotation No.:	Q20-22214
Date Received:	23-Feb-2021
Order No.:	
Date Instructed:	23-Feb-2021
No. of Samples:	16
Turnaround (Wkdays):	5
Results Due:	01-Mar-2021
Date Approved:	01-Mar-2021
Approved By:	
Details:	Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	17	17	16	8.0	19	17	11	7.0
pH	U	2010		4.0	8.3	8.3	8.7	11.7	9.3	8.3	8.8	8.7
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.11	< 0.010	< 0.010	0.63	< 0.010	0.080	0.012	0.50
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	U	2450	mg/kg	1.0	19	18	16	12	11	13	18	24
Cadmium	U	2450	mg/kg	0.10	3.0	2.5	0.62	0.58	1.3	2.1	2.5	0.63
Chromium	U	2450	mg/kg	1.0	22	22	14	18	20	19	13	14
Copper	U	2450	mg/kg	0.50	32	35	13	15	23	28	28	14
Mercury	U	2450	mg/kg	0.10	0.18	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	49	54	31	21	29	39	46	25
Lead	U	2450	mg/kg	0.50	51	36	10	22	17	24	19	19
Selenium	U	2450	mg/kg	0.20	0.77	1.0	< 0.20	< 0.20	0.61	0.85	< 0.20	0.41
Zinc	U	2450	mg/kg	0.50	86	100	24	36	86	86	67	43
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	13	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	23	< 1.0	< 1.0	< 1.0	19
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	29	< 1.0	< 1.0	< 1.0	32
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	78	< 1.0	< 1.0	< 1.0	110
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	23
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	140	< 5.0	< 5.0	< 5.0	180
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	55	< 1.0	< 1.0	< 1.0	57
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	190	< 1.0	< 1.0	< 1.0	420
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	110
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	240	< 5.0	< 5.0	< 5.0	580
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	390	< 10	< 10	< 10	760
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.25	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.23	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.33	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.84	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2700	mg/kg	0.10								
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	4.8	< 2.0	< 2.0	< 2.0	< 2.0
Total Of 17 PAH's	N	2700	mg/kg	2.0								
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20				< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1-Dichloroethene	U	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Trans 1,2-Dichloroethene	U	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0				< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0				< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10				< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10				< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10				< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10				< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0				< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50				< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50				< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Phenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Isophorone	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Naphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Acenaphthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Fluorene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Azobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Phenanthrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Carbazole	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Chrysene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	7.3	11	21	7.4	11	8.6	12	5.2
pH	U	2010		4.0	11.2	9.8	9.2	8.7	8.4	8.3	8.1	8.8
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.73	0.050	< 0.010	0.72	1.5	1.6	1.2	0.19
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	U	2450	mg/kg	1.0	19	28	18	15	18	19	22	15
Cadmium	U	2450	mg/kg	0.10	2.7	1.2	2.5	1.5	2.1	2.3	2.7	0.35
Chromium	U	2450	mg/kg	1.0	19	20	19	9.8	11	12	13	6.4
Copper	U	2450	mg/kg	0.50	16	31	31	16	19	19	23	4.9
Mercury	U	2450	mg/kg	0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	29	33	51	26	42	43	47	12
Lead	U	2450	mg/kg	0.50	14	83	26	11	17	15	19	8.7
Selenium	U	2450	mg/kg	0.20	0.74	0.28	0.77	1.5	3.0	2.7	3.4	< 0.20
Zinc	U	2450	mg/kg	0.50	77	92	85	52	72	51	73	34
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	40
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	33	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	680
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	180
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	33	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	900
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	47	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	130
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	200	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2900
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1100
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	250	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	4100
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	280	< 10	< 10	< 10	< 10	< 10	4900
Naphthalene	U	2700	mg/kg	0.10	< 0.10	0.71	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	0.26	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	0.86	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	4.8	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	1.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	6.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	6.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	2.9	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	2.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	3.5	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	1.6	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	2.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	2.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	0.87	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	2.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2700	mg/kg	0.10								< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	41	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Total Of 17 PAH's	N	2700	mg/kg	2.0								< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chrysene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-05530-1
Initial Date of Issue:	04-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Robert Barry Grant McCullough
Project	20146NI Fgrange Castle Dublin
Quotation No.:	Q20-22214
Date Received:	23-Feb-2021
Order No.:	
Date Instructed:	23-Feb-2021
No. of Samples:	7
Turnaround (Wkdays):	7
Results Due:	03-Mar-2021
Date Approved:	04-Mar-2021
Approved By:	
Details:	Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147178								
Sample Ref:	ES2								
Sample ID:	TP01								
Sample Location:									
Top Depth(m):	0.5								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.2	3	5	6
Loss On Ignition	2610	M	%			5.3	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				6.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.031	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0005	0.0011	0.0052	0.5	2	25
Barium	1455	U	0.013	0.006	0.026	0.065	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0007	0.0010	0.0014	0.0098	0.5	10	70
Copper	1455	U	0.0040	0.0027	0.0076	0.0035	2	50	100
Mercury	1455	U	0.00006	< 0.00005	0.00012	0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0030	0.0057	0.0059	0.054	0.5	10	30
Nickel	1455	U	0.0029	0.0022	0.0055	0.022	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0006	0.0005	0.0012	0.0054	0.06	0.7	5
Selenium	1455	U	0.0014	< 0.0005	0.0027	0.0012	0.1	0.5	7
Zinc	1455	U	0.003	< 0.003	0.006	< 0.003	4	50	200
Chloride	1220	U	1.5	4.2	< 10	39	800	15000	25000
Fluoride	1220	U	0.22	0.57	< 1.0	5.3	10	150	500
Sulphate	1220	U	21	110	40	970	1000	20000	50000
Total Dissolved Solids	1020	N	310	140	600	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	13	6.8	< 50	73	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	24

Leachate Test Information	
Leachant volume 1st extract/l	0.294
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.155

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147179								
Sample Ref:	ES1								
Sample ID:	TP02								
Sample Location:									
Top Depth(m):	0.5								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			2.1	3	5	6
Loss On Ignition	2610	M	%			8.0	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				6.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.022	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0030	0.0015	0.0058	0.016	0.5	2	25
Barium	1455	U	0.058	0.017	0.11	0.19	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0006	0.0006	0.0012	0.0060	0.5	10	70
Copper	1455	U	0.0053	0.0029	0.011	0.0024	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0042	0.0049	0.0082	0.049	0.5	10	30
Nickel	1455	U	0.0052	0.0030	0.010	0.031	0.4	10	40
Lead	1455	U	0.0009	< 0.0005	0.0018	< 0.0005	0.5	10	50
Antimony	1455	U	0.0016	0.0009	0.0031	0.0089	0.06	0.7	5
Selenium	1455	U	0.0015	0.0007	0.0029	0.0074	0.1	0.5	7
Zinc	1455	U	0.004	< 0.003	0.008	< 0.003	4	50	200
Chloride	1220	U	2.7	10	< 10	96	800	15000	25000
Fluoride	1220	U	0.72	0.36	1.4	3.8	10	150	500
Sulphate	1220	U	22	34	43	330	1000	20000	50000
Total Dissolved Solids	1020	N	420	180	820	1900	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	24	9.7	< 50	100	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	17

Leachate Test Information	
Leachant volume 1st extract/l	0.314
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.080

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147180								
Sample Ref:	ES1								
Sample ID:	TP03						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample Location:									
Top Depth(m):	0.25								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.38	3	5	6
Loss On Ignition	2610	M	%			3.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				6.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.076	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	< 0.0002	0.0005	0.0003	0.5	2	25
Barium	1455	U	0.16	0.075	0.33	0.83	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.068	0.055	0.14	0.57	0.5	10	70
Copper	1455	U	0.0086	0.0032	0.017	0.0084	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.024	0.011	0.048	0.12	0.5	10	30
Nickel	1455	U	0.0022	0.0012	0.0044	0.013	0.4	10	40
Lead	1455	U	0.0006	< 0.0005	0.0012	0.0006	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0014	0.0010	0.0028	0.010	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.7	12	< 10	110	800	15000	25000
Fluoride	1220	U	0.42	0.19	< 1.0	2.1	10	150	500
Sulphate	1220	U	5.6	4.4	11	45	1000	20000	50000
Total Dissolved Solids	1020	N	180	980	350	9000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	6.9	4.4	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	9.1

Leachate Test Information	
Leachant volume 1st extract/l	0.332
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.169

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147181								
Sample Ref:	ES1								
Sample ID:	TP07								
Sample Location:									
Top Depth(m):	0.5								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.1	3	5	6
Loss On Ignition	2610	M	%			3.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			710	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.074	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0044	0.0065	0.0087	0.062	0.5	2	25
Barium	1455	U	0.031	0.013	0.061	0.16	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0010	0.0007	0.0021	0.0073	0.5	10	70
Copper	1455	U	0.0013	0.0006	0.0026	0.0020	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.024	0.0024	0.047	0.057	0.5	10	30
Nickel	1455	U	0.0013	0.0005	0.0026	0.0063	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0018	0.0007	0.0037	0.0091	0.06	0.7	5
Selenium	1455	U	0.0008	< 0.0005	0.0016	0.0012	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	11	3.7	22	48	800	15000	25000
Fluoride	1220	U	0.48	0.37	< 1.0	3.9	10	150	500
Sulphate	1220	U	250	83	500	1100	1000	20000	50000
Total Dissolved Solids	1020	N	420	98	830	1500	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	5.9	3.9	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	7.8

Leachate Test Information	
Leachant volume 1st extract/l	0.335
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.275

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147182								
Sample Ref:	ES1								
Sample ID:	TP08								
Sample Location:									
Top Depth(m):	0.25								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			< 0.20	3	5	6
Loss On Ignition	2610	M	%			3.8	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			12	100	--	--
pH	2010	M				10.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.038	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0006	0.0011	0.0063	0.5	2	25
Barium	1455	U	0.017	0.006	0.034	0.068	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0026	0.0010	0.0052	0.011	0.5	10	70
Copper	1455	U	0.0011	0.0009	0.0022	0.0008	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.016	0.018	0.031	0.18	0.5	10	30
Nickel	1455	U	0.0006	0.0006	0.0012	0.0057	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0005	0.0005	0.0011	0.0053	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	4.6	< 10	43	800	15000	25000
Fluoride	1220	U	0.31	0.34	< 1.0	3.4	10	150	500
Sulphate	1220	U	26	74	52	700	1000	20000	50000
Total Dissolved Solids	1020	N	210	91	430	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	7.0	3.0	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	11

Leachate Test Information	
Leachant volume 1st extract/l	0.328
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.130

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147183								
Sample Ref:	ES1								
Sample ID:	TP10								
Sample Location:									
Top Depth(m):	0.5								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.0	3	5	6
Loss On Ignition	2610	M	%			5.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.043	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0005	0.0010	0.0051	0.5	2	25
Barium	1455	U	0.012	< 0.005	0.023	0.0068	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0018	0.0013	0.0035	0.014	0.5	10	70
Copper	1455	U	0.0022	0.0018	0.0043	0.0013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0050	0.0088	0.0097	0.086	0.5	10	30
Nickel	1455	U	0.0016	0.0013	0.0031	0.013	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0007	< 0.0005	0.0014	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.003	< 0.003	0.006	< 0.003	4	50	200
Chloride	1220	U	2.7	3.9	< 10	38	800	15000	25000
Fluoride	1220	U	0.30	0.37	< 1.0	3.6	10	150	500
Sulphate	1220	U	12	28	23	270	1000	20000	50000
Total Dissolved Solids	1020	N	260	110	510	1200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	10	4.7	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	21

Leachate Test Information	
Leachant volume 1st extract/l	0.304
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.103

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Chemtest Sample ID:	1147184								
Sample Ref:	ES1								
Sample ID:	GP04								
Sample Location:									
Top Depth(m):	0								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			6.6	3	5	6
Loss On Ignition	2610	M	%			6.5	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			2100	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				9.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.010	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0008	0.0007	0.0016	0.0073	0.5	2	25
Barium	1455	U	0.039	0.037	0.078	0.37	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0010	0.0006	0.0021	0.0068	0.5	10	70
Copper	1455	U	0.0005	< 0.0005	0.0011	0.0009	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.012	0.0014	0.024	0.032	0.5	10	30
Nickel	1455	U	0.0005	< 0.0005	0.0011	0.0009	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0010	< 0.0005	0.0019	0.0016	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	18	5.7	36	78	800	15000	25000
Fluoride	1220	U	0.75	0.44	1.5	4.9	10	150	500
Sulphate	1220	U	82	28	160	370	1000	20000	50000
Total Dissolved Solids	1020	N	200	57	390	800	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	6.9	3.8	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	5.1

Leachate Test Information	
Leachant volume 1st extract/l	0.341
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.294

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-07410-1
Initial Date of Issue:	15-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	09-Mar-2021
Order No.:		**Date Instructed:**	09-Mar-2021
No. of Samples:	8		
Turnaround (Wkdays):	5	**Results Due:**	15-Mar-2021
Date Approved:	15-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
pH	U	1010		N/A	7.9	8.8	7.9	7.8	7.8	7.7	10.6	8.3
Sulphate	U	1220	mg/l	1.0	92	52	150	110	220	72	140	130
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (Total)	N	1455	µg/l	0.20	2.0	2.5	0.35	1.0	0.39	0.61	6.3	0.34
Cadmium (Total)	N	1455	µg/l	0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	0.20
Chromium (Total)	N	1455	µg/l	0.50	3.3	7.0	5.2	2.9	< 0.50	0.55	43	5.3
Copper (Total)	N	1455	µg/l	0.50	5.7	5.2	2.9	2.6	1.6	1.6	40	2.7
Mercury (Total)	N	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Total)	N	1455	µg/l	0.50	16	4.5	9.4	8.2	4.6	7.6	5.9	8.8
Lead (Total)	N	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	6.1	0.67	< 0.50	< 0.50
Selenium (Total)	N	1455	µg/l	0.50	2.0	6.1	2.0	12	7.1	3.9	38	3.1
Zinc (Total)	N	1455	µg/l	3.0	< 3.0	< 3.0	< 3.0	4.1	< 3.0	13	< 3.0	3.2
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	23	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	48	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	170	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	120	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	360	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	53	< 0.10	< 0.10	< 0.10	260	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	62	< 0.10	< 0.10	< 0.10	71	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	37	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	45	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	200	< 5.0	< 5.0	< 5.0	330	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	560	< 10	< 10	< 10	330	< 10
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.6	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.8	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.1	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	23	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.2	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chrysene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-09988-1
Initial Date of Issue:	06-Apr-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	26-Mar-2021
Order No.:		**Date Instructed:**	29-Mar-2021
No. of Samples:	8		
Turnaround (Wkdays):	5	**Results Due:**	06-Apr-2021
Date Approved:	06-Apr-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-09988	21-09988	21-09988	21-09988	21-09988	21-09988	21-09988	21-09988
Quotation No.:		**Chemtest Sample ID.:**			1168730	1168731	1168732	1168733	1168734	1168735	1168736	1168737
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.50	1.69	1.13	1.16	1.49	2.51	1.43	1.09
		Date Sampled:			24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
pH	U	1010		N/A	7.6	9.4	7.8	7.4	7.6	7.4	10.7	7.6
Sulphate	U	1220	mg/l	1.0	120	38	55	100	200	53	71	94
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (Total)	N	1455	µg/l	0.20	0.80	3.7	< 0.20	0.46	0.21	< 0.20	10	0.31
Cadmium (Total)	N	1455	µg/l	0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Chromium (Total)	N	1455	µg/l	0.50	< 0.50	7.4	6.6	< 0.50	4.2	< 0.50	25	3.5
Copper (Total)	N	1455	µg/l	0.50	4.2	4.6	1.5	1.2	1.6	1.4	9.4	1.1
Mercury (Total)	N	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Total)	N	1455	µg/l	0.50	8.8	4.5	4.2	8.3	4.8	2.6	2.8	5.8
Lead (Total)	N	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Selenium (Total)	N	1455	µg/l	0.50	1.6	4.5	0.62	1.0	< 0.50	2.3	16	0.99
Zinc (Total)	N	1455	µg/l	3.0	< 3.0	< 3.0	3.5	< 3.0	< 3.0	3.0	< 3.0	< 3.0
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-09988	21-09988	21-09988	21-09988	21-09988	21-09988	21-09988	21-09988
Quotation No.:		Chemtest Sample ID.:			1168730	1168731	1168732	1168733	1168734	1168735	1168736	1168737
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.50	1.69	1.13	1.16	1.49	2.51	1.43	1.09
		Date Sampled:			24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 7

GAS MONITORING DATA

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 05/03/21

Weather: Overcast, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH01	0	0.0	0.5	1.3	3.0	0.0	9.4	11.6	
	15	0.0	0.0	1.5	3.0	0.0	13.5	0.0	
	30	0.0	0.0	1.5	3.0	0.0	13.5	0.0	
	60	0.0	0.0	1.5	3.0	0.0	13.5	0.0	
	90	0.0	0.0	1.5	5.0	0.0	13.5	0.0	
	120	0.0	0.0	1.5	5.0	0.0	13.4	0.0	
	180	0.0	0.0	1.5	4.0	0.0	13.4	0.0	
	Time at start of monitoring: 10:00								
	aP at start of monitoring: 1022mb								
	aP at end of monitoring: 1022mb								
	Groundwater Depth: 2.37m								
	Groundwater Sample Depth: 2.37m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH03	0	0.0	0.7	0.2	8.0	2.0	17.1	15.9	
	15	0.0	0.0	0.0	7.0	0.0	14.8	0.0	
	30	0.0	0.0	0.0	1.0	1.0	13.9	0.0	
	60	0.0	0.0	0.0	2.0	1.0	14.0	0.0	
	90	0.0	0.0	0.0	2.0	1.0	14.0	0.0	
	120	0.0	0.0	0.0	3.0	1.0	14.1	0.0	
	180	0.0	0.0	0.0	3.0	1.0	14.0	0.0	
	Time at start of monitoring: 10:15								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.41m								
	Groundwater Sample Depth: 1.41m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH05	0	0.0	0.0	0.0	3.0	0.0	21.2	0.0	
	15	0.0	0.0	0.1	3.0	0.0	18.1	0.0	
	30	0.0	0.0	0.1	3.0	0.0	15.4	0.0	
	60	0.0	0.0	0.1	3.0	0.0	10.1	0.0	
	90	0.0	0.0	0.0	3.0	0.0	9.4	0.0	
	120	0.0	0.0	0.0	2.0	0.0	7.6	0.0	
	180	0.0	0.0	0.0	2.0	0.0	5.9	0.0	
	Time at start of monitoring: 10:30								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 0.37m								
	Groundwater Sample Depth: 0.97m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 05/03/21

Weather: Overcast, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH08	0	0.0	0.0	3.0	8.0	0.0	19.2	0.0	Insufficient water to sample
	15	0.0	0.0	2.8	8.0	0.0	19.1	0.0	
	30	0.0	0.0	2.6	8.0	0.0	19.1	0.0	
	60	0.0	0.0	2.5	7.0	0.0	19.0	0.0	
	90	0.0	0.0	2.5	6.0	0.0	19.0	0.0	
	120	0.0	0.0	2.3	6.0	0.0	18.9	0.0	
	180	0.0	0.0	2.3	6.0	0.0	19.0	0.0	
	Time at start of monitoring: 10:45								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.96m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH10	0	0.0	0.0	2.8	5.0	2.0	19.3	0.0	
	15	0.0	0.0	2.8	5.0	2.0	19.3	0.0	
	30	0.0	0.0	2.5	7.0	1.0	20.0	0.0	
	60	0.0	0.0	2.4	5.0	0.0	20.0	0.0	
	90	0.0	0.0	2.3	7.0	1.0	20.2	0.0	
	120	0.0	0.0	2.3	7.0	1.0	20.3	0.0	
	180	0.0	0.0	2.2	7.0	1.0	20.3	0.0	
	Time at start of monitoring: 11:00								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: Dry								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH11	0	0.0	0.0	3.2	10.0	0.0	19.1	0.0	-
	15	0.0	0.0	3.1	10.0	0.0	19.0	0.0	
	30	0.0	0.0	3.1	9.0	0.0	19.0	0.0	
	60	0.0	0.0	3.0	10.0	0.0	18.8	0.0	
	90	0.0	0.0	3.2	9.0	0.0	18.7	0.0	
	120	0.0	0.0	3.3	8.0	0.0	18.5	0.0	
	180	0.0	0.0	3.3	8.0	0.0	18.5	0.0	
	Time at start of monitoring: 11:15								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.14m								
	Groundwater Sample Depth: 1.14m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 05/03/21

Weather: Overcast, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH12	0	0.0	0.0	3.7	12.0	2.0	18.1	0.0	
	15	0.0	0.0	3.6	11.0	2.0	18.0	0.0	
	30	0.0	0.0	3.6	11.0	2.0	18.1	0.0	
	60	0.0	0.0	3.4	11.0	2.0	18.0	0.0	
	90	0.0	0.0	3.4	10.0	1.0	17.8	0.0	
	120	0.0	0.0	3.3	8.0	2.0	17.8	0.0	
	180	0.0	0.0	3.3	7.0	1.0	17.8	0.0	
	Time at start of monitoring: 11:30								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.46m								
	Groundwater Sample Depth: 1.45m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS01	0	0.0	0.0	0.6	3.0	0.0	21.2	0.0	-
	15	0.0	0.0	2.0	3.0	0.0	8.2	0.0	
	30	0.0	0.0	2.0	3.0	0.0	5.5	0.0	
	60	0.0	0.0	2.0	3.0	0.0	6.6	0.0	
	90	0.0	0.0	2.0	3.0	0.0	6.7	0.0	
	120	0.0	0.0	1.9	5.0	0.0	5.4	0.0	
	180	0.0	0.0	1.8	5.0	0.0	5.4	0.0	
	Time at start of monitoring: 11:45								
	aP at start of monitoring: 1024mb								
	aP at end of monitoring: 1024mb								
	Groundwater Depth: 2.46m								
	Groundwater Sample Depth: 2.46m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS02	0	0.0	0.0	0.0	7.0	3.0	19.4	0.0	-
	15	0.0	0.0	0.0	7.0	0.0	20.7	0.0	
	30	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	60	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	90	0.0	0.0	0.0	5.0	0.0	20.5	0.0	
	120	0.0	0.0	0.0	5.0	0.0	20.6	0.0	
	180	0.0	0.0	0.0	5.0	0.0	20.6	0.0	
	Time at start of monitoring: 12:00								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.10m								
	Groundwater Sample Depth: 1.05m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 05/03/21

Weather: Overcast, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS03	0	0.0	0.0	3.6	5.0	0.0	19.8	0.0	
	15	0.0	0.0	3.9	22.0	0.0	16.9	0.0	
	30	0.0	0.0	4.0	31.0	2.0	16.7	0.0	
	60	0.0	0.0	4.0	34.0	2.0	16.5	0.0	
	90	0.0	0.0	3.9	33.0	1.0	16.4	0.0	
	120	0.0	0.0	3.8	32.0	1.0	16.4	0.0	
	180	0.0	0.0	3.8	27.0	0.0	16.2	0.0	
	Time at start of monitoring: 12:15								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 0.33m								
	Groundwater Sample Depth: 1.05m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 24/03/21

Weather: Sunny, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH01	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	1.4	0.1	0.0	0.0	15.1	0.0	
	30	0.0	1.5	0.1	0.0	0.0	14.8	0.0	
	60	0.0	1.5	0.1	0.0	0.0	15.7	0.0	
	90	0.0	1.6	0.1	0.0	0.0	15.9	0.0	
	120	0.0	1.6	0.2	0.0	0.0	16.5	0.0	
	180	0.0	1.6	0.2	0.0	0.0	16.3	0.0	
	Time at start of monitoring: 10:00								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 2.5m								
	Groundwater Sample Depth: 2.5m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH03	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.0	0.0	0.0	0.0	15.1	0.0	
	30	0.0	0.0	0.0	0.0	0.0	14.8	0.0	
	60	0.0	0.0	0.0	0.0	0.0	15.7	0.0	
	90	0.0	0.0	0.0	0.0	0.0	15.9	0.0	
	120	0.0	0.0	0.0	0.0	0.0	16.5	0.0	
	180	0.0	0.0	0.0	0.0	0.0	16.3	0.0	
	Time at start of monitoring: 10:15								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.69m								
	Groundwater Sample Depth: 1.69m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH05	0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	15	-3.3	0.0	0.0	0.0	0.0	20.1	0.0	
	30	-3.7	0.0	0.0	0.0	0.0	19.9	0.0	
	60	-3.4	0.0	0.0	0.0	0.0	19.9	0.0	
	90	-3.3	0.0	0.0	0.0	0.0	19.9	0.0	
	120	-3.6	0.0	0.0	0.0	0.0	19.9	0.0	
	180	-3.5	0.0	0.0	0.0	0.0	19.9	0.0	
	Time at start of monitoring: 10:30								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.13m								
	Groundwater Sample Depth: 1.13m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 24/03/21

Weather: Sunny, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH08	0	0.0	0.0	0.0	0.0	0.0	20.6	0.0	Insufficient water to sample
	15	0.0	0.0	1.1	0.0	0.0	17.2	0.0	
	30	0.0	0.0	1.5	0.0	0.0	15.9	0.0	
	60	0.0	0.0	1.6	0.0	0.0	15.7	0.0	
	90	0.0	0.0	1.5	0.0	0.0	15.8	0.0	
	120	0.0	0.0	1.6	0.0	0.0	15.7	0.0	
	180	0.0	0.0	1.5	0.0	0.0	15.9	0.0	
	Time at start of monitoring: 10:45								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.97m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH10	0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	15	0.0	0.0	0.9	0.0	0.0	12.7	0.0	
	30	0.0	0.0	0.9	0.0	0.0	11.2	0.0	
	60	0.0	0.0	0.7	0.0	0.0	9.2	0.0	
	90	0.0	0.0	0.4	0.0	0.0	8.5	0.0	
	120	0.0	0.0	0.2	0.0	0.0	8.4	0.0	
	180	0.0	0.0	0.1	0.0	0.0	8.3	0.0	
	Time at start of monitoring: 11:00								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: DRY								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH11	0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	-
	15	0.0	0.0	0.9	0.0	0.0	19.1	0.0	
	30	0.0	0.0	0.9	0.0	0.0	18.9	0.0	
	60	0.0	0.0	0.7	0.0	0.0	19.1	0.0	
	90	0.0	0.0	0.4	0.0	0.0	19.4	0.0	
	120	0.0	0.0	0.2	0.0	0.0	19.7	0.0	
	180	0.0	0.0	0.1	0.0	0.0	19.9	0.0	
	Time at start of monitoring: 11:15								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.18m								
	Groundwater Sample Depth: 1.18m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 24/03/21

Weather: Sunny, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH12	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	15	-8.7	0.0	0.1	0.0	0.0	19.1	0.0	
	30	-7.0	0.0	0.2	0.0	0.0	18.6	0.0	
	60	-6.7	0.0	0.4	0.0	0.0	17.7	0.0	
	90	-6.1	0.0	0.4	0.0	0.0	17.3	0.0	
	120	-5.4	0.0	0.6	0.0	0.0	16.8	0.0	
	180	-5.3	0.0	0.6	0.0	0.0	16.6	0.0	
	Time at start of monitoring: 11:30								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.49m								
	Groundwater Sample Depth: 1.49m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS01	0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	15	0.0	0.0	0.0	0.0	0.0	19.4	0.0	
	30	0.0	0.0	0.0	0.0	0.0	19.3	0.0	
	60	0.0	0.0	0.0	0.0	0.0	18.8	0.0	
	90	0.0	0.0	0.2	0.0	0.0	18.3	0.0	
	120	0.0	0.0	0.4	0.0	0.0	17.7	0.0	
	180	0.0	0.0	0.5	0.0	0.0	17.2	0.0	-
	Time at start of monitoring: 11:45								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 2.51m								
	Groundwater Sample Depth: 2.51m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS02	0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	15	0.2	0.0	0.0	0.0	0.0	19.9	0.0	
	30	0.4	0.0	0.0	0.0	0.0	19.8	0.0	
	60	0.0	0.0	0.0	0.0	0.0	19.9	0.0	
	90	0.0	0.0	0.0	0.0	0.0	19.9	0.0	
	120	0.0	0.0	0.0	0.0	0.0	19.8	0.0	
	180	0.0	0.0	0.0	0.0	0.0	19.9	0.0	-
	Time at start of monitoring: 12:00								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.43m								
	Groundwater Sample Depth: 1.43m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 24/03/21

Weather: Sunny, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS03	0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	15	2.7	0.0	3.6	0.0	0.0	17.2	0.0	
	30	2.8	0.0	3.7	0.0	0.0	16.7	0.0	
	60	2.9	0.0	3.4	0.0	0.0	16.9	0.0	
	90	2.9	0.0	2.8	0.0	0.0	17.3	0.0	
	120	3.0	0.0	2.5	0.0	0.0	17.5	0.0	
	180	2.9	0.0	2.4	0.0	0.0	17.6	0.0	
	Time at start of monitoring: 12:15								
	aP at start of monitoring: 1007mb								
	aP at end of monitoring: 1007mb								
	Groundwater Depth: 1.09m								
	Groundwater Sample Depth: 1.09m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 31/03/21

Weather: Partly Cloudy, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH01	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.9	0.0	0.0	0.0	16.6	0.0	
	30	0.0	1.0	0.1	0.0	0.0	16.5	0.0	
	60	0.0	1.0	0.1	0.0	0.0	16.4	0.0	
	90	0.0	0.8	0.1	0.0	0.0	16.5	0.0	
	120	0.0	0.8	0.1	0.0	0.0	16.5	0.0	
	180	0.0	0.8	0.1	0.0	0.0	16.5	0.0	
	Time at start of monitoring: 10:30								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 2.55m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH03	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.0	0.0	0.0	0.0	18.2	0.0	
	30	0.0	0.0	0.0	0.0	0.0	18.0	0.0	
	60	0.0	0.0	0.0	0.0	0.0	18.1	0.0	
	90	0.0	0.0	0.0	0.0	0.0	18.3	0.0	
	120	0.0	0.0	0.0	0.0	0.0	18.9	0.0	
	180	0.0	0.0	0.0	0.0	0.0	19.3	0.0	
	Time at start of monitoring: 10:45								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.70m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH05	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	30	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	60	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	90	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	120	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	180	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	Time at start of monitoring: 11.00								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.13m								
	Groundwater Sample Depth: N/A								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 31/03/21

Weather: Partly Cloudy, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH08	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	Insufficient water to sample
	15	0.0	0.0	1.1	0.0	0.0	19.2	0.0	
	30	0.0	0.0	1.1	0.0	0.0	19.1	0.0	
	60	0.0	0.0	1.2	0.0	0.0	18.8	0.0	
	90	0.0	0.0	1.1	0.0	0.0	19.0	0.0	
	120	0.0	0.0	1.1	0.0	0.0	19.0	0.0	
	180	0.0	0.0	1.1	0.0	0.0	19.1	0.0	
	Time at start of monitoring: 11.15								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.98m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH10	0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	15	0.0	0.0	0.7	0.0	0.0	14.5	0.0	
	30	0.0	0.0	0.7	0.0	0.0	14.3	0.0	
	60	0.0	0.0	0.5	0.0	0.0	14.5	0.0	
	90	0.0	0.0	0.4	0.0	0.0	15.1	0.0	
	120	0.0	0.0	0.2	0.0	0.0	15.5	0.0	
	180	0.0	0.0	0.2	0.0	0.0	15.5	0.0	
	Time at start of monitoring: 11:30								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: DRY								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH11	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	-
	15	0.0	0.0	0.6	0.0	0.0	18.6	0.0	
	30	0.0	0.0	0.7	0.0	0.0	18.2	0.0	
	60	0.0	0.0	0.5	0.0	0.0	18.3	0.0	
	90	0.0	0.0	0.4	0.0	0.0	18.3	0.0	
	120	0.0	0.0	0.2	0.0	0.0	18.6	0.0	
	180	0.0	0.0	0.2	0.0	0.0	18.7	0.0	
	Time at start of monitoring: 12.00								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.18m								
	Groundwater Sample Depth: N/A								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 31/03/21

Weather: Partly Cloudy, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH12	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.0	0.1	0.0	0.0	19.1	0.0	
	30	0.0	0.0	0.3	0.0	0.0	18.8	0.0	
	60	0.0	0.0	0.4	0.0	0.0	18.5	0.0	
	90	0.0	0.0	0.4	0.0	0.0	18.5	0.0	
	120	0.0	0.0	0.3	0.0	0.0	18.6	0.0	
	180	0.0	0.0	0.3	0.0	0.0	18.7	0.0	
	Time at start of monitoring: 12.15								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.5m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS01	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	15	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	30	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	60	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	90	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	120	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	180	0.0	0.0	0.0	0.0	0.0	20.5	0.0	-
	Time at start of monitoring: 12.30								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 2.5m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS02	0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	15	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	30	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	60	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	90	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	120	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	180	0.0	0.0	0.0	0.0	0.0	20.3	0.0	-
	Time at start of monitoring: 12:45								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.42m								
	Groundwater Sample Depth: N/A								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 31/03/21

Weather: Partly Cloudy, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS03	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	15	1.1	0.0	2.6	0.0	0.0	17.4	0.0	
	30	1.3	0.0	2.7	0.0	0.0	16.9	0.0	
	60	1.1	0.0	2.9	0.0	0.0	16.3	0.0	
	90	1.0	0.0	2.8	0.0	0.0	16.4	0.0	
	120	0.7	0.0	2.4	0.0	0.0	16.8	0.0	
	180	0.7	0.0	2.2	0.0	0.0	17.0	0.0	
	Time at start of monitoring: 13.00								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.09m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

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Appendix 6.3 '*Geotechnical Assessment*', Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.03), dated, August 2021



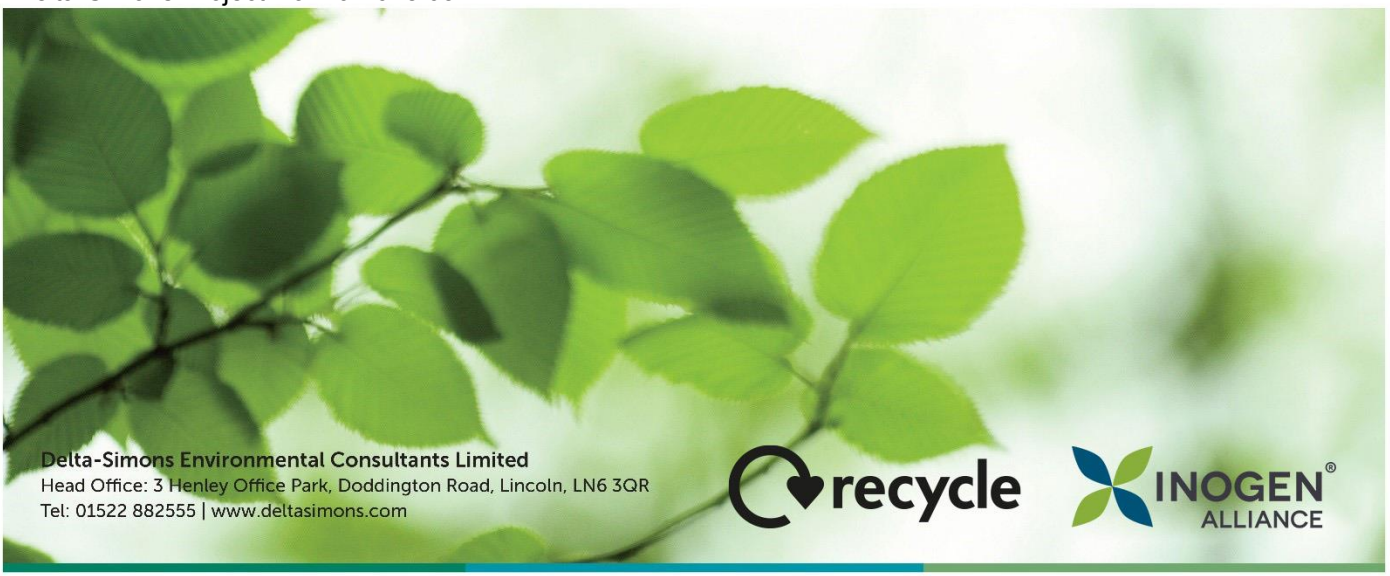
Geotechnical Assessment Report

Grange Castle, Dublin

Presented to: **Pinnacle Consulting Engineers Ltd**

Issued: August 2021

Delta-Simons Project No: 20-2018.03



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Report Details

Client	Pinnacle Consulting Engineers Ltd
Report Title	Geotechnical Assessment Report
Site Address	Grange Castle, Dublin
Report No.	20-2018.03_REPT_Grange-Castle-Geotech-Report_26-07-21
Delta-Simons Contact	Sinead.meehan@deltasimons.com

Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
01	**Final**	**13/08/2021**				
				Sinéad Meehan **Associate**	**Dan Webb** **Unit Manager**	**Dan Webb** **Unit Manager**

About Us

Delta-Simons is a trusted, multidisciplinary environmental consultancy, focused on delivering the best possible project outcomes for customers. Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from across the UK we employ over 180 environmental professionals, bringing experience from across the private consultancy and public sector markets.

As part of Lucion Services, our combined team of 500 in the UK has a range of specialist skill sets in over 50 environmental consultancy specialisms including asbestos, hazardous materials, ecology, air and water services, geo-environmental and sustainability amongst others.

Delta-Simons is proud to be a founder member of the Inogen Environmental Alliance, enabling us to efficiently deliver customer projects worldwide by calling upon over 5000 resources in our global network of consultants, each committed to providing superior EH&S and sustainability consulting expertise to our customers. Through Inogen we can offer our Clients more consultants, with more expertise in more countries than traditional multinational consultancy.

Delta-Simons is a 'Beyond Net-Zero' company. We have set a Science-Based Target to reduce our Scope 1 and Scope 2 carbon emissions in line with the Paris Agreement and are committed to reducing Scope 3 emissions from our supply chain. Every year we offset our residual emissions by 150% through verified carbon removal projects linked to the UN Sustainable Development Goals. Our consultancy services to you are climate positive.

If you would like support in understanding your carbon footprint and playing your part in tackling the global climate crisis, please get in touch with your Delta-Simons contact above who will be happy to help.

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1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Pinnacle Consulting Engineers Ltd (the "Client") to prepare a Geotechnical Assessment for land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin (the "Site").

1.2 Context & Purpose

Delta-Simons has been requested to undertake additional Ground Investigation works in support of the foundation design strategy proposed by the Structural Engineer at the above Site and to provide additional geotechnical information to optimise their preferred foundation design (as set out in Delta-Simons fee proposal Ref (20-2018.03) dated 22nd June 2021.)

A Geotechnical and Waste Assessment was undertaken and reported in April 2021 (Reference: 20-2018.02).

1.3 Proposed Development

The Site is currently vacant and undeveloped. Until recently it has been used as an Electricity Supply Board (ESB) Ireland construction site compound and stockpiling area for excavated material and building rubble. Stockpiles were noted to be 3 m to 4 m high and estimated to be approximately 18,000 m^3 in volume.

It is understood that the Site is intended for development as a 3-storey data centre with associated hardstanding and parking.

1.4 Limitations

The assessment is limited to the issues agreed within the proposal for the works. General notes on limitations associated with this assessment are provided in Appendix A.

1.5 Geotechnical Category of Project

Specific sections of this report may generally follow guidance set out in Eurocode 7 for a Ground Investigation Report (GIR), as defined in BS EN 1997-1:2004 and BS EN 1997-2:2007. Eurocode 7 includes specific guidance on the number and spacing of investigation positions, methods of investigation and sample quality to be achieved which may not have been met by this investigation. The report also includes information which may support a Geotechnical Design Report (GDR) as defined in BS EN 1997-1:2004; however, unless otherwise explicitly stated, the investigation has not been undertaken in accordance with Eurocode 7 and the preliminary geotechnical interpretation, assessments and recommendations presented within this report may not meet the full requirements of a GDR. For the purposes of this report it is considered at this stage Geotechnical [Category 2] is likely to be appropriate.

2.0 Existing Information

2.1 Site Setting

A summary of the current Site status, environmental setting and key historical features is presented below.

Co-ordinates	The geographical co-ordinates for the Site are 53°19'02.4"N 6°26'20.1"W.	**Elevation**	73 - 75 m AOD
		Area	3.0 Ha
Site Location	The Site is located at the Profile Park development area, located to the south of New Nangor Road and to the east of Profile Park, Kilcarbery, Co. Dublin. It is located in South Dublin County, approximately 12 km east of Dublin City Centre. A Site Location Map is provided as Figure 1.		
Current Site Use and Surrounding Area	The Site is currently vacant and undeveloped. Until recently it has been used as an Electricity Supply Board (ESB) Ireland construction site compound and stockpiling area for excavated material and building rubble. Stockpiles were noted to be 3 m to 4 m high and estimated to be approximately 18,000 m^3 in volume. The construction compound contained prefabricated cabins and storage containers and open storage of construction related materials. The former construction compound is relatively flat, with a slight grade to the south. Ground cover now comprises a mixture of gravel hardstanding in the north-west with stockpiles of aggregate and soil in the north-east. The south of the Site is dominated by undulating grass cover and scrub vegetation. The Site is now vacant with no ongoing operations. The Site is located with an area zoned for enterprise and employment related uses, extending to the north, west and south-west of the Site and including Profile Park, under development to the south-west and Grange Castle Business Park to the north and west. Opposite the Site on the north side of New Nangor Road is a petrol filling station. Regional topography slopes gently down to the south.		
Proposed Development	It is understood that the Site is intended for development as a 3-storey data centre with associated hardstanding and parking.		

2.2 Environmental Setting

Published Geology	From Geological Survey of Ireland (GSI) mapping data, the Site is indicated to be underlain by superficial deposits of Glacial Till derived from limestones. The underlying bedrock is described as dark limestone and shale of the Lucan Formation, also locally known as Calp.
Specific Ground Conditions	There are no Geological Survey of Ireland (GSI) recorded boreholes on the Site or in the immediate vicinity of the Site. However, from the previous ground investigation conducted by Delta-Simons in April 2021, the following general sequence was encountered: ▲ Made Ground encountered as hardstanding and soft to firm friable brown grey sandy gravelly silty clay was cobbles (timber, wire, tarmac, metal, plastic and concrete fragments); overlying ▲ Glacial Till encountered as soft becoming firm to stiff friable light brown grey sandy gravelly silty clay, with occasional cobbles. Occasional clayey sandy gravel layers present; overlying

	▲ Lucan Formation encountered as grey fine to coarse angular limestone gravel (weathered limestone) in a sandy clay matrix or soft to stiff silty clay (weathered mudstone). Suspected reworked natural material was encountered in three locations in the north-east of the site only (TP01, TP02, WS01). During the April 2021 Delta-Simons ground investigation, resting groundwater was encountered between 0.33 m and 2.55 m bgl.
Coal Mining	From information available through the Northern Mine Research Society, the Site is not located in an area of known coal mining.
Radon Gas	The Site lies within an area where between 5 % and 10 % of homes are above the EPA Reference Level for homes of 200 bequerel per cubic metre (Bq/m^3) for radon. The EPA website indicates that radon protective measures may be necessary in the construction of new buildings at the Site.

3.0 Ground Investigation

3.1 Intrusive Investigation

Geotechnical Environmental Services Ltd, under direction from Delta-Simons, carried out intrusive investigation work from 17th to 24th February 2021 and 5th to the 8th July 2021 to assess the potential linkages identified in the outline conceptual model and to provide geotechnical information. The initial tranche of investigations during February have been reported within Delta-Simons Geotechnical and Waste Assessment report (Ref: 20-2018.02G; dated April 2021). This report summarises the additional information gathered during the second tranche of investigations in July 2021. It also incorporates (as Appendix C) a geophysical report prepared by Apex Geophysics as made available to Delta-Simons subsequent to issue of the original April 2021 assessment.

3.1.1 Health & Safety Considerations

Service plans for the site were provided by the client, and the ground investigation contractor, Geotechnical Environmental Services Ltd undertook a utilities clearance of intrusive locations prior to excavation.

An initial assessment of the Site identified a Low risk in relation to Unexploded Ordnance (UXO) and so no specific precautionary measures were required for the works.

Future Contractors should undertake their own assessment of UXO risk in relation to their specific proposed scope of works.

3.2 Scope of Ground Investigation and Rationale

3.2.1 Investigation Details

The ground investigation comprised the following items:

- Supervision of all works by a Geotechnical Environmental Services Ltd engineer. All intrusive locations were logged to BS 5930:2015+A1:2020 Code of practice for ground investigations;
- Drilling of 3 No. rotary cored boreholes (RC01 to RC03) to a maximum depth of 10 m bgl, with 3 monitoring wells installed; and,
- 3 No. rising head tests.

3.3 Ground Investigation Factual Data

The investigation locations were surveyed in by the appointed surveying contractor to an accuracy of approximately +/- 0.1m. An intrusive exploratory hole location plan is presented as Figure 2.

Geotechnical Environmental Services Ltd engineer verified borehole logs are included in Appendix B which also incorporates the Delta-Simons April 2021 Ground Investigation locations.

3.4 Results of In-Situ Tests

SPT tests were undertaken in all boreholes at 1.00 m intervals until suspected bedrock. The results of these tests are presented in the borehole logs included as Appendix B. Uncorrected SPT values are shown relative to test elevation in Figure 3 of the Factual Report in Appendix B.

Sampling of superficial deposits comprised disturbed tub, bulk samples and rock core as detailed on the borehole logs.

3.5 Geotechnical Laboratory Testing

A selection of soil and rock samples were submitted to the UKAS accredited laboratory for a range of geotechnical testing, the results of which are included in Appendix B. The rationale for the laboratory tests undertaken is provided in the table below:

Laboratory Test	Test Standard	Number of Samples Tested	Rationale
Classification			
Water Content	BS1377-2:3 or BS EN ISO 17892-1	42	To assess the potential for cohesive soils to shrink and swell due to changes in the water content of a soil associated with the presence, removal or addition of trees and shrubs.
Liquid and Plastic Limits	BS1377-2:4 – 5 or BS EN ISO 17892-12	39	
Particle Size Analysis: Wet/dry sieve (Sedimentation)	BS1377-2:9.2 & 9.3 or BS EN ISO 17892-4	19 (12)	To assess the suitability of the natural soils for re-use as an acceptable earthworks material in accordance with the Specification for Highways Works (SHW) (Series 600).
Soil Strength			
Quick Undrained Triaxial (single stage)	BS1377-7:8 or BS EN ISO 17892-8	3	To derive undrained shear strength (s_u) or cohesion (c_u) of cohesive soils. To assess the bearing capacity of the soil for foundation design purposes.
Rock Testing			
Point Load Test	ISRM 2007	9	Used to provide a strength index to classify rocks for design purposes.
Uniaxial Compressive Strength	ISRM 2007	8	To characterise material properties of a rock core sample for design purposes.
Geo-Chemical – Soil Samples			
pH	BRE Special Digest 1 or other	58	To assess the soil and groundwater conditions of the Site in accordance with BRE Special Digest 1 Concrete in aggressive ground and specify an appropriate concrete class to resist chemical attack. The geology of the Site is potentially pyritic and there is the potential for this to be disturbed (oxidised) as part of the construction process, for example when excavating trenches for shallow foundations etc.
Water-Soluble Sulphate (2:1 water/soil extract)			

4.0 Ground Summary

4.1 Introduction

The sections below summarise the ground and groundwater conditions encountered during the Site investigation.

4.2 Ground Summary

A summary of the observed ground conditions based on latest rotary core logging at the Site is provided below and should be read in conjunction with the Borehole Logs contained in Appendix B. A contour plot (based on the borehole data for both phases excluding trial pit logs) showing the depth to competent (unweathered) Rockhead is presented in Figure 3.

Summary of Observed Ground Conditions (July 2021 Investigations Only)					
Strata	**Typical Strata Description**	**Depth Range of Strata Top (m)**	**Depth Range of Strata Base (m)**	**Thickness Range (m)**	**Comments**
Topsoil	No description	0.0	0.1	0.1	Observed in RC01 only
Made Ground	Grey brown clayey sandy fine to coarse GRAVEL with cobble content. Gravel is sub-angular to sub-rounded. Firm to stiff (friable) grey-brown slightly sandy slightly gravelly silty CLAY with cobble content. Grey HARDCORE containing red brick and wood remnants.	0.0 - 0.1	0.2 - 1.3	0.1 - 1.3	Area of greatest thickness recorded at RC03
Glacial Till	Soft to firm, firm to stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Contains occasional rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.	0.2 - 1.3	2.2 - 2.6	2.15	Area of greatest thickness recorded at RC01
Lucan Formation	Completely weathered SHALE: encountered as stiff slightly sandy gravelly silty CLAY	2.2 - 2.6	2.25 - 2.7	0.25	Area of greatest thickness recorded at RC01
	Interbedded: Very strong crystalline fine grained dark grey LIMESTONE. Closely to medium spaced undulating, rough, sub-vertical and forty five degree joints. Calcite veining evident. Medium strong to strong thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures.	2.25 - 2.7	Not proven	Not proven	Weak thinly laminated shale encountered at RC01 only at a depth of 8.9 m and thickness of 0.25 m.

	Localised pyrite mineralisation evident. Weak thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.				

4.3 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of potential gross contamination was observed in the soils during the investigation.

4.4 Groundwater

4.4.1 Strikes During Investigations

The groundwater strikes during the July 2021 investigation are summarised below:

Exploratory Hole	Water strike during drilling (m bgl)	Water strike during drilling (m AOD)	Stratum	Comment
RC01	1.80	-	Glacial Till	No rise in 20 minutes.

The previous Delta-Simon's 2021 ground investigation observed areas of perched groundwater in the top of the glacial till, and permeable layers within the glacial till, evidenced by the observed rises in levels following strikes.

4.4.2 Levels During Monitoring Programmed

Groundwater levels were monitored on one occasion on 8th July 2021 summarised below.

Exploratory Hole	Response Zone		Water level during monitoring Max to Min Range		Stratum
	m bgl	m AOD	m bgl	m AOD	
RC01	2.50-10.00	71.58 – 64.08	2.55	71.53	Shale/Limestone
RC02	2.50-10.00	72.07 – 64.57	2.10	72.47	Shale/Limestone
RC03	1.00 – 4.00	73.76 – 70.76	2.65	72.11	Glacial Till/Shale/LST

Rising head permeability tests were carried out in the standpipes installed in boreholes RC01-RC03. Permeability tests results are summarised below and indicate poor drainage (k of less than 10^{-9} m/s generally indicates impervious soil):

Exploratory Hole	Response Zone		Water level during monitoring Max to Min Range		Permeability (m/s)
	m bgl	m AOD	m bgl	m AOD	
RC01	2.50-10.00	71.58 – 64.08	2.55	71.53	1.36×10^{-6}
RC02	2.50-10.00	72.07 – 64.57	2.10	72.47	Fail
RC03	1.00 – 4.00	73.76 – 70.76	2.65	72.11	3.9×10^{-6}

K values shown above may be indicative of "impervious" soils modified by the effects of weathering (weathered shale interface) or mixtures of sand/ silt/ clay/ glacial till/ stratified clay deposits.

The latest groundwater monitoring undertaken in RC01 to RC03 are considered to be consistent with the order, range and prevailing conclusions drawn from the April 2021 assessment; where, accounting for potentially anomalous conditions at locations BH05, BH08, WS01 and WS03 (as discussed), and accounting for the new data, resting groundwater depths have been typically recorded between ~1.1 m and 2.65 m bgl across the Site during the monitoring period. Overall, a potential groundwater flow direction towards the south may be inferred, subject to seasonal variations and the presence of shallow bedrock which may locally influence groundwater flow direction, where the bedrock may be effectively impermeable, or as variations such as illustrated by the contour map presented as Figure 3.

Previous elevated groundwater levels were observed in BH05 and WS03 (April 2021) during the first groundwater monitoring visit. Due to the position of those wells in close proximity to the Baldonnel Stream along the southern and eastern boundaries of the Site, it was thought possible that these elevated levels were the result of short-term influence from higher water levels in the stream.

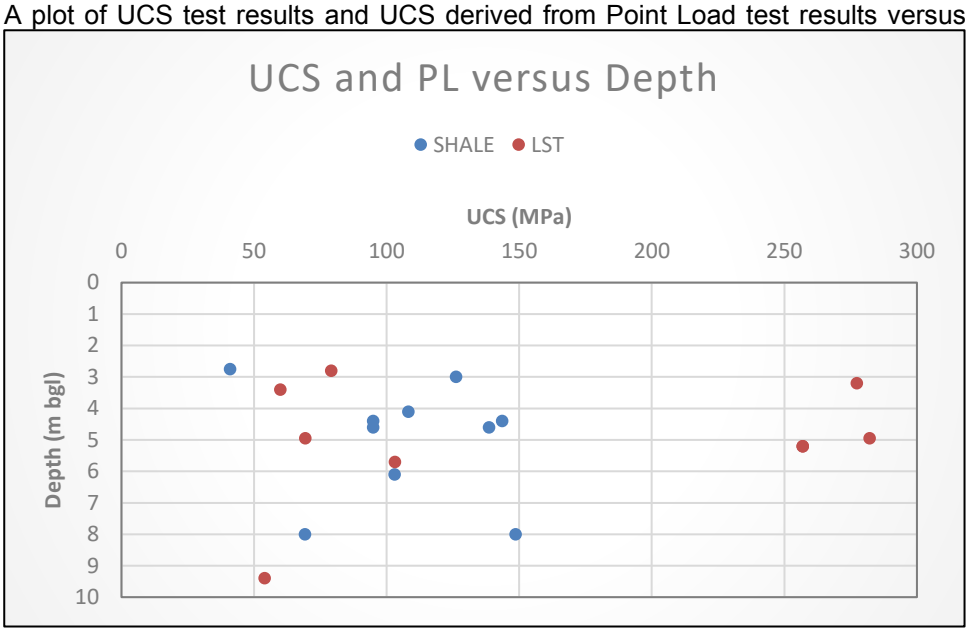
4.5 Material Properties

The table below summarises the factual material properties based upon the results of in-situ and laboratory test data and also incorporates Delta-Simons April 2021 data in brackets.

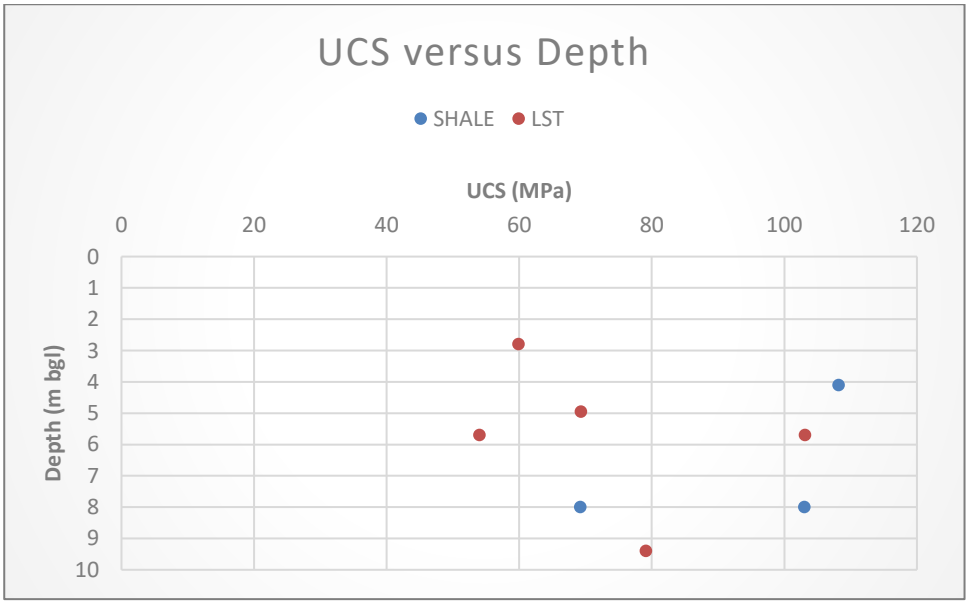
Parameter	Made Ground/ Suspected Made Ground	Glacial Till (Cohesive)	Lucan Formation Shale	Lucan Formation Limestone
Moisture Content - w	-	11 – 18% (7 – 87 %)	-	-
Liquid Limit - wL	-	31 – 40% (25 – 50 %)	-	-
Plastic Limit - wP	-	16 – 22% (15 – 24 %)	-	-
Plasticity Index - IP	-	13 – 20% (10 – 26 %)	-	-
Bulk Density	-	2.21 – 2.28Mg/m^3	-	-
Uncorrected SPT N Value	(18) - 22	(6 – >50)	(41 – >50)	(41 – >50)
Undrained Shear Strength[1] - c_u	-	(30 – >250)	-	-
Undrained Shear Strength[2] - c_u		71 – 162		
Point Load Index			3.41 – 12.39	21.41 - 23.51
Uniaxial Compressive Strength[3] (UCS)			40.92 – 148.68	256.92 – 282.12
Uniaxial Compressive Strength[4] (UCS)			69.2 - 108.2	54 – 103.1

Notes:
1. Correlation from Stroud and Butler (1975) 'The standard penetration test and the engineering properties of glacial materials'. Proc. of the Symposium on the engineering behaviour of glacial materials pp 117 -128.
2. Laboratory UU triaxial tests
3. UCS derived from point load index based on a conversion factor of 12
4. Laboratory measured UCS

A plot of UCS test results and UCS derived from Point Load test results versus depth is presented below.



UCS tests alone plotted against depth are presented in the following graph. A conversion factor (k) of 12 was conservatively assumed for converting corrected point Load to UCS, however the plots highlight the variability in laboratory measured strength of the material.



4.6 Geochemical Testing

Geochemical analysis was undertaken on 58 soil samples of Made Ground and Glacial Till (47 from previous April 2021 GI and 11 from most recent GI), and 16 groundwater samples tested for selective contaminants (BRE Special Digest 1:2005 (3rd Edition), Concrete in Aggressive Ground, the results of which are summarised in the table below.

Tests	No. of Tests	Minimum	Maximum
Soil – pH (July 2021 findings in brackets)	44	8.0 (8.1)	11.7 (8.8)
Soil - Water Soluble Sulphate (July 2021 findings in brackets)	58	<10 mg/L (< 10 mg/L)	1,600 mg/L (44 mg/L)
Water – pH	16	7.4	10.7
Water - Sulphate	16	38 mg/L	220 mg/L

5.0 Geotechnical Assessment

5.1 Summary of Development Proposals

Proposed development layouts have been provided in Drawing Ref: DB081-RKD-ZZ-0G-DR-A-PLAN-1100_S2-Issued for information_P04, the development is understood to be for a three-storey data centre. The approximate building locations/ arrangement is also indicated on Figure 3.

No basements are proposed as part of the development, reinforced concrete retaining walls are proposed as shown on drawing Ref: DB8-Preliminary Level 30.04.2021 – WIP and levelling earthworks are anticipated to create a development platform at a FFL of 75.5 m AOD.

Delta-Simons were requested to undertake the ground investigation to investigate feasibility of bearing capacities of 500 kPa for bedrock to facilitate pad foundations with maximum column loads of 4500 kN, the current preferred foundation option for the scheme.

5.2 Foundations

5.2.1 Spread Foundations on Rock

Bearing capacity and compressibility of rock depends on the uniaxial compressive strength (degree of weathering is reflected in this), lithology and the frequency, nature and orientation of the discontinuities. Uniaxial compressive strength has been summarised in section 4.5 where laboratory test results for UCS and point Load strength index are plotted against depth. A high level of variability is evident as these test results are representative of the Rock core sample only, as opposed to the in situ strength of the rock mass.

Rock core descriptions are included on borehole logs contained in Appendix B and summarised in Section 4.2. Rock core logging identifies medium strong to strong shale at RC01 and RCO2 at shallow depth (2.6 m and 2.2 m bgl respectively), with RC03 encountering very strong Limestone (800 mm thickness) at 2.7 m bgl overlying medium strong to strong Shale. Field descriptions are not entirely consistent with uniaxial compressive strength measured in the laboratory (and derived from point Load strength index tests) as laboratory test results will be undertaken on intact core samples, whereas in the field, engineering descriptions will also take into account the degree of weathering and fracturing. For example, where shale is described as medium strong to strong, it has also been identified in the field that it is locally highly to completely weathered to soft clay.

Lithology, frequency, nature and orientation of discontinuities are also crucial in determining bearing capacity and compressibility of the strata. Taking into account the discontinuity spacings and uniaxial compressive strength (both from laboratory tests and inferred from field identification) allowable bearing pressures of 500 kPa may be achievable for square pad foundations up to 3 m square founding in unweathered bedrock (for settlements not exceeding 0.5% of foundation width as specified by BS EN 1997-1 2004).

A FFL of 75.5 m AOD as identified on drawing Ref: DB8-Preliminary Level 30.04.2021 – WIP has been assumed. Depths to weathered and unweathered bedrock as recorded during Delta-Simons' ground investigations are summarised below:

Exploratory Hole	Level (m AOD) *estimated from dwg ref: DB8-Preliminary Level 30.04.2021 – WIP	Depth to weathered bedrock (mbgl)	Weathered bedrock level (m AOD)	Depth to unweathered bedrock (mbgl)	Unweathered bedrock level (m AOD)
FFL*	75.50				
RC01	74.08	2.35	71.73	2.60	71.48
RC02	74.57	2.23	72.34	2.25	72.32

RC03	74.76	2.60	72.16	2.70	72.06
April 2021 BH01-BH12 WS01-WS04	73.58 - 75.79	1.80 – 4.35	70.52 – 73.24	2.16 – 4.40	70.18 - 72.39
Notes: • April 2021 Trial pits excluded					

As the table above shows, depth to unweathered bedrock based on ground investigations undertaken by Delta-Simons varies across the Site from 70.18 m to 72.39 m AOD as illustrated on Figure 3 which also indicates potential founding depths based on the investigation undertaken and existing Site elevations. However, it is likely that competent rockhead varies further across the Site, as identified on the geophysical survey summarised in Section 5.5 and local deepening will be required to found on competent bedrock. All foundation excavations should be inspected by a suitably qualified Engineer prior to casting to ensure the appropriate depth, founding medium and strength characteristics have been achieved.

Based on the proposed FFL and existing Site levels, it would appear that additional fill in the order of up to ~1 m to ~1.5 m may be typically required in the vicinity of the proposed buildings and therefore the overall foundation excavation depths would also be deeper than the ranges indicated assuming this material would be sequenced first.

Where the depth of excavation, material handling, contract risk/ economics including other practical implications (e.g. requirement for dewatering) it is considered, the building could otherwise be founded on piles.

5.2.2 Floor Slabs

Based on assumed maximum floor slab dimensions of 110m by 28m and assuming a UDL of 30kPa, settlements of 20mm to 25mm are anticipated. However, based on dwg ref: DB8-Preliminary Level 30.04.2021-WIP, and a proposed FFL of 75.5m, up to 1.5m fill is anticipated in areas of the Site which will impose an additional 30 kPa surcharge. For example, assuming a maximum UDL of 62kPa in vicinity of BH07 (SW of Site) where 1.6 m fill is proposed, settlements of 22mm to 26mm are anticipated based on the ground conditions recorded. However, in the vicinity of BH06 where 1.35 m of fill is proposed (centre of the Site), 1.35 m of soft clay has been recorded (underlying 0.95m of Made Ground) which increases settlements > 25mm.

Where ground bearing floor slabs are feasible, all Topsoil, Made Ground and **soft** soils should be removed and the formation thoroughly proof rolled. Soft spots should be excavated and replaced with well-compacted granular material. Alternatively ground improvement may be required prior to land raise to ensure suitable founding stratum.

5.3 Excavations & Obstructions

It is expected that conventional mechanical excavators will readily remove the Made Ground, Glacial Till and weathered bedrock likely to be encountered in shallow excavations. However, a rippability assessment for more competent bedrock is outside of this scope of works. A breaker and other plant may be required for any existing hardstand or processing of stockpiled/ or former construction materials.

All shallow foundation or services excavations at the Site should be considered unstable, therefore, temporary support of all excavations should be considered when excavating on-Site.

5.4 Groundwater

Shallow groundwater may be anticipated, as shallow strikes were encountered during the ground investigation works and monitoring during subsequent groundwater monitoring visits. Should any perched groundwater be encountered, then local dewatering via sump and pump should be suitable, however, treatment prior to disposal to sewer may be required. For deeper foundation excavations (to competent bedrock), alternative dewatering measures may be required to mitigate bedrock softening due to water ingress.

5.5 Geophysical Survey

A geophysical survey was commissioned and undertaken by Apex Geophysics on behalf of the Client to determine the variations in soil type and thickness and determine depth to rockhead. The survey comprised of a reconnaissance EM ground conductivity mapping with follow-up 2D Electrical Resistivity Tomography (ERT) and Seismic Refraction profiling. A review of this report is outside of this scope, but general findings are summarised below.

Results of the geophysical investigation indicated 5 layers based on their seismic velocity and resistivity values, whereby the soils generally increase in stiffness with depth, consistent with the borehole logs. Two different types of bedrock were identified low resistivity mudstone/shale predominately underlying the northern half of the Site and a higher resistivity dark limestone with thin interbedded shales underlying the southern half of the Site. The full geophysical report is appended within Appendix C.

The soil thickness appears greater in the northern and central areas of the Site typically between 4.0-5.25 m, however, soil thickness is reduced in the southeast, central west and southwestern areas of the Site to between 1.75-3.5 m.

The thickness of the weathered rockhead layer across the majority of the Site is shown to be between 0.25-1.75 m. There are however three anomalous areas identified within the report: the eastern site boundary and two localised areas in the southwest of the Site, which record greater thickness of weathered bedrock and coincide with the areas of shallowest overburden (superficial deposits).

In areas where shallow weathered rockhead is encountered removal of weathered bedrock might be required to reach competent rockhead to provide the required bearing capacities. However, it is recommended that the geophysical report be updated based on the most recent intrusive investigation works.

5.6 Chemical Attack on Buried Concrete

Water soluble sulphate concentrations in soils varied from 10 mg/l to 1,600 mg/l for April 2021 ground investigation and <10 mg/L to 44 mg/L for latest ground investigation with soil pH values ranging from 8 to 11.7 for both. Sulphate concentrations in the groundwater ranged from 38 mg/l to 220 mg/l with groundwater pH values ranging from 7.4 to 10.7.

In accordance with the recommendations of BRE Special Digest 1, ‘Concrete in Aggressive Ground’ 2005, the conditions of the soils at the site would therefore be classified as Design Sulphate Class DS-2 and ACEC Class AC-2 for soils and groundwater, when considering the most appropriate type of concrete to be used at the site in order to resist chemical attack from elevated sulphate present in the soils (assuming mobile groundwater in potentially pyritic soils). The Lucan Formation is susceptible to pyrites (as identified on rotary borehole logs), and it is not recommended to crush and reuse as fill. When excavating into rock, it is advised to minimise exposure to air and blind off as soon as possible to minimise likelihood of oxidation.

6.0 Conclusions & Recommendations

6.1 Geotechnical Summary

Bearing capacity and compressibility of rock depends on the uniaxial compressive strength (degree of weathering is reflected in this), lithology and the frequency, nature and orientation of the discontinuities.

Taking into account the discontinuity spacings and uniaxial compressive strength (both from laboratory tests and inferred from field identification) allowable bearing pressures of 500 kPa may be achievable for square pad foundations up to 3 m founding in unweathered bedrock (for settlements not exceeding 0.5% of foundation width as specified by BS EN 1997-1 2004). All foundation excavations should be inspected by a suitably qualified Engineer prior to casting to ensure the appropriate depth, founding medium and strength characteristics have been achieved.

It is expected that conventional mechanical excavators will readily remove the Made Ground, Glacial Till and weathered bedrock likely to be encountered in shallow excavations. However, a rippability assessment for more competent bedrock is outside of this scope of works. A breaker and other plant may be required for any existing hardstand or processing of stockpiled/ or former construction materials.

In accordance with the recommendations of BRE Special Digest 1, 'Concrete in Aggressive Ground' 2005, the conditions of the superficial soils at the Site would therefore be classified as Design Sulphate Class DS-2 and ACEC Class AC-2 for soils and groundwater, when considering the most appropriate type of concrete to be used at the Site in order to resist chemical attack from elevated sulphate present in the soils. The Lucan Formation is susceptible to pyrites, and it is not recommended to crush and reuse as fill. When excavating into rock, it is advised to minimise exposure to air and blind off as soon as possible to minimise likelihood of oxidation.

Figures

Figure 1 – Site Location Map



Scale: NTS @ A4

LEGEND

Site Boundary

Scale: 1 / NTS @ A4

Bing maps

deltasimons
Environment - Health & Safety - Sustainability

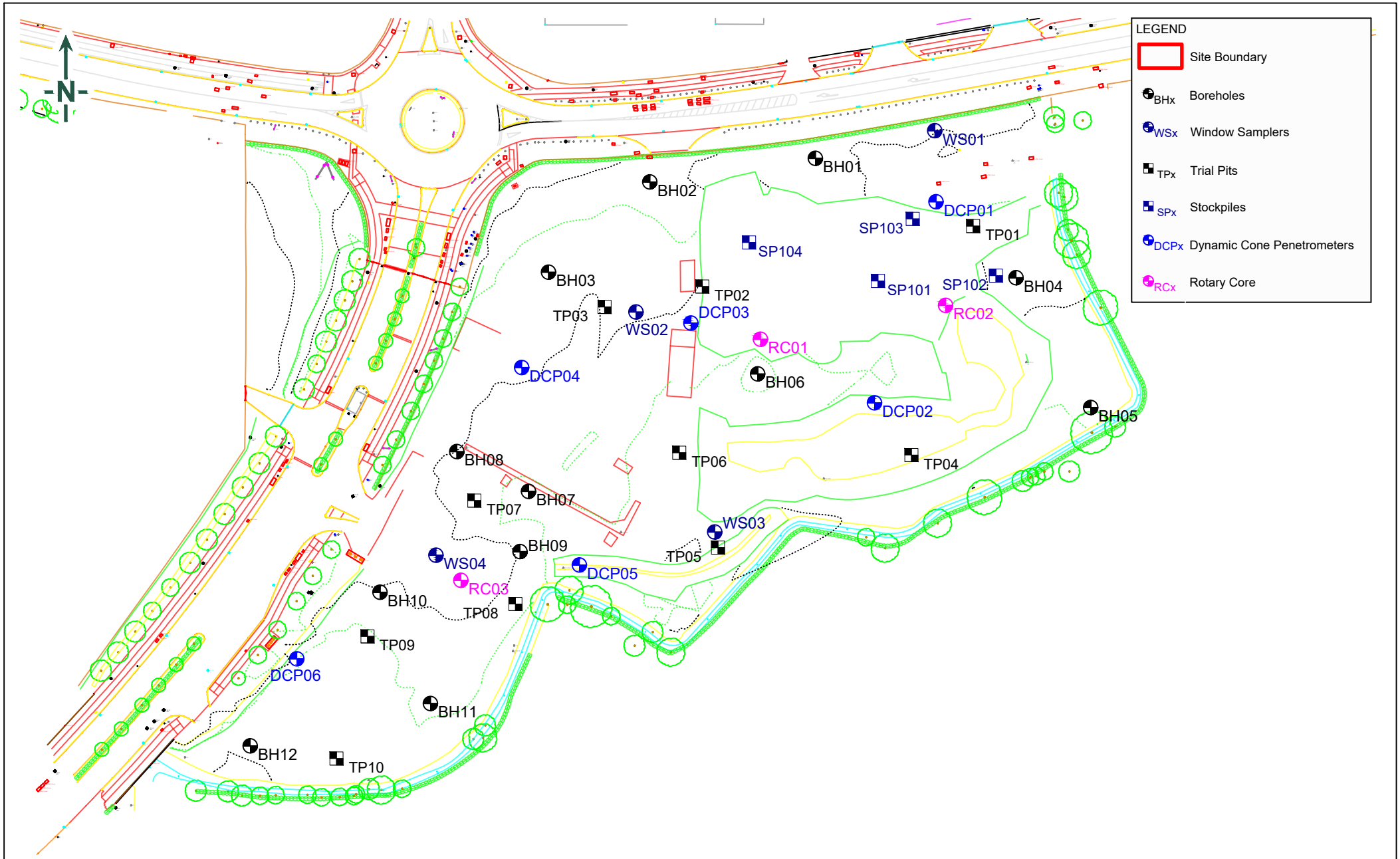
TITLE:
Site Location Map
IER Grange Castle
Dublin

DRAWN BY: YA	SCALE: To Scale@A4
CHECKED BY: JS	REVISION: 1
DATE: 28 July 2020	

PROJECT NO: 20-2018.03

FIGURE NO: 1

Figure 2 – Exploratory Hole Location Plan

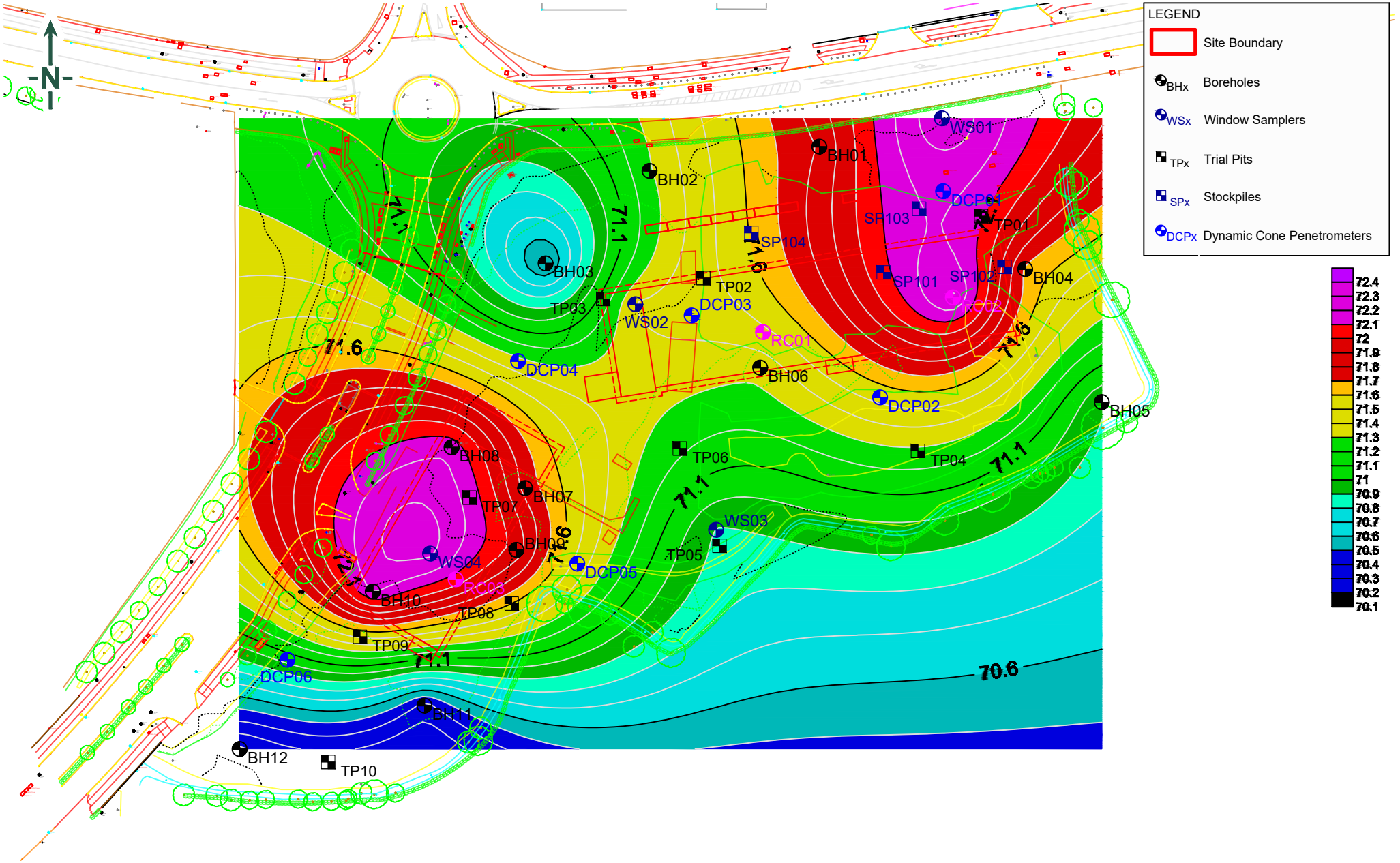


deltasimons
Environment - Health & Safety - Sustainability

TITLE:
Exploratory Hole Location Plan
Grange Castle
Dublin

DRAWN BY: KE	SCALE: Not to Scale	PROJECT NO: 20-2018.03
CHECKED BY: SM	REVISION: 1	FIGURE NO: 2
DATE: 12 August 2021		

Figure 3 – Contour Plan to Unweathered Rockhead



deltasimons
Environment - Health & Safety - Sustainability

TITLE:
Contour Plan (Rockhead)
Grange Castle
Dublin

DRAWN BY: KE	SCALE: Not to Scale	PROJECT NO: 20-2018.03	
CHECKED BY: SM	REVISION: 1	FIGURE NO: 3	
DATE: 12 August 2021			

Appendices

Appendix A – Limitations

Limitations

This Report was prepared by Delta-Simons Environmental Consultants Ltd (Delta-Simons) for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. Delta-Simons does not intend, without its written consent through a formal letter of reliance or warranty, for this Report to be disseminated to any party other than the named Client or to be used or relied upon by any party other than the named Client. Use of the Report by any other party is unauthorised and such use is at the sole risk of the user. Any party using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by Delta-Simons. Unless explicitly agreed otherwise, in writing, this Report has been prepared under Delta-Simons' Standard Terms and Conditions as included within our proposal to the Client.

The recommendations contained within this Report represent Delta-Simons professional opinions, based upon the information detailed within the Report, exercising the reasonable skill and care to be expected of a professional consultant holding itself out as having the competence, experience and resources necessary for the purpose of carrying out similar work in scope and character to the services performed. The Report needs to be considered in the light of the proposal and associated limitations of scope. The Report needs to be read and considered in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the Report.

Where Delta-Simons has obtained, reviewed and evaluated information in preparing this Report from the Client and others and Delta-Simons conclusions, opinions and recommendations has been reasonably determined using this information, Delta-Simons does not warrant the accuracy of the third-party information provided to it and cannot be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

Site surveys document the conditions encountered at the time of survey only and conditions may change due to natural processes or human intervention. As such, surveys represent an assessment at a specific point in time and Delta-Simons cannot be responsible for adverse conditions which arise or become apparent after the time of the survey or for conditions which sit outside the scope for which the survey or Report was commissioned.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work period and on the results of laboratory and field tests performed during the investigation. Ground conditions are inherently variable such that no investigation can be exhaustive to the extent that all adverse conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed or obtained as part of this assessment. It should be noted that groundwater levels vary due to seasonal and other effects and may at times differ to those measured during the investigation. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions. Where risk assessment is undertaken, this is based upon the standards, guidance and common practice at the time of the assessment and Delta-Simons cannot be responsible for conditions which become apparent following changes in guidance or practice or advancements in scientific knowledge which change the position in relation to assessment of risk.

No aspect of this Report constitutes a design. Where this information is used in design, the designer should verify the information has been used appropriately.

Where budgets are prepared and presented within the Report, these are for information only to indicate the likely magnitude of a cost and do not represent an invitation to treat for the works. All budgets and programmes presented should be reviewed and verified by appropriately qualified and experienced independent Project Managers and Cost Consultants.

Appendix B – Geotechnical Environmental Services Ltd Factual Report

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

PROPOSED DEVELOPMENT SITE
PROFILE PARK
GRANGE CASTLE
DUBLIN

GROUND INVESTIGATION (PHASES 1 & 2)

FACTUAL REPORT

REPORT No. 002/ROI/21

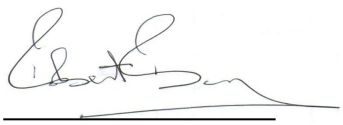
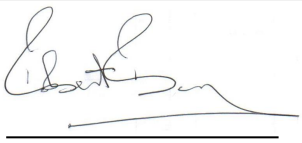
JULY 2021

CLIENT: PINNACLE CONSULTING ENGINEERS

GEO-ENVIRONMENTAL ENGINEER: DELTA-SIMONS

DOCUMENT CONTROL SHEET

CLIENT	PINNACLE CONSULTING ENGINEERS
PROJECT TITLE	PROPOSED DEVELOPMENT SITE PROFILE PARK, GRANGE CASTLE, DUBLIN GROUND INVESTIGATION (PHASES 1 & 2)
CONSULTING ENGINEER	DELTA SIMONS
REPORT No.	002/ROI/21

REV.	STATUS	AUTHOR(S)	REVIEWED & APPROVED BY	ISSUE DATE
1	FINAL	 ROBERT BARRY BSc, MSc, C. Eng, C. Geol, FGS, MIMMM	 ROBERT BARRY BSc, MSc, C. Eng, C. Geol, FGS, MIMMM	09/08/2021

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1.0 INTRODUCTION

On the instruction of Delta-Simons (the Geo-Environmental Engineer), acting on behalf of Pinnacle Consulting Engineers (the Client), Geotechnical Environmental Services Limited (GES) were appointed to undertake a ground investigation to assess the ground and ground water conditions in relation to a proposed development at Profile Park, Grange Castle, Dublin (Appendix 1).

The ground investigation comprised the following:

- 15 No. boreholes, excavated in soil and rock to a maximum depth of 10.0m below existing ground level (begl), with associated in-situ testing and sampling.
- 4 No. windowless sampler boreholes, excavated in soil to a maximum depth of 3.3m below existing ground level (begl), with associated in-situ testing and sampling.
- 11 No. trial pits excavated to a maximum depth of 3.0m begl with associated sampling.
- 4 No. samples from existing spoil heaps.
- The installation of 10 No. combined gas/groundwater monitoring standpipes.
- 6 No. dynamic cone penetrometer (DCP) tests.
- Post fieldwork monitoring of ground gas emissions/groundwater levels and groundwater sampling.
- Geotechnical, geochemical, and environmental laboratory testing.
- Factual reporting.

The Specification for the investigation was the "Specification and Related Documents for Ground Investigation in Ireland" published by Engineers Ireland (2016), with information, amendments, and additions as advised by the Engineer.

Soil and rock descriptions were undertaken in accordance with British Standard BS5930 Code of Practice for Site Investigation:2015+A1:2020. which incorporates guidance presented in BS EN ISO 14688-1:2002+A1:2013, BS EN ISO 14688-2:2004+A1:2013 and BS EN ISO 14689-1, 2018.

The following provides additional clarification of the terminology that has been used:

- Silty CLAY/clayey SILT – used where it is considered that the secondary fraction is important and hence significantly modifies the appearance and/or behaviour of the principal.
- Fine grained (clays/silts) soils plotting on or just below the A-line on a plasticity chart are classified as clays.
- Fine grained soils with less than 35% sand and/or gravel sized particles are classified as slightly sandy and/or slightly gravelly.
- Fine grained soils with between 35% and 65% sand or gravel sized particles are classified as sandy or gravelly ("and" only in theory).
- Fine grained soils with greater than 65% sand or gravel sized particles are classified as very sandy or very gravelly.
- Coarse soils (sands/gravels) with less than 5% clay or silt and/or less than 5% sand or gravel are classified as slightly clayey or slightly silty and/or slightly sandy or slightly gravelly.
- Coarse soils with between 5% and 20% clay or silt and/or between 5% and 20% sand or gravel are classified as clayey or silty and/or sandy or gravelly.
- Coarse soils with greater than 20% clay or silt or greater than 20% sand or gravel are classified as very clayey or very silty and/or very sandy or very gravelly.

As noted in BS5930:2015+A1:2020 Clause 33.4.4.2, Table 15, the classification of very coarse soils (cobbles and boulders) requires a very large sample (circa 1000kg). Accordingly, it is not possible to recover representative samples from boreholes and conventional trial pits to quantify cobble and boulder content as above. Therefore, the exploratory hole logs presented in this report simply make reference to the presence or otherwise of cobbles and boulders with no attempt to classify the % content.

All rock cores obtained were logged by an experienced engineering geologist. Fracture Index (FI), as recorded on the rotary borehole logs, has been expressed in terms of fracture frequency per metre length of core. The term non-intact has been used for highly fractured or fragmented core where the rock material was recovered as fine to coarse gravel sized fragments.

2.0 AIMS AND OBJECTIVES OF THE INVESTIGATION

The investigation was designed with the objective of obtaining the following information:

- An overview of the ground and groundwater conditions present in relation to foundation design.
- An assessment as to the potential aggressiveness of the soils encountered toward buried concrete.
- An assessment as to the presence or otherwise of soil and groundwater contamination.
- An assessment as to the presence or otherwise of ground gases.

This report provides a factual account of the site works undertaken, ground and groundwater conditions encountered, soil gas emissions and laboratory test results obtained.

The contents of the report assume that the data obtained is representative of the site area.

3.0 SITE WORKS

3.1 Introduction

Site works were undertaken during the periods 17th-24th February 2021 (Phase 1) and 5th-8th July 2021 (Phase 2), under the supervision of a geo-environmental engineer from GES.

Ground levels and co-ordinates as noted on the borehole logs are related to Ordnance Datum and Irish Grid, respectively.

An exploratory hole location plan is included in Appendix 1.

3.2 Boreholes

15 No. boreholes (BH01-BH12 and RC01-RC03) were excavated, to refusal on rock head, at a maximum depth of depth of 4.4m begl by means of a CME-55 drill rig using a combination of continuous flight auger (CFA) drilling and percussion sampling techniques to form a hole of 150mm diameter.

Boreholes RC01-RC03 were progressed through the bedrock strata by means of HQ wire line core drilling to produce cores of 63mm diameter while forming a hole of 99mm diameter.

4 No. windowless sampler boreholes (WS01-WS04) were excavated to a maximum depth of 3.3m by means of a Dando Terrier 2002 drill rig using percussion sampling techniques.

The windowless sampler boreholes were excavated at a diameter of 101mm to produce continuous soil samples, retained in 1.0m long pvc liners, of 87mm diameter. Temporary steel casing of 113mm diameter was simultaneously installed to depth of 1.0m begl to ensure the integrity of the borehole sidewalls as progressed through the strata encountered.

The boreholes were excavated to facilitate the collection of representative soil samples for detailed geotechnical description, geotechnical, geochemical, and environmental laboratory testing.

In-situ testing took the form of the Standard Penetration Test (SPT), using a split barrel sampler, to allow measurement of the soil penetration resistance N to be determined under dynamic loading.

Details of groundwater strikes as encountered during boring operations (if applicable) are noted on the borehole logs.

The borehole logs, photographs of the rock cores obtained and a composite plot of SPT N Values v Reduced Levels are included in Appendix 2.

3.3 Standpipes

Combined gas/groundwater or groundwater monitoring standpipes were installed in boreholes BH01, BH03, BH05, BH08, BH10-BH12. RC01-RC03 and WS01-WS03 as per the instructions of the Engineer's site representative.

Each standpipe comprised 50mm i.d. (HDPE) well casing and well screen sections with associated gravel filter pack, bentonite pellet seal, push fit base cap, geotextile filter sock, gas bung/push fit top cap, cement/bentonite grout seals and flush trafficable steel head cover.

Specific details of each standpipe installation are presented on an instrumentation log that accompanies the relevant borehole log as included in Appendix 2.

3.4 Trial Pits

11 No. trial pits (TP01-TP11) were excavated to a maximum depth of 3.0m begl by means of a tracked excavator to provide an assessment of the near surface ground and groundwater conditions.

The trial pit logs, along with photographs of the excavations and resulting spoil are included in Appendix 3.

3.5 Spoil Heaps

4 No. spoil heaps (SP01-SP04) as present on the site were sampled by means of the tracked excavator.

Logs describing the findings, along with photographs of the spoil heaps, are included in Appendix 3.

3.6 Dynamic Cone Penetrometer Testing

6 No. DCP tests (DCP01-DCP06) were undertaken in order that an assessment could be made of the strength of the soils present to a maximum depth of 1.0m begl, i.e. anticipated sub-grade.

The data relating to the cone penetration rate and the conversion to equivalent California Bearing Ratio (CBR) values is presented in Appendix 4.

The DCP locations are referenced as chainages in Appendix 4, i.e. Chainage 1.000 relates to the DCP test undertaken at location DCP01, Chainage 2.000 relates to the DCP test undertaken at location DCP2, etc.

The data was assessed using the UK DCP software as developed by the Transport Research Laboratory (TRL) and as described in TRL Project Report PR/INT/278/04.

3.7 Soil and Groundwater Sampling

Soil samples for detailed geotechnical description, geotechnical, geochemical, and environmental laboratory testing were collected in the following:

- PVC "jar bags" of approximately 1kg capacity.
- PVC "bulk bags" of approximately 10kg capacity.
- 1kg capacity plastic tubs.
- 250g capacity amber glass jars.
- 60g capacity amber glass vials.

Environmental soil sampling was undertaken with reference to guidance presented in British Standard BS10175:2011+A2:2017, British Standard Code of Practice for Investigation of Potentially Contaminated Sites.

Groundwater samples for environmental laboratory testing were collected in the following:

- 2 x 1000ml capacity glass bottle.
- 2 x 500ml capacity plastic bottle.
- 2 x 40ml capacity glass vials.
- 1 x 125ml capacity plastic bottle with sodium hydroxide (NaOH) preservative.
- 1 x 125ml capacity plastic bottle with nitric acid (HNO_3) preservative.
- 1 x 125ml capacity plastic bottle with sulphuric acid (H_2SO_4) preservative.

To maintain sample integrity, and in an attempt to avoid deviation, samples were transported to the laboratory of Chemtest Limited, Newmarket, England in cool boxes containing ice packs.

3.8 Permeability Testing

Rising head permeability tests were carried out in the standpipes installed in boreholes RC01-RC03.

The factual data recorded and calculated permeability for each test are included in Appendix 2.

3.9 Gas Monitoring

Measurement of soil gas emissions took place on 3 No. occasions after the completion of site works and installation/development of the combined gas/groundwater monitoring standpipes.

Ground gases monitored, using a Gas Data LMS xi G3 gas meter, were:

- Methane (CH_4).
- Carbon Dioxide (CO_2).
- Oxygen (O_2).
- Carbon Monoxide (CO).
- Hydrogen Sulfide (H_2S).

The following additional measurements were also collected during the gas monitoring rounds:

- Flow rate (in l/hr).
- Atmospheric pressure (in mb).
- Water level in borehole.

The results obtained are included in Appendix 7.

4.0 LABORATORY TESTING

4.1 Geotechnical and Geochemical Laboratory Testing

Selected soil and weathered rock samples were tested at the laboratories of Queen's University, Belfast and Chemtest Limited, Newmarket, England.

Laboratory testing was scheduled by Delta-Simons and comprised the following:

- Natural moisture content.
- Atterberg Limits.
- Particle size distribution (wet sieve and hydrometer).
- Point load index.
- Uniaxial compressive strength
- pH/Water soluble sulfate.

Laboratory testing was undertaken in accordance with guidance presented in British Standard BS1377:1990, Methods of Test for Soils for Civil Engineering Purposes, The International Society of Rock Mechanics (ISRM) Suggested Methods for Rock Characterisation, Testing and Monitoring: 2007-2014 (2014) and Building Research Establishment (BRE) Special Digest 1 (2005).

The results obtained and composite plots of A-Line data and PSD graphs are included in Appendix 5.

4.2 Environmental Laboratory Testing

Selected environmental soil and groundwater samples (2 No. rounds of groundwater sampling and testing) were tested at the laboratory of Chemtest Limited, Newmarket, England.

Laboratory testing was scheduled by Delta-Simons and comprised the following.

- Metals to low level (As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn).
- Speciated (16) PAHs.
- Coronene.
- VOCs/SVOCs.
- PCB (7 congeners).
- Asbestos Screen.
- TPH-CWG incl. BTEX & MTBE.
- Water Soluble Sulfate/sulfate/pH.
- Free Cyanide.
- Waste Acceptance Criteria (WAC) 2 batch eluate suite and + total solid suite).

Details of the testing scheduled, and associated results, are included in Appendix 6.

REFERENCES

1. Specification and Related Documentation for Ground Investigation in Ireland (Part I Guidance Notes, Part II Technical Specification and Bill of Quantities). The Institute of Engineers of Ireland. Second Edition; 2016.

2. British Standard BS5930:2015+A1:2020, Code of Practice for Site Investigations. British Standards Institution, London.

3. BS EN ISO 14688-1, 2002+A1:2013. Geotechnical Investigation and Testing - Identification and classification of soil. Part 1: Identification and description. British Standards Institution, London.

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5. BS EN ISO 14689-1, 2018. Geotechnical Investigation and Testing – Identification and classification of rock. Part 1: Identification and description. British Standards Institution, London.

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7. British Standard BS1377: 1990, Methods of Test for Soils for Civil Engineering Purposes. British Standards Institution.

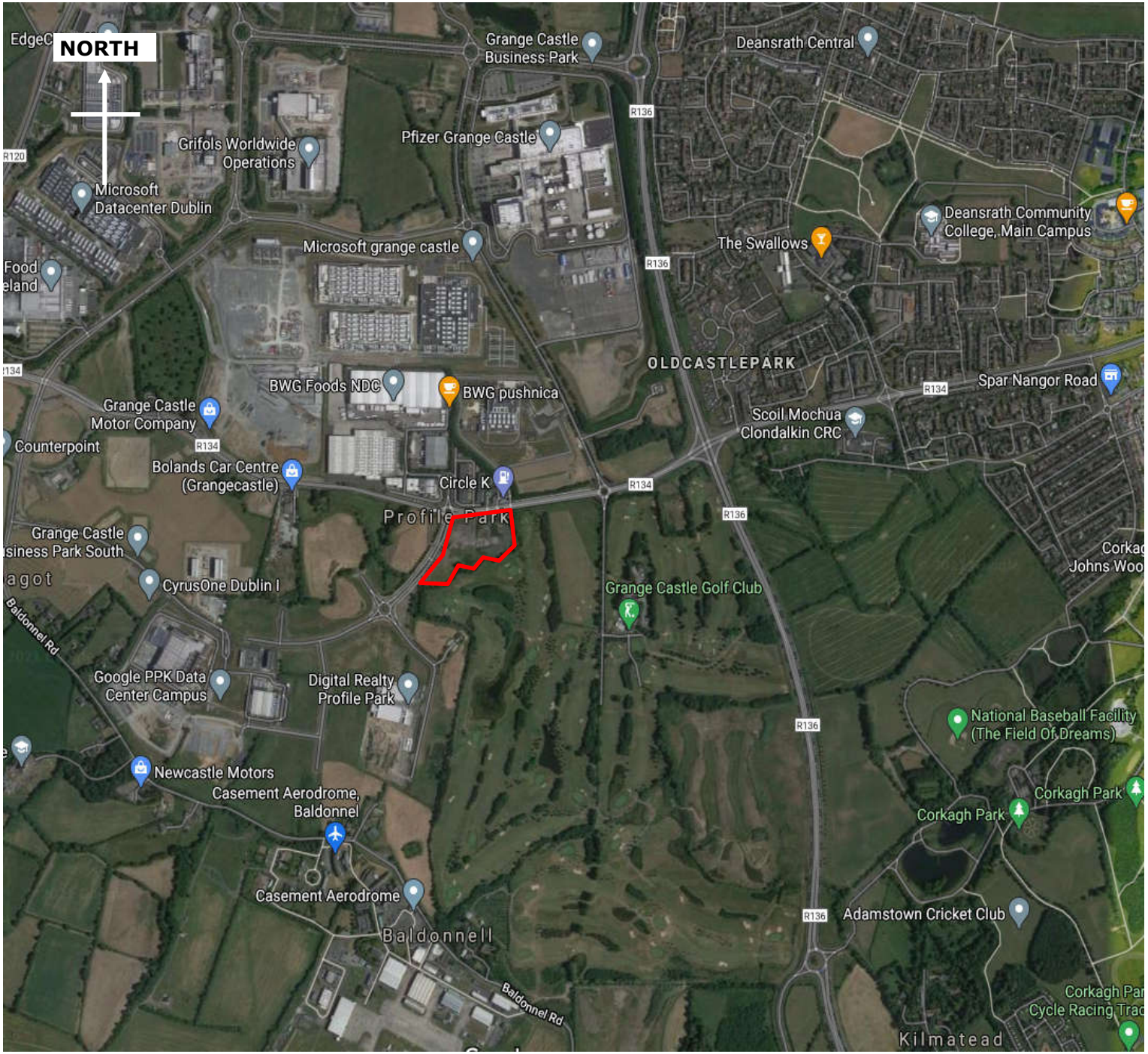
8. The ISRM Suggested Methods for Rock Characterisation, Testing and Monitoring: 2007-2014. 2014. International Society for Rock Mechanics.

9. British Research Establishment Construction Division. 2005. BRE Special Digest 1: Concrete in Aggressive Ground. Third Edition. BRE Bookshop. Garston.

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 1

SITE AND EXPLORATORY HOLE LOCATION PLANS



GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Title: Site Location Plan

Project Name:
Proposed Development Site
Profile Park, Grange Castle, Dublin

Figure No.: 1	Report No. 002/ROI/21

Client: Pinnacle Consulting Engineers

Geo-Environmental Engineer: Delta-Simons

Drawn by: EB	Date: 22/03/2021
Reviewed by: RB	Date: 22/03/2021

Key/Symbols:

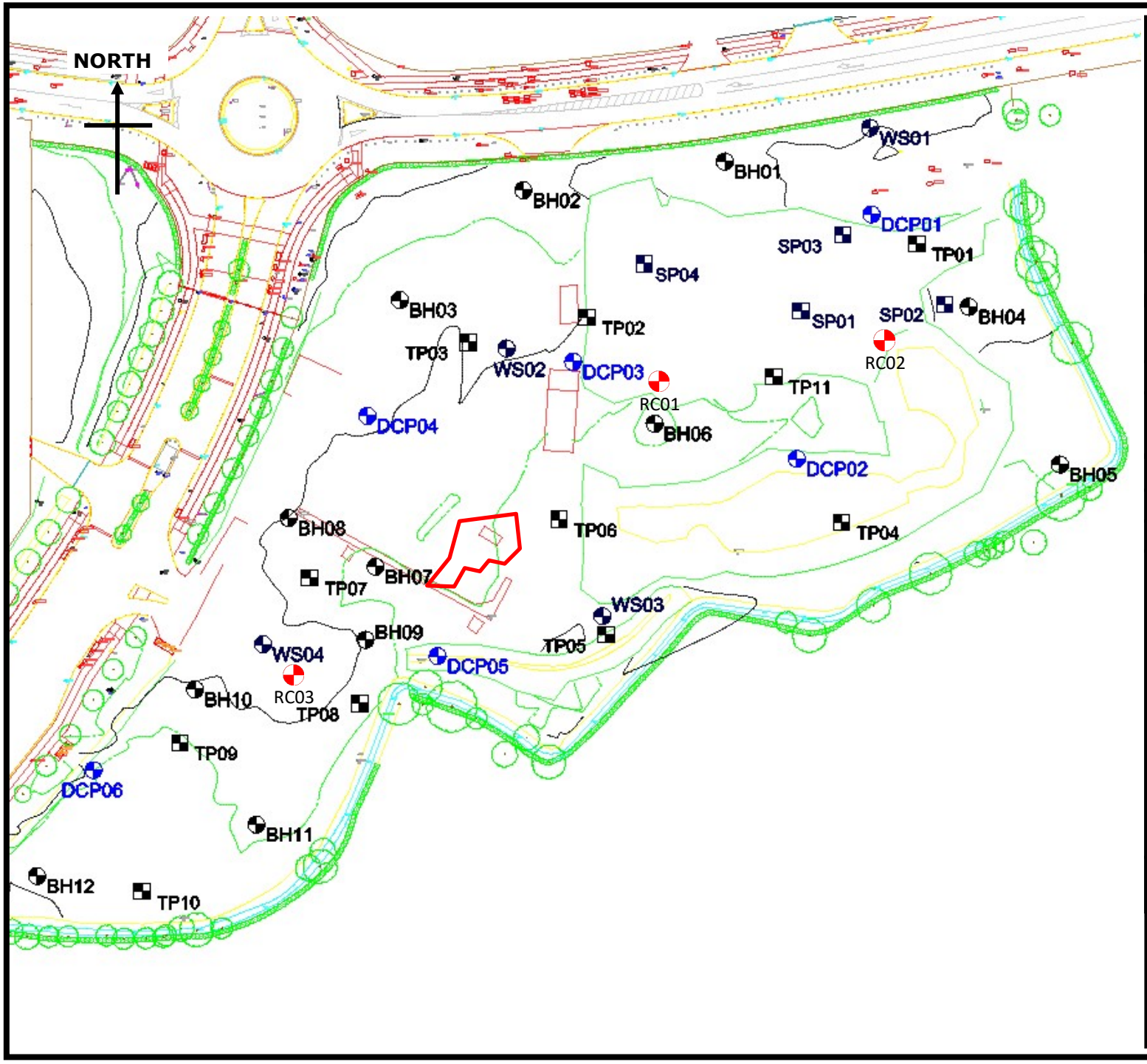
Approximate Site Location

Notes:

Geotechnical Environmental Services Limited

The Old Mill,
22A Kilmoyle Road,
Ballybogey,
Co Antrim.
BT53 6NR.

Tel: 0044 (0)28 2074 2066
Fax: 0044 (0)28 2074 2829
info@geospecialists.co.uk



GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Title: Exploratory Hole Location Plan

Project Name:
Proposed Development Site
Profile Park, Grange Castle, Dublin

Figure No.: 2	Report No. 002/ROI/21

Client: Pinnacle Consulting Engineers

Geo-Environmental Engineer: Delta-Simons

Drawn by: EB	Date: 22/03/2021
Reviewed by: RB	Date: 22/03/2021

Key/Symbols:

BH02	Approximate borehole location
WS02	Approximate WS borehole location
DCP02	Approximate DCP location
TP02	Approximate trial pit location
SP02	Approximate spoil heap location
RC01	Approximate RC borehole location

Notes:

Geotechnical Environmental Services Limited

The Old Mill,
22A Kilmoyle Road,
Ballybogey,
Co Antrim.
BT53 6NR.

Tel: 0044 (0)28 2074 2066
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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 2

**BOREHOLE LOGS; PHOTOGRAPHS OF ROCK CORES;
COMPOSITE PLOT OF SPT N VALUES v REDUCED LEVELS;
VARIABLE HEAD PERMEABILITY TEST DATA**

GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	BH01

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 3.0m depth.	Borehole diam. 150mm to 3.00m	75.79	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 704050 E 730868 N	**Dates** 23/02/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				0.0ppm=PID reading.		(0.35)	FILL: Grey HARDCORE.			
0.35	DS1				75.44	0.35	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing roots and rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.50	ES1 0.1ppm					(1.05)				
1.00-1.45	SPT N=14		DRY	2,2/3,3,4,4						
1.00	BS1									
1.00	ES2 0.1ppm									
1.00-1.45	DS2									
1.40	DS3				74.39	1.40	Firm to stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
						(0.40)				
1.80	DS4				73.99	1.80	Firm to stiff light brown slightly sandy silty CLAY.			
2.00-2.45	SPT N=14		DRY	3,4/3,4,3,4		(0.50)				
2.00	ES3 0.1ppm									
2.00-2.45	DS5									
2.30	DS6				73.49	2.30	Firm to stiff thinly laminated light grey brown slightly sandy silty CLAY.			
2.37	WS1					(0.50)				
2.50	WS2									
2.80	DS7				72.99	2.80	Stiff friable brown grey slightly sandy silty CLAY.		▼1	
				Steady(1) at 2.90m, no rise after 20 mins.		(0.40)				
3.00	ES4 0.0ppm									
3.00-3.45	DS8				72.59	3.20	Very stiff friable dark brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.			
3.00-3.45	SPT N=22		2.90	3,3/4,4,7,7						
3.20	DS9					(0.60)				
3.50	ES5 0.0ppm									
3.80	DS10				71.99	3.80	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.			
3.90-3.98	SPT 25*/50 50/30		2.40	25/50		(0.18)				
3.90-3.98	DS11			Borehole terminated due to refusal on suspected bedrock. 23/02/2021:2.40m	71.81	3.98	Complete at 3.98m			

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)	Logged By
1:40	GM

Figure No. 002.ROI21.BH01

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH01

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704050 E 730868 N

Ground Level (mOD)
75.79

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			75.69	0.10	Concrete
					Bentonite Seal
			74.79	1.00	
	▼1				Slotted Standpipe
			72.29	3.50	
					Bentonite Seal
			71.81	3.98	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
23/02/21		2.90		Steady				2.90	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
23/02/21							3.98		2.40	73.39

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		2.37	73.42	
24/03/21		2.50	73.29	
31/03/21		2.55	73.24	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH02

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 4.0m depth.

Casing Diameter
150mm cased to 4.00m

Ground Level (mOD)
75.41

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (Handheld GPS)
704003.57 E 730861 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.	75.36	0.05 (0.10)	FILL: Grey HARDCORE.		
0.05	DS1				75.26	0.15	MADE GROUND: Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.15	DS2								
0.50	ES3 0.1 ppm					(1.25)	Soft friable light brown slightly sandy slightly gravelly silty CLAY containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=13		DRY	1,1/2,2,5,4					
1.00	BS1								
1.00	ES4 0.1 ppm								
1.00-1.45	DS3								
1.40	DS4				74.01	1.40	Firm to stiff friable dark brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
						(0.30)			
1.70	DS5				73.71	1.70	Stiff friable light grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.00-2.45	SPT N=19		2.40	2,2/2,5,6,6					
2.00	ES2 0.1 ppm					(0.80)			
2.00-2.45	DS6								▼1
2.50	DS7			Steady(1) at 2.50m, rose to 2.30m in 20 mins.	72.91	2.50	Grey brown silty sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.		▽1
						(0.30)			
2.80	DS8				72.61	2.80	Stiff to very stiff friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
3.00-3.39	SPT 50/240		2.30	3,4/17,13,15,5					
3.00	ES1 0.1 ppm					(0.75)			
3.00-3.39	DS9								
					71.86	3.55	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
3.55	DS10					(0.50)			
4.00-4.12	SPT 25*/60 50/60		2.30	25/50 Borehole terminated due to refusal on suspected bedrock. 23/02/2021:2.30m	71.36	4.05	Suspected weathered SHALE: Recovered as grey fine to coarse angular GRAVEL sized fragments.		
4.00	ES5 0.1 ppm				71.29	4.12			
4.00-4.12	DS11						Complete at 4.12m		
4.05	DS12								

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)
1:40

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GM

Figure No.
002.ROI21.BH02

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH03

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 4.0m depth.

Casing Diameter
Borehole diam. 150mm to 4.00m

Ground Level (mOD)
74.87

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703974 E 730836 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
0.10	BS1			0.0ppm=PID reading.		(0.40)	FILL: HARDCORE.
0.40	DS1				74.47	0.40	MADE GROUND: Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
0.50	ES1 0.1 ppm					(0.90)	
1.00-1.45	SPT N=19		DRY	3,3/3,5,5,6			
1.00	ES2 0.1 ppm						
1.00-1.45	DS2				73.57	1.30	Stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
1.30	BS2						
1.30	DS3						
1.41	WS1						
1.69	WS2					(0.90)	
2.00-2.45	SPT N=27		DRY	6,7/5,7,7,8			
2.00	ES3 0.1 ppm						
2.00-2.45	DS4				72.67	2.20	Very stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
2.20	DS5					(0.55)	
2.75	DS6				72.12	2.75	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
3.00-3.39	SPT 25*/130 50/260		DRY	12,13/18,14,12,6			
3.00	ES4 0.1 ppm						
3.00-3.39	DS7					(1.60)	
				Steady(1) at 3.60m, rose to 3.10m in 20 mins.			
4.00-4.40	SPT 50/250		3.60	4,15/14,12,12,12			
4.00	ES5 0.1 ppm						
4.00-4.40	DS8				70.52	4.35	
4.35	DS9			Borehole terminated due to refusal on suspected bedrock. 23/02/2021:3.60m	70.47	4.40	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.
							Complete at 4.40m

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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GM

Figure No.
002.ROI21.BH03

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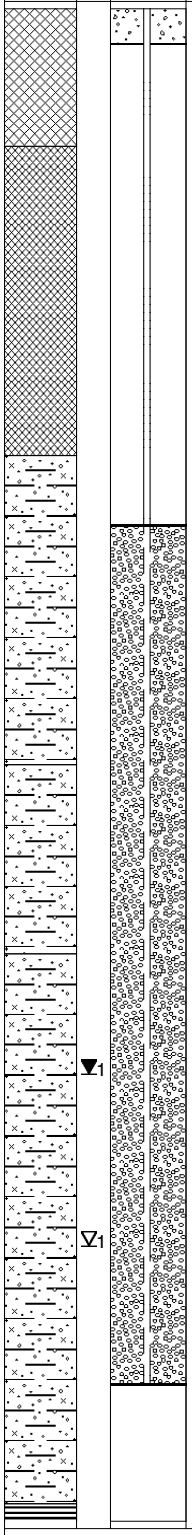
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	BH03

Installation Type	Dimensions	Client	Job Number
Single Installation	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 150 mm	Pinnacle Consulting Engineers	002.ROI21

Location	Ground Level (mOD)	Geo-Environmental Engineer	Sheet
703974 E 730836 N	74.87	Delta-Simons	1/1



Instr (A)	Level (mOD)	Depth (m)	Description
	74.77	0.10	Concrete
			Bentonite Seal
	73.37	1.50	
			Slotted Standpipe
	70.87	4.00	
			Bentonite Seal
	70.47	4.40	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
23/02/21		3.60		Steady				3.10	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
23/02/21							4.40		3.60	71.27

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		1.41	73.46	
24/03/21		1.69	73.18	
31/03/21		1.70	73.17	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH04

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 3.0m depth.

Casing Diameter
Borehole diam. 150mm to 3.00m

Ground Level (mOD)
74.82

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704107 E 730834 N

Dates
24/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.	74.77	0.05	TOPSOIL.		
0.05	DS1					(0.50)	Firm dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		▼1
0.50	ES1 0.2 ppm			Steady(1) at 0.50m, no rise after 20 mins.	74.27	0.55			
0.55	DS2					(0.85)	Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=49		0.50	1,3/7,9,12,21					
1.00	ES2 0.1 ppm								
1.00-1.45	DS3								
1.40	DS4				73.42	1.40			
						(0.40)	Firm to stiff friable dark grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.80	DS5				73.02	1.80			
						(0.35)	Stiff friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.00-2.45	SPT N=41		0.50	10,15/13,12,7,9	72.67	2.15			
2.00	ES3 0.3 ppm					(0.35)	Dense grey clayey sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.		
2.00-2.45	DS6								
2.15	DS7								
2.50	DS8			Groundwater perched on upper surface of clay strata.	72.32	2.50			
						(0.40)	Very stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.90	DS9				71.92	2.90			
3.00-3.14	SPT 25*/70 50/70		0.50	25/50		(0.15)	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
3.00	ES4 0.1 ppm			Borehole terminated due to refusal on suspected bedrock. 24/02/2021:0.50m	71.77	3.05			
3.00-3.14	DS10				71.68	3.14	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.		
3.05	DS11						Complete at 3.14m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH04

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH05

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 3.0m depth.

Casing Diameter
Borehole diam. 150mm to 3.00m

Ground Level (mOD)
74.29

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704128 E 730797 N

Dates
24/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
				0.0ppm=PID reading.		(0.30)	TOPSOIL.
0.30	DS1				73.99	0.30	
0.37	WS1					(0.30)	Firm friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.
0.50	ES1 0.2 ppm				73.69	0.60	
0.60	DS2						Firm friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
1.00-1.45	SPT N=14		DRY	3,4/3,4,3,4		(1.10)	
1.00	BS1						
1.00	ES2 0.1 ppm						
1.00-1.45	DS3						
1.13	WS2						
1.70	DS4				72.59	1.70	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
2.00-2.45	SPT N=12		2.20	3,4/3,3,3,3		(0.50)	
2.00	ES3 0.1 ppm				72.09	2.20	Medium dense grey brown clayey sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.
2.00-2.45	DS5			Steady(1) at 2.20m, rose to 0.80m in 20 mins.		(0.50)	
2.70	DS6				71.59	2.70	Stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
2.95	DS7					(0.25)	
3.00-3.38	SPT 50/230		0.80	8,8/13,17,18,2	71.34	2.95	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
3.00	ES4 0.1 ppm					(0.35)	
3.00-3.38	DS8				70.99	3.30	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.
				Borehole terminated due to refusal on suspected bedrock. 24/02/2021:0.80m	70.91	3.38	Complete at 3.38m

Water: ▼1 at 0.60m; ▽1 at 2.20m

Instr: 150mm diameter borehole to 3.00m; 50mm diameter plain pipe to 0.50m; 50mm diameter slotted pipe to 3.00m; gravel surround to 3.00m

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH05

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Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH05

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704128 E 730797 N

Ground Level (mOD)
74.29

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.19	0.10	Concrete
					Bentonite Seal
	▼1		73.29	1.00	
					Slotted Standpipe
	▽1		71.29	3.00	
					Bentonite Seal
			70.91	3.38	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
24/02/21		2.20		Steady				0.80	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
24/02/21							3.38		0.80	73.49

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		0.37	73.92	
24/03/21		1.13	73.16	
31/03/21		1.13	73.16	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH06

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.8m depth.

Casing Diameter
Borehole diam. 150mm to 2.80m

Ground Level (mOD)
74.14

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704034 E 730807 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.			MADE GROUND: Grey brown clayey sandy fine to coarse GRAVEL with cobble content. Gravel is sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm					(0.95)			
					73.19	0.95			
0.95	DS1						Soft friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=6		DRY	2,2/2,2,1,1					
1.00	ES2 0.1 ppm								
1.00-1.45	DS2								
						(1.30)			
2.00-2.45	SPT N=14		DRY	1,1/1,3,4,6					
2.00	ES3 0.1 ppm								
2.00-2.45	DS3				71.89	2.25			
2.25	DS4					(0.35)	Firm friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
					71.54	2.60			▼1
2.60	DS5			Steady(1) at 2.60m, no rise after 20 mins.		(0.21)	Completely weathered SHALE: Encountered insitu as stiff slightly sandy gravelly silty CLAY.		
2.70-2.81	DS6				71.33	2.81			
2.70-2.81	SPT 25*/70 50/40		2.60	25/50 Borehole terminated due to refusal on suspected bedrock. 23/02/2021:2.60m			Complete at 2.81m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH6

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Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH07

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.0m depth.

Casing Diameter
Borehole diam. 150mm to 2.00m

Ground Level (mOD)
73.92

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (Handheld GPS)
703969 E 730773 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.		(0.30)	FILL: Grey brown clayey sandy HARDCORE with cobble content.		
0.30	DS1				73.62	0.30	MADE GROUND: Soft to firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing plastic remnants. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm					(0.65)			
					72.97	0.95	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.95	DS2								
1.00-1.45	SPT N=18		DRY	5,6/5,5,4,4					
1.00	ES2 0.1 ppm								
1.00-1.45	DS3					(1.00)			
1.75	ES3 0.1 ppm								
					71.97	1.95			▼1
1.95	DS4			Steady(1) at 1.95m, no rise after 20 mins.		(0.21)	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
2.00-2.46	DS5				71.76	2.16			
2.00-2.15	SPT 25*/120 50/30		1.35	12,13/50 Borehole terminated due to refusal on suspected bedrock. 23/02/2021:1.35m			Complete at 2.16m		

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)
1:40

Logged By
GM

Figure No.
002.ROI21.BH07

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Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH08

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 2.0m depth.

Casing Diameter
Borehole diam. 150m to 2.00m

Ground Level (mOD)
74.62

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703948 E 730785 N

Dates
24/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				0.0ppm=PID reading.		(0.20)	FILL: Grey HARDCORE.			
0.20	DS1				74.42	0.20	Firm friable grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.50	ES1 0.1 ppm					(0.55)				
0.75	DS2				73.87	0.75	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.00-1.45	SPT N=16		DRY	2,2/3,4,4,5		(0.55)				
1.00	ES2 0.1 ppm									
1.00-1.45	DS3				73.32	1.30	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.30	DS4					(0.75)				
2.00-2.45	SPT N=41		DRY	4,6/7,7,12,15	72.57	2.05	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.			
2.00-2.45	DS5					(0.40)				
2.05	DS6				72.17	2.45	Complete at 2.45m			
2.35	DS7			Borehole terminated due to refusal on suspected bedrock. 24/02/2021:DRY						

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
Insufficient water in standpipe for groundwater sample.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH08

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH08

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703948 E 730785 N

Ground Level (mOD)
74.62

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.52	0.10	Concrete
					Bentonite Seal
			74.12	0.50	
					Slotted Standpipe
			72.62	2.00	
					Bentonite Seal
			72.17	2.45	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)
					5 min	10 min	15 min	20 min	

Groundwater Observations During Drilling

Date	Start of Shift					End of Shift				
	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
24/02/21							2.45		DRY	

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A]			Remarks
	Time	Depth (m)	Level (mOD)	
05/03/21		1.96	72.66	Insufficient water for groundwater sample.
24/03/21		1.97	72.65	
31/03/21		1.98	72.64	Insufficient water for groundwater sample.

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	BH09

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.5m depth.	Borehole diam. 150mm to 2.50m	74.56	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 703966 E 730756 N	**Dates** 23/02/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				0.0ppm=PID reading.			FILL: Grey brown clayey sandy HARDCORE with cobble content. Also containing red brick remnants.		
0.50	ES1 0.1 ppm					(0.95)			
					73.61	0.95			
0.95	DS1						Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00-1.45	SPT N=21		DRY	4,5/5,5,5,6					
1.00	ES2 0.1 ppm								
1.00-1.45	DS2								
						(1.55)			
2.00-2.45	SPT N=17		DRY	2,2/4,3,4,6					
2.00	ES3 0.1 ppm								
2.00-2.45	DS3								
					72.06	2.50			▽1
2.50	DS4			Seepage(1) at 2.50m.	71.96	(0.10) 2.60	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.		
2.50-2.60	DS5			25/50			Complete at 2.60m		
2.50-2.60	SPT 25*/50			50/50					
				Borehole terminated due to refusal on suspected bedrock. 23/02/2021:2.50m					

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By
1:40	GM

Figure No. 002.ROI21.BH08

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH10

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 2.0m depth.

Casing Diameter
Borehole diam. 150mm to 2.00m

Ground Level (mOD)
74.55

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703926 E 730745 N

Dates
22/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				0.0ppm=PID reading.	74.50	0.05	FILL: Grey HARDCORE.			
0.05	DS1					(0.75)	MADE GROUND: Firm friable grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.50	ES1 0.1 ppm									
0.80	DS2				73.75	0.80	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.00-1.45	SPT N=21		DRY	3,4/5,5,5,6						
1.00	ES2 0.1 ppm									
1.00-1.45	DS3					(1.10)				
1.50	ES3 0.1 ppm									
1.90	DS4				72.65	1.90	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.			
2.00-2.33	SPT 50/180		DRY	6,11/15,18,17		(0.43)				
2.00-2.33	DS5									
				Borehole terminated due to refusal on suspected bedrock. 22/02/2021:DRY	72.22	2.33	Complete at 2.33m			

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
No water in standpipe for groundwater sample.

Scale (approx)
1:40

Logged By
GM

Figure No.
002.ROI21.BH10

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH10

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703926 E 730745 N

Ground Level (mOD)
74.55

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.45	0.10	Concrete
					Bentonite Seal
			74.05	0.50	
					Slotted Standpipe
			73.05	1.50	
					Bentonite Seal
			72.22	2.33	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)
					5 min	10 min	15 min	20 min	

Groundwater Observations During Drilling

Date	Start of Shift					End of Shift				
	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
22/02/21							2.33		DRY	

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A]			Remarks
	Time	Depth (m)	Level (mOD)	
05/03/21		DRY		
24/03/21		DRY		
31/03/21		DRY		

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH11

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 3.6m depth.

Casing Diameter
Borehole diam. 150mm to 3.60m

Ground Level (mOD)
74.23

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703941 E 730713 N

Dates
22/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
				0.0ppm=PID reading.	74.18	0.05	FILL: HARDCORE.
0.05	DS1					(0.55)	MADE GROUND: Firm friable grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
0.50	ES1 0.1 ppm				73.63	0.60	
0.60	DS2						Firm friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
1.00-1.45	SPT N=29		DRY	2,3/6,7,8,8			
1.00	ES2 0.1 ppm						
1.00-1.45	DS3						
1.14	WS1					(1.60)	
1.18	WS2						
2.00	ES3 0.1 ppm			Seepage(1) at 2.00m.			
2.00-2.45	DS4				72.03	2.20	
2.00-2.45	SPT N=35		DRY	3,7/13,8,6,8			Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
2.20	DS5					(0.60)	
2.80	DS7				71.43	2.80	
3.00-3.45	SPT N=35		DRY	6,8/7,7,9,12			Stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
3.00	ES4 0.1 ppm						
3.00-3.45	DS6					(0.90)	
3.60-3.88	SPT 50/130		DRY	10,11/25,25	70.53	3.70	
3.60-3.88	DS8					(0.18)	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.
3.70	DS9				70.35	3.88	
				Borehole terminated due to refusal on suspected bedrock. 22/02/2021:DRY			Complete at 3.88m

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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GM

Figure No.
002.ROI21.BH11

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH11

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703941 E 730713 N

Ground Level (mOD)
74.23

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.13	0.10	Concrete
					Bentonite Seal
			73.23	1.00	
	▽1				Slotted Standpipe
			71.23	3.00	
					Bentonite Seal
			70.35	3.88	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
22/02/21		2.00		Seepage					

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
22/02/21							3.88		DRY	

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		1.14	73.09	
24/03/21		1.18	73.05	
31/03/21		1.18	73.05	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH12

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 3.0m depth.

Casing Diameter
Borehole diam. 150mm to 3.00m

Ground Level (mOD)
73.58

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

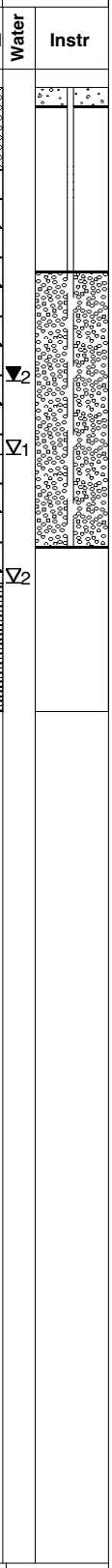
Location (dGPS)
703890 E 730701 N

Dates
22/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
				0.0ppm=PID reading.		(0.45)	MADE GROUND: Soft friable grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
0.25	ES1 0.1 ppm				73.13	0.45	
0.45	DS1						Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
0.75	ES2 0.1 ppm						
1.00-1.45	SPT N=16		DRY	3,4/4,4,4,4		(1.55)	
1.00-1.45	DS2						
1.45	WS1						
1.49	WS2						
1.50	ES3 0.1 ppm						
2.00	DS3			Seepage(1) at 2.00m.	71.58	2.00	Firm to stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
2.00-2.45	DS4						
2.00-2.45	SPT N=28		2.00	6,6/9,6,6,7		(0.70)	
2.50	ES4 0.1 ppm						
2.70	DS5			Steady(2) at 2.70m, rose to 1.60m in 20 mins.	70.88	2.70	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.
3.00-3.40	SPT 50/250		1.60	5,9/8,10,15,15,17		(0.70)	
3.00-3.45	DS6						
				Borehole terminated due to refusal on suspected bedrock. 22/02/2021:1.60m	70.18	3.40	Complete at 3.45m



Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial. No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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Figure No.
002.ROI21.BH12

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
BH12

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703890 E 730701 N

Ground Level (mOD)
73.58

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			73.48	0.10	Concrete
					Bentonite Seal
			72.58	1.00	
	▼2				Slotted Standpipe
	▽1				
	▽2		71.08	2.50	
					Bentonite Seal
			70.18	3.40	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
22/02/21		2.00		Seepage					
22/02/21		2.70		Steady				1.60	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
22/02/21							3.40		1.60	71.98

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		1.46	72.12	
24/03/21		1.49	72.09	
31/03/21		1.50	72.08	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	WS01

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Dando Terrier 2002 Drill Rig. Percussion sampling to 2.9m depth.	113mm cased to 1.00m Borehole diam. 101mm to 2.90m	75.64	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 704084 E 730876 N	**Dates** 23/02/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				0.0ppm=PID reading.		(0.25)				
					75.39	0.25	FILL: Grey HARDCORE containing red brick and concrete remnants. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.25	DS1									
0.50	ES1 0.1 ppm					(0.60)	Suspected MADE GROUND: Firm grey brown slightly sandy silty CLAY containing decayed roots and rootlets.			
					74.79	0.85				
0.85	DS2			Steady(1) at 0.90m, no rise after 20 mins.		(0.25)	Suspected MADE GROUND:Firm grey brown slightly sandy silty CLAY.		▼1	
1.00	ES2 0.1 ppm				74.54	1.10				
1.00-1.45	DS3						Suspected MADE GROUND: Firm to stiff grey brown with orange mottling slightly sandy silty CLAY.			
1.00-1.45	SPT N=18		0.90	1,2/3,4,5,6						
1.10	DS4					(0.70)				
					73.84	1.80	Stiff to very stiff friable light grey brown slightly sandy silty CLAY.			
1.80	DS5									
2.00-2.45	SPT N=23		1.90	5,4/3,5,4,11		(0.60)				
2.00	ES3 0.1 ppm									
2.00-2.45	DS6				73.24	2.40	Completely weathered SHALE: Encountered insitu as soft silty CLAY.			
2.40	DS7					(0.40)				
2.46	WS1				72.84	2.80	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.			
2.51	WS2									
2.80	DS8					(0.45)				
2.90-3.25	SPT 50/200		2.00	13,12/19,31						
2.90-3.30	DS9				72.39	3.25	Complete at 3.30m			
3.00	ES4 0.1 ppm									
				23/02/2021:2.00m						
				Borehole terminated due to refusal on suspected bedrock.						

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)	Logged By
1:40	GM

Figure No.
002.ROI21.WS01

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS01

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704084 E 730876 N

Ground Level (mOD)
75.64

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			75.54	0.10	Concrete
					Bentonite Seal
			75.14	0.50	
	▼1				
					Slotted Standpipe
			73.14	2.50	
					Bentonite Seal
			72.34	3.30	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
23/02/21		0.90		Steady				0.90	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
23/02/21							3.25		2.00	73.64

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		2.41	73.23	
24/03/21		2.50	73.14	
31/03/21		2.50	73.14	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS02

Boring Method
Dando Terrier 2002 Drill Rig. Percussion sampling to 2.9m depth.

Casing Diameter
Borehole diam. 101mm to 2.90m

Ground Level (mOD)
74.66

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
703999 E 730824 N

Dates
24/02/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				0.0ppm=PID reading.	74.56	(0.10) 0.10	FILL: Grey HARDCORE.			
0.10	DS1					(0.35)	MADE GROUND: Grey sandy fine to coarse GRAVEL with cobble content. Also containing red brick and concrete remnants. Gravel is sub-angular to sub-rounded.			
					74.21	0.45				
0.45	DS2					(0.25)				
0.50	ES1 0.1 ppm				73.96	0.70	Firm grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.70	DS3									
0.75	BS1									
1.00-1.45	SPT N=13		DRY	2,2/3,4,3,3						
1.00	ES2 0.1 ppm					(1.05)	Firm grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.00-1.45	DS4									
1.05	WS1									
1.43	WS2									
					72.91	1.75				
1.75	DS5						Firm to stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
2.00-2.45	SPT N=19		1.75	1,2/2,3,5,9		(0.65)				
2.00	ES3 0.5 ppm									
2.00-2.45	DS6									
2.40	DS7				72.26	2.40				
2.40	ES4 0.3 ppm						Very stiff grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
						(0.80)				
2.90-3.25	SPT 50/200		2.25	8,8/12,16,22						
2.90-3.25	DS8									
					71.46	3.20				
3.20	DS9				71.41	3.25	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.			
				Borehole terminated due to refusal on suspected bedrock.			Complete at 3.25m			

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

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GM

Figure No.
002.ROI21.WS02

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS02

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 101 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
703999 E 730824 N

Ground Level (mOD)
74.66

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.56	0.10	Concrete
					Bentonite Seal
			73.66	1.00	
					Slotted Standpipe
			72.16	2.50	
					Bentonite Seal
			71.41	3.25	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		1.10	73.56	
24/03/21		1.43	73.23	
31/03/21		1.42	73.24	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS03

Boring Method
Dando Terrier 2002 Drill Rig. Percussion sampling to 2.8.0m depth.

Casing Diameter
113mm cased to 1.00m
Borehole daim. 101mm to 2.80m

Ground Level (mOD)
73.91

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704022 E 730762 N

Dates
23/02/2021

Geo-Environmental Engineer
Delta-Simons

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Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
				0.0ppm=PID reading.		(0.30)	MADE GROUND: Soft friable brown slightly sandy slightly gravelly silty CLAY. Also containing plastic remnants. Gravel is fine to coarse, sub-angular to sub-rounded.
0.20	ES1 0.2 ppm				73.61	0.30	
0.30	DS1						Firm friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
0.75	ES2 0.1 ppm						
1.00-1.45	SPT N=13	1.00	DRY	2,3/3,3,3,4		(1.80)	
1.00-1.45	DS2						
1.05	WS1						
1.09	WS2						
1.50	ES3 0.1 ppm						
2.00-2.45	DS3			Steady(1) at 2.00m, no rise after 20 mins.	71.81	2.10	
2.10	DS4						Firm friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
2.00-2.45	SPT N=14	1.00	2.00	2,3/3,3,3,5		(0.55)	
2.50	ES4 0.1 ppm				71.26	2.65	
2.65	DS5			Steady(2) at 2.65m, rose to 1.20m in 20 mins.			Completely weathered SHALE: Encountered insitu as stiff silty CLAY.
2.80-3.02	DS6					(0.37)	
2.70-3.02	SPT 25*/100 50/220	1.00	1.20	13,12/14,16,20 Borehole terminated due to refusal on suspected bedrock. 23/02/2021:1.20m	70.89	3.02	Complete at 3.02m

Remarks
ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.
WS=Environmental groundwater sample comprising 2x1000ml capacity glass bottles, 1x500ml capacity plastic bottle, 1x125ml capacity plastic bottle with sulphuric acid preservative, 1x125ml capacity plastic bottle with sodium hydroxide preservative, 1x125ml capacity plastic bottle with nitric acid preservative, 2x40ml capacity glass vials.

Scale (approx)
1:40

Logged By
GM

Figure No.
002.ROI21.WS03

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
WS03

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 150 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704022 E 730762 N

Ground Level (mOD)
73.91

Geo-Environmental Engineer
Delta-Simons

Sheet
1/1

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			73.81	0.10	Concrete
					Bentonite Seal
	▼2		72.91	1.00	
	▼1				Slotted Standpipe
	▽2		71.41	2.50	
					Bentonite Seal
			70.89	3.02	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
23/02/21		2.00	1.00	Steady				2.00	
23/02/21		2.65	1.00	Steady				1.20	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
23/02/21							3.02	1.00	1.20	72.71

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
05/03/21		0.33	73.58	
24/03/21		1.09	72.82	
31/03/21		1.09	72.82	

Remarks
Flush lockable cover.
Push fit gas bung.
Geotextile filter sock surround to well screen section.
Push fit base cap.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
RC01

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.4m depth. HQ wireline core drilling to 10.0m depth.

Casing Diameter
Borehole diam. 150mm to 2.40m
99mm cased to 10.00m

Ground Level (mOD)
74.08

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704011 E 730788 N

Dates
05/07/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
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Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					73.98	0.10	TOPSOIL.			
0.20	DS1				73.88	0.20	MADE GROUND: Grey brown clayey sandy fine to coarse GRAVEL with cobble content. Gravel is sub-angular to sub-rounded.			
0.20-1.00	BS1					(1.20)	Firm to stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Contains occasional rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.00-1.45	US1		DRY	27 blows						
1.40	DS2				72.68	1.40	Soft friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		▼1	
1.40-2.35	BS2			Steady(1) at 1.80m, no rise after 20 mins.		(0.95)				
2.00-2.42	DS4			1,2/1,3,10,36						
2.00-2.45	SPT N=50		1.80							
	TCR	SCR	RQD	FI						
2.40	N/A	N/A	N/A	N/A	71.73	2.35	Completely weathered SHALE: Encountered insitu as stiff slightly sandy gravelly silty CLAY.			
2.60	86	57	24		71.48	(0.25) 2.60	Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
3.30	100	90	78	10		(2.35)	Extremely closely spaced fractures 2.5m-3.25m amd 5.8m-6.25m resuling in non-intact material.			
4.80	100	85	73	5	69.13	4.95	Very strong crystalline fine grained dark grey LIMESTONE. Closely to medium speaced undulating, rough, sub-vertical and forty five degree joints. Calcite veining evident.			
5.60						(1.00)				
6.30	93	67	35	11	68.13	5.95	Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
7.80						(2.65)				
7.85	100	93	80	3	65.48	8.60	Very strong crystalline fine grained dark grey LIMESTONE. Closely to medium speaced undulating, rough, sub-vertical and forty five degree joints.			
8.90				NI	65.18	(0.30) 8.90				
9.15					64.93	(0.25) 9.15				
9.30	100	100	78	4		(0.20)	Weak thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
10.00				05/07/2021:0.00m						

Remarks

Scale (approx)
1:50

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RB

Figure No.
002.ROI21.RC01

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	RC01

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.4m depth. HQ wireline core drilling to 10.0m depth.	Borehole diam. 150mm to 2.40m 99mm cased to 10.00m	74.08	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 704011 E 730788 N	**Dates** 05/07/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						64.73	9.35	Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
						64.08	10.00	Very strong crystalline fine grained dark grey LIMESTONE. Closely to medium speaced undulating, rough, sub-vertical and forty five degree joints. Calcite veining evident. Groundwater level upon completion of borehole represents level of drill flush.			
								Complete at 10.00m			
							(0.65)				

Remarks

Scale (approx)	Logged By
1:50	RB

Figure No. 002.ROI21.RC01

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
RC01

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 99 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704011 E 730788 N

Ground Level (mOD)
74.08

Geo-Environmental Engineer
Delta-Simons

Sheet
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Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			73.98	0.10	Concrete
	▼1				Bentonite Seal
			71.58	2.50	Slotted Standpipe
			64.08	10.00	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
05/07/21		1.80		Steady				1.80	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
05/07/21							10.00	10.00		74.08

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
08/07/21		2.55	71.53	

Remarks
Upright steel head cover.
0.5m "stick up" of well casing.
Push fit base and top caps.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
RC02

Boring Method
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.25m depth. HQ wireline core drilling to 10.0m depth.

Casing Diameter
Borehole diam. 150mm to 2.25m
99mm cased to 10.00m

Ground Level (mOD)
74.57

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704173 E 730813 N

Dates
06/07/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
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Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00	DS1									
0.00-0.45	BS1					(0.45)				
					74.12	0.45	MADE GROUND: Firm to stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.45	DS2									
0.45-1.60	BS2						Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.00-1.45	US1		DRY	142 blows		(1.15)				
1.60-2.00	BS3									
1.45	DS3									
1.60	DS4			4,4/5,12,18,15 DS5 SPT N=50	72.97	1.60	Very stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
2.00-2.42	**TCR**	**SCR**	**RQD**	**FI**						
2.00-2.45	N/A	N/A	N/A	N/A		(0.63)				
2.00					72.34	2.23				
2.25				16	72.32	2.25	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.			
2.50	60	26	12	NI			Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
3.25	93	31	14	22		(2.60)	Extremely closely spaced fractures 2.5m-3.25m resulting in non-intact material.			
4.75					69.72	4.85				
4.85	93	40	40	8		(1.00)	Very strong crystalline fine grained dark grey LIMESTONE. Closely to medium speaced undulating, rough, sub-vertical and forty five degree joints. Calcite veining evident.			
5.85				NI	68.72	5.85	Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
6.25	99	88	62	9		(2.40)	Extremely closely spaced fractures 5.8m-6.25m resulting in non-intact material.			
7.75	87	88	43		66.32	8.25				
						(0.40)	Very strong crystalline fine grained dark grey LIMESTONE. Closely to medium speaced undulating, rough, sub-vertical and forty five degree joints. Calcite veining evident.			
					65.92	8.65				
						(0.60)	Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
9.25	100	80	57		65.32	9.25				
				06/07/2021:0.00m		(0.63)				
10.00							Very strong crystalline fine grained dark grey LIMESTONE. Closely to medium speaced			

Remarks

Scale (approx)
1:50

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RB

Figure No.
002.ROI21.RC02

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	RC02

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.25m depth. HQ wireline core drilling to 10.0m depth.	Borehole diam. 150mm to 2.25m 99mm cased to 10.00m	74.57	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 704173 E 730813 N	**Dates** 06/07/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						64.69	9.88	undulating, rough, sub-vertical and forty five degree joints. Calcite veining evident. Groundwater level upon completion of borehole represents level of drill flush.			
						64.57	10.00	Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
								Complete at 10.00m			

Remarks

Scale (approx)	Logged By
1:50	RB

Figure No. 002.ROI21.RC02

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
RC02

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 99 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704173 E 730813 N

Ground Level (mOD)
74.57

Geo-Environmental Engineer
Delta-Simons

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Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.47	0.10	Concrete
					Bentonite Seal
			72.07	2.50	
					Slotted Standpipe
			64.57	10.00	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)
					5 min	10 min	15 min	20 min	

Groundwater Observations During Drilling

Date	Start of Shift					End of Shift				
	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
06/07/21							10.00	10.00		74.57

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A]			Remarks
	Time	Depth (m)	Level (mOD)	
08/07/21		2.10	72.47	

Remarks
Upright steel head cover.
0.5m "stick up" of well casing.
Push fit base and top caps.

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
RC03

Boring Method
CME-55 Drill Rig.
Continuous flight auger (CFA) drilling and percussion sampling to 2.4m depth.
HQ wireline core drilling to 10.0m depth.

Casing Diameter
Borehole diam. 150mm to 2.70m
99mm cased to 10.00m

Ground Level (mOD)
74.76

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location (dGPS)
704020 E 730729 N

Dates
07/07/2021

Geo-Environmental Engineer
Delta-Simons

Sheet
1/2

Depth (m)	Sample / Tests	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00	DS1									(0.45)	FILL: Grey HARDCORE containing red brick and wood remnants.			
									74.31	0.45				
0.45	DS2										MADE GROUND: Stiff friable grey brown slightly sandy gravelly silty CLAY containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.45-1.30	BS1									(0.85)				
1.00-1.45	SPT N=22						DRY	2,2/5,6,5,6						
1.00-1.45	DS3								73.46	1.30				
1.30	DS4										Very stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.30-2.60	BS2									(1.30)				
2.00-2.45	US1						DRY	153 blows						
2.60								DS6						
2.45	DS5								72.16	2.60				
2.70		92	92	31	5				72.06	2.70	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.			
3.30										(0.80)	Strong crystalline fine grained dark grey LIMESTONE. Closely to medium speaced undulating, rough, sub-vertical and forty five degree joints. Calcite veining evident.			
3.50		87	49	29	12				71.26	3.50	Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced, undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident.			
4.80		93	51	40										
5.80					4					(5.15)				
6.30		97	87	66										
7.20					14									
7.80		97	97	97	4				66.11	8.65	Very strong crystalline fine grained dark grey LIMESTONE. Closely to medium speaced undulating, rough, sub-vertical and forty five degree joints. Calcite veining evident.			
9.30		100	96	96				07/07/2021:0.00m		(0.85)				
									65.26	9.50	Medium strong to stomg thinly laminated black fine grained calcareous SHALE. Slightly weathered to fresh. Locally highly to completely weathered to soft clay. Extremely close to medium spaced,			
10.00										(0.50)				

Remarks

Scale (approx)
1:50

Logged By
RB

Figure No.
002.ROI21.RC03

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Site	Borehole Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	RC03

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill Rig. Continuous flight auger (CFA) drilling and percussion sampling to 2.4m depth. HQ wireline core drilling to 10.0m depth.	Borehole diam. 150mm to 2.70m 99mm cased to 10.00m	74.76	Pinnacle Consulting Engineers	002.ROI21
	Location (dGPS) 704020 E 730729 N	**Dates** 07/07/2021	**Geo-Environmental Engineer** Delta-Simons	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						64.76	10.00	undulating smooth, sub-horizontal fractures. Localised pyrite mineralisation evident. Groundwater level upon completion of borehole represents level of drill flush.			
								Complete at 10.00m			

Remarks

Scale (approx)	Logged By
1:50	RB

Figure No. 002.ROI21.RC03

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site
Proposed Development Site, Profile Park, Grange Castle, Dublin

Borehole Number
RC03

Installation Type
Single Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Diameter of Filter Zone = 99 mm

Client
Pinnacle Consulting Engineers

Job Number
002.ROI21

Location
704020 E 730729 N

Ground Level (mOD)
74.76

Geo-Environmental Engineer
Delta-Simons

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Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
			74.66	0.10	Concrete
					Bentonite Seal
			73.76	1.00	
					Gravel Filter
			70.76	4.00	
					Bentonite Seal
			64.76	10.00	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)
					5 min	10 min	15 min	20 min	

Groundwater Observations During Drilling

Date	Start of Shift					End of Shift				
	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
07/07/21							10.00	10.00		74.76

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe

Date	Instrument [A]			Remarks
	Time	Depth (m)	Level (mOD)	
08/07/21		2.65	72.11	

Remarks
Upright steel head cover.
0.5m "stick up" of well casing.
Push fit base and top caps.

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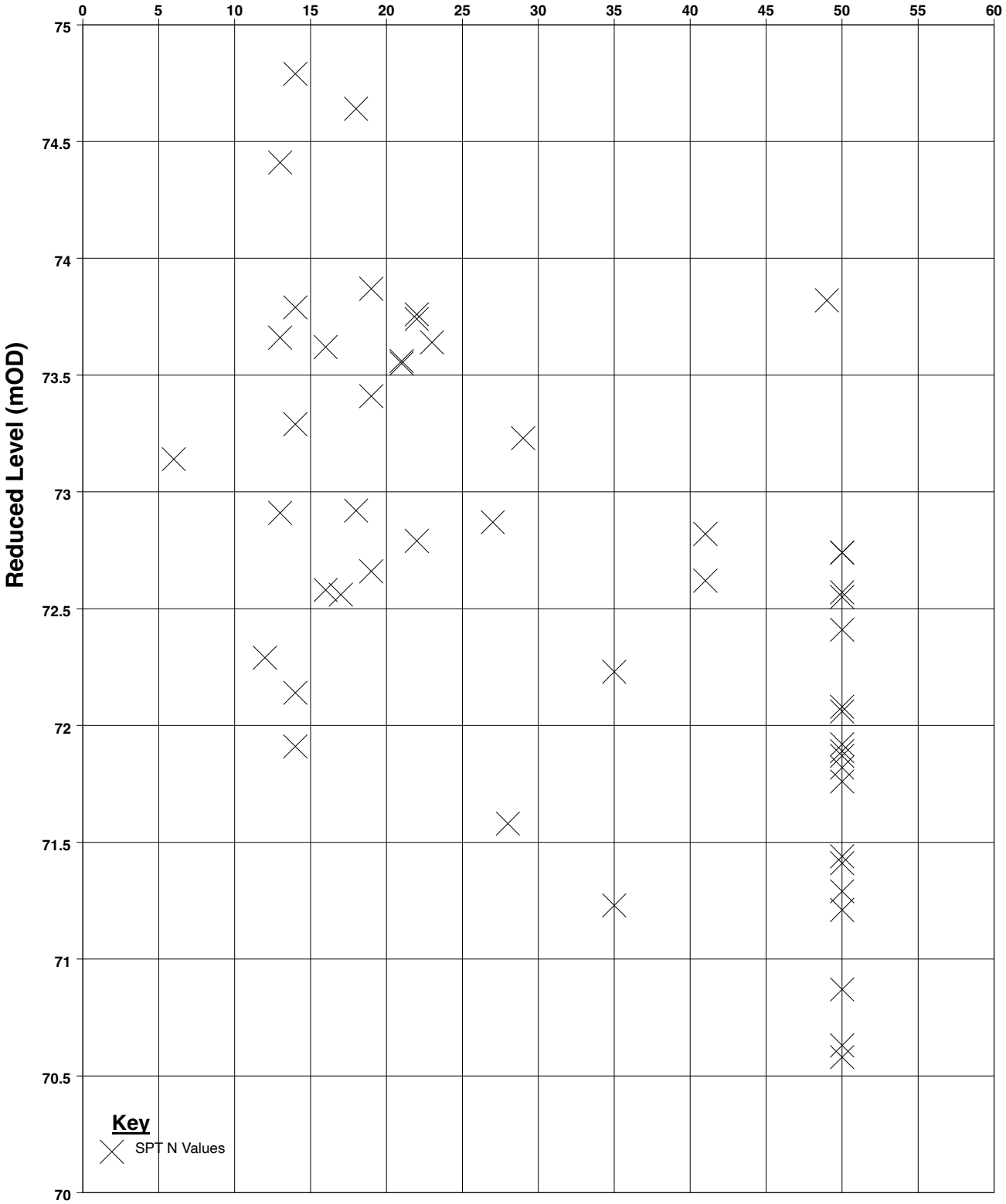
SPT N Values



GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED	**Title** Composite Plot of SPT N Values vs Reduced Level (mOD)			
Site Proposed Development Site, Profile Park, Grange Castle, Dublin	**Date Drawn** 03/08/2021	**Date Checked** 03/08/2021	**Sheet** 1 / 1	**Job Number** 002.ROI21
Client Pinnacle Consulting Engineers	**Drawn By** RB	**Checked By** RB	**Scale** N/A	**Figure No.** 002.ROI21_01

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RC01 BOX 1 2.4m-5.95m



RC01 BOX 2 5.95m-9.3m



RC01 BOX 3 9.3m–10.0m



RC02 BOX 1 2.0m-5.9m



RC02 BOX 2 5.9m-9.25m



RC02 BOX 3 9.25m–10.0m



RC03 BOX 1 2.7m-6.3m



RC03 BOX 2 6.3m-9.3m



RC03 BOX 3 9.3m–10.0m

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VARIABLE HEAD PERMEABILITY TEST (STANDPIPE)

CONTRACT: Proposed Development Site
Profile Park, Grange Castle, Dublin
BOREHOLE No.: RC01
TEST No.: 1
DATE: 08/07/2021
TYPE OF TEST: ***RISING*** HEAD

Diameter of standpipe (d):	*50*	(mm)
Height of TOP of standpipe above ground level:	*0.00*	(m)
Depth to bottom of standpipe below ground level (m):	*10.00*	(m)
Depth to top of filter zone below ground level:	*2.50*	(m)
Depth to bottom of filter zone below ground level:	*10.00*	(m)
Diameter of filter zone (D):	*99.00*	(mm)
Standing ground water level (mbgl):	*2.55*	(m)

DATUM:All depths to water level measured from top of casing. i.e.SWL 2.55 m below datum.

TIME ELAPSED (mins)	WATER LEVEL* (m)	HEAD H (m)	HEAD RATIO H/Ho
0	3.60	-1.05	1.0000
0.5	3.44	-0.89	0.8476
1	3.31	-0.76	0.7238
1.5	3.12	-0.57	0.5429
2	3.03	-0.48	0.4571
2.5	3.01	-0.46	0.4381
3	2.99	-0.44	0.4190
3.5	2.97	-0.42	0.4000
4	2.95	-0.40	0.3810
4.5	2.92	-0.37	0.3524
5	2.89	-0.34	0.3238
6	2.87	-0.32	0.3048
7	2.85	-0.30	0.2857
8	2.84	-0.29	0.2762
9	2.81	-0.26	0.2476
10	2.79	-0.24	0.2286
12	2.75	-0.20	0.1905
14	2.72	-0.17	0.1619
16	2.64	-0.09	0.0857
18	2.56	-0.01	0.0095
20	2.55	0.00	0.0000
22	2.55	0.00	0.0000
24	2.55	0.00	0.0000
26	2.55	0.00	0.0000
28	2.55	0.00	0.0000
30	2.55	0.00	0.0000
32	2.55	0.00	0.0000
36	2.55	0.00	0.0000
40	2.55	0.00	0.0000
44	2.55	0.00	0.0000
48	2.55	0.00	0.0000
52	2.55	0.00	0.0000
56	2.55	0.00	0.0000
60	2.55	0.00	0.0000

CALCULATION OF PERMEABILITY OF SOIL:

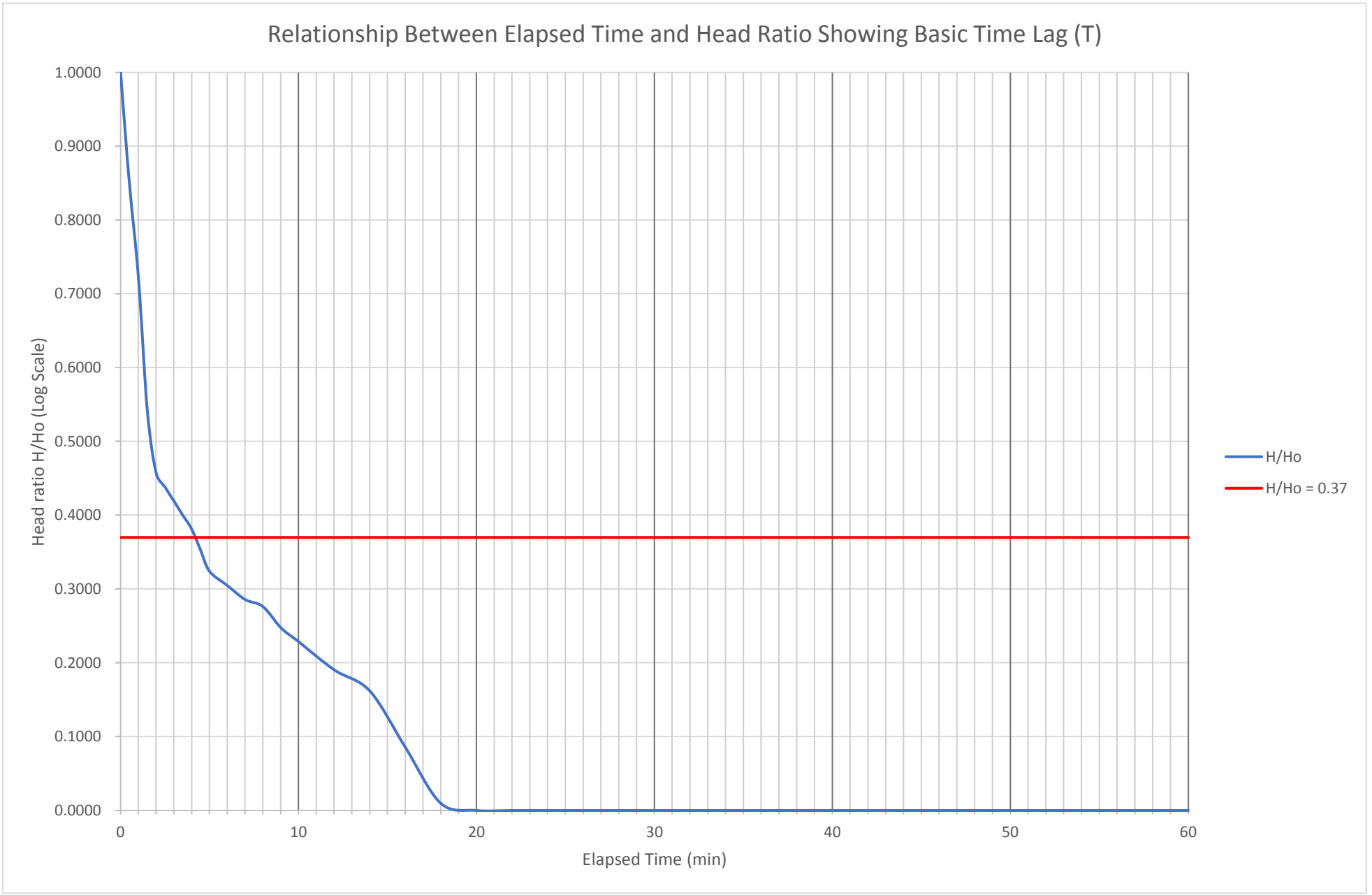
Employing Hvorslev formula: k = A/FT
where:
k is the permeability of soil
A is the cross-section area of borehole
F is the intake factor (see below)
T is the basic time lag factor as defined in BS5930: 1999+A2:2010

Values of intake factor (F/D) from
Dunn and Razouki formula:
F/D = 2.32*PI*(L/D)/loge[1.1*(L/D)+{1+1.1*(L/D)^2}^0.5]

L/D= 75.7576 F/D= 249.660229

i.e. F = 24.7164 (m)
and A = 0.0077 (m^2)
and T = *4* (mins);
240 (secs)

hence, k = 1.3E-06 m/s


Relationship Between Elapsed Time and Head Ratio Showing Basic Time Lag (T)
Head ratio H/Ho (Log Scale)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
0
10
20
30
40
50
60
Elapsed Time (min)
H/Ho
H/Ho = 0.37

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VARIABLE HEAD PERMEABILITY TEST (STANDPIPE)

CONTRACT: Proposed Development Site
Profile Park, Grange Castle, Dublin
BOREHOLE No.: RC02
TEST No.: 1
DATE: 08/07/2021
TYPE OF TEST: ***RISING*** HEAD

Diameter of standpipe (d):	*50*	(mm)
Height of TOP of standpipe above ground level:	*0.00*	(m)
Depth to bottom of standpipe below ground level (m):	*10.00*	(m)
Depth to top of filter zone below ground level:	*2.50*	(m)
Depth to bottom of filter zone below ground level:	*10.00*	(m)
Diameter of filter zone (D):	*99.00*	(mm)
Standing ground water level (mbgl):	*2.10*	(m)

DATUM:All depths to water level measured from top of casing. i.e.SWL 2.10 m below datum.

TIME ELAPSED (mins)	WATER LEVEL* (m)	HEAD H (m)	HEAD RATIO H/Ho
0	3.15	-1.05	1.0000
0.5	3.13	-1.03	0.9810
1	3.11	-1.01	0.9619
1.5	3.09	-0.99	0.9429
2	3.07	-0.97	0.9238
2.5	3.03	-0.93	0.8857
3	3.00	-0.90	0.8571
3.5	2.96	-0.86	0.8190
4	2.93	-0.83	0.7905
4.5	2.92	-0.82	0.7810
5	2.92	-0.82	0.7810
6	2.91	-0.81	0.7714
7	2.90	-0.80	0.7619
8	2.89	-0.79	0.7524
9	2.89	-0.79	0.7524
10	2.89	-0.79	0.7524
12	2.89	-0.79	0.7524
14	2.89	-0.79	0.7524
16	2.89	-0.79	0.7524
18	2.89	-0.79	0.7524
20	2.89	-0.79	0.7524
22	2.89	-0.79	0.7524
24	2.89	-0.79	0.7524
26	2.89	-0.79	0.7524
28	2.89	-0.79	0.7524
30	2.89	-0.79	0.7524
32	2.89	-0.79	0.7524
36	2.89	-0.79	0.7524
40	2.89	-0.79	0.7524
44	2.89	-0.79	0.7524
48	2.89	-0.79	0.7524
52	2.89	-0.79	0.7524
56	2.89	-0.79	0.7524
60	2.89	-0.79	0.7524

CALCULATION OF PERMEABILITY OF SOIL:

Employing Hvorslev formula: k = A/FT
where:
k is the permeability of soil
A is the cross-section area of borehole
F is the intake factor (see below)
T is the basic time lag factor as defined in BS5930: 1999+A2:2010

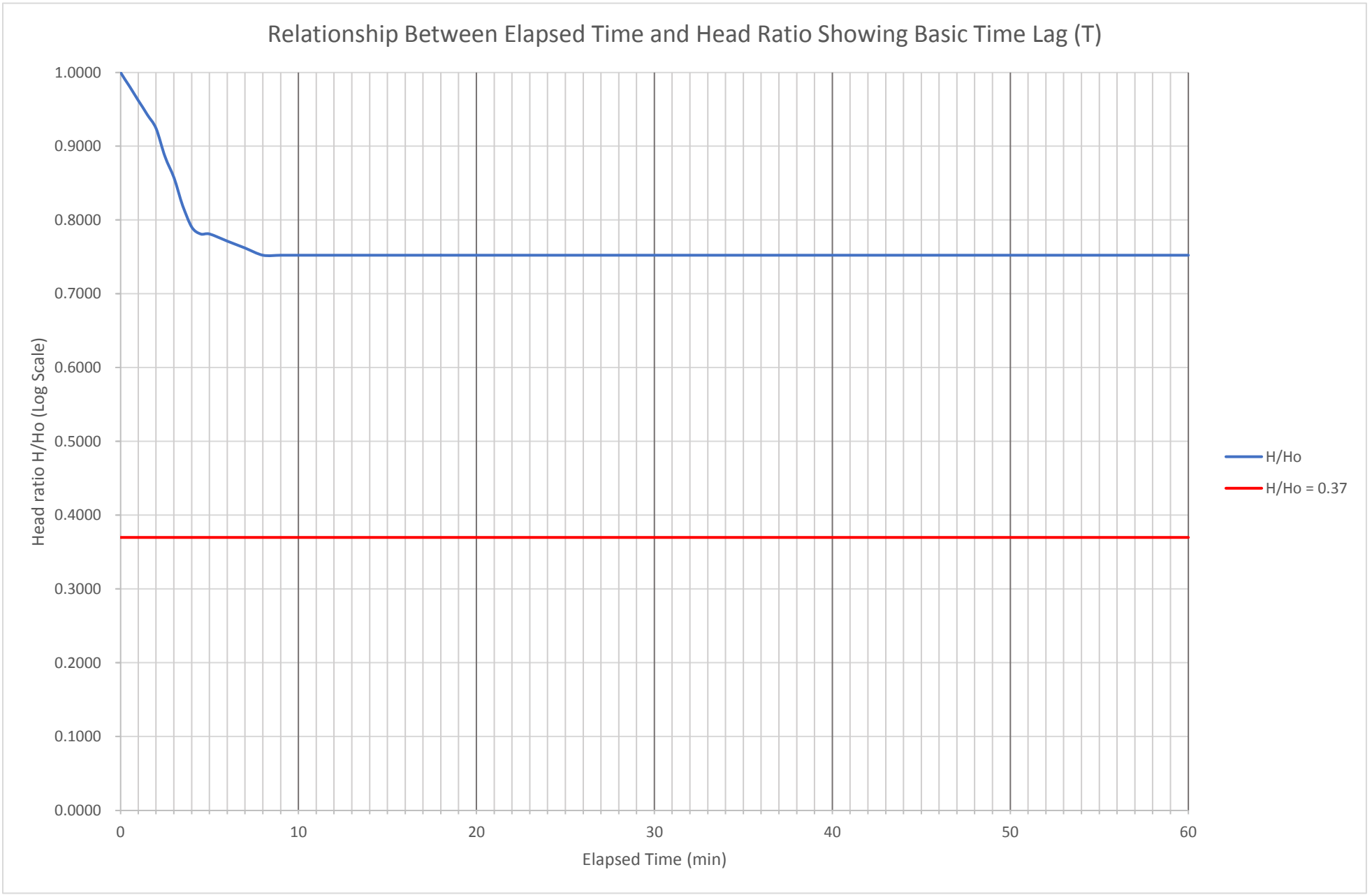
Values of intake factor (F/D) from
Dunn and Razouki formula:
F/D = 2.32*PI*(L/D)/loge[1.1*(L/D)+{1+1.1*(L/D)^2}^0.5]

L/D= 75.7576 F/D= 249.660229

i.e. F = 24.7164 (m)
and A = 0.0077 (m^2)
and T = *n/a* (mins);
n/a (secs)

hence, k = n/a m/s

Test abandoned due to low permeability of strata


Relationship Between Elapsed Time and Head Ratio Showing Basic Time Lag (T)
Head ratio H/Ho (Log Scale)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
0
10
20
30
40
50
60
Elapsed Time (min)
H/Ho
H/Ho = 0.37

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VARIABLE HEAD PERMEABILITY TEST (STANDPIPE)

CONTRACT: Proposed Development Site
Profile Park, Grange Castle, Dublin
BOREHOLE No.: RC03
TEST No.: 1
DATE: 08/07/2021
TYPE OF TEST: ***RISING*** HEAD

Diameter of standpipe (d):	*50*	(mm)
Height of TOP of standpipe above ground level:	*0.00*	(m)
Depth to bottom of standpipe below ground level (m):	*4.00*	(m)
Depth to top of filter zone below ground level:	*2.50*	(m)
Depth to bottom of filter zone below ground level:	*4.00*	(m)
Diameter of filter zone (D):	*99.00*	(mm)
Standing ground water level (mbgl):	*2.65*	(m)

DATUM:All depths to water level measured from top of casing. i.e.SWL 2.65 m below datum.

TIME ELAPSED (mins)	WATER LEVEL* (m)	HEAD H (m)	HEAD RATIO H/Ho
0	3.38	-0.73	1.0000
0.5	3.35	-0.70	0.9589
1	3.32	-0.67	0.9178
1.5	3.23	-0.58	0.7945
2	3.15	-0.50	0.6849
2.5	3.11	-0.46	0.6301
3	3.07	-0.42	0.5753
3.5	3.04	-0.39	0.5342
4	3.02	-0.37	0.5068
4.5	2.95	-0.30	0.4110
5	2.89	-0.24	0.3288
6	2.83	-0.18	0.2466
7	2.78	-0.13	0.1781
8	2.74	-0.09	0.1233
9	2.70	-0.05	0.0685
10	2.68	-0.03	0.0411
12	2.65	0.00	0.0000
14	2.65	0.00	0.0000
16	2.65	0.00	0.0000
18	2.65	0.00	0.0000
20	2.65	0.00	0.0000
22	2.65	0.00	0.0000
24	2.65	0.00	0.0000
26	2.65	0.00	0.0000
28	2.65	0.00	0.0000
30	2.65	0.00	0.0000
32	2.65	0.00	0.0000
36	2.65	0.00	0.0000
40	2.65	0.00	0.0000
44	2.65	0.00	0.0000
48	2.65	0.00	0.0000
52	2.65	0.00	0.0000
56	2.65	0.00	0.0000
60	2.65	0.00	0.0000

CALCULATION OF PERMEABILITY OF SOIL:

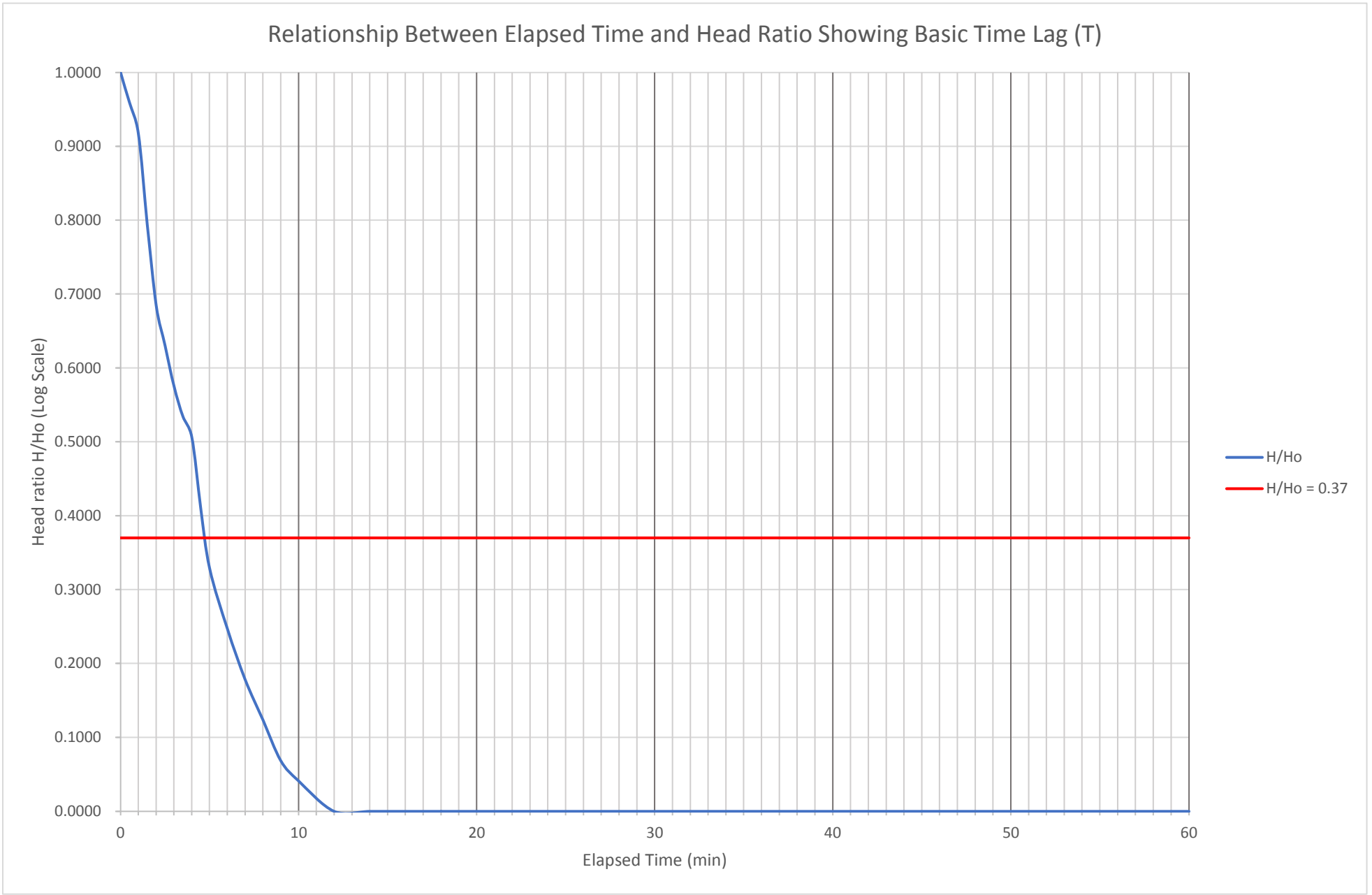
Employing Hvorslev formula: k = A/FT
where:
k is the permeability of soil
A is the cross-section area of borehole
F is the intake factor (see below)
T is the basic time lag factor as defined in BS5930: 1999+A2:2010

Values of intake factor (F/D) from
Dunn and Razouki formula:
F/D = 2.32*PI*(L/D)/loge[1.1*(L/D)+{1+1.1*(L/D)^2}^0.5]

L/D= 15.1515 F/D= 72.9850748

i.e. F = 7.2255 (m)
and A = 0.0077 (m^2)
and T = *4.5* (mins);
270 (secs)

hence, k = 3.9E-06 m/s


Relationship Between Elapsed Time and Head Ratio Showing Basic Time Lag (T)
Head ratio H/Ho (Log Scale)
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
0
10
20
30
40
50
60
Elapsed Time (min)
H/Ho
H/Ho = 0.37

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APPENDIX 3

TRIAL PIT AND SPOIL HEAP LOGS; PHOTOGRAPHS OF EXCAVATIONS, RESULTING SPOIL AND REINSTATEMENTS

GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.25)	FILL: Grey HARDCORE.		
0.20	ES1 0.1 ppm				0.25	Suspected MADE GROUND: Firm friable light brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.25	DS1							
0.50	ES2 0.1 ppm				(0.55)			
0.80	DS2				0.80			
					(0.35)	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.15	DS3				1.15	Firm to stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.50	BS1							
1.50	ES3 0.1 ppm				(1.15)			
2.30	DS4		Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY		2.30 2.35	Completely weathered SHALE: Encountered insitu as stiff silty CLAY. Complete at 2.35m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP01

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.15) 0.15	FILL: Grey HARDCORE.		
0.15	DS1					MADE GROUND: Firm friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing timber, wire, tarmac and concrete remnants. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	BS1							
0.50	ES1 0.1 ppm							
					(1.45)			
1.00	ES2 0.1 ppm							
					1.60	Suspected MADE GROUND: Firm friable brown with orange mottling slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.60	BS2							
1.60	DS2							
2.00	ES3 0.1 ppm							
					(1.40)			
			Seepage(1) at 2.80m. Seepage from gravel surround to suspected service at 2.8m depth. Pit side walls stable. 17/02/2021:2.90m					▽1
3.00	ES4 0.1 ppm				3.00	Complete at 3.00m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP02

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.45)	FILL: Grey HARDCORE containing wire rebar and geotextile membrane.		
0.25	ES1 0.1 ppm				0.45			
0.45	DS1				(0.45)	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.75	ES2 0.1 ppm				0.90			
0.90	DS2					Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	BS1							
1.50	ES3 0.1 ppm				(1.70)			
2.50	ES4 0.1 ppm		Trial pit terminated due to refusal on boulder obstruction. 17/02/2021:DRY		2.60	Complete at 2.60m		
			Pit side walls stable.					

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP03

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.25)	TOPSOIL.		
0.25	DS1				0.25	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm				(0.45)			
0.70	DS2				0.70	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	BS1							
1.00	ES2 0.1 ppm				(1.20)			
1.90	DS3		Seepage(1) at 1.90m. Pit side walls stable to 1.9m depth. Relatively stable below 1.9m.		1.90	Soft friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		▽1
2.00	BS2				(0.90)			
2.00	ES3 0.2 ppm				2.80	Complete at 2.80m		
			17/02/2021:DRY					

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP04

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP05

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		0.07	FILL: Grey HARDCORE.		
0.07	DS1				(0.43)	Firm friable brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.25	ES1				0.50			
0.50	BS1					Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.50	DS2							
1.00	ES2				(1.20)			
					1.70			▽1
1.70	DS3		Seepage(1) at 1.70m.			Firm friable dark grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.		
					(0.50)			
2.20	DS4				2.20			
			Trial pit terminated due to refusal on suspected bedrock. 02/03/2021:DRY		2.30	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.		
			Pit side walls stable.			Complete at 2.30m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP05

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP06

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.07	DS1		0.0ppm=PID reading. Seepage(1) at 0.20m.		(0.20) 0.20	FILL: Grey HARDCORE.		▽1
0.50 0.50	BS1 ES1 0.1 ppm					Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	ES2 0.1 ppm				(1.70)			
1.90 2.00 2.10	DS2 ES3 0.1 ppm DS3				1.90 (0.20) 2.10 (0.15) 2.25	Firm friable dark grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
			Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY			Completely weathered SHALE: Encountered insitu as stiff slightly sandy gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.. Complete at 2.25m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP06

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP07

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.			MADE GROUND: Grey clayey sandy fine to coarse GRAVEL with cobble content. Also containing rebar, wire, tarmac and red brick remnants. Gravel is sub-angular to sub-rounded.		
0.50	ES1 0.1 ppm				(1.10)			
1.10	BS1				1.10			
1.10	DS1				(0.30)	Firm to stiff friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.20	ES2 0.1 ppm				1.40			
1.40	DS2				(0.25)	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.		
			Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY		1.65	Complete at 1.65m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP07

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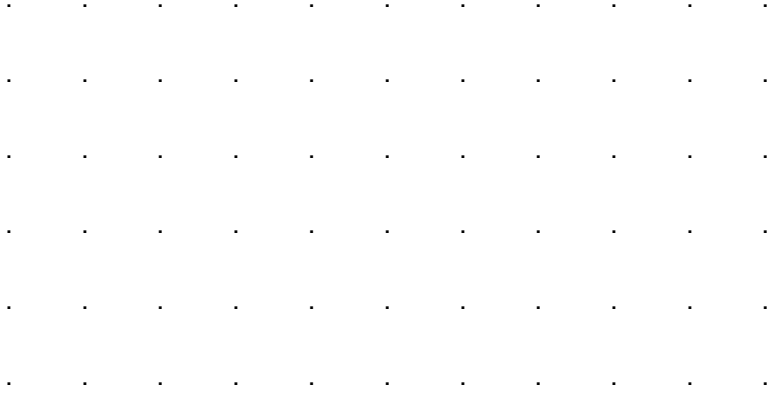
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP08

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.50)	MADE GROUND: Grey clayey sandy fine to coarse GRAVEL with cobble content. Also containing plastic remnants. Gravel is sub-angular to sub-rounded.		
0.25	ES1 0.2 ppm				0.50			
0.50	DS1				(0.60)	Soft to firm friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	ES2 0.2 ppm				1.10			
1.10	BS1					Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.10	DS2				(1.20)			
2.00	ES3 0.1 ppm							
2.30	BS2				2.30			
2.30	DS3				(0.40)	Firm to stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.50	ES4 0.1 ppm				2.70			
2.70	DS4		Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY		2.75	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.		
						Complete at 2.75m		

Plan



Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP08

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP09

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.50)	MADE GROUND: Grey clayey sandy fine to coarse GRAVEL with cobble content. Also containing metal, plastic and tarmac remnants. Gravel is sub-angular to sub-rounded.		
0.25	ES1 0.2 ppm				0.50			
0.50	DS1				(1.10)	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	BS1							
1.00	ES2 0.2 ppm							
1.60	DS2				1.60 (0.15) 1.75	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.		
			Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY			Complete at 1.75m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP09

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.70)	MADE GROUND: Soft friable brown slightly sandy slightly gravelly silty CLAY. Also containing plastic remnants. Gravel is sub-angular to sub-rounded.		
0.50	ES1 0.2 ppm				0.70			
0.70	DS1					Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
1.00	BS1							
1.00	ES2 0.2 ppm				(1.50)			
2.00	ES3 0.1 ppm				2.20			
2.20	BS2				(0.20)			
2.20	DS2				2.40	Firm friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
2.30	ES4 0.1 ppm				2.45			
2.40	DS3		Trial pit terminated due to refusal on suspected bedrock. Pit side walls stable. 17/02/2021:DRY			Completely weathered SHALE: Encountered insitu as stiff silty CLAY.		
						Complete at 2.45m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP10

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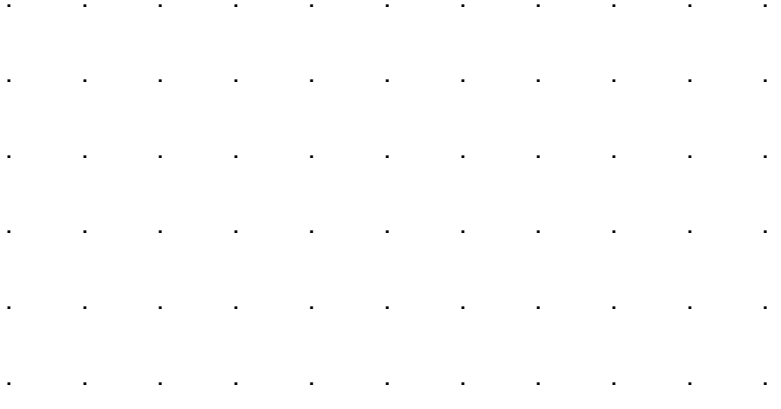
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	TP11

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated.			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			0.0ppm=PID reading.		(0.40)	MADE GROUND: Grey clayey sandy fine to coarse GRAVEL with cobble content. Also containing metal and rebar remnants. Gravel is sub-angular to sub-rounded.		
0.25	ES1 0.1 ppm				0.40			
0.40	DS1					Stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
0.75	ES2 0.1 ppm							
1.00	BS1				(2.00)			
1.50	ES3 0.1 ppm							
2.00	BS2							
2.40	DS2				2.40			
2.50	ES4				(0.40)	Stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.		
					2.80			
			Pit side walls stable. 17/02/2021:DRY			Complete at 2.80m		

Plan



Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.TP11

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	SP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00 0.00	DS1 ES1 0.1 ppm		0.0ppm=PID reading. 17/02/2021:DRY		(0.50) 0.50	MADE GROUND: Soft friable black slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded. Complete at 0.50m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.SP1

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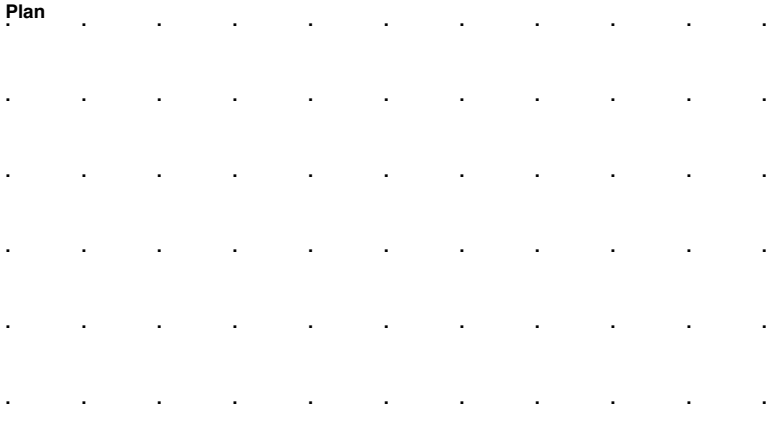
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	SP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00 0.00	DS1 ES1 0.1 ppm		0.0ppm=PID reading. 17/02/2021:DRY		(0.50) 0.50	MADE GROUND: Black clayey sandy fine to coarse GRAVEL. Gravel is fine to coarse, sub-angular to sub-rounded. Complete at 0.50m		

Plan



Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.SP2

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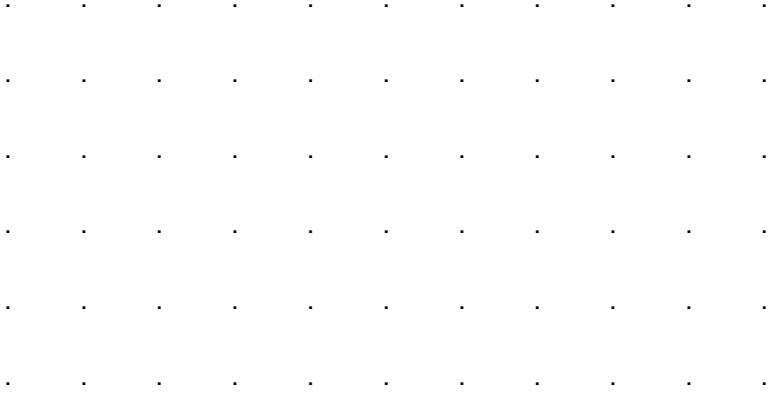
GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	SP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00 0.00 0.00	DS1 ES1 0.1 ppm ES2 0.1 ppm		0.0ppm=PID reading. 17/02/2021:DRY		(0.50) 0.50	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded. Complete at 0.50m		

Plan



Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.SP3

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GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site	Trial Pit Number
Proposed Development Site, Profile Park, Grange Castle, Dublin	SP04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine Excavated			Pinnacle Consulting Engineers	002.ROI21
	Location	**Dates**	**Geo-Environmental Engineer**	**Sheet**
	As Plan.	17/02/2021	Delta-Simons	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00 0.00	DS1 ES1 0.1 ppm		0.0ppm=PID reading. 17/02/2021:DRY		(0.50) 0.50	MADE GROUND: Grey sandy fine to coarse GRAVEL containing tarmac remnants. Gravel is sub-angular to sub-rounded. Complete at 0.50m		

Plan

Remarks

ES=Environmental soil sample comprising 1x1kg capacity pvc tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
No obvious visual or olfactory evidence of contamination.

Scale (approx)	Logged By	Figure No.
1:40	GM	002.ROI21.SP4

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TP01



TP01 Side Wall



TP01 Spoil



TP01 Reinstatement



TP02



TP02 Side Wall



TP02 Spoil



TP02 Reinstatement



TP03



TP03 Side Wall



TP03 Spoil



TP03 Reinstatement



TP04



TP04 Side Wall



TP04 Spoil



TP04 Reinstatement



TP05



TP05 Side Wall



TP05 Spoil



TP05 Reinstatement



TP06



TP06 Side Wall



TP06 Spoil



TP06 Reinstatement



TP07



TP07 Side Wall



TP07 Spoil



TP07 Reinstatement



TP08



TP08 Side Wall



TP08 Spoil



TP08 Reinstatement



TP09



TP09 Side Wall



TP09 Spoil



TP09 Reinstatement



TP10



TP10 Side Wall



TP10 Spoil



TP10 Reinstatement



TP11



TP11 Side Wall



TP11 Spoil



TP11 Reinstatement



SP01



SP01 Side Wall



SP01 Spoil



SP02



SP02 Side Wall



SP02 Spoil



SP03



SP03 Side Wall



SP03 Spoil



SP04



SP04 Side Wall



SP04 Spoil

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 4

DYNAMIC CONE PENTROMETER TEST DATA AND EQUIVALENT CBR VALUES

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	1.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted

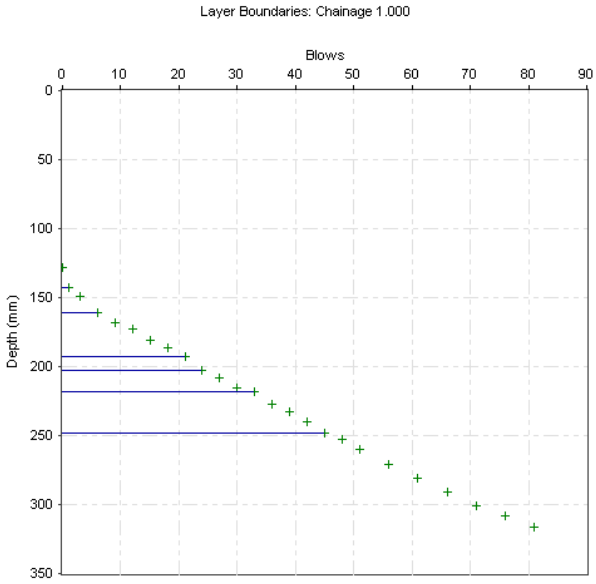
No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	165	0.00					
2	1	1	180	15.00					
3	2	3	186	3.00					
4	3	6	198	4.00					
5	3	9	205	2.33					
6	3	12	210	1.67					
7	3	15	218	2.67					
8	3	18	223	1.67					
9	3	21	230	2.33					
10	3	24	240	3.33					
11	3	27	245	1.67					
12	3	30	252	2.33					
13	3	33	255	1.00					
14	3	36	264	3.00					
15	3	39	270	2.00					
16	3	42	277	2.33					
17	3	45	285	2.67					
18	3	48	290	1.67					
19	3	51	297	2.33					
20	5	56	308	2.20					
21	5	61	318	2.00					
22	5	66	328	2.00					
23	5	71	338	2.00					
24	5	76	345	1.40					
25	5	81	353	1.60					

UK DCP V3.1

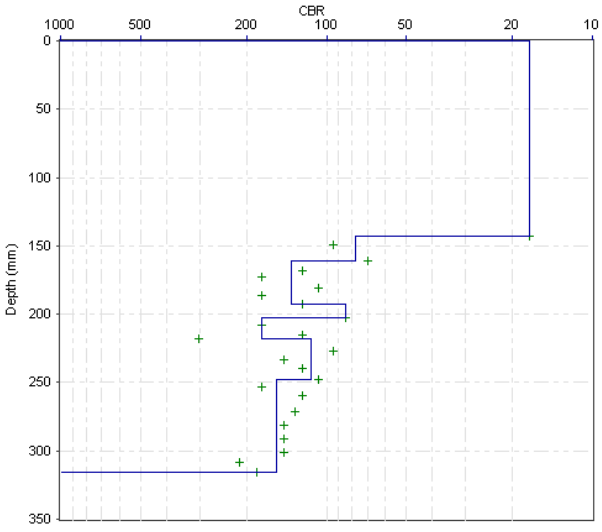
DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	1.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	15.00	17	143	143	Subgrade	--	--	--	--
2	3.60	78	18	161	Subgrade	--	--	--	--
3	2.13	136	32	193	Subgrade	--	--	--	--
4	3.33	85	10	203	Subgrade	--	--	--	--
5	1.67	176	15	218	Subgrade	--	--	--	--
6	2.50	115	30	248	Subgrade	--	--	--	--
7	1.89	154	68	316	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.61	1.61
Pavement Strength	--	1.61	1.61

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km): 2.000
Direction:
Location/Offset: Lay-by / other
Cone Angle: 60 degrees
Zero Error (mm): 37
Test Date: 18/02/2021

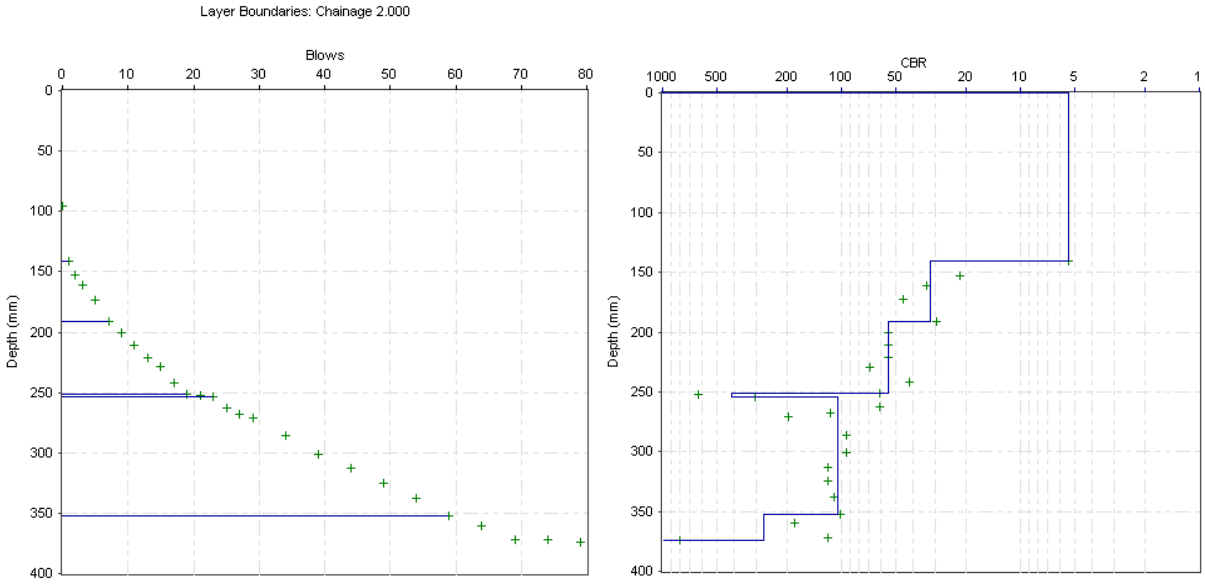
Surface Type: Unpaved
Thickness (mm): 0
Base Type:
Thickness (mm):
Surface Moisture: Unknown
Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	133	0.00	26	5	74	409	0.00
2	1	1	178	45.00	27	5	79	411	0.40
3	1	2	190	12.00					
4	1	3	198	8.00					
5	2	5	210	6.00					
6	2	7	228	9.00					
7	2	9	238	5.00					
8	2	11	248	5.00					
9	2	13	258	5.00					
10	2	15	266	4.00					
11	2	17	279	6.50					
12	2	19	288	4.50					
13	2	21	289	0.50					
14	2	23	291	1.00					
15	2	25	300	4.50					
16	2	27	305	2.50					
17	2	29	308	1.50					
18	5	34	323	3.00					
19	5	39	338	3.00					
20	5	44	350	2.40					
21	5	49	362	2.40					
22	5	54	375	2.60					
23	5	59	389	2.80					
24	5	64	397	1.60					
25	5	69	409	2.40					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	2.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	45.00	5	141	141	Subgrade	--	--	--	--
2	8.33	32	50	191	Subgrade	--	--	--	--
3	5.00	55	60	251	Subgrade	--	--	--	--
4	0.75	409	3	254	Subgrade	--	--	--	--
5	2.72	105	98	352	Subgrade	--	--	--	--
6	1.10	273	22	374	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	0.69	0.69
Pavement Strength	--	0.69	0.69

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

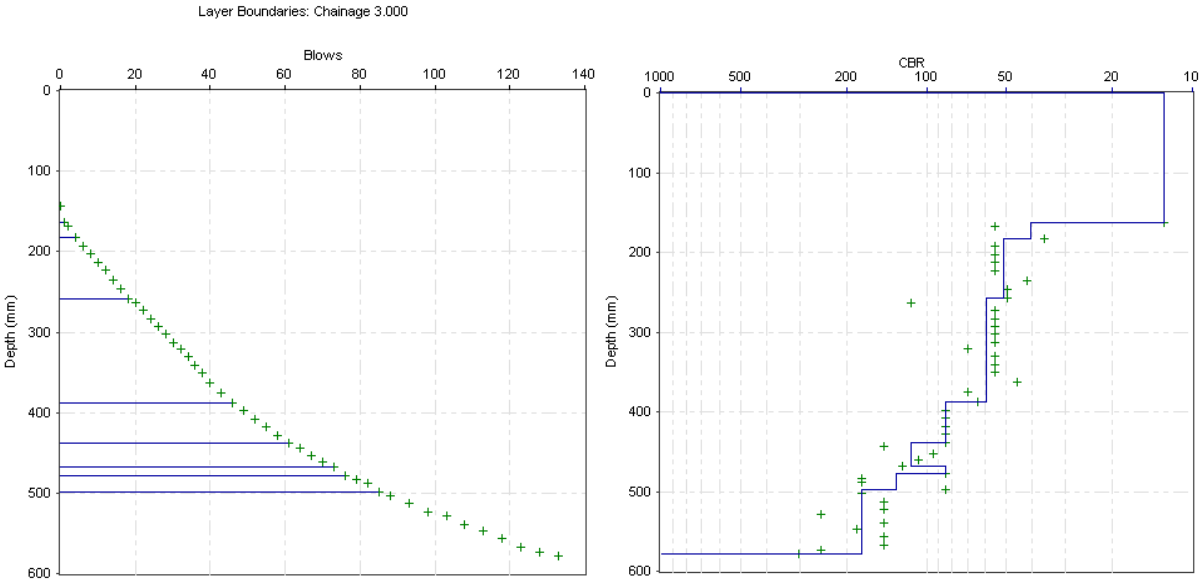
Chainage (km):	3.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	180	0.00	26	3	52	445	3.33
2	1	1	200	20.00	27	3	55	455	3.33
3	1	2	205	5.00	28	3	58	465	3.33
4	2	4	220	7.50	29	3	61	475	3.33
5	2	6	230	5.00	30	3	64	481	2.00
6	2	8	240	5.00	31	3	67	490	3.00
7	2	10	250	5.00	32	3	70	498	2.67
8	2	12	260	5.00	33	3	73	505	2.33
9	2	14	273	6.50	34	3	76	515	3.33
10	2	16	284	5.50	35	3	79	520	1.67
11	2	18	295	5.50	36	3	82	525	1.67
12	2	20	300	2.50	37	3	85	535	3.33
13	2	22	310	5.00	38	3	88	540	1.67
14	2	24	320	5.00	39	5	93	550	2.00
15	2	26	330	5.00	40	5	98	560	2.00
16	2	28	340	5.00	41	5	103	566	1.20
17	2	30	350	5.00	42	5	108	576	2.00
18	2	32	358	4.00	43	5	113	584	1.60
19	2	34	368	5.00	44	5	118	594	2.00
20	2	36	378	5.00	45	5	123	604	2.00
21	2	38	388	5.00	46	5	128	610	1.20
22	2	40	400	6.00	47	5	133	615	1.00
23	3	43	412	4.00					
24	3	46	425	4.33					
25	3	49	435	3.33					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	3.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	20.00	13	163	163	Subgrade	--	--	--	--
2	6.67	41	20	183	Subgrade	--	--	--	--
3	5.36	51	75	258	Subgrade	--	--	--	--
4	4.64	60	130	388	Subgrade	--	--	--	--
5	3.33	85	50	438	Subgrade	--	--	--	--
6	2.50	115	30	468	Subgrade	--	--	--	--
7	3.33	85	10	478	Subgrade	--	--	--	--
8	2.22	130	20	498	Subgrade	--	--	--	--
9	1.67	176	80	578	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.41	1.41
Pavement Strength	--	1.41	1.41

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

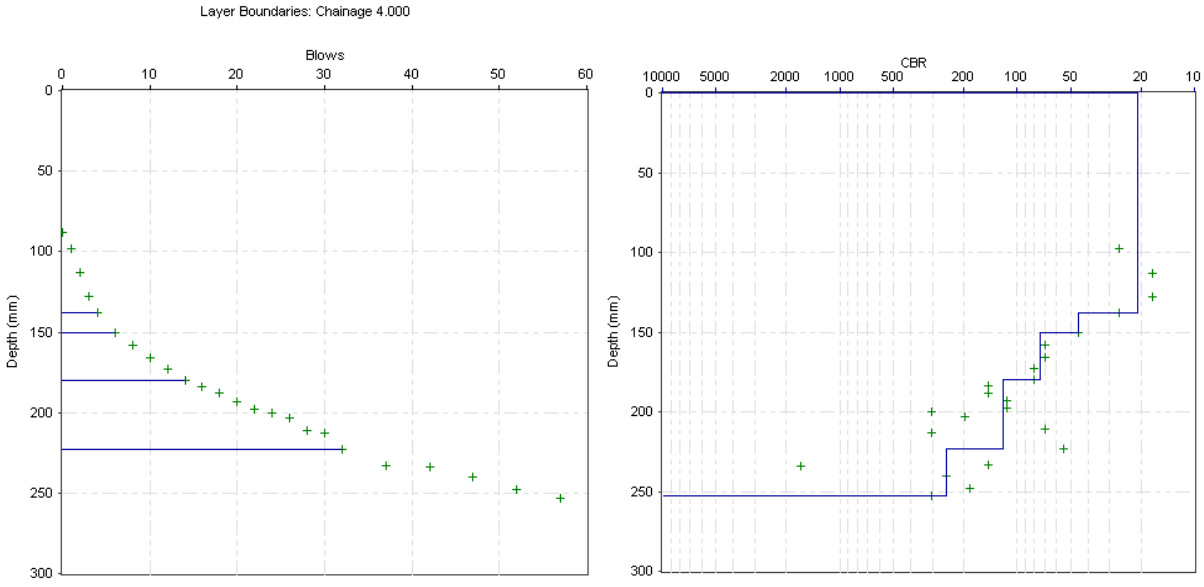
Chainage (km):	4.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	125	0.00					
2	1	1	135	10.00					
3	1	2	150	15.00					
4	1	3	165	15.00					
5	1	4	175	10.00					
6	2	6	187	6.00					
7	2	8	195	4.00					
8	2	10	203	4.00					
9	2	12	210	3.50					
10	2	14	217	3.50					
11	2	16	221	2.00					
12	2	18	225	2.00					
13	2	20	230	2.50					
14	2	22	235	2.50					
15	2	24	237	1.00					
16	2	26	240	1.50					
17	2	28	248	4.00					
18	2	30	250	1.00					
19	2	32	260	5.00					
20	5	37	270	2.00					
21	5	42	271	0.20					
22	5	47	277	1.20					
23	5	52	285	1.60					
24	5	57	290	1.00					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	4.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	12.50	21	138	138	Subgrade	--	--	--	--
2	6.00	45	12	150	Subgrade	--	--	--	--
3	3.75	75	30	180	Subgrade	--	--	--	--
4	2.39	120	43	223	Subgrade	--	--	--	--
5	1.20	249	30	253	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.72	1.72
Pavement Strength	--	1.72	1.72

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

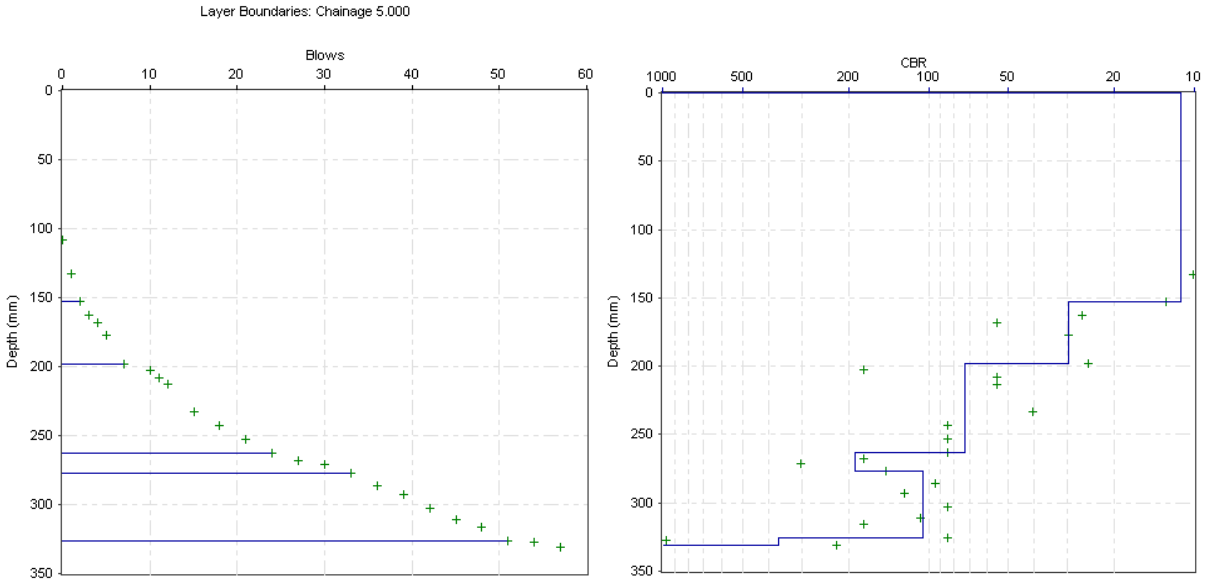
Chainage (km):	5.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	145	0.00					
2	1	1	170	25.00					
3	1	2	190	20.00					
4	1	3	200	10.00					
5	1	4	205	5.00					
6	1	5	214	9.00					
7	2	7	235	10.50					
8	3	10	240	1.67					
9	1	11	245	5.00					
10	1	12	250	5.00					
11	3	15	270	6.67					
12	3	18	280	3.33					
13	3	21	290	3.33					
14	3	24	300	3.33					
15	3	27	305	1.67					
16	3	30	308	1.00					
17	3	33	314	2.00					
18	3	36	323	3.00					
19	3	39	330	2.33					
20	3	42	340	3.33					
21	3	45	348	2.67					
22	3	48	353	1.67					
23	3	51	363	3.33					
24	3	54	364	0.33					
25	3	57	368	1.33					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	5.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	22.50	11	153	153	Subgrade	--	--	--	--
2	9.00	30	45	198	Subgrade	--	--	--	--
3	3.82	73	65	263	Subgrade	--	--	--	--
4	1.56	189	14	277	Subgrade	--	--	--	--
5	2.72	105	49	326	Subgrade	--	--	--	--
6	0.83	366	5	331	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.32	1.32
Pavement Strength	--	1.32	1.32

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Penetration Data Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km): 6.000
Direction:
Location/Offset: Lay-by / other
Cone Angle: 60 degrees
Zero Error (mm): 37
Test Date: 18/02/2021

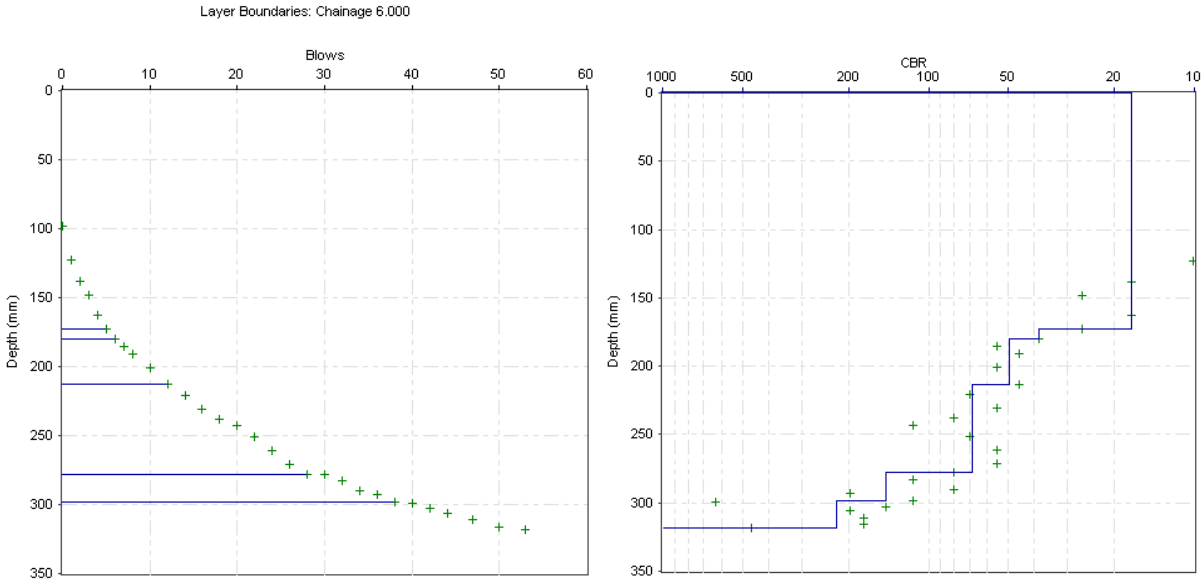
Surface Type: Unpaved
Thickness (mm): 0
Base Type:
Thickness (mm):
Surface Moisture: Unknown
Moisture adjustment factor: Not adjusted

No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)	No.	Blows	Cumulative Blows	Penetration Depth (mm)	Penetration Rate (mm/blow)
1	0	0	135	0.00	26	2	42	340	2.00
2	1	1	160	25.00	27	2	44	343	1.50
3	1	2	175	15.00	28	3	47	348	1.67
4	1	3	185	10.00	29	3	50	353	1.67
5	1	4	200	15.00	30	3	53	355	0.67
6	1	5	210	10.00					
7	1	6	217	7.00					
8	1	7	222	5.00					
9	1	8	228	6.00					
10	2	10	238	5.00					
11	2	12	250	6.00					
12	2	14	258	4.00					
13	2	16	268	5.00					
14	2	18	275	3.50					
15	2	20	280	2.50					
16	2	22	288	4.00					
17	2	24	298	5.00					
18	2	26	308	5.00					
19	2	28	315	3.50					
20	2	30	315	0.00					
21	2	32	320	2.50					
22	2	34	327	3.50					
23	2	36	330	1.50					
24	2	38	335	2.50					
25	2	40	336	0.50					

DCP Layer Strength Analysis Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Chainage (km):	6.000	Surface Type:	Unpaved
Direction:		Thickness (mm):	0
Location/Offset:	Lay-by / other	Base Type:	
Cone Angle:	60 degrees	Thickness (mm):	
Zero Error (mm):	37	Surface Moisture:	Unknown
Test Date:	18/02/2021	Moisture adjustment factor:	Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Position	Strength Coefficient	SN	SNC	SNP
1	15.00	17	173	173	Subgrade	--	--	--	--
2	7.00	39	7	180	Subgrade	--	--	--	--
3	5.50	50	33	213	Subgrade	--	--	--	--
4	4.06	69	65	278	Subgrade	--	--	--	--
5	2.00	145	20	298	Subgrade	--	--	--	--
6	1.33	223	20	318	Subgrade	--	--	--	--

Pavement Strength

	Layer Contribution		
Layer	**SN**	**SNC**	**SNP**
Surface	--	--	--
Base	--	--	--
Sub-Base	--	--	--
Subgrade	--	1.61	1.61
Pavement Strength	--	1.61	1.61

CBR Relationship:

TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(Strength)$

Report produced by .....

Tests Summary Report

Project Name: Proposed Development, Profile Park, Grange Castle, Dublin

Test Details					Upper Layers			Test Layers			Pavement Strength	
No.	**Test Date**	**Chainage (km)**	**Location**	**Offset (m)**	**Surface Type**	**Surface Moisture**	**Base Type**	**Base Thickness (mm)**	**Sub-base Thickness (mm)**	**Subgrade CBR (%)**	**SN**	**SNP**
1	18/02/2021	1.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	17	--	1.61
2	18/02/2021	2.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	5	--	0.69
3	18/02/2021	3.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	13	--	1.41
4	18/02/2021	4.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	21	--	1.72
5	18/02/2021	5.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	11	--	1.32
6	18/02/2021	6.000	Lay-by / other	--	Unpaved	0.5 (Unknown)	--	--	--	17	--	1.61

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 5

GEOTECHNICAL AND GEOCHEMICAL LABORATORY TEST RESULTS; COMPOSITE A-LINE PLOT; COMPOSITE PLOT OF PSD GRAPHS

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 1 / 3

DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425μm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Modified Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %							
BH01	1.40	DS3	19	96	20	40	19	21	0.05	0.00	CI	Firm to stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH02	1.70	DS5	14	57	25	32	17	15	0.53	-0.20	CL	Stiff friable light grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH03	2.75	DS6	7	48	14	25	15	10	-0.10	-0.84	CL	Very stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH04	0.55	DS2	27	72	38	43	22	21	0.76	0.24	CI	Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.
BH04	1.80	DS5	12	40	30	30	16	14	1.00	-0.29	CL	Stiff friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH05	0.60	DS2	12	62	19	45	22	23	-0.13	-0.43	CI	Firm friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH05	1.70	DS4	12	65	18	38	19	19	-0.05	-0.37	CI	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH06	1.00	DS2	17	66	26	32	16	16	0.63	0.06	CL	Soft friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH07	1.00	DS3	13	41	32	31	16	15	1.07	-0.19	CL	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH08	0.75	DS2	26	83	31	50	24	26	0.27	0.08	CI/CH	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH08	1.30	DS4	22	80	28	41	21	20	0.35	0.05	CI	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH09	0.95	DS1	18	69	26	40	19	21	0.33	-0.05	CI	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH10	1.00	DS3	16	78	21	41	20	21	0.05	-0.19	CI	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH11	0.60	DS2	25	85	29	41	22	19	0.37	0.16	CI	Firm friable brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH11	2.20	DS5	11	51	22	33	16	17	0.35	-0.29	CL	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
BH12	0.45	DS1	12	40	30	34	17	17	0.76	-0.29	CL	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
RC01	1.00	US1	11									Firm to stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Contains occasional rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.
RC01	1.40	DS2	18	51	35	31	18	13	1.31	0.00	CL	Soft friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 & 5.2 Sample preparations

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index. Modified liquidity index based on natural moisture content

Remarks :

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 2 / 3

DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425μm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Modified Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %							
RC01	2.00	DS4	17	66	26	36	18	18	0.44	-0.06	CI	Soft friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
RC02	0.45	DS2	13	60	22	32	16	16	0.38	-0.19	CL	Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
RC02	1.00	US1	13									Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
RC02	1.45	DS3	15	64	23	38	18	20	0.25	-0.15	CI	
RC02	2.00	DS5	13	49	27	32	16	16	0.69	-0.19	CL	Very stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
RC03	0.45	DS2	12	47	26	35	17	18	0.50	-0.28	CL/CI	MADE GROUND: Stiff friable grey brown slightly sandy gravelly silty CLAY containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.
RC03	1.00	DS3	14	69	20	40	22	18	-0.11	-0.44	CI	MADE GROUND: Stiff friable grey brown slightly sandy gravelly silty CLAY containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.
RC03	1.30	DS4	15	73	21	36	17	19	0.21	-0.11	CI	Very stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
RC03	2.00	US1	15									Very stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
RC03	2.60	DS6	11	56	20	36	16	20	0.20	-0.25	CI	Completely weathered SHALE: Encountered insitu as stiff silty CLAY.
TP01	0.80	DS2	22	84	26	39	20	19	0.32	0.11	CI	Soft friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP01	1.15	DS3	20	75	27	39	20	19	0.37	0.00	CI	Firm to stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP02	1.60	BS2	20	68	29	34	17	17	0.71	0.18	CL	Suspected MADE GROUND: Firm friable brown with orange mottling slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
TP02	3.00	ES4	18	48	38	39	20	19	0.95	-0.11	CI	Suspected MADE GROUND: Firm friable brown with orange mottling slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
TP03	0.90	DS2	53	61	87	34	18	16	4.31	2.19	CL	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP04	0.70	DS2	14	60	23	35	17	18	0.33	-0.17	CL/CI	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP05	0.50	DS2	14	51	27	30	16	14	0.79	-0.14	CL	Firm friable brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
TP05	1.70	DS3	14	42	33	30	16	14	1.21	-0.14	CL	Firm friable dark grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 & 5.2 Sample preparations

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index. Modified liquidity index based on natural moisture content

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LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425μm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Modified Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %							
TP06	1.90	DS2	19	51	37	34	18	16	1.19	0.06	CL	Firm friable dark grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP08	1.10	DS2	20	61	33	34	17	17	0.94	0.18	CL	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP09	0.50	DS1	20	76	26	41	21	20	0.25	-0.05	CI	Firm to stiff friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP10	0.70	DS1	14	60	23	35	17	18	0.33	-0.17	CL/CI	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP11	0.40	DS1	9	53	18	28	15	13	0.23	-0.43	CL	Stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
TP11	2.40	DS2	13	61	21	34	15	19	0.32	-0.11	CL	Stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 & 5.2 Sample preparations

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index. Modified liquidity index based on natural moisture content

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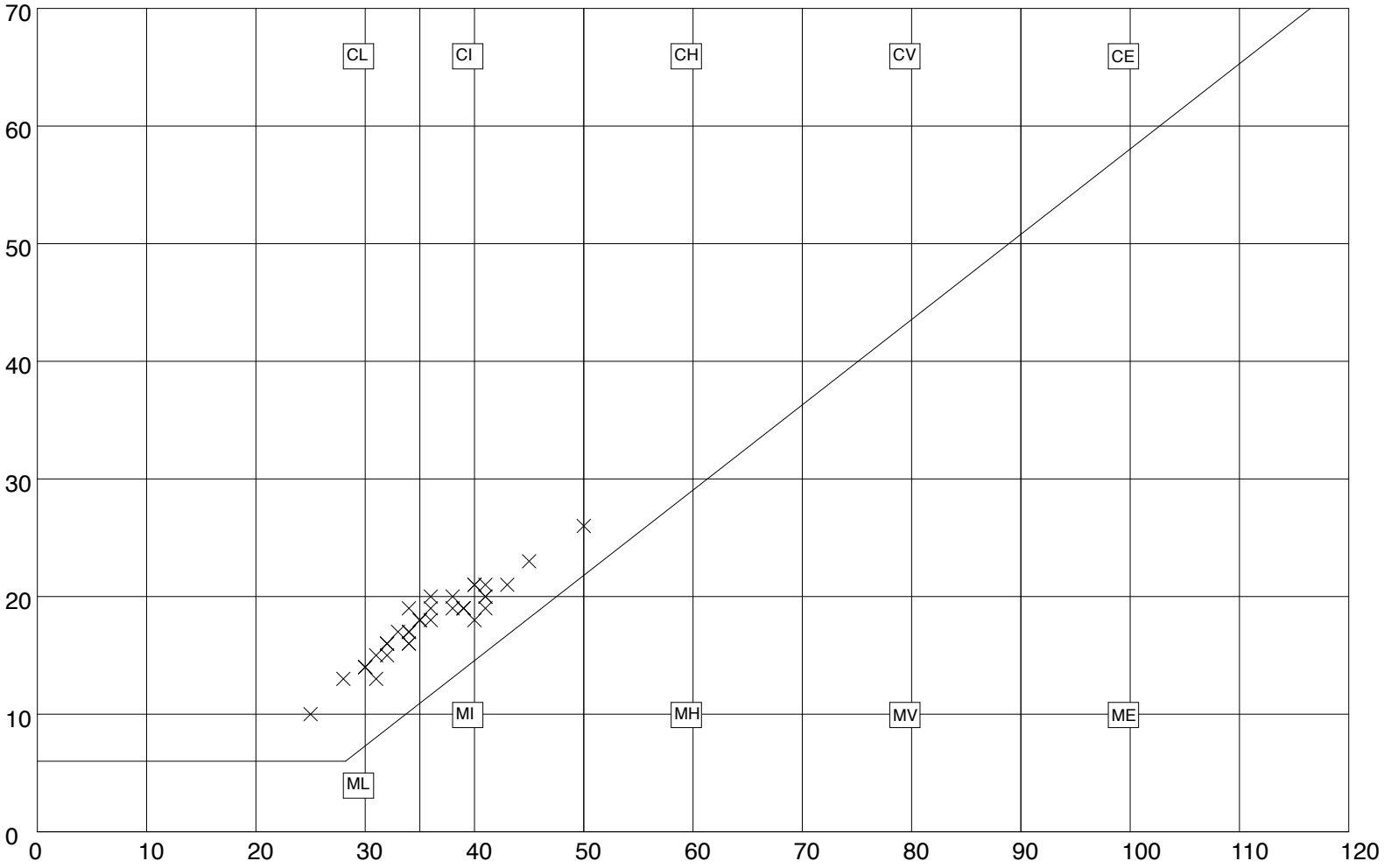

GEOTECHNICAL ENVIRONMENTAL SERVICES LIMITED

Site Proposed Development Site, Profile Park, Grange Castle, Dublin			
Title Composite A-Line Plot			
Drawn RB	**Checked** RB	**Approved** RB	**Job No.** 002.ROI21
Date 03/08/2021	**Date** 03/08/2021	**Date** 03/08/2021	**Figure No.** 4

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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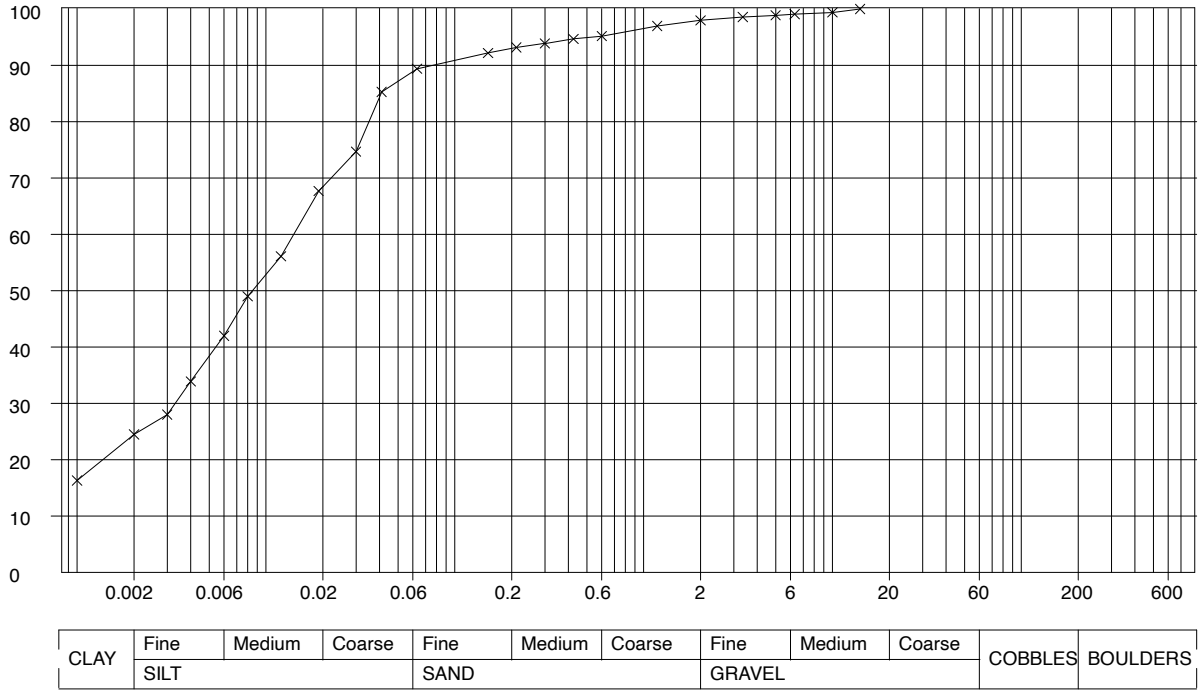
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH01	2.30	DS6	Firm to stiff thinly laminated light grey brown slightly sandy silty CLAY.



Grading Analysis	
D85	40.7 μm
D60	14.4 μm
D10	<1.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	2.0%
Sand	9.1%
Silt	64.4%
Clay	24.5%

Sieve / Particle Size	% Passing
14 mm	100.0
10 mm	99.4
6.3 mm	99.1
5 mm	98.9
3.35 mm	98.6
2 mm	98.0
1.18 mm	97.0
600 μm	95.2
425 μm	94.7
300 μm	93.9
212 μm	93.2
150 μm	92.2
63 μm	89.4
41 μm	85.3
30 μm	74.7
19 μm	67.7
12 μm	56.1
8 μm	49.0
6 μm	42.0
4 μm	33.9
3 μm	28.0
2 μm	24.5
1 μm	16.3

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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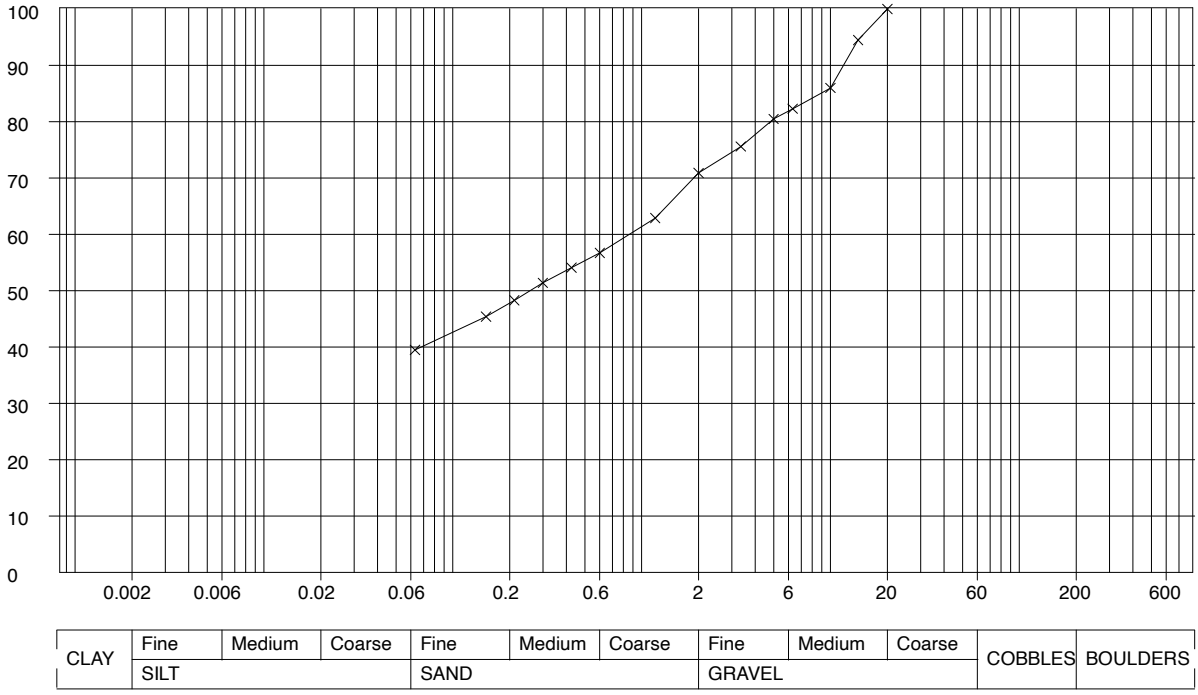
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH01	3.90 - 3.98	DS11	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	94.5
10 mm	86.0
6.3 mm	82.3
5 mm	80.5
3.35 mm	75.6
2 mm	70.9
1.18 mm	62.9
600 μm	56.7
425 μm	54.1
300 μm	51.4
212 μm	48.3
150 μm	45.4
63 μm	39.5

Grading Analysis	
D85	9.0 mm
D60	908.7 μm
D10	<63.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	29.1%
Sand	31.4%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Geo-Environmental Engineer : Delta-Simons

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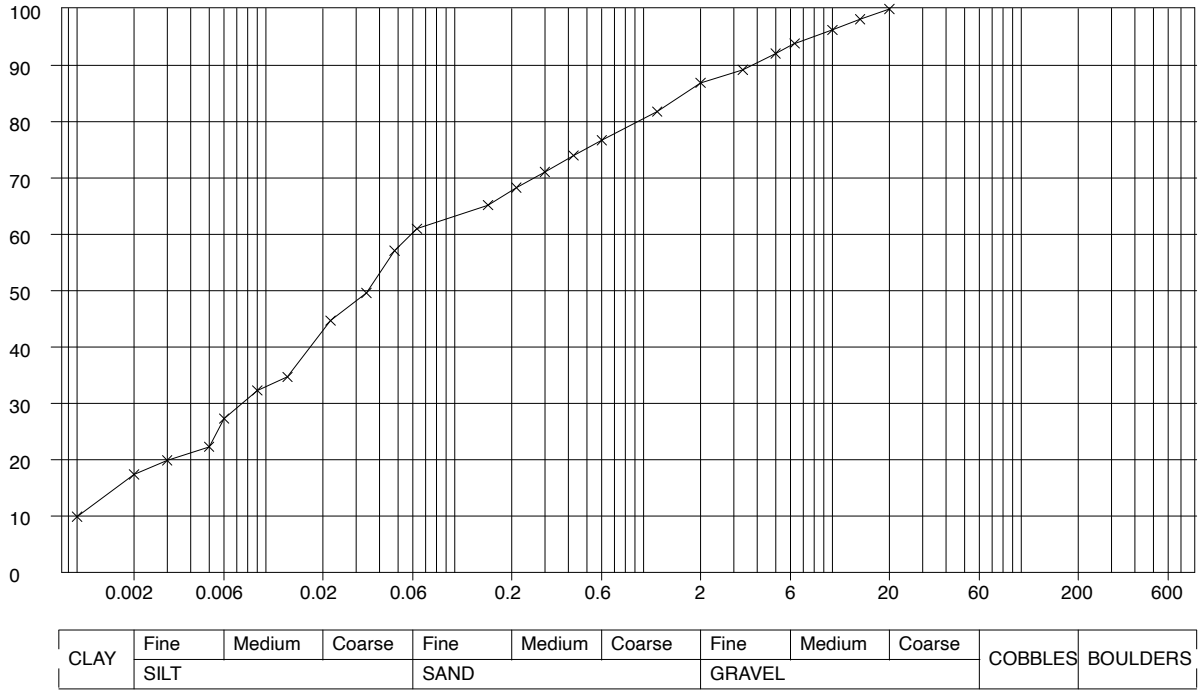
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	1.00 - 1.45	DS3	Soft friable light brown slightly sandy slightly gravelly silty CLAY containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	98.2
10 mm	96.3
6.3 mm	93.9
5 mm	92.1
3.35 mm	89.2
2 mm	86.9
1.18 mm	81.8
600 μm	76.7
425 μm	74.0
300 μm	71.1
212 μm	68.3
150 μm	65.2
63 μm	61.0
48 μm	57.1
34 μm	49.6
22 μm	44.7
13 μm	34.7
9 μm	32.3
6 μm	27.3
5 μm	22.3
3 μm	19.9
2 μm	17.4
1 μm	9.9

Grading Analysis	
D85	1.7 mm
D60	59.2 μm
D10	1.0 μm
Uniformity Coefficient	58.4

Particle Proportions	
Cobbles + Boulders	-
Gravel	13.1%
Sand	26.6%
Silt	42.9%
Clay	17.4%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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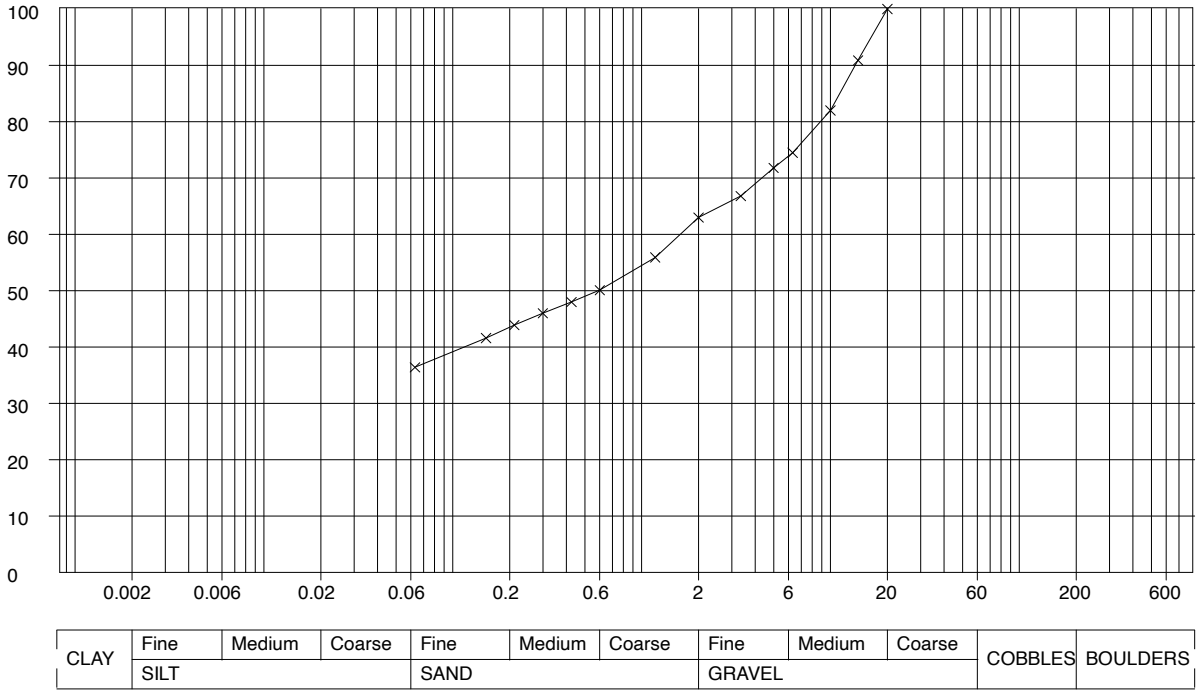
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	4.05	DS12	Completely weathered MUDSTONE: Encountered in situ as stiff silty CLAY.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	90.9
10 mm	82.0
6.3 mm	74.5
5 mm	71.8
3.35 mm	66.8
2 mm	63.0
1.18 mm	55.9
600 μm	50.1
425 μm	48.0
300 μm	46.0
212 μm	43.9
150 μm	41.6
63 μm	36.4

Grading Analysis	
D85	11.3 mm
D60	1.7 mm
D10	<63.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	37.0%
Sand	26.6%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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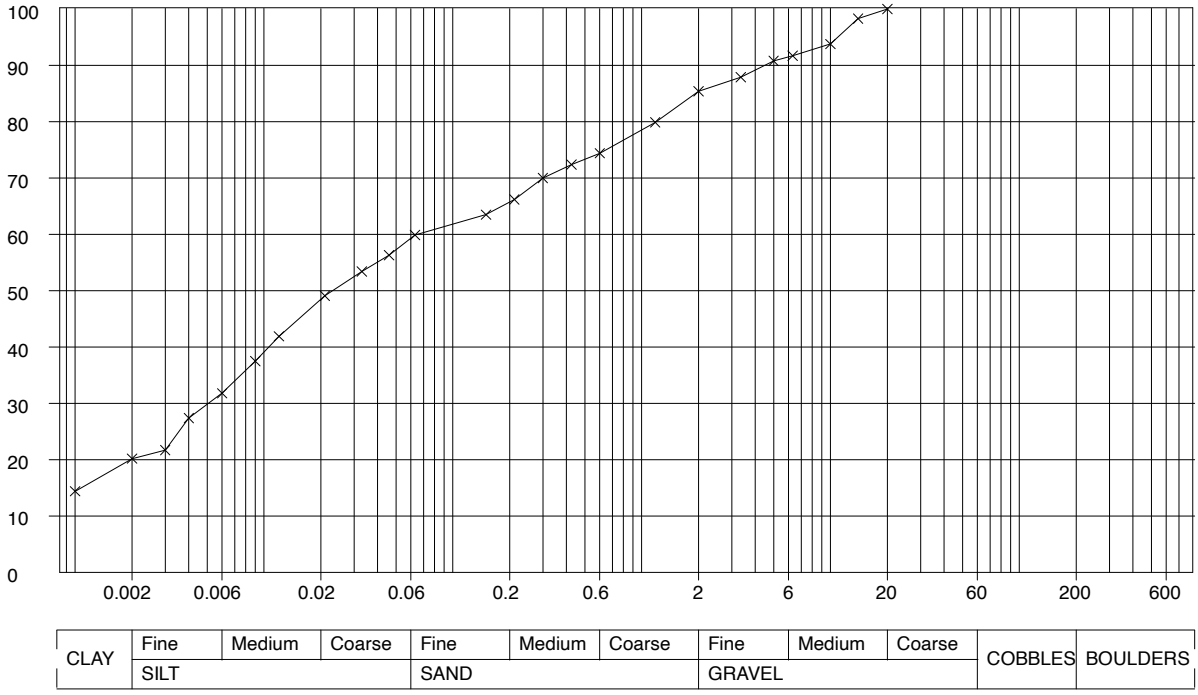
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH04	0.55	DS2	Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Also containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	98.3
10 mm	93.8
6.3 mm	91.7
5 mm	90.8
3.35 mm	87.9
2 mm	85.4
1.18 mm	79.9
600 μm	74.4
425 μm	72.4
300 μm	70.0
212 μm	66.2
150 μm	63.5
63 μm	59.9
46 μm	56.3
33 μm	53.4
21 μm	49.1
12 μm	41.9
9 μm	37.5
6 μm	31.8
4 μm	27.4
3 μm	21.7
2 μm	20.2
1 μm	14.4

Grading Analysis	
D85	1.9 mm
D60	65.4 μm
D10	<1.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	14.6%
Sand	26.1%
Silt	39.1%
Clay	20.2%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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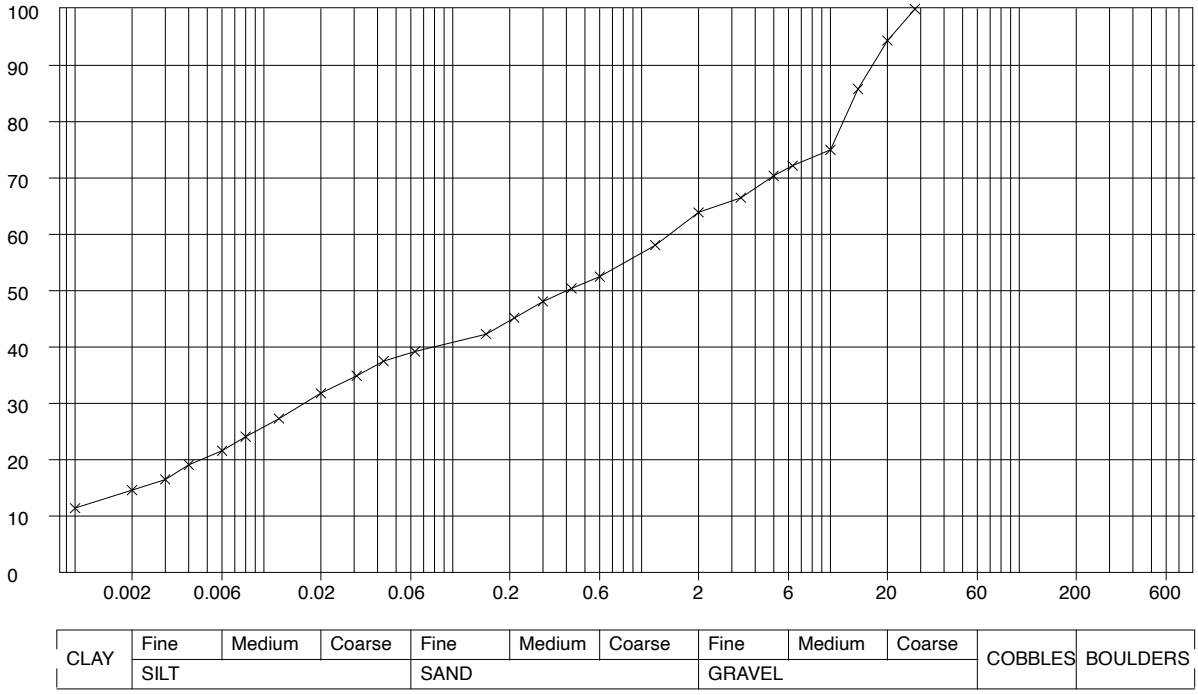
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	0.60	DS2	Firm friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Grading Analysis	
D85	13.7 mm
D60	1.4 mm
D10	<1.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	36.1%
Sand	24.9%
Silt	24.4%
Clay	14.6%

Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	94.4
14 mm	85.8
10 mm	75.0
6.3 mm	72.2
5 mm	70.4
3.35 mm	66.5
2 mm	63.9
1.18 mm	58.1
600 μm	52.5
425 μm	50.4
300 μm	48.1
212 μm	45.2
150 μm	42.3
63 μm	39.2
43 μm	37.5
31 μm	34.9
20 μm	31.8
12 μm	27.3
8 μm	24.1
6 μm	21.6
4 μm	19.1
3 μm	16.5
2 μm	14.6
1 μm	11.4

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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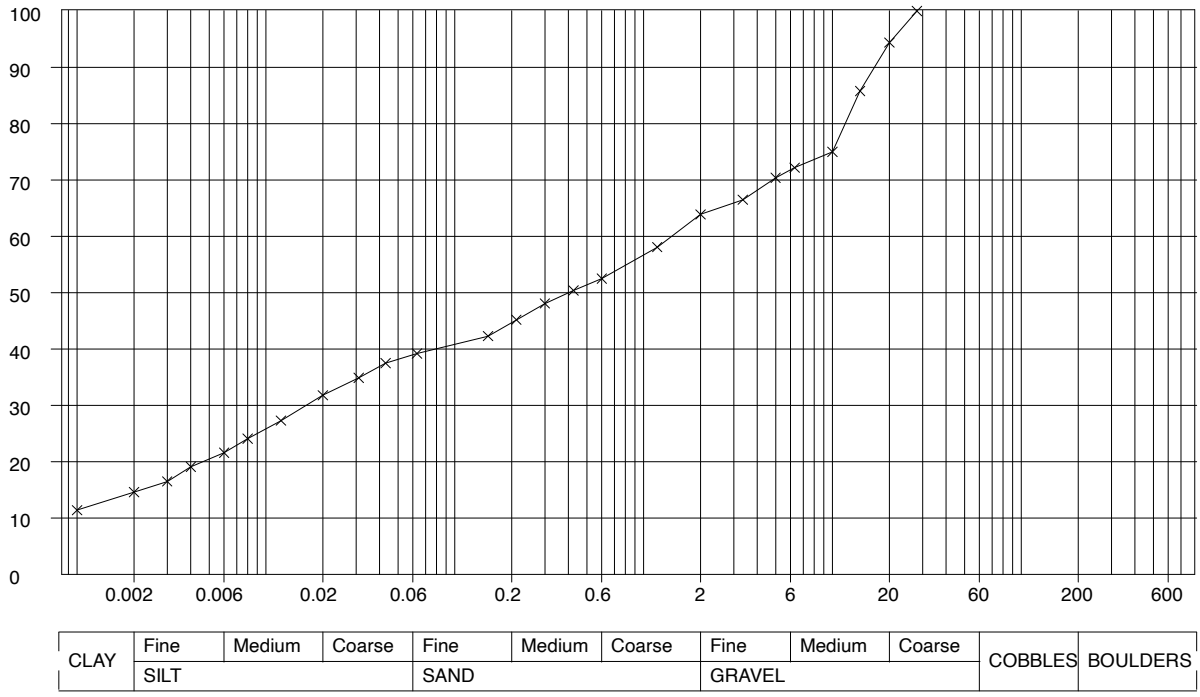
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	1.00	BS1	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Grading Analysis	
D85	13.7 mm
D60	1.4 mm
D10	<1.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	36.1%
Sand	24.9%
Silt	24.4%
Clay	14.6%

Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	94.4
14 mm	85.8
10 mm	75.0
6.3 mm	72.2
5 mm	70.4
3.35 mm	66.5
2 mm	63.9
1.18 mm	58.1
600 μm	52.5
425 μm	50.4
300 μm	48.1
212 μm	45.2
150 μm	42.3
63 μm	39.2
43 μm	37.5
31 μm	34.9
20 μm	31.8
12 μm	27.3
8 μm	24.1
6 μm	21.6
4 μm	19.1
3 μm	16.5
2 μm	14.6
1 μm	11.4

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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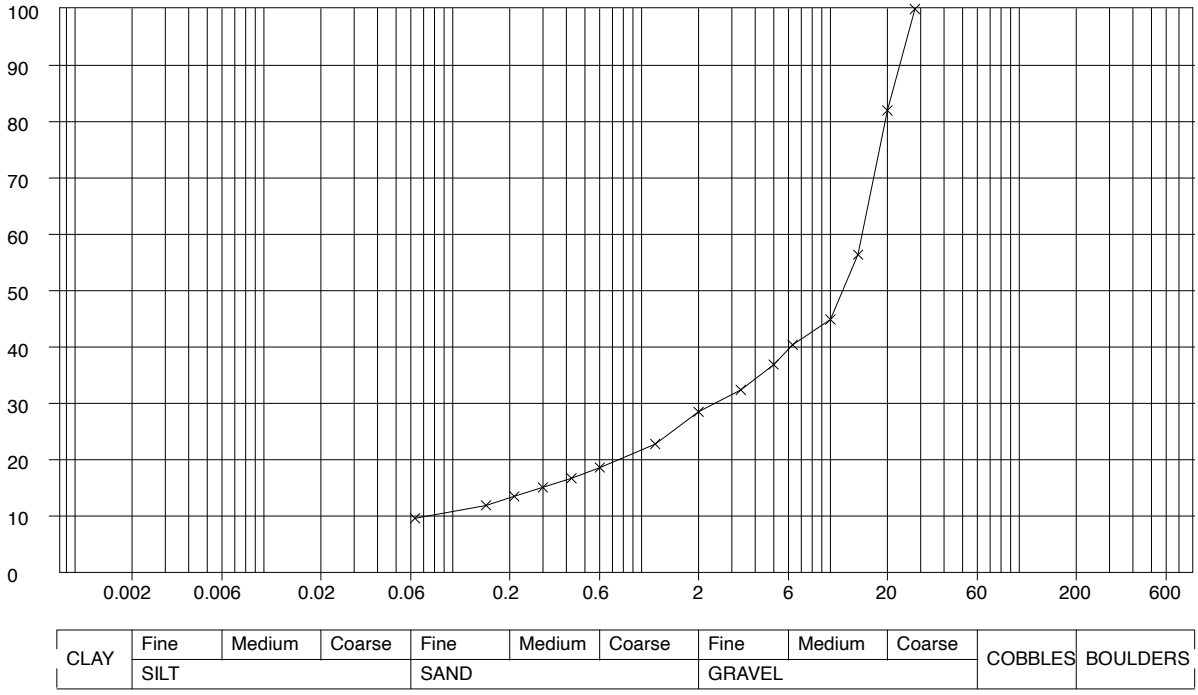
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	2.00 - 2.45	DS5	Medium dense grey brown clayey sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	82.0
14 mm	56.4
10 mm	44.9
6.3 mm	40.4
5 mm	36.9
3.35 mm	32.4
2 mm	28.5
1.18 mm	22.8
600 μm	18.6
425 μm	16.7
300 μm	15.1
212 μm	13.5
150 μm	11.9
63 μm	9.6

Grading Analysis	
D85	21.3 mm
D60	14.8 mm
D10	78.1 μm
Uniformity Coefficient	190.0

Particle Proportions	
Cobbles + Boulders	-
Gravel	71.5%
Sand	18.9%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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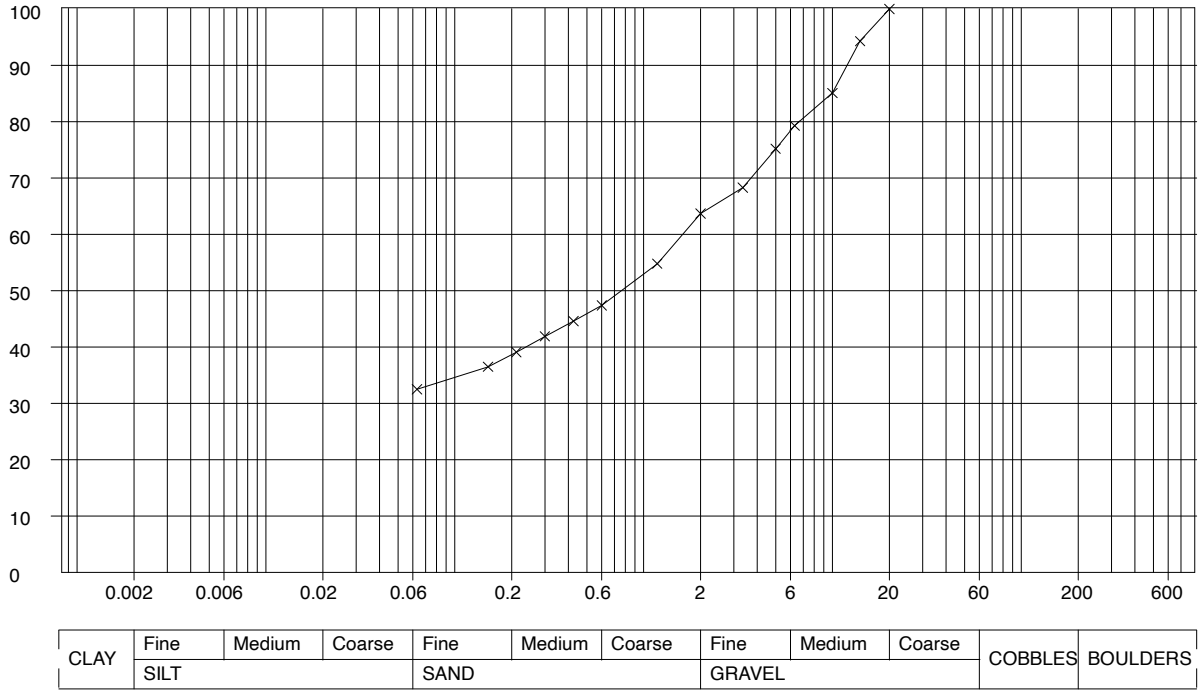
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH05	2.95	DS7	Very stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	94.3
10 mm	85.1
6.3 mm	79.3
5 mm	75.2
3.35 mm	68.3
2 mm	63.7
1.18 mm	54.8
600 μm	47.4
425 μm	44.6
300 μm	41.9
212 μm	39.1
150 μm	36.5
63 μm	32.5

Grading Analysis	
D85	9.9 mm
D60	1.7 mm
D10	<63.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	36.3%
Sand	31.2%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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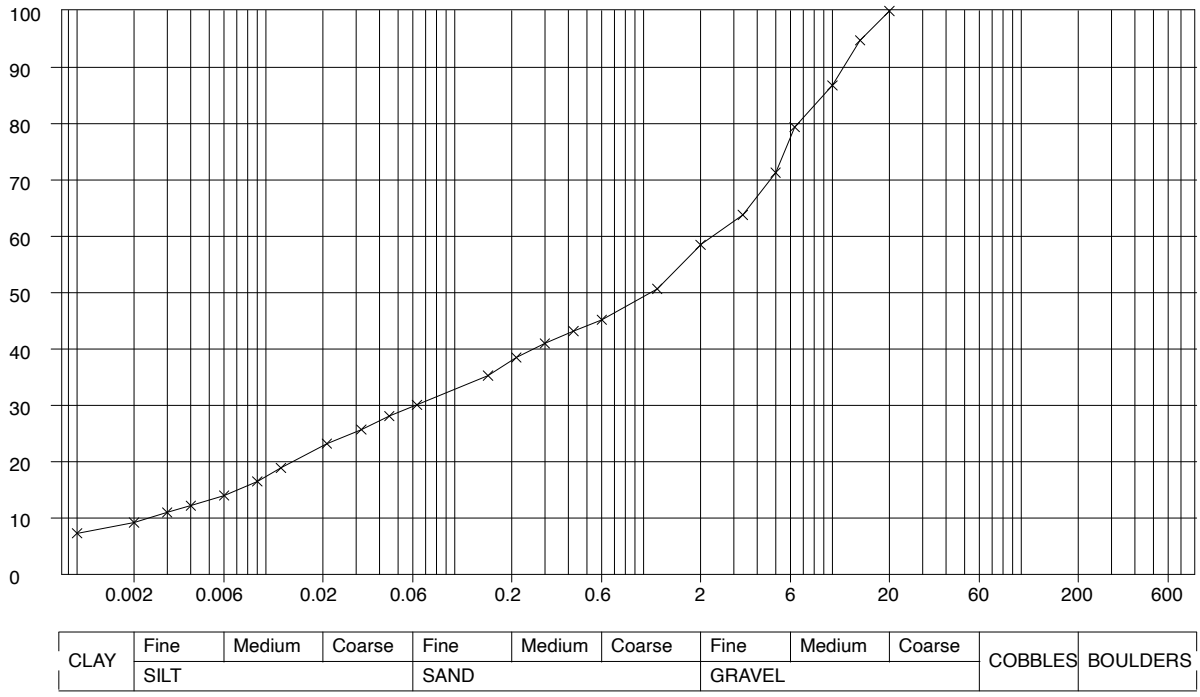
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH06	2.70 - 2.81	DS6	Completely weathered MUDSTONE: Encountered insitu as stiff slightly sandy gravelly silty CLAY.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	94.8
10 mm	86.8
6.3 mm	79.4
5 mm	71.3
3.35 mm	63.8
2 mm	58.5
1.18 mm	50.7
600 μm	45.2
425 μm	43.2
300 μm	41.0
212 μm	38.5
150 μm	35.3
63 μm	30.1
45 μm	28.1
32 μm	25.7
21 μm	23.2
12 μm	18.9
9 μm	16.5
6 μm	14.0
4 μm	12.2
3 μm	11.0
2 μm	9.2
1 μm	7.3

Grading Analysis	
D85	9.1 mm
D60	2.4 mm
D10	2.4 μm
Uniformity Coefficient	974.5

Particle Proportions	
Cobbles + Boulders	-
Gravel	41.5%
Sand	28.7%
Silt	20.6%
Clay	9.2%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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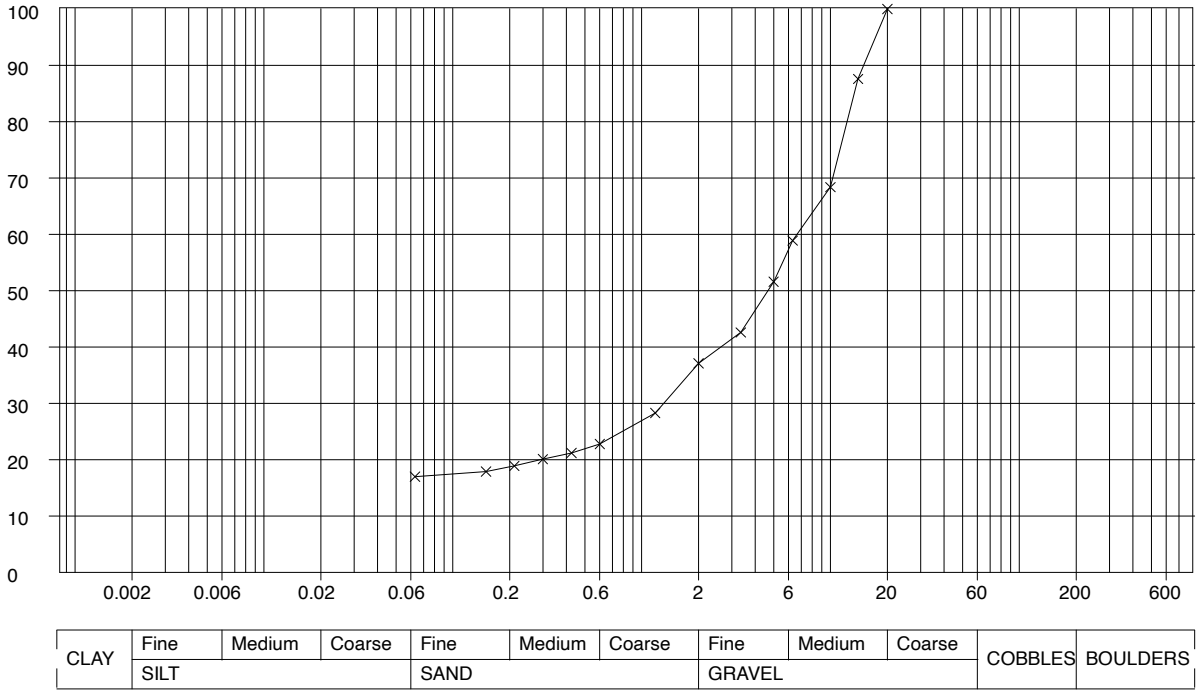
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH08	2.35	DS7	Completely weathered MUDSTONE: Encountered insitu as stiff silty CLAY.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	87.6
10 mm	68.4
6.3 mm	58.9
5 mm	51.6
3.35 mm	42.6
2 mm	37.1
1.18 mm	28.3
600 μm	22.8
425 μm	21.2
300 μm	20.1
212 μm	18.9
150 μm	17.9
63 μm	17.0

Grading Analysis	
D85	13.5 mm
D60	6.7 mm
D10	<63.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	62.9%
Sand	20.1%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

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GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

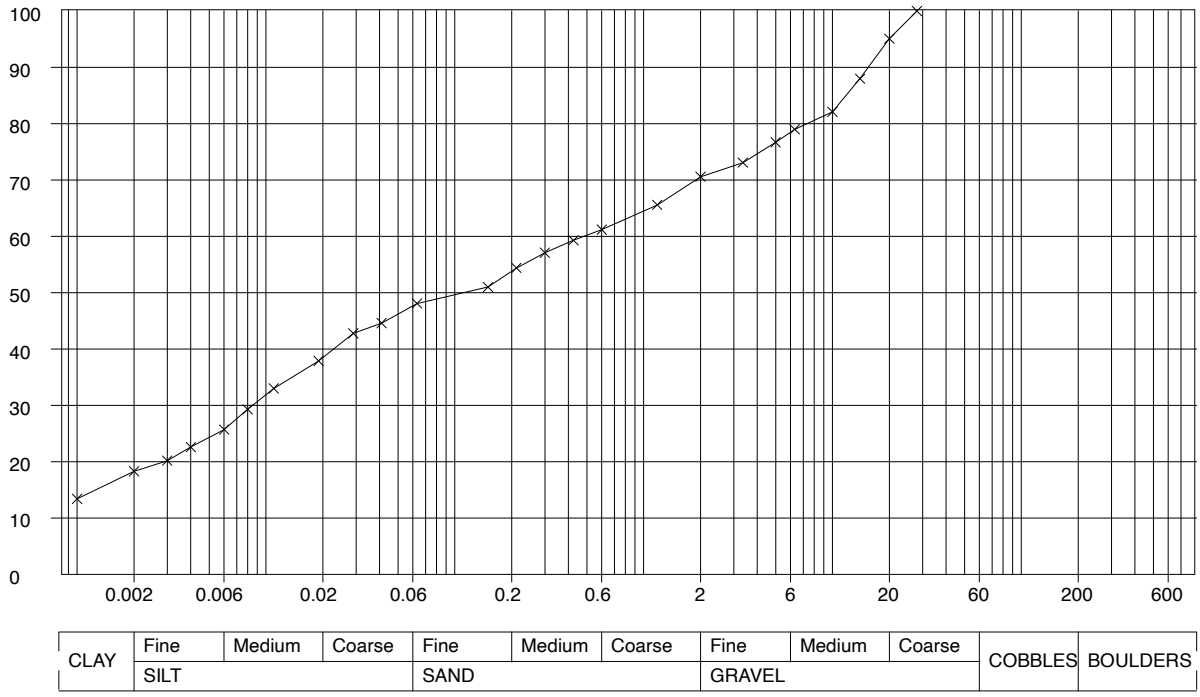
Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 12/19

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH09	2.00 - 2.45	DS3	Firm friable grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	95.1
14 mm	88.0
10 mm	82.1
6.3 mm	79.0
5 mm	76.7
3.35 mm	73.1
2 mm	70.6
1.18 mm	65.6
600 μm	61.2
425 μm	59.3
300 μm	57.1
212 μm	54.4
150 μm	51.0
63 μm	48.1
41 μm	44.6
29 μm	42.8
19 μm	37.9
11 μm	33.0
8 μm	29.3
6 μm	25.7
4 μm	22.6
3 μm	20.2
2 μm	18.3
1 μm	13.4

Grading Analysis	
D85	12.0 mm
D60	489.5 μm
D10	<1.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	29.4%
Sand	22.9%
Silt	29.4%
Clay	18.3%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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GEOTECHNICAL
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LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

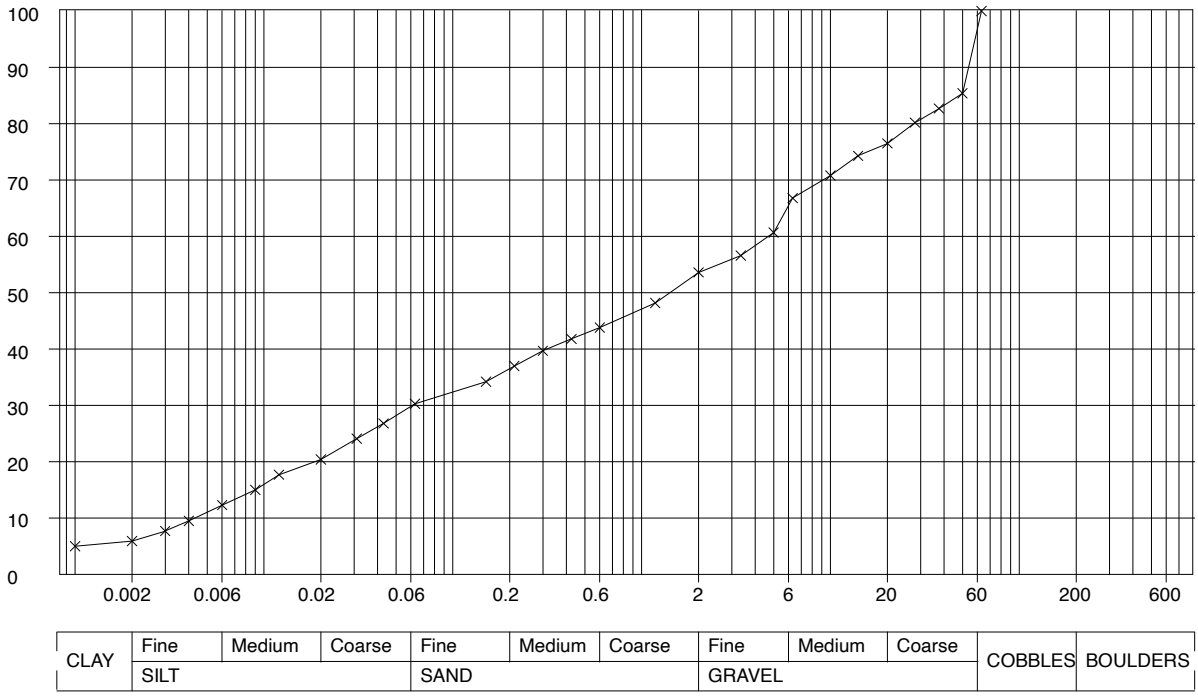
Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 13/19

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
RC01	1.40	BS2	Soft friable grey brown slightly sandy gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	85.4
37.5 mm	82.7
28 mm	80.2
20 mm	76.5
14 mm	74.3
10 mm	70.8
6.3 mm	66.8
5 mm	60.7
3.35 mm	56.6
2 mm	53.6
1.18 mm	48.2
600 μm	43.8
425 μm	41.8
300 μm	39.7
212 μm	37.0
150 μm	34.2
63 μm	30.3
43 μm	26.8
31 μm	24.1
20 μm	20.4
12 μm	17.7
9 μm	15.0
6 μm	12.3
4 μm	9.5
3 μm	7.7
2 μm	5.9
1 μm	5.0

Grading Analysis	
D85	48.1 mm
D60	4.7 mm
D10	4.4 μm
Uniformity Coefficient	1082.9

Particle Proportions	
Cobbles + Boulders	3.1%
Gravel	43.3%
Sand	23.7%
Silt	24.0%
Clay	5.9%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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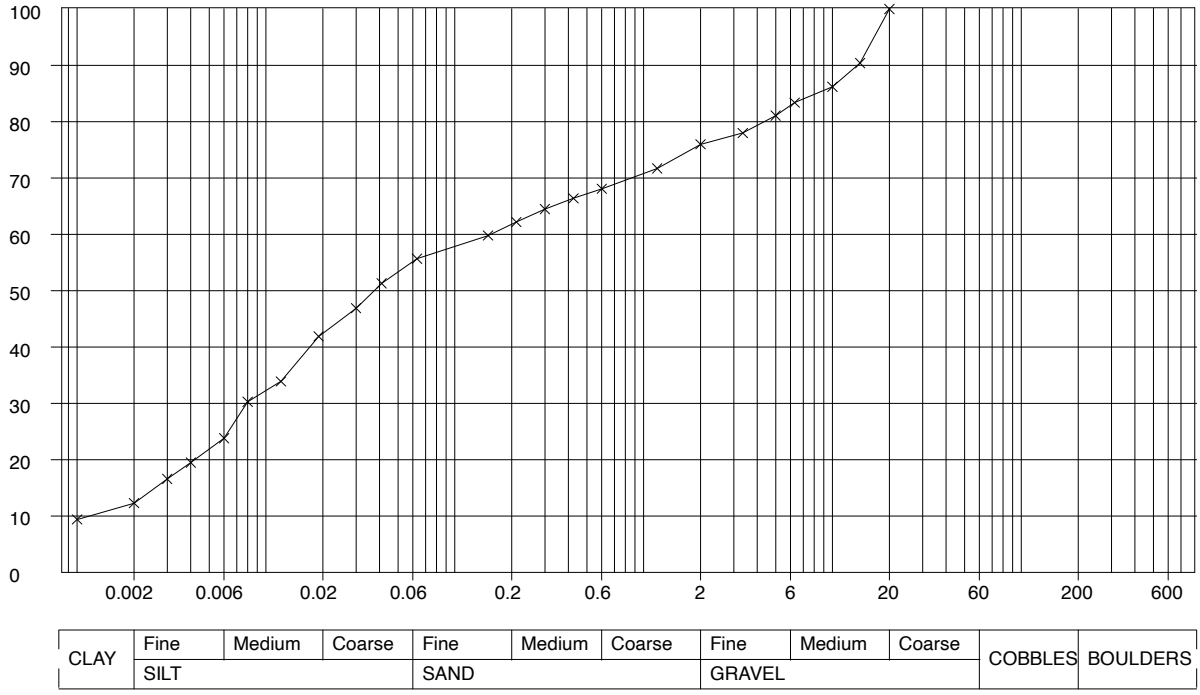
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
RC02	0.45	BS2	Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	90.4
10 mm	86.2
6.3 mm	83.4
5 mm	81.1
3.35 mm	78.0
2 mm	76.0
1.18 mm	71.7
600 μm	68.1
425 μm	66.4
300 μm	64.5
212 μm	62.2
150 μm	59.8
63 μm	55.7
41 μm	51.3
30 μm	46.9
19 μm	41.9
12 μm	33.9
8 μm	30.3
6 μm	23.8
4 μm	19.5
3 μm	16.6
2 μm	12.3
1 μm	9.4

Grading Analysis	
D85	8.4 mm
D60	155.2 μm
D10	1.2 μm
Uniformity Coefficient	128.6

Particle Proportions	
Cobbles + Boulders	-
Gravel	24.0%
Sand	20.8%
Silt	42.9%
Clay	12.3%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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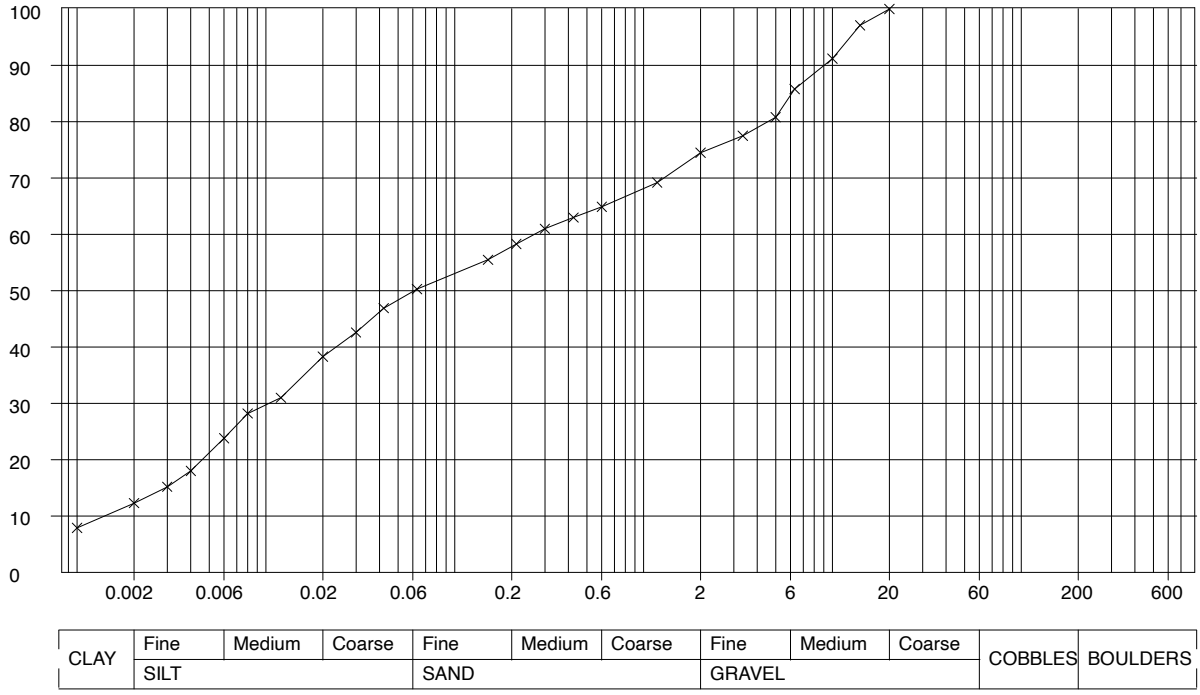
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
RC02	1.60	BS3	Very stiff friable light brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	97.1
10 mm	91.2
6.3 mm	85.8
5 mm	80.8
3.35 mm	77.5
2 mm	74.5
1.18 mm	69.2
600 μm	64.9
425 μm	63.0
300 μm	61.0
212 μm	58.3
150 μm	55.5
63 μm	50.3
42 μm	46.9
30 μm	42.6
20 μm	38.3
12 μm	31.0
8 μm	28.2
6 μm	23.8
4 μm	18.0
3 μm	15.2
2 μm	12.3
1 μm	7.9

Grading Analysis	
D85	6.1 mm
D60	267.4 μm
D10	1.5 μm
Uniformity Coefficient	181.0

Particle Proportions	
Cobbles + Boulders	-
Gravel	25.5%
Sand	24.6%
Silt	37.6%
Clay	12.3%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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GEOTECHNICAL
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LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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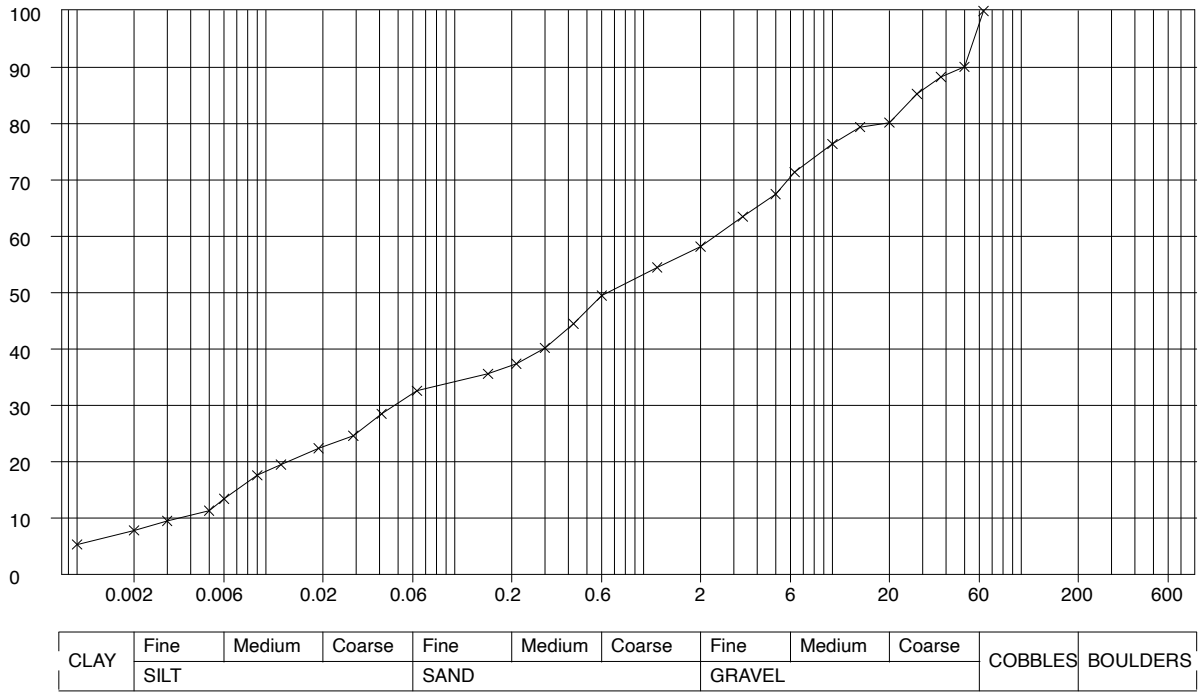
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
RC03	0.45	BS1	MADE GROUND: Stiff friable grey brown slightly sandy gravelly silty CLAY containing rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	90.1
37.5 mm	88.3
28 mm	85.3
20 mm	80.2
14 mm	79.4
10 mm	76.4
6.3 mm	71.4
5 mm	67.5
3.35 mm	63.5
2 mm	58.2
1.18 mm	54.5
600 μm	49.5
425 μm	44.5
300 μm	40.2
212 μm	37.4
150 μm	35.6
63 μm	32.6
41 μm	28.5
29 μm	24.6
19 μm	22.4
12 μm	19.5
9 μm	17.6
6 μm	13.4
5 μm	11.3
3 μm	9.5
2 μm	7.8
1 μm	5.3

Grading Analysis	
D85	27.5 mm
D60	2.5 mm
D10	3.6 μm
Uniformity Coefficient	691.5

Particle Proportions	
Cobbles + Boulders	2.1%
Gravel	39.7%
Sand	26.1%
Silt	24.3%
Clay	7.8%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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LIMITED

Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

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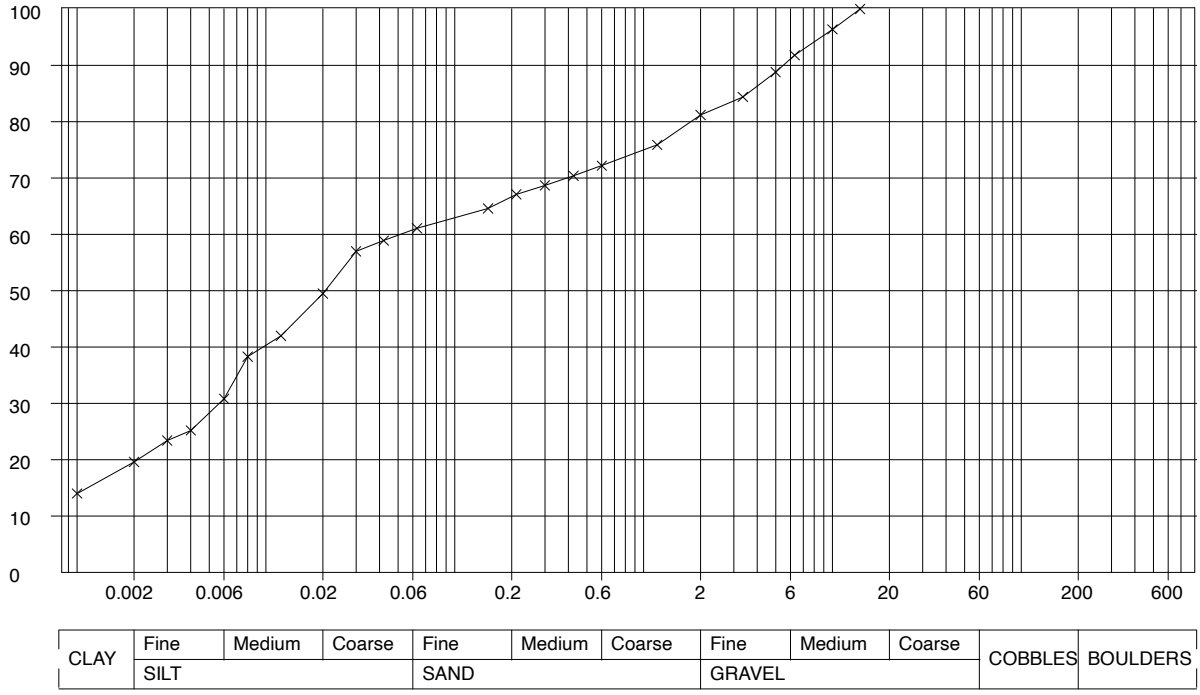
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
RC03	1.30	BS1	Very stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.



Sieve / Particle Size	% Passing
14 mm	100.0
10 mm	96.4
6.3 mm	91.8
5 mm	88.8
3.35 mm	84.4
2 mm	81.2
1.18 mm	75.9
600 μm	72.2
425 μm	70.4
300 μm	68.7
212 μm	67.1
150 μm	64.6
63 μm	61.1
42 μm	58.9
30 μm	57.0
20 μm	49.5
12 μm	42.0
8 μm	38.3
6 μm	30.8
4 μm	25.2
3 μm	23.4
2 μm	19.6
1 μm	14.0

Grading Analysis	
D85	3.6 mm
D60	52.5 μm
D10	<1.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	18.8%
Sand	20.4%
Silt	41.2%
Clay	19.6%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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GEOTECHNICAL
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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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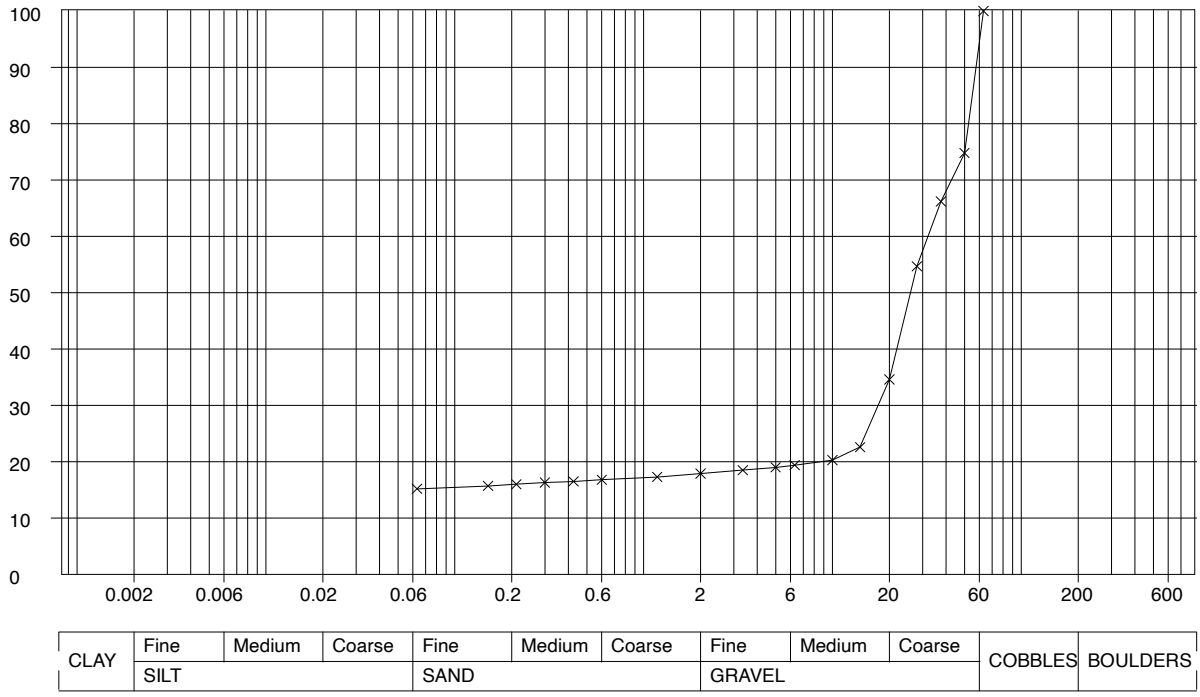
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP01	2.30	DS4	Completely weathered MUDSTONE: Encountered insitu as still silty CLAY.



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	74.8
37.5 mm	66.2
28 mm	54.7
20 mm	34.6
14 mm	22.6
10 mm	20.3
6.3 mm	19.4
5 mm	19.0
3.35 mm	18.5
2 mm	17.9
1.18 mm	17.3
600 μm	16.8
425 μm	16.5
300 μm	16.3
212 μm	16.0
150 μm	15.7
63 μm	15.2

Grading Analysis	
D85	55.3 mm
D60	32.4 mm
D10	<63.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	5.3%
Gravel	76.8%
Sand	2.7%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

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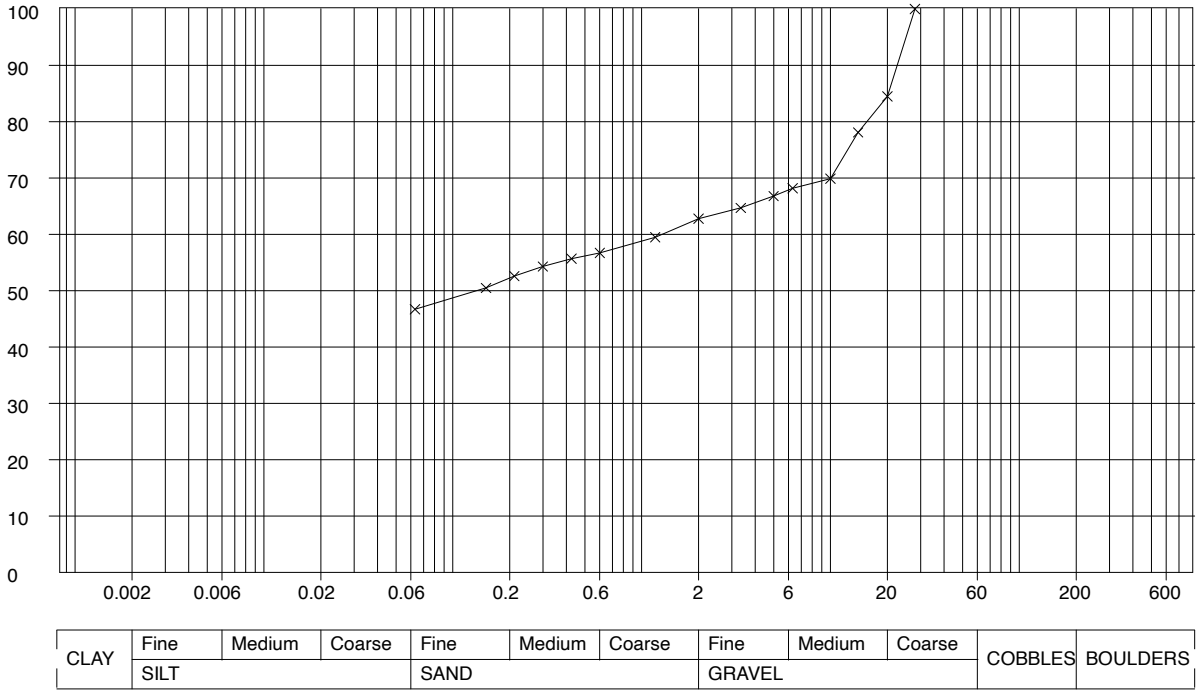
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP06	2.10	DS3	Completely weathered MUDSTONE: Encountered insitu as stiff slightly sandy gravelly silty CLAY. Gravel is fine to coarse, sub-angular to sub-rounded..



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	84.5
14 mm	78.1
10 mm	69.9
6.3 mm	68.2
5 mm	66.8
3.35 mm	64.7
2 mm	62.8
1.18 mm	59.5
600 μm	56.7
425 μm	55.7
300 μm	54.3
212 μm	52.6
150 μm	50.5
63 μm	46.7

Grading Analysis	
D85	20.3 mm
D60	1.3 mm
D10	<63.0 μm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	37.2%
Sand	16.1%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

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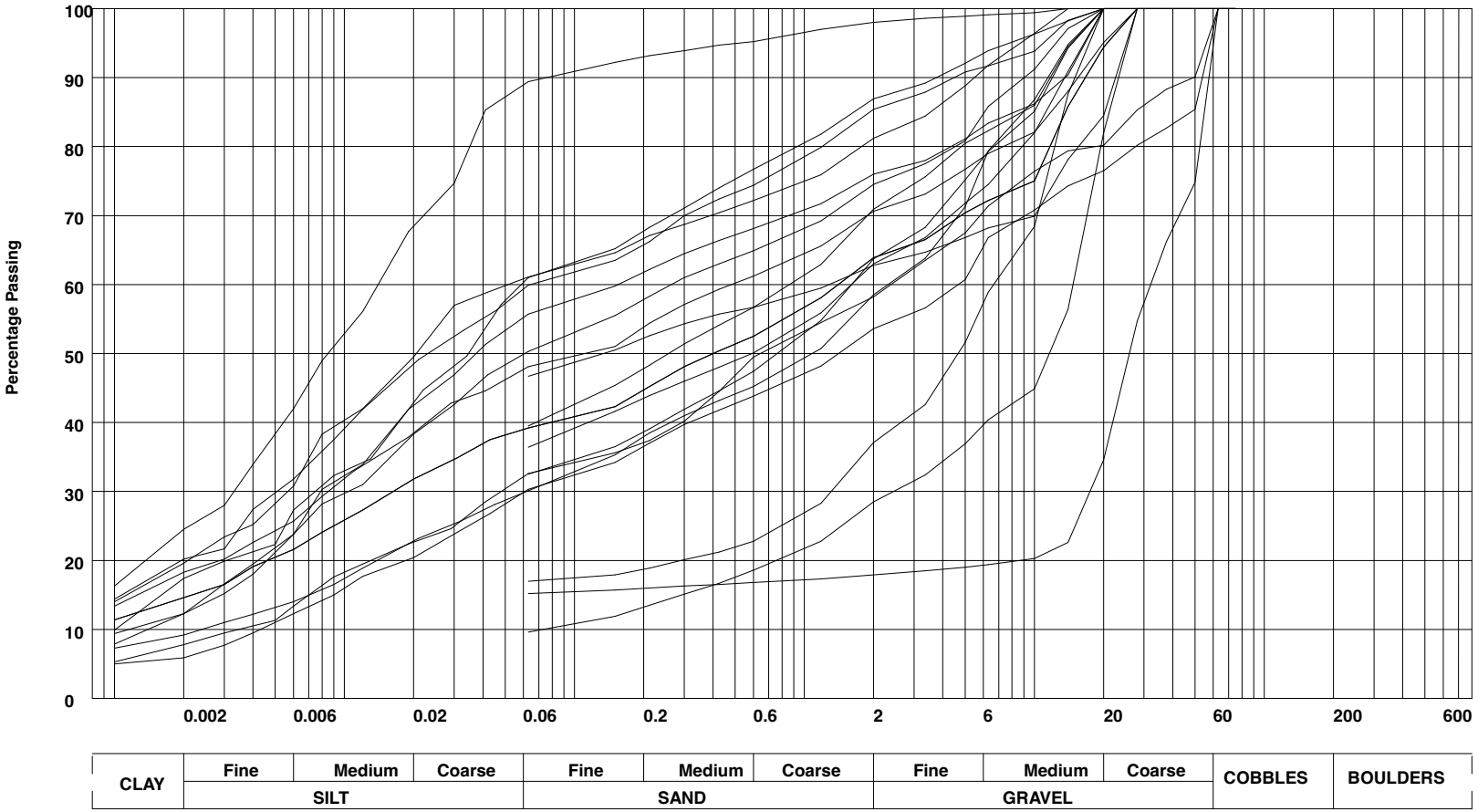

GEOTECHNICAL
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Site Proposed Development Site, Profile Park, Grange Castle, Dublin			
Title Composite Plot of PSD Graphs			
Drawn RB	**Checked** RB	**Approved** RB	**Job No.** 002.ROI21
Date 03/08/2021	**Date** 03/08/2021	**Date** 03/08/2021	**Figure No.** 5

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GEOTECHNICAL
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Laboratory Test Results

Site : Proposed Development Site, Profile Park, Grange Castle, Dublin

Client : Pinnacle Consulting Engineers

Geo-Environmental Engineer : Delta-Simons

Job Number 002.ROI21

Sheet 1 / 1

DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole/ Trial Pit	Depth (m)	Sample	Moisture Content %	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Cell Pressure (kN/m^2)	Deviator Stress (kN/m^2)	Apparent Cohesion (kN/m^2)	Angle of Shearing Resistance (degrees)	Laboratory Description
RC01	1.00	US1	11	2.21	2.00	20	142	71		Firm to stiff friable dark grey slightly sandy slightly gravelly silty CLAY with cobble content. Contains occasional rootlets. Gravel is fine to coarse, sub-angular to sub-rounded.
RC02	1.00	US1	13	2.28	2.01	20	154	77		Firm to stiff brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.
RC03	2.00	US1	15	2.27	1.97	40	324	162		Very stiff grey brown slightly sandy slightly gravelly silty CLAY with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.

Method of Preparation : BS 1377:PART 1:1990:7.4.2 Moisture content 1990: Preparation of undisturbed samples for testing BS 1377:PART 2:1990:7.2

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:7 Determination of density BS 1377:PART 7:1990:8 Undrained shear strength 1990:9 Multistage loading

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POINT LOAD STRENGTH INDEX TESTS

ISRM : 2014

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Contract: **Proposed Development Site, Profile Park, Grange Castle, Dublin**

Borehole No.	Depth (m)	Type/ Orientation	Width (W) (mm)	Platen Separation D (mm)	Platen Separation D' (mm)	Failure Load (P) (kN)	De^2 Axial (mm^2)	De^2 Diametral (mm^2)	Point Load Index (Is) - Axial/Irregular (Mpa)	Point Load Index (Is) - Diametral (Mpa)	Size Factor (F)	Corrected Point Load (Is_{50}) (MPa)	Remarks
RC01	3.00	Diametral		63.0	53.0	32.92		3339		9.86	1.07	10.52	
RC01	4.60	Axial	63.0	38.0	31.0	33.68	3050		11.04		1.05	11.55	
RC01	4.95	Diametral		63.0	58.0	78.88		3654		21.59	1.09	23.51	
RC02	2.75	Diametral		63.0	54.0	39.34		3402		11.56	1.07	12.39	
RC02	4.60	Axial	63.0	20.0	17.0	6.04	1605		3.76		0.91	3.41	
RC02	5.20	Diametral		63.0	55.0	68.92		3465		19.89	1.08	21.41	
RC03	3.20	Diametral		63.0	56.0	75.44		3528		21.38	1.08	23.11	
RC03	4.40	Axial	63.0	25.0	20.0	16.67	2006		8.31		0.95	7.91	
RC03	6.10	Diametral		63.0	52.0	36.87		3276		11.25	1.06	11.96	

W = Core diameter (Axial test) or specimen width (irregular lump test)
D = Core diameter (Diametral test) or specimen length (Axial test/Irregular lump test)
L - Mean applied load for failure
P = Actual applied load for failure (L x calibration factor)
D' = Distance between platens at point of failure

$De^2 = D \times D'$ (Diametral test)
$De^2 = 4(W \times D)/\pi$ (Axial test/Irregular lump test)
Is = Uncorrected point load strength (P/De^2)
$Is_{(50)}$ = Size corrected point load strength (Is x F)
$F = (De/50)^{0.45}$ (Size correction factor for core other than 50mm diameter)

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Our Ref: TAS 21/096
Date: 23 July 2021

Geotechnical Environmental Services Limited
The Old Mill
22A Kilmoyle Road
Ballybogey
Co. Antrim
BT53 6NR

Email: Robert Barry robert@geospecialists.co.uk

Date received:	22 July 2021
Date tested:	23 July 2021
Project:	Proposed Development Site, Profile Park, Grange Castle, Dublin

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK CORES

8 No. rock core samples were received by Qubtest for uniaxial compressive strength testing.

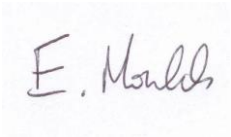
The results are given in Table 1.

Core ID	Length as received (mm)	Diameter (mm)	Test length (mm)	Test ratio Leng : Diam	Area (mm^2)	Failure load (kN)	Uniaxial Compressive strength (N/mm^2)
RC01 4.1m	230	63	126	2 : 1	3117	337.4	108.2
RC01 4.95m	260	63	126	2 : 1	3117	216.1	69.3
RC01 8.0m	170	63	126	2 : 1	3117	215.7	69.2
RC02 5.7m	320	63	126	2 : 1	3117	321.4	103.1
RC02 9.4m	315	63	126	2 : 1	3117	171.2	54.9
RC03 2.8m	260	63	126	2 : 1	3117	246.6	79.1
RC03 3.4m	235	63	126	2 : 1	3117	186.8	59.9
RC03 8.0m	275	63	126	2 : 1	3117	321.2	103.0

Table 1: Rock Core Results

Testing Machine Identity: 7226CB/D/T/87059.
Denison Calibration Certificate No. 137513
(UKAS accredited calibration) 27 July 2020

TAS 21/096



E. Moulds (Senior Lab Technician)

Retention of samples
Samples will only be retained for 28 days after the date of issue of the report unless a specific written request is received for further retention. There may be a charge for further retention or return of samples.

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Final Report

Report No.:	21-06865-1
Initial Date of Issue:	10-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	04-Mar-2021
Order No.:		**Date Instructed:**	04-Mar-2021
No. of Samples:	17		
Turnaround (Wkdays):	5	**Results Due:**	10-Mar-2021
Date Approved:	10-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865	21-06865
Quotation No.:		**Chemtest Sample ID.:**			1154049	1154050	1154051	1154052	1154053	1154054	1154055	1154056	1154057	1154058	1154059
Order No.:		Client Sample Ref.:			DS2	DS4	DS8	DS11	DS2	DS5	DS2	DS3	DS7	DS2	DS3
		Client Sample ID.:			BH01	BH01	BH01	BH02	BH05	BH05	BH07	BH08	BH08	BH09	BH11
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			1.00	1.80	3.00	4.05	0.60	2.00	0.95	1.00	2.15	1.00	1.00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**											
Moisture	N	2030	%	0.020	10	18	18	8.4	20	12	8.8	9.2	12	13	23
pH	U	2010		4.0	[A] 9.1	[A] 8.2	[A] 8.1	[A] 9.1	[A] 8.0	[A] 9.2	[A] 9.3	[A] 9.3	[A] 9.0	[A] 8.8	[A] 8.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.035	[A] 0.035	[A] 0.012	[A] 0.088	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.031	[A] 0.11	[A] 0.16

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06865	21-06865	21-06865	21-06865	21-06865	21-06865
Quotation No.:		**Chemtest Sample ID.:**			1154060	1154061	1154062	1154063	1154064	1154065
Order No.:		Client Sample Ref.:			DS1	DS3	DS2	DS2	DS3	DS1
		Client Sample ID.:			BH12	TP01	TP04	TP06	TP08	TP11
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.45	1.15	0.70	0.90	2.30	0.40
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Moisture	N	2030	%	0.020	15	13	12	46	11	9.7
pH	U	2010		4.0	[A] 8.8	[A] 8.9	[A] 8.9	[A] 8.0	[A] 8.8	[A] 8.7
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.022	[A] 0.023	[A] 0.021	[A] 0.028	[A] 0.075	[A] 0.077

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1154049	DS2	BH01			A	Plastic Bag
1154050	DS4	BH01			A	Plastic Bag
1154051	DS8	BH01			A	Plastic Bag
1154052	DS11	BH02			A	Plastic Bag
1154053	DS2	BH05			A	Plastic Bag
1154054	DS5	BH05			A	Plastic Bag
1154055	DS2	BH07			A	Plastic Bag
1154056	DS3	BH08			A	Plastic Bag
1154057	DS7	BH08			A	Plastic Bag
1154058	DS2	BH09			A	Plastic Bag
1154059	DS3	BH11			A	Plastic Bag
1154060	DS1	BH12			A	Plastic Bag
1154061	DS3	TP01			A	Plastic Bag
1154062	DS2	TP04			A	Plastic Bag
1154063	DS2	TP06			A	Plastic Bag
1154064	DS3	TP08			A	Plastic Bag
1154065	DS1	TP11			A	Plastic Bag

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-25656-1
Initial Date of Issue:	29-Jul-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Grant McCullough Erin Barry Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	26-Jul-2021
Order No.:		**Date Instructed:**	26-Jul-2021
No. of Samples:	11		
Turnaround (Wkdays):	5	**Results Due:**	30-Jul-2021
Date Approved:	29-Jul-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-25656	21-25656	21-25656	21-25656	21-25656	21-25656	21-25656	21-25656	21-25656
Quotation No.:		**Chemtest Sample ID.:**			1247890	1247891	1247892	1247893	1247894	1247895	1247896	1247897	1247898
Order No.:		Client Sample Ref.:			D	U	D	D	D	D	D	D	D
		Client Sample ID.:			S1	S1	S2	S4	S2	S3	S5	S2	S3
		Sample Location:			RC01	RC01	RC01	RC01	RC02	RC02	RC02	RC03	RC03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.20	1.00	1.40	2.00	0.45	1.45	2.00	0.45	1.00
		Date Sampled:			05-Jul-2021	05-Jul-2021	05-Jul-2021	05-Jul-2021	06-Jul-2021	06-Jul-2021	06-Jul-2021	07-Jul-2021	07-Jul-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Moisture	N	2030	%	0.020	14	13	11	14	9.8	16	13	9.5	12
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Clay	Clay	Clay	Sand	Sand	Sand	Sand	Sand
pH	M	2010		4.0	8.1	8.3	8.4	8.4	8.6	8.2	8.5	8.5	8.6
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.039	0.040	< 0.010	0.044	< 0.010	0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited			**Chemtest Job No.:**		21-25656	21-25656
Quotation No.:			**Chemtest Sample ID.:**		1247899	1247900
Order No.:			Client Sample Ref.:		U	D
			Client Sample ID.:		S1	S5
			Sample Location:		RC03	RC030
			Sample Type:		SOIL	SOIL
			Top Depth (m):		2.00	2.45
			Date Sampled:		07-Jul-2021	07-Jul-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Moisture	N	2030	%	0.020	10	8.8
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand
pH	M	2010		4.0	8.8	8.5
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	0.043

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES

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I/S	Insufficient Sample
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<	"less than"
>	"greater than"
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Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 6

ENVIRONMENTAL LABORATORY TEST RESULTS

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-06868-1
Initial Date of Issue:	10-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Robert Barry Erin Barry Grant McCullough
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	04-Mar-2021
Order No.:		**Date Instructed:**	04-Mar-2021
No. of Samples:	13		
Turnaround (Wkdays):	5	**Results Due:**	10-Mar-2021
Date Approved:	10-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:		Client Sample Ref.:			ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
		Client Sample ID.:			BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:							COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A					-		-	
Asbestos Identification	U	2192		N/A					No Asbestos Detected		No Asbestos Detected	
ACM Detection Stage	U	2192		N/A					-		-	
Moisture	N	2030	%	0.020	11	21	19	11	11	19	16	12
pH	M	2010		4.0	8.7	8.2	9.8		9.0		8.4	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	0.033	0.18		0.16		< 0.010	
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50		< 0.50		< 0.50	
Arsenic	M	2450	mg/kg	1.0	15	16	15		19		13	
Cadmium	M	2450	mg/kg	0.10	1.1	2.3	1.8		1.8		1.8	
Chromium	M	2450	mg/kg	1.0	11	21	19		11		17	
Copper	M	2450	mg/kg	0.50	61	57	59		54		85	
Mercury	M	2450	mg/kg	0.10	< 0.10	0.18	0.12		< 0.10		< 0.10	
Nickel	M	2450	mg/kg	0.50	28	46	44		42		44	
Lead	M	2450	mg/kg	0.50	20	100	36		15		26	
Selenium	M	2450	mg/kg	0.20	0.23	0.85	0.88		2.7		0.84	
Zinc	M	2450	mg/kg	0.50	41	110	83		65		91	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	41	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	28	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	17	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	19	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	1.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	42	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	44	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	150	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited					Chemtest Job No.:	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:					Chemtest Sample ID.:	1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:					Client Sample Ref.:	ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
					Client Sample ID.:	BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
					Date Sampled:	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
					Asbestos Lab:					COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Acenaphthylene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	0.61	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	1.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	1.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	0.75	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10		< 0.10	< 0.10	0.73	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2700	mg/kg	0.10		< 0.10				< 0.10		< 0.10	
Total Of 16 PAH's	M	2700	mg/kg	2.0			< 2.0	5.0	< 2.0		< 2.0		< 2.0
Total Of 17 PAH's	N	2700	mg/kg	2.0		< 2.0				< 2.0		< 2.0	
Dichlorodifluoromethane	U	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Chloromethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Vinyl Chloride	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Bromomethane	M	2760	µg/kg	20		< 20	< 20			< 20		< 20	
Chloroethane	U	2760	µg/kg	2.0		< 2.0	< 2.0			< 2.0		< 2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloroethene	M	2760	mg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Trans 1,2-Dichloroethene	M	2760	mg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0		< 5.0	< 5.0			< 5.0		< 5.0	
Trichloromethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Tetrachloromethane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
Benzene	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dichloroethane	M	2760	µg/kg	2.0		< 2.0	< 2.0			< 2.0		< 2.0	
Trichloroethene	N	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0		< 1.0	< 1.0			< 1.0		< 1.0	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:		Client Sample Ref.:			ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
		Client Sample ID.:			BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:							COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0			< 5.0		< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10			< 10		< 10	
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10			< 10		< 10	
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10			< 10		< 10	
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0		< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10			< 10		< 10	
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0			< 5.0		< 5.0	
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0		< 2.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50			< 50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50			< 50		< 50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0		< 2.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0		< 1.0	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited			**Chemtest Job No.:**		21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:			**Chemtest Sample ID.:**		1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:			Client Sample Ref.:		ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
			Client Sample ID.:		BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
			Date Sampled:		23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
			Asbestos Lab:						COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154071	1154072	1154073	1154074	1154075	1154076	1154077	1154078
Order No.:		Client Sample Ref.:			ES2	ES2	ES1	ES2	ES1	ES2	ES1	ES2
		Client Sample ID.:			BH01	BH02	BH03	BH03	BH04	BH04	BH05	BH05
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			1.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:							COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50		< 0.50	
PCB 28	U	2815	mg/kg	0.010					< 0.010			
PCB 52	U	2815	mg/kg	0.010					< 0.010			
PCB 90+101	U	2815	mg/kg	0.010					< 0.010			
PCB 118	U	2815	mg/kg	0.010					< 0.010			
PCB 153	U	2815	mg/kg	0.010					< 0.010			
PCB 138	U	2815	mg/kg	0.010					< 0.010			
PCB 180	U	2815	mg/kg	0.010					< 0.010			
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10					< 0.10			

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-	-	-	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	
ACM Detection Stage	U	2192		N/A	-	-	-	-	
Moisture	N	2030	%	0.020	5.6	19	18	19	18
pH	M	2010		4.0	9.0	8.7	8.7	11.3	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.065	0.011	< 0.010	0.77	
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Arsenic	M	2450	mg/kg	1.0	20	14	18	27	
Cadmium	M	2450	mg/kg	0.10	0.63	1.7	4.5	0.51	
Chromium	M	2450	mg/kg	1.0	8.9	18	24	17	
Copper	M	2450	mg/kg	0.50	72	230	250	110	
Mercury	M	2450	mg/kg	0.10	< 0.10	0.11	0.11	< 0.10	
Nickel	M	2450	mg/kg	0.50	20	49	93	25	
Lead	M	2450	mg/kg	0.50	14	44	35	19	
Selenium	M	2450	mg/kg	0.20	0.63	0.78	0.99	< 0.20	
Zinc	M	2450	mg/kg	0.50	42	84	120	50	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	48	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	34	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	31	8.2	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	8.8	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	48	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	110	65	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	2.9	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	20	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	190	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	210	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	120	270	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Coronene	N	2700	mg/kg	0.10					
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Total Of 17 PAH's	N	2700	mg/kg	2.0					
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bromomethane	M	2760	µg/kg	20	< 20	< 20	< 20	< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloroethene	M	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Trans 1,2-Dichloroethene	M	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		Chemtest Sample ID.:			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10	< 10	< 10	
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		Chemtest Sample ID.:			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06868	21-06868	21-06868	21-06868	21-06868
Quotation No.:		**Chemtest Sample ID.:**			1154079	1154080	1154081	1154082	1154083
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES2
		Client Sample ID.:			BH08	WS01	WS02	WS04	WS04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	0.50	0.50	0.50	1.00
		Date Sampled:			24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021	24-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	
PCB 28	U	2815	mg/kg	0.010		< 0.010			
PCB 52	U	2815	mg/kg	0.010		< 0.010			
PCB 90+101	U	2815	mg/kg	0.010		< 0.010			
PCB 118	U	2815	mg/kg	0.010		< 0.010			
PCB 153	U	2815	mg/kg	0.010		< 0.010			
PCB 138	U	2815	mg/kg	0.010		< 0.010			
PCB 180	U	2815	mg/kg	0.010		< 0.010			
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10		< 0.10			

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-06872-1
Initial Date of Issue:	13-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	04-Mar-2021
Order No.:		**Date Instructed:**	04-Mar-2021
No. of Samples:	8		
Turnaround (Wkdays):	7	**Results Due:**	12-Mar-2021
Date Approved:	13-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154089								
Sample Ref:	ES2						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH01								
Top Depth(m):	1.00								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.5	3	5	6
Loss On Ignition	2610	M	%			5.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.033	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0004	0.0010	0.0043	0.5	2	25
Barium	1455	U	0.022	0.011	0.043	0.12	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	0.0007	< 0.0005	0.0059	0.5	10	70
Copper	1455	U	0.0063	0.0041	0.012	0.0066	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0027	0.0041	0.0052	0.040	0.5	10	30
Nickel	1455	U	0.0053	0.0033	0.010	0.035	0.4	10	40
Lead	1455	U	0.0008	0.0006	0.0015	0.0063	0.5	10	50
Antimony	1455	U	0.0006	< 0.0005	0.0013	0.0007	0.06	0.7	5
Selenium	1455	U	0.0010	< 0.0005	0.0020	0.0010	0.1	0.5	7
Zinc	1455	U	0.004	< 0.003	0.008	0.004	4	50	200
Chloride	1220	U	1.6	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.65	0.73	1.3	7.2	10	150	500
Sulphate	1220	U	8.9	< 1.0	17	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	230	130	460	1400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	14	4.4	< 50	55	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	18

Leachate Test Information	
Leachant volume 1st extract/l	0.311
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.183

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154090								
Sample Ref:	ES2						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH02								
Top Depth(m):	1.00								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			2.0	3	5	6
Loss On Ignition	2610	M	%			6.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			130	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0080	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0004	0.0004	0.0007	0.0043	0.5	2	25
Barium	1455	U	0.018	< 0.005	0.036	0.014	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0035	0.0026	0.0068	0.0026	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0007	0.0012	0.0013	0.012	0.5	10	30
Nickel	1455	U	0.0014	0.0013	0.0028	0.013	0.4	10	40
Lead	1455	U	< 0.0005	0.0010	< 0.0005	0.0092	0.5	10	50
Antimony	1455	U	0.0006	0.0005	0.0012	0.0054	0.06	0.7	5
Selenium	1455	U	0.0005	< 0.0005	0.0010	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.005	< 0.003	0.010	0.004	4	50	200
Chloride	1220	U	6.5	2.1	13	24	800	15000	25000
Fluoride	1220	U	0.69	0.86	1.3	8.4	10	150	500
Sulphate	1220	U	120	18	240	260	1000	20000	50000
Total Dissolved Solids	1020	N	310	91	590	1100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	11	4.2	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	21

Leachate Test Information	
Leachant volume 1st extract/l	0.303
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.131

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154091								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH03								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.3	3	5	6
Loss On Ignition	2610	M	%			5.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				10.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.023	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.020	0.015	0.039	0.15	0.5	2	25
Barium	1455	U	0.031	0.016	0.061	0.17	20	100	300
Cadmium	1455	U	0.0053	0.0013	0.010	0.014	0.04	1	5
Chromium	1455	U	0.011	0.0044	0.021	0.047	0.5	10	70
Copper	1455	U	0.13	0.060	0.25	0.061	2	50	100
Mercury	1455	U	0.00020	0.00006	0.00038	0.00065	0.01	0.2	2
Molybdenum	1455	U	0.027	0.0068	0.053	0.077	0.5	10	30
Nickel	1455	U	0.049	0.024	0.096	0.25	0.4	10	40
Lead	1455	U	0.016	0.011	0.030	0.11	0.5	10	50
Antimony	1455	U	0.014	0.0082	0.028	0.084	0.06	0.7	5
Selenium	1455	U	0.027	0.014	0.053	0.14	0.1	0.5	7
Zinc	1455	U	0.024	0.016	0.048	0.17	4	50	200
Chloride	1220	U	8.2	5.6	16	57	800	15000	25000
Fluoride	1220	U	0.35	0.26	< 1.0	2.6	10	150	500
Sulphate	1220	U	63	18	120	200	1000	20000	50000
Total Dissolved Solids	1020	N	200	110	390	1100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	38	20	75	210	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	20

Leachate Test Information	
Leachant volume 1st extract/l	0.307
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.081

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154092								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH04								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.83	3	5	6
Loss On Ignition	2610	M	%			3.0	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.095	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	0.0002	< 0.0002	0.0021	0.5	2	25
Barium	1455	U	0.017	0.006	0.035	0.073	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0008	0.0006	0.0016	0.0007	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.093	0.057	0.18	0.60	0.5	10	30
Nickel	1455	U	0.0008	< 0.0005	0.0015	0.0006	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0017	0.0012	0.0034	0.012	0.06	0.7	5
Selenium	1455	U	0.0042	0.0029	0.0083	0.030	0.1	0.5	7
Zinc	1455	U	0.003	< 0.003	0.007	< 0.003	4	50	200
Chloride	1220	U	5.6	1.9	11	22	800	15000	25000
Fluoride	1220	U	0.60	0.39	1.2	4.1	10	150	500
Sulphate	1220	U	130	19	260	280	1000	20000	50000
Total Dissolved Solids	1020	N	290	91	580	1100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	4.1	< 2.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	10

Leachate Test Information	
Leachant volume 1st extract/l	0.330
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.148

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154093								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH05								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	24-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.4	3	5	6
Loss On Ignition	2610	M	%			4.6	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.012	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0009	0.0012	0.0018	0.011	0.5	2	25
Barium	1455	U	< 0.005	< 0.005	< 0.0005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	0.0009	0.0011	0.0017	0.011	0.5	10	70
Copper	1455	U	0.0063	0.0048	0.012	0.0038	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0006	0.0007	0.0011	0.0069	0.5	10	30
Nickel	1455	U	0.0035	0.0032	0.0069	0.032	0.4	10	40
Lead	1455	U	0.0024	0.0031	0.0047	0.030	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.010	0.012	0.020	0.11	4	50	200
Chloride	1220	U	2.8	2.5	< 10	25	800	15000	25000
Fluoride	1220	U	0.35	0.35	< 1.0	3.5	10	150	500
Sulphate	1220	U	4.9	< 1.0	< 10	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	29	120	300	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	11	4.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	18

Leachate Test Information	
Leachant volume 1st extract/l	0.311
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.105

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154094								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	WS01								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	24-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.6	3	5	6
Loss On Ignition	2610	M	%			5.8	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.013	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0035	0.0020	0.0068	0.021	0.5	2	25
Barium	1455	U	0.027	0.012	0.053	0.13	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0074	0.0034	0.015	0.0050	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0039	0.0042	0.0077	0.042	0.5	10	30
Nickel	1455	U	0.0053	0.0029	0.011	0.031	0.4	10	40
Lead	1455	U	0.0015	< 0.0005	0.0029	0.0010	0.5	10	50
Antimony	1455	U	0.0011	< 0.0005	0.0021	0.0007	0.06	0.7	5
Selenium	1455	U	0.0009	< 0.0005	0.0018	0.0006	0.1	0.5	7
Zinc	1455	U	0.006	< 0.003	0.011	0.004	4	50	200
Chloride	1220	U	9.7	1.6	19	21	800	15000	25000
Fluoride	1220	U	0.48	0.48	< 1.0	4.8	10	150	500
Sulphate	1220	U	19	1.8	37	30	1000	20000	50000
Total Dissolved Solids	1020	N	290	160	580	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	20	7.9	< 50	87	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	16

Leachate Test Information	
Leachant volume 1st extract/l	0.316
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.118

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154095								
Sample Ref:	ES1						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	WS02								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	24-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.81	3	5	6
Loss On Ignition	2610	M	%			4.1	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0070	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0009	0.0005	0.0017	0.0048	0.5	2	25
Barium	1455	U	0.014	0.007	0.027	0.070	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0046	0.0025	0.0091	0.0030	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0021	0.0024	0.0042	0.024	0.5	10	30
Nickel	1455	U	0.0041	0.0026	0.0080	0.027	0.4	10	40
Lead	1455	U	0.0006	< 0.0005	0.0011	< 0.0005	0.5	10	50
Antimony	1455	U	0.0008	< 0.0005	0.0015	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0006	< 0.0005	0.0012	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.010	< 0.003	0.020	0.006	4	50	200
Chloride	1220	U	2.1	1.9	< 10	19	800	15000	25000
Fluoride	1220	U	0.25	0.29	< 1.0	2.9	10	150	500
Sulphate	1220	U	20	4.3	39	53	1000	20000	50000
Total Dissolved Solids	1020	N	200	98	380	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	16	5.8	< 50	65	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	19

Leachate Test Information	
Leachant volume 1st extract/l	0.309
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.113

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06872								
Chemtest Sample ID:	1154096								
Sample Ref:	ES1								
Sample ID:									
Sample Location:	WS04								
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	24-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			0.51	3	5	6
Loss On Ignition	2610	M	%			2.3	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			84	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				10.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.048	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.028	0.066	0.055	0.60	0.5	2	25
Barium	1455	U	0.007	< 0.005	0.015	0.012	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.0012	< 0.0012	0.04	1	5
Chromium	1455	U	0.0006	< 0.0005	0.0011	0.0009	0.5	10	70
Copper	1455	U	0.0068	0.0011	0.014	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.023	0.0020	0.046	0.054	0.5	10	30
Nickel	1455	U	0.0075	0.0010	0.015	0.020	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0028	0.0010	0.0055	0.013	0.06	0.7	5
Selenium	1455	U	0.0009	< 0.0005	0.0018	0.0014	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	9.9	1.2	20	26	800	15000	25000
Fluoride	1220	U	0.65	0.21	1.3	2.8	10	150	500
Sulphate	1220	U	64	6.3	130	160	1000	20000	50000
Total Dissolved Solids	1020	N	160	53	310	700	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	4.8	2.8	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	4.9

Leachate Test Information	
Leachant volume 1st extract/l	0.341
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.283

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	21-06432-1
Initial Date of Issue:	09-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	01-Mar-2021
Order No.:		**Date Instructed:**	02-Mar-2021
No. of Samples:	14		
Turnaround (Wkdays):	5	**Results Due:**	08-Mar-2021
Date Approved:	09-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-		-		-		-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	
ACM Detection Stage	U	2192		N/A	-		-		-		-	
Moisture	N	2030	%	0.020	7.0	10	11	11	11	11	4.9	11
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	1.1		0.37		0.068		0.16	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Arsenic	U	2450	mg/kg	1.0	23		16		44		29	
Cadmium	U	2450	mg/kg	0.10	2.5		0.89		0.93		0.70	
Chromium	U	2450	mg/kg	1.0	15		18		22		27	
Copper	U	2450	mg/kg	0.50	26		18		27		35	
Mercury	U	2450	mg/kg	0.10	< 0.10		< 0.10		0.23		< 0.10	
Nickel	U	2450	mg/kg	0.50	43		26		36		38	
Lead	U	2450	mg/kg	0.50	24		15		50		24	
Selenium	U	2450	mg/kg	0.20	1.8		0.25		0.20		< 0.20	
Zinc	U	2450	mg/kg	0.50	63		49		72		71	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.5	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.34	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.5	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.9	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.95	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	10	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Chloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Bromomethane	U	2760	µg/kg	20	< 20		< 20		< 20		< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1-Dichloroethene	U	2760	mg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Trans 1,2-Dichloroethene	U	2760	mg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0		< 5.0	
Trichloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Benzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Dibromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0		< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10		< 10		< 10	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Toluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10		< 10		< 10	
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10		< 10		< 10		< 10	
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10		< 10		< 10		< 10	
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0		< 5.0	
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
o-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Styrene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Bromobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50		< 50		< 50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50		< 50		< 50		< 50	
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0		< 1.0	
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Phenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Isophorone	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Naphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Acenaphthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Fluorene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151954	1151955	1151956	1151957	1151958	1151959	1151960	1151961
Order No.:		Client Sample Ref.:			ES1	ES2	ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH06	BH06	BH07	BH07	BH09	BH09	BH10	BH10
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	1.00	0.50	1.75	0.50	2.00	0.50	1.50
		Date Sampled:			23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	23-Feb-2021	22-Feb-2021	22-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Azobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Phenanthrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		1.6		< 0.50	
Anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Carbazole	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		2.4		< 0.50	
Pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		2.1		< 0.50	
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		1.5		< 0.50	
Chrysene	U	2790	mg/kg	0.50	< 0.50		< 0.50		1.5		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		1.3		< 0.50	
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50		< 0.50		0.73		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
ACM Type	U	2192		N/A	-		-		-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	
ACM Detection Stage	U	2192		N/A	-		-		-	
Moisture	N	2030	%	0.020	12	13	13	12	18	13
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.29		< 0.010		< 0.010	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Arsenic	U	2450	mg/kg	1.0	21		30		17	
Cadmium	U	2450	mg/kg	0.10	1.4		1.9		1.6	
Chromium	U	2450	mg/kg	1.0	15		24		18	
Copper	U	2450	mg/kg	0.50	24		30		26	
Mercury	U	2450	mg/kg	0.10	< 0.10		< 0.10		0.10	
Nickel	U	2450	mg/kg	0.50	38		48		37	
Lead	U	2450	mg/kg	0.50	24		32		30	
Selenium	U	2450	mg/kg	0.20	0.68		0.86		0.66	
Zinc	U	2450	mg/kg	0.50	65		96		78	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Chloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Bromomethane	U	2760	µg/kg	20	< 20		< 20		< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1-Dichloroethene	U	2760	mg/kg	1.0	< 1.0		< 1.0		< 1.0	
Trans 1,2-Dichloroethene	U	2760	mg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0	
Trichloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Benzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Dibromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10		< 10	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Toluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10		< 10	
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10		< 10		< 10	
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10		< 10		< 10	
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0		< 5.0		< 5.0	
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
o-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Styrene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Bromobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50		< 50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50		< 50		< 50	
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0		< 2.0		< 2.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0		< 1.0		< 1.0	
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Phenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		Chemtest Sample ID.:			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Isophorone	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Naphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Acenaphthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Fluorene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	

Results - Soil

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-06432	21-06432	21-06432	21-06432	21-06432	21-06432
Quotation No.:		**Chemtest Sample ID.:**			1151962	1151963	1151964	1151965	1151966	1151967
Order No.:		Client Sample Ref.:			ES1	ES3	ES1	ES3	ES1	ES3
		Client Sample ID.:			BH11	BH11	BH12	BH12	WS03	WS03
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.50	2.00	0.25	1.50	0.20	1.50
		Date Sampled:			22-Feb-2021	22-Feb-2021	22-Feb-2021	22-Feb-2021	23-Feb-2021	23-Feb-2021
		Asbestos Lab:			COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Azobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Phenanthrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Carbazole	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Chrysene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50		< 0.50		< 0.50	

Test Methods

SOP	Title	Parameters included	Method summary
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-06438-1
Initial Date of Issue:	10-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	01-Mar-2021
Order No.:		**Date Instructed:**	02-Mar-2021
No. of Samples:	3		
Turnaround (Wkdays):	7	**Results Due:**	10-Mar-2021
Date Approved:	10-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06438								
Chemtest Sample ID:	1151974								
Sample Ref:	ES1								
Sample ID:	BH06								
Sample Location:									
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			2.2	3	5	6
Loss On Ignition	2610	M	%			3.5	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			14	100	--	--
pH	2010	M				9.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.026	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0019	0.0008	0.0039	0.0091	0.5	2	25
Barium	1455	U	0.053	0.011	0.11	0.16	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0010	0.0007	0.0020	0.0012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.14	0.025	0.27	0.38	0.5	10	30
Nickel	1455	U	0.0019	0.0005	0.0039	0.0071	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0009	0.0008	0.0017	0.0077	0.06	0.7	5
Selenium	1455	U	0.0084	0.0019	0.017	0.027	0.1	0.5	7
Zinc	1455	U	0.005	< 0.003	0.010	0.006	4	50	200
Chloride	1220	U	12	< 1.0	24	14	800	15000	25000
Fluoride	1220	U	0.23	0.26	< 1.0	2.6	10	150	500
Sulphate	1220	U	1300	140	2500	2700	1000	20000	50000
Total Dissolved Solids	1020	N	1400	280	2800	4200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	4.3	2.7	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	8.8

Leachate Test Information	
Leachant volume 1st extract/l	0.333
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.208

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06438								
Chemtest Sample ID:	1151975								
Sample Ref:	ES1								
Sample ID:	BH09								
Sample Location:									
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	23-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.6	3	5	6
Loss On Ignition	2610	M	%			3.7	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			270	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			88	100	--	--
pH	2010	M				9.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.036	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0029	0.0031	0.0058	0.031	0.5	2	25
Barium	1455	U	0.052	0.061	0.10	0.60	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0088	0.0019	0.018	0.027	0.5	10	70
Copper	1455	U	0.012	0.0028	0.023	0.014	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.035	0.0040	0.070	0.077	0.5	10	30
Nickel	1455	U	0.018	0.0036	0.036	0.053	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0030	0.0015	0.0059	0.017	0.06	0.7	5
Selenium	1455	U	0.0043	0.0019	0.0085	0.022	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	23	3.7	46	60	800	15000	25000
Fluoride	1220	U	0.33	0.20	< 1.0	2.1	10	150	500
Sulphate	1220	U	140	28	270	410	1000	20000	50000
Total Dissolved Solids	1020	N	310	120	610	1400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	7.5	4.4	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	11

Leachate Test Information	
Leachant volume 1st extract/l	0.328
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.205

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Grange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-06438								
Chemtest Sample ID:	1151976								
Sample Ref:	ES1								
Sample ID:	BH10								
Sample Location:									
Top Depth(m):	0.50								
Bottom Depth(m):									
Sampling Date:	22-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.2	3	5	6
Loss On Ignition	2610	M	%			3.5	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			44	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			46	100	--	--
pH	2010	M				9.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.036	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0035	0.0046	0.0070	0.044	0.5	2	25
Barium	1455	U	0.019	0.006	0.038	0.077	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0017	0.0007	0.0034	0.0020	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.037	0.0053	0.073	0.089	0.5	10	30
Nickel	1455	U	0.0012	< 0.0005	0.0023	0.0014	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0023	0.0013	0.0046	0.014	0.06	0.7	5
Selenium	1455	U	0.0009	< 0.0005	0.0018	0.0010	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	23	1.9	46	44	800	15000	25000
Fluoride	1220	U	0.66	0.44	1.3	4.7	10	150	500
Sulphate	1220	U	220	28	440	500	1000	20000	50000
Total Dissolved Solids	1020	N	360	98	730	1300	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	5.0	< 2.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	7.6

Leachate Test Information	
Leachant volume 1st extract/l	0.336
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.204

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
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E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

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All water samples will be retained for 14 days from the date of receipt
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customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	21-05529-1
Initial Date of Issue:	01-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Robert Barry Erin Barry Grant McCullough
Project	20146NI Grange Castle, Dublin
Quotation No.:	Q20-22214
Date Received:	23-Feb-2021
Order No.:	
Date Instructed:	23-Feb-2021
No. of Samples:	16
Turnaround (Wkdays):	5
Results Due:	01-Mar-2021
Date Approved:	01-Mar-2021
Approved By:	
Details:	Glynn Harvey, Technical Manager

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	17	17	16	8.0	19	17	11	7.0
pH	U	2010		4.0	8.3	8.3	8.7	11.7	9.3	8.3	8.8	8.7
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.11	< 0.010	< 0.010	0.63	< 0.010	0.080	0.012	0.50
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	U	2450	mg/kg	1.0	19	18	16	12	11	13	18	24
Cadmium	U	2450	mg/kg	0.10	3.0	2.5	0.62	0.58	1.3	2.1	2.5	0.63
Chromium	U	2450	mg/kg	1.0	22	22	14	18	20	19	13	14
Copper	U	2450	mg/kg	0.50	32	35	13	15	23	28	28	14
Mercury	U	2450	mg/kg	0.10	0.18	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	49	54	31	21	29	39	46	25
Lead	U	2450	mg/kg	0.50	51	36	10	22	17	24	19	19
Selenium	U	2450	mg/kg	0.20	0.77	1.0	< 0.20	< 0.20	0.61	0.85	< 0.20	0.41
Zinc	U	2450	mg/kg	0.50	86	100	24	36	86	86	67	43
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	13	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	23	< 1.0	< 1.0	< 1.0	19
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	29	< 1.0	< 1.0	< 1.0	32
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	78	< 1.0	< 1.0	< 1.0	110
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	23
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	140	< 5.0	< 5.0	< 5.0	180
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	55	< 1.0	< 1.0	< 1.0	57
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	190	< 1.0	< 1.0	< 1.0	420
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	110
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	240	< 5.0	< 5.0	< 5.0	580
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	390	< 10	< 10	< 10	760
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.25	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.23	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.33	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.84	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2700	mg/kg	0.10								
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	4.8	< 2.0	< 2.0	< 2.0	< 2.0
Total Of 17 PAH's	N	2700	mg/kg	2.0								
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20				< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1-Dichloroethene	U	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Trans 1,2-Dichloroethene	U	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0				< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0				< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10				< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10				< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10				< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10				< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0				< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50				< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50				< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0				< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0				< 1.0

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Phenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Isophorone	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Naphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Acenaphthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147162	1147163	1147164	1147165	1147166	1147167	1147168	1147169
Order No.:		Client Sample Ref.:			ES2	ES1	ES3	ES1	ES1	ES1	ES1	ES1
		Client Sample ID.:			TP01	TP02	TP02	TP03	TP04	TP05	TP06	TP07
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	0.5	2	0.25	0.5	0.25	0.5	0.5
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Fluorene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Azobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Phenanthrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Carbazole	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Chrysene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50				< 0.50

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	7.3	11	21	7.4	11	8.6	12	5.2
pH	U	2010		4.0	11.2	9.8	9.2	8.7	8.4	8.3	8.1	8.8
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.73	0.050	< 0.010	0.72	1.5	1.6	1.2	0.19
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	U	2450	mg/kg	1.0	19	28	18	15	18	19	22	15
Cadmium	U	2450	mg/kg	0.10	2.7	1.2	2.5	1.5	2.1	2.3	2.7	0.35
Chromium	U	2450	mg/kg	1.0	19	20	19	9.8	11	12	13	6.4
Copper	U	2450	mg/kg	0.50	16	31	31	16	19	19	23	4.9
Mercury	U	2450	mg/kg	0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	29	33	51	26	42	43	47	12
Lead	U	2450	mg/kg	0.50	14	83	26	11	17	15	19	8.7
Selenium	U	2450	mg/kg	0.20	0.74	0.28	0.77	1.5	3.0	2.7	3.4	< 0.20
Zinc	U	2450	mg/kg	0.50	77	92	85	52	72	51	73	34
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	40
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	33	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	680
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	180
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	33	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	900
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	47	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	130
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	200	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2900
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1100
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	250	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	4100
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	280	< 10	< 10	< 10	< 10	< 10	4900
Naphthalene	U	2700	mg/kg	0.10	< 0.10	0.71	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	0.26	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	0.86	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	4.8	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	1.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	6.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	6.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	2.9	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	2.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	3.5	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	1.6	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	2.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	2.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	0.87	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	2.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2700	mg/kg	0.10								< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	41	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Total Of 17 PAH's	N	2700	mg/kg	2.0								< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Soil

Project: 20146NI Grange Castle, Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529	21-05529
Quotation No.: Q20-22214		**Chemtest Sample ID.:**			1147170	1147171	1147172	1147173	1147174	1147175	1147176	1147177
Order No.:		Client Sample Ref.:			ES1	ES1	ES1	ES1	ES1	ES1	ES2	ES1
		Client Sample ID.:			TP08	TP09	TP10	TP11	SP01	SP02	SP03	SP04
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.25	0.25	0.5	0.25	0	0	0	0
		Date Sampled:			17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021	17-Feb-2021
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chrysene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-05530-1
Initial Date of Issue:	04-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Robert Barry Grant McCullough
Project	20146NI Fgrange Castle Dublin
Quotation No.:	Q20-22214
Date Received:	23-Feb-2021
Order No.:	
Date Instructed:	23-Feb-2021
No. of Samples:	7
Turnaround (Wkdays):	7
Results Due:	03-Mar-2021
Date Approved:	04-Mar-2021
Approved By:	
Details:	Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147178								
Sample Ref:	ES2								
Sample ID:	TP01								
Sample Location:									
Top Depth(m):	0.5								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.2	3	5	6
Loss On Ignition	2610	M	%			5.3	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				6.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.031	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0005	0.0011	0.0052	0.5	2	25
Barium	1455	U	0.013	0.006	0.026	0.065	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0007	0.0010	0.0014	0.0098	0.5	10	70
Copper	1455	U	0.0040	0.0027	0.0076	0.0035	2	50	100
Mercury	1455	U	0.00006	< 0.00005	0.00012	0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0030	0.0057	0.0059	0.054	0.5	10	30
Nickel	1455	U	0.0029	0.0022	0.0055	0.022	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0006	0.0005	0.0012	0.0054	0.06	0.7	5
Selenium	1455	U	0.0014	< 0.0005	0.0027	0.0012	0.1	0.5	7
Zinc	1455	U	0.003	< 0.003	0.006	< 0.003	4	50	200
Chloride	1220	U	1.5	4.2	< 10	39	800	15000	25000
Fluoride	1220	U	0.22	0.57	< 1.0	5.3	10	150	500
Sulphate	1220	U	21	110	40	970	1000	20000	50000
Total Dissolved Solids	1020	N	310	140	600	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	13	6.8	< 50	73	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	24

Leachate Test Information	
Leachant volume 1st extract/l	0.294
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.155

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147179								
Sample Ref:	ES1								
Sample ID:	TP02								
Sample Location:									
Top Depth(m):	0.5								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			2.1	3	5	6
Loss On Ignition	2610	M	%			8.0	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				6.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.022	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0030	0.0015	0.0058	0.016	0.5	2	25
Barium	1455	U	0.058	0.017	0.11	0.19	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0006	0.0006	0.0012	0.0060	0.5	10	70
Copper	1455	U	0.0053	0.0029	0.011	0.0024	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0042	0.0049	0.0082	0.049	0.5	10	30
Nickel	1455	U	0.0052	0.0030	0.010	0.031	0.4	10	40
Lead	1455	U	0.0009	< 0.0005	0.0018	< 0.0005	0.5	10	50
Antimony	1455	U	0.0016	0.0009	0.0031	0.0089	0.06	0.7	5
Selenium	1455	U	0.0015	0.0007	0.0029	0.0074	0.1	0.5	7
Zinc	1455	U	0.004	< 0.003	0.008	< 0.003	4	50	200
Chloride	1220	U	2.7	10	< 10	96	800	15000	25000
Fluoride	1220	U	0.72	0.36	1.4	3.8	10	150	500
Sulphate	1220	U	22	34	43	330	1000	20000	50000
Total Dissolved Solids	1020	N	420	180	820	1900	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	24	9.7	< 50	100	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	17

Leachate Test Information	
Leachant volume 1st extract/l	0.314
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.080

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147180								
Sample Ref:	ES1								
Sample ID:	TP03						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample Location:									
Top Depth(m):	0.25								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.38	3	5	6
Loss On Ignition	2610	M	%			3.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				6.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.076	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	< 0.0002	0.0005	0.0003	0.5	2	25
Barium	1455	U	0.16	0.075	0.33	0.83	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.068	0.055	0.14	0.57	0.5	10	70
Copper	1455	U	0.0086	0.0032	0.017	0.0084	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.024	0.011	0.048	0.12	0.5	10	30
Nickel	1455	U	0.0022	0.0012	0.0044	0.013	0.4	10	40
Lead	1455	U	0.0006	< 0.0005	0.0012	0.0006	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0014	0.0010	0.0028	0.010	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.7	12	< 10	110	800	15000	25000
Fluoride	1220	U	0.42	0.19	< 1.0	2.1	10	150	500
Sulphate	1220	U	5.6	4.4	11	45	1000	20000	50000
Total Dissolved Solids	1020	N	180	980	350	9000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	6.9	4.4	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	9.1

Leachate Test Information	
Leachant volume 1st extract/l	0.332
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.169

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147181								
Sample Ref:	ES1								
Sample ID:	TP07								
Sample Location:									
Top Depth(m):	0.5								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.1	3	5	6
Loss On Ignition	2610	M	%			3.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			710	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.074	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0044	0.0065	0.0087	0.062	0.5	2	25
Barium	1455	U	0.031	0.013	0.061	0.16	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0010	0.0007	0.0021	0.0073	0.5	10	70
Copper	1455	U	0.0013	0.0006	0.0026	0.0020	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.024	0.0024	0.047	0.057	0.5	10	30
Nickel	1455	U	0.0013	0.0005	0.0026	0.0063	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0018	0.0007	0.0037	0.0091	0.06	0.7	5
Selenium	1455	U	0.0008	< 0.0005	0.0016	0.0012	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	11	3.7	22	48	800	15000	25000
Fluoride	1220	U	0.48	0.37	< 1.0	3.9	10	150	500
Sulphate	1220	U	250	83	500	1100	1000	20000	50000
Total Dissolved Solids	1020	N	420	98	830	1500	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	5.9	3.9	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	7.8

Leachate Test Information	
Leachant volume 1st extract/l	0.335
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.275

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147182								
Sample Ref:	ES1								
Sample ID:	TP08								
Sample Location:									
Top Depth(m):	0.25								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			< 0.20	3	5	6
Loss On Ignition	2610	M	%			3.8	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			12	100	--	--
pH	2010	M				10.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.038	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0006	0.0011	0.0063	0.5	2	25
Barium	1455	U	0.017	0.006	0.034	0.068	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0026	0.0010	0.0052	0.011	0.5	10	70
Copper	1455	U	0.0011	0.0009	0.0022	0.0008	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.016	0.018	0.031	0.18	0.5	10	30
Nickel	1455	U	0.0006	0.0006	0.0012	0.0057	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0005	0.0005	0.0011	0.0053	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	4.6	< 10	43	800	15000	25000
Fluoride	1220	U	0.31	0.34	< 1.0	3.4	10	150	500
Sulphate	1220	U	26	74	52	700	1000	20000	50000
Total Dissolved Solids	1020	N	210	91	430	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	7.0	3.0	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	11

Leachate Test Information	
Leachant volume 1st extract/l	0.328
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.130

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530								
Chemtest Sample ID:	1147183								
Sample Ref:	ES1								
Sample ID:	TP10								
Sample Location:									
Top Depth(m):	0.5								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.0	3	5	6
Loss On Ignition	2610	M	%			5.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.043	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0005	0.0010	0.0051	0.5	2	25
Barium	1455	U	0.012	< 0.005	0.023	0.0068	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0018	0.0013	0.0035	0.014	0.5	10	70
Copper	1455	U	0.0022	0.0018	0.0043	0.0013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0050	0.0088	0.0097	0.086	0.5	10	30
Nickel	1455	U	0.0016	0.0013	0.0031	0.013	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0007	< 0.0005	0.0014	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.003	< 0.003	0.006	< 0.003	4	50	200
Chloride	1220	U	2.7	3.9	< 10	38	800	15000	25000
Fluoride	1220	U	0.30	0.37	< 1.0	3.6	10	150	500
Sulphate	1220	U	12	28	23	270	1000	20000	50000
Total Dissolved Solids	1020	N	260	110	510	1200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	10	4.7	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	21

Leachate Test Information	
Leachant volume 1st extract/l	0.304
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.103

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 20146NI Fgrange Castle Dublin

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-05530						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Chemtest Sample ID:	1147184								
Sample Ref:	ES1								
Sample ID:	GP04								
Sample Location:									
Top Depth(m):	0								
Bottom Depth(m):									
Sampling Date:	17-Feb-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			6.6	3	5	6
Loss On Ignition	2610	M	%			6.5	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			2100	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				9.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.010	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0008	0.0007	0.0016	0.0073	0.5	2	25
Barium	1455	U	0.039	0.037	0.078	0.37	20	100	300
Cadmium	1455	U	< 0.00012	< 0.00012	< 0.00012	< 0.00012	0.04	1	5
Chromium	1455	U	0.0010	0.0006	0.0021	0.0068	0.5	10	70
Copper	1455	U	0.0005	< 0.0005	0.0011	0.0009	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.012	0.0014	0.024	0.032	0.5	10	30
Nickel	1455	U	0.0005	< 0.0005	0.0011	0.0009	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0010	< 0.0005	0.0019	0.0016	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	18	5.7	36	78	800	15000	25000
Fluoride	1220	U	0.75	0.44	1.5	4.9	10	150	500
Sulphate	1220	U	82	28	160	370	1000	20000	50000
Total Dissolved Solids	1020	N	200	57	390	800	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	6.9	3.8	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	5.1

Leachate Test Information	
Leachant volume 1st extract/l	0.341
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.294

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-07410-1
Initial Date of Issue:	15-Mar-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	09-Mar-2021
Order No.:		**Date Instructed:**	09-Mar-2021
No. of Samples:	8		
Turnaround (Wkdays):	5	**Results Due:**	15-Mar-2021
Date Approved:	15-Mar-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
pH	U	1010		N/A	7.9	8.8	7.9	7.8	7.8	7.7	10.6	8.3
Sulphate	U	1220	mg/l	1.0	92	52	150	110	220	72	140	130
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (Total)	N	1455	µg/l	0.20	2.0	2.5	0.35	1.0	0.39	0.61	6.3	0.34
Cadmium (Total)	N	1455	µg/l	0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	0.20
Chromium (Total)	N	1455	µg/l	0.50	3.3	7.0	5.2	2.9	< 0.50	0.55	43	5.3
Copper (Total)	N	1455	µg/l	0.50	5.7	5.2	2.9	2.6	1.6	1.6	40	2.7
Mercury (Total)	N	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Total)	N	1455	µg/l	0.50	16	4.5	9.4	8.2	4.6	7.6	5.9	8.8
Lead (Total)	N	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	6.1	0.67	< 0.50	< 0.50
Selenium (Total)	N	1455	µg/l	0.50	2.0	6.1	2.0	12	7.1	3.9	38	3.1
Zinc (Total)	N	1455	µg/l	3.0	< 3.0	< 3.0	< 3.0	4.1	< 3.0	13	< 3.0	3.2
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	23	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	48	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	170	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	120	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	360	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	53	< 0.10	< 0.10	< 0.10	260	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	62	< 0.10	< 0.10	< 0.10	71	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	37	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	45	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	200	< 5.0	< 5.0	< 5.0	330	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	560	< 10	< 10	< 10	330	< 10
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.6	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.8	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.1	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	23	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.2	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410	21-07410
Quotation No.:		**Chemtest Sample ID.:**			1156520	1156521	1156522	1156523	1156524	1156525	1156526	1156527
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.37	1.41	0.98	1.14	1.46	2.47	1.05	1.05
		Date Sampled:			05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021	05-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chrysene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-09988-1
Initial Date of Issue:	06-Apr-2021
Client	Geotechnical Environmental Services Limited
Client Address:	The Old Mill 22A Kilmoyle Road Ballybogey County Antrim BT53 6NR
Contact(s):	Erin Barry Grant McCullough Robert Barry
Project	20146NI Grange Castle Dublin

Quotation No.:		**Date Received:**	26-Mar-2021
Order No.:		**Date Instructed:**	29-Mar-2021
No. of Samples:	8		
Turnaround (Wkdays):	5	**Results Due:**	06-Apr-2021
Date Approved:	06-Apr-2021		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		**Chemtest Job No.:**			21-09988	21-09988	21-09988	21-09988	21-09988	21-09988	21-09988	21-09988
Quotation No.:		**Chemtest Sample ID.:**			1168730	1168731	1168732	1168733	1168734	1168735	1168736	1168737
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.50	1.69	1.13	1.16	1.49	2.51	1.43	1.09
		Date Sampled:			24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
pH	U	1010		N/A	7.6	9.4	7.8	7.4	7.6	7.4	10.7	7.6
Sulphate	U	1220	mg/l	1.0	120	38	55	100	200	53	71	94
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (Total)	N	1455	µg/l	0.20	0.80	3.7	< 0.20	0.46	0.21	< 0.20	10	0.31
Cadmium (Total)	N	1455	µg/l	0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Chromium (Total)	N	1455	µg/l	0.50	< 0.50	7.4	6.6	< 0.50	4.2	< 0.50	25	3.5
Copper (Total)	N	1455	µg/l	0.50	4.2	4.6	1.5	1.2	1.6	1.4	9.4	1.1
Mercury (Total)	N	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Total)	N	1455	µg/l	0.50	8.8	4.5	4.2	8.3	4.8	2.6	2.8	5.8
Lead (Total)	N	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Selenium (Total)	N	1455	µg/l	0.50	1.6	4.5	0.62	1.0	< 0.50	2.3	16	0.99
Zinc (Total)	N	1455	µg/l	3.0	< 3.0	< 3.0	3.5	< 3.0	< 3.0	3.0	< 3.0	< 3.0
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: 20146NI Grange Castle Dublin

Client: Geotechnical Environmental Services Limited		Chemtest Job No.:			21-09988	21-09988	21-09988	21-09988	21-09988	21-09988	21-09988	21-09988
Quotation No.:		Chemtest Sample ID.:			1168730	1168731	1168732	1168733	1168734	1168735	1168736	1168737
Order No.:		Client Sample Ref.:			S1	S1	S1	S1	S1	S1	S1	S1
		Client Sample ID.:			BH01	BH03	BH05	BH11	BH12	WS01	WS02	WS03
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Top Depth (m):			2.50	1.69	1.13	1.16	1.49	2.51	1.43	1.09
		Date Sampled:			24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021	24-Mar-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

GEOTECHNICAL
ENVIRONMENTAL SERVICES
LIMITED

APPENDIX 7

GAS MONITORING DATA

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin	
Date: 05/03/21	
Weather: Overcast, Dry	**Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH01	0	0.0	0.5	1.3	3.0	0.0	9.4	11.6	
	15	0.0	0.0	1.5	3.0	0.0	13.5	0.0	
	30	0.0	0.0	1.5	3.0	0.0	13.5	0.0	
	60	0.0	0.0	1.5	3.0	0.0	13.5	0.0	
	90	0.0	0.0	1.5	5.0	0.0	13.5	0.0	
	120	0.0	0.0	1.5	5.0	0.0	13.4	0.0	
	180	0.0	0.0	1.5	4.0	0.0	13.4	0.0	
	Time at start of monitoring: 10:00								
	aP at start of monitoring: 1022mb								
	aP at end of monitoring: 1022mb								
	Groundwater Depth: 2.37m								
	Groundwater Sample Depth: 2.37m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH03	0	0.0	0.7	0.2	8.0	2.0	17.1	15.9	
	15	0.0	0.0	0.0	7.0	0.0	14.8	0.0	
	30	0.0	0.0	0.0	1.0	1.0	13.9	0.0	
	60	0.0	0.0	0.0	2.0	1.0	14.0	0.0	
	90	0.0	0.0	0.0	2.0	1.0	14.0	0.0	
	120	0.0	0.0	0.0	3.0	1.0	14.1	0.0	
	180	0.0	0.0	0.0	3.0	1.0	14.0	0.0	
	Time at start of monitoring: 10:15								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.41m								
	Groundwater Sample Depth: 1.41m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH05	0	0.0	0.0	0.0	3.0	0.0	21.2	0.0	
	15	0.0	0.0	0.1	3.0	0.0	18.1	0.0	
	30	0.0	0.0	0.1	3.0	0.0	15.4	0.0	
	60	0.0	0.0	0.1	3.0	0.0	10.1	0.0	
	90	0.0	0.0	0.0	3.0	0.0	9.4	0.0	
	120	0.0	0.0	0.0	2.0	0.0	7.6	0.0	
	180	0.0	0.0	0.0	2.0	0.0	5.9	0.0	
	Time at start of monitoring: 10:30								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 0.37m								
	Groundwater Sample Depth: 0.97m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin	
Date: 05/03/21	
Weather: Overcast, Dry	Sampled by: GM (GFM 400 Series Gas Analyser)

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH08	0	0.0	0.0	3.0	8.0	0.0	19.2	0.0	Insufficient water to sample
	15	0.0	0.0	2.8	8.0	0.0	19.1	0.0	
	30	0.0	0.0	2.6	8.0	0.0	19.1	0.0	
	60	0.0	0.0	2.5	7.0	0.0	19.0	0.0	
	90	0.0	0.0	2.5	6.0	0.0	19.0	0.0	
	120	0.0	0.0	2.3	6.0	0.0	18.9	0.0	
	180	0.0	0.0	2.3	6.0	0.0	19.0	0.0	
	Time at start of monitoring: 10:45								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.96m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH10	0	0.0	0.0	2.8	5.0	2.0	19.3	0.0	
	15	0.0	0.0	2.8	5.0	2.0	19.3	0.0	
	30	0.0	0.0	2.5	7.0	1.0	20.0	0.0	
	60	0.0	0.0	2.4	5.0	0.0	20.0	0.0	
	90	0.0	0.0	2.3	7.0	1.0	20.2	0.0	
	120	0.0	0.0	2.3	7.0	1.0	20.3	0.0	
	180	0.0	0.0	2.2	7.0	1.0	20.3	0.0	
	Time at start of monitoring: 11:00								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: Dry								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH11	0	0.0	0.0	3.2	10.0	0.0	19.1	0.0	-
	15	0.0	0.0	3.1	10.0	0.0	19.0	0.0	
	30	0.0	0.0	3.1	9.0	0.0	19.0	0.0	
	60	0.0	0.0	3.0	10.0	0.0	18.8	0.0	
	90	0.0	0.0	3.2	9.0	0.0	18.7	0.0	
	120	0.0	0.0	3.3	8.0	0.0	18.5	0.0	
	180	0.0	0.0	3.3	8.0	0.0	18.5	0.0	
	Time at start of monitoring: 11:15								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.14m								
	Groundwater Sample Depth: 1.14m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin	
Date: 05/03/21	
Weather: Overcast, Dry	**Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH12	0	0.0	0.0	3.7	12.0	2.0	18.1	0.0	
	15	0.0	0.0	3.6	11.0	2.0	18.0	0.0	
	30	0.0	0.0	3.6	11.0	2.0	18.1	0.0	
	60	0.0	0.0	3.4	11.0	2.0	18.0	0.0	
	90	0.0	0.0	3.4	10.0	1.0	17.8	0.0	
	120	0.0	0.0	3.3	8.0	2.0	17.8	0.0	
	180	0.0	0.0	3.3	7.0	1.0	17.8	0.0	
	Time at start of monitoring: 11:30								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.46m								
	Groundwater Sample Depth: 1.45m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS01	0	0.0	0.0	0.6	3.0	0.0	21.2	0.0	
	15	0.0	0.0	2.0	3.0	0.0	8.2	0.0	
	30	0.0	0.0	2.0	3.0	0.0	5.5	0.0	
	60	0.0	0.0	2.0	3.0	0.0	6.6	0.0	
	90	0.0	0.0	2.0	3.0	0.0	6.7	0.0	
	120	0.0	0.0	1.9	5.0	0.0	5.4	0.0	
	180	0.0	0.0	1.8	5.0	0.0	5.4	0.0	-
	Time at start of monitoring: 11:45								
	aP at start of monitoring: 1024mb								
	aP at end of monitoring: 1024mb								
	Groundwater Depth: 2.46m								
	Groundwater Sample Depth: 2.46m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS02	0	0.0	0.0	0.0	7.0	3.0	19.4	0.0	
	15	0.0	0.0	0.0	7.0	0.0	20.7	0.0	
	30	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	60	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	90	0.0	0.0	0.0	5.0	0.0	20.5	0.0	
	120	0.0	0.0	0.0	5.0	0.0	20.6	0.0	
	180	0.0	0.0	0.0	5.0	0.0	20.6	0.0	-
	Time at start of monitoring: 12:00								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 1.10m								
	Groundwater Sample Depth: 1.05m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 05/03/21

Weather: Overcast, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS03	0	0.0	0.0	3.6	5.0	0.0	19.8	0.0	
	15	0.0	0.0	3.9	22.0	0.0	16.9	0.0	
	30	0.0	0.0	4.0	31.0	2.0	16.7	0.0	
	60	0.0	0.0	4.0	34.0	2.0	16.5	0.0	
	90	0.0	0.0	3.9	33.0	1.0	16.4	0.0	
	120	0.0	0.0	3.8	32.0	1.0	16.4	0.0	
	180	0.0	0.0	3.8	27.0	0.0	16.2	0.0	
	Time at start of monitoring: 12:15								
	aP at start of monitoring: 1023mb								
	aP at end of monitoring: 1023mb								
	Groundwater Depth: 0.33m								
	Groundwater Sample Depth: 1.05m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin	
Date: 24/03/21	
Weather: Sunny, Dry	**Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH01	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	1.4	0.1	0.0	0.0	15.1	0.0	
	30	0.0	1.5	0.1	0.0	0.0	14.8	0.0	
	60	0.0	1.5	0.1	0.0	0.0	15.7	0.0	
	90	0.0	1.6	0.1	0.0	0.0	15.9	0.0	
	120	0.0	1.6	0.2	0.0	0.0	16.5	0.0	
	180	0.0	1.6	0.2	0.0	0.0	16.3	0.0	
	Time at start of monitoring: 10:00								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 2.5m								
	Groundwater Sample Depth: 2.5m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH03	0	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	15	0.0	0.0	0.0	0.0	0.0	19.9	0.0	
	30	0.0	0.0	0.0	0.0	0.0	19.8	0.0	
	60	0.0	0.0	0.0	0.0	0.0	19.4	0.0	
	90	0.0	0.0	0.0	0.0	0.0	19.4	0.0	
	120	0.0	0.0	0.0	0.0	0.0	19.5	0.0	
	180	0.0	0.0	0.0	0.0	0.0	19.6	0.0	
	Time at start of monitoring: 10:15								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.69m								
	Groundwater Sample Depth: 1.69m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH05	0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	15	-3.3	0.0	0.0	0.0	0.0	20.1	0.0	
	30	-3.7	0.0	0.0	0.0	0.0	19.9	0.0	
	60	-3.4	0.0	0.0	0.0	0.0	19.9	0.0	
	90	-3.3	0.0	0.0	0.0	0.0	19.9	0.0	
	120	-3.6	0.0	0.0	0.0	0.0	19.9	0.0	
	180	-3.5	0.0	0.0	0.0	0.0	19.9	0.0	
	Time at start of monitoring: 10:30								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.13m								
	Groundwater Sample Depth: 1.13m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin	
Date: 24/03/21	
Weather: Sunny, Dry	Sampled by: GM (GFM 400 Series Gas Analyser)

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH08	0	0.0	0.0	0.0	0.0	0.0	20.6	0.0	Insufficient water to sample
	15	0.0	0.0	1.1	0.0	0.0	17.2	0.0	
	30	0.0	0.0	1.5	0.0	0.0	15.9	0.0	
	60	0.0	0.0	1.6	0.0	0.0	15.7	0.0	
	90	0.0	0.0	1.5	0.0	0.0	15.8	0.0	
	120	0.0	0.0	1.6	0.0	0.0	15.7	0.0	
	180	0.0	0.0	1.5	0.0	0.0	15.9	0.0	
	Time at start of monitoring: 10:45								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.97m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH10	0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	15	0.0	0.0	0.9	0.0	0.0	12.7	0.0	
	30	0.0	0.0	0.9	0.0	0.0	11.2	0.0	
	60	0.0	0.0	0.7	0.0	0.0	9.2	0.0	
	90	0.0	0.0	0.4	0.0	0.0	8.5	0.0	
	120	0.0	0.0	0.2	0.0	0.0	8.4	0.0	
	180	0.0	0.0	0.1	0.0	0.0	8.3	0.0	
	Time at start of monitoring: 11:00								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: DRY								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH11	0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	-
	15	0.0	0.0	0.6	0.0	0.0	19.1	0.0	
	30	0.0	0.0	0.6	0.0	0.0	18.9	0.0	
	60	0.0	0.0	0.5	0.0	0.0	19.1	0.0	
	90	0.0	0.0	0.3	0.0	0.0	19.4	0.0	
	120	0.0	0.0	0.2	0.0	0.0	19.7	0.0	
	180	0.0	0.0	0.1	0.0	0.0	19.9	0.0	
	Time at start of monitoring: 11:15								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.18m								
	Groundwater Sample Depth: 1.18m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin	
Date: 24/03/21	
Weather: Sunny, Dry	**Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH12	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	15	-8.7	0.0	0.1	0.0	0.0	19.1	0.0	
	30	-7.0	0.0	0.2	0.0	0.0	18.6	0.0	
	60	-6.7	0.0	0.4	0.0	0.0	17.7	0.0	
	90	-6.1	0.0	0.4	0.0	0.0	17.3	0.0	
	120	-5.4	0.0	0.6	0.0	0.0	16.8	0.0	
	180	-5.3	0.0	0.6	0.0	0.0	16.6	0.0	
	Time at start of monitoring: 11:30								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.49m								
	Groundwater Sample Depth: 1.49m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS01	0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	15	0.0	0.0	0.0	0.0	0.0	19.4	0.0	
	30	0.0	0.0	0.0	0.0	0.0	19.3	0.0	
	60	0.0	0.0	0.0	0.0	0.0	18.8	0.0	
	90	0.0	0.0	0.2	0.0	0.0	18.3	0.0	
	120	0.0	0.0	0.4	0.0	0.0	17.7	0.0	
	180	0.0	0.0	0.5	0.0	0.0	17.2	0.0	-
	Time at start of monitoring: 11:45								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 2.51m								
	Groundwater Sample Depth: 2.51m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS02	0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	15	0.2	0.0	0.0	0.0	0.0	19.9	0.0	
	30	0.4	0.0	0.0	0.0	0.0	19.8	0.0	
	60	0.0	0.0	0.0	0.0	0.0	19.9	0.0	
	90	0.0	0.0	0.0	0.0	0.0	19.9	0.0	
	120	0.0	0.0	0.0	0.0	0.0	19.8	0.0	
	180	0.0	0.0	0.0	0.0	0.0	19.9	0.0	-
	Time at start of monitoring: 12:00								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.43m								
	Groundwater Sample Depth: 1.43m								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 24/03/21

Weather: Sunny, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS03	0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	15	2.7	0.0	3.6	0.0	0.0	17.2	0.0	
	30	2.8	0.0	3.7	0.0	0.0	16.7	0.0	
	60	2.9	0.0	3.4	0.0	0.0	16.9	0.0	
	90	2.9	0.0	2.8	0.0	0.0	17.3	0.0	
	120	3.0	0.0	2.5	0.0	0.0	17.5	0.0	
	180	2.9	0.0	2.4	0.0	0.0	17.6	0.0	
	Time at start of monitoring: 12:15								
	aP at start of monitoring: 1007mb								
	aP at end of monitoring: 1007mb								
	Groundwater Depth: 1.09m								
	Groundwater Sample Depth: 1.09m								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin	
Date: 31/03/21	
Weather: Partly Cloudy, Dry	**Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH01	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.9	0.0	0.0	0.0	16.6	0.0	
	30	0.0	1.0	0.1	0.0	0.0	16.5	0.0	
	60	0.0	1.0	0.1	0.0	0.0	16.4	0.0	
	90	0.0	0.8	0.1	0.0	0.0	16.5	0.0	
	120	0.0	0.8	0.1	0.0	0.0	16.5	0.0	
	180	0.0	0.8	0.1	0.0	0.0	16.5	0.0	
	Time at start of monitoring: 10:30								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 2.55m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH03	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.0	0.0	0.0	0.0	18.2	0.0	
	30	0.0	0.0	0.0	0.0	0.0	18.0	0.0	
	60	0.0	0.0	0.0	0.0	0.0	18.1	0.0	
	90	0.0	0.0	0.0	0.0	0.0	18.3	0.0	
	120	0.0	0.0	0.0	0.0	0.0	18.9	0.0	
	180	0.0	0.0	0.0	0.0	0.0	19.3	0.0	
	Time at start of monitoring: 10:45								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.70m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH05	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	30	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	60	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	90	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	120	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	180	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	Time at start of monitoring: 11.00								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.13m								
	Groundwater Sample Depth: N/A								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin	
Date: 31/03/21	
Weather: Partly Cloudy, Dry	**Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH08	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	Insufficient water to sample
	15	0.0	0.0	1.1	0.0	0.0	19.2	0.0	
	30	0.0	0.0	1.1	0.0	0.0	19.1	0.0	
	60	0.0	0.0	1.2	0.0	0.0	18.8	0.0	
	90	0.0	0.0	1.1	0.0	0.0	19.0	0.0	
	120	0.0	0.0	1.1	0.0	0.0	19.0	0.0	
	180	0.0	0.0	1.1	0.0	0.0	19.1	0.0	
	Time at start of monitoring: 11.15								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.98m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH10	0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	15	0.0	0.0	0.7	0.0	0.0	14.5	0.0	
	30	0.0	0.0	0.7	0.0	0.0	14.3	0.0	
	60	0.0	0.0	0.5	0.0	0.0	14.5	0.0	
	90	0.0	0.0	0.4	0.0	0.0	15.1	0.0	
	120	0.0	0.0	0.2	0.0	0.0	15.5	0.0	
	180	0.0	0.0	0.2	0.0	0.0	15.5	0.0	
	Time at start of monitoring: 11:30								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: DRY								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH11	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	-
	15	0.0	0.0	0.6	0.0	0.0	18.6	0.0	
	30	0.0	0.0	0.7	0.0	0.0	18.2	0.0	
	60	0.0	0.0	0.5	0.0	0.0	18.3	0.0	
	90	0.0	0.0	0.4	0.0	0.0	18.3	0.0	
	120	0.0	0.0	0.2	0.0	0.0	18.6	0.0	
	180	0.0	0.0	0.2	0.0	0.0	18.7	0.0	
	Time at start of monitoring: 12.00								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.18m								
	Groundwater Sample Depth: N/A								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin

Date: 31/03/21

Weather: Partly Cloudy, Dry | **Sampled by: GM (GFM 400 Series Gas Analyser)**

Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
BH12	0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	15	0.0	0.0	0.1	0.0	0.0	19.1	0.0	
	30	0.0	0.0	0.3	0.0	0.0	18.8	0.0	
	60	0.0	0.0	0.4	0.0	0.0	18.5	0.0	
	90	0.0	0.0	0.4	0.0	0.0	18.5	0.0	
	120	0.0	0.0	0.3	0.0	0.0	18.6	0.0	
	180	0.0	0.0	0.3	0.0	0.0	18.7	0.0	
	Time at start of monitoring: 12.15								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.5m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS01	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	-
	15	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	30	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	60	0.0	0.0	0.0	0.0	0.0	20.1	0.0	
	90	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	120	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	180	0.0	0.0	0.0	0.0	0.0	20.5	0.0	
	Time at start of monitoring: 12.30								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 2.5m								
	Groundwater Sample Depth: N/A								

Borehole	Time (s)	Flow	CH_4	CO_2	CO	H2S	O_2	LEL	Notes
WS02	0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	-
	15	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	30	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	60	0.0	0.0	0.0	0.0	0.0	20.0	0.0	
	90	0.0	0.0	0.0	0.0	0.0	20.2	0.0	
	120	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	180	0.0	0.0	0.0	0.0	0.0	20.3	0.0	
	Time at start of monitoring: 12:45								
	aP at start of monitoring: 1006mb								
	aP at end of monitoring: 1006mb								
	Groundwater Depth: 1.42m								
	Groundwater Sample Depth: N/A								

Site: Proposed Development Site, Profile Park, Grange Castle, Dublin									
Date: 31/03/21									
Weather: Partly Cloudy, Dry				**Sampled by: GM (GFM 400 Series Gas Analyser)**					
Note: Flow rate monitoring undertaken for three minutes and subsequently the ground gas concentrations were monitored for three minutes.									
Borehole	**Time (s)**	**Flow**	**CH_4**	**CO_2**	**CO**	**H2S**	**O_2**	**LEL**	**Notes**
WS03	0	0.0	0.0	0.0	0.0	0.0	20.4	0.0	
	15	1.1	0.0	2.6	0.0	0.0	17.4	0.0	
	30	1.3	0.0	2.7	0.0	0.0	16.9	0.0	
	60	1.1	0.0	2.9	0.0	0.0	16.3	0.0	
	90	1.0	0.0	2.8	0.0	0.0	16.4	0.0	
	120	0.7	0.0	2.4	0.0	0.0	16.8	0.0	
	180	0.7	0.0	2.2	0.0	0.0	17.0	0.0	
	Time at start of monitoring: 13.00								
	aP at start of monitoring: 1018mb								
	aP at end of monitoring: 1018mb								
	Groundwater Depth: 1.09m								
	Groundwater Sample Depth: N/A								

Borehole	**Time (s)**	**Flow**	**CH_4**	**CO_2**	**CO**	**H2S**	**O_2**	**LEL**	**Notes**
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

Borehole	**Time (s)**	**Flow**	**CH_4**	**CO_2**	**CO**	**H2S**	**O_2**	**LEL**	**Notes**
	0								
	15								
	30								
	60								
	90								
	120								
	180								
	Time at start of monitoring:								
	aP at start of monitoring:								
	aP at end of monitoring:								
	Groundwater Depth:								
	Groundwater Sample Depth:								

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Appendix C - Grange Castle Geophysical Report_Apex Geophysics Ltd

AGP21018_01

Report on the Geophysical Investigation at Profile Park, Grange Castle Co. Dublin For Pinnacle

22ND March 2021

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PRIVATE AND CONFIDENTIAL

THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOPHYSICS LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.

PROJECT NUMBER	AGP21018		
AUTHOR	**CHECKED**	**REPORT STATUS**	**DATE**
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1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by Pinnacle to carry out a geophysical survey for a new development at Profile Park, Grange Castle, Co. Dublin. The geophysical investigation was requested as part of the ground investigation to provide information on the sub-soil conditions and map the depth to bedrock across the site.

The c. 2.8 ha site is located at the junction of the Nangor Road and Profile Park. A hardcore cover is present across most of the site, with some stockpiles in the eastern part.

The Geological Survey of Ireland soils and bedrock maps indicate till derived from limestone across the site underlain by muddy limestone and shale of the Lucan Formation.

Boreholes cored across the site generally encountered hardcore underlain in places by Made Ground (comprising of predominantly slightly sandy, slightly gravelly silty clay with some brick and plastic) over firm to stiff slightly sandy, slightly gravelly silty clay, over a layer of possible weathered limestone recovered as angular gravel. Refusal on possible bedrock occurred at depths from 2.16 to 4.4 m (average 3.17 m) below ground level (bgl).

The geophysical investigation consisted of reconnaissance EM ground conductivity mapping with follow-up 2D Electrical Resistivity Tomography (ERT) and Seismic Refraction profiling.

The combined geophysical and borehole data have been interpreted as indicating:

- Soils predominantly comprising of slightly sandy, slightly gravelly silty clay across the site.
- The interpreted soil thickness ranges from 1.8 – 5.8 m, with an average thickness of 3.5 m. Seismic velocities indicate that on average the upper 0.6 m of soils will be soft to firm, becoming firm to stiff with depth.
- Two rock types have been interpreted across the site; low resistivity mudstone/shale predominantly underlying the northern half of the site; and higher resistivity dark limestone with thin interbedded shales underlying the southern half of the site.
- The geophysical data indicate two rock layers: an upper layer of highly to moderately weathered rock (on average 0.9 m thick) which should be rippable to marginally rippable; over slightly weathered to fresh rock which will require breaking/blasting. It should be noted that the cut-off velocity for excavatability will be lower if excavating in trenches.

Where bedrock excavation is proposed, a detailed assessment of excavatability should be carried out combining the results of the geophysical survey, any rotary core drilling, strength testing and trial excavation pits using a high-powered excavator such as a CAT 336E or more powerful model. Trial excavations should be attempted down to formation level using a high-powered excavator of similar rating to that to be used during construction. A more detailed discussion of velocity and excavatability is contained in Appendix B.

The findings of the geophysical investigation should be reviewed following any further direct investigation.

2. INTRODUCTION

APEX Geophysics Limited was requested by Pinnacle to carry out a geophysical survey for a new development at Profile Park, Grange Castle, Co. Dublin. The geophysical investigation was requested as part of the ground investigation to provide information on the sub-soil conditions and map the depth to bedrock across the site.

2.1 Survey Objectives

The objectives of the investigation were to:

- Determine variations in soil type and thickness, and
- Determine depth to bedrock.

2.2 Site Background

The site is located at the junction of the Nangor Road and Profile Park, northwest of the Grange Castle Golf Course. The survey area is c. 2.8 ha in extent (Figure 2.1). A hardcore cover is present across most of the site, with some stockpiles in the eastern part. Site topography ranges from 73.7 to 75.5 mOD, increasing to 78 mOD on the stockpiles.



Fig 2.1: Location map (site marked in red).

2.2.1 Soils

The Geological Survey of Ireland (GSI) soils map for the area (GSIa, 2019) indicates that the soils across the site comprise of till derived from limestone (Fig. 2.2).

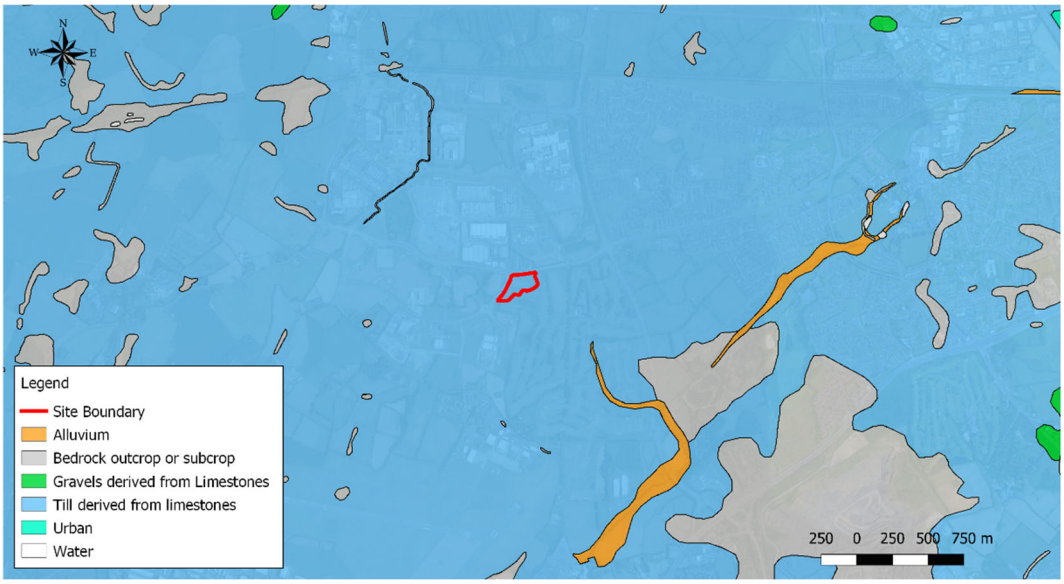

Fig 2.2: The Teagasc soil map (site marked in red).

2.2.2 Geology

The GSI 1:100k Bedrock Geology map (GSI, 2018) indicates that the site is underlain by muddy limestone and shale of the Lucan 'Calp' Formation (Fig. 2.3). The Lucan Formation is classified as a "Locally Important aquifer – bedrock which is moderately productive only in local zones" (GSIc, 2019).



Fig 2.3: The GSI bedrock map (site marked in red).

2.2.3 Groundwater Vulnerability

The groundwater vulnerability at the site (GSIb, 2019) is classified as 'high' (Fig. 2.5).



Fig 2.5: The GSI groundwater vulnerability classification map (site marked in red).

2.2.4 Historical Data

The historical 6 inch sheet for the area (Figure 2.4) does not indicate any outcropping rock in the vicinity of the site.



Fig 2.4: The historical 6inch map (site marked in red, outcrop marked in red).

2.2.5 Direct Investigation

Twelve cable percussive boreholes and four window samples were cored across the site. They generally encountered hardcore underlain in places by Made Ground (comprising of predominantly slightly sandy slightly gravelly silty clay with some brick and plastic) over firm to stiff slightly sandy, slightly gravelly silty clay, over a layer of possible weathered limestone recovered as angular gravel. Refusal on possible bedrock occurred at depths from 2.16 to 4.4 m (average 3.17 m) below ground level (bgl).

2.3 Survey Rationale

The investigation consisted of reconnaissance EM ground conductivity mapping with follow-up 2D Electrical Resistivity Tomography (ERT) and Seismic Refraction profiling:

EM ground conductivity mapping operates on the principle of inducing currents in conductive substrata and measuring the resultant secondary electro-magnetic field. The strength of this secondary EM field is calibrated to give apparent ground conductivity in milliSiemens/metre (mS/m). This technique will provide information on the shallow (0-6m below ground level) variation of the superficial deposits and outline the shallow bedrock.

ERT images the resistivity of the materials in the subsurface along a profile to produce a cross-section showing the variation in resistivity with depth, depending on the length of the profile. Each cross-section is interpreted to determine the material type along the profile at increasing depth, based on the typical resistivities returned for Irish ground materials.

Seismic Refraction profiling measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

As with all geophysical methods the results are based on indirect readings of the subsurface properties. The effectiveness of the proposed approach will be affected by variations in the ground properties. By combining a number of techniques it is possible to provide a higher quality interpretation and reduce any ambiguities which may otherwise exist. Further information on the detailed methodology of each geophysical method employed in this investigation is given in **APPENDIX A: DETAILED METHODOLOGY**.

3. RESULTS

The survey was carried out on the 22nd February 2021 involving the collection of 462 EM readings, 5 ERT profiles and 8 seismic refraction profiles.

The geophysical survey locations are indicated on Drawing AGP21018_01 (Appendix C).

3.1 EM Ground Conductivity Mapping

EM ground conductivity data was recorded in accessible locations across the site. The EM conductivity results (Drawing AGP21018_02, Appendix C) are indicative of the bulk conductivity of the ground materials from 0-6.0m bgl. The recorded conductivity values ranged from 5 to 20 mS/m and have been generally interpreted in conjunction with the ERT and seismic data as follows:

Conductivity (mS/m)	Interpretation
< 10.5	Soils comprising predominantly slightly sandy slightly gravelly silty CLAY
> 10.5	Stockpiles of Made Ground/SILT/CLAY and/or Interference from disturbed ground, fences, surface metals, etc..

3.2 ERT

Five ERT Profiles (R1 to R5) were recorded across the site. The resistivity values have been interpreted in conjunction with the trial pits and boreholes as follows:

Resistivity (Ohm-m)	Interpretation
25-50	Made Ground/SILT/CLAY
50 - 125	Slightly sandy slightly gravelly silty CLAY
125 - 150	Weathered Rock
50 - 300	MUDSTONE/SHALE
300 - 550	Dark LIMESTONE with thin interbedded SHALES

3.3 Seismic Refraction Profiling

Eight seismic refraction spreads (S1-S8) were recorded across the site. The seismic refraction data indicated up to 4 velocity layers which have been interpreted in conjunction with the window samples and boreholes as follows:

Layer	Seismic Velocity (m/s)	Average Seismic Velocity (m/s)	Interpretation	Stiffness/ Rock Quality	Excavatability
1	172-681	400	Soil	Soft-Firm	Diggable
2	452-1280	720	Soil	Firm-Stiff	
3	875-1889	1350	Soil	Stiff	
			Highly-Moderately Weathered Rock	Poor-Fair	Rippable -Marginally Rippable
4	3000-4609	3850	Slightly Weathered – Fresh Rock	Good	Heavy Breaking/ Blasting

It should be noted that the cut-off velocity for excavatability will be lower if excavating in trenches.

3.4 Discussion

The ERT, Seismic Refraction and borehole information have been combined to produce the Interpreted Sections on Drawings AGP21018_R1 to AGP21018_R5 (Appendix C). The combined results have been summarised as follows:

Layer	Seismic Velocity (m/s)	Average Seismic Velocity (m/s)	Resistivity (Ohm-m)	Interpretation	Stiffness/ Rock Quality	Excavatability
1	172-681	400	25-50	Made Ground/SILT/CLAY	Soft-Firm	Diggable
			50-125	Slightly sandy slightly gravelly silty CLAY		
2	452-1280	720	25-50	Made Ground/SILT/CLAY	Firm-Stiff	
			50-125	Slightly sandy slightly gravelly silty CLAY		
3	875-1889	1350	50-125	Slightly sandy slightly gravelly silty CLAY	Stiff	
4			125-150	Highly-Moderately Weathered Rock	Poor-Fair	Rippable - Marginally Ripp.
5	3000-4609	3850	50-200	Slightly Weathered –Fresh MUDSTONE/SHALE	Good	Heavy Breaking /Blasting
			150 - 550	Slightly Weathered –Fresh dark LIMESTONE with thin interbedded SHALES		

3.4.1 Soils

The soils have been interpreted as predominantly slightly sandy, slightly gravelly silty clay across the site with made ground/silt/clay encountered in the stockpiles in the east of the site. The interpreted soil thickness is plotted on Drawing AGP21018_03 and ranges from 1.8 – 5.8 m, with an average thickness of 3.5 m. Seismic velocities indicate that on average the upper 0.6 m of soils will be soft to firm, becoming firm to stiff with depth.

3.4.2 Bedrock

Two rock types have been interpreted across the site; low resistivity mudstone/shale predominantly underlying the northern half of the site; and higher resistivity dark limestone with thin interbedded shales underlying the southern half of the site (see Drawings AGP21018_R1 – R5).

The geophysical data have been interpreted as indicating two rock layers: an upper layer of highly to moderately weathered rock which should be rippable to marginally rippable; over slightly weathered to fresh rock which will require heavy breaking/blasting. The interpreted highly to moderately weathered rock layer thickness is plotted on Drawing AGP21018_04 and ranges from 0.2 – 3.4 m, with an average thickness of 0.9 m. It should be noted that the cut-off velocity for excavatability will be lower if excavating in trenches.

The interpreted top of the highly to moderately weathered rock/base of the soils is contoured on Drawing AGP21018_05 at elevations from 69.5 to 72.8 mOD. The top of the slightly weathered to fresh rock has been interpreted at elevations from 68.2 to 72.3 mOD and is contoured on Drawing AGP21018_06.

All contour maps include a degree of interpolation, and the data points used to construct the map are shown on each of the Drawings AGP21018_03 to AGP21018_06.

4. RECOMMENDATIONS

Where bedrock excavation is proposed, a detailed assessment of excavatability should be carried out combining the results of the geophysical survey, any rotary core drilling, strength testing and trial excavation pits using a high-powered excavator such as a CAT 336E or more powerful model. Trial excavations should be attempted down to formation level using a high-powered excavator of similar rating to that to be used during construction. The bedrock resistivity indicates that a certain mudstone content is likely. If any excavation of bedrock and reuse for filling is proposed then the usual caution regarding possible pyrite content applies. A more detailed discussion of velocity and excavatability is contained in Appendix B.

The findings of the geophysical investigation should be reviewed following any further direct investigation.

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APPENDIX A: DETAILED METHODOLOGY

A combination of geophysical techniques was used to provide a high quality interpretation and reduce any ambiguities, which may otherwise exist.

EM Ground Conductivity Mapping

Principles

This is an electromagnetic technique used to investigate lateral variations in overburden material and to assist with the indication of the depth to bedrock. This method operates on the principle of inducing currents in conductive substrata and measuring the resultant secondary electro-magnetic field. The strength of this secondary EM field is calibrated to give apparent ground conductivity in milliSiemens/metre (mS/m). Readings over material such as organic waste and peat give high conductivity values while readings over dry materials with low clay mineral content such as gravels, limestone or quartzite give low readings. The EM31 survey technique determines the apparent conductivity of the different overburden layers from 0-6m bgl depending on the dipole mode used.

Data collection

The EM31 equipment used was a GF CMD-4 conductivity meter equipped with data logger. This instrument features a real time graphic display of the previous 20 measurement points to monitor data quality and results. Conductivity and in-phase values were recorded across the site. Local conditions and variations were recorded.

Data processing

The conductivity and in-phase field readings were downloaded, contoured and plotted using the SURFER 12 program (Golden Software, 2015). Data which was affected by metallic objects was removed. Assignation of material types and possible anomaly sources was carried out, with cross-reference to other data.

Electrical Resistivity Tomography (ERT)

Electrical Resistivity Tomography was carried out to provide information on lateral variations in the overburden material as well as on the underlying overburden and bedrock.

Principles

This surveying technique makes use of the Wenner resistivity array. The 2D-resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in material types. This method involves the use of electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.

Data Collection

Profiles were recorded using a Tigre resistivity meter, imaging software, a 32 takeout multicore cables and up to 32 stainless steel electrodes. Saline solution was used at the electrode/ground interface in order to gain a good electrical contact required for the technique to work effectively. The recorded data were processed and viewed immediately after surveying.

Data Processing
The field readings were stored in computer files and inverted using the RES2DINV package (Geotomo Software, 2006) with up to 5 iterations of the measured data carried out for each profile to obtain a 2D-depth model of the resistivities.

The inverted 2D resistivity models and corresponding interpreted geology are displayed on the accompanying drawings alongside the processed seismic sections. Profiles have been contoured using the same contour intervals and colour codes. Distance is indicated along the horizontal axis of the profiles.

Seismic refraction profiling

Principles
This method measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

Seismic profiling measures the p-wave velocity (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher Vp velocities while soft, loose or fractured materials have lower Vp velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

Data Collection
A Geode high resolution 24 channel digital seismograph, 24 x 10HZ vertical geophones and a 10 kg hammer were used to provide first break information, with a 24 take-out cable (2m spacing). Equipment was carried was operated by a two-person crew.

Readings are taken using geophones connected via multi-core cable to a seismograph. The depth of resolution of soil/bedrock boundaries is determined by the length of the seismic spread, typically the depth of resolution is about one third the length of the profile.(eg. 46m profile ~15m depth). Shots from seven different positions were taken (2 x off-end, 2 x end, 3 x middle) to ensure optimum coverage of all refractors.

Data Processing
First break picking in digital format was carried out using the FIRSTPIX software program to construct p-wave (Vp) traveltime plots for each spread. Velocity phases were selected from these plots using the GREMIX software program and were used to calculate the thickness of individual velocity units. Topographic data were input. Material types were assigned and estimation made of material properties.

First break picking in digital format was carried out using the FIRSTPIX software program to construct traveltime plots for each spread. The recorded data was processed and interpreted using the GREMIX software program. GREMIX interprets seismic refraction data as a laterally varying layered earth structure. It incorporates the slope-intercept method, parts of the Plus-Minus Method of Hagedoorn (1959), Time-Delay Method, and features the Generalized Reciprocal Method (GRM) of Palmer (1980). Up to four layers can be mapped; one deduced from direct arrivals and three deduced from refractions. Phantoming of all possible travel time pairs can be carried out by adjusting reciprocal times of off shots. Material types were assigned and estimation made of material properties, cross-referenced to borehole data.

Approximate errors for Vp velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects may also occur (Soske, 1959).

Spatial Relocation

All the geophysical investigation and thermal resistivity locations were acquired using Trimble Geo 7X high-accuracy GNSS handheld GPS system using the settings listed below. This system allows collecting GPS data with c.20mm accuracy.

Projection:	Irish Transverse Mercator
Datum:	Ordnance
Coordinate units:	Metres
Altitude units:	Metres
Survey altitude reference:	MSL
Geoid model:	Republic of Ireland

APPENDIX B: EXCAVATABILITY

The seismic velocity of a rock formation is related to characteristics of the rock mass which include rock hardness and strength, degree of weathering and discontinuities. Usually the velocity is just one of several parameters used in the assessment of excavatability. The excavatability of a rock formation is favoured by the following factors:

- Open fractures, faults and other planes of weakness of any kind
- Weathering
- Brittleness and crystalline nature
- High degree of stratification or lamination
- Large grain size
- Low compressive strength

Weaver (1975) presented a comprehensive rippability rating chart (Fig.1) in which the p-wave velocity value and the relevant geological factors could be entered and assigned appropriate weightings. The total weighted index was found to correlate very well with actual rippability.

Fig.1 Rippability Rating Chart

Rock class	I	II	III	IV	V
Description	Very good rock	Good rock	Fair rock	Poor rock	Very poor rock
Seismic velocity (m/s)	>2150	2150-1850	1850-1500	1500-1200	1200-450
Rating	26	24	20	12	5
Rock hardness	Extremely hard rock	Very hard rock	Hard rock	Soft rock	Very soft rock
Rating	10	5	2	1	0
Rock weathering	Unweathered	Slightly weathered	Weathered	Highly weathered	Completely weathered
Rating	9	7	5	3	1
Joint spacing (mm)	>3000	3000-1000	1000-300	300-50	<50
Rating	30	25	20	10	5
Joint continuity	Non continuous	Slightly continuous	Continuous-no gouge	Continuous-some gouge	Continuous-with gouge
Rating	5	5	3	0	0
Joint gouge	No separation	Slight separation	Separation <1mm	Gouge <5mm	Gouge >5mm
Rating	5	5	4	3	1
Strike and dip orientation	Very unfavourable	Unfavourable	Slightly unfavourable	Favourable	Very favourable
Rating	15	13	10	5	3
Total rating	100-90	90-70*	70-50	50-25	<25
Rippability assessment	Blasting	Extremely hard ripping and blasting	Very hard ripping	Hard ripping	Easy ripping
Tractor horsepower		770/385	385/270	270/180	180
Tractor kilowatts		575/290	290/200	200/135	135

APPENDIX C: SEISMIC DATA

APPENDIX D: DRAWINGS

The information derived from the geophysical investigation as well as correlation with the available direct investigation is presented in the following drawings:

AGP21018_01	Geophysical Locations	1:1250	@ A4
AGP21018_02	EM Ground Conductivity Contours (mS/m)	1:1250	@ A4
AGP21018_03	Interpreted Soil Thickness (m)	1:1250	@ A4
AGP21018_04	Interpreted Weathered Rock Layer Thickness (m)	1:1250	@ A4
AGP21018_05	Interpreted Top of Weathered Rock Layer (mOD)	1:1250	@ A4
AGP21018_06	Interpreted Base of Weathered Rock Layer (mOD)	1:1250	@ A4
AGP21018_R1	Results & Interpretation- ERT R1	1:100	@ A4
AGP21018_R2	Results & Interpretation- ERT R2	1:750	@ A4
AGP21018_R3	Results & Interpretation- ERT R3	1:750	@ A4
AGP21018_R4	Results & Interpretation- ERT R4	1:750	@ A4
AGP21018_R5	Results & Interpretation- ERT R5	1:750	@ A4
AGP21018_S4, S6, S8	Results & Interpretation- Seismic Refraction S4, S6 & S8	1:750	@ A4

GEOPHYSICAL LOCATIONS

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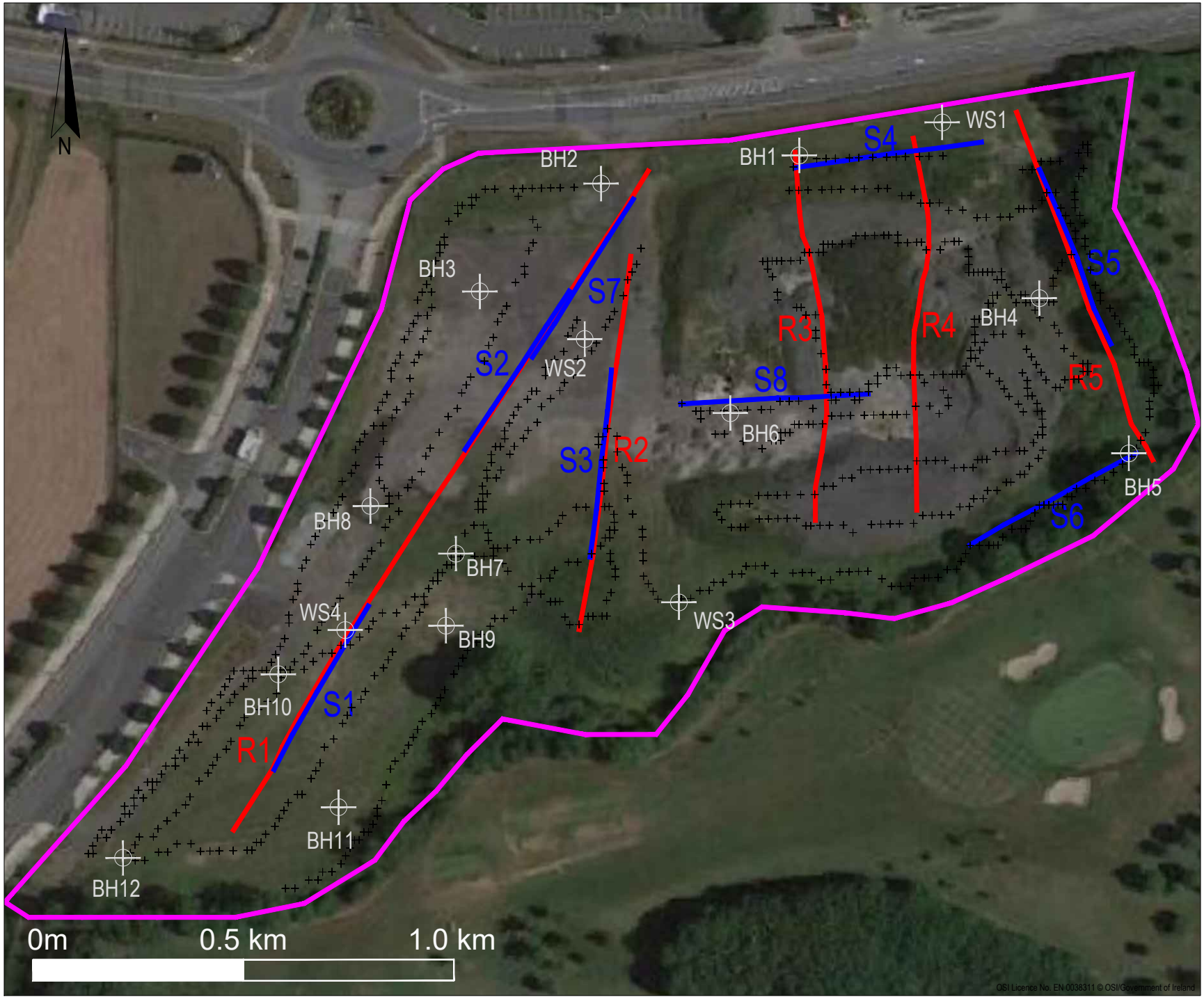

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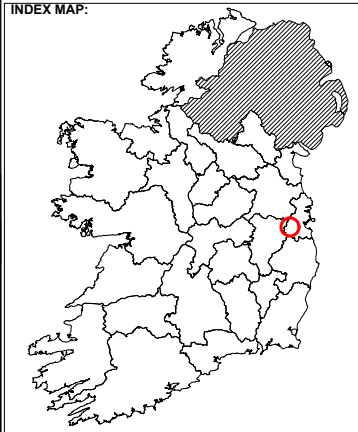

LEGEND:

- Site
- EM conductivity reading
- R1 — 2D resistivity profile
- S1 — Seismic refraction profile
- BH1 — Borehole
- WS1 — Window Sample

The information displayed here is to be used in conjunction with AGP21018_01 Report on the Geophysical Investigation at Profile Park, Grange Castle, Co. Dublin for Pinnacle, APEX Geophysics Ltd. 22nd March 2021

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PROJECT:	PROFILE PARK, GRANGE CASTLE GEOPHYSICAL SURVEY
CLIENT.:	PINNACLE
DRAWING NO:	AGP21018_01
SCALE:	AS INDICATED @ A4
DATE:	22-03-2020

Version:	Date:	Drawn By:	Checked:
01	22-03-2020	YOC	POC

EMCONDUCTIVITY CONTOURS (mS/m)

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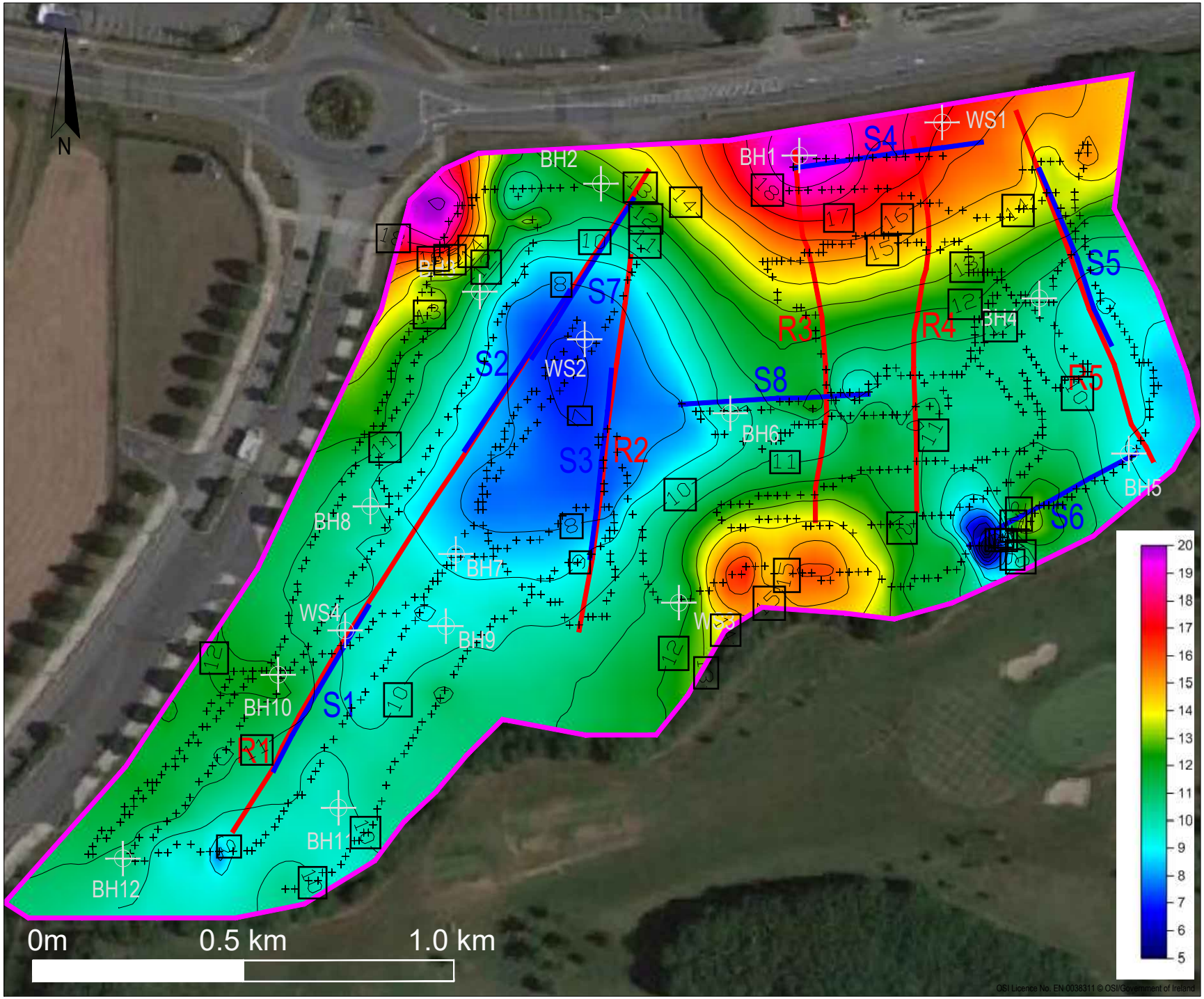

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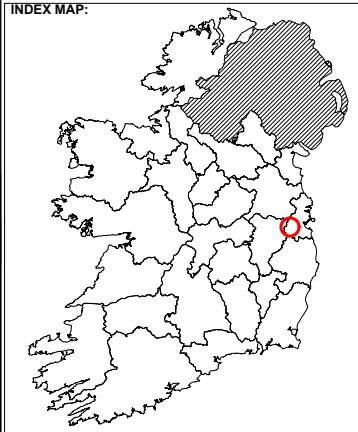

LEGEND:

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- EM conductivity reading
- R1 — 2D resistivity profile
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DATE:	22-03-2020

Version:	Date:	Drawn By:	Checked:
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INTERPRETED SOIL THICKNESS (m)

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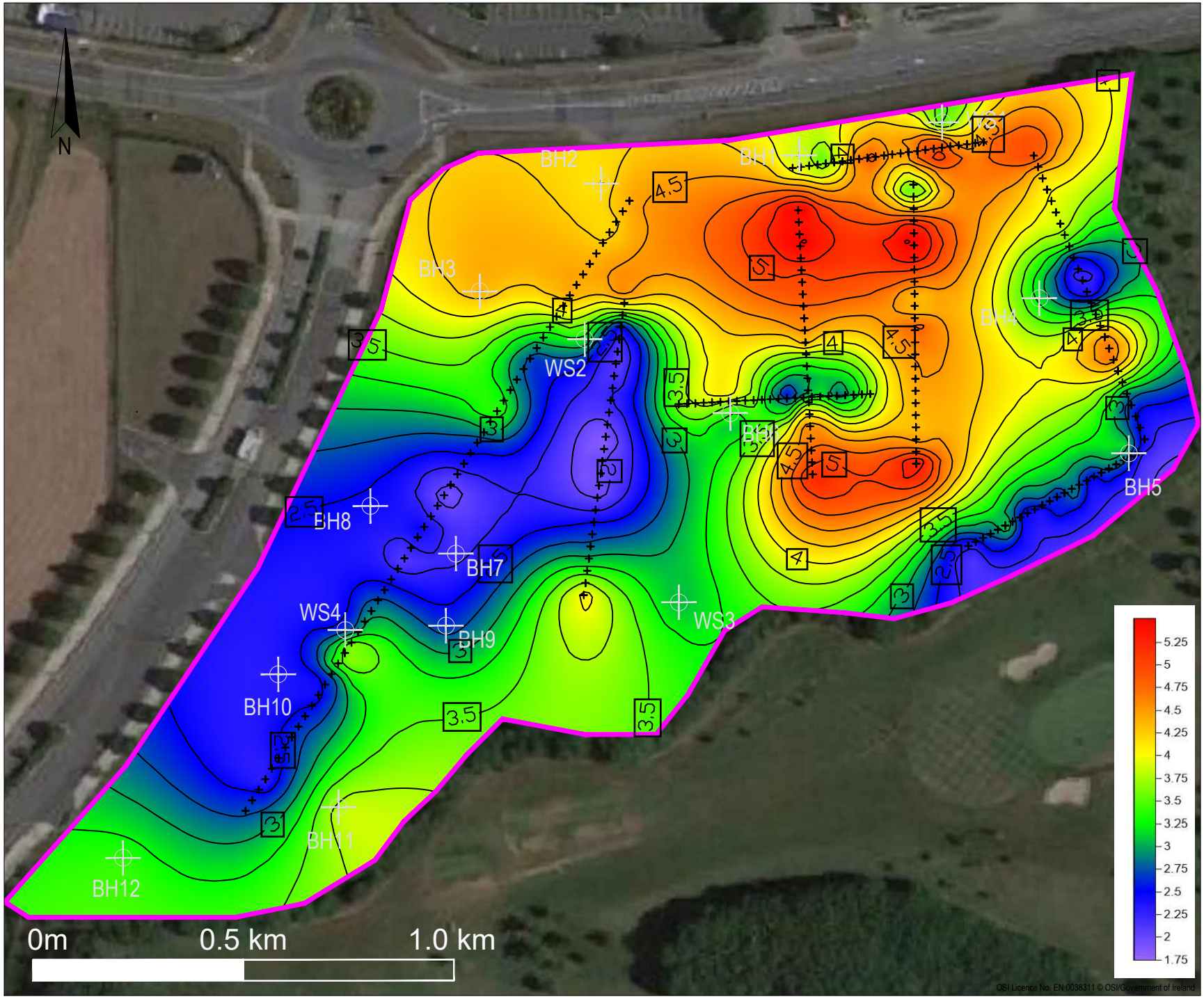

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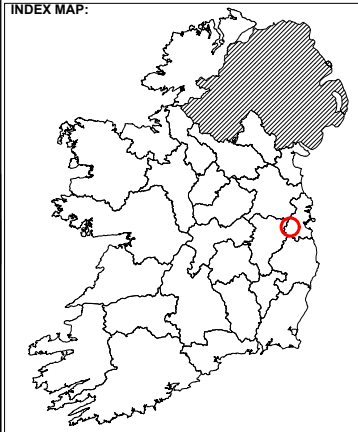

LEGEND:

- Site
- Data Point
- BH1 Borehole
- WS1 Window Sample

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DATE:	22-03-2020

Version:	Date:	Drawn By:	Checked:
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INTERPRETED WEATHERED ROCK LAYER THICKNESS (m)

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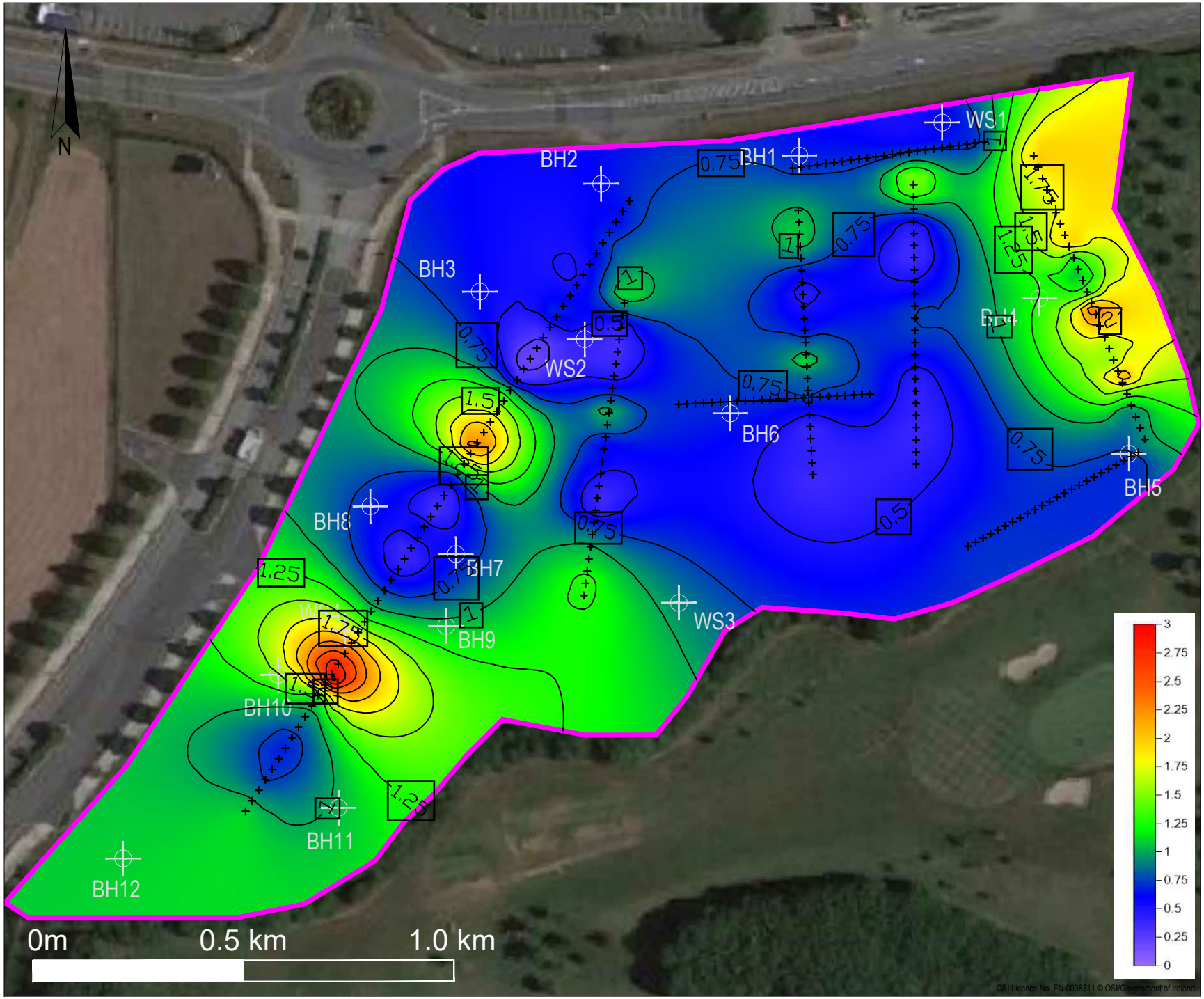

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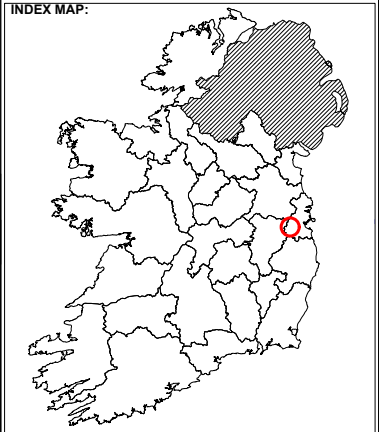

LEGEND:

- Site
- Data Point
- BH1 Borehole
- WS1 Window Sample

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DATE:	22-03-2020

Version:	Date:	Drawn By:	Checked:
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INTERPRETED TOP OF WEATHERED ROCK LAYER (mOD)

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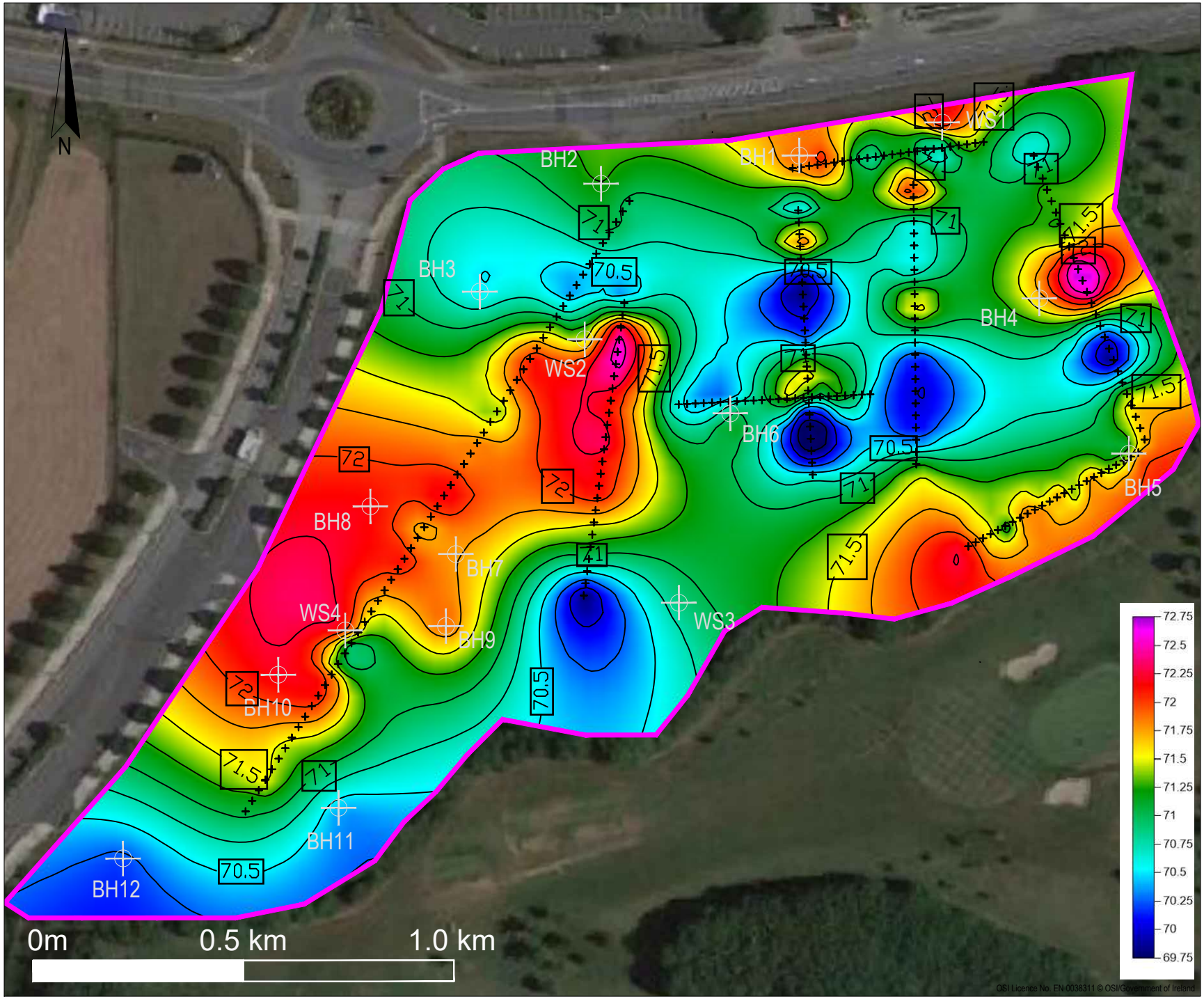

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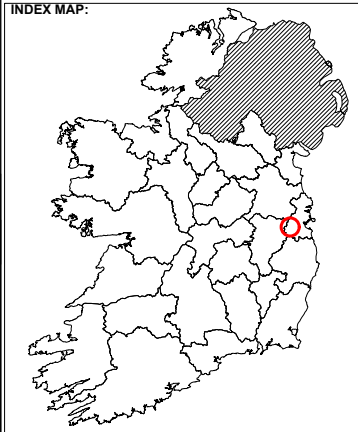

LEGEND:

- Site
- Data Point
- BH1 Borehole
- WS1 Window Sample

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Version:	Date:	Drawn By:	Checked:
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INTERPRETED BASE OF WEATHERED ROCK LAYER (mOD)

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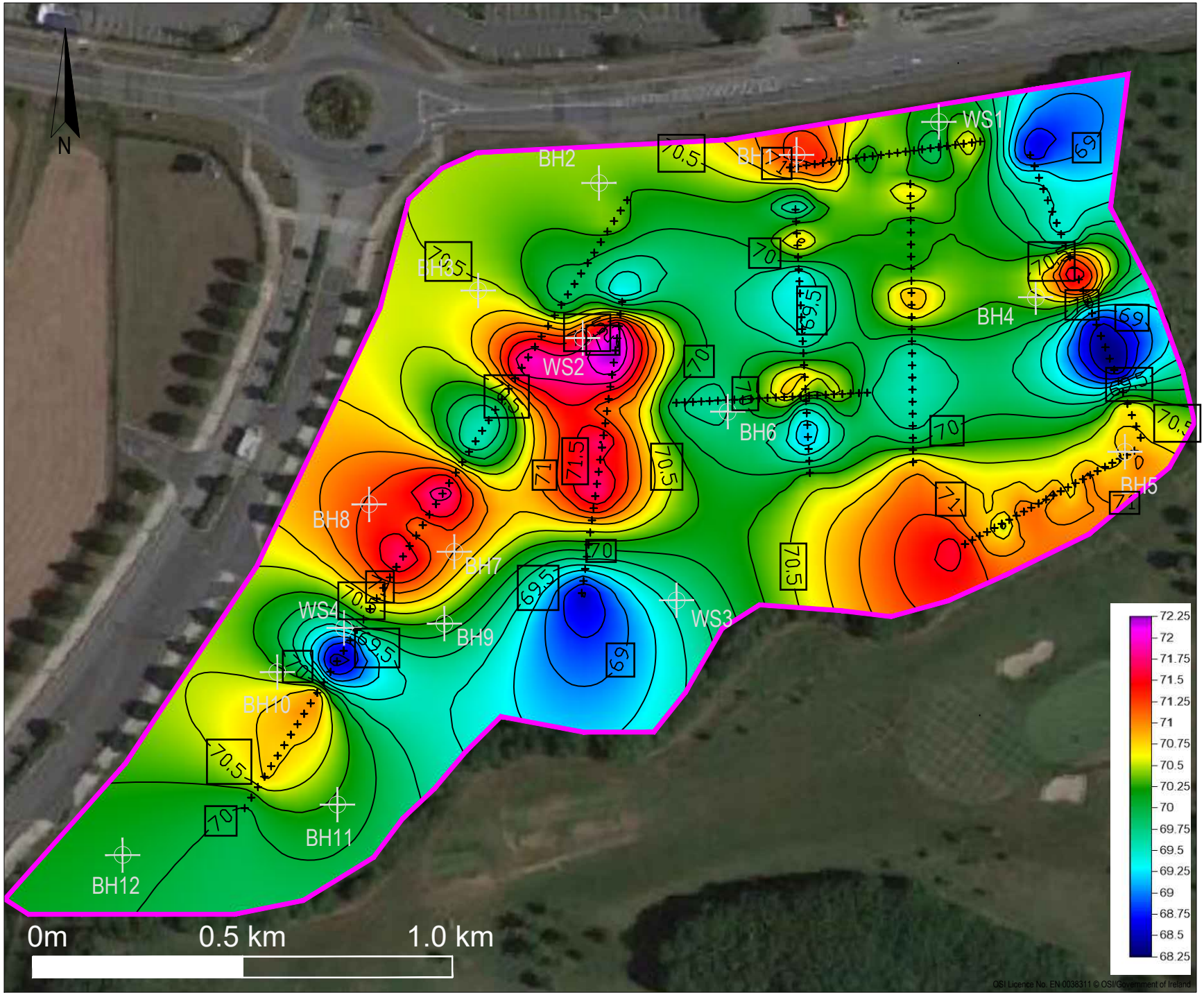

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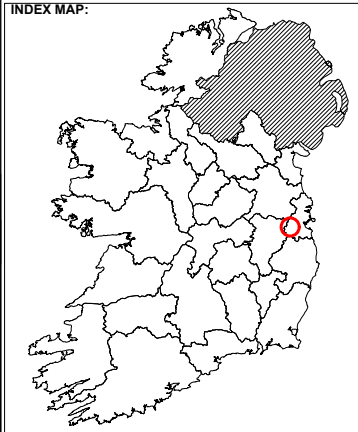

LEGEND:

- Site
- Data Point
- BH1 Borehole
- WS1 Window Sample

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Version:	Date:	Drawn By:	Checked:
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RESULTS & INTERPRETATION - ERT R1

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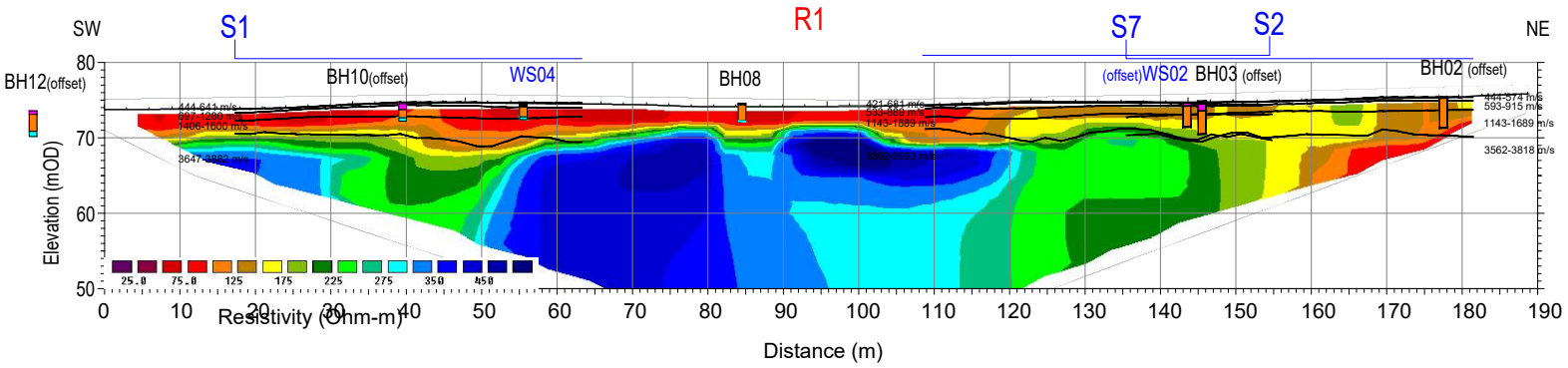
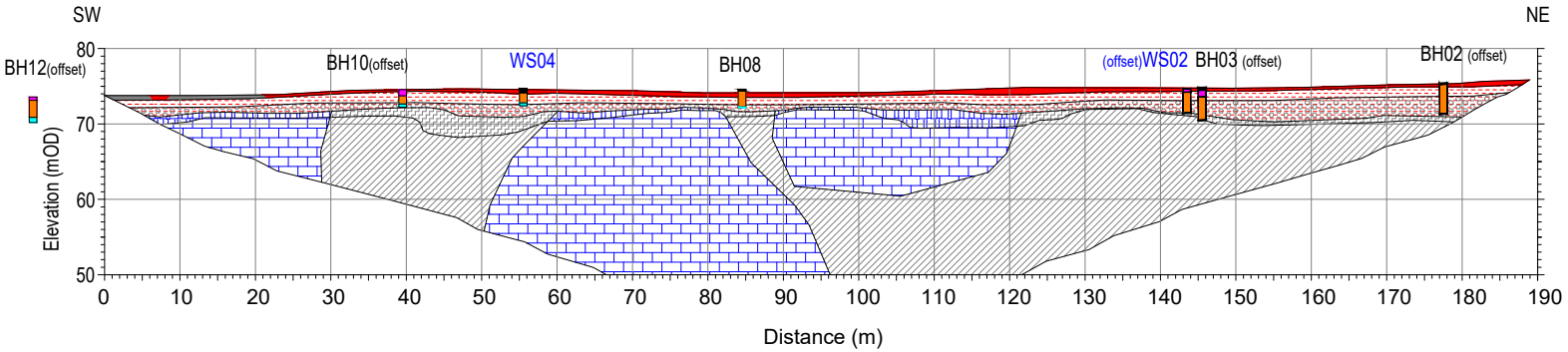
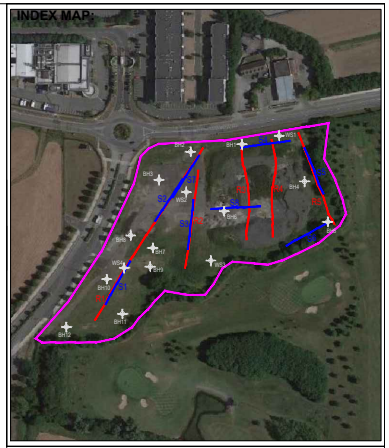




Borehole Key
- Topsoil
- Hardcore
- Made Ground
- slightly Sandy slightly Gravelly Silty CLAY
- silty clayey SAND/GRAVEL
- Possible weathered LIMESTONE



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CLIENT.:	PINNACLE
DRAWING NO:	AGP21018_R1
SCALE:	AS INDICATED @ A4
DATE:	22-03-2020

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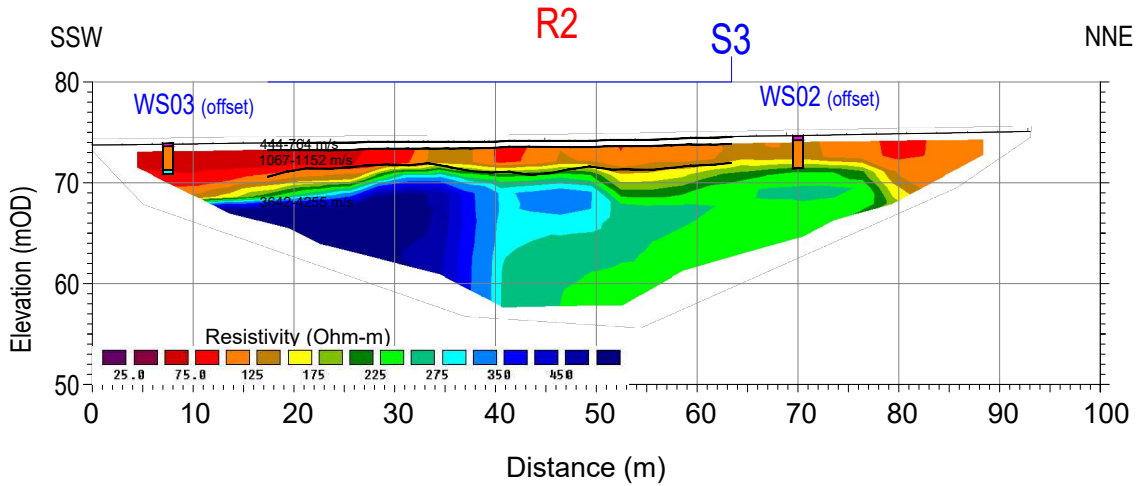
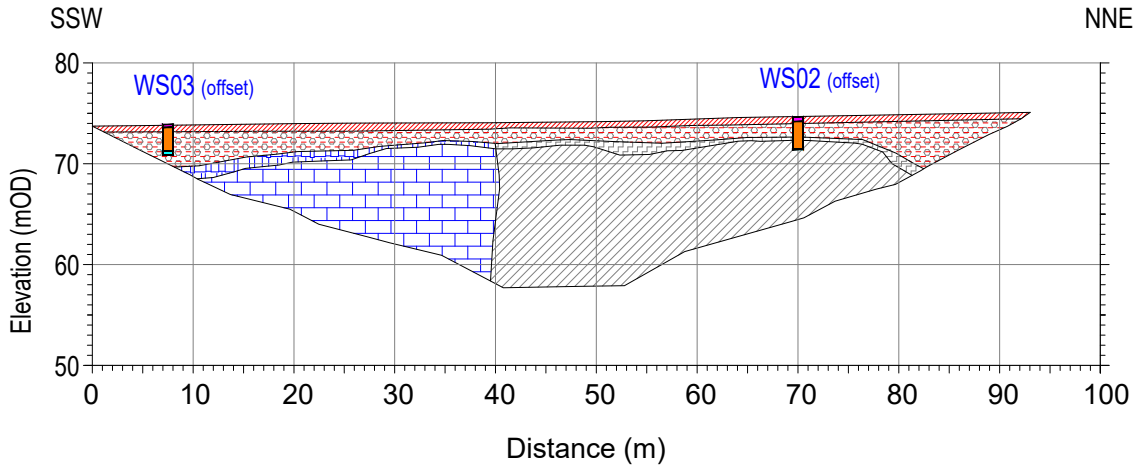
RESULTS & INTERPRETATION - ERT R2

SCALE 1:750





Borehole Key
- Topsoil
- Hardcore
- Made Ground
- slightly Sandy slightly Gravelly Silty CLAY
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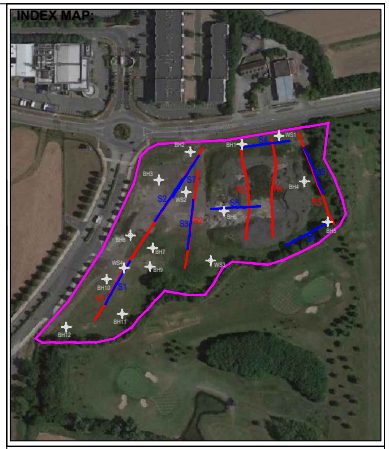
INDEX MAP:



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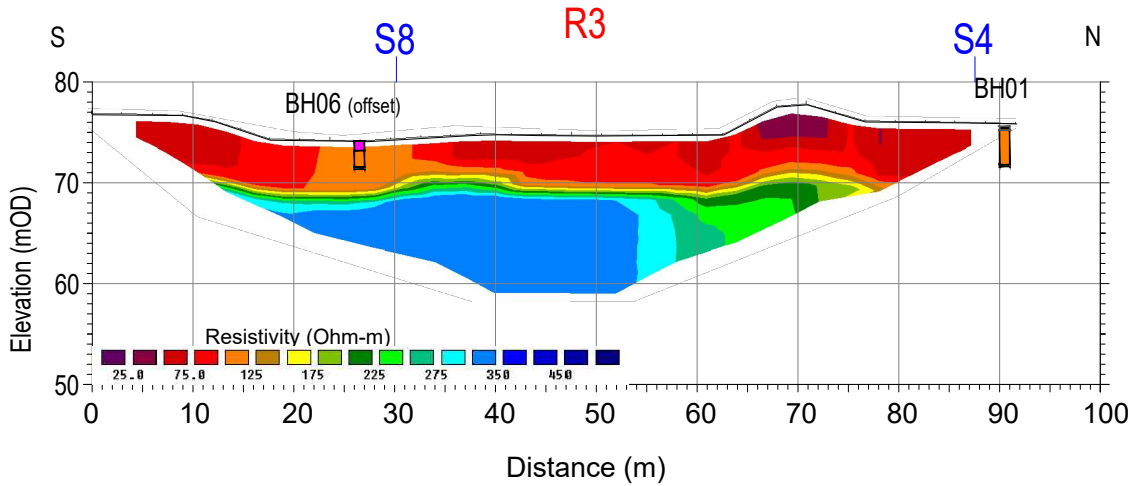
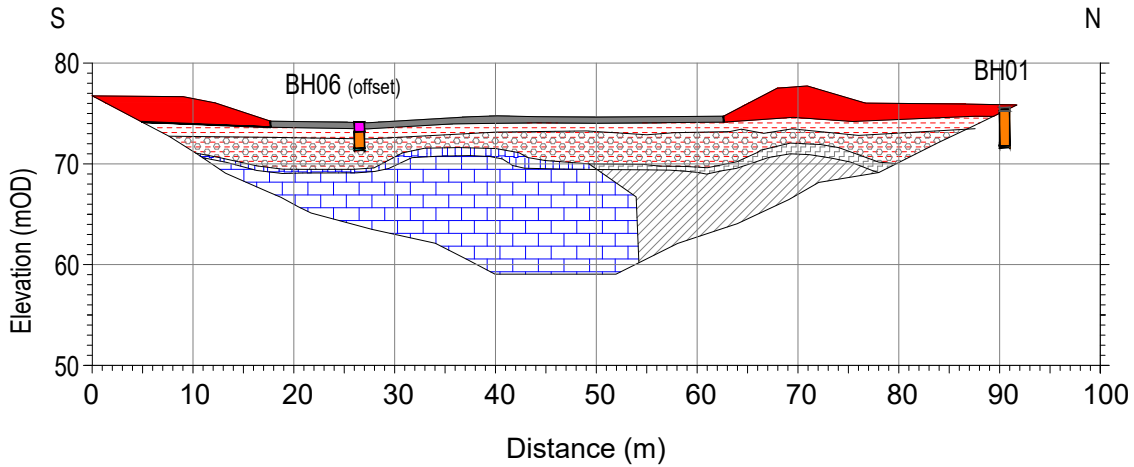
RESULTS & INTERPRETATION - ERT R3

SCALE 1:750





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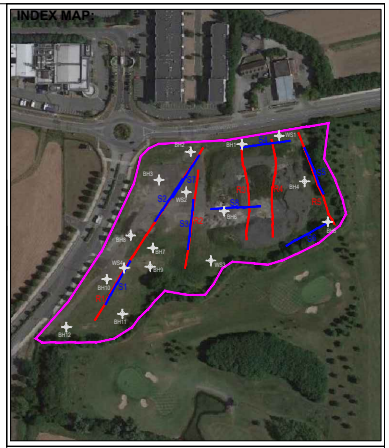
INDEX MAP:



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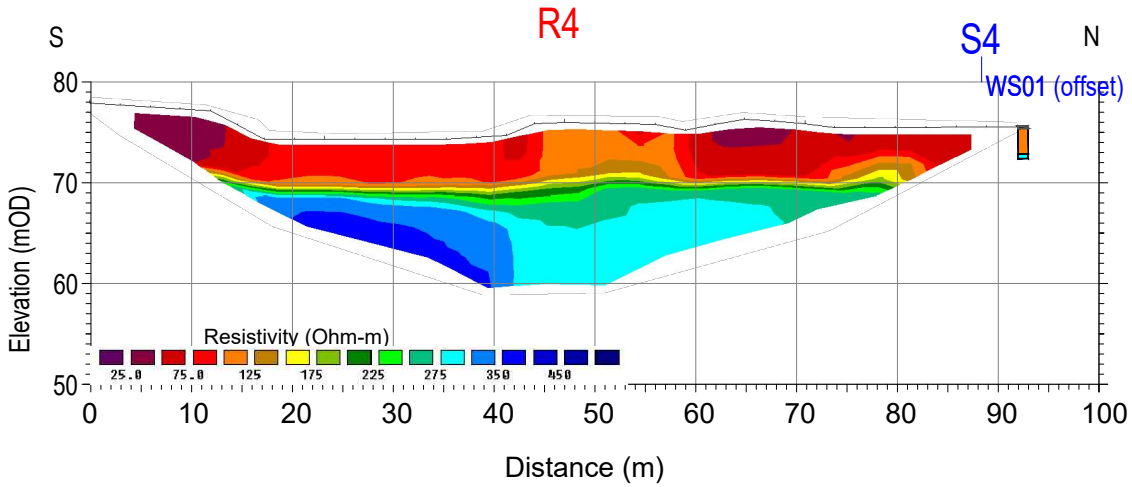
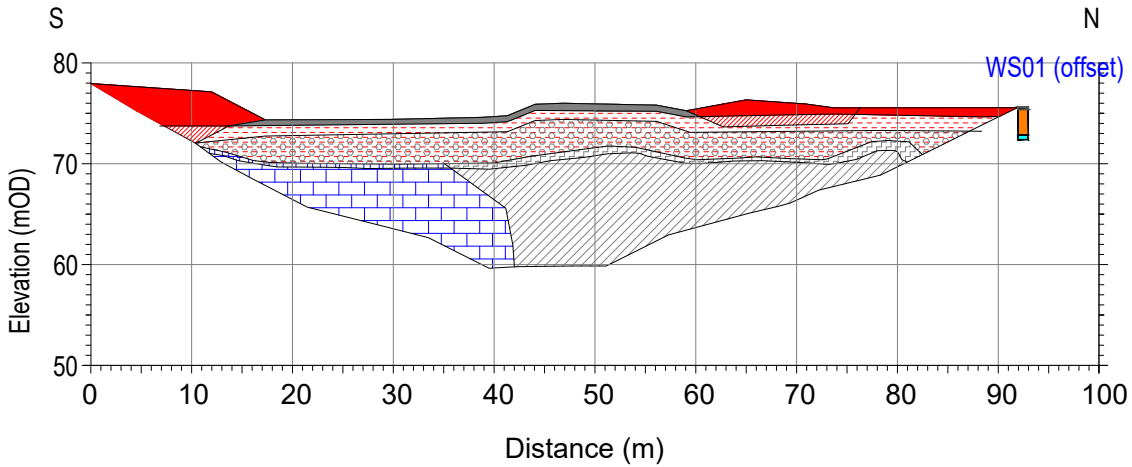
RESULTS & INTERPRETATION - ERT R4

SCALE 1:750





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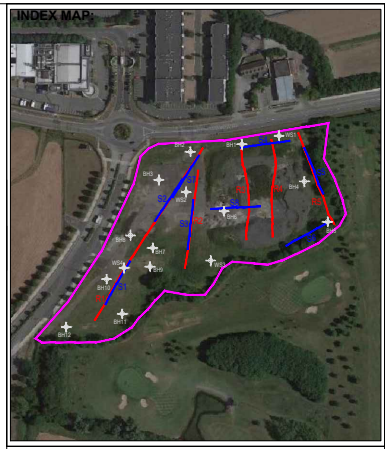

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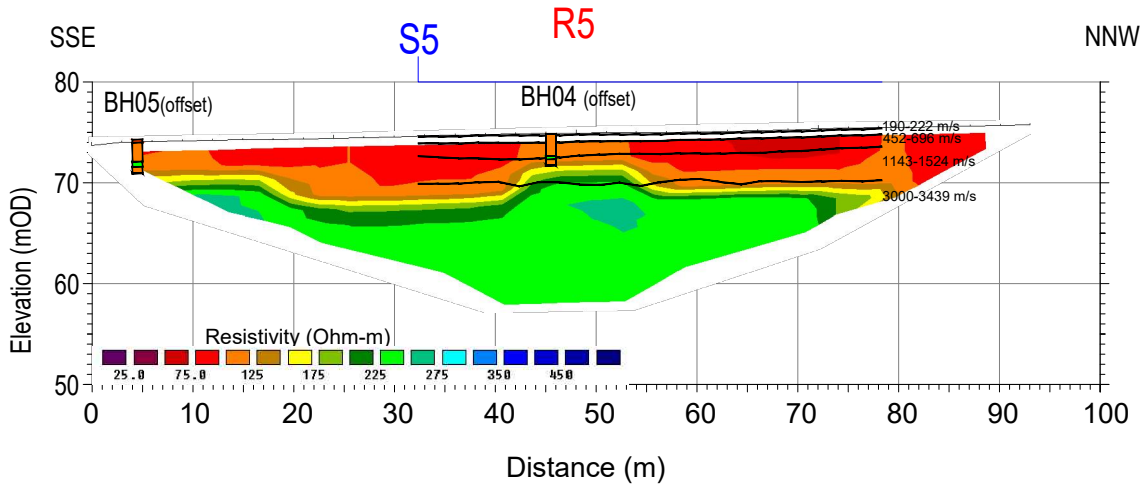
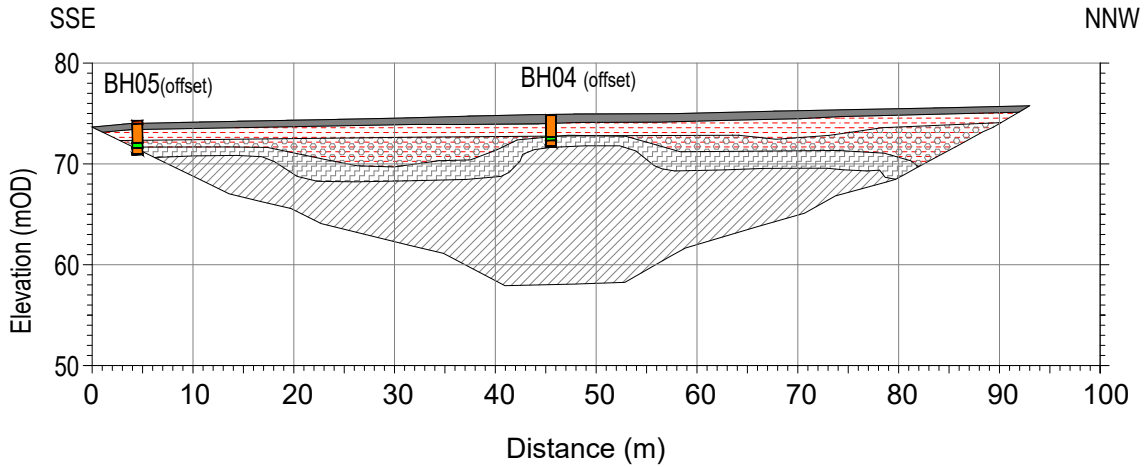
RESULTS & INTERPRETATION - ERT R5

SCALE 1:750





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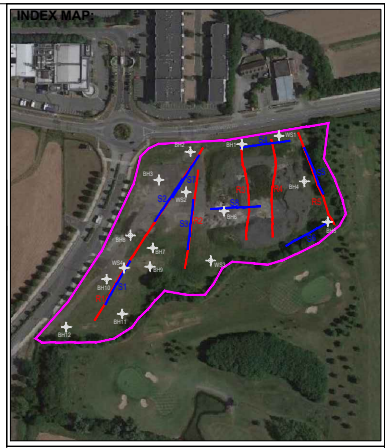

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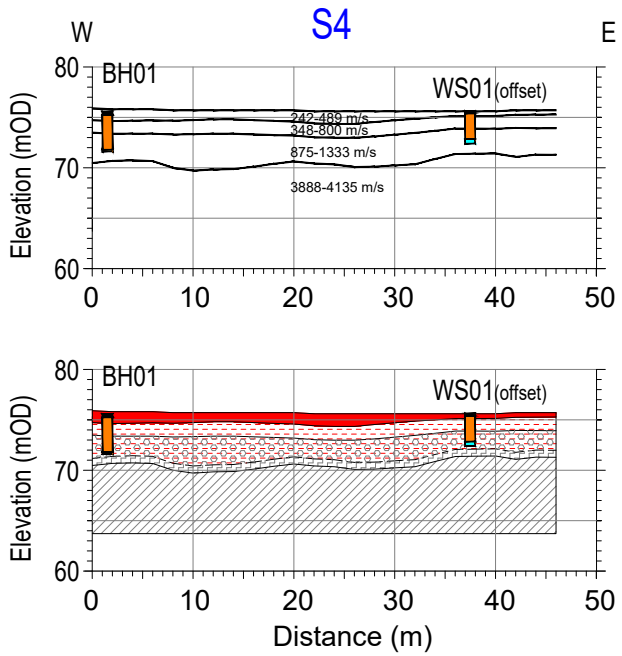
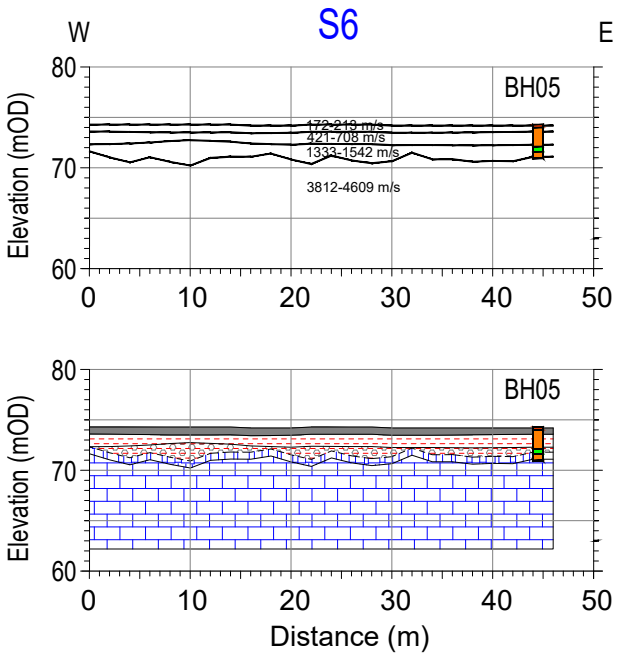
SCALE:	AS INDICATED @ A4
DATE:	22-03-2020

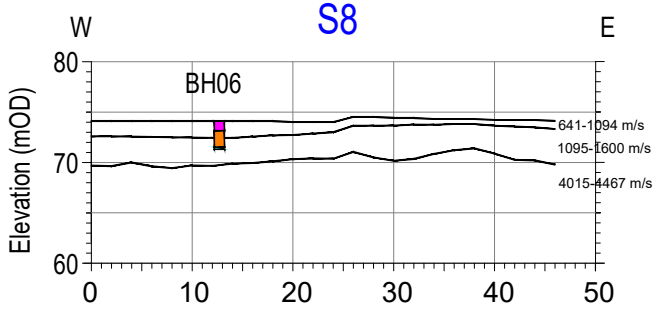
Version:	Date:	Drawn By:	Checked:
01	22-03-2020	YOC	POC

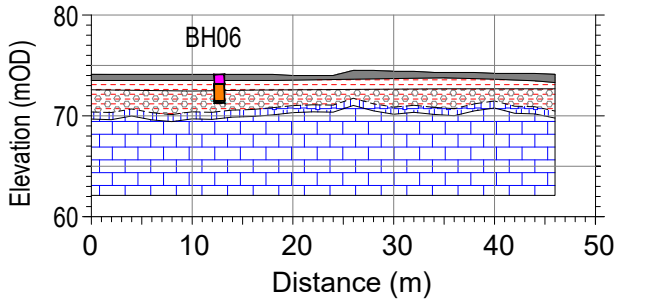
RESULTS & INTERPRETATION - SEISMIC REFRACTION S4 S6 & S8

SCALE 1:750









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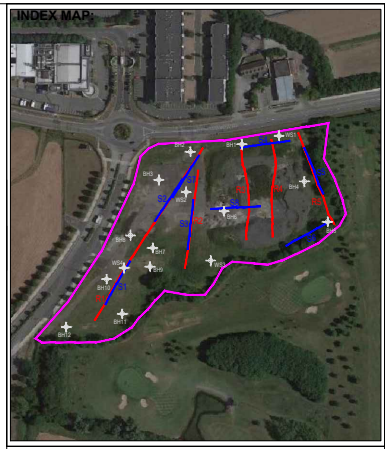

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PROJECT:	PROFILE PARK, GRANGE CASTLE GEOPHYSICAL SURVEY
CLIENT.:	PINNACLE
DRAWING NO:	AGP21018_S4, S6, S8
SCALE:	AS INDICATED @ A4
DATE:	22-03-2020

Version:	Date:	Drawn By:	Checked:
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Appendix 6.4 - Environmental Impact Assessment for Profile Park Roads and Services Application by RPS Planning and Environment dated, July 2006. Chapter 6 and Appendix B – Soils, Geology and Hydrogeology (including waste), including trial pit logs by WYG

PLANNING AND DEVELOPMENT ACT, 2000,
PLANNING & DEVELOPMENT (AMENDMENT) ACT, 2002
EUROPEAN COMMUNITIES (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 1989 TO 1999,
PLANNING AND DEVELOPMENT REGULATIONS, 2001 & 2002

South Dublin County Council
Planning Department - Registry

05. JUL 2006 SD06A 0568

Date Received	Register Reference

Planning permission is sought by Dasnoc Limited for development consisting of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Ballybane, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

ENVIRONMENTAL IMPACT STATEMENT

Prepared for

DASNOC LIMITED

By

RPS Planning & Environment

Ordnance Survey Licence No. SU 0001006

July 2006

PROFILE PARK – ROADS AND SERVICES APPLICATION
ENVIRONMENTAL IMPACT STATEMENT
STRUCTURE AND CONTENTS

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1.0 INTRODUCTION

1.1 NATURE AND EXTENT OF PROPOSED DEVELOPMENT

Planning permission is sought by Dasnoc Limited for development consisting of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

This business park forms part of a larger overall area of approximately 200 acres for which a Masterplan has already been prepared in line with the requirements of the South Dublin County Development Plan 2004-2010 (See figure 1.1).

1.2 REASON FOR THIS ENVIRONMENTAL IMPACT STATEMENT

The roads and services development which is the subject of this planning application is sub-threshold in terms of the requirement to carry out an Environmental Impact Assessment. Notwithstanding this, these roads and services will facilitate a business park development of 39.84 hectares and in this regard, it is a requirement under Schedule 5, Part 2, 10 (a) of the Planning and Development Regulations 2001, that infrastructure projects consisting of industrial estate development projects, where the area would exceed 15 hectares, require the undertaking of an Environmental Impact Assessment. Thus having carried out a scoping exercise at the outset of the project it was decided that an Environmental Impact Assessment of the proposed roads and services development should be undertaken in light of the size of the overall development of which the current application forms part, and in light of the potential for significant or cumulative environmental impacts.

1.3 EIS STRUCTURE AND CONTENT

The information contained in this EIS has been completed in accordance with the relevant provisions set out in Article 94 of the Planning and Development Regulations, and detailed in Schedule 6 as follows:

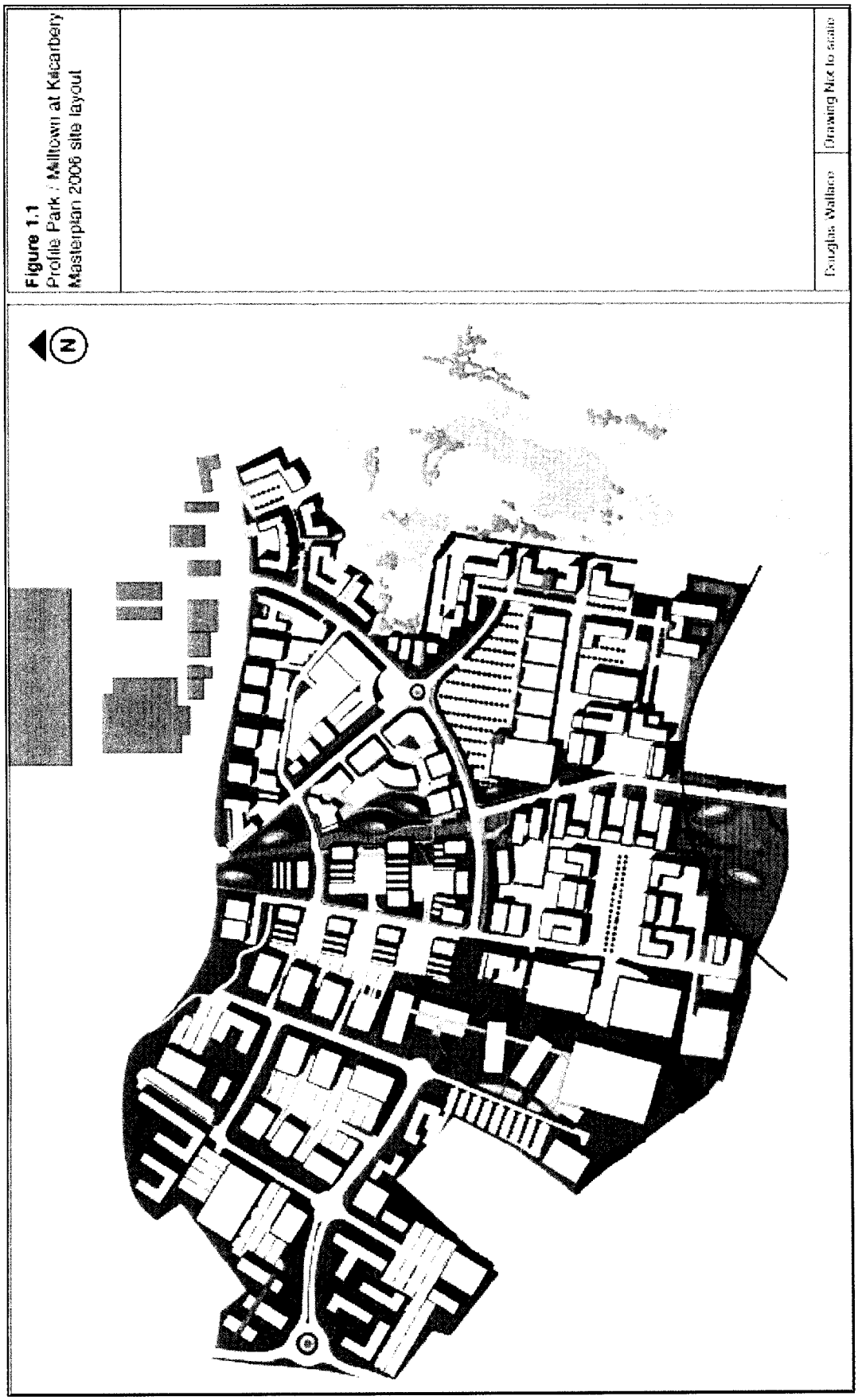
1. (a) A description of the proposed development comprising information on the site, design and size of the proposed development.

(b) A description of the measures envisaged in order to avoid, reduce and if possible, remedy significant adverse effects.

(c) The data required to identify and assess the main effects which the proposed development is likely to have on the environment.

(d) An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment.

Figure 1.1: Profile Park/Milltown at Kilcarbery Masterplan 2006 – Site layout



2. Further information by way of explanation or amplification of the information referred to in paragraph 1, on the following matters:

(a)(i) a description of the physical characteristics of the whole proposed development and the land-use requirements during the constructional and operational phase;

(ii) a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;

(iii) an estimate, by type and quantity, of expected residues and emissions (including water, air, and soil pollution, noise, vibration, light, heat and radiation) resulting from the operation of the proposed development;

(b) a description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular:

- human beings, fauna and flora
- soil, water, air, climatic factors and the landscape
- material assets, including the architectural and archaeological heritage and the cultural heritage.
- The inter-relationship between the above factors;

(c) a description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from:

- the existence of the proposed development,
- the use of natural resources,
- the emission of pollutants, the creation of nuisances and the elimination of waste,

and a description of the forecasting methods used to assess the effects on the environment;

(d) an indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.

The preparation of an EIS requires the co-ordination and synthesis of associated yet diverse elements of the overall assessment. To facilitate this process, a schematic structure was used in order to provide a coherent documentation of the varied aspects of the environment considered. Specifically, this Environmental Impact Statement follows the "grouped format structure" as referred to in Section 1.7.2 of the EPA document – "*Guidelines on the Information to be contained in Environmental Impact Statements*". The grouped format structure used for the purposes of this EIS is detailed below.

(1) The Receiving Environment (Baseline Situation)

This section contains a description of the existing environment in which the proposed development is located. The particular aspects of the environment are discussed in terms of their context, character, significance and sensitivity.

(2) The Characteristics of the Proposal

This section provides a projection of the specific "load" on the particular aspects of the environment, specific to a particular topic, which the proposal would be likely to generate. This includes a summary of the principal aspects of the scheme that have the potential to impact on the environment.

(3) The Potential Impact of the Proposal

This section comprises a general description of the possible types of impacts which proposals of this kind would be likely to produce. This includes a consideration of the "Do Nothing" scenario which describes the environment as it would be in the future if there was no development.

(4) Remedial or Reductive Measures

This section contains a description of any specific remedial or reductive measures considered necessary and practicable resulting from the assessment of potential impacts described in (3) above.

(5) The Predicted Impact of the Proposal

(a) An assessment of the specific direct and indirect impacts of the proposal arrived at by adding to the receiving environment (as in (1) above), the loading of the proposal (as in (2) above) and the remedial or reductive measures (as in (4) above) is provided. The predicted impacts are discussed having regard to their character, magnitude, duration, consequences and significance.

(b) This includes a consideration of a "Worst Case" scenario which would arise where a development, or its mitigation measures, substantially fails.

(6) Monitoring

A description of any post development monitoring of effects on the environment which might be necessary, covering the monitoring methods, and the Agencies responsible for their implementation is provided in this sub-section.

(7) Reinstatement

Where required, a description of reinstatement measures and the Agencies responsible for their implementation is provided.

This EIS has also been prepared having regard to the "*Guidelines on the Information to be contained in Environmental Impact Statements*" and also "*Advice Notes on Current Practice in the preparation of Environmental Impact Statements*", which were published by the Environmental Protection Agency in 2002 and 2003 respectively.

1.4 EIS STUDY TEAM

This EIS was prepared by a study team led by RPS Planning and Environment, who were responsible for the overall management and co-ordination of the study. RPS Planning and Environment were also responsible for the preparation of various sections of the EIS including the introduction, the non-technical summary, the description of the proposed development, the planning and development context and the sections in relation to human beings and interactions. The members of the study team and their respective inputs into this EIS are outlined in Table 1.1 below.

Table 1.1 – EIS Study Team

EIS Consultant	EIS Section
RPS Planning and Environment	• Introduction • Non technical summary • Description of Proposed Development • Planning and Development Context • Human Beings • Interactions
Scott Cawley	• Flora and Fauna
White Young Green	• Soils, Geology and Hydrogeology including Waste
Doherty Finnegan Kelly Consulting Engineers	• Water – including water supply, surface water and foul sewerage
Roughan O'Donovan Consulting Engineers	• Traffic
RPS Consulting Engineers	• Air – including noise and vibration • Climate – air quality
Murray and Associates	• Landscape and Visual Appraisal
Byrne Mullins	• Archaeology • Architectural Heritage • Cultural Heritage

2.0 NON-TECHNICAL SUMMARY

2.1 INTRODUCTION

This non-technical summary follows the format outlined in Articles 2 and 3 of the Second Schedule of the European Communities (Environmental Impact Assessment), Regulations 1989 (S.I. No. 349 of 1989), as amended by the European Communities (Environmental Impact Assessment) Regulations, 1999 and the Planning & Development Regulations, 2001.

This Environmental Impact Statement has also been prepared having regard to the "*Guidelines on the Information to be contained in Environmental Impact Statements*" and also "*Advice Notes on Current Practice in the preparation of Environmental Impact Statements*" both of which were prepared by the Environmental Protection Agency and published in 2002 and 2003 respectively.

2.2 DESCRIPTION OF THE SUBJECT SITE

The site to which this EIS relate is located in the central western area of County Dublin, to the north of Baldonnell (Military) Aerodrome and approximately 2.5km to the west of Clondalkin village. The site is bound to the north by the R134 (the Nangor or Clondalkin-Milltown Road), the Grange Castle Business Park and Kilcarbery Business Park and to the south by a minor road which runs from the R134 to the N7, and Baldonnell Aerodrome. The eastern edge of the subject lands is bordered by Grange Castle Golf Club. The lands to the west are currently in agricultural use. The subject site itself consists of vacant agricultural fields which collectively comprise an area of 39.84 hectares.

2.3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The development which is the subject of this planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park on the subject site, which will be known as 'Profile Park'. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

2.4 ALTERNATIVES CONSIDERED

The subject site is zoned for enterprise, employment and relates uses under the South Dublin Development Plan 2004-2010, thus the consideration of alternative sites to accommodate the proposed development was not deemed necessary in this instance.

The undertaking of a scoping exercise in the preparation of the Masterplan for the subject lands allowed an examination of alternative land uses on the site to be undertaken and a final masterplanning approach to be decided upon.

The consideration of alternative road layouts on the subject site reflects the constraints of the site itself, the requirements of the Roads Department of South

Dublin County Council and inputs received from the other EIS specialists with regard to potential impacts arising from the proposed development.

2.5 ASPECTS OF THE ENVIRONMENT CONSIDERED

Human Beings

The results of the 2002 Census of Population were used to establish the baseline environment of the site and it surroundings with regard to population, employment and community aspects.

Flora and Fauna

A constraints assessment was carried out on 3rd November 2005 followed by a more detailed site survey on 31st March 2006. Bat foraging surveys were undertaken on 1st May 2006. These surveys allowed an assessment of the ecological status of the site, identification of any ecological constraints, and an assessment of any likely significant impacts of the proposed development on the ecology of the site and its surroundings. During the site visits a detailed account of the floral and faunal composition encountered during the survey was recorded.

Soils, Geology and Hydrogeology (including waste)

A desktop study, site walkover and trial pit investigations were undertaken in order to determine the nature of the existing soils and geology of the site and to assess the impact of construction and operation of the proposed development at the site on the underlying soils and geology. Information relating to the hydrogeological setting at the site was derived from trial pit information and a desk-based study using the Geological Survey of Ireland (GSI) database.

Water

The effects of the development on water was examined under three headings – Surface Water Drainage, Water Supply and Foul Drainage.

Surface water run-off from all individual sites within the business park will be attenuated within the curtilage of each site and that the surface water run-off from the estate roads etc. will be attenuated before discharge to the Griffeen River, the attenuated water being stored in oversized pipes.

Water Supply to the site will be provided from the 700mm diameter trunk main (the Low Level Lucan/Palmerstown Water Supply Scheme) which passes across the northern edge of the site. This watermain is connected to the Belgard reservoir and has sufficient pressure to service this development.

With regard to Foul Drainage, the effluent from this site will be discharged to a pumping station within Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend. All wastewater from the area is treated at the Ringsend Wastewater Treatment Plan (WWTP), which has the capacity to treat a population equivalent of 1.7 million.

Air

Six sample locations were chosen to represent the baseline air quality in the vicinity of the proposed development. As a result of existing site conditions and the potential for traffic derived pollution, the following parameters were measured: nitrogen dioxide (NO_2), sulphur dioxide (SO_2), Benzene, Carbon monoxide (CO) and Particulate Matter PM_{10}. Information regarding the climate at the location of the subject site was obtained from meteorological data from the nearest meteorological station at Baldonnell Aerodrome.

Noise

A baseline noise survey was carried out on the 29th and 30th of March 2006 at four noise sensitive locations in the area of the proposed development. Measurements were made for a period of 15 minutes during the survey. All measurements were carried out in accordance with ISO 1996: '*Acoustics-Description and Measurement of Environmental Noise*'.

Landscape and Visual Assessment

An assessment of the impact of the proposed development on the visual character of the site was undertaken. The methodology employed included a site survey to determine the character of the site and its surrounding area, an assessment of the proposed development using layout plans and sections to determine the impacting features and evaluating the impacts on the landscape in accordance with EPA guidelines.

Traffic and Transportation

The transportation impact of the proposed development was assessed using widely acceptable methods including the T.R.I.C.S. database, which is widely used for trip estimation in Ireland. Consideration was given to access to/from and within the site for all users (cars, pedestrians, cyclists and public transport users). The parking requirements on the site were considered with reference to the South Dublin Development Plan 2004-2010.

Cultural Heritage

The cultural heritage of the area of the proposed development was examined through an archaeological, architectural and historical study. The archaeological and architectural studies involved a documentary/cartographic search and field inspection of the area, while the historical study involved a documentary search.

2.6 LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS AND THE MEASURES ENVISAGED TO AVOID, REDUCE OR REMEDY THEM.

The proposed development was assessed under various environmental headings. The likely predicted impacts of the development on each of these environmental aspects are outlined below.

Human Beings

Population

The development which is the subject of this planning application and the development of the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their construction and operational phases. Thus no remedial measures are required in this regard.

Employment

The construction and operation of the roads and services which are the subject of this planning application will not have a significant impact on employment levels having regard to the nature and scale of the development proposed.

The development of the remainder of the business park has the potential to have a temporary positive impact on employment levels in the locality. In addition, it is estimated that the operational phase of the business park has the potential to increase the workforce of the area by some where in the range of 5,000 - 10,000 persons.

As the impacts on employment levels are expected to be either insignificant or positive, no remedial measures are proposed in this regard.

Community Aspects

There will be no significant negative impact on the resident, working or visiting community at this location during the construction phase of the proposed development. Some short-term localised impacts may be experienced by the adjoining residential units as a result of noise during construction and increased traffic levels. The hours of operation of construction machinery on the subject site will be limited in order to limit any such potential impacts. A construction management plan will also be prepared where construction traffic will be programmed to avoid peak traffic conditions on the surrounding road network. Thus these impacts are not predicted to be significant.

There will be no significant impacts on the resident, working or visiting community at this location during the operational phase of the proposed development thus no mitigation measures are required in this regard.

Some potential adverse localised impacts may be expected to occur during the construction phase of the business park. Many of these would be of a nuisance nature such as an increase in daytime noise levels in the locality. Construction traffic has the potential to pose impacts to the neighbourhood community depending on its frequency, overall numbers and routing. In order to limit any potential short-term noise impact on adjacent residential properties during the construction phase of the business park, the hours of operation of construction machinery on the subject site will be limited. As stated previously a construction management plan will also be prepared in order that construction traffic avoids peak conditions on the surrounding road network.

Potential impacts that may arise during the operational phase of the business park include increased traffic levels, both pedestrian and vehicular in the area, impacts on the existing natural landscape, increased employment opportunities in the area and impact on local services and commercial facilities.

Mitigation measures proposed in this regard include the planting of the boundaries of the subject site with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings. In addition, the heights of any buildings proposed will be reduced adjacent to existing housing at the site boundaries in order to reduce the visual bulk of the buildings. A mobility management plan will also be implemented to reduce the reliance on private car usage.

Flora and Fauna

Replanting or relocation of hedgerows will compensate the loss of hedgerow habitat during the construction phase so that there is no net loss of hedgerow habitat. The ecological functions of the hedgerow will be diminished, as the disturbance of habitats will push otters, badgers and bats away from the site. The residual impacts of this disturbance are likely to be temporary but monitoring of bat, badger and otter activity will help to determine the level of impact prior to any further development of the site. Careful control of the construction works will reduce any potential indirect construction related impacts on off-site areas.

It is not anticipated that there will be any significant impacts to flora and fauna during the operational phase of the proposed development. In order to identify any unforeseen effects during construction and operation of the proposed development, the following mitigation measures are proposed: water quality monitoring of any off-site discharges, monitoring of use of wildlife underpasses, monitoring for otter, bat and badger activity and annual monitoring of condition of planted or relocated hedgerow vegetation.

Soils, Geology and Hydrogeology (including waste)

The soils present across much of the site are of good quality. There were isolated elevated concentrations of lead, diesel range organics, and mineral oil in the leachate analyses at 2 of the 29 trial pit locations. These are not considered to be significant due to the localised extent of the contamination and can easily be resolved by removal of the source material to a licensed facility for disposal.

The area of the site that has received waste in the past comprises mainly inert fill material. While the concentrations of metals were higher in this area they do not pose a risk to the environment or to human health. The presence of wood material within this area may lead to methane generation. Removal of the main area of the wood source would be required in order to reduce further gas generation.

The development of the roads and services infrastructure which is the subject of the current planning application and the associated development of "Profile Park" will involve the disturbance and the removal of soils from the site. This will be mitigated against by keeping earth movements to a minimum. This will result in no residual impacts on the environment.

The removal of the two localised areas containing wood and hydrocarbon compounds will improve the conditions of the site prior to development.

Depending on the specific industries which locate within the business park, some monitoring of groundwater quality may be required.

Water

As noted in Section 2.5, the effects of the development on water are examined under three headings – Surface Water Drainage, Water Supply and Foul Drainage.

Surface Water

With regard to surface water drainage, during the construction phase, there is potential for some silt loads to enter the existing watercourses during rainy periods.

Silltation and groundwater control ponds and underground structures will be utilised at construction stage in order to minimise any potential impact, as well as oil interceptors and post-construction re-instatement. If these measures are put in place, minimal effect is anticipated on stream flows downstream of the subject development.

During the operational phase of the development, due to the increase in the hard surface area, there will be an increase in surface water run-off from the subject lands. Oil spillages are also a possibility.

However, due to the implementation of attenuation measures and petrol interceptors, there should be no appreciable impact on surface water volumes from the proposed development.

Water Supply

The water supply for this proposed development has been designed to cater for the entire Masterplan development. Potential impacts on the existing watermain include construction stage impacts when installing new pipelines and additional demand on the local water supply. During the operational phase, the development will result in an increase in the water demand on the existing watermain network.

In order to limit the possibility of unclean pipework and to limit the likelihood of leaks, all connections to the existing network will be carried out under Local Authority supervision. During the operational phase water usage will be monitored by water meters. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

The impact on water supply during the construction phase will be minimised due to the remedial measures put in place. During the operational phase the development will cause an increase in water usage. However, there is adequate capacity available with the existing network for the Masterplan development.

Foul Drainage

Due to the nature of the proposed development on site, the effluent to be discharged from the site will generally be domestic standard wastewater.

During the construction phase, the significant numbers of workers on the overall subject lands will lead to the generation of foul sewage associated with temporary showers, toilets, canteen and washing facilities. There is also the

possibility of debris and building rubble falling into the existing sewer, as well as health and safety issues resulting from working in close proximity to a live foul sewer. The construction of the sewer network could result in the discharge of silt to existing watercourses.

During the operational phase, there will be an increase in the hydraulic loading within the existing sewer network and a reduction in the capacities of the existing sewer system and there is a possibility of untreated effluent discharging to the water table if pipes are broken or not laid properly during construction.

A number of remedial measures will be put in place in order to minimise potential impacts on the existing sewer system. Temporary, chemical or waterborne facilities will be provided by contractors for the duration of the construction phase.

Siltation and groundwater control ponds and underground structures will be utilised during the construction of the sewer network in order to minimise the potential of silt discharging to water courses.

Mitigation measures during the operational phase include the inspection of sewers by C.C.T.V. cameras and testing in accordance with Local Authority requirements, prior to the discharge of foul effluent to the public sewer system.

There will be no significant impacts on the foul drainage network as a result of foul drainage during the construction phases due to the remedial measures being put in place.

During the operational phase, the increase in the quantity of effluent within the Local Authority sewer network will result in a slight impact on this network.

Air

The main environmental nuisance associated with construction activities is dust. However, if the construction contractor adheres to good working practices and dust mitigation measures the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.

A modelling assessment was carried out to determine the potential increase in ambient pollutant concentrations as a result of the traffic volumes onto the current road network. The modelling approach took a number of conservative approaches to the input data to allow a margin of tolerance in the results and ensure a worst-case scenario of predicted results. The results for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality. The existing backgrounds are relatively low and the increased pollution as a result of the evening peaks of traffic from the proposed development is not predicted to lead to breaches of the relevant air quality limits.

With regard to the potential impact of the proposed development on the climate of the environs of the subject site, it is anticipated that once significant consideration is given to the environmental impact of greenhouse gas emissions at the design stage and that heating and energy systems are operated in accordance with principles of best practice or within consent conditions, the effect of a domestic heating system and energy supply are not considered to be significant. Furthermore the use of natural gas will significantly reduce the

potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Noise

Noise during the operational phase of the development is predicted to be minor with road traffic being the largest contributor. Noise resulting from development related traffic is not predicted to lead to any significant impact at the nearest noise sensitive locations to the proposed site.

With regard to construction activities, all plant items used during the construction phase should comply with standards outlined in 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1998. During the construction phase the following noise control measures are proposed: (i) selection of plant with low inherent potential for generation of noise and/or vibration (ii) siting of plant away from sensitive noise receptors where possible (iii) erection of temporary screens around noisy items of plant where possible and/or at the site boundary (iv) erection of temporary screens around noisy items of plant and around the site perimeter.

Predicted noise levels for the construction phase of the development are within recommended limits. The Local Authority will set down permissible construction times. Hence the noise and vibration impact of this phase of the development should be kept to a minimum.

Landscape and Visual Assessment

The removal of existing hedgerows and trees from the interior of the site in the initial stages of construction will result in a slight, permanent landscape impact. However, following additional planting on the site the overall effect on landscape vegetation will be positive.

In the operational stage the landscape measures and planting proposed on the site will mature changing the landscape character from agricultural to infrastructural/commercial. Additional distinct landscape features such as water features, tree and shrub plantings, sculptures etc, will have a positive impact on the landscape amenity value of the site and the overall amount of significant tree cover will be increased.

The subject site is not particularly visible in the wider landscape area and consequently, the effects on views during the construction phase will be generally slight.

During the operational phase, the effect on views from dwellings along the Nangor Road will be moderately negative, as views of the Dublin Mountains from these dwellings will be partially blocked. Views from Kilbride House to the north will have a moderate negative impact due to a reduction in the visual quality of the landscape.

With regard to views from within the site, the proposed development will generate a moderate change to the character of the existing views during its operational phase. New landscape features will create a distinct, visually interesting landscape setting. However, removal of the agricultural landscape will result in a slight negative impact overall.

The impact on views of the site from Grange Castle Golf Course is predicted to be slight as the proposed development will be screened from the course.

During the construction phase, all mature trees, hedgerows and bushes to be retained should be appropriately fenced for protection. The landscape works during the construction stage will entail the monitoring of the topsoil stripping and the establishment of the main structural planting on the street areas. Following completion of the works there will be an ongoing programme of landscape management for the site, which will be overseen by a Landscape Manager or Landscape Architect.

Traffic and Transportation

During the construction phase, the primary access point to the site will be via the existing roundabout junction on the Nangor Road. A construction management plan will be prepared where construction traffic will be managed to avoid peak traffic conditions on the surrounding road network. Where possible, excavated material and material will be recycled / reused on site. During excavation and removal of this material from the site, road cleaning and wheel washing at vehicular accesses from the site will be carried out.

During construction it is considered that there will be adequate land within the curtilage of the site to accommodate temporary car and truck parking for construction staff and operations at the early stage of the programme, and at later stages there will be adequate car parking space available in the basement of the development.

With regard to the operational phase of the development, the analysis undertaken for the roundabout junction on the Nangor Road indicates that this junction will operate satisfactorily in the year 2007 with approximately 70% of the traffic from the overall development. Any additional traffic from the proposed development will result in excessive queuing. Consequently it is proposed to phase the completion of the completion of the development to 70% until such a time as the Baldonnell Road access junction is provided at the southern site boundary.

The analysis further indicates that the Baldonnell Road priority junction will perform well within capacity during the 2020 post development scenario when 30% of the development traffic will access the site via Baldonnell Road.

It is proposed to provide parking on the site generally in accordance with the county development plan standards. The exact details with regard to the quantity of parking provided will be decided at planning application stage when applications for individual buildings within the business park are submitted.

A mobility management plan has been prepared in order to provide direction to the developer, the Local Authority and public transport agencies on ways to best achieve an improved modal split for the journey to work, and minimise the traffic impact as a result of encouraging greater use of public transport, cycling and walking.

Cultural Heritage

Local History

An assessment of the receiving environment in terms of local history indicated that there are no historic events associated with the subject site that require consideration in the undertaking of the overall design and boundaries of the development. Consequently no remedial measures are deemed necessary with respect to local history.

Archaeology

There are no previously identified monuments or features of archaeological interest and/or potential located within the proposed development lands. Consequently no remedial measures are required with respect to existing archaeological monuments.

There is a possibility that undocumented sub-surface archaeological features and material might exist within the boundaries of the overall development lands. Mitigation measures in this regard include the presence of an archaeologist on site to monitor all programmes of topsoil stripping/general ground surface reduction works.

The development of the subject lands will not cause any impacts with respect to structures of architectural heritage. Consequently, no pre-development remedial or reductive measures are required in this regard.

2.7 INTERACTIONS

There are a number of interactions of effects regarding aspects of the environment. There are no significant long-term adverse impacts arising from this proposed development. There will be short-term adverse impacts, and there will there be positive and beneficial impacts arising from the development.

2.8 ESTIMATED TYPE AND QUANTITY OF EXPECTED RESIDUES AND EMISSIONS RESULTING WHEN DEVELOPMENT IS OPERATIONAL

These are detailed elsewhere in this non-technical summary in Section 2.6 entitled – *'Likely Significant Environmental Effects and the Measures Envisaged to Avoid, Reduce or Remedy them'*. It is not considered necessary to reiterate them at this point.

2.9 DIRECT AND INDIRECT EFFECTS ON THE ENVIRONMENT RESULTING FROM THE USE OF NATURAL RESOURCES

The likely significant direct and indirect effects on the environment of the proposed development which may result from the use of natural resources, in this case the natural resources being the land encompassed within the subject site, have been comprehensively assessed in this Environmental Impact Statement.

2.10 LIKELY SIGNIFICANT DIRECT AND INDIRECT EFFECTS RESULTING FROM EMISSION OF POLLUTANTS, CREATION OF NUISANCES AND ELIMINATION OF WASTE

Details of emissions arising from the development together with any direct and indirect effects resulting from same have been comprehensively addressed and are outlined in greater detail in the relevant sub-sections of Section 5.0 – 'Aspects of the Environment Considered'. There will be no significant direct or indirect effects on the environment arising from these sources.

2.11 METHODS USED TO FORECAST IMPACTS ON THE ENVIRONMENT

The methods employed to forecast the effects on the various aspects of the environment are standard techniques used by each of the particular individual disciplines. The general format followed was to identify the receiving environment, to add to that a projection of the 'loading' placed on the various aspects of the environment by the development, to put forward mitigation measures to lessen or remove an impact and thus arrive at a net predicted impact.

2.12 DIFFICULTIES IN COMPILING ANY SPECIFIED INFORMATION

No specific difficulties were encountered in obtaining baseline information. Wherever necessary, surveys were carried out to supplement existing available data. Generally speaking, the best available methods were employed to forecast environmental effects.

3.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 INTRODUCTION

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of approximately 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

3.2 INFORMATION ON THE SITE OF THE PROPOSED DEVELOPMENT

The site to which this EIS relates is located in the central western area of County Dublin, to the north of Baldonnell (Military) Aerodrome and approximately 2.5km to the west of Clondalkin village. The site is bound to the north by the R134 (the Nangor or Clondalkin-Milltown Road), Grange Castle Business Park and Kilcarbery Business Park and to the south by a minor road which runs from the R134 to the N7, and Baldonnell Aerodrome. The eastern edge of the subject lands is bordered by Grange Castle Golf Club. The lands to the west of the subject site are currently in agricultural use.

The subject site currently consists of vacant agricultural fields which collectively comprise an area of 39.84 hectares. The site is zoned for enterprise, employment and related uses under the South County Dublin Development Plan 2004-2010. In this regard the development plan contains an objective in relation to this area requiring the production of a Masterplan for the *"lands at Baldonnell, Greenogue and west of Grange Castle Golf Course, zoned in this Development Plan for Enterprise and Employment purposes".*

The Development Plan further stipulates in relation to these lands that *"Masterplans shall be prepared and agreed with the Council for their overall development and the control of new development shall be carried out in accordance with the terms of these Masterplans".*

In this regard a Masterplan has now been prepared for the subject site together with the existing agricultural land immediately to the west of the subject site at Milltown, which collectively comprise an area of approximately 200 acres. A copy of this Masterplan is included with this planning application.

The objective of the Masterplan is to guide the development of the lands at Milltown and Kilcarbery in a coherent, transparent and rational manner. It is intended that each of these sites will be developed as two distinct business parks. The vision for the area is to carefully control development to attract the right balance of enterprise/financial and clean industry employers that will increase the value and profile of the area. The provision of roads and services to facilitate the future development of Profile Park is the subject of this planning application.

3.3 INFORMATION ON THE DESIGN AND SIZE OF THE PROPOSED DEVELOPMENT

Road Network

The spine road in Profile Park will connect to the Nangor Road at the location of the existing roundabout providing access to Kilcabery Business Park. This roundabout will be changed to a traffic signal controlled junction, if a QBC is installed on the Nangor Road. A spur connection off the spine road in Profile Park will connect onto the Baldonnell Road at the southern perimeter of the site. This spur connection will be the subject of a subsequent planning application. The spine roads in Profile Park and the adjacent business park at Milltown will not be connected in order to prevent through-traffic movements.

The first section of spine road leading into the business park will be a dual carriageway from the entrance to the first internal roundabout. The dual carriageway generally consists of two 6.5 metre wide carriageways with a 2 metre wide central median. On either side of the carriageway there are 4.5 metre wide zones containing grass verges, footpaths and on one side only, a cycle path. Outside these zones there are two, five metre wide landscaped mounds.

Inside the first roundabout after the entrance, the central median is omitted and the spine rod becomes a 9 metre wide single carriageway. The 4.5 metre wide verge/footpath/cycle path and the 5 metre wide landscaped mounds are retained for the full length of the spine road. Car parking will not be permitted on the spine road, which will be achieved by having a painted median in the centre of the road with the lane widths kept to a minimum to discourage parking. The painted median will be omitted at junctions, etc, where right turning lanes are required.

The remainder of the estate roads will have a 7.5 metre wide carriageway with the same 4.5 metre wide verge/footpath/cycle path zones on either side. The future link road connecting onto the Baldonnell Road will be 9 metres wide. The width of the landscaped mounds on either side of these roads will be 5 metres.

The cycle path will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority for cyclists.

Services

The infrastructure within the Grange Castle Business Park to the north of the site was designed to cater for the lands for which a Masterplan has been prepared and of which the subject site forms part. Thus in general, each of the business parks will be served via the Grange Castle Business Park.

Services within the subject site including drainage, water mains, telecommunication ducting, ESB ducting, gas main, etc are generally located under the grass verges, footpaths and cycle paths.

The service connections for the foul drainage, telecommunications and IT, gas main and ESB will all be provided as part of the road construction comprising the realignment of the Nangor Road and the construction of a new entrance into Grange Castle Business Park. The connection point for the services feeding into Profile Park will be located in a services wayleave to the south of the realigned section of the Nangor Road. The services for Profile Park will pass through a

wayleave on the Milltown park site, to reach the connection point on the Nangor Road.

The surface water run-off from the site will be discharged to the tributary of the Griffeen River which flows from south to north through the site to Grange Castle Business Park. This tributary will be upgraded to cater for this surface water run-off. The run-off from each of the business park sites will be attenuated on site to give a maximum discharge of 4.2 litres/second/hectare, and any run-off from the roads, car parks, etc within each site will be passed through a petrol inceptor before being discharged to the main drainage system.

The watermain connection for each business park will be taken from a 700 mm diameter trunk water main (the 'Low Level Lucan/Palmerstown Water Supply Scheme'), which runs along the southern edge of the Nangor Road. Each of the business parks will have two connections to this watermain, and a ring main will be provided within each park. In order to reduce water requirements on the site some rainwater run-off will be stored on site in several water features and water from this source will be used for the irrigation of soft landscaped areas. In addition each business within the park will have a metered water connection and shall be liable for water charges.

The foul effluent from the business park will discharge by gravity to a new foul sewer, which is being installed as part of the road construction works comprising the realignment of the Nangor Road and the construction of the new entrance to the Grange Castle Business Park. The effluent from Profile Park will discharge to a new manhole on the realigned Nangor Road and will then fall by gravity to an existing pumping station in the Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend in Dublin City, via the Grand Canal Sewer.

The effluent from each business shall be treated to at least domestic standard before being discharged to the Council's sewer.

Telecommunications and IT ducting is being provided to cater for four different telecoms providers, each of which will have their one dedicated set of ducting and chambers.

The electricity supply to Profile Park will be taken from a 110 kV National Grid substation, which was constructed within the Grange Castle Business Park. This substation serves the existing Wyeth and Takeda developments, and has the capacity to cater for the foreseeable future demand in the area.

Profile Park will be supplied with natural gas from Bord Gais via a new pressure reducing station which has been installed within the Grange Castle Business Park. Where individual users within the site decide to use oil or LPG for heating etc, this will be stored on their own site and no significant lengths of distribution pipe work will be required.

3.4 CONSTRUCTION PROGRAMME, PHASING AND LAND USE REQUIREMENTS DURING CONSTRUCTION

It is anticipated that the development which is the subject of this planning application will be constructed in two phases. The first phase comprises the majority of the road network except the secondary road which runs parallel to the

boundary with Grange Castle Golf Club. The estimated completion timeframe for phase 1 is 6 months. It is estimated that construction of Phase 2 may commence approximately one year later subject to demand for individual sites within the business park.

The development of the remainder of the business park will be subject to market forces and as such will be developed on a site by site basis as required.

3.5 EMISSIONS AND WASTES

Drainage

Foul effluent arising from Profile Park will discharge to a new manhole on the realigned Nangor Road and will then fall by gravity to an existing pumping station in the Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend in Dublin City, via the Grand Canal Sewer.

Emissions

The main environmental nuisance associated with construction activities is dust emissions. If good working practices and dust mitigation measures are adhered to the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.

With regard to traffic derived pollution resulting from the business park development, the results of the traffic modelling for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality.

The impact of the business park on the climate of the area is not considered to be significant. The use of natural gas to fuel individual buildings will significantly reduce the potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Solid Waste Disposal

It is intended to minimise the volume of material removed from the site. Topsoil will be retained on site for re-use in the landscaped mounds. The material to be removed from the site will generally be subsoil with an estimated volume of approximately 14,000 m^3. This equates to approximately 11-12 truck movements per day over a 6 month period. This material will be transported to a normal landfill facility.

A policy of waste recycling will be adopted in the management of Profile Park which will be incorporated into tenancy agreements etc. Paper, plastic and glass waste will be stored and collected separately.

4.0 PLANNING AND DEVELOPMENT CONTEXT

4.1 INTRODUCTION

This chapter sets out the strategic and statutory development context for the subject lands. This analysis refers to a number of Guidelines and Statutory documents as well as to the South County Dublin Development Plan 2004-2010. Reference is also made to other Masterplan documents which have been prepared for lands within the immediate vicinity of the subject site.

In addition this Chapter examines issues of accessibility in respect of the subject lands as well as providing an analysis of the alternatives considered with respect to the proposed development.

4.2 STRATEGIC PLANNING CONTEXT

Sustainable Development: A Strategy for Ireland (1997)

The Department of the Environment document *'Sustainable Development; A Strategy for Ireland'* recognises that land use planning can support sustainable development in a number of ways.

The principle of sustainable development underpins Ireland's industrial policy, the key objective of which is to promote a strong, internationally competitive enterprise sector, comprising both indigenous and non-national companies, which will make the maximum contribution to self-sustaining employment growth.

Dublin Transportation Office: A Platform for Change (2000-2016)

This Government backed strategy has two interdependent elements:

- Improvements in infrastructure and services to increase the supply of transport, including a substantial expansion of the public transport network, some strategic road construction and traffic management.

- Demand management, to reduce the growth in travel through the application of land use and other policies while maintaining economic progress, and which is designed to encourage a transfer of trips, especially at peak periods, from the private car to sustainable modes of transport (such as public transport, cycling and walking).

As this is an integrated strategy, it is recognised that it will only be effective when both elements are implemented together in a coherent manner. Developing the infrastructure element alone will not be enough. It must be accompanied by the demand management element and the complementary policies if the strategy is to achieve its overall objectives.

With regard to the lands which are the subject of this planning application, the strategy indicates proposals for both the expansion of the strategic road network as well as improved public transport within close proximity of the subject site.

These proposals have been integrated into overall proposals for the Masterplan study area. The more recent "Transport 21" investment programme (November 2005) has solidified those proposals for public transport in the Clondalkin area.

For example, proposals for both Dart/Suburban Rail and Metro serving the Clondalkin area have been reconfirmed, while the 'Outer Ring Road' section to the immediate east of the site was recently completed. These transport infrastructure developments will beneficially serve the future development of the subject site and the remainder of the Masterplan lands. The consolidation of public transport already serving the adjoining Business Parks will comply with demand management strategies without hindering economic progress.

National Spatial Strategy (2002-2020)

The Government's *"National Spatial Strategy"* (NSS) is intended to set a national context for spatial planning which will inform Regional Planning Guidelines and strategies, as well as County and City Development Plans and strategies.

The NSS advocates that, "*policy must recognise the different locational requirements of enterprise activity in various parts of the country. Targeted strategies must seek to strengthen a wider range of areas, without damaging areas that are already performing strongly. The inherent advantages of the South and East (S&E) region in its overall contribution to national economic development must be consolidated and, at the same time, the relative deficit of demographic, settlement and productive resources which is limiting the development potential of the Border, Midlands and West (BMW) region must be addressed.*"

It is envisaged that the proposed Masterplan area will develop in tandem with the existing International Business Park at Grange Castle, immediately to the north of the study area. Thus, the policies of the NSS for the South and East region relating to the consolidation of established development areas which contribute to national economic development are consistent with the principle of development at the subject site.

Regional Planning Guidelines for the Greater Dublin Area (2004 – 2016)

The Regional Planning Guidelines for the Greater Dublin Area (RPGGDA) were prepared for the four Dublin Local Authorities (Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire-Rathdown County Council) together with Meath, Wicklow and Kildare County Councils. These Guidelines provide a long term planning framework for the development of the Greater Dublin Area in the 12-year period up to 2016 and within the vision of the National Spatial Strategy for 2020. The Guidelines have statutory force under the Planning and Development Act 2000 and must be taken into account by local authorities in the preparation of development plans and the assessment of planning applications.

The Guidelines embrace the principles of sustainable development, as set out in the National Sustainable Development Strategy and conform to the direction of emerging policy in Europe, emanating from the European Spatial Development Perspective. The main aim of the RPGGDA is the consolidation of future growth as a response to the unsustainable urban sprawl that has characterised the Greater Dublin Area in recent decades.

The key to future development of the Metropolitan Area is the realisation of a sustainable and integrated public transportation system that will reduce dependency on the private car. This will allow for the consolidation of significant

levels of additional development into the area and allow for higher development densities than traditionally applied.

The principal implications of the Guidelines for the development of Profile Park, which is located within the Metropolitan Area, include:

- The incorporation of the principles of sustainable development.
- The inclusion of adequate provision for appropriate public transport, which should have precedence over the requirements of the private car.
- The close integration of new and existing development with the public transport system.

The Guidelines state that within the economy there are a number of distinct trends that are predicted to continue, including the tendency towards spatial concentrations of technology intensive companies in electronics, chemicals and pharmaceuticals, medical products and software. The Guidelines also add that the key centres for future economic development in the Greater Dublin Area are Arklow, City West, *Grange Castle*, Media Lab-Liberties, Naas, Navan and Park West. Four sectors are considered to offer the best potential to contribute to the future development of the region; they are Life Sciences, International Services (including Financial Services (IFSC) and e-commerce, ICT/ Software development and e-learning/ Digital Media).

Having regard to the '*Location of Industrial and Commercial Development*', the Guidelines state that the least restrictive enterprise land use approach to zoning of land, consistent with good planning, should be taken and a sufficient amount of serviced land should be available to meet demands from enterprise. A high quality built and natural environment that is attractive to industry is to be promoted and the speedy implementation of key infrastructural projects, including a coherent solid waste management strategy, should be supported. The Guidelines add that the location of developments that attract a large numbers of people, such as employment uses or major recreational facilitates, should be encouraged on transportation corridors offering access to a number of transport modes.

The proposed development of the Masterplan study area, which is a suitably zoned and serviced subject site, located adjacent to an already successful International Business Park at Grange Castle, is clearly consistent with the policies and objectives of the RPGGDA to consolidate and expand the development of enterprise within an already developed enterprise area.

4.3 COUNTY AND LOCAL CONTEXT

South Dublin County Development Plan

Land use in the study area is subject to the objectives and polices of the South Dublin County Development Plan 2004-2010, which came into effect on 8th December 2004.

The most significant land-use planning issues affecting the study area include:

- The application of the principles of sustainable development.

- The close integration of development with existing and future public transportation.

- The balanced development of the area for a range of appropriate uses, including small, medium and large scale businesses, together with ancillary services.

- Conformance with the planning polices and standards relating to Baldonnell Aerodrome. It should be noted that the Masterplan which has been prepared for the subject lands conforms with the Development Plan policies relating to development in the vicinity of Baldonnell Aerodrome, with specific reference to Schedule 4 of the current County Development Plan, where the use, height and type of development are controlled within the envelope of the aerodrome cordon as illustrated in the County Development Plan Index Map.

The following Development Plan zoning objective covers the entire Masterplan area (see figure 4.1 below):

'Objective E: To provide for Enterprise, Employment and Related Uses'

Uses which are '*permitted in principle*' in this zone include:

Abattoir, advertisements and advertising structures, carpark, cash & carry/ wholesale outlet, crèche / nursery school, enterprise centre, halting sites / group housing, heavy vehicle park, household fuel depot, industry – general, industry – light, industry – special, motor sales outlet, office less than 100 sqm, offices 100 sqm – 1,000 sqm, offices over 1,000 sqm, office based industry, open space. Petrol station, public services, refuse transfer station, science and technology based enterprise, scrap yard, service garage, shop – local, transport depot, warehousing.

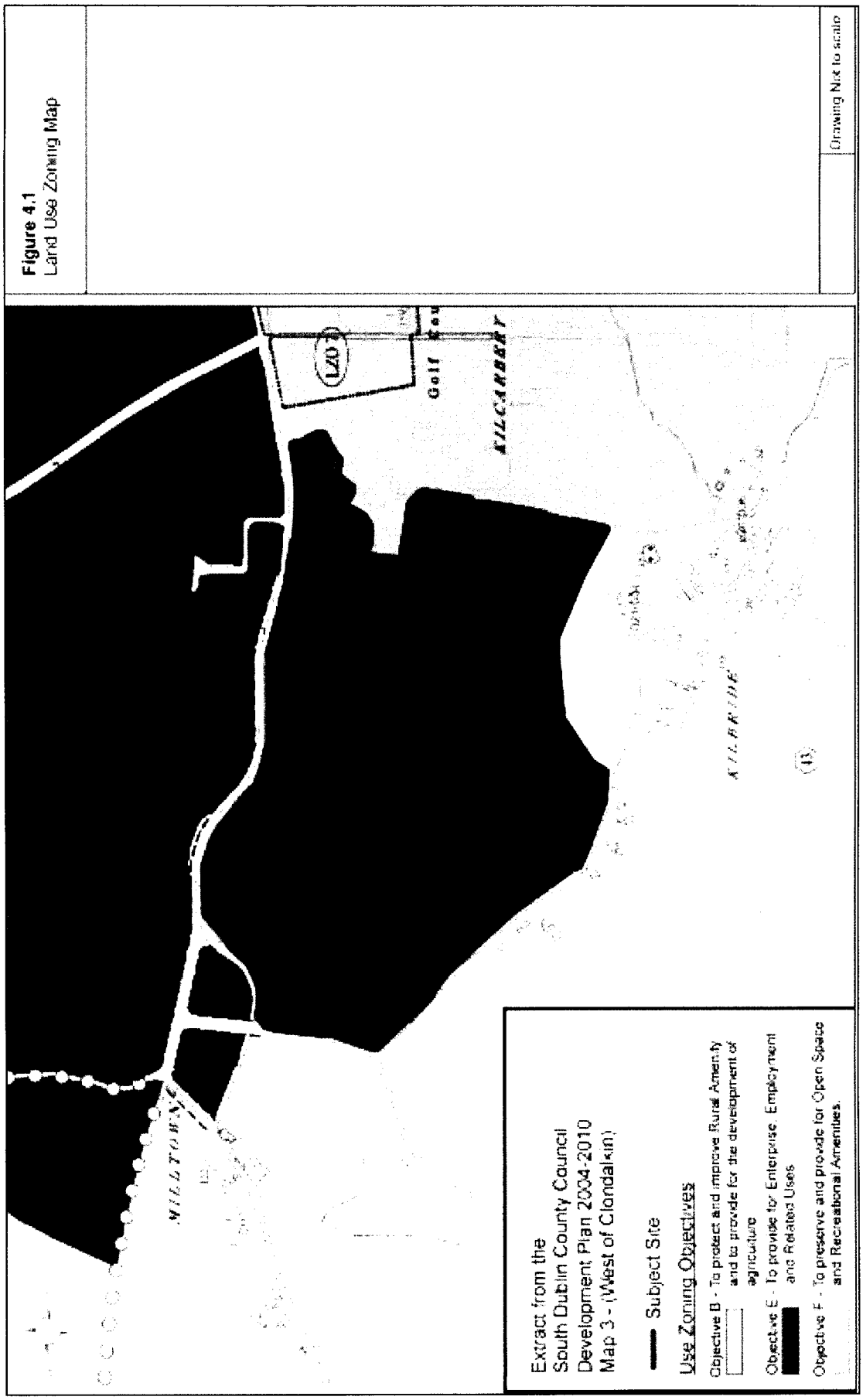
Uses which are '*open for consideration*' include:

Agricultural buildings, bed & breakfast barding kennels, church, community centre, concrete/asphalt (etc.) plant in or adjacent to a quarry, cultural use, dance hall / discotheque, doctor / dentist, education, funeral home, garden centre, health centre, home based economic activities, hotel / motel, industry – extractive, public house, recreational buildings (commercial), recreational facility / sports club, refuse landfill / tip, restaurant, retail warehouse, shop – discount food store, shop – neighbourhood, veterinary surgeon.

Uses which are '*not permitted*' include:

Aerodrome / airfield, betting office, caravan park / holiday, caravan park – residential, cemetery, guest house, hospital, nursing home, residential, residential institution, retirement home, rural industry – cottage, rural industry – food, shops – major sales outlet.

Figure 4.1: Land Use Zoning Map



Objectives/Policies Pertinent to the Subject Site

The County Development Plan makes reference to a number of specific local objectives in regard to development of the subject lands:

- Specific Local Objective No. 49

Prior to the commencement of any development on the lands at Baldonnell, Greenogue and West of Grange Castle Golf Course, zoned in the Development Plan for Enterprise and Employment purposes, Masterplans shall be prepared and agreed with the Council for their overall development and the control of new development shall be carried out in accordance with the terms of these Masterplans. Any office floorspace which is ancillary to industrial or warehousing uses shall not exceed 20% of the total floor area of any such developments. (South Dublin Development Plan; Ch.14)

A Masterplan for the subject lands has now been prepared and is included as part of this planning application.

- Specific Local Objective No. 51

Development on the eastern boundary of lands adjoining Grange Castle Golf Course shall be of high quality siting, design and finish, and shall have regard to the location of the Golf Course. (South Dublin Development Plan; Ch.14)

Further Development Plan policies, which are of relevance to the subject lands, include the following:

- Policy EE7

Office developments with a high level of employment should normally be located in areas where there is convenient access to a good public transport network (i.e. QBC, LUAS or heavy rail. (Ch. 2.3.7.ii)

- Policy EE8

On lands zoned for enterprise and employment (objective 'E'), it will be an objective to consider whether there is a need to require that suitable provision should be made for small and medium scale enterprises within the overall development scheme, in order to ensure that an appropriate mix of commercial / industrial uses is accommodated within the area. (Ch. 2.3.8.ii)

- Policy EE10

It is the policy of the Council to facilitate the provision of local service centres in enterprise and employment zones to cater for the local retail, crèche and other daily services needs of those working in these employment areas as appropriate. (Ch. 2.3.10.i)

Grange Castle/Corkagh Masterplan and Framework Study 2000

This Masterplan, as adopted by South Dublin County Council relates to approximately 783 hectares of land, with a core area of approximately 442 hectares located immediately to the north and east of the site which is the subject

of this planning application. The County Council owns the principal development areas within the Framework/Masterplan area.

The area incorporates the Grange Castle International Business Park, which is the world's largest integrated biotechnology campus, together with wide-ranging amenities including Corkagh Regional Park, Grange Castle Golf Course and a section of the Grand Canal.

The plan for the Business Park element proposed a flexible response to the needs of incoming biotechnology, information and communication technology, pharmaceutical and electronics investors.

The Framework/Masterplan also proposed an extension to the Grange Castle Golf course to include a 27-hole course, a 100 bedroom hotel with conference and leisure facilities, 40 apartments and 60 houses. The Framework/Masterplan further proposed to extend the Corkagh Regional Park along the Outer Ring Road, to enhance the Grand Canal corridor, and to develop an area of residential land to the south of the Nangor Road, including the possible neighbourhood centre and further development of the existing school, with links to the existing residential area to the north of the Nangor Road to be improved.

At this point in time, the Wyeth and Takeda plants, located within this Business Park, are operational, and the majority of the primary infrastructural work within that Business Park has been completed. In addition a planning application lodged by the IDA for a single large 'circuit manufacturing campus' at the end of January 2006, which will occupy much of the remaining land within this business park, was recently granted permission by South Dublin County Council.

Grange Castle Masterplan (updated) 2005

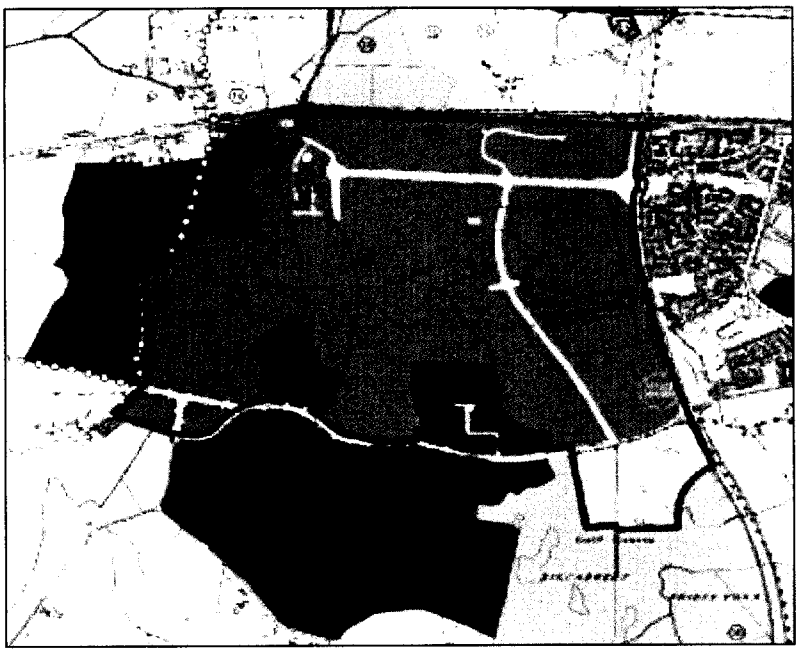
The updated Masterplan for Grange Castle focuses primarily on the Grange Castle Business Park element of the previous Framework/Masterplan. This smaller area now covers approximately 200 hectares (see figure 4.2 below). As per the 2000 Masterplan, it is being developed as a high-tech industrial environment with sites of up to 40 hectares in size. It has been designed in a low density campus style format "*so that the rural benefits of the location are preserved for all to enjoy*". Having regard to the proposed roads network, it is notable that the "Stables Greenway" from the 2000 plan has been realigned to connect with the Nangor Road further to the west near the Griffeen River. Furthermore, prior proposals in the 2000 plan for a central connector road between the "Stables Greenway" and the "Fairways Greenway" have been omitted.

The 2005 Plan includes a non-statutory zoning diagram of the study area that identifies the preferred land use in the various potential development sites. This concept was developed in the original zoning study in the 2000 Plan. The 2005 Plan also examines the issues associated with the implementation of a large Masterplanning project. It proposes an ongoing review of design guidelines and a maintenance structure including a pivotal role for site management in the Park.

The establishment of a marketing plan with IDA Ireland for the Business Park land and also the golf course site is stated to be of critical importance to achieve full development of the study area. The Business Park's Marketing Plan will be an important tool in attracting potential clients to the site, as public awareness of the identity of Grange Castle area needs to be increased. To this end, the

document is published on the internet as a live webpage that will be maintained and updated in line with the growth and development of the Business Park.

Figure 4.2: Grange Castle Masterplan 2005



Profile Park/Milltown at Grange Castle Masterplan 2006

This Masterplan relates to an area of approximately 200 acres located to the south of Grange Castle in South County Dublin. The site which is the subject of the current application accounts for approximately 100 acres of this area. This Masterplan has been prepared in accordance with the requirements of the South County Dublin Development Pan 2004-2010 which has zoned this area for *'Enterprise, Employment and Related Uses'* and which has identified the area as one for which a Masterplan must be prepared. The Development Plan also states that control of new development shall be carried out in accordance with the terms of this Masterplan.

The stated objective of the Masterplan is to guide the development of these lands in a coherent, transparent and rational manner. It is proposed that the Masterplan area will be developed as two distinct business parks. The site which is the subject of this planning application shall be known as *'Profile Park'*, while the site to the west will be known as *'Milltown Business Park'*. Pedestrian links are proposed between the two parks however, the internal road network on the Masterplan lands will reflect the separation of the business parks as both will have separate vehicular entrances.

As the Masterplan area comprises a single Development Plan zoning objective, it is proposed that the distribution of uses through this area will be more a function of form than zoning with specific building uses laid out in a logical and coherent pattern. High profile enterprise, services and office uses shall address the primary internal road network and public areas, while larger unit uses will generally occupy discreet sites.

The Masterplan proposes the creation of five 'Character Areas' within the Masterplan lands. In each of these areas a vocabulary of the landscape treatment of public spaces is suggested, with objectives for green spaces, squares, courtyards and spaces for cars.

The landscape design concept for the Masterplan area aims to create a unique visual image for the park. This involves enhancing the entrance spaces, roadways, building frontages and incidental spaces with a select landscape treatment with high quality materials proposed throughout. The landscape design concept also aims to create a network of open spaces for the site, forming a hierarchy of pedestrian spaces which can be used to provide pedestrian-friendly access.

4.4 ACCESSIBILITY

Existing Road Network

The Grange Castle area is strategically located on the western fringe of Dublin approximately 16 km southwest of Dublin International Airport, 10 km west of Dublin City Centre and approximately 2.5 km from Clondalkin village. Nearby towns and villages within the administrative area of South Dublin County Council include Lucan 2.5 km to the north, Tallaght 3 km to the southeast, Saggart 4 km to the southwest, Newcastle 3 km to the west. Leixlip is located 6 km to the northwest within Co. Kildare.

The subject site is located between the N4 and N7 National Primary Routes and approximately 5 km west of the M50 Motorway, the orbital ring road around Dublin City. The recently completed Grange Castle Road (R136) (Outer Ring Road – Phase 1) links the subject site with the N7 National Primary Route from Dublin to the south and southwest of the country. The subject site is 2.5 km south of the N4/M4 National primary road from Dublin to the Midlands, West and Northwest, which is proposed to be linked directly in Phase 2 of the Outer Ring Road.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has been improved over recent years and consists of a single side carriageway with dedicated bus lanes in each direction extending as far out as the Outer Ring Road. The Nangor Road along the northern site boundary and to the west is of lower standard in terms of alignment and cross-sections, but is due to be upgraded shortly. The Outer Ring Road Phase 1 opened from the N7 as far as Grange Castle International Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction.

Existing Public Transport

The No. 68 Dublin Bus Route operates along the Nangor Road at the northern boundary of the subject site. Approximately 1.5 km east of the site, the No. 51B, 51X and 210 Dublin Bus Routes operate along the Nangor Road. Clondalkin Village is served by the No. 69, 76, 76A and 76B Dublin Bus Routes. The Quality Bus Network in the area is expanding with dedicated bus lanes on the Nangor Road east of the Outer Ring Road and the Outer Ring Road itself.

The main intercity rail line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, is located north of the subject site. Intercity services are mainly to Cork and Limerick/Shannon, with a commuter service to Kildare. The nearest station is at Clondalkin approximately 3 km northeast of the subject site which is served by 15 commuter trains in each direction during weekdays.

Proposed Transport Improvements

'Transport 21' is a transportation strategy commitment by the Government to significantly improve the country's transport network within a 10-year timeframe up to 2015. The Strategy will include major investment in both public transport and road infrastructure in the Greater Dublin Area.

Proposed Road Improvements

Phase 2 of the Outer Ring Road, which will see a local link road from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road, is due for completion in 2006. Following completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and N7. Phase 3 of the Outer Ring Road, continuing south from the N7 to the N81 Blessington Road is scheduled to open late 2006/early 2007.

The upgrading of the N7 to dual three-way standard from Dublin to Naas is underway and is anticipated to be completed by the end of 2006. Improvements are also planned to the N4 to bring it to dual three-lane standard as far as the Leixlip Interchange from the M50/N4 Interchange within three years.

The Nangor Road west of the subject site and extending as far as the R120 is also being realigned and will consist of approximately 2.03 km of a two-way, single carriageway road. The land acquisition process for this realignment commenced in January 2006.

The following road infrastructure identified in Transport 21 will have a positive impact on the road network in the area:

- Dublin Port Tunnel (completion date - 2006)
- M50 upgrade Phase 1 (completion date - 2007)
- M50 upgrade Phase 2 (completion date - 2010)

Proposed Public Transport Improvements

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme – 2004/5) within the vicinity of the site including the following:

- South Clondalkin QBC – Grange Castle roundabout to Bawnogue Road – Work completed.
- South Clondalkin QBC – Ninth Lock to Naas Road – Completed March 2006
- Outer Ring Road QBC – Completed January 2005

- Naas Road QBC – Kingswood to Bluebell Q3 –Phase 1 completed April 2005, Phases 2 and 3 60% and 98% complete respectively as of April 2006.

These objectives form part of the extensive QBN that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 – 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, better pedestrian and cycle facilities encouraging commuters to use alternate mode of transport to private cars.

Proposed public transport infrastructure identified in Transport 21 which will have a positive impact on the public transport infrastructure network in the area include the following:

- Dublin City Centre rail resignalling (completion date 2009)
- Opening of new Dublin City Centre railway station (2010)
- Kildare rail upgrade
- Metro West Phase 1 Tallaght - Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)
- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extended electrification to Hazelhatch (2015)
- Rail interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015)

In addition the development at Adamstown, north of the subject site, includes a new railway station which will be approximately 2 km from the subject site.

4.5 ALTERNATIVES CONSIDERED

The subject site is zoned for enterprise, employment and related uses under the South Dublin Development Plan 2004-2010. The development of a business park on these lands was deemed appropriate having regard to the relevant policies contained in the development plan and to the land uses which are *'permitted in principle'* and *'open for consideration'* under the use zoning. Furthermore the subject site is located in an area which has already seen considerable development of a similar nature at Kilcarbery and Grange Castle Business Parks which are located immediately north of the subject site. Consequently the consideration of alternative sites to accommodate the proposed development was not deemed necessary in this instance.

In line with the requirements of the South Dublin Development Plan 2004-2010, a Masterplan has been prepared for the subject lands. The initial step in the preparation of this Masterplan was to undertake a scoping exercise for the lands. This exercise allowed alternative development options to be assessed and a final masterplanning approach to be decided upon.

A number of alternatives were considered during the design process of the roads layout which is the subject of the current planning application. The final road layout proposed reflects the requirements of the Roads Engineering Department of South Dublin County Council and also the future land uses proposed on the site in terms of plot size and arrangement.

The final road layout proposed within the site also reflects input received from the other EIS specialists with regard to potential impacts arising from the proposed development.

The option of providing road access to the site from the southern site boundary was also considered as part of this planning application. However, an analysis of the traffic levels which will be generated on site as a result of the completed business park development indicate that a 70% build out of the site can be accommodated by the northern access alone. As a result it was decided during the road design process that the southern access to the site will be provided at a later stage and as such will be the subject of a separate future planning application.

5.0 ASPECTS OF THE ENVIRONMENT CONSIDERED

5.1 HUMAN BEINGS

General

Human beings form one of the most important aspects of the environment which must be given consideration as part of this EIS. Any likely significant impact on human beings therefore must be comprehensively addressed. The principal concern in this regard is that human beings experience no significant unacceptable diminution in any aspect of *'quality of life'* as a consequence of the construction or operation of the proposed development. This section of the Environmental Impact Statement considers the human environment in the vicinity of the subject site, in terms of population profile and trends, employment and community aspects.

The site which is the subject of the current planning application is a vacant greenfield site and as such, does not have any resident population. Thus the proposed development will have no negative impact on any existing population nor will it result in the severance of any existing community. The site is located within the Electoral Division of Clondalkin Village. Census data for this Electoral Division has been used as the best available source to identify trends with respect to the population of the wider area of which the site forms part.

5.1.1 POPULATION

5.1.1.1 RECEIVING ENVIRONMENT

The most recent census of population was undertaken on 23rd April 2006. The results of this census were not available at the time of the writing of this EIS therefore the results of the 2002 Census of Population have been used for the purposes of this assessment. The smallest geographical units distinguished by the Central Statistics Office are Electoral Divisions. In this regard the subject site is located within the Electoral Division (ED) of Clondalkin Village.

This section of the Environmental Impact Statement examines recent demographic trends at Electoral Division, Local, County and State level. For the purposes of this assessment, the figures for County level relate to South County Dublin only, while the local level has been defined as those electoral divisions which are located immediately adjacent to the Electoral Division of Clondalkin Village as follows:

- Clondalkin-Ballymount
- Clondalkin-Dunawley
- Clondalkin-Monastery
- Tallaght-Belgard
- Tallaght-Fettercairn
- Newcastle

Figure 5.1.1 illustrates the location of the Electoral Divisions which have been defined as being at the 'Local Level' for the purposes of this assessment.

Figure 5.1.1: Electoral Divisions (ED) Map



Table 5.1.1 below indicates the population increase experienced in these areas between 1996 and 2002. It is noted that the population increase experienced in South Dublin exceeded that in the State as a whole between 1996 and 2002. The population growth at local level (as defined in Section 5.2.2 above) for the same period also exceeded that at State level. However the population growth in the Electoral Division of Clondalkin Village was notably lower than that experienced at Local, County and State level.

Table 5.1.1: Total Population 1996 – 2002

Area	1996	2002	Change in Population 1996-2002 (%)
Clondalkin Village ED	8,123	8,595	5.8
Local	29,688	32,897	10.8
County	218,728	238,835	9.2
State	3,626,087	3,917,203	8.0

Source: Census of Population 1996, 2002

Section 1.3.1(ix) of the South Dublin Development Plan 2004-2010 outlines population projections for South Dublin in 2010 based on the projections contained in the Regional Planning Guidelines. In this regard the projected population for South Dublin in 2010 is 253,292. This represents a 6% increase on the 2002 Census figure.

Age Profile

Table 5.1.2 below contains information on population according to age group for South Dublin, the whole of the Dublin Area and for the State.

Table 5.1.2: Population Classified by Age Profile

Age Group (years)	South Dublin (persons)	%	Dublin Area (persons)	%	State (persons)	%
0-14	53,671	22.5	215,192	19.2	827,428	21.1
15-24	44,248	18.5	199,267	17.8	641,522	16.4
25-44	76,808	32.2	367,138	32.7	1,180,259	30.1
45-64	49,147	20.5	227,252	20.2	831,993	21.2
65+	14,961	6.3	113,972	10.2	436,001	11.1
Total	**238,835**	**100**	**1,122,821**	**100**	**3,917,203**	**100**

Source: Census of Population 1996, 2002

From an analysis of the figures above it is noted that a high proportion of the population of South Dublin is less than 25 years of age, accounting for 41% of the total population. This figure is higher than that for the Dublin Area (37%) and for the State (37%). The County also has a low proportion of people aged 65 and over accounting for just 6%. The corresponding figures for the whole of the Dublin Area and the State are 10% and 11% respectively.

It is further noted from the figures outlined in Table 5.2 above that those persons in the working age cohort (15-64 years) account for 71% of the total population of South Dublin. This figure corresponds generally to those figures for the Dublin Area and the State which are 71% and 68% respectively.

Household Size

The results of the 2002 Census of Population indicate that the average household size in Ireland is decreasing over time. Between 1991 and 2002 the average number of persons per private household in the State decreased from 3.34 to 2.95. The figures for South Dublin over the same period showed a similar pattern, decreasing from 3.77 to 3.21.

The total number of private households in South Dublin in 2002 was 73,516. The corresponding figures for the whole of Dublin and for the State are 379,372 and 1,287,958 respectively. The Regional Planning Guidelines projected number of households in South Dublin in 2010, (as outlined in Section 1.1.3 (ix) of the South Dublin Development Plan 2004-2010), is 91,815. This represents a 25% increase over the 2002 figure.

Population Catchment

The Masterplan for Profile Park, a copy of which has been submitted as part of this planning application, includes an analysis of the population catchment of the Masterplan lands according to 15, 30 and 45 minute drive times. The 15 minute drive time extends from north of Lucan to Saggart in the south and to the east of Clondalkin. The 30 minute drive time includes Finglas and Mulhuddart in the north, Celbridge, Leixlip and Maynooth in the west, Kill and Brittas in the south and Santry and Dundrum in the east. The 45 minute drive time extends beyond the Greater Dublin Area and extends northwards as far as the main M1 exit for Skerries including Ashbourne and Dunboyne. The 45 minute drive time catchment also includes most of the east coast from Rush to Bray, Blessington in the south and Naas and Kilcock in the west.

An analysis of the relevant 2002 Census data for each drive time is summarised below in Table 5.1.3.

Table 5.1.3: Drive Time Population Catchments

Drive Time	Population	Households
15 minute	95,646	29,220
30 minute	734,869	249,857
45 minute	1,135,258	381,171

Source: Jones Lang Lasalle (2005) & Gamma, CSO 2002 Census of Population

The Masterplan also highlights the potential catchment at the new urban district of Adamstown which consists of approximately 10,000 additional household units which will be provided on a phased basis with a potential population of between 20,000 and 25,000 people.

5.1.1.2 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.1.1.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

It is anticipated that the construction phase of the proposed development will not have any direct impact on the population of the immediate environs of the site. Given the nature and extent of the proposed development and the anticipated construction timeframe, it is expected that the work force employed on the site will travel from existing places of residence to the construction site rather than reside temporarily in the immediate environs of the site.

It is anticipated that the construction phase of the future business park scheme will increase the temporary working population of the area but is not expected to permanently increase population figures for the area.

Operational Phase

There will be no increase in the population of the area during the operational phase of the proposed development.

The operational phase of the business park will result in an increase in the temporary working population of the area. However, as no residential development is proposed as part of the overall scheme it is considered unlikely that there would be any permanent increase in population figures for the area as a result of this development.

Do-Nothing Impact

If the proposed development did not proceed there would be no impact on the population of the area.

5.1.1.4 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

The development which is the subject of this planning application and the development of the remainder of the business park scheme will not result in any adverse potential impacts on population during the course of construction. Consequently no remedial or reductive measures are required in this regard.

Operational Phase

The development which is the subject of this planning application and the completion of the business park scheme will not result in any adverse potential impacts on population during the operational phase. Therefore no remedial or reductive measures are required in this regard.

5.1.1.5 PREDICTED IMPACT OF THE PROPOSAL

The development which is the subject of this application and the development of the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their construction phases.

Operational Phase

The proposed development and the remainder of the business park scheme are not predicted to have any material impact on the population of the area during their operational phases.

Worst Case Scenario

If the development which is the subject of this planning application did not proceed, there would be no significant impact on the population of the area.

If the business park scheme which the proposed development will facilitate did not proceed, there would be no significant impact on the population of the area.

5.1.1.6 MONITORING

No monitoring measures are required in relation to population as a result of the proposed development.

5.1.1.7 REINSTATEMENT

No reinstatement measures are required in relation to population as a result of the proposed development.

5.1.2 EMPLOYMENT

5.1.2.1 RECEIVING ENVIRONMENT

In 2002 the total number of persons aged 15 years and over at work in the State was 1,641,587. Of this total, 110,101 were at work in South Dublin. By comparison, a total of 138,199 persons were unemployed in the State in 2002 of which 8,148 were accounted for in South Dublin.

It is stated in Section 2.1(i) of the South Dublin Development Plan 2004-2010 that South Dublin has a variety of employment types with large employment centres including sixteen major industrial estates and two international business parks at Grange Castle and Citywest. It is estimated in the plan that there are over 3,500 businesses in operation with 11 of Ireland's top 100 companies located in the county. The growth sectors in the county are identified as chemical industries, biotechnology, information technology, communications, electronics, hospitality, transport, internationally traded services and prepared food.

This area of the County is envisaged to become the premier location for enterprise and employment generation. A Masterplan has previously been prepared for the lands to the north and east (The Grange Castle Masterplan), and South Dublin County Council has recently published an updated version of this document. A number of large-scale developments have been implemented following the adoption of this Masterplan, including the Wyeth Medica campus and the Takeda Pharma pharmaceutical plant (Profile Park Masterplan, 2006). South Dublin County Council have also recently granted planning permission for an Integrated Circuit Manufacturing Facility on a 145 acre site at Grange Castle Business Park.

5.1.2.2 CHARACTERISTICS OF THE PROPOSAL

The roads and services which are the subject of this planning application will not have a significant impact on employment numbers having regard to the nature and scale of the development involved.

However the Masterplan for Profile Park envisages that the business park itself, which these roads and services will facilitate, will consist of a *'vibrant mixed use area, with enterprise, service, employment and office activities'* (Profile Park Masterplan, 2006). Indicative building layouts and land uses have been identified in the Masterplan. The design and size of the buildings proposed on the site will be addressed at planning application stage when detailed plans for each building type and land use have been decided.

Although the final details regarding the nature and scale of the buildings proposed within the business park have not yet been decided, it is possible at this stage to make an approximate 'best estimate' of the level of employment that may potentially be generated at Profile Park. Having regard to the land uses proposed on the site, it is considered that somewhere in the range of 5,000 – 10,000 jobs may be generated as a result of the future business park development. It is evident therefore that the proposed business park has the potential to have a moderate positive impact on employment levels in the locality.

5.1.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

The construction of the roads and services which are the subject of this planning application will not have a significant impact on employment levels having regard to the nature and scale of the development proposed.

The development of the remainder of the business park will have a temporary positive impact on employment levels in the locality. Temporary construction employment will be directly created on the site. Indirect employment will also be created through the provision of building supplies, local goods and services to the site and its employees. Overall a moderate positive impact will result an employment levels as a result of the business park development.

Operational Phase

The operational phase of the proposed development will have no impact on employment levels in the locality.

The development of the remaining area of the business park lands has the potential to a moderate positive impact on employment levels in the locality.

Do Nothing Impact

If the development which is the subject of the current planning application does not proceed there would be no significant impact on employment levels in the locality.

If the business park development did not proceed the opportunity for the creation of additional jobs in the locality would not be realised.

5.1.2.4 REMEDIAL OR REDUCTIVE MEASURES

No remedial or reductive measures are required in relation to employment.

5.1.2.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

The predicted impact would be the same as the potential impact.

Operational Phase

The predicted impact would be the same as the potential impact.

Worst Case Scenario

The predicted impact would be the same as the potential impact.

5.1.2.6 MONITORING

No monitoring measures are required in relation to employment.

5.1.2.7 REINSTATEMENT

No reinstatement measures are required in relation to employment.

5.1.3 COMMUNITY ASPECTS

5.1.3.1 RECEIVING ENVIRONMENT

There are three principal components of the community within the vicinity of the subject site which are considered in this section: the resident, working and visitor communities.

The Resident Community

The subject site consists of a rural greenfield site which was previously used for agricultural purposes. There is some dispersed housing along the site boundaries. Consequently there will be no severance of any existing community as a result of the proposed development. The nearest existing resident community is located approximately 2.5 km to the east of the subject site at Clondalkin Village. There are a small number of residential units and a car sales operation located west of the subject site along the Nangor Road. There are also a number of residential units located in the vicinity of the southern boundary of the site.

The Working Community

The major employers at this location are located immediately to the north of the subject site at Kilcarbery Business Park, which is now fully developed and occupied and Grange Castle Business Park, which contains two large bio-technology facilities – Wyeth Medica Ireland and Takeda Pharma Ireland. Wyeth Medica Ireland has 1,100 staff in direct employment with an additional 600 in indirect employment. When fully operational the Takeda plant will create approximately 80 high quality jobs. Baldonnell Aerodrome to the south of the subject site is another employment generator in the locality.

The Visiting Community

The primary attractions for visitors to this area consist of Grange Castle Golf Course which borders the subject site to the east and Corkagh Regional Park, including Camac Valley Tourist Caravan and Camping Park to the east of the golf course. Ballybane Pitch and Putt course is also located along the Nangor Road to the northwest of the subject site.

5.1.3.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.1.3.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

Given the nature and scale of the proposed development it is considered that there will be no significant negative impact on the resident, working or visiting community at this location during the construction phase. Some short-term localised impacts may result on the adjoining residential units as a result of noise during construction.

Having regard to the scale of the overall business park development, which the proposed development will facilitate, some potential adverse localised impacts may be expected to occur during the construction phase of the business park. It is expected that the resident, working and visiting communities would experience these short-term localised impacts. Many of these would be of a nuisance nature such as an increase in daytime noise levels in the locality. Construction traffic has the potential to pose impacts to the neighbourhood community depending on its frequency, overall numbers and routing. These impacts are more fully addressed in the relevant specialist sections of this EIS.

Operational Phase

The proposed development will have no significant negative impact on the existing community during its operational phase. Additional planting will be provided along site boundaries adjacent to existing housing to mitigate any potential negative visual impact.

It is considered that the following potential impacts may arise as a result of the operation of the completed business park development:

- Increased traffic levels, both pedestrian and vehicular in the area.
- Impact on the existing natural landscape.
- Increased employment opportunities in the area.
- Impact on local services and commercial facilities.

Do Nothing Impact

If the proposed development did not proceed, it is likely that there would be no significant impact on the existing community.

If the business park which the proposed development will facilitate did not proceed, the potential benefits associated with the business park development, such as increased employment opportunities in the locality, would not be available to the community.

5.1.3.4 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

The hours of operation of construction machinery on the subject site will be limited in order to limit any potential short-term noise impact on adjacent residential properties associated with the development of roads and services infrastructure at this location. No further remedial or reductive measures are considered necessary during the construction phase of the proposed development.

Similarly the hours of operation of construction on site will be limited during the construction of the business park in order to limit any potential short-term noise impact on adjacent residential properties. These measures are discussed in greater detail in the specialist chapters of this EIS.

Operational Phase

No remedial or reductive measures are considered necessary during the operational phase of the proposed development.

A number of reductive measures are proposed during the operational phase of the business park scheme. It is proposed that the boundaries of the subject site be planted with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings. In addition, the heights of any buildings proposed will be reduced adjacent to existing housing at the site boundaries in order to reduce the visual bulk of the buildings.

5.1.3.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

Having regard to the remedial and reductive measures proposed during the construction period, the impact of the proposed development on the community will not be significant and any impact will be temporary in nature.

Having regard to the remedial and reductive measures proposed during the construction phase of the overall business park scheme it is considered that there be no significant negative impact on the community as result of the proposed development and any impact will be temporary in nature.

Operational Phase

The operational phase of the development which is the subject of this application will have no significant impact on the existing community.

Having regard to the remedial and reductive measures proposed during the operational phase of the overall business park scheme it is considered that there be no significant negative impact on the community as result of the proposed development.

Worst Case Scenario

The predicted impact will be the same as the potential impact.

5.1.3.6 MONITORING

No monitoring measures are required in this regard.

5.1.3.7 REINSTATEMENT

No reinstatement measures are required in this regard.

5.2 FLORA AND FAUNA

5.2.1 INTRODUCTION

This flora and fauna impact assessment has been prepared by Scott Cawley. It qualitatively assesses the development of lands in Grange Castle, County Dublin, within the context of the potential direct, indirect and cumulative impacts upon the flora and fauna presently existing on-site, and in the immediate environs.

The proposed development area is located within Grange Castle to the south-west of the Dublin conurbation. It is composed of agricultural grassland divided by hedgerows and wet ditches.

Methodology

The assessment comprised a constraints assessment on the 3rd November 2005 and a more detailed site survey on 31st March 2006. Bat foraging surveys were undertaken on 1st May 2006.

During the site visits a detailed account of the floral and faunal composition encountered during the survey was recorded. These, combined with desktop consultations of the following resources, produced the finalised baseline report as presented.

- O.S. maps for Co. Dublin;
- Site layout plans;
- EIS of proposed Integrated Circuit Manufacturing Facility in Grangecastle, Co. Dublin (2006);
- National Parks and Wildlife Service Database, The Department of the Environment, Heritage and Local Government.

The proposed development site was surveyed using the methodology outlined in the Heritage Council Habitat Survey Guidelines (Draft April 2005). The principal habitats present within the site were identified and classified using the Heritage Council's A Guide to Habitats in Ireland (Fossitt, 2000).

Floral nomenclature follows *An Irish Flora* (Webb, Parnell & Doogue, 1996) for Latin names and the *Census Catalogue of the Flora of Ireland* (Scannell & Synnott, 1987) for common names. Nomenclature for horticultural species follows the Royal Horticultural Society's *Encyclopaedia of Garden Plants* (Brickell, 1998).

Faunal identifications were confirmed using the following sources:

- *The Macmillan Guide to Birds of Britain & Europe*, Macmillan 1998,
- *The Complete Guide to Ireland's Birds* (2002), Dempsey E. & O'Cleary. M. Gill & Macmillan.
- *Exploring Irish Mammals*, Dúchas The Heritage Service 2001.

As opposed to floral investigations, the surveying of faunal usage of subject lands cannot be based upon direct sightings alone. The presence of fauna is substantiated through the detection of field signs such as tracks, habitats, markings, feeding signs, and droppings, as well as by direct observation. Likewise, bird species present on site are recorded along with any notable

avifauna habitats, droppings, or tracks. The likely species were assessed in relation to the habitats present within the site.

Ecological evaluation of the site and the assessment of significance of impacts follows guidance provided by the Institute for Ecology and Environmental Assessment and the Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000).

Designated areas and protected species

The nearest ecologically designated site is at the Grand Canal which is a proposed Natural Heritage Area. Proposed NHAs (pNHAs) are designated for their natural heritage value and are considered to be of conservation importance at a national level. pNHA's are offered legal protection under the Wildlife (Amendment) Act 2000, once their boundaries have been finalised and they have been formally adopted. This process of formal adoption for pNHAs is still on-going, however until such time pNHAs are offered protection under planning legislation, Planning Authorities are required to take these designated areas into consideration in planning decisions.

The Grand Canal pNHA is located approximately 1.6km north of the site. The site does appear to be hydraulically-linked to the Canal. The designation has been made on the basis of the presence of several important habitats including calcareous grassland, reedswamp, scrub and woodland as well as protected species such as otters. None of these habitats will be affected by the development at the proposed site.

5.2.2 RECEIVING ENVIRONMENT

The study area is almost entirely made up of agricultural grassland that was previously used for grazing livestock (cattle recorded grazing on site in 2005 but not in early 2006). This habitat type is generally of little or low ecological value, aside from the certain aspects and ecological functions identified below as being of ecological interest.

Whilst there are a few residential buildings surrounding the site of various ages, sizes and designs, their ecological importance is limited to being a potential roost and breeding sites for bats and birds.

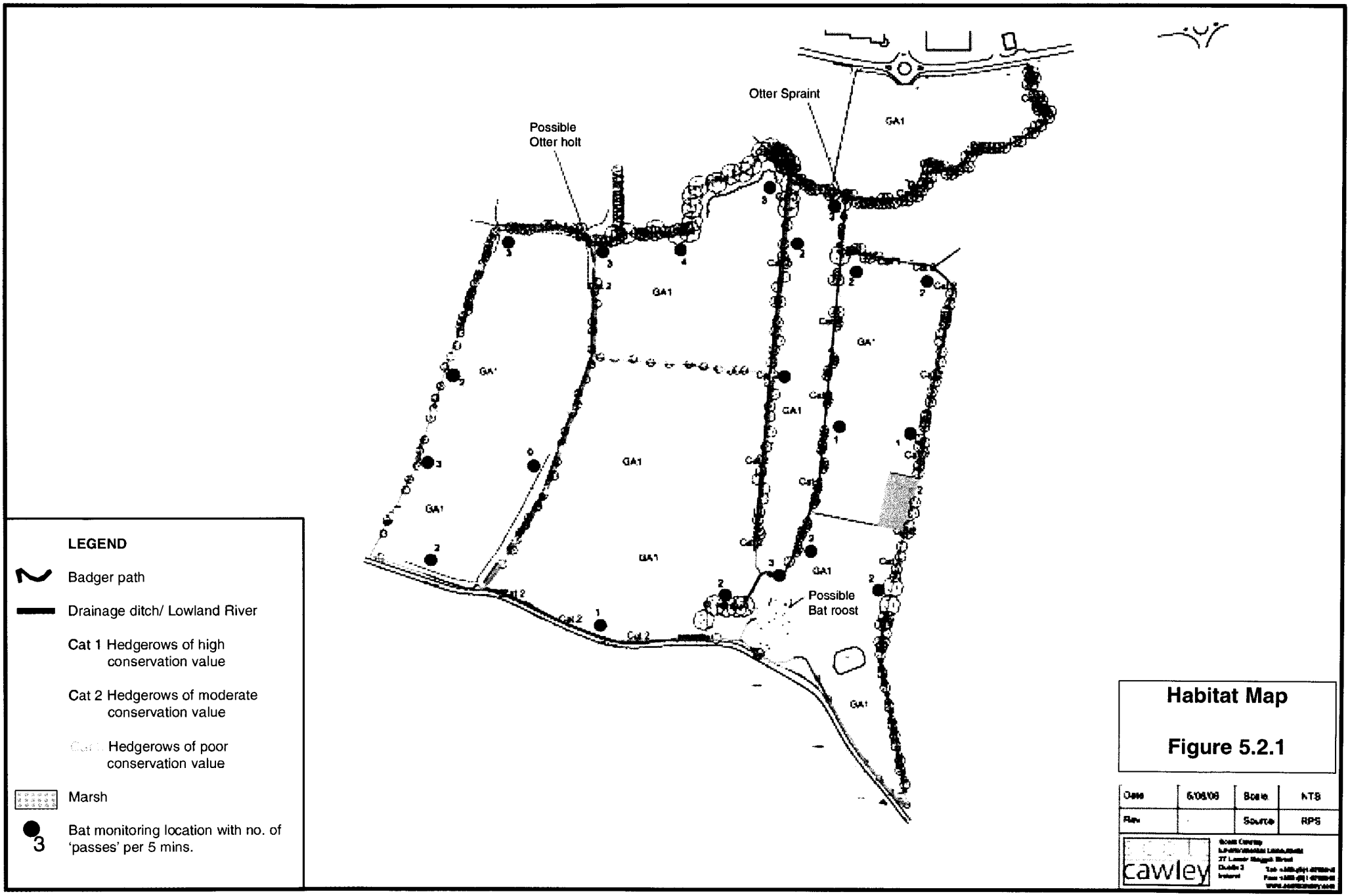
Field boundaries throughout the study area are formed by hedgerows that are of varying ecological quality, ranging from severely degraded and species-poor hedgerows to moderately species-rich mature hedgerows.

Habitats

This section describes the habitats that have been recorded in the study area. There is a relatively low diversity of habitats within the study area. The habitat types identified during the survey include the following categories:

- Grassland and Marsh Habitat;
- Woodland habitat;
- Freshwater habitat.

Figure 5.2.1 illustrates all habitat types present within the study area.


Otter Spraint
Possible
Otter holt
GA1
Possible
Bat roost
LEGEND
Badger path
Drainage ditch/ Lowland River
Cat 1 Hedgerows of high conservation value
Cat 2 Hedgerows of moderate conservation value
Hedgerows of poor conservation value
Marsh
Bat monitoring location with no. of 'passes' per 5 mins.
Habitat Map
Figure 5.2.1
Date
Scale
NTS
Rev
Source
RPS
cawley

Grassland and Marsh Habitat

Improved agricultural grassland (GA1)

Grassland habitat takes up the vast majority of the areas surveyed, in the form of typical improved agricultural grassland (GA1). This habitat occurs across the majority of the study area and has been used for cattle grazing. This type of grassland is characterised by open fields that contain a range of grass and broad-leaved species. Key species include meadow grasses (*Poa pratensis, P. annua*), ryegrass (*Lolium perenne*), crested dog's tail (*Cynosurus cristatus*), cock's foot (*Dactylus glomerata*) and broad-leaved species such as dandelion (*Taraxacum officinale*), creeping thistle (*Cirsium arvense*), spear thistle (*C. vulgare*), common nettle (*Urtica dioica*), ribwort plantain (*Plantago lanceolata*), broad-leaved dock (*Rumex obtusifolius*), creeping buttercup (*Ranunculus repens*), greater willowherb (*Epilobium hirsutum*) and common knapweed (*Centaurea nigra*).

All of these species are typical of agricultural grassland which experiences human influence in the form of grazing, mowing, fertilisation, planting and tilling. They offer a food source to birds (particularly crow (*Corvidae*) species) and to a range of invertebrates that feed on cattle dung. Overall, this habitat is of moderate ecological value and is well represented in the locality and throughout Ireland.

Woodland Habitat

There are no significant areas of woodland within the site, as is normally understood by the term "woodland". However, hedgerows (WL1) fall under this type of land-use. For the purposes of describing their importance in ecological terms, the hedgerows are rated from 1-3 with 1 = high conservation value, 2 = moderate conservation value and 3 =low conservation value. The criteria used for the classification system is reproduced below from the National Road Authority's *Guidelines for the Assessment of Ecological Impacts of National Road Schemes.*

Category 1: High Value, Local Importance

- Average shrub canopy height over 5m (note: a continuous line of mature trees over 5m is normally referred to as a treeline)
- Average width at ground level over 4m
- Dense ground cover
- Mature standard trees more than 5 per 50m length
- Gaps less than 10% per 50m length
- End connections to greater than 4 other hedges
- Dominant tree and shrub species mainly native
- Diversity of greater than 8 tree and shrub species
- Typical diverse woodland ground flora present
- Associated stream or drain with permanent water

Category 2: Moderate Value, Local Importance

- Average canopy height 2 to 5m
- Average width at ground 2 to 4m
- Patchy ground cover
- Mature standard trees 1 to 5 per 50m length
- Gaps between 10-30% per 50m length
- End connections to 2 to 4 other hedges
- Dominant tree and shrub species mixed native and non-native
- Diversity of 5 to 8 tree and shrub species
- Some woodland ground flora species present
- Parallel stream or drain with seasonal water only

Category 3: Low Value, Local Importance

- Average canopy height less than 2m
- Average width at ground less than 2m
- Little or no ground cover
- No mature standard trees
- Gaps more than 30% per 50m length
- End connections to less than 2 other hedges
- Dominant tree and shrub species mainly non-native
- Diversity of less than 5 tree and shrub species
- No woodland ground flora species present
- No parallel stream or drain

The hedgerows encountered in the site survey are described below.

Hedgerows (WL1) of high conservation value (Category 1)

Hedgerows bounding the watercourses in the northern half of the site and along the eastern boundary fall under this category. These are of high conservation value due to the relatively high species diversity, vertical composition, thickness and age. They generally comprise of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus agg.*) with some larger ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*). Large mature trees offer good nesting and refuge habitat for birds and bat species as well as providing fruit and insects that are preyed upon by these fauna. The hedgerows to the north and east have an established ground flora at its edge and include lords and ladies (*Arum maculatum),* lesser cellandine (*Ranunculus ficaria*), germander speedwell (*Veronica chamaedrys*) and dog violet (*Viola riviana*) and primrose (*Primula vulgaris*). See photograph 5.2.1 below.



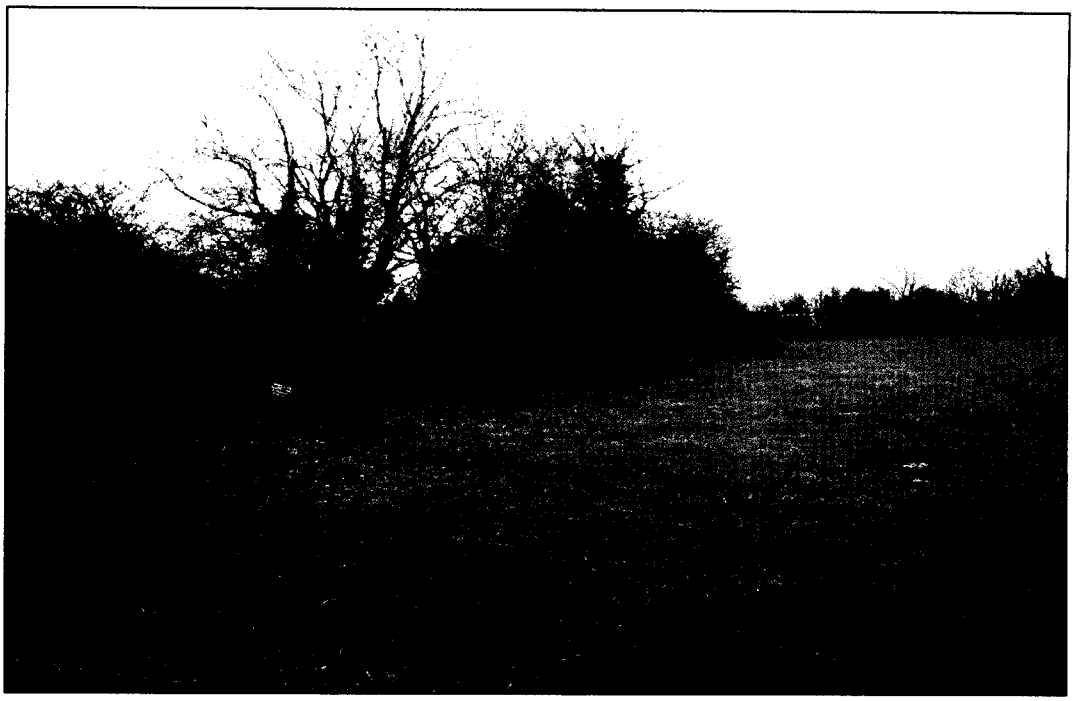
Photograph 5.2.1: Category 1 hedgerow on the left with mature trees in north east corner of site.

Baseline data collected for a neighbouring site also includes hogweed (*Brachypodium sylvaticum*), herb robert (*Geranium robertanium*), wood avens (*Geum urbanum*), bush vetch (*Vicia sepium*), hart's tongue fern (*Phylitis scolopendium*) and meadowsweet (*Filipendula ulmaria*).

Hedgerows (WL1) of moderate conservation value (Category 2)

There are several hedgerows of this category in the study area, principally in the western and mid to south portion of the site. These are of moderate conservation value due to the relatively high species diversity, vertical composition, thickness and age. They generally comprise of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus agg.*) with some ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*). They offer good nesting habitat for birds as well as providing fruit and supporting insects.

These differ from the category 1 hedgerow in that they are generally more 'gappy' and thinner in nature and are less species diverse. They are composed almost entirely of hawthorn, blackthorn and bramble with elder or ash found in low frequency of occurrence. Despite their sub-optimal structure they still perform valuable ecological functions as food sources and wildlife corridors and are found occupied by a broad range of bird species and alongside rabbits. See photograph 5.2.2.



Photograph 5.2.2: Example of Category 2 hedgerow.

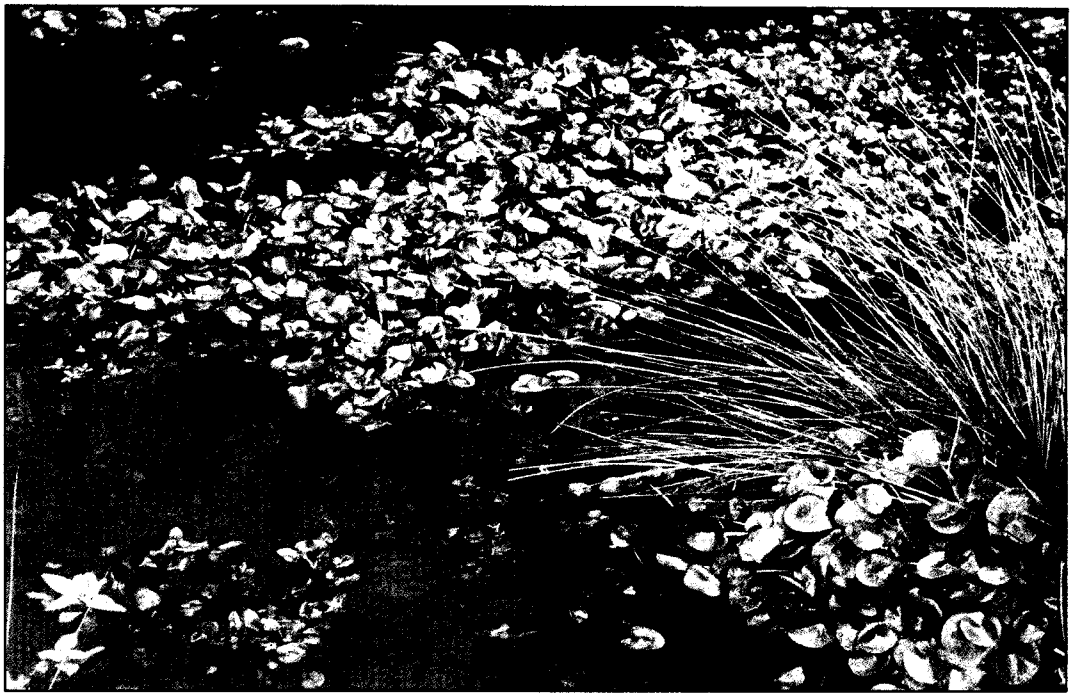
Hedgerows (WL1) of poor conservation value (Category 3)

These types of hedgerows are often broken lines of hawthorn or heavily managed hedgerows that have little ecological value. Such a hedgerow is found bisecting a field from east to west in the middle of the site.

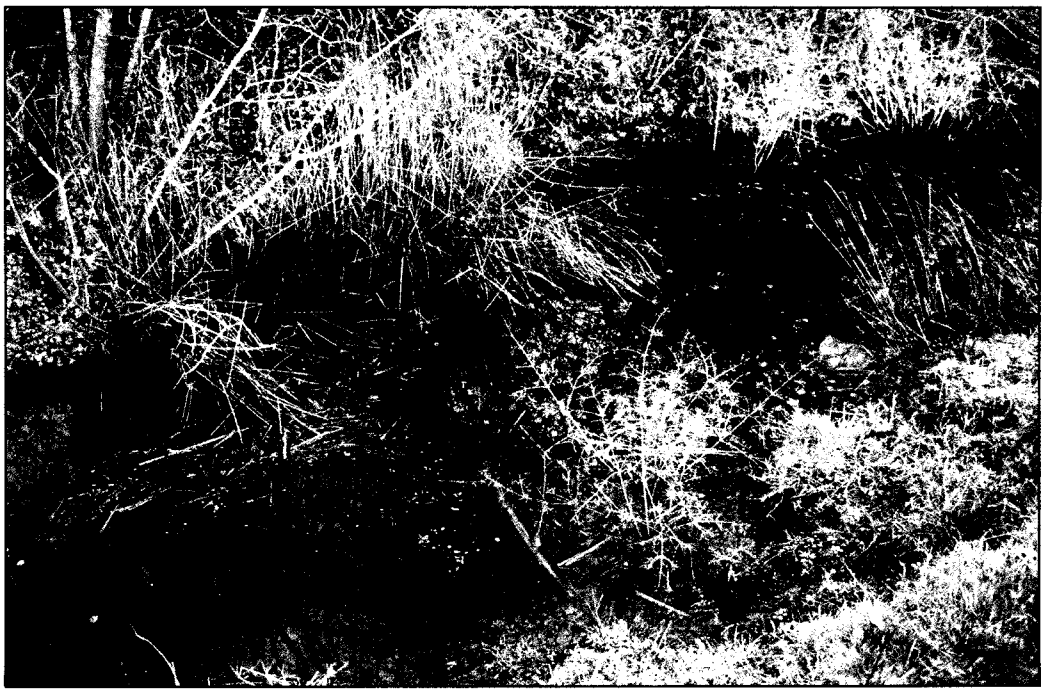
Freshwater

There are a series of connected drainage ditches/small streams that flow from south to north across the site in association with the hedgerows. These are of moderate ecological value and in places are heavily shaded by overhanging hedgerows. There was no noticeable in-stream vegetation where there were sections in shade. However, other drainage ditches were filled with Fool's watercress (*Apium nodiflorum*) and other emergent aquatic macrophytes such as flag iris (*Iris pseudacorus*).

A larger watercourse, a tributary of the Griffeen River, runs east-west through the northern portion of the site and is joined by another smaller watercourse that flows in from the west near the scrapyard. The stream is approximately 3m wide and up to 60cm deep in places and in some places is swift flowing. The substrate appears to be muddy with occasional patches of sand and gravel. Most of the watercourses in the northern portion of the site are shaded by hawthorn, ash and blackthorn riparian vegetation. Macrophytes were found to be growing in the stream where the wooded corridor opens up to allow light to penetrate. Aquatic macrophytes included soft rush (*Juncus effesus*), mare's tail (*Hippurus vulgaris*), fool's watercress, water mint (*Mentha aquatica*) and marsh marigold (*Caltha palustris*). See photographs 5.2.3 and 5.2.4 below.



Photograph 5.2.3: Marsh Marigold in the north-east corner of the site.



Photograph 5.2.4: Drainage ditch containing Mare's Tail

The semi-natural and undisturbed sections of this watercourse are ecologically important at a local level. The Griffeen River flows in the Liffey near Lucan and is an important sea trout spawning area according to the Eastern Regional Fisheries Board.

The site survey undertaken on 31st March 2006 noted the contamination of the river flowing from Baldonnell Aerodrome northward through the site. The

contaminant which was hydrocarbon-based, did not appear to be having any toxic effects on the watercourse fauna or flora but emitted a strong petroleum odour along its course.

Fauna

Detailed fauna assessments were carried out as part of this ecological assessment and specifically addressed use of the site by badgers, otters and bats.

Mammals

Badgers *(Meles meles)*
Evidence of badgers was present in terms of occasional feeding signs and well-used paths crossing the site in various locations as shown in Figure 5.2.1. It had previously been suspected that there may be a sett in the northern part of the site, in the location of the scrap yard. Dense vegetation prevented thorough survey of this area during the site visit. Two possible setts were identified close to the larger watercourse although the lack of other field signs evidence that they may be setts (no fresh digging, bedding or latrines nearby) and their waterside location may suggest more active use by otters (see later). No obvious badger setts were located within the site.

There are also old badger setts outside of the site boundary to the south, that have since been taken over by rabbits. Rabbits are abundant throughout the site.

Badgers, their breeding and resting sites are protected under the Wildlife Act (1976 as amended in 2000).

Otters (*Lutra lutra*)
There is evidence that otters are using the site for resting and commuting. Evidence on site includes an otter spraint (dropping) on a corrugated iron sheet in the water course in the north east corner of the site and a suspected otter holt on the northern site boundary adjacent to the watercourse near the scrapyard. The holt has a single entrance that is 2.5m above the stream level. There were no spraints around the site entrance that would usually suggest occupancy and no prints or other field signs nearby. However, detecting use of otter holts is often difficult and can only be confirmed by regular monitoring. Otters are thought to be using the drainage ditches as corridors to allow movements to the golf course and to other areas where they may be feeding.

Otters, their breeding and resting sites are protected under the EC Habitats Directive and under the Wildlife (Amendment) Act 2000. They are particularly sensitive to human disturbance and development pressures.

Bats
The stone farm buildings to the south of the site are regarded as potential bat roosts. The timing of the earlier surveys (Winter-early spring) prevented any bat surveys being carried out and this was remediated by undertaking a survey in early May 2006.

The methodology used to assess use of the site by bats involved bat surveyors measuring the frequency of encounters with bats over a five minute period in various locations around the site. Figure 5.2.1 shows these locations and the numbers of encounters or "passes". Two bat surveyors were used to cover the

site, each using heterodyne ultrasonic bat detectors to record the numbers and species of bats using the site.

The species of bats encountered included common and soprano pipistrelle bats (*Pipistrellus pipistrellus* and *P. pygmaeus*) and Leisler's bat (*Nyctalus leislerei*). Both pipistrelle species were noted commuting along the Category 2 and Category 3 hedgerows from south to north along the hedgerows aligned in this direction. They were also feeding along the Category 1 hedgerows near the watercourse and generally there were more "passes" encountered along these denser hedgerows.

Leisler's bats usually feed much higher and are the only bat to feed over open fields and parkland away from cover. They were recorded flying across the site in the southern portion near the farm buildings and also in the north west corner but could not be recorded visually.

Monitoring of the farm buildings during the emergence period did not conclusively reveal use of the building by bats although there were numerous possible access/exit points and coverage of all of the building could not be achieved. Pipistrelle bats were recorded in the vicinity of the buildings during this time.

The bat surveys were regarded to provide a crude indication of the use of the site for feeding and commuting. However, they were carried out early in the year and during cool conditions that are not optimum for bat feeding surveys. Therefore the results of the surveys should be treated with a degree of caution.

Currently there are nine species of bat known to breed in Ireland. All nine species and their roost sites are strictly protected under both European and national legislation as described below.

Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna 1992 (Council Directive 92/43/EEC)

The Habitats Directive offers legal protection to all nine bat species that occur in Ireland and lists them under Annex IV of the directive as species of community interest, in need of strict protection.

Wildlife (Amendment) Act, 2000 (S.I. No. 38 of 2000)

All bat species occurring in Ireland are listed in Schedule V of the Wildlife Act 1976 (amended by the 2000 Act) as protected species. This legislation makes it illegal to kill or injure bats in the wild and makes it an offence to wilfully interfere with or to destroy their breeding and resting places.

European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997)

These regulations give effect to the above two strands of European and national legislation. All bat species occurring in Ireland are listed in the First Schedule of these regulations. This legislation makes it an offence to deliberately capture or kill bats in the wild, to deliberately disturb them particularly during the breeding, rearing, hibernation and migration seasons, or to cause the deterioration or destruction of their breeding and resting sites.

Furthermore as a signatory to the European Bats Agreement (Agreement on the Conservation of Bats in Europe) 1993, Ireland is required to protect their habitats, requiring the identification and protection from damage or disturbance, of important feeding areas. All Irish bat species are listed in Appendix II of the Bern Convention, as species requiring strict protection. Finally, all but two bat species in Ireland are listed as internationally important in the Irish Red Data Book (1993). Natterer's and the whiskered bat are both listed as indeterminate. Given the site's geographic location, nature of the habitats of the site and knowledge of the area it is likely that the site is being used by at least five out of the nine species known to breed in Ireland.

Other species

Other species commonly found this agricultural setting include fox (*Vulpes vulpes*), rabbit, hedgehog (*Erinaceus europaeus*), pygmy shrew, (*Sorex minutus*), wood mouse (*Apodemus sylvaticus*) and brown rat (*Rattus norvegicus*). It is highly likely that these species would make use of the grassland, woodland and freshwater habitats present within the study area. Hedgehog and pygmy shrew are protected under the *Wildlife (Amendment) Act 2000.*

Avifauna

The habitats within the study area support a range of commonly found passerine bird species including magpie (*Pica pica*), hooded crow (*Corvus corone*), blackbird (*Turdus merula*), song thrush (*T. philomelos*) robin (*Erithacus rubecula*), wren (*Troglodytes troglodytes*), blue tit (*Parus caeruleus*) and a range of other species frequently encountered in agricultural fields and hedgerows. Other species also seen on site include goldfinch (*Carduelis carduelis*) and snipe (*Gallinago gallinago*). A buzzard (*Buteo buteo*) was also seen hunting over the site and rested on an ash tree in the middle of the site for a period of 15 minutes. Buzzards are slowly spreading their range further south and along the east coast and are now frequently recorded in Co. Dublin and Wicklow.

Barn owls (Tyto alba) are known to be present in areas to the west of the site (*Doherty, pers, comm.*). The proposed development site would represent good hunting habitat but there are no suitable roosting structures within the site boundary. A possible barn owl pellet was recorded under a mature ash tree on the western boundary. However the pellet was in poor condition and could not be confirmed as being from an owl. No owl sightings were recorded in this area during the site surveys.

Aquatic Fauna

The drainage ditches did not appear to contain any macroinvertebrates or fish although no specific intrusive surveys were undertaken. The ditch would be expected to support a degree of macroinvertebrate life although on-site observations indicated that the water quality is threatened by upstream pollution by hydrocarbons.

Habitats in the Surrounding Area

The habitats surrounding the proposed development site include built environments and grassland. The surrounding habitats are of similarly low ecological value to those found within the proposed development site.

Evaluation of Habitats

Evaluation of habitats follows the *Heritage Council's Draft Habitat Survey Guidelines* (2005) and the *Institute for Ecology and Environmental Management's Draft Guidelines for Ecological Impact Assessment* (2005). The former criteria are set out below:

Table 5.2.1:Scheme for Ecological Evaluation of Sites (after Nairn and Fossitt, 2004)

Rating	Qualifying Criteria
A	Internationally important • Sites designated (or qualifying for designation) as SAC or SPA under the EU Habitats or Birds Directives. • Undesignated sites containing good examples of Annex I priority habitats under the EU Habitats Directive. • Major salmon river fisheries. • Major salmonid (salmon, trout or char) lake fisheries.
B	Nationally important • Sites or waters designated or proposed as an NHA or statutory Nature Reserves. • Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). • Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000. • Major trout river fisheries. • Water bodies with major amenity fishery value. • Commercially important coarse fisheries.
C	High value, locally important • Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. • Small water bodies with known salmonid populations or with good potential salmonid habitat. • Sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. • Large water bodies with some coarse fisheries value.
D	Moderate value, locally important • Sites containing some semi-natural habitat or locally important for wildlife. • Small water bodies with some coarse fisheries value or some potential salmonid habitat. • Any water body with unpolluted water (Q-value rating 4-5).
E	Low value, locally important • Artificial or highly modified habitats with low species diversity and low wildlife value. • Water bodies with no current fisheries value and no significant potential fisheries value.

The development site itself is not under any conservation designation and there are no designated areas immediately adjacent to the proposed development site which could be impacted upon by the proposed development.

The majority of the proposed development site is characterised by agricultural grassland with hedgerows of varying quality. The Category 1 hedgerows that are associated with the watercourse in the northern part of the site are the most important ecological feature on the site and provide feeding and refuge for bats and for otters. This habitat is therefore regarded to be of high value with local importance as protected species (otters and bats) are present. Hedgehog and pygmy shrew which could also be present within these are protected under the *Wildlife (Amendment) Act 2000.*

5.2.3 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park on the subject site which will be known as *'Profile Park'*. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.2.4 POTENTIAL IMPACT OF THE PROPOSAL

Impacts significance terminology follows nomenclature provided in the NRA Guidelines referred to earlier. See Table 5.2.2 below.

Table 5.2.2: NRA Impacts Significance Terminology

Impact	Site Category				
	A sites Internationally important	**B Nationally important**	**C High value, locally important**	**D Moderate value, locally important**	**E Low value, locally important**
Severe negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent beneficial impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor positive				Permanent impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

Construction Phase

The potential negative impacts associated with the construction phase of this proposed roads and infrastructure development will involve the physical and direct disturbance of most of the habitats within the proposed development site. Aspects of the construction phase that are likely to be *potential* sources of significant ecological impacts include:

- Vegetation Removal
- Topsoil stripping
- Use and storage of chemicals and fuels on site
- Culverting of watercourses
- Security lighting, noise and vibration.

Direct Impact
For the purposes of this assessment it is assumed that site clearance will involve removal of the hedgerows and grassland habitat within the entire site boundary. The loss of these hedgerows is regarded to be of major negative significance in the absence of any mitigation. It will remove feeding areas and cover for bats, otters and other fauna that currently use the hedgerows within the site.

Topsoil stripping will follow vegetation removal. In the absence of any controls in place, there is a potential risk of wind-blown soil and dust reaching the watercourses and causing adverse impacts downstream. Such impacts are usually temporary and intermittent unless soils are stored close to watercourses when such impacts can be more prolonged.

Materials, including fuels, concrete, cement, biocides etc when stored incorrectly or at inappropriate locations often pose a risk to watercourses. Abnormal events such as spillages and leaks may also give rise to pollution of water bodies.

The tributary of the Griffeen River that flows into the site from the east will require culverting as a result of the proposed roads and infrastructure development. This has the potential to adversely impact upon the aquatic fauna within and downstream of the culverted sections as well as the fauna that use the watercourse as a refuge and for feeding. The proposed works will require the removal of the possible otter holt. This will require derogation from the EC Habitats Directive as such works have to potential to constrain the territorial range of otters in this area. In the absence of any mitigation this impact is regarded to be moderately negative as the impact is localised upon the watercourses.

Indirect Impact
The accumulation of water on site during the construction works has the potential to lead to sediment being allowed to flow into the nearby watercourses unless controlled. This could have potential significant adverse effects upon aquatic fauna and flora both in the Griffeen River and downstream into the Liffey, although the effects will diminish with increasing distance as the dilution factor also increases.

Security lighting at the site perimeter and within the site, as well as machinery noise and vibration have the potential to disturb breeding birds and fauna within and off-site. Whilst insects are often attracted to lights, most bat species will not feed near bright lights and will not use commuting routes that are illuminated.

Cumulative Impact
The significance of the cumulative loss of hedgerows and grassland habitat in south west Dublin needs to be taken into account in this assessment. Whilst it is difficult to obtain quantitative data on the rate of habitat loss, the following ecological issues are deemed to be pertinent with regard to the proposed development.

Reduction of semi-natural habitat

- The cumulative loss of grassland and hedgerow habitat is regarded to be significant at a local level (ie southwest County Dublin) but not significant when assessed at a regional or national scale.
- The cumulative impacts upon protected species are manifested in the reduction.

Reduction of habitat for protected fauna

- Cumulative loss of feeding and refuge areas for bats, barn owls, badger and otters is regarded to be significant at a local level (i.e. SW Co. Dublin) and moderately significant when assessed at a regional or national scale. There is evidence locally that otters can tolerate well-designed business park environments but there is little research undertaken to inform how such developments affect their territorial ranges.

Operational Phase

The potential negative impacts associated with the operational phase of this proposed roads and infrastructure development are primarily associated with noise and disturbance issues. Aspects of the operational phase that are likely to be *potential* sources of significant ecological impacts include:

- Lighting of car park and environs
- Traffic and machinery noise
- Discharges of surface water

Direct Impact
There are no potential direct impacts within the site anticipated from the operation of the development. This assessment does not address future land-uses that may arise as a result of permitting access into this site.

Impacts caused by the site design may affect movements of otters and other fauna across the site. Otters usually follow watercourses and will prefer to travel over land than travel through culverted sections. This puts them at risk of collision with vehicles.

Indirect Impact
Potential indirect impacts could result from untreated surface water or spillages of contaminants entering the Griffeen River off-site unless suitably treated or controlled.

Vehicular movement and lighting around the site perimeter have a similar potential to cause off-site impacts such as those described earlier.

Cumulative Impact
There are no predicted cumulative impacts as a result of the operation of the proposed development.

5.2.5 REMEDIAL OR REDUCTIVE MEASURES

Mitigation by Reduction

Taking measures to limit the working area during the construction phase will reduce the impacts of the development on hedgerows and grassland that do not require removal. The construction area will be clearly delimited and machinery will operate only within the allocated area. This will result in seven hedgerows being affected within the site.

The length of watercourses to be culverted have been minimised by careful site design. Wherever possible within the site design, the existing watercourses and the riparian vegetation will be left untouched.

During dry windy days in the construction period dust preventative measures as outlined in Section 5.6 of this EIS will be implemented to prevent any dust blow to areas outside the delimited construction areas.

Any fuels which it is necessary to store on-site will be contained within specially constructed bunds to ensure that fuel spillages whether accidental or otherwise are fully contained. Such bund areas shall be roofed to exclude rainwater. A spill tray will be used when re-fuelling vehicles and machinery on-site.

An emergency spill response kit will be held on site with an absorbent material to deal with any accidental oil or petrol spills. This absorbent material will be properly disposed of after use.

Mitigation by Avoidance

The hedgerow and mature trees should not be cut or removed between the beginning of March through to the end of August to avoid negative impacts to nesting birds and mammals species.

There are no additional practical measures which can be implemented for the further avoidance of impacts on hedgehogs and pygmy shrew which are protected mammal species.

Mitigation by Remedy

In order to compensate for the loss of riparian vegetation, additional ash and hawthorn hedging will be planted to abut the riparian corridor. Relocation of hedgerow vegetation to suitable areas is a viable option and will be agreed with the contractor.

If it is proposed to landscape the area in association with the proposed design, then landscaping plans should have an emphasis on the use of native species as far as possible. Suggested landscaping planting in this regard is as follows:

Suggested Species for Planting

• Oak	*Quercus robur & Q. petrea*
• Ash	*Fraxinus excelsior*
• Silver Birch	*Betula pendula*
• Field Maple	*Acer campestre*
• Hawthorn	*Crataegus monogyna*
• Alder	*Alnus glutinosa*
• Goat Willow	*Salix caprea*
• Guelder Rose	*Viburnum opulus*
• Hazel	*Coryllus avellana*
• Blackthorn	*Prunus spinosa*
• Elder	*Sambucus nigra*
• Yew	*Taxus baccata*
• Buddleja	*Buddleja davidii*
• Holly	*Ilex aquifolium*
• Honeysuckle	*Lonicera periclymenum*
• Dogrose	*Rosa canina*
• Fieldrose	*Rosa arvensis*
• Ivy	*Hedera helix*

Non-native exotic species will not be included within the landscaping and in particular invasive species such as rhododendron, Japanese knotweed and cherry laurel will not be used.

Where roads pass over the larger watercourses in the northern portion of the site, separate dry 600mm diameter culverts will be provided to allow safe passage for wildlife under the roads. The invert level underpasses will be raised above the high water level to ensure that they remain dry.

5.2.6 PREDICTED IMPACT OF THE PROPOSAL

Taking the above mitigation measures into account, the following predicted impacts will apply.

Construction Phase

Direct Impact
The loss of hedgerow habitat may be compensated by replanting or relocation of hedgerows so that there is no net loss of hedgerow habitat. However, the ecological functions of the hedgerow will be diminished as the disturbance of habitats during construction will push otters, badgers and bats away from the site. The residual impacts of this disturbance is likely to be temporary but monitoring of bat, badger and otter activity will help to determine the level of impact prior to any further development of the site.

Indirect Impact
The careful control of the construction works (i.e. confining works to within the site boundary, clearly delimiting the boundary, the use of fuel bunds, spill trays and emergency response kits, dust preventative measures) will reduce any potential indirect construction related impacts on off-site areas.

Operational Phase

Direct Impact
It is possible following reinstatement of the site that flora and fauna will recolonise the area. This will be monitored by further surveys of bats, badger and otter activity to provide further information on the effects of such developments on these species.

There are not anticipated to be any significant impacts from the operation from the development.

Indirect Impact
Off-site impacts on the Griffeen will be effectively mitigated by proposed surface water attenuation and interception systems and are not deemed to be significant.

5.2.7 MONITORING

In order to identify any unforeseen effects during construction and operation of the proposed development, the following monitoring measures are proposed:

- Water Quality monitoring of any off-site discharges
- Monitoring of use of wildlife underpasses (quarterly for two years following completion)
- Monitoring for otter, bat and badger activity (twice per year in appropriate seasons)
- Annual monitoring of condition of planted or relocated hedgerow vegetation.

5.2.8 REINSTATEMENT

Reinstatement measures that would restore the site to pre-development conditions are not possible in this type of development. All proposed works are permanent and irreversible.

5.3 GEOLOGY, SOILS AND HYDROGEOLOGY

5.3.1 INTRODUCTION

This chapter describes the bedrock geology and soils at the proposed development site. The information is based on a desktop study, site walkover and trial pit investigation by a WYG hydrogeologist. This assessment of geology and soils has been undertaken in accordance with the *Draft Guidelines on the Information to be contained in Environmental Impact Statements* (EPA, 2002), the Institute of Geologists of Ireland guidelines for *Geology in Environmental Impact Statements* and also *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* (EPA, 2003).

Desk study information was attained from a number of sources including:

- Geological Survey of Ireland's Sheet 16 – Geology of Kildare - Wicklow (GSI, 1999).
- Geological Survey of Ireland's National Draft Bedrock Aquifer Map.
- Existing White Young Green (WYG) database.
- Ordnance Survey of Ireland (OSI) Discovery Series Map 50, 1:50,000.

The impact of construction and operation of the proposed development at the site on the underlying soils and geology is discussed and evaluated. Potential impacts are noted and mitigation measures are proposed.

5.3.2 RECEIVING ENVIRONMENT

Bedrock Geology

Regional Geology

The Geological Survey of Ireland's Sheet 16 – Wicklow - Kildare (GSI, 1999) provided an illustration of geology of this area of Co. Dublin. The bedrock of the Dublin City region is mainly composed of Calp Limestone and Shale. To the south-east of Dublin city lie the Leinster Granite plutons, while the southwest is dominated by siltstones, muddy limestones, greywackes and shales. Directly north and west of the city there are areas comprising of Waulsortian limestones around Lucan and Blanchardstown. The regional geology is shown on figure 5.3.1.

Local Geology

The bedrock geology of the site location is Calp which reportedly consists of dark grey to black limestones and shales. The bedrock in this area is shallow, ranging from 3 – 5m below ground level.

Quaternary Geology

Twenty-nine trial pits were excavated across the site in March 2006 to depths ranging from 1.5m below ground level (bgl) to 3.75m bgl. For the majority of the site quaternary deposits overlie the limestone bedrock. These deposits range from sandy gravely clays to gravely clays and in general are termed Glacial drift deposits. The depth of these deposits varied from 1.5m bgl to 3.5m bgl. Below this, a layer of fractured limestone was encountered becoming competent limestone with depth.

On the eastern side of the site an area of land was known to have received fill material in the past. There is a water treatment facility managed by Baldonnel

Aerodrome in this area. This infilled area was investigated more comprehensively than the other areas of the site in order to determine the content and extent of the waste material. The material consisted largely of construction and demolition wastes and was found to persist to at least 3.5m bgl in many of the excavations. This area has been identified separately on the site layout plan (see figure 5.3.2). Full details of the trial pit logs are presented in Appendix B.

Figure 5.3.1: Regional Geology

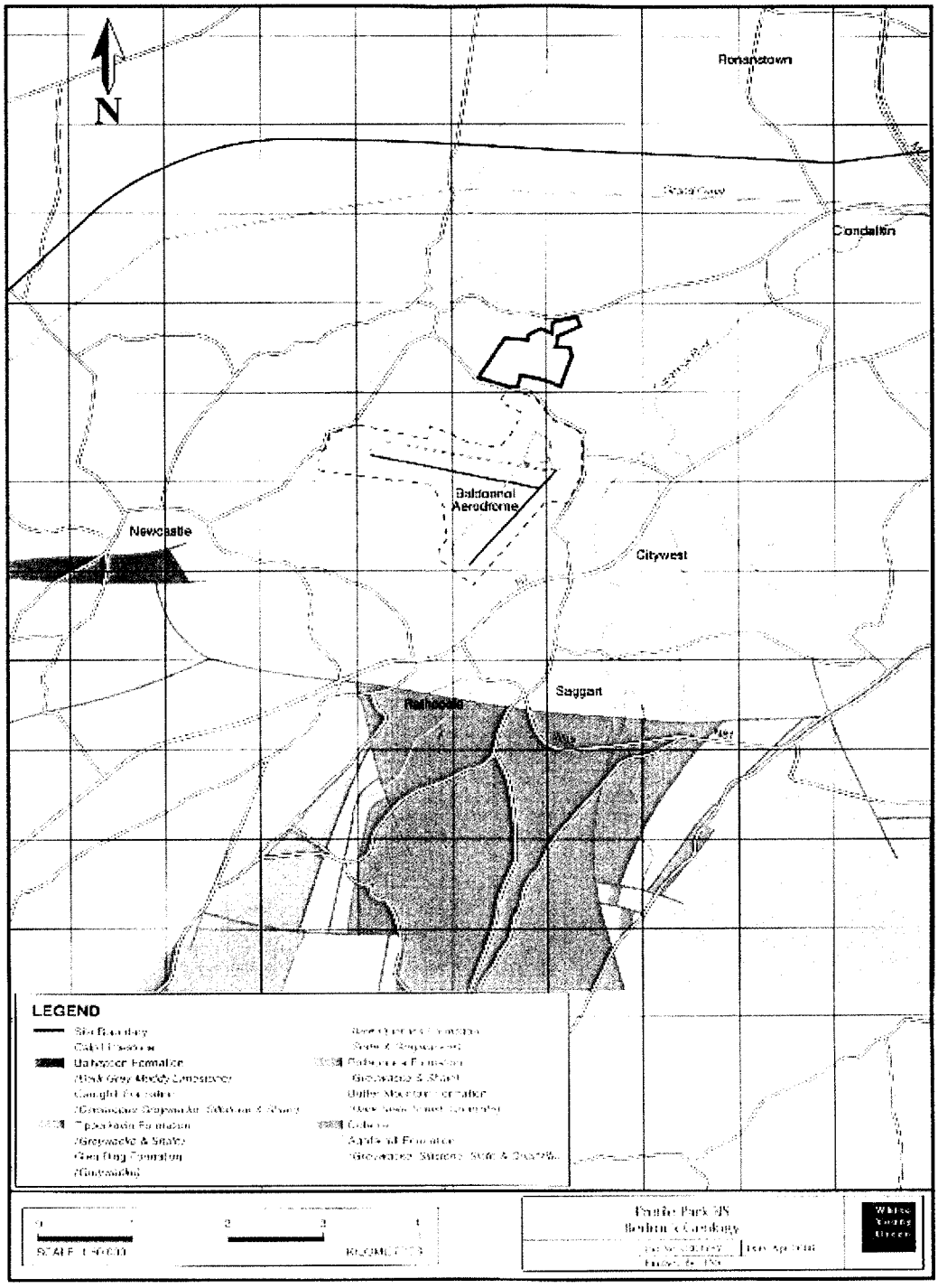
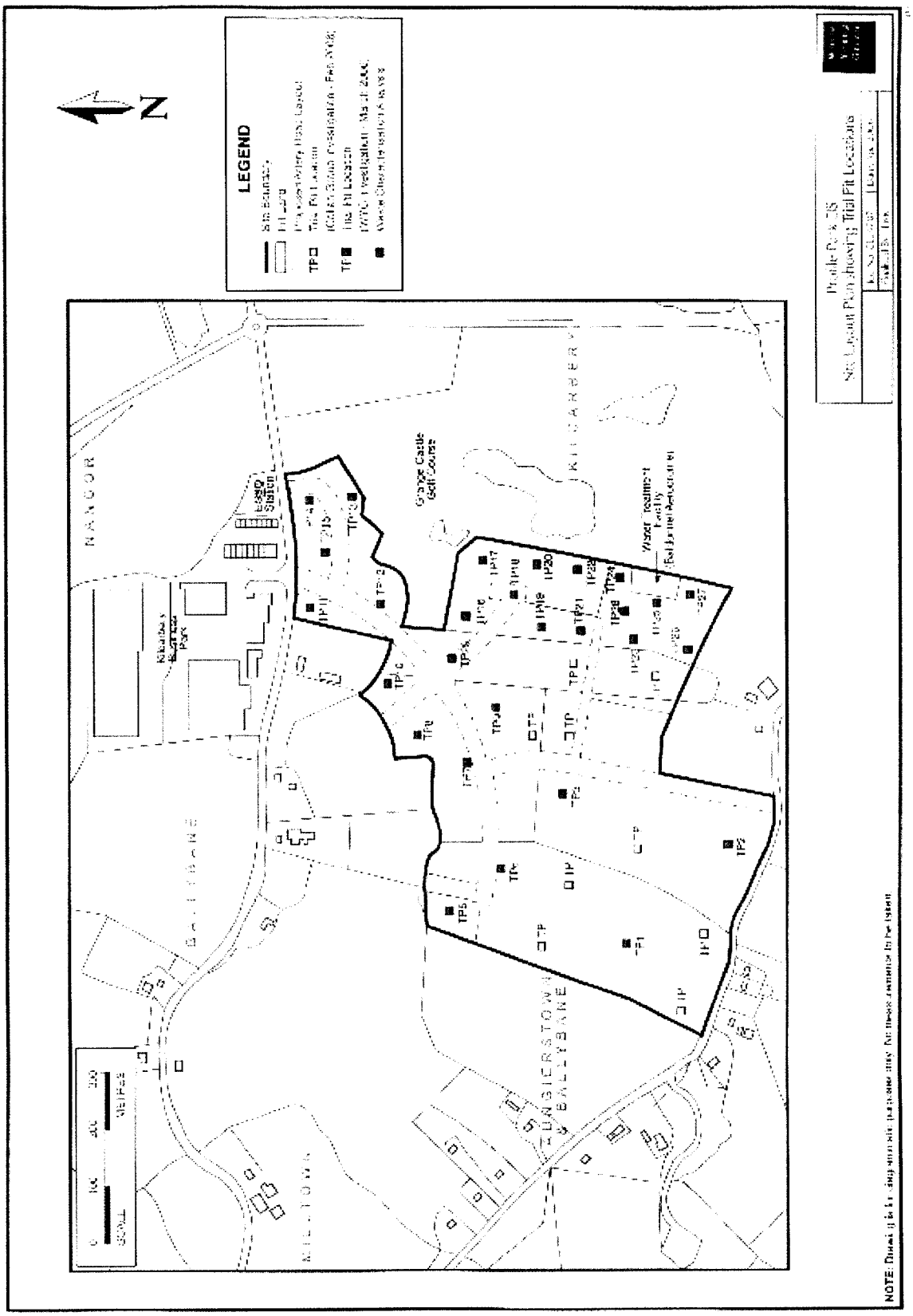


Figure 5.3.2: Site Layout Plan Showing Trial Pit Locations



Hydrogeology

There was no borehole drilling undertaken during the investigation. The information relating to the hydrogeological setting at the site is derived from trial pit information and a desk based study using the Geological Survey of Ireland (GSI) database.

Previous studies carried out in the area surrounding the site has indicated that the groundwater table is within the weathered limestone bedrock 1m to 2m bgl. The recent trial pit investigation carried out on the site encountered groundwater inflows between 1m and 3.5m bgl.

The Griffeen River drains parts of the site and the River Liffey lies approximately 4.5km to the north of the site. Groundwater flow on the site will be influenced by topographic gradient and regional groundwater flows would be expected to flow to the north or northeast either towards these rivers or sub-parallel to the river flow direction.

Aquifer Classification

The Geological Survey of Ireland has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification depends on a number of parameters including, the areal extent (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater throughput (Mm^3/d). There are 3 main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

Information from the GSI's National Draft Bedrock Aquifer Map which is shown on Figure 5.3.3 indicates that the site lies on an area which is classified as Locally Important Aquifer (Lm), i.e. bedrock which is moderately productive only in local zones.

Aquifer Vulnerability

The vulnerability of an aquifer to contamination is determined by the nature and thickness of the overburden material overlying it. The classification guidelines, as published by the GSI, are given in Table 5.3.1 below. The groundwater protection scheme for Co. Dublin is not yet completed. As such the vulnerability of the site has been determined from Table 5.3.1.

Figure 5.3.3: Bedrock Aquifer Map

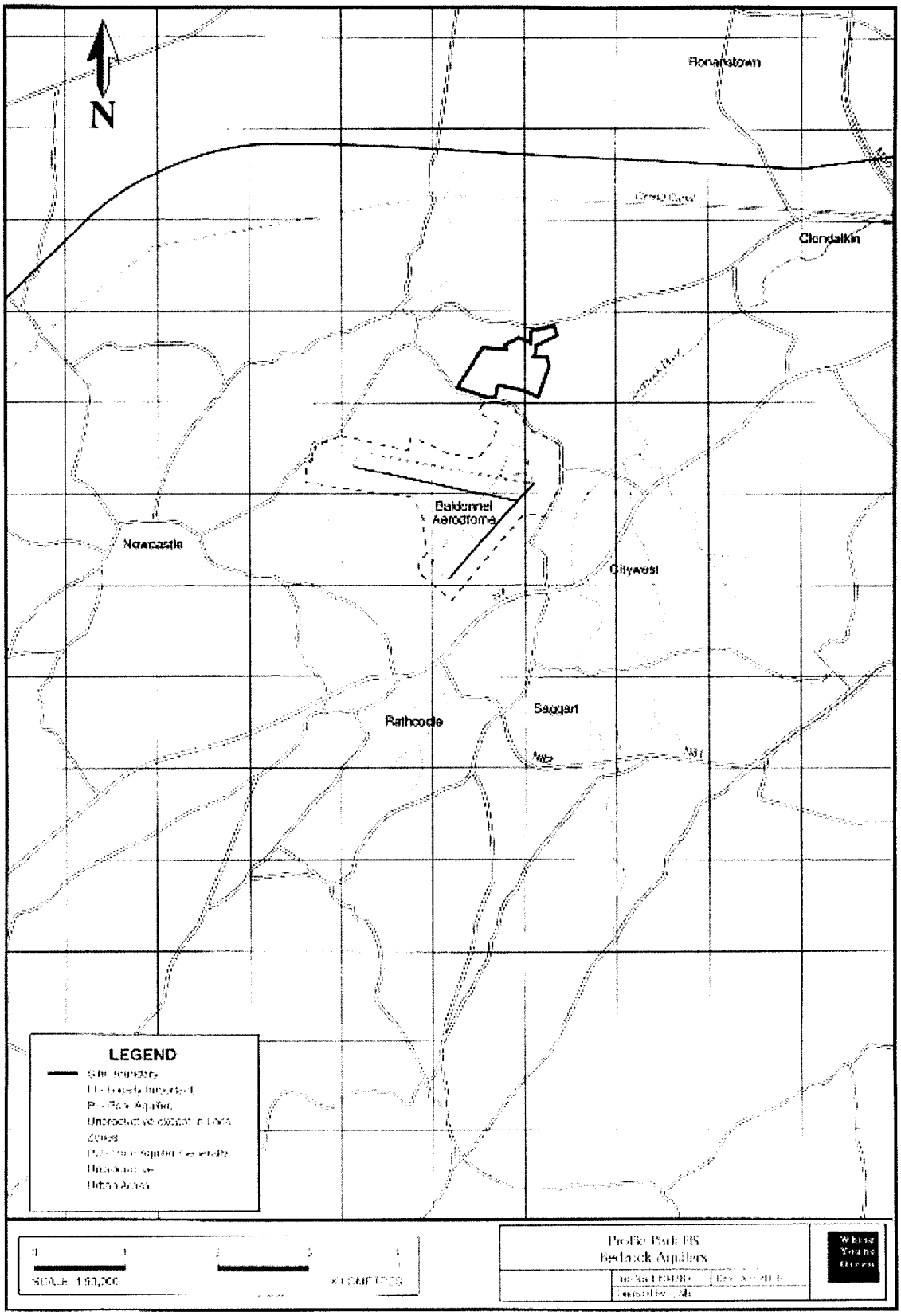


Table 5.3.1:GSI Vulnerability Mapping Guidelines (from Daly & Warren 1997)

Vulnerability Rating	Hydrogeological Requirements				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Recharge Type
	high permeability (sand/gravel)	moderate permeability (sandy till)	low permeability (clayey till, clay, peat)	(sand & gravel aquifers only)	
Extreme	0-3.0m	0-3.0 m	0-3.0m	0-3.0m	point (>30 m radius)
High	>3.0	3.0-10.0m	3.0-5.0m	>3.0m	diffuse
Moderate	N/A	>10m	5.0-10.0m	N/A	diffuse
Low	N/A	N/A	>10.0m	N/A	diffuse
Notes: i)N/A =not applicable ii) Precise permeability values cannot be given at present iii) Release point of contaminants is assumed to be 1-2 m below ground surface					

As the table above indicates, the less permeable and thicker the overburden overlying an aquifer is, the lower the vulnerability of the aquifer to contamination.

The GSI Groundwater Protection Scheme indicates therefore that the vulnerability across the development area is likely to range from high (H) to extreme (E).

Composition and Extent of Waste Material

Waste material was encountered in the eastern area of the map (see figure 5.3.2) which extended from the north as far as the water treatment facility. The depth of this material ranged from 2.50m to 3.75m in thickness and comprised gravely clays with cobbles and boulders of limestone and concrete. Wood was encountered in many of the trial pits in this area, in particular TP23 which had a layer of wood and branches approximately 0.5m in thickness. Bricks, plastics and some metals (wiring, hub cap etc.) were occasionally encountered. It is clear that this waste is derived from construction and demolition operations. At no point was any domestic type refuse encountered.

Three Waste Characterisation analyses were performed on arisings from three trial pits excavated in this area (TP16, TP22, and TP23). This analysis was carried out in line with the EPA guidance for Waste Characterisation. The form used in this analysis is presented in Appendix B. The overall results from this analysis indicate that the following materials make up the majority of waste in this part of the site.

- Unclassified Incombustibles (Stones, concrete, soil clasts) 79.7%
- Fine elements smaller than 20mm round mesh 16.8%
- Other unclassified combustibles (Wood, branches) 3.4%
- Other metal waste 0.04%
- Other glass waste 0.02%
- Other plastic waste 0.01%

As a general rule, land which contains more than 3% wood material is considered to pose a risk in terms of methane generation. The average wood component of the three waste characterisations was just above this value and therefore requires action.

Gas Monitoring

Soil samples obtained from the trial pits were analysed for the following gases: carbon monoxide, oxygen, VOCs (volatile organic compounds), hydrogen sulphide (H_2S) and methane (expressed as LEL, lower explosive limit). The results of this monitoring are presented in Appendix B.

In summary, the only area of land investigated which returned gas levels outside the ambient levels was the area of land which infilled. These gas levels correspond to the areas in which wood, wood derivatives and plastic materials were encountered. The degradation of these compounds leads to the generation of gases. Background levels of oxygen were measured at 20.9%. Oxygen levels were slightly reduced in many of the trial pits in the infilled area, the lowest being 18.2% in TP19. The reduced oxygen values reflect the presence of CO and methane. Although methane was detected, these were at very low levels and did not exceed the EPA recommended guideline of 1% LEL methane in any sample.

Soil Chemical Analysis

Soil samples were taken from various depths in trial pits across the site. The soils were analysed in ALcontol Laboratories, Dublin for metals, diesel range organics, mineral oils, volatile organic compounds and leachability. The full results from these analyses are presented in Appendix B.

In order to assess the soil analyses results with regard to potential human health risks, WYG have derived Threshold Screening Values (TSVs) in accordance with the UK framework outlined by the UK Environment Agency (EA) and the Department for Environment, Food and Rural Affairs (DEFRA). The most recent CLR (Contaminated Land Report) documents CLR7-10 (EA/DEFRA, 2002) set out the basis for this assessment.

Research by the EA is ongoing to produce toxicology reports (TOX series) for each of the contaminants identified within the CLR framework with the aim of producing published Soil Guideline Values (SGVs) using the Contaminated Land Exposure Assessment (CLEA) Model. To date, SGVs have been published for only a limited suite of contaminants, with current SGVs derived for four different land use scenarios namely:

- residential with plant uptake;
- residential without plant uptake;
- allotments; and
- commercial/industrial.

Since a retail/commercial development is proposed for the site, WYG TSVs (Issue 6f) applicable to commercial/industrial end use have been used for assessment of the risk for the site. Where SGVs have been published by the EA, these are adopted as the TSVs. For all other contaminants, TSVs for different land use scenarios have been derived by WYG in accordance with the CLR framework.

In the absence of SGVs or the TSVs derived by WYG, the Dutch Intervention Values (DIVs) have been quoted as guidance.

Metals

There were no exceedances of the respective TSVs for any of the metals analysed in this investigation. The area of land which received waste in the past returned higher concentrations in general but still fell within acceptable levels based on the commercial/industrial nature of the end use of the development. The results are displayed in Table 5.3.2 below.

Table 5.3.2: Soil Metal, DRO and Mineral Oil Concentrations, April 2006

Determinand	Units	Agricultural Land		Infilled Land		WYGE TSV*
		Min	Max	Min	Max	
Arsenic	mg/kg	<0.5	<0.5	<05	156	500
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	1400
Chromium	mg/kg	13	28	15	35	5000
Copper	mg/kg	21	41	7	89	8600
Lead	mg/kg	8	46	8	105	750
Mercury	mg/kg	<0.3	<0.3	<0.3	<0.3	480
Nickel	mg/kg	28	85	17	79	5000
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	8000
Zinc	mg/kg	50	134	58	996	46100
Boron	mg/kg	<1	<1	<1	<1	-
DRO	mg/kg	<1	<1	<1	<1	
Mineral Oil	mg/kg	<1	<1	<1	1	

* White Young Green Threshold Screening Values based on CLEA and Dutch Human Health Values

Diesel Range Organics

There were no detections of any diesel range organics in any of the standard soil analyses. There was one detection of trace concentrations of mineral oil (1 mg/kg) in TP22 which is located in the infilled area. The industry standard remediation guideline value for mineral oil is typically 100mg/kg and as such the detection in TP22 is insignificant.

Leachates

Leachate analysis on soil samples provides information on the maximum potential for a given sample of soil to contaminate groundwater. It should be noted that leachate analysis does not necessarily indicate that contamination is occurring. The EPA has derived Interim Guideline Values (IGVs) for the protection of groundwater. Leachate results have been compared to these EPA guideline values to give further indication of the soil quality at the site.

The leachate analysis was performed on 10 samples from 5 trial pits, 3 of which were located in the infilled area (TP19, TP22, and TP23). This analysis was performed to ascertain the potential for the material to contaminate groundwater. The results of the leachate analysis are displayed in Table 5.3.3 below.

Table 5.3.3: Soil Leachate Concentrations, April 2006

Determinand	Units	Agricultural Land		Infilled Land		IGV*
		Min	Max	Min	Max	
Dissolved Arsenic	mg/l	<0.001	0.012	0.002	0.006	0.01
Dissolved Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	0.005
Dissolved Chromium	mg/l	0.002	0.003	0.003	0.005	0.03
Dissolved Copper	mg/l	0.005	0.009	0.006	0.020	0.03
Dissolved Lead	mg/l	0.004	0.174	<0.001	0.007	0.01
Dissolved Mercury	mg/l	<0.00005	0.00012	<0.00005	0.00012	0.001
Dissolved Nickel	mg/l	0.001	0.002	0.003	0.009	0.02
Dissolved Selenium	mg/l	0.001	0.003	0.002	0.006	-
Dissolved Zinc	mg/l	0.029	0.037	0.020	0.035	0.1
Dissolved Boron	mg/l	0.008	0.088	0.007	0.061	1
Dissolved DRO	mg/l	<0.01	<0.01	<0.01	4.87	0.01
Dissolved Mineral Oil	mg/l	<0.01	<0.01	<0.01	0.97	0.01

*Interim Guideline Values for groundwater, EPA.

The results of the leachate analyses on the soils at the site indicate that for the most part, there is no risk of contamination of groundwater from the overburden. There were however two trial pits which were an exception to this, TP9 and TP19. The leachate results for lead in TP9 (0.174mg/l) exceeded the IGV of 0.01mg/l. This result is surprising given the visual observation of the sample, the absence of any obvious source, and the soil quality of the surrounding agricultural land. As such this value is considered anomalous. The leachate results for TP19 (4.87mg/l) for DRO and mineral oil (0.97mg/l) exceeded the respective IGV of 0.01mg/l and indicate an isolated pocket of hydrocarbon related contamination in the infilled land.

Volatile Organic Compounds

There were no detections of any volatile organic compounds in the soil samples sent for analysis.

Conclusions of Site Investigation

From a quality point of view, the soils present across much of the site are good. There are isolated elevated concentrations of lead, DRO, and mineral oil in the leachate analyses at 2 of the 29 locations. These are not considered to be significant due to the localised extent of the contamination and can easily be resolved by removal of the source material to a licensed facility for disposal.

The area of the site which has received waste in the past comprises mainly inert fill material and as such the results reflect this. While the concentrations of metals were higher in this area they were below the respective TSVs and as such do not pose a risk to the environment or human health.

The presence of wood material within this area may lead to methane generation. The gas monitoring undertaken indicated that there were some areas where there was some low level methane generation. Removal of the main area of the wood source (TP23, ~6% wood material) would be required in order to reduce further gas generation. This would reduce the average percentage of wood calculated at the site to below 3% which is the recommended industry standard action level.

5.3.3 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park, to be known as *'Profile Park'*, on the subject lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout, all on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.3.4 POTENTIAL IMPACTS OF THE PROPOSAL

Construction Phase

The construction phase will involve the disturbance and removal of topsoil and overburden. Site preparation works will involve site clearance, excavation and construction of roads and service lines. This will have a direct impact on the soils present at the site. However, as the soils are of no conservation value, this impact is not considered to be significant.

There is an increased risk of groundwater contamination resulting from spills or leaks from machinery or storage areas due to bedrock being exposed during overburden removal.

An area of the site has received infill waste in the past. This material largely consisted of construction and demolition waste with some wood. The majority of the wood encountered during the investigation was found in TP23. Results to date suggest that this material is producing low levels of methane.

The trial pit investigation across the rest of the site has proven that the overburden is glacial till and free from contamination. However, in the event of excavation operations discovering material which appears contaminated, this material should be stockpiled, analysed and disposed of if necessary to a licensed facility under the supervision of a qualified scientist.

There is the potential for dust generation during the construction phase of the development.

Operational Phase

The operational phase of the development will not involve unlicensed direct emissions to the soil or groundwater environment. Any discharges to groundwater of surface waters will require a permit or licence from the local authority or EPA.

There will be increased volumes of traffic on the site as a result of the development which will lead to increased risk of leakage of fuels from vehicles which have the potential to impact on the underlying aquifer.

5.3.5 REMEDIAL OR REDUCTIVE MEASURES

The remedial (or mitigation) measures proposed are put forward to address the potential impacts on the soils and groundwater at the site resulting from the construction and operation of the roads and services which will facilitate the future business park development.

It is advisable to remove the areas containing wood material in order to reduce methane gas generation. The area at TP23 should be excavated and screened for wood materials. This area can be extended during the removal works depending on visual observations of wood content.

In order to provide further assurance that there will be negligible methane generation from the fill material, a network of up to 6 gas monitoring wells could be installed across the infilled area in order to monitor during the construction phase.

Removal of the soils found in TP19 should be carried out in order to remove the isolated hydrocarbon contamination.

The construction works will involve the disturbance of soils at the site. This disturbance should be kept to a minimum. Where disturbance is unavoidable, the material should either be stored in stockpiles prior to reuse at the site or removed from the site. These stockpiles should be managed in a way to prevent negative impacts to the surrounding environment. The investigation across the site has indicated areas where fill material exists. However, should fill material that is not suitable for reuse be encountered during the construction phase, it should be transported offsite to be dealt with in an appropriate facility.

The excavation of soils during the initial stage of the development will be limited to the installation of services at the site and as such will not be deeper than 2-3m below ground level. Foundations for buildings are likely to extend deeper.

Dust generation should be mitigated against by dampening down construction areas during dry and windy weather conditions.

Any fuels or chemicals stored on the site during the construction or operation phases should be stored in appropriately bunded areas. Drainage from hardstanding areas on the site should incorporate interceptors to prevent contamination of surface water bodies in the event of leaks or spillages.

Facilities to store sewage during the construction phase should be provided and maintained appropriately. There should be no discharge to ground.

Good management practices in accordance with the CIRIA guide for environmental good practice on site during the construction and operation phases will mitigate against any spillages or leakages from vehicles or machinery.

5.3.6 PREDICTED IMPACT OF THE PROPOSAL

The proposal for the development of roads and services and the associated development of Profile Park will involve the disturbance and the removal of soils from the site. This will be mitigated against by keeping earth movements to a minimum and following the proposed mitigation measures listed above. This will result in no residual impacts on the environment.

The removal of the two localised areas containing wood and hydrocarbon compounds will improve the condition of the site prior to development.

5.3.7 MONITORING

There is no requirement for future monitoring of soil or groundwater quality for this stage of the development.

Information to date suggests that very low level methane is being generated in the infilled area. As such, it may be deemed necessary to install up to 6 gas monitoring boreholes across the infilled area in order to confirm that the material is not producing significant levels of methane.

Depending on the specific industries located at the development, some monitoring of groundwater quality may be required. This will be outlined within IPPC licenses or County Council requirements for any facilities which have gained permission to discharge to ground.

5.3.8 REINSTATEMENT

There are no re-instatement requirements envisaged for the construction of the roads and services and the associated business park development.

5.4 WATER – SUPPLY, SURFACE & EFFLUENT

Introduction

This section of the EIS was completed by Doherty Finegan Kelly Consulting Engineers. It assesses the impact of the proposed Business Park on the receiving wastewater infrastructure and the water supply environment. The lands which are the subject of this EIS are located in the townland of Ballybane.

The effects of the development on water are examined under the following headings:

5.4.1 Surface Water Drainage
5.4.2 Water Supply
5.4.3 Foul Drainage

The assessment of the potential impact of the proposed development, for both the construction and operational phases, on the receiving wastewater infrastructure and the water environment was carried out according to the methodology specified by the Environmental Protection Agency (EPA)[1, 2].

5.4.1 SURFACE WATER DRAINAGE

5.4.1.1 RECEIVING ENVIRONMENT

The site is currently greenfield. A tributary of the Griffeen River flows through the subject site and then joins the Griffeen within Grange Castle Business Park. The Griffeen eventually joins the River Liffey in Lucan, Co. Dublin.

There are additional smaller ditches and watercourses within the subject lands, which all ultimately discharge to the stream.

The section of the stream immediately downstream of the site has been upgraded in the recent past to alleviate any local restrictions on capacity.

5.4.1.2 CHARACTERISTICS OF THE PROPOSAL

The site storm water systems are shown on Doherty Finegan Kelly drawings 04173/200-204. The system shall be designed in conformance with the requirements of South Dublin County Council (SDCC) and the Greater Dublin Strategic Drainage Study (GDSDS).

The main tributary of the Griffeen River runs along the boundary of these lands, and will not be disturbed by the development. It is proposed to culvert the other existing ditches on the site, where they pass under the road network.

The proposed surface water drainage system will consist of gravity sewers, which will drain to the north of the site, where they will discharge to the stream. Due to the topography of the lands it is necessary that three surface sewer networks be provided for the development with three separate outfalls to the stream.

It is proposed that the surface water run-off from all individual sites within the business park will be attenuated within the curtilage of each site. The surface water run-off from the estate roads etc will be attenuated before discharge to the Griffeen River, the attenuated water being stored in oversized pipes.

Within the individual sites permeable paving etc. will be used, where appropriate, to allow the surface water to percolate into the ground, thus reducing the total volume being discharged to the surface water drainage system.

The details of the three network catchments and sub-catchments are outlined in Table 5.4.1. The allowable runoff (permissible outflows) from the development has been calculated for the various catchments and sub catchments using the GDSDS document. The catchments have been designed using the Qbar equation

$$Qbar = 0.00108 \times (AREA)^{0.89} (SAAR)^{1.17} (SOIL)^{2.17}$$

Table 5.4.1 –Surface Water Catchment Details

Network	Catchment Area (Ha)	Attenuated Sites (Ha)	Roads and Footpaths (Ha)	Landscaped Areas (Ha)	Runoff (ltrs/sec)	Attenuation *
Network A (discharging at MH 14.0)	22.78	20.57	1.13	1.08	96	375
Network B (discharging at MH 25.0)	13.25	10.76	1.27	1.22	56	422
Network C (discharging at MH 30.0)	3.81	3.21	.3	.3	16	104

* The attenuation volume covers the run-off from roads and footpaths only. The run-off from the individual sites is stored within the site curtailage.

Peak flows will be routed through storage structures, both within individual sites and on the roads network, to control the final outflow rate. The storage structures and their outlet controls are sized to ensure that future peak flow rates to the natural watercourses do not exceed the figures within the GDSDS document.

Pipelines will be designed to provide self-cleansing velocities in accordance with BS EN 752. Pipelines will generally consist of pre-cast concrete flexibly jointed pipes. Pre-cast concrete manholes and trapped gully chambers will be used throughout the site. Manhole covers and gully gratings shall be installed to suit loading requirements in accordance with BS EN 124. The gravity drainage systems proposed will be laid in accordance with IS 6 and more particularly, with the Building Regulations Section H. All works within public areas will be constructed to the requirements of the Local Authority.

At each discharge location a Class 1 Bypass Petrol Interceptor will be provided. This petrol interceptor will be sized and selected in accordance with IS EN 858 Parts 1 and 2.

Network A consists of two catchment areas and drains the western section of the business park. This network will outfall to the existing stream at the north of the site at MH14.0. in a 375 mm diameter pipe laid at a gradient of 1:160. The main

catchment drains Road 6 within the business park, as well as the individual sites located off this road. It is envisaged that this road will eventually connect to the Baldonnell Road at the southern boundary of the site. The secondary catchment will drain a future road running parallel to and to the West of Road 6. This road is not part of this planning application. Network A will be constructed under phase 1 of the development.

Network B consists of a main catchment and a secondary catchment and drains the main eastern section of the business park. This network will outfall to the existing stream at the north of the site at MH25.0 in a 300 mm diameter pipe laid at a gradient of 1:160. The main catchment drains Roads 5 and 7 within the business park, as well as the individual sites located off these roads. The smaller sub catchment drains Road 4 to the north of the internal roundabout, as well as the individual sites located off this road. It is envisaged that Road 4 will eventually be connected to a road network within the lands to the north of this site, but this road network will have its own surface water drainage network. Network B will be constructed under phase 1 of the development.

Network C consists of a single catchment and drains the north eastern section of the site, which is located to the north of the Griffeen tributary. This network will outfall to the existing stream at MH30.0 in a 225 mm diameter pipe laid at a gradient of 1:200. The catchment drains Road 2, which is the main entrance dual carriageway to the business park, as well as the sites located off this road. Network C will be constructed under phase 1 of the development.

Silt storage is provided prior to the outflow point from the attenuation storage pipes under the roadway and the oil storage volume within the interceptor unit, to ensure that best practices to remove any traces of hydrocarbon contamination (from vehicular or fuel storage/loading areas) are applied prior to discharge off-site.

A summary of the design criteria and design assumptions are as follows:

The drainage system has been designed for the current phase of development only, which includes a total area of 39.84 Ha (398,400m^2) approximately.

Rainfall data utilised for calculation purposes is that obtained from Met Éireann (The Irish Meteorological Service) for Baldonnel (Military) Areodrome. A 10% increase factor for climate change has been included in calculations as recommended by the Greater Dublin Strategic Drainage Study. This provides for the following:

- Annual rainfall = 801mm
- RP5 60 min = 18.7mm
- RP5 2d = 65.3mm
- System variables selected:
- Global time of entry (Te) = 2 minutes;
- Volumetric runoff coefficient, Cv = 1.0 for all paved or roofed areas;
- Linear measure of effective roughness, ks = 0.6mm for all gravity pipelines.

Allowable outflow rates, following attenuation, have been assessed based on an outflow of 2 l/s per hectare with growth factors of 2.1 and 2.6 for the 30 year and 100 year return periods respectively; in accordance with the Greater Dublin Strategic Drainage Study.

Attenuation volumes have been estimated on a quantitative basis for the critical storm at both the 30 year and 100 year return periods. The 30 year storage volume will be contained within oversized surface water pipes and the 100 year volume will be allowed to cause flooding of the manholes (and the internal estate roads adjacent to the outfall where necessary).

5.4.1.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

As a result of the construction works, some silt loads might be anticipated on the existing watercourses in rainy periods at construction stage.

Operational Phase

The increased area of roads, footpaths etc proposed for the Phase 1 development will result in an increase in surface water run-off from the subject lands. There is potential for disturbance to the watercourse due to uncontrolled run-off discharge. This could change the character of the river and have adverse impacts on flora and fauna associated with it.

There is a possibility for oil spillages both during construction and following completion of the Phase 1 development. Such spillages could pollute the existing watercourses.

'Do-Nothing' Impact

If the development does not proceed, there would be no change to the existing situation on the currently undeveloped lands, vis-à-vis surface water run-off.

5.4.1.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Siltation and groundwater control ponds and underground structures will be utilised at construction stage in order to minimise the impact of the construction operations on the receiving environment.

Normal post-construction reinstatement will take place. In the case of works in public areas this will be to the specification and approval of the relevant Local Authority.

Oil interceptors which will be provided as part of the development will be utilised at the construction stage to prevent contamination of the watercourses.

Operational Phase

In order to mitigate against any impact of development of the lands on the stream, it is proposed to design the surface drainage system in line with current best management practice (i.e. the GDSDS). These measures will include as follows:

- Attenuation of storm water discharging from each phase of development to reduce peak flows and mitigate against possible down stream flooding. Attenuation will be controlled by hydro brakes or other approved systems.

- Provision of petrol interceptors within the site to reduce the possible effects of oil spillage's, siltation and "first flush" pollution of the outfall watercourse.

The storage structures, outflow control systems and oil interceptors will require periodic maintenance. Telemetry systems will also be installed within these structures to warn of oil spillages and possible flooding. The monitoring of this telemetry along with the maintenance of the structures will be carried out, as required, by the development management company.

5.4.1.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

Pipeline and drainage element construction will be carried out simultaneously with the earthworks/access roads construction. Both sets of works will be phased to suit the overall development programme. As retention structures form an integral part of the scheme design, minimal effect is anticipated on stream flows downstream of the subject development.

Operational Phase

Because of the use of attenuation and petrol interceptors, there should be no appreciable impact on the stream from the operation of the completed development.

'Worst Case' Impact

If the remedial and reductive measures set out above failed, uncontrolled storm discharges from the proposed significantly increased hardstanding area of the roads infrastructure would result in short pulses of high water volumes down the existing stream, which could eventually change the character of the stream and impact upon the adjacent lands in the Lucan area. However, the full implementation of proposed remedial and reductive measures will ensure that such a scenario will not arise.

5.4.1.6 MONITORING

Monitoring measures, where required, are outlined in Section 5.4.1.4 above.

5.4.1.7 REINSTATEMENT

Normal post-construction reinstatement will take place. In the case of works in public areas this will be to the specification and approval of the relevant Local Authority.

5.4.2 WATER SUPPLY

5.4.2.1 RECEIVING ENVIRONMENT

The water supply to the site will be provided from the 700mm diameter trunk main [the Low Level Lucan/Palmerstown Water Supply Scheme] which passes across the northern edge of the site within a 15m wide wayleave. This watermain is connected to the Belgard reservoir and has sufficient pressure to service this development.

5.4.2.2 CHARACTERISTICS OF THE PROPOSAL

The water supply network for this proposed development is shown on Doherty Finegan Kelly drawings 04173/300-304.

The water supply system proposed to be constructed as part of this development has been designed to cater for the entire Masterplan development. Table 5.4.2 contains preliminary estimates of the anticipated water supply demand for the Masterplan development.

It should be noted that the land uses indicated in the table below are preliminary estimates of land use only. All future uses proposed on the lands will be subject to planning approval.

Table 5.4.2 – Masterplan Water Supply Demand

Use Category	Total Floor Area (m^2)	Total Occupancy (persons)	Total Daily Flow (ltrs/pers/day)	Total Daily Demand (ltrs/day)	Average Flow (8 hour day) (ltrs/sec)
Neighbourhood Service Centre/SME's	19,365	645	45	29,025	1.01
Offices	20,640	1,376	45	61,920	2.15
Retail Warehouse	29,685	990	45	44,550	1.55
Showrooms	17,423	581	45	26,145	0.91
General Industry	28,329	944	45	42,480	1.48
Logistics	70,823	2,361	45	106,425	3.69
Retained lands *	14,590	486	45	21,870	0.76
Existing house site *	30,280	1,009	45	45,405	1.58
Other lands to the north of the site *	46,257	3,084	45	138,780	4.82
Total	277,392	11,476	45	516,600	17.95

* These areas are not covered by this planning application, but they are covered by the Masterplan and the water supply network has to be designed to cater for these flows.

The full Masterplan water demand of approx 517 m^3 per day will not occur until completion of the Masterplan development. As a consequence, a "growing demand" profile will be experienced during development of the Masterplan. The full water demand is confirmed to be within the capacity of the local system. The peak flow from the Masterplan development is anticipated as 3 times the average flow and equates to 53.85 litres per second.

The occupancy rates for the individual units are based on the values in Table 5.4.3 The daily flow rates for each of the unit types are again extracted from Table 3 of the Wastewater Treatment Manuals - Treatment Systems for Small Communities, Business, Leisure Centres and Hotels published by the Environmental Protection Agency 1999.

Table 5.4.3– Unit Occupancy Rates

Use Category	Occupancy Rate
Neighbourhood Service Centre/SME's	1/30 m^2
Offices	1/15 m^2
Retail Warehouse	1/30 m^2
Showroom	1/30 m^2
General Industry	1/30 m^2
Logistics	1/30 m^2
Retained lands	1/30 m^2
Existing house site	1/30 m^2
Other lands to the north of the site	1/15 m^2

Water pipeline construction will take place as part of the general earthworks/site infrastructure works. Such works will therefore be phased to suit the overall phased building programme.

5.4.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Construction Phase

Possible effects that can be expected on the existing watermain network include:

- Construction stage impacts when installing new pipelines.
- Additional demand on the local water supply.

The proposed development will not affect the existing network until a connection is made. At this stage there is the possibility of contamination of the existing water supply caused by the construction work.

Operational Phase

Once occupied, the development will result in an increase in the water demand on the existing watermain network. It is proposed to provide a minimum of 24 hours storage within each unit

'Do-Nothing' Impact

If the development on the subject lands does not proceed, there would be no change to the existing situation vis-à-vis water supply.

5.4.2.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

All pipe work will be cleaned and tested in accordance with the requirements of the Local Authorities, prior to connection to the existing watermain network. All connections to the existing network will be carried out under Local Authority supervision. This should limit the possibility of contamination from unclean pipe work and should also limit the likelihood of leaks.

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

Operational Phase

Water usage will be monitored by bulk water meters to be installed on the supply pipes to the individual sites in the business park. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

5.4.2.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

If the remedial measures detailed above are implemented, there would be no significant adverse direct or indirect impacts as a result of water supply connections during the construction phase of the development.

Operational Phase

The operation of the overall Masterplan development is likely to result in the increase in the quantity of water being used within the existing Local Authority watermain network by a peak rate of 53.85 litres per second. This equates to the daily demand of 517 m^3. Adequate capacity is available within the existing network for the Masterplan development. The demand on the existing network will also experience a growing profile as outlined above.

'Worst Case' Impact

The worst case scenario is that a previously installed section of the watermain might be damaged during later excavation works, leading to the escape of water from the main and the possible contamination of the fresh water supply. There are sufficient valves provided on the watermain, however, to permit any damaged section of main to be isolated and repaired.

5.4.2.6 MONITORING

Water usage will be monitored by bulk water meters to be installed on the supply pipes to the individual sites in the business park. These meters will be read regularly by the Local Authority for billing and leakage control purposes.

5.4.2.7 REINSTATEMENT

Normal post construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

5.4.3 FOUL DRAINAGE

5.4.3.1 RECEIVING ENVIRONMENT

All wastewater from the area is treated at the Ringsend Wastewater Treatment Plant (WWTP) which has the capacity to treat a population equivalent of 1.7 million. This equates to a volumetric treatment capacity of 382,500 m^3/day and a BOD mass treatment capacity of 110,500 kg/day.

5.4.3.2 CHARACTERISTICS OF THE PROPOSAL

The site foul sewer network is shown on Doherty Finegan Kelly drawings 04173/250-255.

The effluent from this site will discharge to a pumping station within Grange Castle Business Park, from where it will be pumped up to the 9B trunk sewer, which conveys sewage directly to the main municipal treatment works at Ringsend.

The proposed development is likely to comprise a mixture of building uses, i.e. retail, office, retail warehouse, logistics, showrooms and general industry. The effluent to be discharged from the site will, therefore, generally be domestic standard wastewater. Any effluent produced on the site, which is lower than this standard, will be treated to bring it up to domestic standard.

The drainage scheme serving the different elements of the development is proposed to be constructed to Local Authority requirements for taking in charge; however, the scheme is intended to remain in private ownership under the maintenance and control of a management company.

The effluent from the site will discharge to a manhole located at the north western corner of the site (FSMH16.0). It will be conveyed from there to the pumping station along a 15m wide wayleave passing through the proposed new Milltown Business Park (in the ownership of SDCC), and then along the line of the new entrance road into Grange Castle Business Park.

The gravity drainage system proposed will be constructed with uPVC or concrete pipes laid in accordance with IS 6 and, more particularly, the Building Regulations, Section H. All works within public areas will be constructed in accordance to the requirements of the Local Authority.

In order to design the sewers that will be constructed as part of the application it is necessary to estimate the likely possible occupancy rates for the full Masterplan development with resulting effluent. Table 5.4.4 contains a summary of the predicted occupancy, average and peak flow rates resulting from the entire Masterplan development. The peak flow from the Masterplan development is anticipated as 4 times the average flow and equates to 71.8 litres per second.

Table 5.4.4 – Masterplan Effluent Generation

Use Category	Total Floor Area (m^2)	Total Occupancy (persons)	Total Daily Flow (ltrs/pers/day)	Total Daily Demand (ltrs/day)	Average Flow (8 hour day) (ltrs/sec)	Design Flow (4 x DWF) (ltrs/sec)
Neighbourhood Service Centre/SME's	19,365	645	45	29,025	1.01	4.04
Offices	20,640	1,376	45	61,920	2.15	8.6
Retail Warehouse	29,685	990	45	44,550	1.55	6.2
Showrooms	17,423	581	45	26,145	0.91	3.64
General Industry	28,329	944	45	42,480	1.48	5.92
Logistics	70,823	2,361	45	106,425	3.69	14.76
Retained lands *	14,590	486	45	21,870	0.76	3.04
Existing house site *	30,280	1,009	45	45,405	1.58	6.32
Other lands to the north of the site *	46,257	3,084	45	138,780	4.82	19.28
Total	277,392	11,476	45	516,600	17.95	71.8

* These areas are not covered by this planning application, but they are covered by the Masterplan and the foul sewer has to be designed to cater for these flows.

The occupancy rates for the individual units are based on the values in Table 5.4.5. The daily flow rates for each of the unit types are again extracted from Table 3 of the Wastewater Treatment Manuals - Treatment Systems for Small Communities, Business, Leisure Centres and Hotels published by the Environmental Protection Agency 1999.

Table 5.4.5 – Unit Occupancy Rates

Use Category	Occupancy Rate
Neighbourhood service centre/SME's	1/30 m^2
Offices	1/15 m^2
Retail Warehouse	1/30 m^2
Showroom	1/30 m^2
General Industry	1/30 m^2
Logistics	1/30 m^2
Retained lands	1/30 m^2
Existing house site	1/30 m^2
Other lands to the north of the site	1/15 m^2

Following the estimation of flows from each building, the sewer networks were designed in accordance with BS8301 and South Dublin County Council requirements.

5.4.3.3 POTENTIAL IMPACT OF THE PROPOSAL

There are three potential impacts that require consideration in regard to the provision of a foul sewerage system to serve the proposed development:

- Pipeline construction activity.
- Additional demands on the existing pipe network.
- Possible pollution of ground water from pipe breakages or leaks.

Construction Phase

The construction of the proposed sewer network should not affect the existing network until the final connection is made. At this point, there is the possibility of debris and building rubble falling into the existing sewer. There are also the inherent safety and health problems associated with construction works occurring in close proximity to a live foul sewer.

The presence of significant numbers of workers on the overall subject lands over the phased construction period will lead to the generation of foul sewage associated with temporary showers, toilets, canteen and washing facilities.

Operational Phase

Once effluent is discharged from the completed and operational development it will result in an increase in the hydraulic loading within the existing sewer network and a reduction in the capacities of the existing sewer system.

There is a possibility of untreated effluent discharging to the water table if pipes are broken or not laid properly during construction.

'Do-Nothing' Impact

If the development were not to proceed, there would be no change to the existing situation on the site vis-à-vis foul drainage.

5.4.3.4 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Temporary, chemical or waterborne facilities will be provided by the contractors for the duration of the construction phase, involving off-site disposal or temporary connection to the public sewer.

The construction of the sewer network within the subject lands will be carried out as part of the overall earthworks, roads and infrastructure development, which will be carried out in a phased manner to match the overall phased development of the subject lands. This could result in the discharge of silt to existing watercourses. Mitigation measures, as detailed in section 5.4.2, concerning surface water will be carried out to minimise this potential impact.

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

Fauna investigations of the site have revealed that otters traverse the site along the watercourse which runs in an east west direction across the northen portion of the site. See section 5.2 for details. In order to mitigate any potential negative impact to otters as a result of the proposed development, a dry culvert will be provided where the road network crosses this watercourse to faciliate the movement of otters across the site. The design of the culvert is in accordance with the Ecologists advice.

Operational Phase

In order to mitigate against the possibility of leakage of effluent into the ground water, all sewers will be inspected by C.C.T.V. camera and tested in accordance with Local Authority requirements, prior to the discharge of foul effluent to the public sewer system. Connections made to the public sewer will also be carried out in the presence of Local Authority Representatives.

As this is a significant project, with a phased construction period of some 5 - 10 years for the Masterplan development, the demand being placed on existing and proposed drainage facilities will grow to the maximum anticipated over a relatively long period. Thus, any network improvements required can be considered and provided for in stages.

No specific monitoring of the type of effluent discharged is anticipated at this point; however, some future occupiers of the proposed development scheme may require discharge licences for specific processes in due course.

5.4.3.5 PREDICTED IMPACT OF THE PROPOSAL

Construction Phase

If the remedial measures detailed above are implemented, there would be no significant adverse direct or indirect impacts as a result of foul drainage during the construction phase of the development.

Operational Phase

The operation of the overall Masterplan development is likely to result in the increase in the quantity of effluent within the existing Local Authority sewer network. Recently completed upgrading works of the Municipal network will ensure adequate capacity is available for the development.

As a consequence, the predicted impact of the proposed development, in terms of Foul Drainage is assessed as being slight.

'Worst Case' Impact

The worst case scenario would be a sewer blockage or spillage giving rise to contamination. However, the design, installation and inspection of the scheme will be to such a standard as to guarantee that this is not a realistic scenario.

5.4.3.6 MONITORING

No monitoring is proposed in this instance.

5.4.3.7 REINSTATMENT

Normal post-construction reinstatement will take place. In the case of works in public areas this reinstatement will be to the specification and approval of the relevant authority.

5.5 AIR

5.5.1 NOISE

Introduction

This section of the EIS will assess and describe the noise impacts associated with the proposed Profile Park Business Park development on its surrounding environment. The noise assessment has been made using the following methodologies:

- A baseline survey at the noise sensitive locations at the proposed development has been conducted. The survey was carried out in accordance with ISO 1996: Acoustics: 'Description and measurement of environmental noise'.
- Construction noise impacts have been assessed in accordance with BS5228 'Noise and Vibration Control of Construction and Open Sites' (1997).
- Guidance relating to the operation of the site has been made with reference to the EPA: Guidance note for noise in relation to scheduled activities and W.H.O guidelines.

Particular attention is focused on sensitive receptors, such as residential properties adjacent to the site, and to the extent of the exposure of these receptors to noise derived as a result of the proposed development.

5.5.2 RECEIVING ENVIRONMENT

The proposed development is situated midway between the N4 and the N7 national roads and in West County Dublin. The receiving environment is semi-rural in nature in a satellite area of West County Dublin. The existing acoustic environment is dominated by traffic along local roads and by air traffic from Baldonnel Aerodrome. In the absence of passing traffic, noise from the N7 makes up the background noise.

Baseline Survey

A baseline noise survey was carried out on the 29th and 30th of March 2006 at 4 noise sensitive locations in the area of the proposed development. Measurements were made for a period of 15 minutes during the survey.

All measurements were carried out in accordance with ISO 1996: 'Acoustics-Description and measurement of environmental noise'. Measurements were made at a height of 1.5m above ground level. All measurements were free field, and were positioned 1-2m from reflecting surfaces.

The equipment used during this survey was a Type 1, Brüel and Kjaer 2250 sound level meter. Before and after the survey the measurement apparatus was checked and calibrated to an accuracy of +/- 0.3dB using a Brüel and Kjaer 4231 calibrator.

The weather conditions were dry and mild with overcast conditions. Wind speeds were below 5m/s during all measurements.

Five environmental noise parameters were measured which are defined below.

LAeq is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value.

LAmax is the maximum A-weighted sound level measured during the sample period.

LAmin is the minimum A-weighted sound level measured during the sample period.

LA10 is the A-weighted sound level that is exceeded for 10% of the sample period and is used to quantify traffic noise.

LA90 is the A-weighted sound level that is exceeded for 90% of the sample period and is used to quantify background noise.

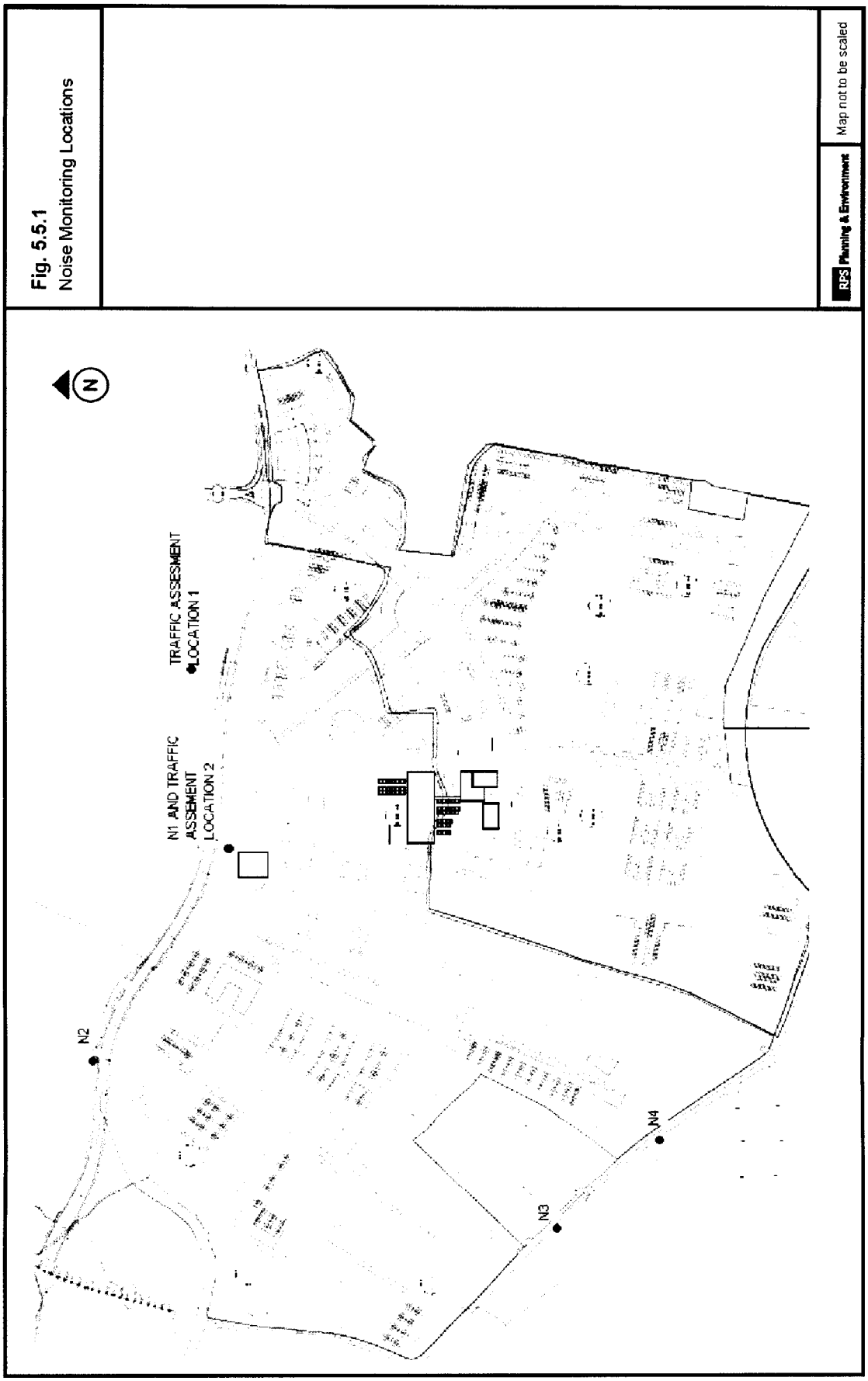
A-weighting is the process by which noise levels are corrected to account for the non-linearity of human hearing. All noise levels quoted are relative to a sound pressure of 2x10-5 Pa.

A description of the noise monitoring locations is presented in Table 5.5.1 below and their locations are shown on Figure 5.5.1.

Table 5.5.1: Noise monitoring locations

Position No.	Description
N1	Residential property north of site, opposite Ballygowan facility
N2	Residential property north of site, opposite side of Road
N3	Timber gated House, west of site, on road to Baldonnel
N4	Residential Property adjacent to Baldonnel Aerodrome, Southwest of site.

Figure 5.5.1: Noise Monitoring Location Map



Survey Results

The results of the noise surveys carried out are included in Table 5.5.2 below. The locations of these sites can be seen in figure 5.5.1.

Table 5.5.2: Summary of baseline noise measurements made on 29th and 30th March 2006

Location	Time	LAeq	LAmax	LAmin	LA10	LA90
N1	11:20	68.1	83.4	44.6	72.7	50.3
	11:36	67.7	83.5	42.1	72.4	48.7
	14:55	68	84.3	42.1	72.4	48.7
	23:00	61.6	78.7	35.5	64.4	39.7
N2	11:53	71.4	58.9	41.3	75.6	50.4
	12:14	72.7	89.9	38.3	76.8	47.0
	14:35	67.8	85.1	40.8	72.0	47.5
	22:43	63.3	78.6	37.8	68.7	41.6
N3	12:33	68.9	88.9	38.6	69.7	42.2
	12:55	68.3	89.2	35.0	67.9	38.2
	13:49	68.9	88.7	36.2	70.3	40.1
	22:02	62.8	86.6	40.3	57.7	42.3
N4	13:13	67.7	88.0	35.0	66.3	38.8
	13:32	66.8	86.5	35.6	65.5	38.9
	14:12	67.2	90.5	36.3	64.8	39.8
	22:20	61.0	87.4	40.0	48.8	41.7

Location N1

Daytime noise levels at this location were dominated by very heavy passing road traffic and frequent over-light by low level aircraft and helicopters from Baldonnel. Very busy traffic using Kilcarbery Business Park formed the majority of the road traffic.

Night time noise was dominated by infrequent passing road traffic, foliage noise, and once again, aircraft passing overhead from Baldonnel.

Location N2

Daytime noise levels in this area were dominated by heavy passing traffic. Guard dogs in the property barked continuously during all daytime surveys. Frequent air traffic from Baldonnel once again contributed to the noise climate at this location.

During the night time period, road traffic and air traffic were less frequent but remained the dominant noise sources, foliage noise contributed to a lesser degree.

Location N3

Sustained frequent road traffic dominated the noise climate in this area during the day. The impact from air traffic was proportionally higher in this location as it is on a direct flight path to Baldonnel.

During the night period, a barking guard dog was noted, as were infrequent passing traffic and decreased air traffic. In quiet periods background road traffic noise was audible from the surrounding busier roads.

Location N4

This location is adjacent to Baldonnel and as such, the daytime noise climate was largely affected by aircraft noise. Frequent passing road traffic remained the most dominant noise source at this receptor none the less.

The night period showed less air traffic and less road traffic, while these remained the principle noise sources in the area. Foliage noise and background road traffic noise from the surrounding busier roads was audible in lull periods.

Noise criteria

In order to assess the operating levels of the site, the following criteria and regulatory bodies have been referenced which may be considered applicable to the operation of the facility in question:

Environmental Protection Agency EPA: Guidance note for noise in relation to scheduled activities

This document states that ideally, if the total noise level from all noise sources is taken into account, the noise level at the sensitive locations should be kept below an LAeq value of 55dB (A) by daytime. At night, to avoid disturbance, the noise level at noise sensitive locations should not exceed an LA eqT value of 45dB (A). Audible tones and impulsive noise at sensitive locations at night should be avoided. In some particularly quiet areas, such as pastoral, rural settings, where background noise levels are very low, lower noise limits may be more appropriate.

Environmental Protection Agency (EPA): Guidance notes for noise

This document suggests the usual range of values allowed for industrial activities is 45dBLAeq at night, and 55dBLAeq during the day. These values relate to noise levels at the nearest noise sensitive locations or at the boundary of the premises.

World Health Organisation (WHO) Guidelines for Community Noise 1999

This document recommends that to protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. At night time, outside sound levels about 1m from facades of living spaces should not exceed 45dB LAeq so that people may sleep with bedroom windows open.

In summary, operational noise levels for the facility should be limited to 55dB LAeq during day time hours and 45dB LAeq during night time hours in line with the above guidance documents.

5.5.2 POTENTIAL IMPACT OF THE PROPOSAL

The proposed site is located on lands midway between N7 and the N4, near Clondalkin in northwest Dublin. The development comprises the provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on a site of 39.84 hectares at the Nangor Road, Kilcarbery, Dublin 22. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

"Do Nothing" Impact

If the proposal were not to go ahead there would be no noise impact from this proposed facility. However as this area has seen considerable development over the last number of years it is likely that noise from traffic will increase in the future. Baseline noise surveys have indicated quite heavy road traffic and aviation traffic noise in the area at present.

Predicted Impact

The predicted noise impact of this development will occur during both the construction and operational phases of the project.

Construction phase

The construction phase of the proposed development has the potential to increase noise levels at noise sensitive locations surrounding the development site. Impact from the construction phase will depend on the number and type of equipment used during the development. The construction stage of the project will include the construction of the internal roads as outlined above. It is envisaged that construction works associated with the site development will involve some if not all of the following pieces of machinery during site preparation and construction works;

- Dozer
- Tracked Excavator
- Dump Trucks
- Standby Generator
- Road Sweeper
- Road Lorries
- Rock crusher

Predicted noise levels have been estimated using the methodology described in BS: 5228: Noise and Vibration on construction and open sites. Predictions are based on a LAeq1hour value with all machinery listed below operating for a continual period of 1 hour. This may be considered a worst-case scenario as machinery may not work simultaneously. Additionally, calculations are based on

minimum distances between site activities and the nearest noise sensitive locations.

In Ireland, there are no statutory guidelines relating to noise limits for construction activities. These are generally controlled by local authorities and commonly refer to limiting working hours to prevent a noise nuisance. A publication from the National Road Authority (NRA) 'Guidelines for the treatment of noise and vibration in national road schemes' 2004, has outlined recommended noise levels for construction noise.

Although these refer to road projects, they have been developed in line with typical construction noise limits on general construction projects used previously in Ireland. The limits outlined represent a reasonable compromise between the practical limitations during a construction project and the need to ensure an acceptable ambient noise level for local residents. As a result, these limits have become the most acceptable standard for construction noise limits for EIS assessments to date. Considering the high baseline noise levels measured at this site, these values are considered a reasonable target. Table 5.5.3 below details these recommended limits.

Table 5.5.3: Maximum permissible noise levels at the façade of dwellings during construction

Days and Times LAeg (1hr)	LAeq (1Hr) dB	LpA (max) slow dB
Monday to Friday 07:00 to 19:00hrs	70	80[2]
Monday to Friday 19:00 to 22:00hrs	60[2]	65[2]
Saturday 08:00 to 16:30hrs	65	75
Sundays and Bank Holidays 08:00 to 16:30hrs	60[2]	65[2]

[2]Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority

The National Roads Authority considers that the noise levels in Table 5.5.3 above are typically deemed acceptable. However the NRA stipulates that: "these values are indicative only, it may be appropriate to apply more stringent limits in areas where pre-existing noise levels are low". As stated above, the baseline levels obtained during the survey are not low and hence Table 5.5.3 is considered appropriate.

Table 5.5.4 below summarises the calculated noise levels, which would be expected at the noise sensitive locations as described in Table 5.5.1.

The nature of the construction period and the variety of machinery used should ensure that no construction activity is operational for long periods in a single area. This will therefore result in short term impacts, as construction will migrate in natural progression ensuring noise receptors are not subject to constant stationary noise sources during the construction phase. The noise impact of the plant used during the construction phase has been assessed in Table 5.5.4

below for distances of 150m, 250m and 350m, to assess the effect on properties within these distance bands.

Table 5.5.4: Construction noise level predictions

BS5228 Calculations		Estimated Construction noise levels at varying distances LAeq 1 hour	
Plant	**150m**	**250m**	**350m**
2 x road sweeper	48	42	38
2 x Dozer	58	52	48
2 x Dumper truck	54	48	44
2 x road lorry	58	52	48
2 x Asphalt spreader	48	42	38
2 x JCB	48	42	38
2 x Tracked Excavator	55	53	49
2x standby generator	38	35	31
Combined Level LAeq 1hour	64	59	55

The result of the construction noise predictions in table 5.5.4 above, indicate that noise levels during this phase of the development will be well within the guidance levels detailed in Table 5.5.3 and are also similar to existing baseline levels, therefore resulting in a moderate short term impact.

Operational Phase

The operational phase of the proposed development has the potential to increase noise levels at noise sensitive locations surrounding the development site. A number of noise sensitive locations (houses) are distributed around the site.

Impact from the operation of the site will depend on the road traffic numbers using the development, and the nature of the industry carried out in the business park.

Traffic Noise

The potential noise impacts from this proposed development during its operational phase will primarily be as a result of increased traffic flows along existing routes within and surrounding the development as a result of the operation of the various businesses operating within the facility. The greatest potential increase in traffic noise will be along the entrance road to the site. Traffic flow predictions have been provided by the traffic consultants in order to assess the impact of traffic flows on noise levels in the surrounding environment. From the projected flow analysis resulting from the development, the majority of site traffic (90%) will enter and exit the site from the eastern Nangor Road side, while the remaining 10% will enter and exit the site from the west of the site entrance along the Nangor Road.

No noise sensitive locations are distributed along the Nangor Road to the east of the site entrance in the surrounding vicinity of the development site. Traffic noise levels are predicted to increase by 3 to 4dB between the 'do nothing' and 'do something' scenarios along this section of the road.

The nearest noise sensitive properties to the site entrance are located along the Nangor Road to the west of the site entrance. Two of the nearest properties to the site entrance have been assessed as part of the traffic noise (TN) impact with reference to the Calculation of Road Traffic Noise 1998 (CRTN) prediction methodology based on the traffic flow information provided by the traffic consultants.

TN 1: Is a noise sensitive property located along the western side of the site entrance along the Nangor Road approximately 30m from the road edge.

TN 2: Is a noise sensitive property located along the western side of the site entrance along the Nangor Road approximately 11m from the road edge.

Table 5.5.6: Results of Road Noise Traffic Study in L_{A10} 1 Hour Values

	2007 Do Nothing	2007 Do Something	Increase in Noise Levels	2020 Do Nothing	2020 Do Something	Increase in Noise Levels
Location TN1 L_{A10} 1 hour dB values						
Am Peak	73	76	+2 dB	75	76	+1 dB
Pm Peak	73	75	+2 dB	74	76	+2 dB
Location TN2 L_{A10} 1 hour dB values						
Am Peak	78	80	+2 dB	79	80	+1 dB
Pm Peak	77	80	+2 dB	79	80	+2 dB

From the table above, traffic noise levels are predicted to be 73 dB LA10 1 hour at the nearest property to the site entrance (TN1) at a distance of 30m from the road during the 'Do Nothing' scenario in 2007, i.e. without the development in place. During the operation of the proposed site, the 'do something' scenario, these values will increase to 75 - 76dB LA10 1 hour resulting in an overall noise level increase of 2dB. In terms of significance, this is considered to be of minor significance. During the year 2020 noise levels are predicted to increase by 1 to 2 dB between the 'do nothing' and 'do something' scenarios at this location.

At the TN2 property, noise levels are similarly predicted to increase by the same margin.

Increases in noise levels is dependant on subjective responses by individuals, however based on acoustic principles and environmental studies, the Institute of Environmental Management and Assessment (IEMA) and the Institute of Acoustics (IOA) have summarised guidelines for categorising noise level changes. Table 5.5.7 below summarises related impacts to changes in noise levels.

Table 5.5.7: Recommended Impact Categories for Changes in Noise Levels

Noise Change dB	Category
0	No Impact
0.1-2.9	Slight Impact
3.0-4.9	Moderate Impact
5.0-4.9	Substantial Impact
10+	Severe Impact

From Table 5.5.7 above, the change in noise levels associated with the increased development traffic at properties along the Nangor Road will be of slight impact to the west and of moderate impact to the east of the site entrance.

Building Services Plant

With the construction of a high number of large buildings there is potential for noise disturbance due to air conditioning units, fans, etc. There is also a provision for an admin/office buildings and associated car parking and building services and amenities, which will also harbour noise sources such as air conditioning units, fans etc. The semi-rural, sparsely populated nature of the area means that these sources could hold potential nuisance for pre-existing properties, particularly in the case of night time operations.

As discussed in the section entitled "noise criteria" the usual range of values allowed for Industrial activities is 45dB LAeq at night and 55dB LAeq during the day at the nearest residence or at the boundary of the site. The operation of all building services plant will be required to maintain noise levels below the above-mentioned criteria. It is not envisaged that there will be any significant noise impact from building services plant. The operation of all building services plant should be designed such that the total noise from all such plant will not exceed the 45-55dB limits at the nearest noise sensitive locations to the site. As the baseline noise climate is in excess of this in the Do Nothing scenario, it is not expected that this aspect of the facility will cause any noise nuisance.

5.5.3 REMEDIAL OR REDUCTIVE MEASURES

Noise from the construction phase of the project will result in increased noise levels at the nearest noise sensitive properties during this stage of the development. Noise during the operational phase of the development is predicted to be minor with road traffic being the largest contributor.

Construction Phase

With regard to construction activities, all plant items used during the construction phase should comply with standards outlined in 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1998. Reference should be made to BS5228: Noise control on construction and open sites, which offers guidance on the control of noise from construction activities.

It is proposed that various practices be adopted during construction, including:

- Limiting the hours during which site activities, which may give rise to a noise nuisance are permitted by the local authority.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These will include:

- Selection of plant with low inherent potential for generation of noise and/or vibration.
- Siting of plant away from sensitive receptors where possible.
- Erection of temporary screens around noisy items of plant where possible and or at the site boundary.
- Erection of temporary screens around noisy items of plant and around the site perimeter.

Operational Phase

Building services plant

The operational phase of the development is not anticipated to significantly increase noise on its surrounding environment. With regards to noise from possible services plant there are various practicable measures, which may be taken to ensure noise will not cause any disturbance to nearby residences:

- Siting of extraction fans at roof level to reduce ground level noise disturbance
- Duct Mounted attenuators on the atmosphere end of all acoustically offending air moving plant
- Splitter attenuators or acoustic louvres providing free ventilation to internal plant areas

5.5.4 PREDICTED IMPACTS OF THE PROPOSAL

Construction Phase

Due to the nature of the activities undertaken on a large construction site, there is potential for generation of high levels of noise, if noise control measures above are not adhered to. Therefore, it is usual to limit the times during which it is permissible to carry out noisy construction work in order to minimise the impact on nearby noise sensitive locations.

Predicted noise levels for this phase of the development are within recommended limits. Permissible construction times and durations will be set down by the Local Authority. Hence the noise and vibration impact of this phase of the development should be kept to a minimum.

Operational Phase

Noise impacts as a result of the operational stage of the development are not anticipated to be significant if control measures as described in this document are adhered to. In this setting, building services plant noise, when managed as described above will not cause significant noise disturbance and will be within the limits outlined in the section entitled "noise criteria" above.

Noise resulting from development related traffic is not predicted to lead to any significant impact at the nearest noise sensitive locations to the proposed site.

5.5.5 MONITORING

In the event of a perceived noise nuisance during the construction or operation of this facility, noise assessments should be carried out in accordance with:

ISO 1996: Acoustics: 'Description and measurement of environmental noise'.

BS5228 'Noise and Vibration Control of Construction and Open Sites' (1997).

EPA: Guidance note for noise in relation to scheduled activities and W.H.O guidelines.

These assessments should be carried out by an Acoustic Engineer.

5.5.6 REINSTATEMENT

Reinstatement measures are not applicable in this instance.

5.6 CLIMATE

5.6.1 Introduction

This section of the EIS describes the impact to air quality associated with the proposed Profile Park business park development at Grange Castle, Dublin 22. This section should be read in conjunction with the site layout plans and project description sections of this EIS. This assessment was prepared in accordance with the "Guidelines on the information to be contained in Environmental Impact Statements" (EPA 2002) and the "Advice Notes on Current Practice" Project Type 28 - Urban development.

This study will identify, describe and assess the impact of the development in terms of its impact on air quality. Particular attention will be focused on sensitive receptors, such as residential areas adjacent to the site, and to the extent of the exposure of these receptors to both airborne pollutants derived as a result of the development.

5.6.2 RECEIVING ENVIRONMENT

The proposed site of the development is located in Grange Castle, Dublin 22, and is situated less than 15km from Dublin City Centre and approximately 2.5 km west of Clondalkin village. The site is approximately 4km west of the M50, approximately 2km north of the N7 and 3.5km south of the N4. It is adjacent to Dublin's new Outer Ring Road, Phase 1 of which is now complete and links the area directly to the N7, and will shortly reach the N4.

The area also has existing business parks in the vicinity, including Grange Castle Business Park and Kilcarbery Park. These parks contain a number of industries that may have an impact on existing air quality. The main potential source is a large pharmaceutical plant to the north of the site, however, this facility is regulated by the EPA to ensure emissions to atmosphere do not have an impact to atmosphere.

The M50 to the west, the N7 to the south and the N4 to the north of Grange Castle are busy with traffic and frequently congested. In addition, there is some traffic congestion on the other regional and third class roads in the area. The level of traffic on the roads is likely to generate traffic derived pollutants nitrogen oxides and benzene from vehicle exhausts.

There is a railway line approximately 2km to the north of the development which runs from Dublin to the south and west as well as serving suburban trains, which carry diesel-powered engines and this may affect local air quality.

As part of the Framework Directive 96/62/EC on air quality monitoring, assessment and management, with particular reference on air quality standards laid down by the directive, four air quality zones have been defined for Ireland. These zones are as follows:

- Zone A - Dublin City and Environs
- Zone B - Cork City and Environs
- Zone C - 16 Urban areas with populations greater than 15,000 (includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee and Dundalk)
- Zone D – the remainder of the country

These zones have been defined to meet criteria for air quality monitoring and management as described by directive 96/62/EC and its "daughter directives". The proposed development lies in Zone A so background air quality is referenced from the Air Quality Monitoring Report 2004 results for Ballyfermot (Public Library) and Phoenix Park (Ordnance Survey buildings), which are the closest Zone A stations to the proposed development. Where results for these stations are unavailable, Dublin City Centre data is employed. All results are compared to the limit values defined in the National Air Quality Standards Regulations 2002 (S.I No. 271 of 2002).

Baseline Air Quality

A total of six sample locations were chosen to represent the baseline air quality in the vicinity of the proposed development. These locations are listed in Table 5.6.1.

Table 5.6.1: Description of Air Monitoring Locations

Reference	Description
A1	Northern Boundary of site on Nangor Road
A2	NW corner of site at Nangor Road Junction
A3	SW corner of site
A4	Southern Boundary of site
A5	SE corner of site
A6	NE corner of site on Nangor Road at boundary to Golf Club

As a result of the existing site conditions and the potential for traffic derived pollution, the following parameters were monitored:

NO_2 (Nitrogen Dioxide)

Nitrogen dioxide is classed as both a primary pollutant and a secondary pollutant. As a primary pollutant NO_2 is emitted from all combustion processes (such as a gas/oil fired boiler or a car engine). Potentially the main sources of primary NO_2 for the proposed development will be from heating-related emissions and vehicle exhausts.

As a secondary pollutant NO_2 is derived from atmospheric reactions of pollutants that are themselves, derived mainly from traffic sources (e.g. volatile organic compounds). Secondary pollution is usually derived from regional sources and may be used as an indicator of general air quality in the region. Nitrogen Dioxide has been shown to reduce the pulmonary function of the lungs. Long-term exposure to high concentrations of NO_2 can cause a range of effects, primarily in the lungs, but also in the liver and blood.

At each of the sites, levels of NO_2 were measured using diffusion tubes, which were left on site for a 14-day period. The tubes were then analysed using UV spectrophotometry, at a UKAS accredited laboratory (Gradko International, Winchester), giving an average concentration over the period. The results are presented in Table 5.6.2.

Table 5.6.2: Average NO_2 concentrations at each location as measured by passive diffusion tubes.

Location	Sampling Period	Average NO_2 ($\mu g/m^3$)
A1	23/03/06 – 04/04/06	13.57
A2	23/03/06 – 04/04/06	19.05
A3	23/03/06 – 04/04/06	14.80
A4	23/03/06 – 04/04/06	13.43
A5	23/03/06 – 04/04/06	16.17
A6	23/03/06 – 04/04/06	16.17
Limit Value	-	40(1)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)

The results of the NO_2 monitoring indicate similar concentrations at each location indicating a uniform air quality. The concentrations are typical of those experienced adjacent to relatively busy roadways and are all below the EU limit value. The results suggest that the main source of NO_2 in the area is from road traffic. The levels detected for 2004 in the national monitoring network are presented in Table 5.6.3 below. The annual average for Ballyfermot is slightly higher than the levels determined in the site baseline survey. This is probably due to increased vehicle numbers and congestion in the suburban area compared to the more rural site area.

Table 5.6.3: National NO_2 monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA)

Station	Annual Average NO_2 ($\mu g/m^3$)	Maximum 1-hour Average NO_2 ($\mu g/m^3$)
Ballyfermot	23	138
Limit	40	200

SO_2 (Sulphur Dioxide)

Sulphur dioxide is classed as a primary pollutant principally emitted from the combustion of fossil fuels (diesel, coal, oil, etc.) SO_2 is emitted from boilers and heating units. As traffic based pollutant, SO_2 is mainly emitted from vehicles running on diesel fuel, which will include most light goods vehicles (LGVs) and heavy goods vehicles (HGVs). SO_2 emissions from domestic heating may be significant as SO_2 is a major constituent of sulphurous smog. However, in recent years the government has significantly reduced the importance of SO_2 as an air pollutant with the introduction of smokeless fuel.

In addition, future EU legislation will attempt to minimise and eliminate the sulphur content in motor fuels. Consequently, concentrations of SO_2 in major urban areas are typically low and this is likely to decrease in future years with the broadening of the ban on non-smokeless fuels and the introduction of new EU fuel directives. Sulphur Dioxide is a known contributor to respiratory illness and respiratory symptoms. People with asthma are the most susceptible in the community to elevated SO_2 levels.

At each of the sites, the air was monitored for sulphur dioxide over a 14-day period, using SO_2 diffusion tubes. The sample tubes were analysed for SO_2 at a

UKAS accredited laboratory (Gradko International, Winchester). The results are presented in Table 5.6.4.

Table 5.6.4: Average SO_2 concentrations at each location as measured by passive diffusion tubes.

Location	Sampling Period	Average $SO_2(\mu g/m^3)$
A1	23/03/06 – 04/04/06	2.58
A2	23/03/06 – 04/04/06	5.16
A3	23/03/06 – 04/04/06	4.30
A4	23/03/06 – 04/04/06	1.72
A5	23/03/06 – 04/04/06	1.72
A6	23/03/06 – 04/04/06	1.72
Limit Value	-	20(1)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)

The results from the SO_2 monitoring indicate low levels of SO_2 in the area and all levels are within the EU limit. This is typical of areas in the Dublin conurbation where there is currently a ban on smokeless fuel – the major source of SO_2. The levels detected at Ballyfermot in 2004 are presented in Table 5.6.5 and indicate an annual average similar to that determined in the site baseline survey.

Table 5.6.5: National SO_2 monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average SO_2 ($\mu g/m^3$)	Maximum 1-hour Average SO_2 ($\mu g/m^3$)
Ballyfermot	3	97
Limit	20	350

Benzene

The sources associated with individual volatile organic compounds (VOC's) tend to be dependent on the land use and nature of any industries in the sample region. Benzene and other aromatic compounds and alkanes are most likely derived from petrol driven vehicle exhausts. Benzene is a known carcinogen, poisonous by inhalation and a severe eye and moderate skin irritant.

The EPA monitoring station in Winetavern Street in Dublin City Centre is the only Zone A reference in the network for benzene. The 2004 results for Winetavern Street are presented in Table 5.6.6. The results indicate benzene levels in Dublin City Centre are lower than the appropriate limit. The levels of benzene at the site of the proposed development would be expected to be lower than those determined in the city centre.

Table 5.6.6: National Benzene monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average ($\mu g/m^3$)
Winetavern Street	1.3
Limit	5(1)

Note: (1) EU Ambient Air Standard (2000/69/EC) (as an annual average)

Carbon Monoxide

Carbon Monoxide is a primary pollutant that is a by-product of any combustion of carbon-based fuels such as from vehicular exhausts. Carbon monoxide is the product of incomplete combustion of the fuel. Carbon Monoxide is an intense poison on inhalation. No site specific CO monitoring was carried out but data is referenced from the Winetavern Street monitoring station in Dublin City Centre for 2004 in Table 5.6.7. The results indicate that levels of Carbon Monoxide in this Zone A area are relatively low and do not exceed the ambient air quality limit.

Table 5.6.7: National CO monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Mean 8-Hour (mg/m^3)	Max 8-Hour (mg/m^3)
Winetavern Street	0.3	4.2
Limit	-	10(1)

Note: (1) EU Ambient Air Standard (2000/69/EC) (as an 8-hour rolling average)

Particulate Matter PM_{10}

PM_{10} may be emitted as a primary pollutant from road vehicle exhausts, which is the main source in urban areas. Point sources such as combustion, i.e. domestic fires, industrial boilers etc. are also primary sources of PM_{10}. PM_{10} may also be formed as secondary pollutants from the condensation or reaction of chemical vapours in the atmosphere. Health effects associated with PM_{10} in the long term include chronic effects such as increased rates of bronchitis and reduced lung function.

No site specific PM_{10} monitoring was carried out but data is referenced from the Phoenix Park and Ballyfermot monitoring stations for 2004 in Table 5.6.8. The results indicate a low annual average but show that there are some exceedences of the daily limit. In the Phoenix Park there were 2 days in 2004 that exceeded the limit and in Ballyfermot there were 5 days. The PM_{10} levels at the site of the proposed development would be expected to be similar or lower than those outlined in Table 5.6.8.

Table 5.6.8: National PM_{10} monitoring data (Source "Ambient Air Quality in Ireland 2004" EPA).

Station	Annual Average PM_{10} ($\mu g/m^3$)	Maximum 24-hour Average PM_{10} ($\mu g/m^3$)
Phoenix Park	12	71
Ballyfermot	14	112
Limit	40(1)	50(2)

Note: (1) EU Ambient Air Standard (1999/30/EC) (as an annual average)
(2) EU Ambient Air Standard (1999/30/EC) (as a 24-hour average)

Assessment Criteria

The EU has introduced several measures to address the issue of air quality management. In 1996 Environmental Ministers agreed a Framework Directive on ambient air quality assessment and management (Council Directive 96/62/EC). As part of the measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, 1999/30/EC, has set limit values for sulphur dioxide, lead, PM_{10} and nitrogen dioxide and is detailed in Table 5.6.9. EU Council Directive 2000/69/EC defines limit values for both carbon monoxide and benzene in ambient air and is presented in Table 5.6.10.

The National Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) transpose those parts of the "Framework" Directive 92/30/EC on ambient air quality assessment and management not transposed by Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 2002 Regulations also transpose, in full, the 1st two "Daughter" Directives 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air and 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.

Table 5.6.9: EU Ambient Air Standard 1999/30/EC.

Pollutant	Regulation	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	1999/30/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	50% until 2001 reducing linearly to 0% by 2010	200 $\mu g/m^3$ NO_2
		Annual limit for protection of human health	50% until 2001 reducing linearly to 0% by 2010	40 $\mu g/m^3$ NO_2
		Annual limit for protection of vegetation	None	30 $\mu g/m^3$ NO + NO_2
Lead	1999/30/EC	Annual limit for protection of human health	100% until 2001 reducing linearly to 0% by 2005	0.5 $\mu g/m^3$
Sulphur Dioxide	1999/30/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	43% until 2001 reducing linearly until 0% by 2005	350 $\mu g/m^3$
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	None	125 $\mu g/m^3$
		Annual & Winter limit for the protection of ecosystems	None	20 $\mu g/m^3$
Particulate Matter Stage 1	1999/30/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50% until 2001 reducing linearly to 0% by 2005	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health	20% until 2001 reducing linearly to 0% by 2005	40 $\mu g/m^3$ PM_{10}
Particulate Matter Stage 2	1999/30/EC	24-hour limit for protection of human health - not to be exceeded more than 7 times/year	To be derived from data and to be equivalent to Stage 1 limit value	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health	50% until 2005 reducing linearly to 0% by 2010	20 $\mu g/m^3$ PM_{10}

Table 5.6.10: EU Ambient Air Standard – 2000/69/EC

Pollutant	Regulation	Limit Type	Margin of Tolerance	Value
Benzene	2000/69/EC	Annual limit for protection of human health	100% until 2003 reducing linearly to 0% by 2010	5 $\mu g/m^3$
Carbon Monoxide	2000/69/EC	8-hour limit (on a rolling basis) for protection of human health	50% until 2003 reducing linearly to 0% by 2005	10 mg/m^3

Climate

The 30-year average meteorological data from the nearest meteorological station at Baldonnell Aerodrome. Located immediately south of the site are listed in Table 5.6.11 below.

Table 5.6.11: 30-year Average Meteorological Data from Casement Aerodrome (Annual Values).

Parameter	30-year Average
Mean Temperature (^{0}C)	9.3
Mean Relative Humidity at 0900UTC (%)	83
Mean Daily Sunshine Duration (hours)	3.64
Mean Monthly Total Rainfall (mm)	711.4
Mean Wind Speed (knots)	11.0

The prevailing wind in Ireland is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain. Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

The site of the proposed development would have similar climate patterns to those determined from Baldonnell Aerodrome listed above, due to the proximity of locations.

5.6.3 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of the current planning application consists of the provision of roads and services infrastructure to facilitate the future development of a business park, which will be known as '*Profile Park*' on the site. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout on a site of 39.84 hectares. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.6.4 POTENTIAL IMPACTS OF THE PROPOSAL

Construction Phase

Construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction.

The potential impact from dust also depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and as such any impacts from dust deposition will typically be close to the source.

Operation Phase

There are no details of specific operations that will be located in the park but an assessment has been carried out based on the scheduled land uses. Regarding operations at the proposed development, the activities to be located in the development are planned for commercial, retail and light industrial uses. As a result, there are no major scheduled emissions (i.e. through stacks, vents, etc.) planned for the development and site activities are unlikely to cause any deterioration in local air quality.

There are relatively high volumes of traffic on the adjoining roads currently in the area of the proposed development. This is shown in the levels of traffic derived pollutants determined in the baseline period (nitrogen dioxide). However, it should be noted that these levels of pollutants are within the relevant limits. Any alterations to the existing traffic scenario, i.e. traffic volumes and/or a significant drop in vehicle speed (to gridlock speeds) may cause a significant variation in the pollutant concentrations.

Climate

There is a potential for impacts to climate as a result of any development that requires fuel and energy. These impacts are the generation of greenhouse gas emissions (principally carbon dioxide) from the on-site heating systems and the energy source, which may be located a considerable distance from the site.

The space heating for the development may be natural gas, fuel oils or solid fuel (fuel oils are regarded as the worst polluters where natural gas is considered the "cleanest" fossil fuel). The domestic heating system may effect emissions to atmosphere of carbon monoxide, sulphur dioxide, oxides of nitrogen and particulates.

Do-nothing Scenario

The baseline survey results suggest that air quality in the vicinity of the proposed development is good and shows typical levels for a rural/suburban interface area with all pollutants within the relevant EU limits at all locations. The air quality may improve slightly in future years due to improvements in engine technology and greater controls on petrol, diesel, coal and gas composition and purity.

If the proposed development were not to take place, the current air pollutant concentrations will remain unchanged followed by potential decreases in future years for the reasons outlined above.

5.6.5 AVOIDANCE REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

Construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction.

The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and as such any impacts from dust deposition will typically be within several hundred metres of the construction area.

In order to ensure that no dust nuisance occurs, a series of measures will be implemented. Site roads will be regularly cleaned and maintained as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface. Any un-surfaced roads will be restricted to essential site traffic only. Furthermore, any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.

Vehicles using site roads shall have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road and on hard surfaced roads that site management dictates speed will be restricted to 20 km per hour.

It is recommended that vehicles exiting the site shall make use of a wheel wash facility, preferably automatic, prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.

Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

As part of the construction strategy a "Construction Dust Minimisation Plan" will be formulated as part of the construction contract. The UK British Research Establishment (BRE) document "Control of Dust from Construction and Demolition Activities" (February 2003) is a best practice guidance document for such plans.

Operational phase

For the majority of vehicle-generated pollutants, emissions rise as speed drops. Emissions are also higher under stop-start conditions when compared with steady speed driving. The free flow of the traffic in the vicinity of proposed development is essential in order to minimise the generation of traffic related pollutants.

Climate

All space heating and energy requirements for the proposed development should be designed in accordance with best practice. The Building Regulations 2002 "Technical Guidance Document Part L – Conservation of Fuel and Energy Dwellings" should be used as a reference for best practice in order to reduce the impact of the proposed development on greenhouse gas emissions.

5.6.7 PREDICTED IMPACTS OF THE PROPOSAL

Construction Phase

If a satisfactory environmental impact minimisation plan is implemented, the effect of construction on air quality will not be significant. The main environmental nuisance associated with construction activities is dust. However, if the construction contractor adheres to good working practices and dust mitigation measures the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance. A series of such good working practices and mitigation measures are outlined in this chapter.

Operational Phase

Summary traffic flow information was obtained from the traffic section of the Statement and has been used to assess whether any significant impact on sensitive receptors may occur as a result of traffic alterations in the area. The traffic section of the report has generated AM (morning) and PM (evening) peak traffic counts as a result of the proposed development. The traffic section predicts total morning peak two way trips of 1,505 and total evening peak two way trips of 2,039 in 2020 as a result of the traffic for the proposed development. A modelling assessment has been carried out to determine the potential increase in ambient pollutant concentrations as a result of these traffic volumes onto the current road network.

A prediction of the increased ground level concentrations of traffic-derived pollutants was carried out using US EPA approved refined air quality modelling software, CAL3QHCR (CALINE dispersion model). The CAL3QHCR model which incorporates the Industrial Source Complex (ISC) mixing height algorithm and it also has the additional enhancement where it incorporates the Discrete Parcel Method to account for NO to NO_2 conversion. Tier I approach of the CAL3QHCR model was used where a full year of hourly meteorological data and one hour of emissions traffic volume is required. Using this approach is considered to be a worst-case situation for predicting daily and annual average concentrations of the individual pollutants because peak hour traffic conditions are assumed for the entire modelling period.

The emission factors used for NO_2, PM_{10}, VOC, CO, and Benzene for the modelling scenario were derived from the speed dependent emission equations formulated in the 2003 EFT2e. The Emission Factor Toolkit allows the calculation of emission rates in grams/vehicle per kilometre. It incorporates national fleet composition data for motorways, urban and rural roads, fleet composition based on European emission standards from pre-Euro I to Euro IV, speed related emission functions and scaling factors for reductions in emissions in future years. Traffic speeds have been assumed at worst case, i.e. 50km/hr to represent slow moving traffic conditions in 2006. Emissions are higher under

slower traffic conditions so these emission factors are considered a worst case estimation.

The most important parameters governing dispersion in the atmosphere are wind speed, wind-direction and the stability or turbulence of the atmosphere. These parameters along with the ambient temperature and inferred mixing heights for each hour were included in the modelling using data from the nearest met station (Dublin Airport). Five years worth of hourly sequential meteorology data representative of the area (2001 to 2005 for Dublin Airport) was used for the operation of the atmospheric dispersion model. The 2002 meteorological data was determined as the worst case year and was employed in the model to generate highest levels of pollutant concentrations.

The modelling approach has taken a number of conservative approaches to the input data to allow a margin of tolerance in the results and ensure a worst-case scenario of predicted results. These approaches include the use of the evening peak hour traffic flows and the emission factors are calculated for lower speeds where emissions are greater. As such, it can be assumed, with some confidence, that if the model predicts that there will be no significant impact on air quality, there will be no significant actual impact on air quality from traffic derived pollution.

The results of the modelling are presented in Table 5.6.12. The results for all parameters indicate that the increased contribution to air pollution levels in the area above the existing background, will not breach the EU limits for ambient air quality. The existing backgrounds (taken from Ballyfermot and the city centre) are relatively low and the increased pollution as a result of the evening peaks of traffic from the proposed development does not lead to breaches of the relevant air quality limits.

Table 5.6.12: Predicted increases in traffic derived pollution as a result of traffic from the proposed development in the evening peak hour.

Parameter	Averaging Value	Predicted Increase	Background	Increase and Background	Limit
CO (mg/m^3)	8-hour Average	0.14	0.3	0.44	10
Benzene ($\mu g/m^3$)	Annual Average	0.06	1.3	1.36	5
NO_2 ($\mu g/m^3$)	Annual Average	3.65	23	26.65	40
	Max 1-hour Average	19	138	157	200
PM_{10} ($\mu g/m^3$)	Annual Average	0.77	14	14.77	40
	Max 24-hour Average	3.18	14	17.18	50

Once significant consideration is given to the environmental impact of greenhouse gas emissions at the design stage and the heating and energy system are operated in accordance with principles of best practice or within consent conditions, the effect of a domestic heating system and energy supply are not considered to be significant. The use of natural gas will significantly

reduce the potential for emissions of nitrogen oxides, carbon monoxide and in particular sulphur dioxide.

Worst Case Scenario

For traffic-derived pollutants, the "worst-case" scenario consists of gridlock conditions in the vicinity of the development as presented in Table 5.6.12 above. The refined predictive model employed has been set up to generate worst-case scenario predictions for air quality. If this model indicates that pollutant levels will not breach the EU limits, then it can be assumed with some confidence that a project will not produce air pollution problems if none are identified by this method. There are no predicted breaches of EU legislation from the proposed traffic increase on top of the existing backgrounds. As a result of these model predictions it may be concluded that the worst-case impact of the traffic alterations associated with the proposed development are predicted to be insignificant.

5.6.8 MONITORING

In the event that dust from the proposed development is creating an environmental nuisance during the construction phase of the development, an ambient dust deposition survey is recommended. This survey should be carried out by qualified consultants using EPA approved Bergerhoff gauges. The requisite number of gauges should be placed at the nearest sensitive receptors to the construction works and at key locations along the proposed haul routes. Monitoring should be carried out at monthly intervals for the duration of the construction phase.

The TA Luft (German Government "Technical Instructions on Air Quality") states a guideline of 350 $mg/m^2/day$ for the deposition of non-hazardous dusts. This value should be used to determine the impact of construction dust as an environmental nuisance should the need arise.

5.6.9 REINSTATEMENT

Resinstatement measures are not applicable in this instance.

5.7 LANDSCAPE AND VISUAL APPRAISAL

5.7.1 INTRODUCTION

The landscape and visual impact assessment of the proposed development will examine the existing landscape in terms of its visibility and scenic quality. The impact of the proposed development in general terms on that character is assessed, including views into and out from the site. Further consideration will be given to the effects of the proposed development on existing vegetation.

In determining the impact, consideration is given to reducing any significant impact associated with the development proposal and accordingly mitigation measures are considered.

Landscape and Visual Assessment Methodology

The assessment of the impact on the visual character of the site as a result of the proposed development is based on the guidelines laid down by the Environmental Protection Agency (EPA) in the Advice Notes on Current Practice in the preparation of Environmental Impact Statements (2003).

The assessment was conducted as follows:
1. Site survey to determine the character of the site and its surrounding area.
2. Assessing the proposed development through layout plans and sections to determine the impacting features.
3. Evaluating these impacts on the landscape in accordance with EPA guidelines.

The following definitions are used in the visual assessment:

Extent of visual impact

No Impact:	There is no change to views in the visual landscape.
Imperceptible Impact:	In this situation the proposal is adequately screened due to the existing landform, vegetation or constructed features.
Slight Impact:	In this situation the affected view forms only a small element in the overall visual composition, or changes the view in a marginal manner.
Moderate Impact:	In this situation the proposal affects an appreciable segment of the overall visual composition, or where there is an intrusion into the foreground of a view.
Significant Impact:	In this situation the proposal affects a significant segment of the overall visual composition, or where views are so affected that they form a new element in the physical landscape.
Profound Impact:	Is one where the view is entirely altered, obscured or affected.

Quality of visual impact

Neutral Impact:	Will neither detract nor enhance the landscape character or viewpoint.
Positive Impact:	Will improve or enhance the landscape character or viewing.
Negative Impact:	Will disimprove or detract the quality of the landscape.

Duration of visual impact

Temporary:	Impacts lasting one year or less.
Short-term:	Impacts lasting one to seven years.
Medium-term:	Impacts lasting seven to twenty years.
Long-term:	Impacts lasting twenty to fifty years.
Permanent:	Impacts lasting over fifty years.

5.7.2 THE RECEIVING ENVIRONMENT

Landscape Character/Context

The landscape in the site area is composed of medium sized agricultural fields which are bounded by hedgerows. The landscape character of the area is one of open, large scale, rural setting at present, but on the fringe of development, as indicated by the presence nearby of Grange Castle International Business Park and Kilcarbery Business Park to the north and large scale residential housing to the east. One is conscious of development taking place to the landscape setting in the environs of the site.

The eastern boundary of the site is defined by the presence of the local authority golf club and grounds, Grange Castle Golf Club. The northern and north-western boundary is indicated by the meandering profile of the Old Nangor Road. The remaining boundaries, to the south and west, are defined by fringe hedgerows and trees and the local roads serving the village of Newcastle and Baldonnell Aerodrome. Internal field boundaries are formed by open drainage ditches with associated trees and hedgerows.

The landscape character of the site is essentially agricultural. The existing pattern of field hedgerows with some mature trees is the main defining feature of the landscape area. The area is one which has undergone considerable change in recent times. The recently constructed surroundings have changed and are constantly changing the landscape character to one of a commercial suburban setting. It can therefore be considered in transition between agriculture and industrial/commercial uses.

Development Plan Context

There are no particular landscape designations associated with the subject site. There are no listed views in the environs of the site. The relevant Development Plan provisions pertaining to the site are as follows:

1. The inclusion of the subject site and Grange Castle to the north in the South County Development Plan 2004 as an area which has the zoning objective E to provide "enterprise and employment related uses" by means of commercial development;
2. The key strategic position of the site to the south of the existing Grange Castle International Business Park;
3. The proximity of the site to a large residential catchment area;
4. The proximity of the site to existing (and permitted) high quality commercial and leisure facilities.

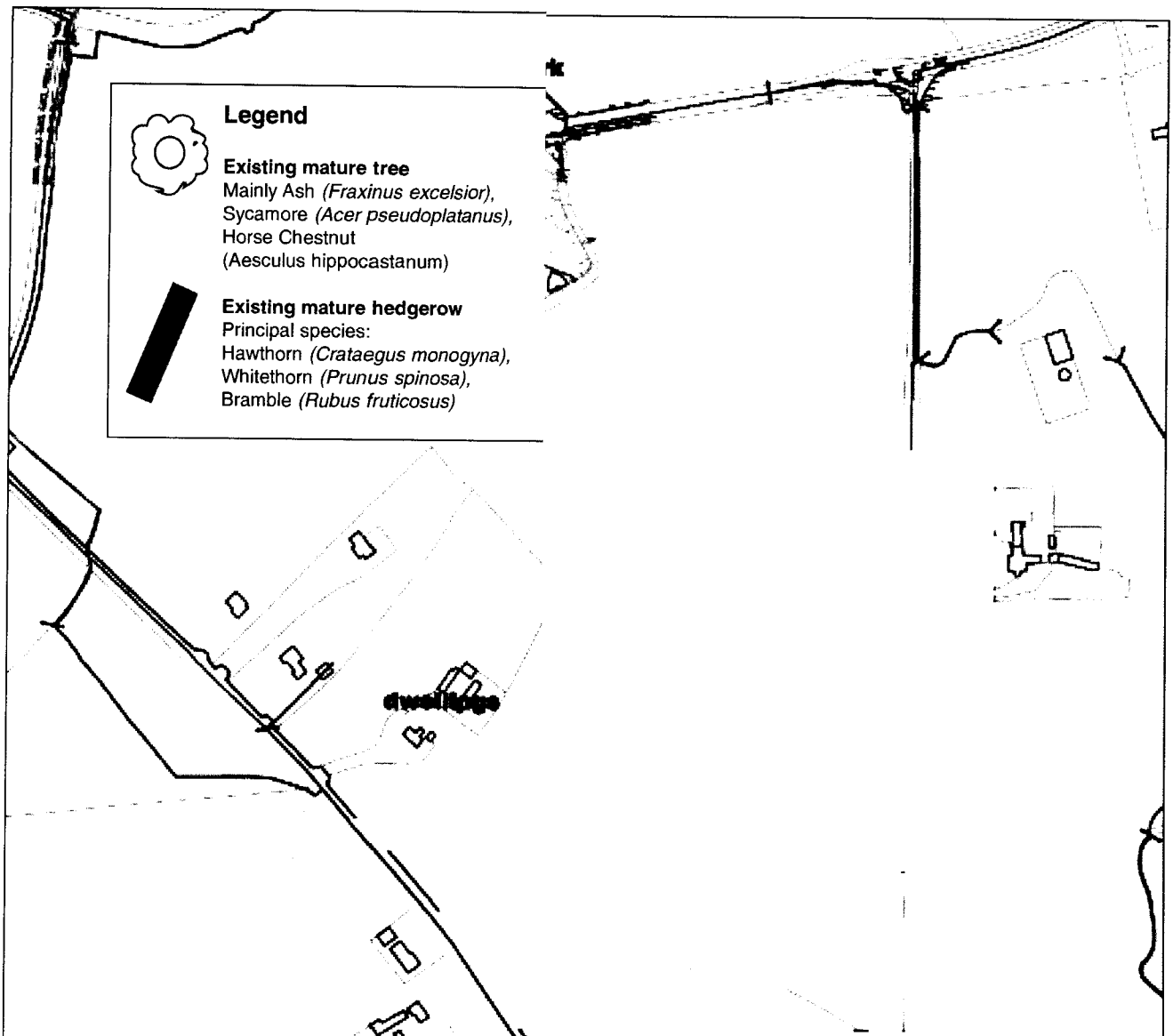
Existing Landscape Features and Vegetation

The site is situated in a landscape characterised by even flat landforms with elevations between 72.5 and 83.5m OD. The local topography falls gradually south to north. There are no exceptional or unique landscape features on the site.

The existing mature hedgerows and trees within the site and particularly on the northern and southern boundaries contribute to a sense of landscape maturity within the overall development area. These hedgerows form and frame the site of the proposed business park. They are native hedgerows consisting, in the main, of ash, hawthorn (*Crataegus monogyna*), Whitethorn (*Prunus spinosa*), bramble and briar (*Rubus* spp.). Internally, there are five large sized fields laid out in a north-south orientation. These fields are themselves bounded by hedgerows of a similar composition which have been managed over the years and there is evidence of coppice management. Some mature trees, principally ash, punctuate this hedgerow pattern.

The principal mature trees on the site are on the southern boundary and primarily comprise Ash (*Fraxinus excelsior*), Horse Chestnut (*Aesculus hippocastanum*) and Sycamore (*Acer pseudoplatanus*).

See figure 5.7.1 for plan of Existing Vegetation and Topography.



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Project Title:

PROFILE PARK
LANDSCAPE AND VISUAL ASSESSMENT

Client:
DASNOC Ltd

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Figure 5.7.1 Existing Vegetation and Topography Plan

Project Planner:
RPS Planning & Environment Ltd

Scale:	**NTS**	Revision
Date:	May 2006	**0**

Existing Views

This section of the report assesses the visibility of the site from within the overall business park area and from surrounding areas. The main views within the site are confined to the general site area and are composed of views of agricultural pasture and new development.

The key viewing areas into the site are classified as follows:
1. Views from roadways and adjoining dwellings.
2. Views from within the site.
3. Views from local amenities.

Views from roadways and adjoining dwellings

The site is occasionally visible from the Old Nangor Road to the north due to the fragmented hedgerow flanking the southern roadside verge. This view is across farmland. This visibility into the site is divided due to the alignment of the hedgerows within the site, running in a north-south direction, thereby providing uninterrupted views across most of the site.

The main landscape feature is the presence of the Dublin Mountains in the background, approximately 10 kilometres in the distance. This landscape element is significant as it provides topographical relief to a relatively flat domain.

There is also some visibility into the site from the local road serving Baldonnell Aerodrome, which bounds the southern side of the site. These views are restricted, however, due to presence of uniform mature hedgerows along the roadside verges, which vary in height from 4-7 metres.

There are also a number of dwellings located along the main roadways, which are interspersed with commercial developments. Ten dwellings are likely to be affected; five are located along each of the Nangor Road and the road to the south of the development. These dwellings have potential visibility to the subject site, limited only by garden and boundary planting.

Views within the site

The views from within the site may be categorised into two distinct aspects: views to the north consisting of commercial elements and views to the south composed of a rural landscape.

The views to the north are defined by a skyline consisting primarily of the commercial components of the Wyeth and Takeda buildings and the lower, but closer, industrial / warehouse buildings in Kilcarbery Business Park. These are two substantial building masses which are easily identifiable on the distant horizon.

The views to the south are more pastoral in content. There are sweeping areas of grassland framed by hedgerows and backdropped by the Dublin Mountains. Dwellings and buildings are scarce in the views due to the screening effects of existing vegetation and topography. The view is characterised by the rural landscape of South County Dublin.

Views from local amenities

The principal amenity in the vicinity of the development site is the public golf course which borders the site to the east. Views from the golf course are currently restricted by existing mature tree and hedgerow and by additional boundary planting on the golf course lands.

Significance of Local and Site Landscape Amenities

There are no existing landscape features on the site or in the environs of any particular note.

5.7.3 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of the provision of roads and services infrastructure to facilitate the future development of a business park, which will be known as 'Profile Park' on the subject lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

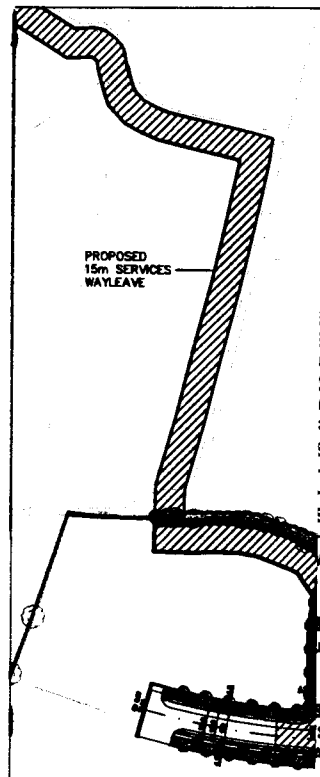
It is proposed that there will be high quality streetscapes within the site to accommodate future commercial development. All streetscapes have been designed to a high landscape standard (see figure 5.7.2).

The layout of the scheme has been designed to provide a variety of elevations to the streets. The soft landscape treatment to the proposed streets is a combination of semi-mature street trees, grass verges, mounding and groundcover shrub planting. This treatment will create a structure within the site and reinforce the hierarchy of the streets with size and intensity of planting typologies.

Throughout the site, there is a landscape buffer strip to the road reservation edge of 5 metres on the main avenues and 3 metres on secondary roads. This allows for tree and shrub planting and earth mounding to create screening to the sites to the rear, as well as form a structure to the business park. There are four proposed typologies of planting, as follows:

1. **Entrance Area and Entrance Road**: Large avenue trees (Norway Maple – *Acer platanoides* 'Emerald Queen') will be planted in the 5-metre strip to define the entrance area and street, with groundcover shrub planting to a maximum of 1.5 metres and asymmetrical earth mounding. A second, smaller tree (Upright Rowan – *Sorbus aucuparia* 'Asplenifolia') would be planted in the central median (see Sections A-A/B-B – figure 5.7.3);

2. **Main Avenue:** The main roads through the site will be defined with a double avenue of trees planted in a 5-metre wide landscape reservation strip, composed of an outer line of Norway Maple and an inner line of Upright Rowan (see Section C-C – figure 5.7.3). The groundcover and mounding detail will also be continued;



legend

Primary Avenue Tree
Acer platanoides 'Emerald Queen'
Norway Maple

Secondary Avenue Tree
Sorbus aucuparia 'Asplenifolia'
Upright Mountain Ash

Woodland screen planting
Scots Pine (*Pinus sylvestris* 15%)
European Larch (*Larix decidua* 10%)
Ash (*Fraxinus excelsior* 10%)
Common Oak (*Quercus robur* 10%)
Alder (*Alnus glutinosa* 5%)
Rowan (*Sorbus aucuparia* 5%)
Silver Birch (*Betula pendula* 5%)
Holly (*Ilex aquifolium* 20%)
Hawthorn (*Crataegus monogyna* 10%)
Blackthorn (*Prunus spinosa* 5%)
Hazel (*Corylus avellana* 5%)
Wild rose (*Rosa canina, R. rugosa* 5%)

Shrub planting
Under Avenue Trees

Specific Landscape Measure
Subject to approval of Planning Authority. See text of report for details

Existing Hedgerow / Trees

Existing Hedgerow / Trees to be removed due to development.
All other trees / hedgerows retained

Existing Contour

Existing Ditch

Site Boundary

Road details see engineer's drawings

Revision

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5.7.2 Landscape Masterplan

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ning & Environment Ltd.

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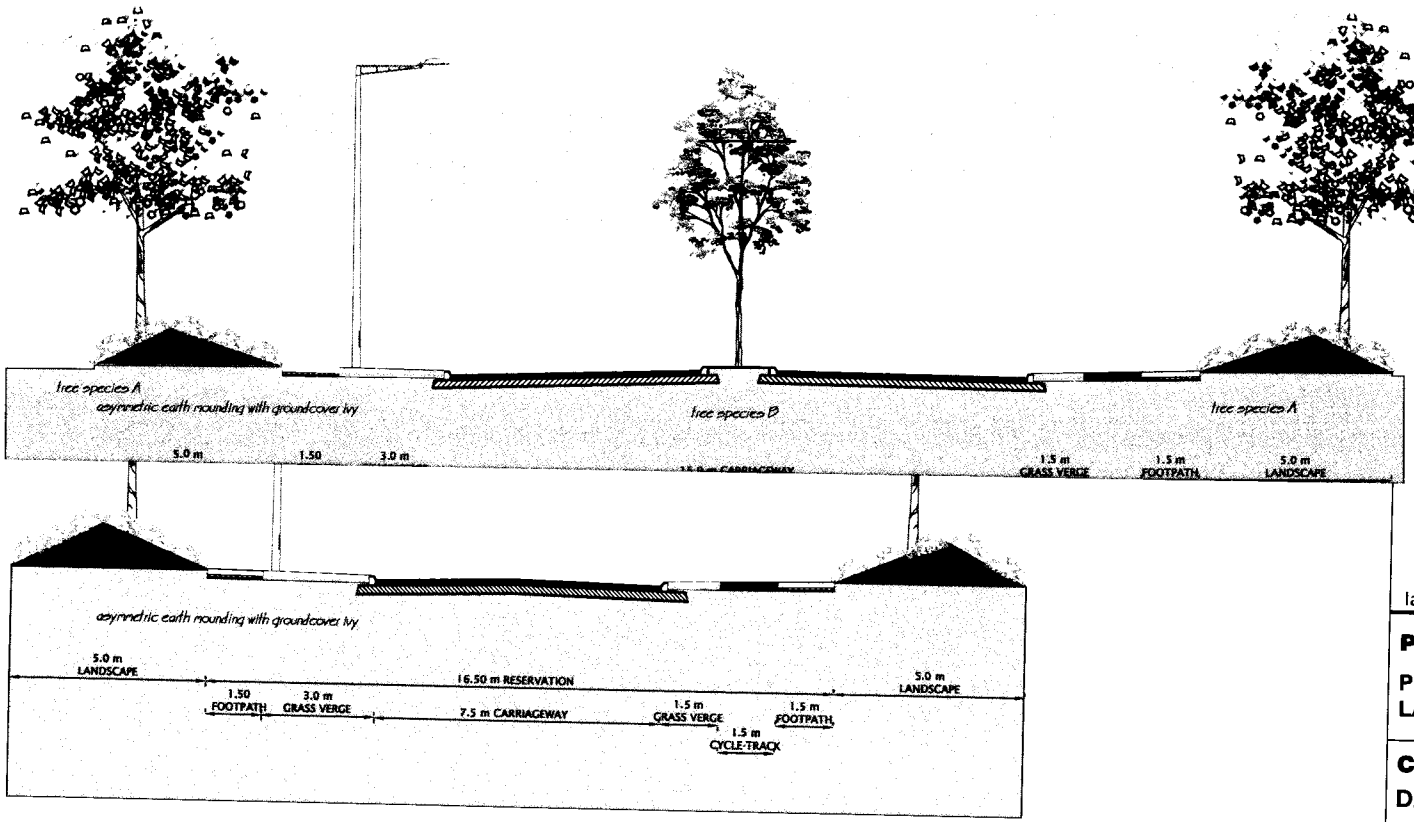
SECTION A-A - ENTRANCE AVENUE



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landscape architecture

Project Title:

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LANDSCAPE AND VISUAL ASSESSMENT

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DASNOC LIMITED

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Landscape Sections

Figure 5.7.3

Project Planner:

RPS Planning & Environment Ltd.

Scale:	Paper Size:	Revision:
1:200	**A3**	**A**
Date: **July 2006**		

3. **Typical Secondary Road:** The majority of secondary roads will be more open in character, with future buildings set back within sites and the 3-metre wide, mounded landscape strip planted with Norway Maple trees to form an avenue and groundcover shrubs;

4. **Service/Neighbourhood Centre Cluster:** In the later design of the site, the secondary streets could have two separate urban design characters. The second of these would form an urban street, with future retail buildings close to the path edge. In this case, planting of Norway Maple trees would form a single avenue in predominantly paved environs;

5.7.4 POTENTIAL IMPACT OF THE PROPOSAL

The potential landscape and visual effects are discussed in this section in terms of the effects which may arise. The potential effects allow for the important effects to be identified, and described in detail in order to determine the degree of effects which will be mitigated by landscape works.

This section assesses the impacts likely to be caused by the proposed roads and services development only. It is recognised that future build out of the site will occur, but the nature and form of this development has not been designed in detail, and therefore cannot be assessed at this time.

It is assumed that the traffic using these roads will be a mix of vehicles, including HGVs. The largest vehicles using the site will be 4-5 metres in height, and the visual assessment will be based on this height.

Existing Landscape Features and Existing Vegetation

The primary landscape features on the subject site are the existing mature hedgerows and trees. The proposed development will essentially change the agricultural pattern of the subject site to a commercial development. The proposed development will entail the construction of roads and services on the subject site which will result in the removal of 400 metres of existing hedgerows and trees within the site. Future development within the site may also result in the removal of existing site vegetation. Boundary hedgerows and trees can be largely retained. All existing drains and watercourses will be retained, except for a 25-metre section of a watercourse in the north of the site which will be culverted. This generates a slight negative landscape impact as this represents a small percentage (<10%) of the entire site vegetation and these features are not unique or valuable from an amenity or landscape point of view.

Views

The proposed development of roads and services with tree planting to either side of each road would have a relatively low visual weight, compared with the extent of the site. Traffic would be partially screened by the proposed trees, but the movement of traffic increases its visibility.

Views from roadways and adjoining dwellings

At the nearest point, the proposed roads are located 200-300 metres to the south or south-east of the existing dwellings along the Nangor Road. The effect on views from these dwellings would be moderately negative as the proposed development would contrast with the existing landscape and result in reducing the quality of the views of the Dublin Mountains from these dwellings. The effect

of the development on the visual quality of the agricultural landscape in the fore- and middle-ground of the views would be slightly negative.

At the nearest point, the proposed roads are located 175 metres north-west of Kilbride House in the south-east of the site and between 340 metres and 770 metres from dwelling to the west of the site. Views from Kilbride House to the north of the agricultural landscape in the fore and middle ground would be moderately negatively affected. Impacts to views from other dwellings would be slight and negative, due to the distance from the proposed roads and the existing mature boundary vegetation. Long distance views to the industrial buildings to the north-east of the site would be partially blocked although this would not counter-balance the negative effects.

Views from the roadway to the west of the site would also be slightly negatively affected.

Views from within the site
The views from the site are views across agricultural fields to the south, and the view to the north towards Grange Castle International Business Park and Kilcarbery Business Park. The site development will generate a moderate change to the character of the existing views. Given the existing quality of the views in this location, there will be moderate visual effects to the existing views in this area, particularly to the south.

Views from local amenities
Views from the public golf course east of the site are currently partially restricted by existing mature trees and hedgerows and by additional boundary planting on the golf course lands. The potential impact to views from the course is slight in extent due to the nature of the proposed development and its likely relatively low visibility from the course.

5.7.5 REMEDIAL OR REDUCTIVE MEASURES

The scheme of landscape works for the proposed development can be defined in the following areas:

1. Main roadways and entrance spaces
2. Boundary treatments

The details of the landscape scheme are illustrated on figure 5.7.2.

The planting scheme for the site takes account of the native species already in the area as these would be the most useful for local wildlife. In the detailed design phase, preference should be given to the planting of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*) and willow (*Salix* spp.) as these are the principal native species in this part of County Dublin. Other occasional species include oak (*Quercus robur*), alder (*Alnus glutinosa*), birch (*Betula* spp.), rowan (*Sorbus aucuparia*), holly (*Ilex aquifolium*), crab apple (*Malus sylvestris*) and wild roses (*e.g.* dog rose, *Rosa canina*).

Roadways and Entrance Spaces

The main roadways will be developed for cycling and pedestrian access, and are proposed to be defined by strong lines of semi mature standard trees, as described in Section 5.7.3. It is envisaged that the footpaths will be developed with a high quality pavement. The ancillary roadways have been developed using street trees, with a species composition that relates to each individual roadway.

At the entrances to the proposed development and at junctions within the site, it is proposed to implement Specific Landscape Measures (SLMs). It is intended that these spaces would create a visual break in the external environment and therefore give visual interest. These spaces could then be further aesthetically enhanced by tree and shrub planting, lighting, site furniture, water features and/or sculptural features. These would enhance the amenity value of the site and would be designed in detail at a later stage, as part of the urban design process for the future business park.

Boundary Treatments

The boundaries of the proposed development site are proposed to be planted with primarily native tree and shrub species to mitigate against the loss of hedgerows and trees and to create screening to ameliorate the impact to views from the adjacent dwellings.

The following species mix is proposed, as follows:

Native Tree and Shrub Screen Planting mix

Scots Pine (*Pinus sylvestris* 15%), European Larch (*Larix decidua* 10%), Ash (*Fraxinus excelsior* 10%), Common Oak (*Quercus robur* 10%), Alder (*Alnus glutinosa* 5%), Rowan (*Sorbus aucuparia* 5%), Silver Birch (*Betula pendula* 5%), Holly (*Ilex aquifolium* 20%), Hawthorn (*Crataegus monogyna* 10%), Blackthorn (*Prunus spinosa* 5%), Hazel (*Corylus avellana* 5%) and wild rose (*Rosa canina, R. rugosa* 5%).

The screening mix will be planted along the boundaries with existing dwellings in a 5m band and in an 8m band along the golf course boundary to ensure that the proposed development is screened in views. This will have the effect of enhancing the screening and aesthetic value of the existing hedgerows by introducing additional native deciduous and evergreen trees. It will not be planted along the southern boundary of the site to the north of Kilbride House, due to external constraints. Massed plantings will be planted as bare root whips / transplants, with container-grown evergreen trees/shrubs.

5.7.6 PREDICTED IMPACT OF THE PROPOSAL

The predicted landscape and visual effects are the residual effects of the proposed development on the landscape and visual environment, after consideration of mitigation measures.

Existing Landscape Features and Existing Vegetation

Construction stage

Site clearance works would result in the removal of 400m of existing hedgerows and trees from the interior of the site in the initial stages of construction. This would result in a slight, permanent landscape impact. However, following planting of streets and boundaries as described in section 5.7.5, the overall effect on landscape vegetation would be positive.

Operational Stage

In the operational stage the landscape measures and planting proposed in section 5.7.5 for the site will establish and mature. This will result in a change to the landscape character from agricultural to infrastructural/commercial. In the wider landscape context, this is a continuation of an established pattern on adjacent lands. Additional distinct landscape features such as water features, tree and shrub plantings, sculpture, etc. would have a positive impact on the landscape amenity value of the site and the overall amount of significant tree cover would be increased.

Views

Construction stage

There may be some slight visibility of the construction works in the wider landscape, and the completed infrastructure during the establishment stage of the scheme. The subject site is not particularly visible in the wider landscape area and these effects will be generally slight. Views from adjacent dwellings will be primarily negatively affected to a slight extent.

Operational stage

Views from roadways and adjoining dwellings

The predicted effect on views from dwellings along the Nangor Road would be moderately negative as the proposed commercial development cannot be screened from view with screen planting within the site but the views of the Dublin Mountains from these dwellings would be partially blocked and the visual quality and context of the landscape is reduced.

Views from Kilbride House to the north would be moderately negatively affected as the proposed roads would be visible in the landscape and the visual quality of the landscape is reduced. Impacts to views from other dwellings to the west of the site would be negligible, due to the distance from the proposed development and the existing mature boundary vegetation, augmented with screen planting.

Views from the roadway to the west of the site would also be slightly negatively affected.

Views from within the site

The views from the site are views across agricultural fields to the south, and the view to the north towards Grangecastle International Business Park and Kilcarbery Business Park. The site development will generate a moderate change to the character of the existing views. New landscape features will create a distinct, visually interesting landscape setting. However, removal of the agricultural landscape will result in slight negative impact overall.

Views from local amenities
The predicted impact to views from the Grange Castle Golf Course is slight in extent as the proposed development will be screened from the course and will have only a slight effect on approaches to the course and the landscape setting.

5.7.7 MONITORING

The landscape development of the site will be carried out as follows:

Construction stage

All mature trees, hedgerows or bushes to be retained should be appropriately fenced for protection. Where trees will be interfered with by construction works, an Arborist should monitor the site works.

For the retention of all other landscape qualities, including topsoil stripping and storage, instructions should be submitted to all contractors to maintain good practice while manoeuvring vehicles or materials within the vicinity of, or on, the site. Monitoring should occur by site inspections from an appointed Landscape Architect.

The landscape works construction stage will entail the monitoring of the topsoil stripping and the establishment of the main structural planting on the street areas.

Operation stage

Following completion of the works, there will be an ongoing programme of landscape management for the site, which will be overseen by a Landscape Manager or Landscape Architect.

5.7.8 REINSTATEMENT

The proposed landscape development works in the form of contouring, shrub and tree planting will form the reinstatement of the site following the completion of the main building works. These works will be carried out by a landscape contractor and will be supervised by the appointed Landscape Architect.

5.8 MATERIAL ASSETS

5.8.1 TRAFFIC AND TRANSPORTATION

5.8.2 INTRODUCTION

The development that is the subject of the current planning application consists of the provision of roads and services infrastructure, which will accommodate the future development of a business park on the subject site. The future land uses proposed on the site include industrial, office, retail, and neighbourhood centre uses including shops, cafes, crèche etc. Vehicular access to the site is proposed via the Nangor Road Regional Road R134, which has access to the Outer Ring Road R136. When completed, the Outer Ring Road will connect the N4 to the N7 and N81. Pedestrian and cycle access will be provided throughout the site and will connect with the Nangor Road which is to be upgraded to provide for these modes of travel.

This section of the EIS addresses the existing transportation environment in the vicinity of the proposed development, the traffic generation, parking and public transportation requirements of the development and the transportation impact on the surrounding road network.

The transportation impact of the proposed development has been assessed using widely accepted methods including the T.R.I.C.S. database (based on surveys in the UK and Ireland, which is widely used for trip estimation in Ireland). Consideration has been given to access to/from and within the site for all users (cars, pedestrians, cyclists and public transport users).

The parking requirements for the development have been considered with reference to the South Dublin County Council Development Plan 2004 – 2010.

5.8.3 RECEIVING ENVIRONMENT

Site Description and Location

The Kilcarbery area is strategically located from a transportation point of view on the western fringe of the Greater Dublin Area, approximately 13km west of Dublin City Centre and 2.5 km west of Clondalkin Village.

The subject site is located on the southern side of the Nangor Road, west of the Outer Ring Road. The site is currently agricultural / undeveloped lands.

To the north is Grange Castle Business Park, to the east of the site is a golf course and further east is the established residential area of Clondalkin. To the south is Baldonnell Military Aerodrome and to the west are primarily agricultural lands. Refer to Figure 5.8.1 Site Location - Regional Context and Figure 5.8.2 Site Location - Local Context.

Figure 5.8.1: Site Location – Regional Context

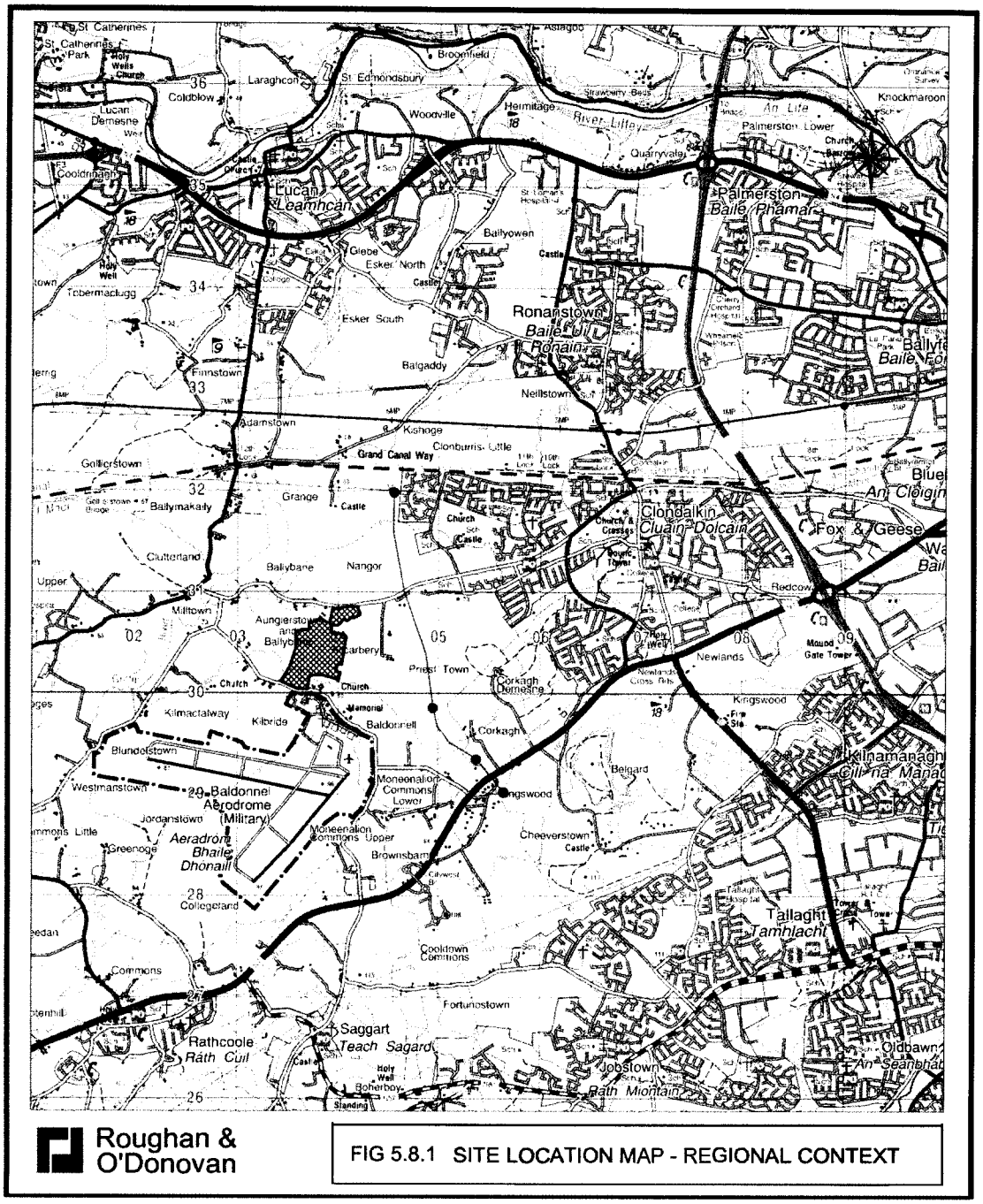
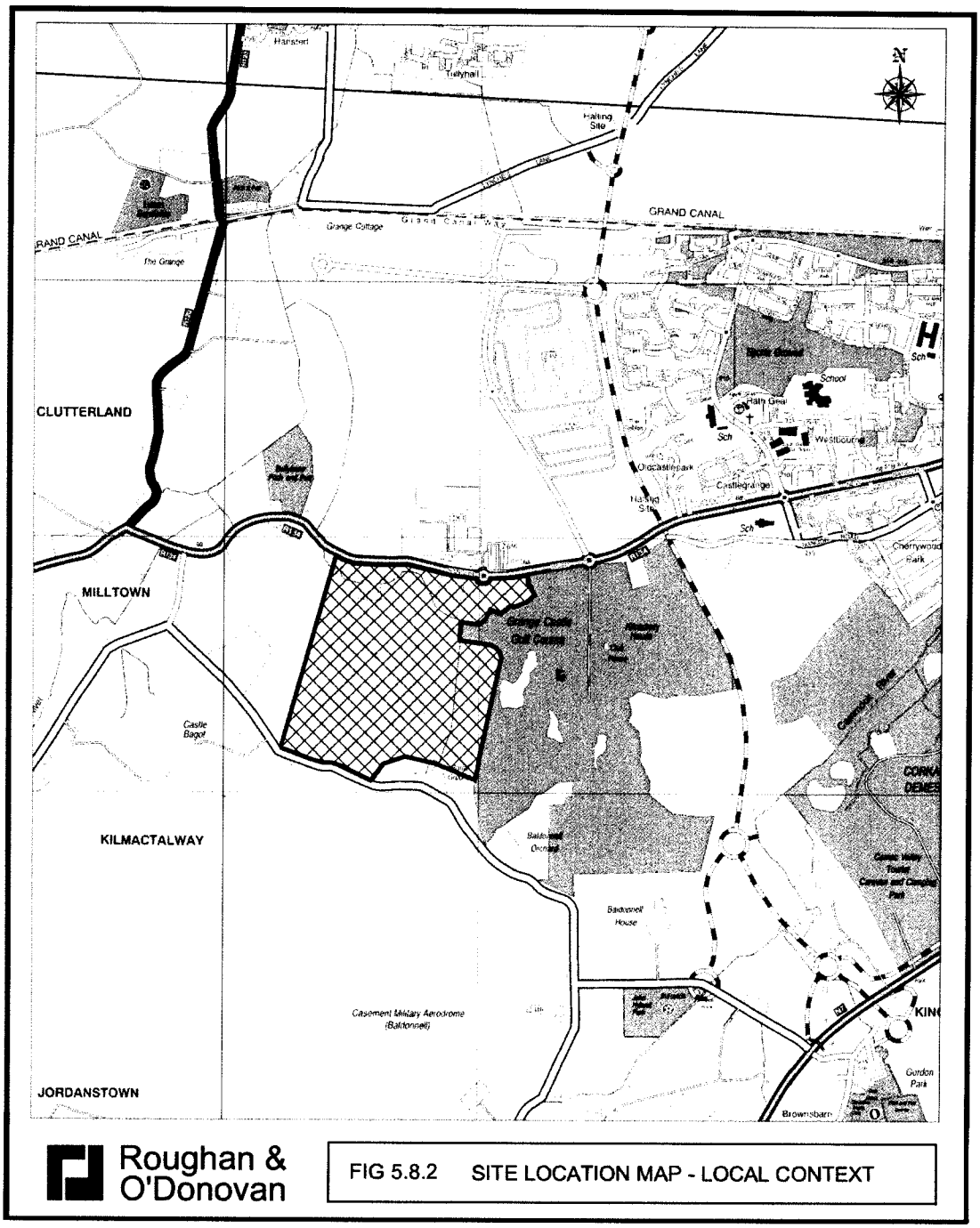


Figure 5.8.2: Site Location – Local Context



Transportation Policies

The transportation strategies 'Transport 21' and 'A Platform for Change, 2000-2016, prepared by the Dublin Transportation Office (DTO) and approved by the Government, contain proposals for a high-capacity public transport network throughout Dublin. The aim is to achieve a substantial share of the transport market in Dublin for public transport services. The land use and development control policies of the local authorities are expected to be coordinated with the transport policy through an emphasis on development of sites that are easily accessible by public transport.

It is an objective of South Dublin County Council to *'promote ease of movement within, and access to South Dublin, by integrating land use planning with a high quality, sustainable and integrated transport system for people and goods within the County.'*

The proximity of the site to the future QBC along the northern boundary of the site on the Nangor Road will encourage travel to the site by bus. In addition the orbital bus priority on the Outer Ring Road will also encourage travel by bus.

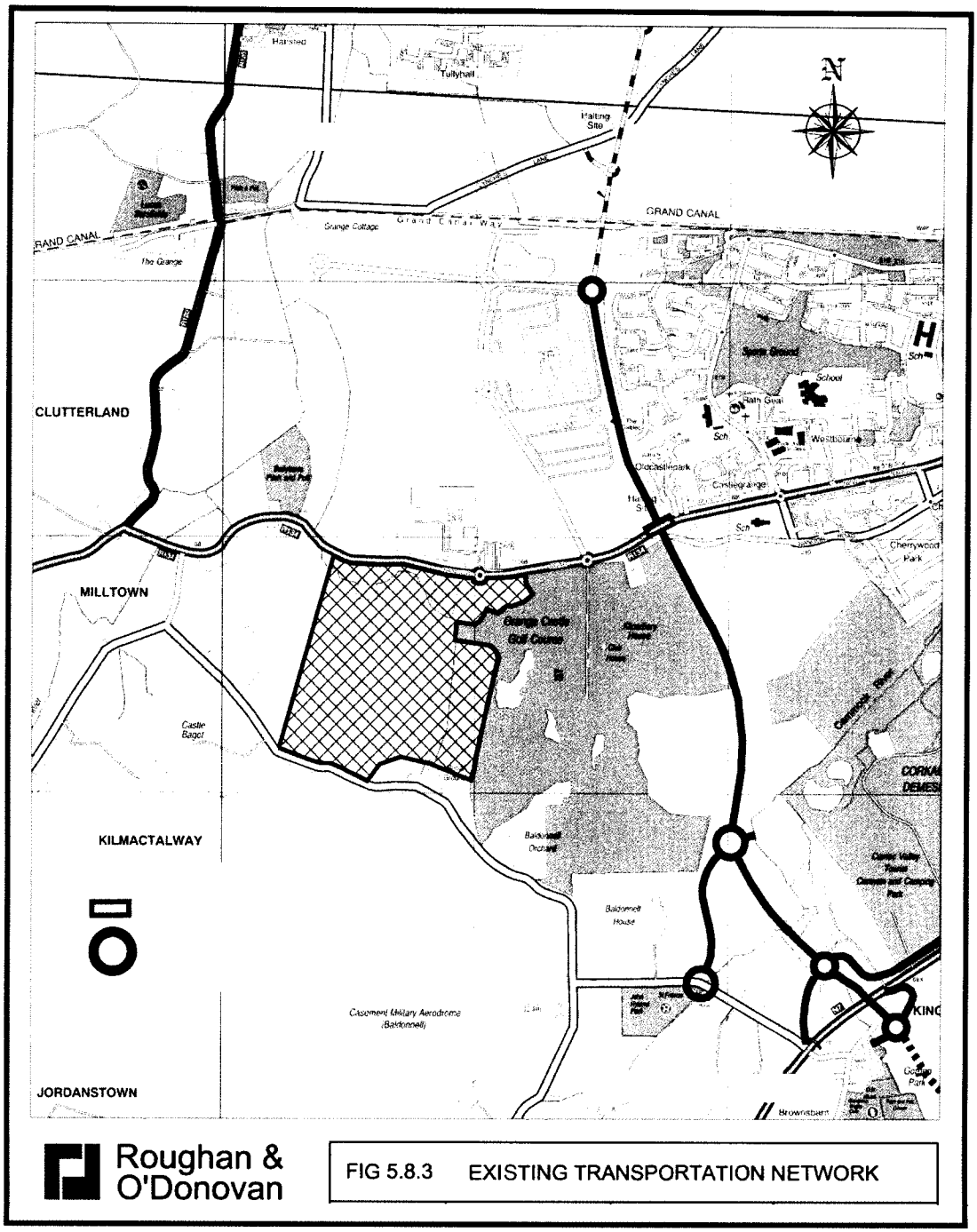
Existing Road Network

The site is situated between the N4 and N7 National Primary Routes and approximately 5km west of the M50 Motorway. The M50 is an orbital ring road around Dublin City with interchanges at all radiating National Primary Roads from the N1 to the North and the M11 to the South.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has seen steady improvements over recent years, and is a wide single carriageway with dedicated bus lanes in each direction extending as far out as the Kilcarbery Park roundabout. The Nangor Road along the northern boundary of the site and to the west is of lower standard in terms of alignment and cross-sections, but will soon be upgraded and widened to include bus lanes in each direction.

The Outer Ring Road Phase 1 was opened from the N7 as far as Grange Castle Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction. Refer to Figure 5.8.3 Existing Transportation Network.

Figure 5.8.3: Existing Transportation Network



Proposed Road Improvements

Phase 2 of the Outer Ring Road, which will see a local road link from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road, which commenced construction in 2005 and is due to be completed by mid 2007. With completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and the N7. Phase 3 of the Outer Ring Road, continuing south from the N7 to the N81 Blessington Road is progressing through the planning and design process and construction is expected to commence this year.

The upgrading of the N7 to dual three-lane standard from Dublin to Naas has commenced and is anticipated to be complete by the end of 2006. Improvements are also planned to the N4 to bring it to dual three-lane standard as far as the Leixlip Interchange from the M50 / N4 Interchange within three years.

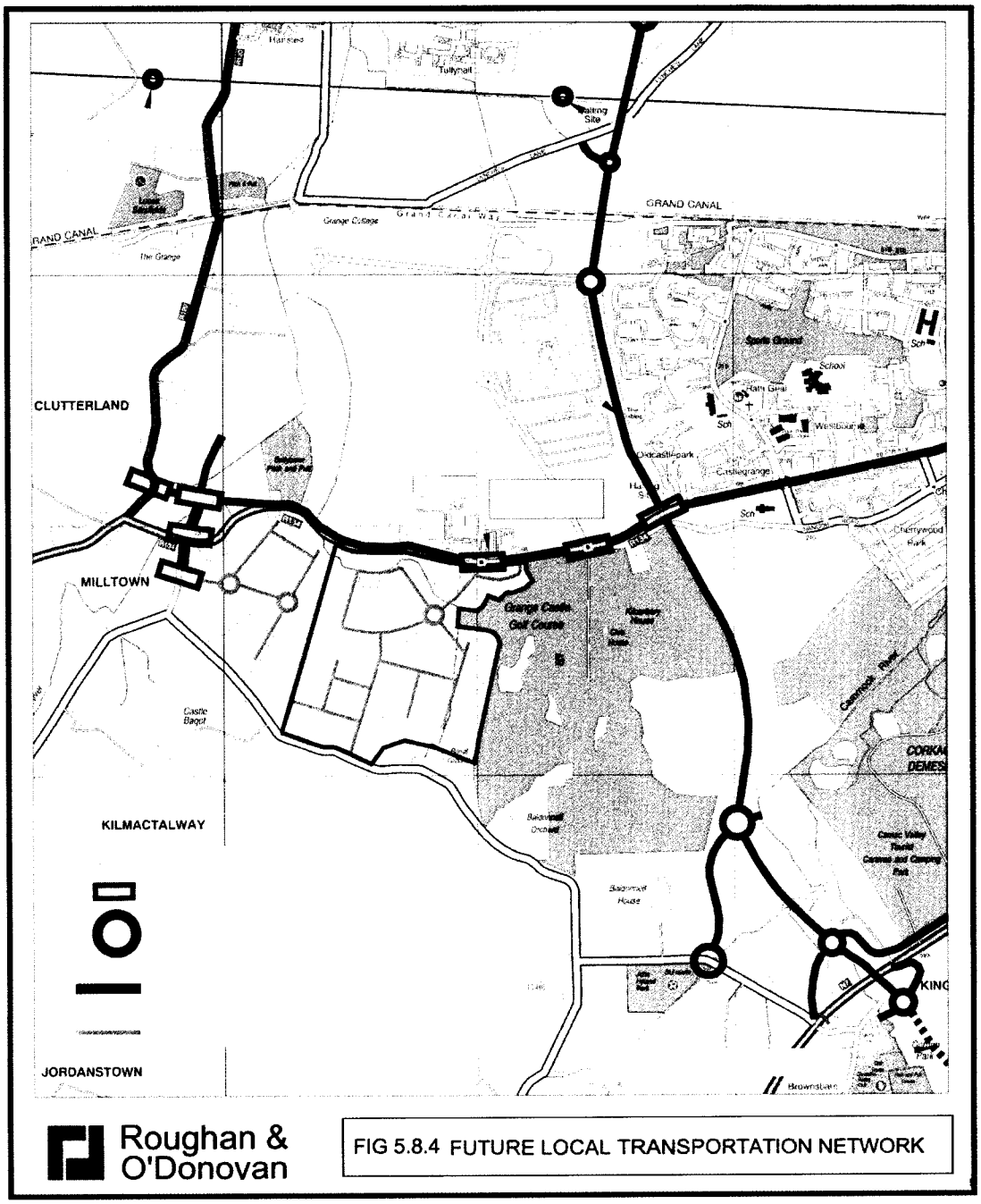
The Nangor Road west of the Outer Ring Road will be upgraded and widened to include bus lanes in each direction. Two of the existing roundabout junctions will be upgraded to traffic signal control to facilitate the Quality Bus Corridor (QBC) along this route.

Proposed road infrastructure identified in Transport 21, which will have a positive impact on the road network in the area include the following (completion dates):

- Dublin Port Tunnel (2006)
- M50 upgrade phase 1. These upgrades will provide essentially 'free flow' interchanges at the N4 and N7 (2008).
- M50 upgrade phase 2 Upgrading remainder of the M50 including the interchanges and widening to 3 lanes between the M1 interchange and Scholarstown interchange (2010)

Refer to Figure 5.8.4 Future Transportation Network.

Figure 5.8.4: Future Transportation Network



Existing Traffic Conditions

The existing road network adjacent the subject site is operating well within its capacity, however no traffic surveys have been undertaken on the surrounding road network as traffic conditions are expected to change significantly as a result of extensive development within the area and the completion of the Outer Ring Road. Instead, the estimated future traffic flows on the surrounding road network were obtained from South Dublin County Council, which were undertaken as part of the Nangor Road Improvement Scheme. These traffic flows take account of proposed transportation Infrastructural improvements and development of zoned lands. This traffic data was used for base years 2007 and 2020 to assess the

impacts of the proposed development on the surrounding road network. Refer to Figures 5.8.5 and 5.8.6 2007 Base Year Traffic Flows – Weekday AM & PM Peak Hour Traffic.

Figure 5.8.5: Base Year Traffic Flows Weekday AM Peak Hour

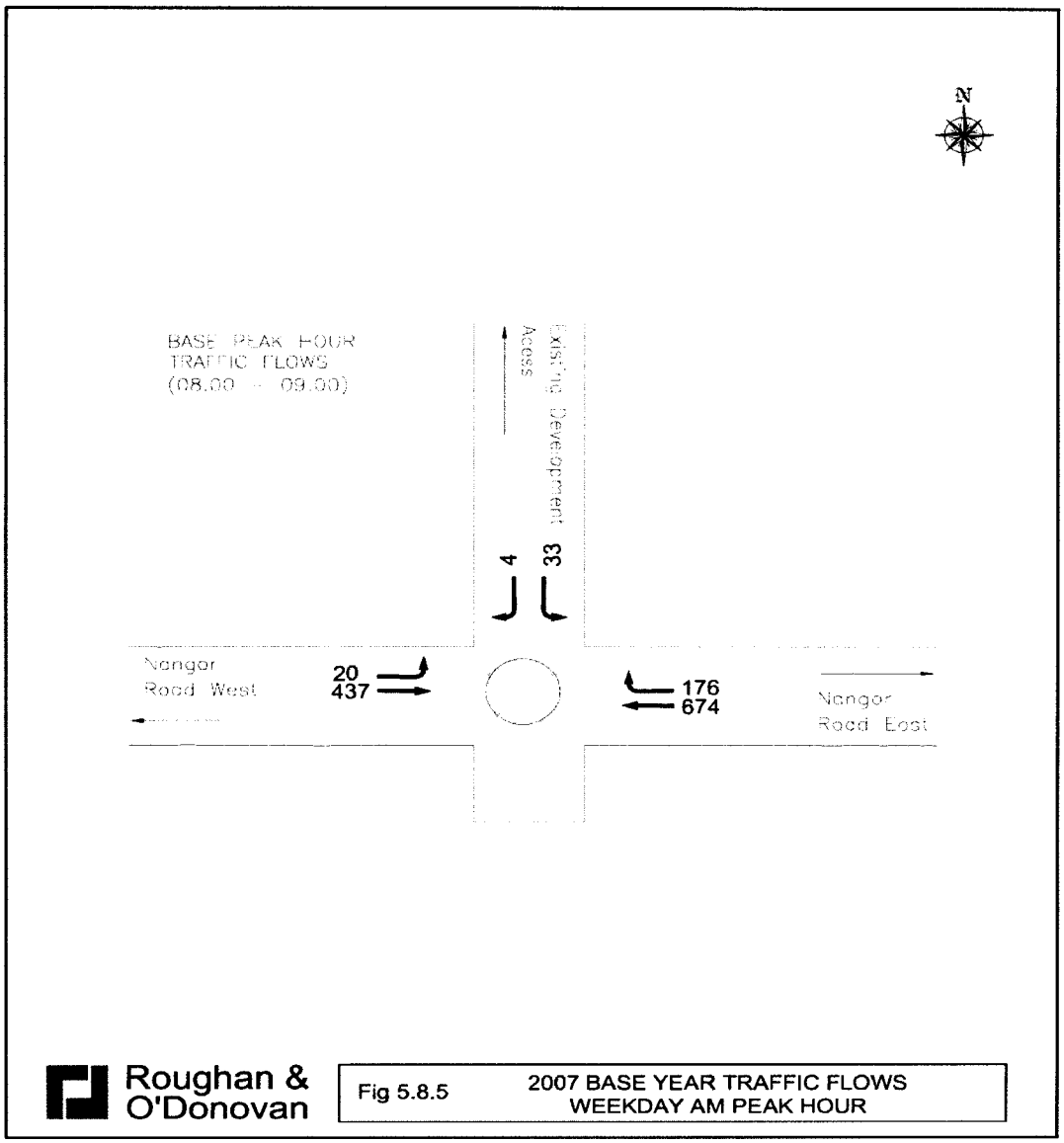
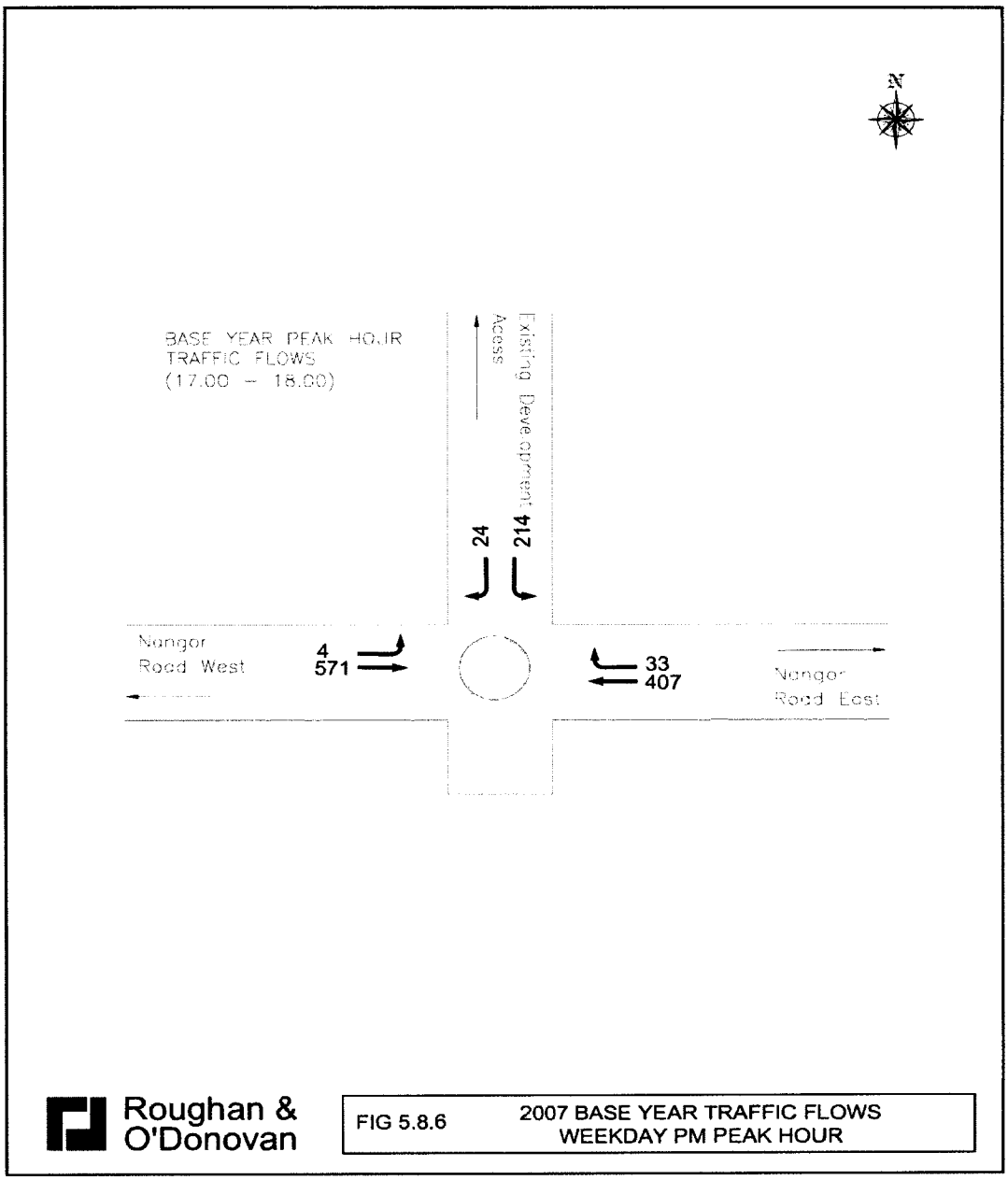


Figure 5.8.6: 2007 Base Year Traffic Flows Weekday PM Peak Hour



Public Transport Accessibility

Currently the Dublin Bus Route No. 68 operates along the Nangor Road at the northern boundary of the subject site. Approximately 1.5km east of the site the Dublin Bus Route Nos. 51B, 51X and 210 operate along the Nangor Road. Clondalkin Village 3km east of the site is served by the Dublin Bus Route Nos. 69, 76, 76A and 76B.

The Quality Bus Network (QBN) in the area continues to expand with dedicated bus lanes on the Nangor Road east of the Kilcarbery Park Roundabout and the Outer Ring Road. It is noted that these Quality Bus Corridors are not yet operational but they are likely to be operational by the time the subject site is developed.

The main intercity railway line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, runs to the north of the subject site. Intercity services are mainly to Cork and Limerick / Shannon, with the commuter service to Kildare. The nearest station is Clondalkin Station which is located approximately 3km northeast of the site and is served by 15 suburban commuter trains in each direction during weekdays.

Proposed Public Transport Infrastructure

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme within the vicinity of the site including:

- Outer Ring Road QBC – Phase 1 N7 to Adamstown Roundabout complete Phase 2 connecting to the N4 under construction
- Nangor Road QBC West of Outer Ring Road currently at design stage
- Naas Road QBC Kingswood to Bluebell - under construction.

These objectives form part of the extensive QBN that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 - 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, with better pedestrian and cycle facilities thereby encouraging commuters to use alternate modes of transport to private cars.

The Kildare Route Project is a railway improvement project for part of the Dublin to Hazelhatch railway line, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site, and additional railway tracks to allow for the separation of suburban, regional and intercity trains and the introduction of a new high capacity suburban service, which is expected to be complete by 2010.

Proposed public transport infrastructure identified in Transport 21, which will have a positive impact on the public transport infrastructure network in the area, include the following (completion dates):

- Dublin City Centre rail resignalling (2008)
- Opening of the new Dublin City Centre railway station (2009)
- Kildare rail upgrade (2010)
- Metro West Phase 1 Tallaght to Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)
- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extend Electrification to Hazelhatch (2015)
- Rail Interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015).

Refer to Figure 5.8.4 Future Local Transportation Network.

5.8.4 CHARACTERISTICS OF THE PROPOSAL

Introduction

The development which is the subject of the current planning application consists of the provision of roads and services infrastructure which will facilitate the future development of a business park on the subject lands.

Broad assumptions, which can be made regarding likely future land uses within the buiness park at this time, are as follows:

General industry/logistics	39.00 acres,	78,914 sq.m gross floor area;
General Industry/enterprise	32.86 acres,	66,490 sq.m gross floor area;
Office	17.38 acres,	35,167 sq.m gross floor area;
Retail park	14.67 acres,	29,684 sq.m gross floor area;
Showroom	8.61 acres,	17,422 sq.m gross floor area;
Neighbourhood Centre	2.39 acres,	5,000 sq.m gross floor area.

Physical Infrastructure

The Spine Road within the proposed development will join the Nangor Road at the location of the existing roundabout providing access to the Kilcarbery Business Park. This junction will be modified to traffic signal control as part of the Nangor Road improvement scheme and will include a left-in slip lane to the site that will extend along the site frontage of the Nangor Road.

The Spine Road will be a dual carriageway road between Nangor Road and the roundabout within the site; with each carriageway to be 6.5m wide with two-lanes, separated by a 2.0m median. In addition the Spine Road will include a 1.5m wide cycle path on one side, and a 1.5m footpath on each side, plus verges for services and landscaping. The cycle path will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority to cyclists at the junctions.

Beyond the roundabout the Spine Road will reduce to be a 9.0m wide single carriageway with sufficient width to accommodate right turning vehicles. The cycle path and footpath conditions will be the same as those described above.

Vehicular access to the future proposed service / neighbourhood centre will be via a 6.0m wide carriageway with a 1.5m wide cycle path on one side and 1.5m wide footpaths on both sides. This road will be between the Nangor Road and will meet the Spine Road at a priority junction on the dual carriageway section of the Spine Road between the Nangor Road and the internal roundabout.

The remaining side roads will include 7.5m road carriageways, and a 1.5m cycle path on one side plus a 1.5m footpath on both sides. These roads will meet the Spine Road at the roundabout or at priority junctions in the single carriageway section of the Spine Road.

A second access will be provided at a later date by way of a priority junction onto Baldonnell Road half way along the southern site boundary following the realignment of the section of Baldonnell Road along the site boundary.

Pedestrian and cycle access to the site will be available at the northeastern corner via the site access roundabout or the neighbourhood centre link and northwestern corners via a pedestrian / cycle link only to Nangor Road. A north-south link road will connect the main access road to Baldonnell Road, with the adjoining development lands to the west of the site connected by a pedestrian and cycle only link.

Trip Generation

Trip generation is calculated by the number of trips per 100m^2 floor area (or other appropriate measure, such as number of residential apartments) based on surveys at similar sites, or by using the T.R.I.C.S. database from the UK and Ireland, which is widely used in Ireland for trip estimation for commercial uses (see TRICS Data and Trip Generation Rates attached in Appendix D).

Traffic Generation

Based on the preceding parameters, the predicted traffic flows in and out of the site are shown in Table 5.8.1 below.

As stated elsewhere in this Environmental Impact Statement, the land uses indicated in the table below are general assumptions only which have been used by the relevant specialists to undertake calculations to assess the impact of the proposed development. All future uses proposed on the site will be subject to planning approval.

Table 5.8.1: Predicted Traffic Generation of the Proposed Development

Use	AM Peak			PM Peak		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
General Industry / Logistics	234	44	278	44	284	328
General Industry / Enterprise	110	52	162	65	110	175
Office	329	38	367	51	267	319
Retail Warehousing	126	62	188	285	311	596
Showrooms	146	52	198	56	124	180
Neighbourhood Centre	52	35	88	126	126	252
Total	997	282	1,279	626	1.223	1.849

Based on the preceding parameters, the predicted HGV traffic flows in and out of the site are shown in Table 5.8.2 below.

Table 5.8.2: Predicted HGV Traffic Generation of the Proposed Development

Use	AM Peak			PM Peak		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
General Industry / Logistics	16	16	32	8	8	16
General Industry / Enterprise	40	32	72	32	32	64
Office	0	0	0	0	0	0
Retail Warehousing	3	3	6	0	3	3
Showrooms	3	5	8	0	0	0
Neighbourhood Centre	1	1	2	0	1	1
Total	63	57	120	40	44	84

Traffic Distribution

Considering the likely origins and destination of traffic to / from the subject site in the future and the capacity of the surrounding road network, vehicular traffic accessing the development has been split into:

- 60% to and from Nangor Road (the east);
- 10% to and from the Nangor Road (the west): and
- 30% to and from Baldonnell Road (to south).

These traffic flows are summarised on Figures 5.8.7 to 5.8.10 for the 2007 and 2020 post development scenarios.

Figure 5.8.7: 2007 Post Development Traffic Flows Weekday Am Peak Hour

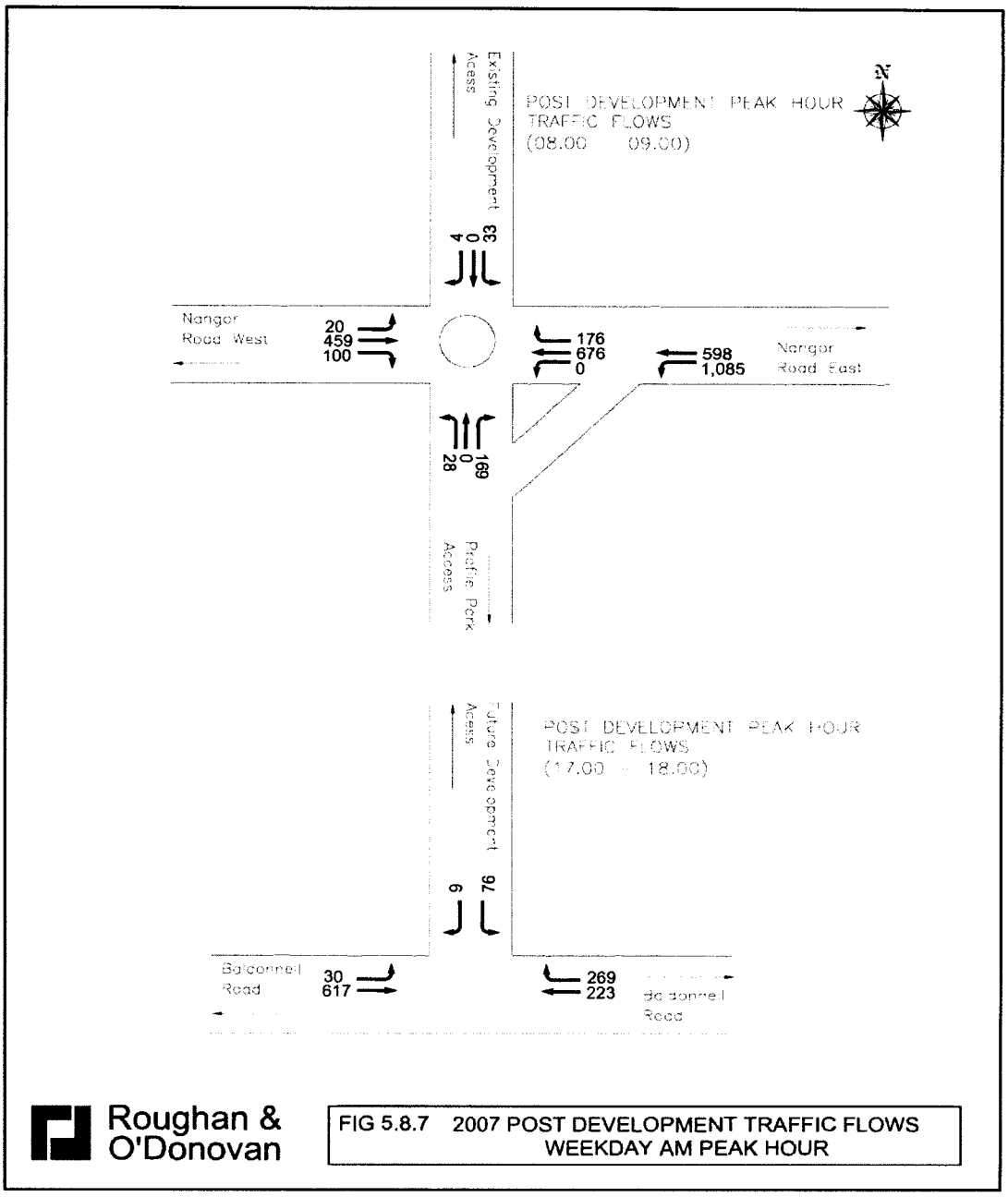


Figure 5.8.8: 2007 Post Development Traffic Flows Weekday PM Peak Hour

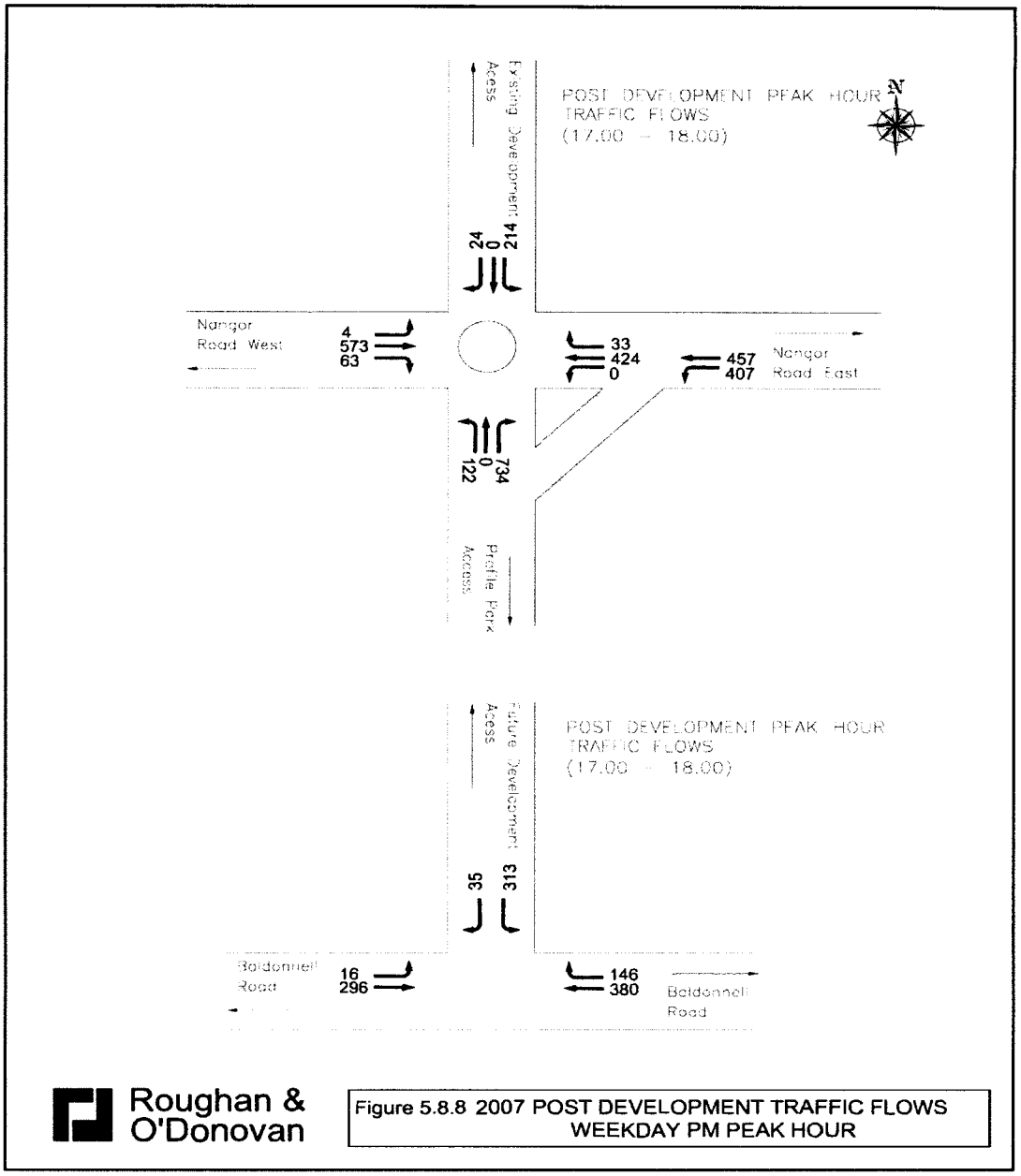


Figure 5.8.9: 2020 Post Development Traffic Flows Weekday AM Peak Hour

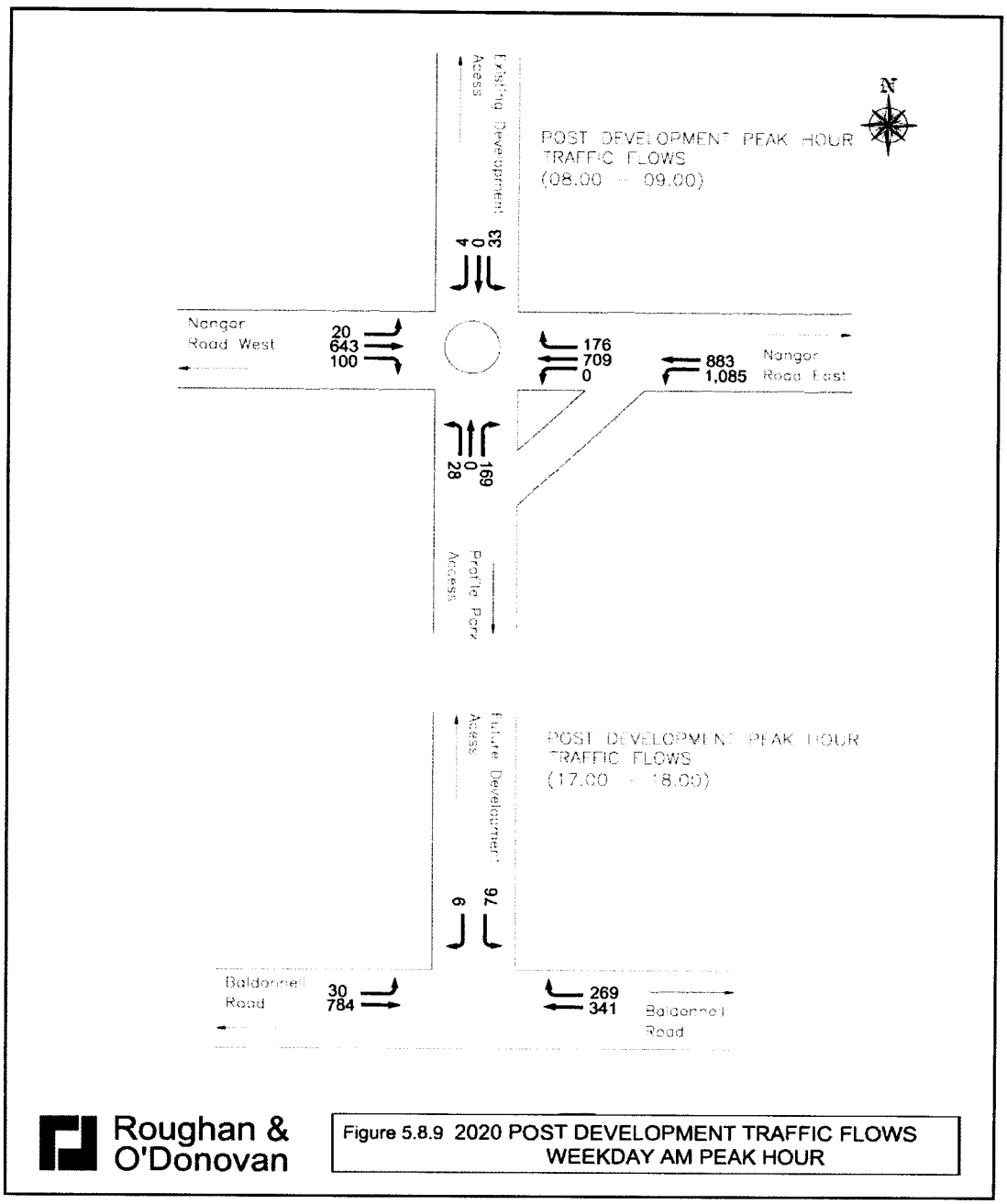
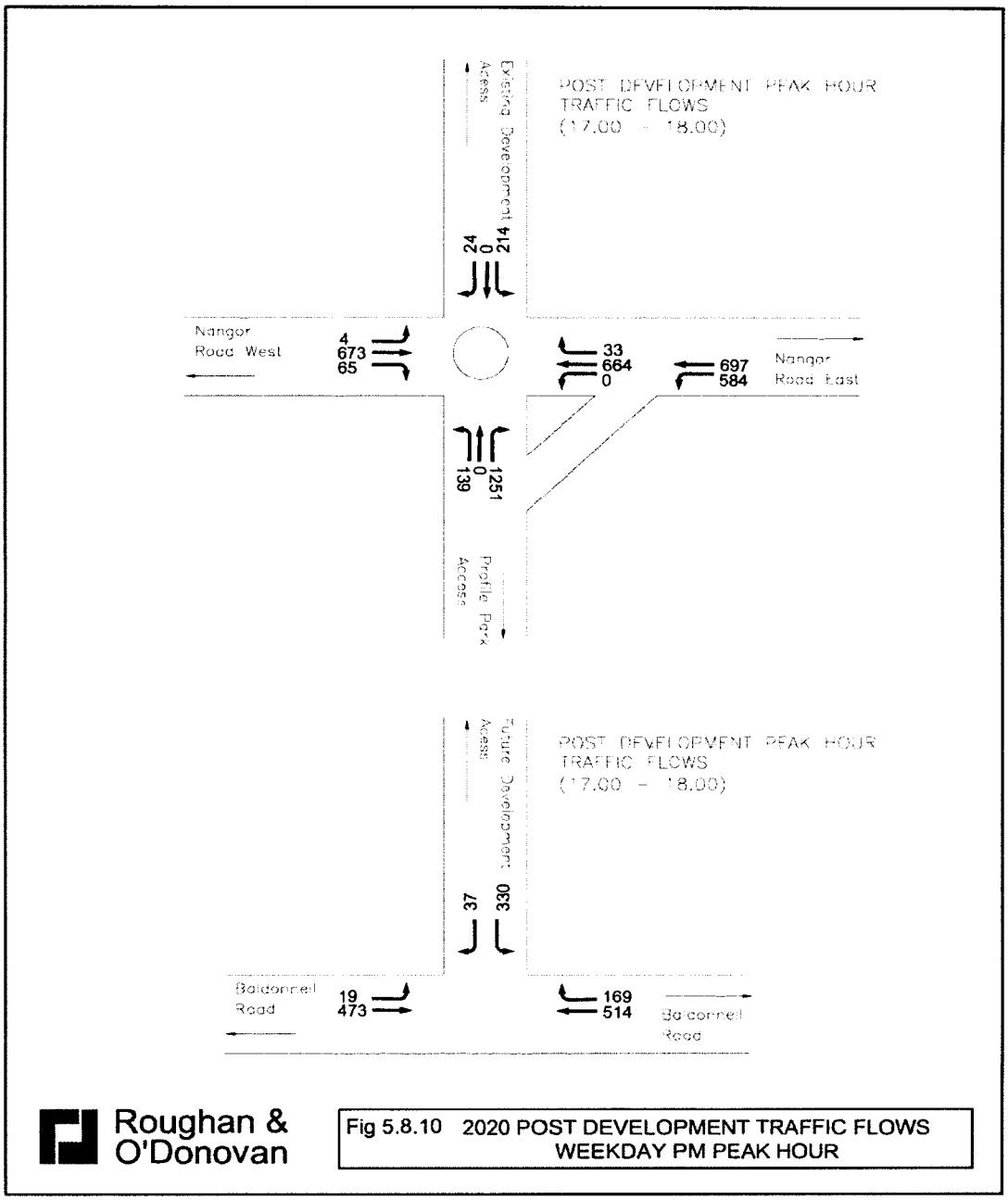


Figure 5.8.10: 2020 Post Development Traffic Flows Weekday PM Peak Hour



5.8.5 POTENTIAL IMPACT OF THE PROPOSAL

The potential transport impacts of this development are considered below.

Development Access; Safe access to junctions that, where possible, comply with the normal junction standards should serve new developments.

Trip Generation; The proposed development will generate a mixture of car trips as well as public transport, cycle and walk trips There will also be trips generated between the subject site and other lands within development, as workers visit the retail and service facilities proposed on the subject site (and vice-versa).

Traffic Impact; The traffic impact of this development is dependent on the interaction of the following:

- The existing traffic on the road network;
- Additional traffic generated or diverted by the development;
- Capacity of the road network.

These features will vary over different parts of the road network for different times of the day and different days of the week. In accordance with general practice, the traffic situation during the midweek morning and evening peaks has been selected to illustrate the traffic impact of this development, on the basis that traffic at these times of the week is most representative of the general peak traffic conditions on the network and also peak development traffic.

Typically, the main traffic impact of a traffic generating development is the imposition on the surrounding road network of traffic volumes, which could lead to congestion and delays where the capacity of nearby junctions is either being approached or exceeded. The scale of the impact can vary depending on the nature of the road network. In urban areas, the extent of the road network and the spread of trip origins and destinations are usually such that a variety of routes can be reached quickly, thus dissipating the impact.

Car Parking; A major consideration for any development is the adequate provision of parking spaces consistent with the transportation strategy for the development.

Cycle Parking and Facilities; Consideration should be given to the adequacy of the cycle parking provision and facilities consistent with the transportation strategy for the development.

Construction Traffic; The construction impacts of this development are dependent on the capacity of the surrounding road network and the adequacy to accommodate temporary car and truck parking and storage of materials.

5.8.6 REMEDIAL OR REDUCTIVE MEASURES

Construction Phase

A construction management plan will be prepared where construction traffic including both construction plant and materials deliveries will be programmed to avoid peak traffic conditions on the surrounding road network.

Operational Phase

The site of the proposed development is ideally situated for travel by public transport. The proposed public transport infrastructure improvements as described above will significantly improve the accessibility of the site by sustainable modes.

Access to public transport, provision of safe and convenient pedestrian and cycle links will encourage travel to the development by sustainable modes. The developer seeks to promote the use of public transport, cycling and walking and reduce the reliance on private car usage with the implementation of a mobility management plan, in compliance with South Dublin County Council's policies on sustainable development and as per the Dublin Transportation Office, 2000 –

2016 strategy, 'A Platform for Change'. The Mobility Management Plan for Profile Park is included in Appendix D.

5.8.7 PREDICTED IMPACT OF THE PROPOSAL

Operational Phase - Traffic Capacity

The forecast operational phase development flows are outlined in earlier sections, and summarised on Figures 5.8.5 to 5.8.10.

The performance of the site access junctions, were analysed using software ARCADY, OSCADY and PICADY designed by the Transport Research Laboratory (TRL) of the UK[1]. The results of the junction performance assessments are shown in Tables 5.8.3 – 5.8.5 (further details are attached in Appendix D).

Table 5.8.3 - Results of ARCADY Assessment - 2007 Site Access / Nangor Road / Kilcarbery Roundabout

	Max Ratio of Flow to Capacity (RFC)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – No Development	0.553	1.2	0.08
PM Peak – No Development	0.134	0.5	0.06
AM Peak – Post Development	0.559	1.3	0.08
PM Peak – Post Development	0.608	1.5	0.10

The junction analysis of the roundabout junction on the Nangor Road indicate that the junction will operate satisfactorily in the year 2007 with approximately 70% of the traffic from the overall development. It is expected that within the next two years this roundabout junction will be changed to a signalised junction as part of the Nangor Road Improvement Scheme and this is reflected in the junction assessment for the 2020 year scenario below.

Table 5.8.4 - Results of OSCADY Assessment - 2020 Proposed Signalised Site Access / Nangor Road / Kilcarbery Junction

	Max Degree of Saturation (DoS)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – Post Development	69.7%	6.4 (Nangor Rd –west)	0.34
PM Peak – Post Development	89.5%	18.1 (Profile Park)	0.82

[1] ARCADY in the instance of roundabout junctions, OSCADY for the traffic signal control junction of the Nangor Road Junction and PICADY for the priority junction on Baldonnell Road.

The junction analysis of the proposed signalised junction on the Nangor Road indicate that the junction will operate satisfactorily in the year 2020 with approximately 70% of the traffic from the overall development. Any additional traffic from the proposed development will result in over saturation of the junction and lead to excessive queuing. Therefore it is proposed that South Dublin County Council phase the completion of the proposed business park development to 70% until such a time as the Baldonnell Road access junction is provided.

Table 5.8.5: Results of PICADY Assessment 2020 Proposed Priority Junction on Baldonnell Road

	Max Ratio of Flow to Capacity (RFC)	Maximum Queue (veh)	Ave Delay (min/veh)
AM Peak – Post Development	0.768	3.2 (Profile Park)	0.14
PM Peak – Post Development	0.685	2.1 (Right turn into site)	0.09

The above analysis shows that the proposed Baldonnell Road priority junction will perform well within capacity during the 2020 post development scenario when 30% of the development traffic will access the site via Baldonnell Road.

Operational Phase - Car Parking Provision

The South Dublin County Development Plan 2004 – 2010 recommends parking provision rates as follows (Table 11.5 Parking Standards):

- Offices, Office based industry — 1 space per 40 sq.m gross floor area;
- Restaurant / Café — 1 space per 6 sq.m of public space;
- Retail Warehousing in industrial areas — 1 space per 35sq.m gross floor area;
- Shopping Centres and retail stores — 1 space per 20sq.m gross floor area;
- Warehousing — 1 space per 100sq.m gross floor area.

It is proposed to provide parking generally in accordance with the County Development Plan standards. However each individual site within Profile Park will require planning permission when the exact parking provision will be determined.

Construction Phase

The primary access point during construction is likely to be via the existing roundabout junction on Nangor Road.

A construction management plan will be prepared where construction traffic will be managed to avoid peak traffic conditions on the surrounding road network. Where possible, excavated material will be recycled / reused on site. During excavation and removal of this material from the site, road cleaning and wheel washing at vehicular accesses from the site will be carried out.

During construction it is considered that there will be adequate land within the curtilage of the site to accommodate temporary car and truck parking for construction staff and operations at the early stage of the programme, and at later stages there will be adequate car parking space available in the basements of the development.

5.8.8 MONITORING

No monitoring measures are proposed.

5.8.9 REINSTATEMENT

No reinstatement measures are proposed.

5.9 CULTURAL HERITAGE

5.9.1 INTRODUCTION

Cultural Heritage, in respect of a project, is assumed to include all humanly created features on the landscape, including portable artefacts, which might reflect the prehistoric, historic, architectural, engineering and/or social history of the area. The Cultural Heritage of the area of the proposed development was examined through an Archaeological, Architectural and Historical study. The Archaeological and Architectural studies involved a documentary/cartographic search and field inspection of the area, while the Historical study involved a documentary search.

Methodology

The Local History, Archaeological and Architectural Heritage Assessment components of the study comprise the results of a survey and evaluation of selected sites of historical, archaeological, architectural heritage potential within, and in the immediate environs of, the proposed development area. The work consists of the results of a desk-top survey and field inspection of the site and immediate surrounds.

(i) Paper Survey

As part of a documentary/cartographic search, the following principal sources were examined from which a list of sites and areas of Cultural Heritage interest/potential was compiled:

- Record of Monuments and Places – Co. Dublin.
- Archives of the Archaeological Survey of Ireland.
- Records of the National Museum of Ireland.
- Annual Archaeological Excavation Bulletin (up to 2002).
- Survey of the Architectural Heritage of South Dublin County (NIAH).
- Stereoscopic photographic coverage carried out by the Geological Survey of Ireland.
- Documentary and cartographic sources in South Dublin County Library (see Appendix 5.9.2).
- South Dublin County Development Plan 2004-2010.
- Grange Castle Master Plan 2005.

(ii) Field Inspection

From the preceding paper survey, a list of cultural heritage sites/sites of cultural heritage potential was compiled for inspection. The subject lands and a 200m area surrounding the boundaries of such lands was assessed for the presence of archaeological monuments and structures of architectural heritage potential by reference to map and aerial photographic sources. Detailed field surveys of the subject lands were undertaken in late November 2005 and late March/early April 2006.

An attempt was also made to identify previously unrecorded sites of cultural heritage potential within, and in the immediate environs of, the proposed development area.

Sites of cultural heritage potential identified on the basis of the paper survey were inspected in an attempt to confirm their locations on the ground and to determine, if possible, their likely extent.

Assessment of Impacts

The following table (based on NRA, 2003, 21) provides the baseline criteria used to describe the impacts that the proposed development will have on Cultural Heritage sites.

Table 5.9.1: Criteria Used to Determine Impacts on Cultural Heritage Sites

	Direct	Indirect
Severe	Cultural Heritage site is within a proposed development area. Construction work will entail the removal of part or the entire cultural heritage site.	Cultural Heritage site is within a proposed development area. Construction works will entail the destruction of the visual context of the site or isolate it from associated groups or features.
Potentially Severe	Cultural Heritage site is adjacent to a proposed development area. There is potential for related remains being affected by development works.	Cultural Heritage site is adjacent to a proposed development area. Construction works will greatly injure the visual context of the site or isolate it from associated groups or features.
Moderate	Existing access to a cultural heritage site will be severed. Development works will affect the context of a cultural heritage site.	N/A
No Predicted	The proposed development will have no predicted impact.	N/A

General Receiving Environment

The subject lands are located in the townland of Ballybane(O.S. 6" Map: Dublin Sheets 21), in the central western area of County Dublin, to the north of Baldonnell Military Aerodrome and c. 2.5km to the west of Clondalkin. The subject lands are generally bounded to the north by the R134 (Clondalkin – Milltown) road, to the south by a minor road which links the R134 road to the N7, to the east by golf course lands and to the west by agricultural lands.

The lands are comprised of 5 fields with a series of open drains/streams flowing in a general northerly direction through the centre. The subject lands are under grass, with those to the south used for pasture, and generally fall from south to north.

5.9.2 LOCAL HISTORY

5.9.2.1 RECEIVING ENVIRONMENT

The subject development lands are located in the townland of Ballybane and the parish of Kilbride and in the barony of Newcastle. The name Kilbride is an Anglicisation of Cill Bríde – (St.) Brigid's Church and takes its name from a former parish church to the south/southeast of the subject lands (see Site CH-2; Section 5.9.3.1).

In the seventeenth century this parish consisted of the townlands of Baldonan and Kilbride but it now contains the townlands of Baldonnell Little, Lower and Upper, Kilbride and Kilcarbery.

Following the Anglo-Normans Invasions, the lands of Kilbride were held under the Crown, for the service of a foot sergeant on payment of five shillings, by the Comyns, and formed part of the manor of Balgriffin. In about 1270 the Comyns' property was temporarily in the hands of the King, and the escheator accounted for rents received from the betaghs of Kilbride. A castle (see Site CH-1; Section 5.9.3.1) was built before the sixteenth century, and was leased in 1537 to John Gibbons, with a reversion to Chief Justice Aylmer, and in 1570 to Thomas Bathe, whose family acquired the manor of Balgriffin. In the early part of the sixteenth century the Bathes were still in possession of the Kilbride lands, but at the time of the Restoration they had been succeeded by the family of Carberry, from whom the adjacent townland of Kilcarbery takes its name, while the Luttrells appear as owners of Baldonan.

Nothing much is known of the history of the parish church (see Site CH-2; Section 5.9.3.1), except that it formed a portion of the corps of the Dean of St. Patrick's Cathedral. In 1547 it was described as an old chapel and had an associated cottage.

Lewis, writing in 1837, notes that the parish of Kilbride "is a vicarage in the diocese of Dublin, and forms part of the union of Clondalkin. The church is in ruins. In the R.C. divisions it is united to Lucan, Palmerstown, and Clondalkin" (Ryan, 2001, 185).

The eastern boundary of the parish of Kilbride serves as a townland boundary, as does much of the western boundary. This latter boundary also serves as a parish boundary.

5.9.2.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park on the subject lands, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary

works, on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.2.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

Changes to the existing topography by developments of this kind can have the ability to remove the 'sense of place' to areas where previous historical events took place. Furthermore, the securing of boundaries and extinguishing of 'rights of way' can also impact on places of historical activity.
There are no historic events associated within the proposed development area that require consideration in the undertaking of the overall design and boundaries of the development.

Operational Stage

Potential adverse impacts with respect to historical events are not anticipated during the operational lifetime of the development.

'Do-Nothing' Scenario

In historical terms, the site will remain as it is and no impacts will occur.

5.9.2.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Stage

It is not considered that potential adverse impacts with respect to events of historical interest will occur as a result of the development of the site. Consequently, no remedial measures are deemed necessary.

Operational Phase

Potential adverse impacts with respect to events of historical interest are not anticipated during the operational lifetime of the development. Therefore no remedial measures are deemed necessary.

5.9.2.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Stage

There are no predicted impacts with respect to historical events associated with the proposed development.

Operational Phase

There are no predicted adverse impacts with respect to historical events once the development has become operational.

'Worst Case' Scenario

No 'worst case' scenario is envisaged

5.9.2.6 MONITORING

It is not envisaged that monitoring measures are required.

5.9.2.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

5.9.3 ARCHAEOLOGY

5.9.3.1 RECEIVING ENVIRONMENT

The area examined included the proposed development site, as well as an area of c. 200m surrounding the defined boundaries of the site, where possible.

The area under assessment is part of a landscape which is rich in historical and archaeological material. The general region has attracted settlement from early times as evidenced by the presence of monuments dating back to the prehistoric period. Continuity of settlement is illustrated by artefacts dating to the Neolithic and by identified monuments ranging from Neolithic to Medieval and Post-Medieval remains.

The siting preferences of particular monument types are well documented. Broadly speaking, the general landscape of the proposed development area offers a potential setting for the discovery of archaeological sites and remains, as follows:

- The subject lands and surrounding landscape offer many opportunities for the location of Fulachta Fiadh (prehistoric cooking sites). These sites are location specific, generally located close to rivers and streams or in wet marshy areas, and sometimes occur in groups.

- The general rolling nature of the landscape is a favoured position for the location of prehistoric burial sites, ringforts and enclosure sites in the general region surrounding the subject development lands.

There are no previously recorded archaeological sites identified, on the basis of the Paper Survey, within the subject development lands. Furthermore, cartographic and aerial photographic research does not indicate any topographical features within the subject lands which might be of archaeological interest/potential. There are, however, two archaeological sites located within the defined study area (subject lands + 200m surrounding area) outside the south-eastern boundary of the subject lands. The locations of these sites are indicated in Fig. 5.9.1 and are described as follows:

SITE CH-1

Townland	Classification	SMR No.:	Protection[1]
Kilbride	Castle (site of)	DU 021:004	RMP

[1] Note: See Appendix C for information relating to Statutory Protections

Description

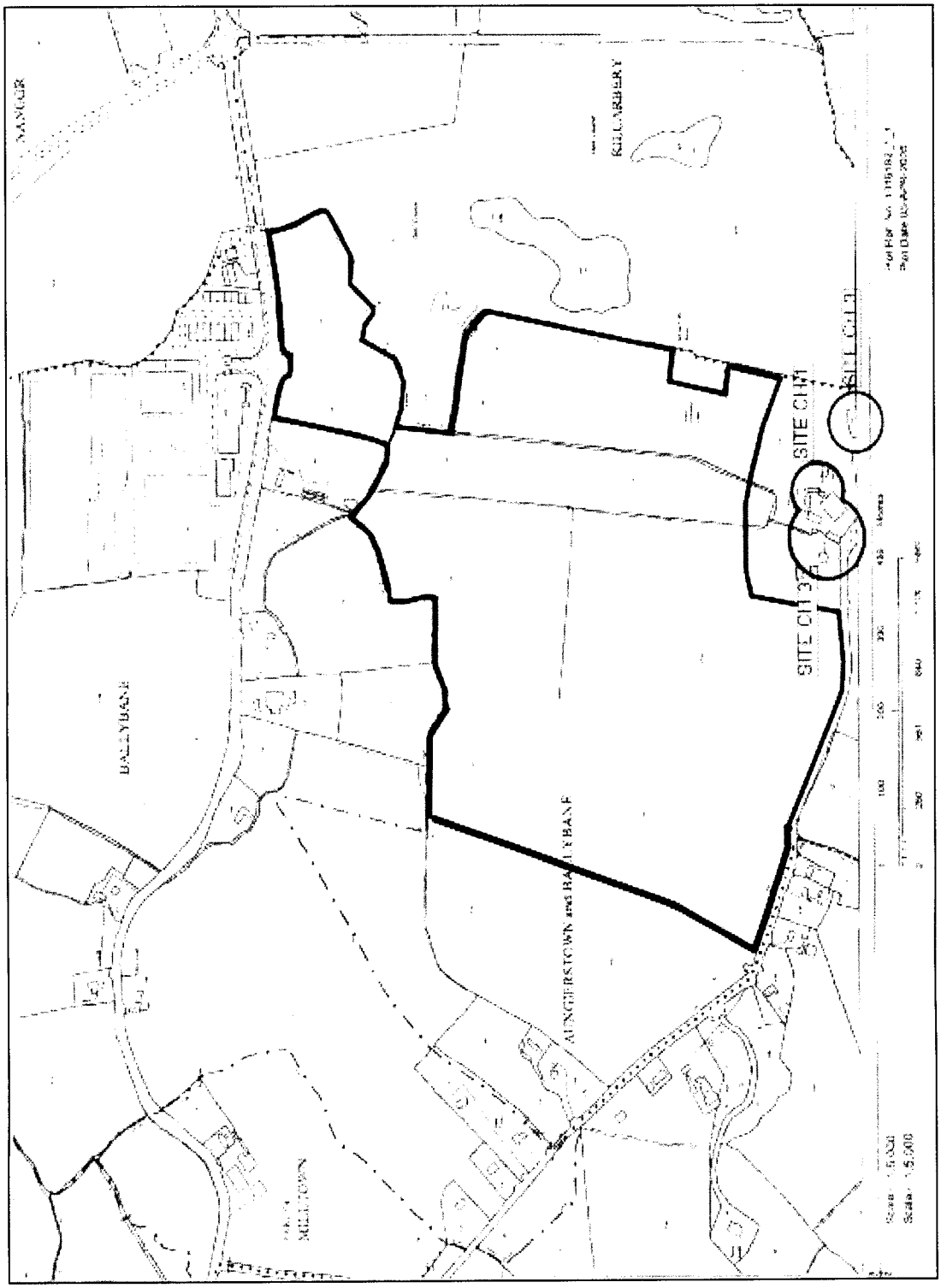
Kilbride Castle was built before the sixteenth century (Ball, vi, 68) and was leased in 1537 to John Gibbons and in 1570 to Thomas Bathe. The castle was subsequently occupied by Francis Carberry, who was succeeded by his widow, and later by Alderman John Carberry.

No visible traces of the castle remain, which was probably a tower house. The site is presently occupied by farm buildings (see photograph 5.9.1 below). An

inspection of the site in 1986 by the Archaeological Survey of Ireland did not note any cut-stone in the then unplastered walls of the farm buildings, although it is likely that these walls were built using material from the castle.

The site of the castle is marked on the O.S. 6" maps (Dublin Sheet 21) of 1837 and 1937.

Figure 5.9.1: Location of Archaeological Sites



Photograph 5.9.1 Outbuildings in general location of site CH-1



SITE CH-2

Townland	Classification	SMR No.:	Protection
Kilbride	Ecclesiastical Complex	DU 021:005	RMP & RPS

Description

This complex comprises three separate elements, namely a Church and Graveyard (SMR: DU021:00501), an Enclosure (SMR: DU021:00502) and Earthworks (SMR: DU021:00503). The site is marked on both the 1837 and 1937 editions of the O.S. 6" Map – Dublin Sheet 21.

The church is located in a circular raised graveyard (see photograph 5.9.2 below), possibly the remains of an early ecclesiastical enclosure, at the edge of a broad-bottomed valley. The church remains comprise a small rectangular building with a north-west turret in ruinous condition. The church is built of randomly coursed masonry and was formerly entered through a now damaged, doorway in the west gable. There is an ambry in the east-end of the north wall. The east window has a southern jamb of tufa (internal dimensions.; L-5.8m; W-3.63m; Wall T-0.85m). There are remnants of another window in the western end of the southern wall. The north-west turret is entered through a linteled doorway of the church. It has a corbelled roof (L-1.35m; W-0.77m; H-1.78m). There are traces of a stairwell in the southern side.

Photograph 5.9.2 Site CH-2 viewed from the west.



5.9.3.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park on the subject lands, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.3.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development/Site Preparation Phase

There are no previously identified monuments or features of archaeological interest and/or potential located within the proposed development lands. The former castle remains (site CH-1) and ecclesiastical remains (site CH-2) are located at minimum distances of c. 100m and c. 120m, respectively, from the subject development lands (see Fig. 5.9.1). Consequently, these monuments do not have the ability to be directly impacted by the development proposals.

However, in general, ground reductions associated with developments of the kind proposed for the lands have the ability to uncover and disturb hitherto unrecorded subsurface features, deposits, structures and finds of archaeological

interest and potential. In this regard, it is noted that works associated with the development of the adjacent Grange Castle International Business Park uncovered a number of previously unrecorded archaeological sites and features, including a prehistoric ring-barrow burial site (Doyle, 2002a, 75-76), a medieval field system (Doyle, 2002b, 76), prehistoric and medieval features (McConway, 1998, 26; O'Brien, 1996, 26-7; Doyle, 2002c, 73-4) and a fulacht fiadh - prehistoric cooking site (Doyle, 2002d, 74-5). In addition, remains of a Neolithic house were excavated in the townland of Kishoge (O'Donovan, 2003, 125-6). Without specific mitigation strategies, such subsurface archaeological features which might exist within the boundaries of the subject lands would be disturbed and destroyed and not identified and recorded.

Operational Phase

There are no previously identified monuments or features of archaeological potential located within the subject lands. There are no extant remains of the former castle site (Site CH-1 above) located to the south/southeast of the subject lands. The site of the ecclesiastical remains (Site CH-2) are situated a minimum of c. 120m from the nearest boundary to the subject lands. Given this distance, and the low visual nature of the subject development, coupled with the fact that the views from the ecclesiastical remains towards the subject development lands are largely restricted by farm buildings, a house and associated boundaries (see site CH-3; Section 5.9.4.1 below) it is not considered that any visual impact will result on the setting of the monument. Consequently, potential adverse impacts with respect to the archaeological heritage are not anticipated during the operational phase of the proposed development.

'Do-Nothing' Scenario

In terms of Archaeological Heritage, the site will remain as it is and no impacts will occur.

5.9.3.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Phase

As noted above in Section 5.9.3.3 there is a possibility that undocumented sub-surface archaeological features and material might exist within the boundaries of the overall development lands. In addition, it is the policy of the Department of the Environment, Heritage and Local Government that developments of this scale should be subjected to some manner of archaeological intervention (Dept. of Arts, Heritage, Gaeltacht & the Islands, 1999). Consequently, it is recommended that the following general mitigation strategies should be considered with regard to the overall development of the subject lands.

All topsoil stripping / general ground surface reductions down onto the surface of the underlying sterile geological subsoils required of the development should be monitored, on a full-time basis, by a suitably qualified and experienced archaeologist. Although it is not a legal requirement for an archaeologist to obtain an excavation licence from the Department of the Environment, Heritage and Local Government in order to undertake such monitoring, it is suggested that such a licence be obtained. This would allow the archaeologist to investigate, almost immediately, any features of archaeological potential that might be uncovered during the course of the development works, thus minimising any potential delays to the project. In addition, it is recommended by the Department

of the Environment, Heritage and Local Government that archaeologists involved in the monitoring of large-scale developments obtain an excavation licence prior to the commencement of such works (Dept. of Arts, Heritage, Gaeltacht and the Islands, 1999, 28-9).

In the event of archaeological material being uncovered during the course of such monitoring, the archaeologist shall be empowered to have works ceased in the vicinity of such material pending the receipt of advise from the Heritage and Planning Division of the Department of the Environment, Heritage and Local Government (National Monuments Section). Likewise, should archaeological artifactual material be uncovered/recovered during such works, the requirements of the National Museum of Ireland with regard to such items should be implemented.

Following completion of all monitoring, and other possible archaeological investigations, the archaeologist shall prepare a report for submission to both the Planning Authority and the Department of the Environment, Heritage and Local Government.

Operational Phase

No remedial measures are deemed necessary.

5.9.3.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

There are no predicted impacts with respect to previously identified monuments. The requirement for an archaeologist to be present during all programmes of topsoil stripping / general ground surface reduction works will ensure that in the event of previously unidentified subsurface archaeological features being uncovered, appropriate measures can be implemented in consultation with the Department of the Environment, Heritage and Local Government. Likewise, should archaeological artifactual material be recovered during the course of such works, the requirements of the National Museum of Ireland, with regard to such items, can be implemented.

Operational Phase

There are no predicted impacts during the operational phase.

'Worst Case' Scenario

A 'worst-case scenario' with respect to archaeological heritage would arise where the development was permitted to commence without any archaeological mitigation requirements being included in a grant of planning permission, without the appointment of an archaeologist to undertake monitoring and/or without the attendance of such appointed archaeologist. In such scenarios, features or artefacts of archaeological interest uncovered during the process of topsoil stripping/general ground reduction works would, most likely, not be identified and recorded.

5.9.3.6 MONITORING

Monitoring of all topsoil stripping/general ground reductions onto the surface of the underlying subsoils should be undertaken by a suitably qualified archaeologist.

5.9.3.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

5.9.4 ARCHITECTURAL HERITAGE

5.9.4.1 RECEIVING ENVIRONMENT

There are no protected structures within the meaning of the Planning and Development Act, 2000 situated within the boundaries of the proposed development lands. The only structure listed in the South Dublin County Development Plan – Record of Protected Structures (RPS) as being situated within 200m of the boundaries of the subject site is Site CH-2 (see Section 5.9.3.1 above). Furthermore, there are no structures located within the overall subject landholding.

There is a modern dwelling with associated outbuildings located outside the central northern area of the subject lands. Following an inspection of these structures, it is not considered that they are of interest from an architectural heritage perspective. However, there is one complex of structures located outside and to the central southern area of the subject lands which are considered to be of architectural heritage interest and, thus, worthy of a brief description. The location of this complex is illustrated in Fig. 5.9.1 and is described as follows:

SITE CH-3

Townland	Classification
Kilbride	Dwelling, garage and farm buildings

Kilbride House, with associated structures, is located a minimum of c. 60m from the boundaries to the subject lands. The outbuildings, consisting of nineteenth century single and one-and-half storey gable-ended stone structures, as well as modern steel-framed barns, have already been mentioned with respect to Site CH-2. It is considered that some of these structures are built on the site of the former Kilbride Castle and that some of the stone used in the construction of the earlier outbuildings may be re-used from the former castle structure (see Section 5.9.3.1 above).

The house is situated in a private garden setting, fronting the road, and at a distance of c. 40m to the west of the outbuildings. It consists of a two-storey stone-faced structure with a partial single-storey and partial lean-to two-storey rear extension. There is a large modern brick-built, flat-roofed porch structure to the front, in which is set the entrance door. A central window on the first floor has been enlarged to accommodate a doorway leading onto the roof of the porch, which serves as a balcony. All the windows and doorway on the façade appear to be of a dark hardwood, indicating that they are replacements, although the windows reflect the probable nature of the originals. The hipped-roof is in slate with ridge tiles, and the two central chimneys are in brick.

There is a modern stone-faced double garage to the west of the house. The road frontage boundary consists of a modern stone wall, with end and gate pillars, all of which are topped with a cope-stone effect, while the western boundary to the garden is a modern metal fence (see photograph 5.9.3 below).

Photograph 5.9.3 Kilbride House (Site CH-3)



5.9.4.2 CHARACTERISTICS OF THE PROPOSAL

The development which is the subject of this planning application consists of the provision of roads infrastructure and services which will facilitate the future development of a business park, which will be known as 'Profile Park'.

The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary site works on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park.

5.9.4.3 POTENTIAL IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

During the pre-development/site preparation phase of a project, the potential direct impacts on buildings and structures of architectural interest from a development of this kind include:

- The demolition or loss of a structure or site of architectural interest.
- The severance of other linked features such as gardens, paddocks or outbuildings.
- Alteration of the original landscape of the building or site.

There are no buildings located within the overall development site. Therefore, no direct impacts can occur. Furthermore, given the location of Site CH-1, it is not considered that any impacts will occur with respect to this complex of buildings.

Operational

During the operational phase of a project, the potential indirect impacts from a development of this kind include:

- Increased visual intrusion.
- Increased noise and vibration disturbance.
- Loss of amenity, especially where open to the public.

It is not considered that the development proposals under discussion have the ability to cause any major impacts during the operation phase of the project.

5.9.4.4 REMEDIAL OR REDUCTIVE MEASURES

Pre-Development / Site Preparation Phase

The development of the subject lands will not cause any impacts with respect to structures of architectural heritage interest. Consequently, no pre-development remedial or reductive measures are required.

Operational Phase

It is not envisaged that any structures of architectural heritage interest will be adversely impact upon during the operational phase of the proposed development. Consequently, no remedial or reductive measures are proposed.

5.9.4.5 PREDICTED IMPACT OF THE PROPOSAL

Pre-Development / Site Preparation Phase

There are no predicted adverse impacts on any structures of architectural heritage.

Operational Phase

There are no predicted adverse impacts with respect to the architectural heritage of the environs of the project area during the operation phase of the development.

5.9.4.6 MONITORING

It is not envisaged that monitoring measures are required.

5.9.4.7 REINSTATEMENT

It is not envisaged that reinstatement measures are required.

6.0 INTERACTIONS

In addition to the requirement to describe the likely significant effects of the proposed development on particular aspects of the environment, it is also a requirement to consider the interaction of those effects.

Human Beings and Material Assets

The development of the roads and services infrastructure, which is the subject of the current planning application, will not have a significant impact on employment levels in the locality having regard to the nature and scale of the development involved. However the proposed development will facilitate the development of a business park on the subject lands and as such, will introduce a new employment resource into the area.

Emissions from vehicles associated with the proposed development are not expected to have a significant impact on air quality in the general area.

Human Beings and Air

There is a potential for dust generation during construction and development works which under dry windy conditions could lead to localised dust nuisance for properties close to the development site. However, the implementation of proper on-site controls as proposed will ensure that no adverse impacts will accrue to local residents.

Human Beings/Cultural Heritage

The proposed development will be undertaken on a greenfield site, at some distance from recorded sites in the area. Consequently, it is highly unlikely that any construction work associated with the proposed development will reveal subsurface archaeological remains. However, periodic monitoring of the site will ensure that any soils, features, or deposits of an archaeological nature encountered during the construction phase are fully recorded.

Human Beings/Landscape

Existing residents, workers and visitors to the site will be aware of the change in the landscape from an agricultural setting to an infrastructural/commercial setting. However in the wider landscape context this is a continuation of the established pattern on adjacent lands. Additional planting on the site will result in an overall significant positive impact on the landscape.

Landscape/Flora and Fauna

The landscape works associated with the construction works will involve some disturbance to the flora and fauna of the site including the removal of portions of the existing hedgerows to facilitate the proposed road layout. This will have a localised impact on the flora and fauna of the site. Where such impacts are predicted appropriate mitigation measures will be undertaken to avoid significant or permanent negative impacts.

PLANNING AND DEVELOPMENT ACT, 2000,
PLANNING & DEVELOPMENT (AMENDMENT) ACT, 2002
EUROPEAN COMMUNITIES (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 1989 TO 1999,
PLANNING AND DEVELOPMENT REGULATIONS, 2001 & 2002

APPENDICES

South Dublin County Council
Planning Department - Registry
05. JUL 2006 SD 06 A 0568
Date Received | Register Reference

ENVIRONMENTAL IMPACT STATEMENT

Prepared for

DASNOC LIMITED

By

RPS Planning & Environment

Ordnance Survey Licence No. SU 0001006

July 2006

Appendix A

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APPENDIX B

SOILS AND GEOLOGY

Trial Pit Logs – Profile Park Investigation 21 – 24 March 2006

TP1

0 – 0.25	Mid brown slightly sandy, slightly silty CLAY.
0.25 – 0.7	Orange/brown slightly gravely CLAY. Gravels are medium fragments of limestone.
0.7 – 1.5	Grey gravely CLAY. Gravels are medium fragments of limestone.
1.5 -	Fractured LIMESTONE with minor calcite veining
	Groundwater ingress @ 1.5 mbgl

TP2

0 – 0.3	Mid brown slightly sandy, slightly silty CLAY.
0.3 – 0.8	Orange/brown slightly sandy CLAY.
0.8 – 1.3	Mid brown slightly gravely CLAY. Gravels are medium to coarse fragments of limestone.
1.3 – 2.5	Grey very gravely CLAY. Gravels are coarse to cobble sized fragments of limestone
2.5 -	Fractured LIMESTONE
	Dry

TP3

0 – 0.35	Mid brown slightly sandy, slightly silty CLAY.
0.35 – 1.05	Mid brown slightly sandy gravely CLAY
1.05 – 2.30	Grey/brown very gravely CLAY
2.3 -	Fractured LIMESTONE
	Groundwater ingress @ 2.3m bgl

TP4

0 – 0.30	Mid brown slightly sandy, slightly silty CLAY.
0.3 – 0.9	Mid brown slightly sandy gravely CLAY
0.9 – 1.6	Grey very gravely CLAY
1.6 -	Fractured LIMESTONE
	Dry

TP5

0 – 0.30	Mid brown slightly sandy CLAY.
0.3 – 0.9	Light brown to grey slightly sandy slightly gravely CLAY.
0.9 – 2.10	Grey very gravely CLAY. Gravels are coarse fragments of limestone
2.1 –	Fractured LIMESTONE with major calcite veining
	Groundwater ingress @ 2.25m bgl

TP6

0 – 0.35	Mid brown slightly sandy CLAY.
0.35 – 1.0	Mid brown slightly gravely CLAY.
1.0 – 1.8	Dark grey/black organic gravely CLAY with many rootlets and plant fragments. Gravels are fine to medium fragments of limestone.
1.8 – 2.0	Fractured LIMESTONE
	Groundwater ingress @ 2.0m bgl

TP7

0 – 0.35	Mid brown slightly sandy CLAY.
0.35 – 1.8	Mid brown slightly sandy gravely CLAY. Gravels are coarse with occasional boulders of limestone
1.8 –	Fractured LIMESTONE
	Groundwater ingress @ 1.8m bgl

TP8

0 – 0.30	Mid brown slightly sandy CLAY.
0.30 – 1.2	Light brown slightly gravely CLAY. Gravels are coarse with occasional boulders of limestone
1.2 – 2.0	Mid brown clayey GRAVEL. Gravel is very loose coarse limestone fragments
	Groundwater ingress @ 2.0m bgl. Trial pit very unstable

TP9

0 – 0.6	Light brown slightly sandy CLAY.
0.6 – 1.6	Mid brown slightly gravely CLAY. Gravels are coarse fragments of limestone
1.6 – 2.0	Brown/Gray clayey GRAVEL. Gravels are coarse fragments of limestone
2.0 – 2.3	Fractured LIMESTONE
	Groundwater ingress @ 2.2m bgl

TP10

0 – 0.4	Mid brown slightly sandy CLAY.
0.4 – 0.6	Light brown slightly sandy CLAY.
0.6 – 1.4	Brown gravely CLAY
1.4 – 2.2	Dark grey loose GRAVEL. Gravel is composed of limestone fragments.
2.2 – 2.4	Fractured LIMESTONE
	Groundwater ingress @ 2.4m bgl

TP11

0 – 0.5	Mid brown slightly sandy CLAY.
0.5 – 2.4	Mid brown very gravely CLAY.
2.4 – 3.0	Grey/Black clayey GRAVEL. Gravel is composed of limestone fragments
3.0 -	Fractured LIMESTONE
	Groundwater ingress @ 3.0m bgl

TP12

0 – 0.5	Mid brown slightly sandy CLAY.
0.5 – 1.8	Mid brown slightly gravely CLAY.
1.8 – 2.1	Grey slightly clayey GRAVEL. Gravel is composed of limestone fragments
2.1 – 2.35	Fractured LIMESTONE
	Groundwater ingress @ 2.30m bgl

TP13

0 – 0.4	Mid brown slightly sandy CLAY.
0.4 – 2.1	Mid brown very gravely CLAY. Gravels are coarse with many cobbles and occasional boulders of limestone.
2.1 – 2.4	Grey clayey GRAVEL. Gravels are coarse limestone fragments.
	Groundwater ingress @ 2.40m bgl. Pit becoming unstable from 2.0m.

TP14

0 – 0.8	Mid brown slightly sandy CLAY.
0.8 – 2.1	Mid brown gravely CLAY. Gravels becoming coarser with depth
2.1 – 2.5	Grey/brown clayey GRAVEL. Gravel is coarse fragments of limestone with occasional cobble and boulder sized gravels.
2.5 -	Fractured LIMESTONE
	Groundwater ingress @ 2.50m bgl

TP15

0 – 0.7	Mid brown slightly sandy CLAY.
0.7 – 2.2	Mid brown gravely CLAY. Gravels becoming coarser with depth.
2.2 – 2.5	Grey/brown clayey GRAVEL. Gravel is coarse fragments of limestone with occasional cobble and boulder sized gravels.
2.5 -	Fractured LIMESTONE.
	Dry

TP16

0 – 0.3	Mid brown slightly sandy gravely CLAY. Gravels are fragments of limestone and masonry.
0.3 – 0.8	Mid brown gravely CLAY. Gravels are composed of limestone, concrete and occasional brick fragments.
0.8 – 2.3	Brown/grey clayey GRAVEL. Gravel comprises limestone, concrete and slate fragments with occasional metal wiring, re-bar, wood and chip board fragments.
2.3 – 3.1	Grey mottled brown organic slightly gravely CLAY with many rootlets and occasional coarse gravels.
	Dry

TP17

0 – 0.2	Mid brown sandy gravely CLAY.
0.2 – 0.4	Mid brown very gravely CLAY. Gravels are composed of limestone, and concrete fragments.
0.4 – 0.8	Black clayey GRAVEL. Gravel comprises tarmac fragments.
0.8 – 2.8	Light brown clayey GRAVEL. Gravel consists of boulders of concrete and limestone with occasional concrete piping and copper wiring. Section of cable encountered at 0.8m bgl.
2.8 -	Fractured LIMESTONE.
	Groundwater inflows @ 2.8m bgl

TP18

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 0.7	Light brown gravely CLAY. Gravels are fine to coarse fragments of limestone, granite and concrete.
0.7 – 0.8	Grey gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete.
0.8 – 2.8	Brown gravely CLAY. Gravels are cobbles and boulders of limestone and concrete with rare plastic fragments and metal cans.
2.8 – 3.4	Grey mottled brown slightly gravely organic CLAY with many rootlets.
	Groundwater inflows @ 1.0m bgl but dry at base of trial pit.

TP19

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.0	Light brown gravely CLAY. Gravels are fine to coarse fragments of limestone, bricks and concrete.
1.0 – 1.7	Dark grey/black clayey GRAVEL. Gravel is coarse to cobble sized fragments of limestone, comprises occasional concrete boulders, and rare metal wheel hub cap.
1.7 – 2.0	Light brown gravely CLAY. Gravels are coarse fragments of limestone and masonry.
2.0 – 3.1	Grey mottled brown slightly gravely organic CLAY with many rootlets.
	Groundwater inflows @ 1.7m bgl causing instability.

TP20

0 – 0.2	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 2.3	Mid brown slightly sandy very gravely CLAY. Gravel is medium to cobble sized fragments of limestone, and concrete with occasional wood fragments (tree branches) and boulders or concrete
	Groundwater inflows @ 2.3m bgl causing instability.

TP21

0 – 0.3	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.0	Mid brown slightly sandy gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete with occasional wire and wood fragments.
1.0 – 2.0	Brown gravely CLAY. Gravels are fine to coarse fragments of limestone and concrete with occasional wire and wood fragments.
2.0 – 2.2	Light grey slightly silty slightly gravely CLAY. Gravels are fine to medium (Possibly ash origin).
2.2 – 3.2	Brown gravely CLAY. Gravels are coarse fragments of limestone and concrete.
3.2 – 3.4	Dark grey/black gravely CLAY. Gravels are medium to coarse limestone fragments.
	Dry

TP22

0 – 0.4	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.4 – 2.2	Mid brown slightly sandy very gravely CLAY. Gravel is medium to cobble sized fragments of limestone, granite and concrete with occasional wood fragments (tree branch) and boulders of concrete. Rare metal and roof tiles (slate) were encountered.
2.2 – 3.6	Grey gravely CLAY. Gravels are medium to cobbles of limestone and concrete with rare boulders of limestone. Occasional plastic and wood fragments were encountered.
	Groundwater inflows @ 2.5 bgl causing instability.

TP23

0 – 0.2	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 1.2	Brown gravely CLAY. Gravels are medium to coarse fragments of limestone and concrete.
1.2 – 1.7	Layer of wood – branches and root fragments.
1.7 – 2.8	Grey/brown gravely CLAY. Gravel is medium to coarse fragments of limestone
2.8 – 3.4	Grey gravely CLAY. Gravels are medium to coarse fragments of concrete and limestone with many rootlets.

TP24

0 – 0.25	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.25 – 2.7	Mid brown very gravely CLAY. Gravels are coarse fragments of limestone and concrete with many cobbles and occasional boulders. Occasional wood, metal, piping, concrete and rare tarpaulin was encountered.
2.7 – 3.2	Dark grey gravely CLAY. Gravels are medium to coarse fragments of limestone.
	Major groundwater inflow @ 2.4m bgl – (from water treatment area). Slight odour.

TP25

0 – 0.35	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.35 – 1.1	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.1 – 1.2	Light brown slightly gravely CLAY with some organic matter. Gravels are fine to medium
1.2 – 2.4	Grey clayey GRAVEL. Gravel is medium to coarse fragments of limestone
2.4 -	Fractured LIMESTONE.
	Groundwater inflow @ 2.4m bgl

TP26

0 – 0.30	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.5	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.5 – 2.4	Grey clayey GRAVEL. Gravel is coarse limestone fragments
2.4 -	Competent LIMESTONE
	Groundwater inflow @ 2.4m bgl

TP27

0 – 0.30	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.3 – 1.6	Brown gravely CLAY. Gravels are coarse fragments of limestone.
1.6 – 1.7	Fractured LIMESTONE
1.7	Competent LIMESTONE.
	Dry

TP28

0 – 0.20	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.2 – 1.2	Mid brown gravely CLAY. Gravels are coarse to cobble sized fragments of limestone and concrete with occasional ceramic fragments and rare metal and plastic.
1.2 – 2.5	Grey gravely CLAY. Gravel is coarse to cobble sized fragments limestone and concrete. Section of disused plastic pip encountered at 2.3m bgl
2.5 – 2.6	Light grey sandy gravely CLAY. Gravels are coarse fragments of limestone.
3.0 – 3.75	Dark grey/black slightly gravely organic CLAY. Gravels are coarse to cobble sized fragments of limestone. Occasional fragments of wood (branches) were encountered.
3.75 -	Fractured LIMESTONE
	Groundwater inflow @ 3.75m bgl

TP29

0 – 0.70	Mid brown slightly sandy slightly gravely CLAY. Gravels are fine to medium fragments of limestone.
0.7 – 1.5	Grey gravely CLAY. Gravels are fragments of limestone.
1.5 – 1.8	Fractured LIMESTONE
1.8	Competent LIMESTONE.
	Groundwater inflow @ 1.8m bgl

APPENDIX C

CULTURAL HERITAGE

C1 Abbreviations & Protections

SMR No. – Sites and **M**onuments **R**ecord Number.
This refers to the unique reference number of each individual archaeological monument, or monument element, as listed in the Sites and Monuments Record Archive of the Archaeological Survey of Ireland. The number comprises three elements. The first element consists of a two letter county code; the second element refers to the O.S. 6" map sheet on which the monument is located and the third element refers to the number of the site, as contained on the specific 6" map.

RMP - **R**ecord of **M**onuments and **P**laces.
Section 12 (1) of the National Monuments (Amendment) Act, 1994, provides that the Minister of the Environment, Heritage and Local Government shall establish and maintain a record of monuments and places where the Minister believes there are monuments, such record to be comprised of a list of monuments and relevant places and a map or maps showing each monument and relevant place of each county of the State. This is referred to as the *Record of Monuments and Places*, and monuments entered into it are referred to as *Recorded Monuments*.

Section 12 (3) of the 1994 Act provides that where the owner or occupier (other than the Minister) of a monument or place included in the Record, or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he or she shall give notice in writing of his proposal to carry out the work to the Minister of the Environment, Heritage and Local Government and shall not, except in cases of urgent necessity and with the consent of the Minister, commence work for a period of two months after having given the notice.

RPS – **R**ecord of **P**rotected **S**tructures.
This refers to a protection or mention in the County Development Plan.

C2 List of Consulted Sources

A. Cartographic

Origin	Scale	Sheet Ref.	Publication Date
Ordnance Survey	1:10,560 (6")	Dublin 21	1837
Ordnance Survey	1:10,560 (6")	Dublin 21	1937
Ordnance Survey	1:50,000	50	2005

B. Documentary
See Appendix A

APPENDIX D

TRAFFIC

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : J - RETAIL PARK - INCLUDING FOOD
VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	HC	HAMPSHIRE	1 days
04	**EAST ANGLIA**		
	NF	NORFOLK	1 days
05	**EAST MIDLANDS**		
	LN	LINCOLNSHIRE	1 days
06	**WEST MIDLANDS**		
	WK	WARWICKSHIRE	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	2 days
11	**SCOTLAND**		
	FI	FIFE	1 days
	HI	HIGHLAND	1 days
	SL	SOUTH LANARKSHIRE	5 days

Main parameter selection:

Parameter: Gross floor area
Range: 734 to 45000 (units: sqm)

Date Range: 01/01/97 to 18/06/05

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	3 days
Friday	7 days

Selected survey types:

Manual count	9 days
Directional ATC Count	5 days

TRIP RATE for Land Use 01 - RETAIL/J - RETAIL PARK - INCLUDING FOOD

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	5	22682	0.06	5	22682	0.11	5	22682	0.17
01:00 - 02:00	5	22682	0.03	5	22682	0.04	5	22682	0.07
02:00 - 03:00	5	22682	0.01	5	22682	0.04	5	22682	0.05
03:00 - 04:00	5	22682	0.01	5	22682	0.02	5	22682	0.03
04:00 - 05:00	5	22682	0.02	5	22682	0.03	5	22682	0.05
05:00 - 06:00	5	22682	0.08	5	22682	0.08	5	22682	0.16
06:00 - 07:00	5	22682	0.17	5	22682	0.16	5	22682	0.33
07:00 - 08:00	11	16857	0.64	11	16857	0.47	11	16857	1.11
08:00 - 09:00	14	15970	1.31	14	15970	0.88	14	15970	2.19
09:00 - 10:00	14	15970	2.02	14	15970	1.32	14	15970	3.34
10:00 - 11:00	14	15970	2.39	14	15970	1.95	14	15970	4.34
11:00 - 12:00	14	15970	2.60	14	15970	2.44	14	15970	5.04
12:00 - 13:00	14	15970	3.08	14	15970	2.95	14	15970	6.03
13:00 - 14:00	14	15970	3.13	**14**	**15970**	**3.26**	**14**	**15970**	**6.39**
14:00 - 15:00	14	15970	2.88	14	15970	3.01	14	15970	5.89
15:00 - 16:00	14	15970	2.84	14	15970	2.98	14	15970	5.82
16:00 - 17:00	14	15970	3.06	14	15970	3.10	14	15970	6.16
17:00 - 18:00	**14**	**15970**	**3.14**	14	15970	3.16	14	15970	6.30
18:00 - 19:00	14	15970	2.94	14	15970	3.07	14	15970	6.01
19:00 - 20:00	12	16122	2.40	12	16122	2.66	12	16122	5.06
20:00 - 21:00	12	16122	1.20	12	16122	1.89	12	16122	3.09
21:00 - 22:00	10	18147	0.69	10	18147	0.97	10	18147	1.66
22:00 - 23:00	7	20227	0.42	7	20227	0.59	7	20227	1.01
23:00 - 24:00	6	20410	0.18	6	20410	0.25	6	20410	0.43
Daily Trip Rates:			35.31			35.41			70.73

Parameter summary

Trip rate parameter range selected:	734 - 45000 (units: sqm)
Survey date date range:	01/01/97 - 18/06/05
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : A - OFFICE
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	2 days
02	**SOUTH EAST**		
	EX	ESSEX	1 days
	HF	HERTFORDSHIRE	1 days
	OX	OXFORDSHIRE	1 days
	SC	SURREY	3 days
	WS	WEST SUSSEX	5 days
03	**SOUTH WEST**		
	CW	CORNWALL	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	LE	LEICESTERSHIRE	3 days
08	**NORTH WEST**		
	LC	LANCASHIRE	1 days
09	**NORTH**		
	CB	CUMBRIA	1 days
	TV	TEES VALLEY	2 days
	TW	TYNE & WEAR	2 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	AS	ABERDEENSHIRE	2 days
	FI	FIFE	1 days
	PK	PERTH & KINROSS	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 408 to 175000 (units: sqm)

Date Range: 01/01/97 to 04/07/05

Selected survey days:

Monday	4 days
Tuesday	6 days
Wednesday	8 days
Thursday	10 days
Friday	2 days

Selected survey types:

Manual count	25 days
Directional ATC Count	5 days

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
00:30 - 01:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
01:00 - 01:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
01:30 - 02:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
02:00 - 02:30	5	5442	0.00	5	5442	0.01	5	5442	0.01
02:30 - 03:00	5	5442	0.00	5	5442	0.01	5	5442	0.01
03:00 - 03:30	5	5442	0.00	5	5442	0.01	5	5442	0.01
03:30 - 04:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
04:00 - 04:30	5	5442	0.00	5	5442	0.00	5	5442	0.00
04:30 - 05:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
05:00 - 05:30	5	5442	0.01	5	5442	0.05	5	5442	0.06
05:30 - 06:00	5	5442	0.00	5	5442	0.04	5	5442	0.04
06:00 - 06:30	5	5442	0.05	5	5442	0.06	5	5442	0.11
06:30 - 07:00	5	5442	0.04	5	5442	0.04	5	5442	0.08
07:00 - 07:30	28	5008	0.25	28	5008	0.07	28	5008	0.32
07:30 - 08:00	28	5008	0.45	28	5008	0.07	28	5008	0.52
08:00 - 08:30	29	5468	0.94	29	5468	0.11	29	5468	1.05
08:30 - 09:00	**29**	**5468**	**1.05**	29	5468	0.12	**29**	**5468**	**1.17**
09:00 - 09:30	30	5319	0.70	30	5319	0.17	30	5319	0.87
09:30 - 10:00	30	5319	0.49	30	5319	0.20	30	5319	0.69
10:00 - 10:30	30	5319	0.26	30	5319	0.19	30	5319	0.45
10:30 - 11:00	30	5319	0.23	30	5319	0.19	30	5319	0.42
11:00 - 11:30	30	5319	0.19	30	5319	0.21	30	5319	0.40
11:30 - 12:00	30	5319	0.21	30	5319	0.23	30	5319	0.44
12:00 - 12:30	30	5319	0.25	30	5319	0.41	30	5319	0.66
12:30 - 13:00	30	5319	0.33	30	5319	0.43	30	5319	0.76
13:00 - 13:30	30	5319	0.40	30	5319	0.39	30	5319	0.79
13:30 - 14:00	30	5319	0.40	30	5319	0.31	30	5319	0.71
14:00 - 14:30	30	5319	0.30	30	5319	0.25	30	5319	0.55
14:30 - 15:00	30	5319	0.22	30	5319	0.24	30	5319	0.46
15:00 - 15:30	30	5319	0.16	30	5319	0.25	30	5319	0.41
15:30 - 16:00	30	5319	0.18	30	5319	0.27	30	5319	0.45
16:00 - 16:30	30	5319	0.18	30	5319	0.54	30	5319	0.72
16:30 - 17:00	30	5319	0.21	30	5319	0.62	30	5319	0.83
17:00 - 17:30	29	5468	0.16	**29**	**5468**	**0.95**	29	5468	1.11
17:30 - 18:00	29	5468	0.15	29	5468	0.67	29	5468	0.82
18:00 - 18:30	28	5417	0.05	28	5417	0.28	28	5417	0.33
18:30 - 19:00	28	5417	0.03	28	5417	0.17	28	5417	0.20
19:00 - 19:30	5	5442	0.03	5	5442	0.20	5	5442	0.23
19:30 - 20:00	5	5442	0.03	5	5442	0.19	5	5442	0.22
20:00 - 20:30	5	5442	0.02	5	5442	0.08	5	5442	0.10
20:30 - 21:00	5	5442	0.02	5	5442	0.07	5	5442	0.09
21:00 - 21:30	5	5442	0.04	5	5442	0.15	5	5442	0.19
21:30 - 22:00	5	5442	0.03	5	5442	0.14	5	5442	0.17
22:00 - 22:30	5	5442	0.00	5	5442	0.03	5	5442	0.03
22:30 - 23:00	5	5442	0.00	5	5442	0.02	5	5442	0.02
23:00 - 23:30	5	5442	0.00	5	5442	0.02	5	5442	0.02
23:30 - 24:00	5	5442	0.00	5	5442	0.00	5	5442	0.00
Daily Trip Rates:			8.08			8.49			16.52

Parameter summary

Trip rate parameter range selected:	408 - 175000 (units: sqm)
Survey date date range:	01/01/97 - 04/07/05
Number of weekdays (Monday-Friday):	30
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : K - RETAIL PARK - EXCLUDING FOOD

VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	ES	EAST SUSSEX	1 days
	HC	HAMPSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
06	**WEST MIDLANDS**		
	ST	STAFFORDSHIRE	1 days
	WM	WEST MIDLANDS	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	5 days
	LC	LANCASHIRE	1 days
	MS	MERSEYSIDE	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 2057 to 35244 (units: sqm)

Date Range: 01/01/97 to 25/06/05

Selected survey days:

Monday	1 days
Thursday	3 days
Friday	11 days

Selected survey types:

Manual count	15 days
Directional ATC Count	0 days

TRIP RATE for Land Use 01 - RETAIL/K - RETAIL PARK - EXCLUDING FOOD

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	6	12889	0.13	6	12889	0.06	6	12889	0.19
08:00 - 09:00	14	11596	0.53	14	11596	0.26	14	11596	0.79
09:00 - 10:00	15	11054	1.06	15	11054	0.67	15	11054	1.73
10:00 - 11:00	15	11054	1.35	15	11054	1.12	15	11054	2.47
11:00 - 12:00	15	11054	1.49	15	11054	1.33	15	11054	2.82
12:00 - 13:00	15	11054	1.67	15	11054	1.58	15	11054	3.25
13:00 - 14:00	**15**	**11054**	**1.72**	**15**	**11054**	**1.72**	**15**	**11054**	**3.44**
14:00 - 15:00	15	11054	1.60	15	11054	1.63	15	11054	3.23
15:00 - 16:00	15	11054	1.49	15	11054	1.57	15	11054	3.06
16:00 - 17:00	15	11054	1.37	15	11054	1.47	15	11054	2.84
17:00 - 18:00	15	11054	1.20	15	11054	1.31	15	11054	2.51
18:00 - 19:00	15	11054	1.28	15	11054	1.33	15	11054	2.61
19:00 - 20:00	15	11054	0.89	15	11054	1.36	15	11054	2.25
20:00 - 21:00	9	12686	0.33	9	12686	0.58	9	12686	0.91
21:00 - 22:00	6	12889	0.19	6	12889	0.37	6	12889	0.56
22:00 - 23:00	2	17788	0.04	2	17788	0.21	2	17788	0.25
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			16.33			16.57			32.91

Parameter summary

Trip rate parameter range selected:	2057 - 35244 (units: sqm)
Survey date date range:	01/01/97 - 25/06/05
Number of weekdays (Monday-Friday):	15
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : F - WAREHOUSING (COMMERCIAL)

VEHICLES

Selected regions and areas:

02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	BU	BUCKINGHAMSHIRE	1 days
	HF	HERTFORDSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	3 days
04	**EAST ANGLIA**		
	SF	SUFFOLK	1 days
06	**WEST MIDLANDS**		
	WO	WORCESTERSHIRE	2 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	GC	GLASGOW CITY	1 days
	SL	SOUTH LANARKSHIRE	1 days
12	**NORTHERN IRELAND**		
	NI	NORTHERN IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 950 to 55740 (units: sqm)

Date Range: 01/01/97 to 06/03/03

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	9 days
Friday	3 days

Selected survey types:

Manual count	16 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	1	7500	0.09	1	7500	0.08	1	7500	0.17
00:30 - 01:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
01:00 - 01:30	1	7500	0.01	1	7500	0.03	1	7500	0.04
01:30 - 02:00	1	7500	0.04	1	7500	0.07	1	7500	0.11
02:00 - 02:30	1	7500	0.03	1	7500	0.03	1	7500	0.06
02:30 - 03:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
03:00 - 03:30	1	7500	0.03	1	7500	0.01	1	7500	0.04
03:30 - 04:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
04:00 - 04:30	1	7500	0.05	1	7500	0.05	1	7500	0.10
04:30 - 05:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
05:00 - 05:30	1	7500	0.08	1	7500	0.07	1	7500	0.15
05:30 - 06:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
06:00 - 06:30	2	18844	0.06	2	18844	0.10	2	18844	0.16
06:30 - 07:00	2	18844	0.07	2	18844	0.07	2	18844	0.14
07:00 - 07:30	16	17995	0.05	16	17995	0.06	16	17995	0.11
07:30 - 08:00	16	17995	0.09	16	17995	0.04	16	17995	0.13
08:00 - 08:30	16	17995	0.08	16	17995	0.04	16	17995	0.12
08:30 - 09:00	16	17995	0.09	16	17995	0.04	16	17995	0.13
09:00 - 09:30	16	17995	0.08	16	17995	0.05	16	17995	0.13
09:30 - 10:00	16	17995	0.08	16	17995	0.05	16	17995	0.13
10:00 - 10:30	16	17995	0.06	16	17995	0.05	16	17995	0.11
10:30 - 11:00	16	17995	0.05	16	17995	0.05	16	17995	0.10
11:00 - 11:30	16	17995	0.06	16	17995	0.05	16	17995	0.11
11:30 - 12:00	16	17995	0.06	16	17995	0.05	16	17995	0.11
12:00 - 12:30	16	17995	0.05	16	17995	0.07	16	17995	0.12
12:30 - 13:00	16	17995	0.05	16	17995	0.05	16	17995	0.10
13:00 - 13:30	16	17995	0.09	16	17995	0.07	16	17995	0.16
13:30 - 14:00	**16**	**17995**	**0.16**	16	17995	0.11	**16**	**17995**	**0.27**
14:00 - 14:30	16	17995	0.07	**16**	**17995**	**0.12**	16	17995	0.19
14:30 - 15:00	16	17995	0.07	16	17995	0.10	16	17995	0.17
15:00 - 15:30	16	17995	0.05	16	17995	0.07	16	17995	0.12
15:30 - 16:00	16	17995	0.05	16	17995	0.07	16	17995	0.12
16:00 - 16:30	16	17995	0.05	16	17995	0.08	16	17995	0.13
16:30 - 17:00	16	17995	0.04	16	17995	0.08	16	17995	0.12
17:00 - 17:30	16	17995	0.04	16	17995	0.09	16	17995	0.13
17:30 - 18:00	16	17995	0.06	16	17995	0.08	16	17995	0.14
18:00 - 18:30	15	17183	0.04	15	17183	0.06	15	17183	0.10
18:30 - 19:00	15	17183	0.03	15	17183	0.04	15	17183	0.07
19:00 - 19:30	2	6775	0.03	2	6775	0.03	2	6775	0.06
19:30 - 20:00	2	6775	0.01	2	6775	0.04	2	6775	0.05
20:00 - 20:30	1	7500	0.05	1	7500	0.01	1	7500	0.06
20:30 - 21:00	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:00 - 21:30	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:30 - 22:00	1	7500	0.01	1	7500	0.03	1	7500	0.04
22:00 - 22:30	1	7500	0.07	1	7500	0.05	1	7500	0.12
22:30 - 23:00	1	7500	0.07	1	7500	0.04	1	7500	0.11
23:00 - 23:30	1	7500	0.04	1	7500	0.04	1	7500	0.08
23:30 - 24:00	1	7500	0.04	1	7500	0.04	1	7500	0.08
Daily Trip Rates:			2.71			2.73			5.47

Parameter summary

Trip rate parameter range selected:	950 - 55740 (units: sqm)
Survey date date range:	01/01/97 - 06/03/03
Number of weekdays (Monday-Friday):	16
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : C - INDUSTRIAL UNITS
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	4 days
	GS	GLOUCESTERSHIRE	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
	NF	NORFOLK	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	1 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	ER	EAST RENFREWSHIRE	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 620 to 34581 (units: sqm)

Date Range: 01/01/97 to 21/06/04

Selected survey days:

Monday	2 days
Tuesday	5 days
Wednesday	2 days
Thursday	5 days

Selected survey types:

Manual count	14 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNITS

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	0	0	0.00	0	0	0.00	0	0	0.00
00:30 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 01:30	0	0	0.00	0	0	0.00	0	0	0.00
01:30 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 02:30	0	0	0.00	0	0	0.00	0	0	0.00
02:30 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 03:30	0	0	0.00	0	0	0.00	0	0	0.00
03:30 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 04:30	0	0	0.00	0	0	0.00	0	0	0.00
04:30 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 05:30	0	0	0.00	0	0	0.00	0	0	0.00
05:30 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 06:30	1	22926	0.02	1	22926	0.09	1	22926	0.11
06:30 - 07:00	1	22926	0.03	1	22926	0.02	1	22926	0.05
07:00 - 07:30	14	15321	0.14	14	15321	0.03	14	15321	0.17
07:30 - 08:00	14	15321	0.18	14	15321	0.03	14	15321	0.21
08:00 - 08:30	**14**	**15321**	**0.20**	14	15321	0.03	14	15321	0.23
08:30 - 09:00	14	15321	0.17	14	15321	0.04	14	15321	0.21
09:00 - 09:30	14	15321	0.09	14	15321	0.03	14	15321	0.12
09:30 - 10:00	14	15321	0.06	14	15321	0.04	14	15321	0.10
10:00 - 10:30	14	15321	0.04	14	15321	0.05	14	15321	0.09
10:30 - 11:00	14	15321	0.05	14	15321	0.04	14	15321	0.09
11:00 - 11:30	14	15321	0.04	14	15321	0.05	14	15321	0.09
11:30 - 12:00	14	15321	0.05	14	15321	0.05	14	15321	0.10
12:00 - 12:30	14	15321	0.05	14	15321	0.07	14	15321	0.12
12:30 - 13:00	14	15321	0.06	14	15321	0.08	14	15321	0.14
13:00 - 13:30	14	15321	0.08	14	15321	0.06	14	15321	0.14
13:30 - 14:00	14	15321	0.08	14	15321	0.05	14	15321	0.13
14:00 - 14:30	14	15321	0.05	14	15321	0.07	14	15321	0.12
14:30 - 15:00	14	15321	0.04	14	15321	0.04	14	15321	0.08
15:00 - 15:30	14	15321	0.04	14	15321	0.06	14	15321	0.10
15:30 - 16:00	14	15321	0.04	14	15321	0.06	14	15321	0.10
16:00 - 16:30	14	15321	0.03	14	15321	0.12	14	15321	0.15
16:30 - 17:00	14	15321	0.03	14	15321	0.21	14	15321	0.24
17:00 - 17:30	14	15321	0.03	**14**	**15321**	**0.31**	**14**	**15321**	**0.34**
17:30 - 18:00	14	15321	0.04	14	15321	0.14	14	15321	0.18
18:00 - 18:30	14	15321	0.01	14	15321	0.07	14	15321	0.08
18:30 - 19:00	14	15321	0.01	14	15321	0.03	14	15321	0.04
19:00 - 19:30	2	17449	0.00	2	17449	0.03	2	17449	0.03
19:30 - 20:00	2	17449	0.01	2	17449	0.01	2	17449	0.02
20:00 - 20:30	2	17449	0.00	2	17449	0.01	2	17449	0.01
20:30 - 21:00	2	17449	0.00	2	17449	0.01	2	17449	0.01
21:00 - 21:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:30 - 22:00	2	17449	0.01	2	17449	0.00	2	17449	0.01
22:00 - 22:30	1	11972	0.00	1	11972	0.00	1	11972	0.00
22:30 - 23:00	1	11972	0.18	1	11972	0.01	1	11972	0.19
23:00 - 23:30	0	0	0.00	0	0	0.00	0	0	0.00
23:30 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			1.88			1.94			3.80

Parameter summary

Trip rate parameter range selected:	620 - 34581 (units: sqm)
Survey date date range:	01/01/97 - 21/06/04
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 14 - CAR SHOW ROOMS
Category : A - CAR SHOW ROOMS
VEHICLES

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	KC	KENT	1 days
	SC	SURREY	1 days
	WS	WEST SUSSEX	3 days
03	**SOUTH WEST**		
	DV	DEVON	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	DS	DERBYSHIRE	1 days
	LE	LEICESTERSHIRE	3 days
06	**WEST MIDLANDS**		
	WM	WEST MIDLANDS	1 days
07	**YORKSHIRE & NORTH LINCOLNSHIRE**		
	WY	WEST YORKSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	3 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	3 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	EA	EAST AYRSHIRE	2 days
14	**REPUBLIC OF IRELAND**		
	IR	REPUBLIC OF IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 695 to 5058 (units: sqm)

Date Range: 01/01/97 to 06/07/05

Selected survey days:

Monday	4 days
Tuesday	3 days
Wednesday	3 days
Thursday	4 days
Friday	12 days

Selected survey types:

Manual count	26 days
Directional ATC Count	0 days

TRIP RATE for Land Use 14 - CAR SHOW ROOMS/A - CAR SHOW ROOMS

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	9	2700	0.41	9	2700	0.08	9	2700	0.49
08:00 - 09:00	**23**	**2445**	**1.05**	23	2445	0.37	23	2445	1.42
09:00 - 10:00	25	2324	0.79	25	2324	0.57	25	2324	1.36
10:00 - 11:00	26	2291	0.68	26	2291	0.67	26	2291	1.35
11:00 - 12:00	26	2291	0.64	26	2291	0.65	26	2291	1.29
12:00 - 13:00	26	2291	0.72	26	2291	0.79	**26**	**2291**	**1.51**
13:00 - 14:00	26	2291	0.72	26	2291	0.64	26	2291	1.36
14:00 - 15:00	26	2291	0.61	26	2291	0.68	26	2291	1.29
15:00 - 16:00	26	2291	0.66	26	2291	0.72	26	2291	1.38
16:00 - 17:00	26	2291	0.61	26	2291	0.78	26	2291	1.39
17:00 - 18:00	26	2291	0.40	**26**	**2291**	**0.89**	26	2291	1.29
18:00 - 19:00	22	2360	0.13	22	2360	0.39	22	2360	0.52
19:00 - 20:00	11	2539	0.05	11	2539	0.09	11	2539	0.14
20:00 - 21:00	0	0	0.00	0	0	0.00	0	0	0.00
21:00 - 22:00	0	0	0.00	0	0	0.00	0	0	0.00
22:00 - 23:00	0	0	0.00	0	0	0.00	0	0	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			7.48			7.30			14.79

Parameter summary

Trip rate parameter range selected:	695 - 5058 (units: sqm)
Survey date date range:	01/01/97 - 06/07/05
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : J - RETAIL PARK - INCLUDING FOOD
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	HC	HAMPSHIRE	1 days
04	**EAST ANGLIA**		
	NF	NORFOLK	1 days
05	**EAST MIDLANDS**		
	LN	LINCOLNSHIRE	1 days
06	**WEST MIDLANDS**		
	WK	WARWICKSHIRE	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	2 days
11	**SCOTLAND**		
	FI	FIFE	1 days
	HI	HIGHLAND	1 days
	SL	SOUTH LANARKSHIRE	5 days

Main parameter selection:

Parameter: Gross floor area
Range: 734 to 45000 (units: sqm)

Date Range: 01/01/97 to 18/06/05

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	3 days
Friday	7 days

Selected survey types:

Manual count	9 days
Directional ATC Count	5 days

TRIP RATE for Land Use 01 - RETAIL/J - RETAIL PARK - INCLUDING FOOD

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	5	12247	0.01	5	12247	0.02	5	12247	0.03
08:00 - 09:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
09:00 - 10:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
10:00 - 11:00	**6**	**13326**	**0.04**	**6**	**13326**	**0.03**	**6**	**13326**	**0.07**
11:00 - 12:00	6	13326	0.03	6	13326	0.02	6	13326	0.05
12:00 - 13:00	6	13326	0.03	6	13326	0.03	6	13326	0.06
13:00 - 14:00	6	13326	0.02	6	13326	0.03	6	13326	0.05
14:00 - 15:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
15:00 - 16:00	6	13326	0.02	6	13326	0.02	6	13326	0.04
16:00 - 17:00	6	13326	0.01	6	13326	0.02	6	13326	0.03
17:00 - 18:00	6	13326	0.01	6	13326	0.01	6	13326	0.02
18:00 - 19:00	6	13326	0.01	6	13326	0.01	6	13326	0.02
19:00 - 20:00	4	12462	0.01	4	12462	0.00	4	12462	0.01
20:00 - 21:00	4	12462	0.00	4	12462	0.00	4	12462	0.00
21:00 - 22:00	2	18924	0.00	2	18924	0.00	2	18924	0.00
22:00 - 23:00	1	19128	0.01	1	19128	0.00	1	19128	0.01
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.25			0.24			0.51

Parameter summary

Trip rate parameter range selected:	734 - 45000 (units: sqm)
Survey date date range:	01/01/97 - 18/06/05
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : K - RETAIL PARK - EXCLUDING FOOD
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	ES	EAST SUSSEX	1 days
	HC	HAMPSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
06	**WEST MIDLANDS**		
	ST	STAFFORDSHIRE	1 days
	WM	WEST MIDLANDS	1 days
	WO	WORCESTERSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	5 days
	LC	LANCASHIRE	1 days
	MS	MERSEYSIDE	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 2057 to 35244 (units: sqm)

Date Range: 01/01/97 to 25/06/05

Selected survey days:

Monday	1 days
Thursday	3 days
Friday	11 days

Selected survey types:

Manual count	15 days
Directional ATC Count	0 days

TRIP RATE for Land Use 01 - RETAIL/K - RETAIL PARK - EXCLUDING FOOD
OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	3	13810	0.01	3	13810	0.01	3	13810	0.02
08:00 - 09:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
09:00 - 10:00	7	10709	0.03	7	10709	0.03	7	10709	0.06
10:00 - 11:00	7	10709	0.02	7	10709	0.03	7	10709	0.05
11:00 - 12:00	**7**	**10709**	**0.04**	**7**	**10709**	**0.04**	**7**	**10709**	**0.08**
12:00 - 13:00	7	10709	0.02	7	10709	0.03	7	10709	0.05
13:00 - 14:00	7	10709	0.03	7	10709	0.02	7	10709	0.05
14:00 - 15:00	7	10709	0.03	7	10709	0.03	7	10709	0.06
15:00 - 16:00	7	10709	0.02	7	10709	0.02	7	10709	0.04
16:00 - 17:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
17:00 - 18:00	7	10709	0.00	7	10709	0.01	7	10709	0.01
18:00 - 19:00	7	10709	0.01	7	10709	0.01	7	10709	0.02
19:00 - 20:00	7	10709	0.00	7	10709	0.01	7	10709	0.01
20:00 - 21:00	3	13810	0.00	3	13810	0.00	3	13810	0.00
21:00 - 22:00	3	13810	0.00	3	13810	0.00	3	13810	0.00
22:00 - 23:00	1	15750	0.00	1	15750	0.00	1	15750	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.24			0.26			0.49

Parameter summary

Trip rate parameter range selected:	2057 - 35244 (units: sqm)
Survey date date range:	01/01/97 - 25/06/05
Number of weekdays (Monday-Friday):	15
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : F - WAREHOUSING (COMMERCIAL)
OGVS

Selected regions and areas:

02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	BU	BUCKINGHAMSHIRE	1 days
	HF	HERTFORDSHIRE	2 days
	KC	KENT	1 days
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	3 days
04	**EAST ANGLIA**		
	SF	SUFFOLK	1 days
06	**WEST MIDLANDS**		
	WO	WORCESTERSHIRE	2 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	GC	GLASGOW CITY	1 days
	SL	SOUTH LANARKSHIRE	1 days
12	**NORTHERN IRELAND**		
	NI	NORTHERN IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 950 to 55740 (units: sqm)

Date Range: 01/01/97 to 06/03/03

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	9 days
Friday	3 days

Selected survey types:

Manual count	16 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	**1**	**7500**	**0.09**	**1**	**7500**	**0.08**	**1**	**7500**	**0.17**
00:30 - 01:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
01:00 - 01:30	1	7500	0.01	1	7500	0.03	1	7500	0.04
01:30 - 02:00	1	7500	0.04	1	7500	0.07	1	7500	0.11
02:00 - 02:30	1	7500	0.03	1	7500	0.03	1	7500	0.06
02:30 - 03:00	1	7500	0.05	1	7500	0.07	1	7500	0.12
03:00 - 03:30	1	7500	0.03	1	7500	0.01	1	7500	0.04
03:30 - 04:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
04:00 - 04:30	1	7500	0.05	1	7500	0.05	1	7500	0.10
04:30 - 05:00	1	7500	0.07	1	7500	0.05	1	7500	0.12
05:00 - 05:30	1	7500	0.04	1	7500	0.07	1	7500	0.11
05:30 - 06:00	1	7500	0.03	1	7500	0.04	1	7500	0.07
06:00 - 06:30	2	18844	0.03	2	18844	0.03	2	18844	0.06
06:30 - 07:00	2	18844	0.04	2	18844	0.06	2	18844	0.10
07:00 - 07:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
07:30 - 08:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
08:00 - 08:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
08:30 - 09:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
09:00 - 09:30	14	18310	0.02	14	18310	0.03	14	18310	0.05
09:30 - 10:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
10:00 - 10:30	14	18310	0.03	14	18310	0.03	14	18310	0.06
10:30 - 11:00	14	18310	0.02	14	18310	0.03	14	18310	0.05
11:00 - 11:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
11:30 - 12:00	14	18310	0.03	14	18310	0.03	14	18310	0.06
12:00 - 12:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
12:30 - 13:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
13:00 - 13:30	14	18310	0.03	14	18310	0.02	14	18310	0.05
13:30 - 14:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
14:00 - 14:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
14:30 - 15:00	14	18310	0.03	14	18310	0.03	14	18310	0.06
15:00 - 15:30	14	18310	0.03	14	18310	0.02	14	18310	0.05
15:30 - 16:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
16:00 - 16:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
16:30 - 17:00	14	18310	0.03	14	18310	0.02	14	18310	0.05
17:00 - 17:30	14	18310	0.02	14	18310	0.02	14	18310	0.04
17:30 - 18:00	14	18310	0.02	14	18310	0.02	14	18310	0.04
18:00 - 18:30	13	17396	0.02	13	17396	0.02	13	17396	0.04
18:30 - 19:00	13	17396	0.02	13	17396	0.02	13	17396	0.04
19:00 - 19:30	2	6775	0.03	2	6775	0.01	2	6775	0.04
19:30 - 20:00	2	6775	0.01	2	6775	0.02	2	6775	0.03
20:00 - 20:30	1	7500	0.05	1	7500	0.01	1	7500	0.06
20:30 - 21:00	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:00 - 21:30	1	7500	0.04	1	7500	0.05	1	7500	0.09
21:30 - 22:00	1	7500	0.01	1	7500	0.03	1	7500	0.04
22:00 - 22:30	1	7500	0.07	1	7500	0.05	1	7500	0.12
22:30 - 23:00	1	7500	0.07	1	7500	0.04	1	7500	0.11
23:00 - 23:30	1	7500	0.04	1	7500	0.04	1	7500	0.08
23:30 - 24:00	1	7500	0.04	1	7500	0.04	1	7500	0.08
Daily Trip Rates:			1.59			1.59			3.18

Parameter summary

Trip rate parameter range selected:	950 - 55740 (units: sqm)
Survey date date range:	01/01/97 - 06/03/03
Number of weekdays (Monday-Friday):	16
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : C - INDUSTRIAL UNITS
OGVS

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	SC	SURREY	1 days
03	**SOUTH WEST**		
	DC	DORSET	4 days
	GS	GLOUCESTERSHIRE	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
	NF	NORFOLK	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	1 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
11	**SCOTLAND**		
	ER	EAST RENFREWSHIRE	2 days

Main parameter selection:

Parameter: Gross floor area
Range: 620 to 34581 (units: sqm)

Date Range: 01/01/97 to 21/06/04

Selected survey days:

Monday	2 days
Tuesday	5 days
Wednesday	2 days
Thursday	5 days

Selected survey types:

Manual count	14 days
Directional ATC Count	0 days

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNITS

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	0	0	0.00	0	0	0.00	0	0	0.00
00:30 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 01:30	0	0	0.00	0	0	0.00	0	0	0.00
01:30 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 02:30	0	0	0.00	0	0	0.00	0	0	0.00
02:30 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 03:30	0	0	0.00	0	0	0.00	0	0	0.00
03:30 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 04:30	0	0	0.00	0	0	0.00	0	0	0.00
04:30 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 05:30	0	0	0.00	0	0	0.00	0	0	0.00
05:30 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 06:30	1	22926	0.01	1	22926	0.00	1	22926	0.01
06:30 - 07:00	**1**	**22926**	**0.02**	**1**	**22926**	**0.02**	**1**	**22926**	**0.04**
07:00 - 07:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
07:30 - 08:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
08:00 - 08:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
08:30 - 09:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
09:00 - 09:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
09:30 - 10:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
10:00 - 10:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
10:30 - 11:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
11:00 - 11:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
11:30 - 12:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
12:00 - 12:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
12:30 - 13:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
13:00 - 13:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
13:30 - 14:00	13	15818	0.00	13	15818	0.01	13	15818	0.01
14:00 - 14:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
14:30 - 15:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
15:00 - 15:30	13	15818	0.01	13	15818	0.01	13	15818	0.02
15:30 - 16:00	13	15818	0.01	13	15818	0.01	13	15818	0.02
16:00 - 16:30	13	15818	0.00	13	15818	0.01	13	15818	0.01
16:30 - 17:00	13	15818	0.00	13	15818	0.01	13	15818	0.01
17:00 - 17:30	13	15818	0.00	13	15818	0.00	13	15818	0.00
17:30 - 18:00	13	15818	0.00	13	15818	0.00	13	15818	0.00
18:00 - 18:30	13	15818	0.00	13	15818	0.01	13	15818	0.01
18:30 - 19:00	13	15818	0.00	13	15818	0.00	13	15818	0.00
19:00 - 19:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
19:30 - 20:00	2	17449	0.01	2	17449	0.00	2	17449	0.01
20:00 - 20:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
20:30 - 21:00	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:00 - 21:30	2	17449	0.00	2	17449	0.00	2	17449	0.00
21:30 - 22:00	2	17449	0.00	2	17449	0.00	2	17449	0.00
22:00 - 22:30	1	11972	0.00	1	11972	0.00	1	11972	0.00
22:30 - 23:00	1	11972	0.00	1	11972	0.00	1	11972	0.00
23:00 - 23:30	0	0	0.00	0	0	0.00	0	0	0.00
23:30 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.23			0.22			0.44

Parameter summary

Trip rate parameter range selected:	620 - 34581 (units: sqm)
Survey date date range:	01/01/97 - 21/06/04
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 14 - CAR SHOW ROOMS
Category : A - CAR SHOW ROOMS
OGVS

Selected regions and areas:

01	**GREATER LONDON**		
	GL	GREATER LONDON	1 days
02	**SOUTH EAST**		
	BD	BEDFORDSHIRE	1 days
	KC	KENT	1 days
	SC	SURREY	1 days
	WS	WEST SUSSEX	3 days
03	**SOUTH WEST**		
	DV	DEVON	1 days
04	**EAST ANGLIA**		
	CA	CAMBRIDGESHIRE	1 days
05	**EAST MIDLANDS**		
	DS	DERBYSHIRE	1 days
	LE	LEICESTERSHIRE	3 days
06	**WEST MIDLANDS**		
	WM	WEST MIDLANDS	1 days
07	**YORKSHIRE & NORTH LINCOLNSHIRE**		
	WY	WEST YORKSHIRE	1 days
08	**NORTH WEST**		
	GM	GREATER MANCHESTER	3 days
	LC	LANCASHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	3 days
10	**WALES**		
	WR	WREXHAM	1 days
11	**SCOTLAND**		
	EA	EAST AYRSHIRE	2 days
14	**REPUBLIC OF IRELAND**		
	IR	REPUBLIC OF IRELAND	1 days

Main parameter selection:

Parameter: Gross floor area
Range: 695 to 5058 (units: sqm)

Date Range: 01/01/97 to 06/07/05

Selected survey days:

Monday	4 days
Tuesday	3 days
Wednesday	3 days
Thursday	4 days
Friday	12 days

Selected survey types:

Manual count	26 days
Directional ATC Count	0 days

TRIP RATE for Land Use 14 - CAR SHOW ROOMS/A - CAR SHOW ROOMS
OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.00	0	0	0.00	0	0	0.00
01:00 - 02:00	0	0	0.00	0	0	0.00	0	0	0.00
02:00 - 03:00	0	0	0.00	0	0	0.00	0	0	0.00
03:00 - 04:00	0	0	0.00	0	0	0.00	0	0	0.00
04:00 - 05:00	0	0	0.00	0	0	0.00	0	0	0.00
05:00 - 06:00	0	0	0.00	0	0	0.00	0	0	0.00
06:00 - 07:00	0	0	0.00	0	0	0.00	0	0	0.00
07:00 - 08:00	**8**	**2936**	**0.04**	8	2936	0.02	**8**	**2936**	**0.06**
08:00 - 09:00	19	2643	0.02	**19**	**2643**	**0.03**	19	2643	0.05
09:00 - 10:00	19	2643	0.02	19	2643	0.02	19	2643	0.04
10:00 - 11:00	20	2584	0.01	20	2584	0.02	20	2584	0.03
11:00 - 12:00	20	2584	0.01	20	2584	0.01	20	2584	0.02
12:00 - 13:00	20	2584	0.03	20	2584	0.02	20	2584	0.05
13:00 - 14:00	20	2584	0.02	20	2584	0.02	20	2584	0.04
14:00 - 15:00	20	2584	0.01	20	2584	0.01	20	2584	0.02
15:00 - 16:00	20	2584	0.02	20	2584	0.01	20	2584	0.03
16:00 - 17:00	20	2584	0.01	20	2584	0.02	20	2584	0.03
17:00 - 18:00	20	2584	0.00	20	2584	0.00	20	2584	0.00
18:00 - 19:00	17	2682	0.00	17	2682	0.00	17	2682	0.00
19:00 - 20:00	9	2749	0.00	9	2749	0.00	9	2749	0.00
20:00 - 21:00	0	0	0.00	0	0	0.00	0	0	0.00
21:00 - 22:00	0	0	0.00	0	0	0.00	0	0	0.00
22:00 - 23:00	0	0	0.00	0	0	0.00	0	0	0.00
23:00 - 24:00	0	0	0.00	0	0	0.00	0	0	0.00
Daily Trip Rates:			0.19			0.18			0.37

Parameter summary

Trip rate parameter range selected:	695 - 5058 (units: sqm)
Survey date date range:	01/01/97 - 06/07/05
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Optional parameters used in selection:	NO
Surveys manually removed from selection:	0

Roughan & O'Donovan Consulting Engineers

Profile Park
Traffic Assessment

		Made:	KD	04/05/2006
ROD Ref:	5.311	Checked:	JB	
		Approved:	KD	

Use		Scale	1 acre =
Neighbourhood Centre	2.47 acres	4,998 sqm	4046.856 sqm
Office	10.20 acres	20,639 sqm	
Retail park	14.67 acres	29,684 sqm	Plot ratio = 0.5
General Industry/enterprise	39.96 acres	80,856 sqm	
General industry/logistics	39.00 acres	78,914 sqm	
Showroom	8.61 acres	17,422 sqm	

AM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips* Inbound (veh/hr)	No. Trips* Outbound (veh/hr)	No. Trips* Two-way (veh/hr)
Neighbourhood Centre	1.31	0.88	52	35	88
Office	1.99	0.23	329	38	367
Retail park	0.53	0.26	126	62	188
General Industry/enterprise	0.17	0.08	110	52	162
General industry/logistics	0.37	0.07	234	44	278
Showroom	1.05	0.37	146	52	198
Total Trips			*997*	*282*	*1,279*

* 20% reduction due to dual use / multi purpose trips and implementation of the Mobility Management Plan

PM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips* Inbound (veh/hr)	No. Trips* Outbound (veh/hr)	No. Trips* Two-way (veh/hr)
Neighbourhood Centre	3.14	3.16	126	126	252
Office	0.31	1.62	51	267	319
Retail park	1.2	1.31	285	311	596
General Industry/enterprise	0.1	0.17	65	110	175
General industry/logistics	0.07	0.45	44	284	328
Showroom	0.4	0.89	56	124	180
Total Trips			*626*	*1,223*	*1,849*

* 20% reduction due to dual use / multi purpose trips and implementation of the Mobility Management Plan

TRICS rates for vehicles used for the following uses:

Neighbourhood Centre	- retail park including food
Office	- office
Retail park	- retail park excluding food
General Industry/enterprise	- warehousing (commercial)
General industry/logistics	- industrial units
Showroom	- car show rooms

Roughan & O'Donovan Consulting Engineers

Profile Park
Traffic Assessment - HGVs

		Made:	KD	28/04/2006
ROD Ref:	5.311	Checked:	JB	
		Approved:	KD	

Use		Scale	1 acre =
Neighbourhood Centre	2.47 acres	4,998 sqm	4046.856 sqm
Office	10.20 acres	20,639 sqm	
Retail park	14.67 acres	29,684 sqm	
General Industry/enterprise	39.96 acres	80,856 sqm	
General industry/logistics	39.00 acres	78,914 sqm	
Showroom	8.61 acres	17,422 sqm	

AM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips Inbound (veh/hr)	No. Trips Outbound (veh/hr)	No. Trips Two-way (veh/hr)
Neighbourhood Centre	0.02	0.02	1	1	2
Office	0	0	0	0	0
Retail park	0.01	0.01	3	3	6
General Industry/enterprise	0.05	0.04	40	32	73
General industry/logistics	0.02	0.02	16	16	32
Showroom	0.02	0.03	3	5	9
Total			*64*	*57*	*121*

PM Peak Hour

Use	Trip Rate Inbound (veh/100sqm/hr)	Trip Rate Outbound (veh/100sqm/hr)	No. Trips Inbound (veh/hr)	No. Trips Outbound (veh/hr)	No. Trips Two-way (veh/hr)
Neighbourhood Centre	0.01	0.01	0	0	1
Office	0	0	0	0	0
Retail park	0	0.01	0	3	3
General Industry/enterprise	0.04	0.04	32	32	65
General industry/logistics	0	0	0	0	0
Showroom	0	0	0	0	0
Total			*33*	*36*	*69*

TRICS rates for vehicles used for the following uses:

Neighbourhood Centre	- retail park including food
Office	- office
Retail park	- retail park excluding food
General Industry/enterprise	- warehousing (commercial)
General industry/logistics	- industrial units
Showroom	- car show rooms

Profile Park
Proposed Commercial Development

Mobility Management Plan

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1.0 INTRODUCTION

The development that is the subject of the current planning application consists of the provision of roads and services infrastructure, which will accommodate the future development of a business park on the subject site. The future land uses proposed on the site include industrial, office, retail, and neighbourhood centre uses including shops, cafes, crèche etc. Vehicular access to the site is proposed via the Nangor Road Regional Road R134, which has access to the Outer Ring Road R136. When completed, the Outer Ring Road will connect the N4 to the N7 and N81. Pedestrian and cycle access will be provided throughout the site and will connect with the Nangor Road which is to be upgraded to provide for these modes of travel.

This Mobility Management Plan has been prepared in support of the planning application for the proposed development.

1.1 Background to Mobility Management Plans

Road traffic growth is having a damaging effect on the environment, the economy and public health. A key contributor to this is the number of people commuting to work in a 'driver only car'. The impact that new developments have on the local road network can be reduced through the preparation and implementation of a mobility management plan. A mobility management plan assesses a development in terms of its accessibility by all modes of transport and makes recommendations that encourage and makes it easier for staff and visitors to travel to the workplace by public transport, car sharing, walking or cycling. The transportation policies and objectives of South Dublin County Council reflect the central elements of the Dublin Transportation Office (DTO) strategy. The DTO strategy outlined in 'A Platform for Change: An Integrated Transportation Strategy for the Greater Dublin Area 2000-2016' is to support and compliment the strategic land use planning framework for the Greater Dublin Area. The DTO Strategy has two interdependent elements: infrastructure and service improvements and demand management. The DTO Strategy on demand management is:

"To reduce the growth in travel through the application of land use and other policies while maintaining economic progress, and which is designed to encourage a transfer of trips, especially at peak periods, from the private car to sustainable modes of transport (such as public transport, cycling and walking)."

The DTO considers mobility management to be a suitable mechanism by which new developments can support the objectives of sustainable development and the achievement of reduced car dependency.

1.2 Structure of this Mobility Management Plan

It is intended that this report will provide a review of the existing transport options at the site of the proposed development together with direction to the developer, the Local Authority and public transport agencies on ways to best achieve an improved modal split for the journey to work, and minimise the traffic impact as a result of encouraging greater use of public transport, cycling and walking.

This mobility management plan is divided into the following principal sections:

- Objects and scope of the Mobility Management Plan;
- Existing transport infrastructure available in the vicinity of the site;

- Current commuter trends in the Dublin area;
- Recommendations to encourage greater use of more sustainable modes of transport by the future office employees at the site; and
- Likely commuter trends of the employees at the proposed development.

2.0 OBJECTIVES AND SCOPE OF THE MOBILITY MANAGEMENT PLAN

2.1 Objectives

The purpose of the Mobility Management Plan is to assist the Development Managers and 'unit end users' to minimise the amount of road traffic the development will generate. It encourages and makes it easier for staff of incoming companies and people visiting the site to travel by public transport, cycle, walk and car share. It particularly focuses upon journeys to work made by staff and their business trips.

Target modal splits have been identified for each mode of transport, and associated mobility management proposals are identified to enable these targets to be achieved. Thus the plan will make a direct contribution to reducing the traffic impact of the proposed development.

2.2 Scope

The Mobility Management Plan is a strategy consisting of a package of both physical measures and good working practices and policies that will be put in place once the commercial development is operational.

3.0 TRANSPORTATION INFRASTRUCTURE

This Section outlines how the transport infrastructure available in the vicinity of the site will support the objectives of this Mobility Management Plan.

3.1 Road Network

The site is situated between the N4 and N7 National Primary Routes and approximately 5km west of the M50 Motorway. The M50 is an orbital ring road around Dublin City with interchanges at all radiating National Primary Roads from the N1 to the North and the M11 to the South.

The site is bounded to the north by the R134 Nangor Road Regional Road, which connects the R120 at Milltown to the R110 at Walkinstown and on into the City Centre via the R110 Naas Road. The Nangor Road east of the site has seen steady improvements over recent years, and is a wide single carriageway with dedicated bus lanes in each direction extending as far out as the Outer Ring Road. The Nangor Road along the northern boundary of the site and to the west is of lower standard in terms of alignment and cross-sections, but will soon be upgraded and widened to include bus lanes in each direction.

The Outer Ring Road Phase 1 was opened from the N7 as far as Grange Castle Business Park in January 2005 and comprises a dual carriageway with dedicated bus lanes in each direction. Phase 2 of the Outer Ring Road, will see a local road link from the recently constructed Phase 1 of the Outer Ring Road (Grange Castle Road) north to the N4 and east to the R113 Fonthill Road. With completion of the northern section of the Outer Ring Road there will be a direct link to both the N4 and

the N7. Phase 3 of the Outer Ring Road, will extend south from the N7 to the N81 Blessington Road.

3.2 Public Transport Services

Public Transport Accessibility

Currently the Dublin Bus Route No. 68 operates along the Nangor Road at the northern boundary of the site. Approximately 1.5km east of the site the Dublin Bus Route Nos. 51B, 51X and 210 operate along the Nangor Road. Clondalkin Village 3km east of the site is served by the Dublin Bus Route Nos. 69, 76, 76A and 76B.

The Quality Bus Network in the area continues to expand with dedicated bus lanes on the Nangor Road east of the site and the Outer Ring Road.

The main intercity railway line, which connects Dublin to the west and southwest of the country and provides both intercity and suburban rail services, runs to the north of the subject site. Intercity services are mainly to Cork and Limerick / Shannon, with the commuter service to Kildare. The nearest station is Clondalkin Station which is located approximately 3km northeast of the site and is served by 15 suburban commuter trains in each direction during weekdays.

Proposed Public Transport Infrastructure

The QBN Project Office has proposed the provision of bus priority lanes (Quality Bus Network Programme) within the vicinity of the site including:

- Outer Ring Road QBC – Phase 1 N7 to Adamstown roundabout complete - Phase 2 connecting to the N4 under construction
- Nangor Road QBC west of Outer Ring Road currently at design stage
- Naas Road QBC Kingswood to Bluebell under construction.

These objectives form part of the extensive QBN (Quality Bus Network) that will be part of an integrated public transport network, as proposed by the DTO strategy 'A Platform for Change: 2000 - 2016'. These changes to the QBN are expected to lead to an increased frequency bus service, with better pedestrian and cycle facilities thereby encouraging commuters to use alternate modes of transport to private cars.

The Kildare Route Project is a railway improvement project for part of the Dublin to Hazelhatch railway line, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site, and additional railway tracks to allow for the separation of suburban, regional and intercity trains and the introduction of a new high capacity suburban service, which is expected to be complete by 2010.

Proposed public transport infrastructure identified in Transport 21, which will have a positive impact on the public transport infrastructure network in the area, include the following (completion dates):

- Dublin City Centre rail resignalling (2008)
- Opening of the new Dublin City Centre railway station (2009)
- Kildare rail upgrade (2010)
- Metro West Phase 1 Tallaght to Clondalkin (2010)
- Metro West Phase 2 Clondalkin – Lucan (2011)
- Metro West Phase 3 Lucan – Blanchardstown (2012)

- Metro West Phase 4 Blanchardstown – Ballymun (2014)
- Extend Electrification to Hazelhatch (2015)
- Rail Interconnector, which will enable passengers to transfer between suburban rail, METRO and LUAS at a number of interchange stations (2015).

3.3 Cycle Facilities

There is a good cycle track network on the existing roads in the vicinity of the site with the recently improved Nangor Road and Outer Ring Road Phase 1 which include cycle tracks that form part of the extensive and emerging cycle path network in the area.

The developing cycle route network will increase the attractiveness of cycling for people working in the development. Commitments by the developers to provide secure and sheltered cycle parking throughout the development will serve to complement the efforts of the local authority in promoting and sustaining cycling.

Cycle access to the site will be available at the northeastern corner via the site access roundabout or the neighbourhood centre link and northwestern corners via a pedestrian / cycle link only to Nangor Road. A north-south link road will connect the main access road to Baldonnell Road, with the adjoining development lands to the west of the site connected by a pedestrian and cycle only link.

The internal roads within the site will have cycle paths on one side and will be off-road between junctions, but lowered to road level on the approaches to the junctions with side roads to provide priority to cyclists at the junctions.

Secure sheltered cycle parking will be provided at appropriate locations adjacent to the main building entrances and changing and shower facilities will be available for use by cyclists where practicable.

3.4 Pedestrian Facilities

There are well-established footpaths along the roads to the east of the site, while the roads to the west are generally rural roads without dedicated pedestrian facilities, although there are proposals to upgrade the Nangor Road west of the main site access which will further improve pedestrian access.

People are typically prepared to walk up to 30 minutes to work. Special attention was given to creating a high quality safe walking environment, where pedestrian routes should be:

- Comfortable – provide a good surface without puddles and trips;
- Convenient – provide continuous footpaths;
- Convivial – be safe to use, and free from litter;
- Conspicuous – routes should be open to view, clearly signed and lit, assisting to improve perceptions of personal security; and
- Connected – direct routes reflecting desire lines where possible. They should link the main starting points with the destinations.

The internal roads on the site will have footpaths included on both sides with street lighting and landscaping of a high standard to make walking to and from the site more secure and attractive for people working there.

4.0 TRANSPORT MODAL SPLITS

4.1 Existing Modal Splits

The modal split of employees cannot be anticipated at this stage, although looking at modal splits for other similar sites a high portion of staff will commute to the development by car. The following modal split is a worst case assumption based on the location of the site and the existing availability of alternative modes of transport but without the expected improvements to the public transport network as described in Section 3 and the introduction of a Mobility Management Plan.

Table 1: Modal Split – Existing

Mode of Travel	*2006*
	%
Car Driver	70
Car Passenger	10
Bus & Rail	16
Walk	2
Cycle	2

4.2 External Factors which may Influence Modal Choice

A number of developments are likely to have a significant impact on the journey to work practices of the future workforce, on the site:

- Further development of the Quality Bus Network, and improved bus services for the area provided by Dublin Bus and the private sector, especially along the Nangor Road and Outer Ring Road QBC's;
- Completion of the Kildare Route Project, which includes provision of new railway stations at Adamstown and Kishogue, which will be approximately 2km from this site.
- Further development of the cycle track network and improved pedestrian facilties.

It is important to note that proposed changes to the public transport system such as integrated ticketing and co-ordination of timetables have yet to be implemented. It is expected that these measures will remove some of the barriers currently dissuading potential passengers from using public transport.

5.0 MOBILITY MANAGEMENT PLAN

This section outlines a series of recommendations to help achieve and maintain the 'Target Modal Split', throughout the life of the development.

5.1 Mobility Plan Administration

A Mobility Management Plan Co-ordinator is required to administer, implement, monitor and review the Mobility Management Plan. The Plan Co-ordinator should liaise with the management companies from adjacent developments, the Local Authority, and public transport operators.

5.2 Mobility Plan Details

Car travel is comfortable and convenient and inevitably an attractive mode of transport. There are a number of measures that will be undertaken by the development managers and 'unit end users' to help reduce car travel as outlined below. The Plan Co-ordinator will play a key role in encouraging and enabling companies locating within the development to adopt these recommendations. These are set out under the following general headings:

A. Travel awareness
B. Travel database
C. Public transport
D. Car sharing scheme
E. Cycling
F. Walking
G. Working practices
H. Car parking management
I. Policies on car use

(A) Travel Awareness

It will be the responsibility of the Plan Co-ordinator to make all staff and visitors aware of the environmental consequences of their travel choices. Consideration will be given to the various media for communicating the Mobility Management Plan to staff and visitors. Ideas include a Mobility Management Plan Newsletter or Website. These will provide details of the Mobility Management Plan and information on public transport services, car sharing, etc.

(B) Travel Database

The Plan Co-ordinator will produce and maintain a staff travel database. This will contain information relating to the travel patterns of employees to the site. It is envisaged that once the development is occupied, the Plan Co-ordinator would distribute a Travel Survey Questionnaire for the occupants to then forward to their own employees. The survey would provide details of the following:

- staff profile;
- home location;
- normal working hours;
- mode of travel to work;
- route taken to work;
- interest in car sharing;
- home to work journey time;
- distance home to work;
- car ownership;
- work related travel throughout the day;
- reasons for not car sharing, using public transport, cycling, walking or motorcycling;
- measures that would encourage the use of public transport, cycling, walking or motorcycling;
- estimates of public transport journey times and cost.

The availability of this data will assist in more accurately defining travel requirements for the site, and in defining the specific measures that would maximise the success of the Plan. This survey should be repeated annually, with published

results in a report highlighting any changes. In addition the Plan Co-ordinator would carry out further on-site data collection, which will include surveys to measure car park and cycle facility use. This data will complement the information provided in the staff survey questionnaires and will provide guidance on how the Plan could be improved or modified.

(C) Public Transport

It is anticipated that the management company will provide a shuttle bus service to and from appropriate locations so as to improve the accessibility of the development by public transport. In particular, a shuttle bus services could operate between the site and the nearest rail station on the Kildare Line, and to other public transport nodes such as Clondalkin Village.

The Plan Co-ordinator will enable the management company to promote a public transport culture amongst staff and visitors. Poor or insufficient access to information can be a major barrier to public transport use. Making people aware of travel alternatives will form a key element to the Mobility Management Plan. It will be the responsibility of the Plan Co-ordinator to regularly liaise with public transport operators to ensure that visitors and employees are provided with up to date public transport information to help maximise patronage. This includes timetable information, fares, bus stop location and route planning and the provision of annual and monthly public transport tickets to employees, which has tax benefits for both the employer and employee.

This information will be on permanent display at prominent locations throughout the development and included on a Mobility Management Plan Newsletter / Website which will be provided to all occupants of the development.

(D) Car Sharing Scheme

Using the Travel Database the Plan Co-ordinator will set a staff car-sharing scheme. This will involve preparing a car-sharing database or list, regularly updated, of those wishing to car share and the locations from which they travel.

Experience has shown that one of the issues that currently prevents car sharing is the lack of flexibility should an emergency occur at home. To overcome this obstacle a guaranteed ride home service could be provided in such circumstances. This could be from a colleague or through a company-paid / reimbursed taxi ride. A contract with a local taxi firm could be negotiated, allowing business related trips to be invoiced directly to the company.

It would also be possible for a car-sharing database to be developed for individual companies within the development or Profile Park as a whole, which would involve a number of companies within the park and allow car sharing to occur on a wider basis between various organisations.

(E) Cycling

In addition to providing 'bicycle friendly' facilities such as cycle parking, showers, changing rooms and lockers, the Plan Co-ordinator will promote cycling in a number of other ways. In order to encourage more staff to cycle to work, the Mobility Management Plan newsletter or website could set up a bicycle user group, provide information on the cycle facilities in the area and raise awareness amongst staff of the health benefits of cycling.

(F) Walking

Similar to cycling, the Plan Co-ordinator will encourage more staff to walk to work by raising awareness of the health benefits of walking.

(G) Working practices

Other initiatives the management company could use to encourage the staff to adopt more sustainable travel habits may include:

- Only paying user mileage on business journeys where no alternative is realistic by other means of travel.
- Introducing flexitime. This can help reduce congestion as not everyone is arriving and leaving the site at the same time. Flexitime can also help cyclists and walkers by allowing them to make trips in daylight during winter months or before bad weather sets in.
- Investigate the scope for introducing a home working scheme.

If reasonable, the introduction of pool cars. This would allow the staff that need to use a car in the course of their business to walk, cycle or use public transport to get to and from work.

(H) Car park management

Where there is free and plentiful car parking it is difficult to persuade people to try the other alternatives available. A car parking management plan should be produced to review the allocation of car parking spaces and the introduction of controls. The underlying assumption will be that the supply of car parking spaces is controlled and that they are allocated according to need. Should car-parking charges be introduced, the revenue raised should be used to subsidise other elements of this Mobility Plan.

(I) Policies on car use

Many companies provide company cars, car loans and car allowances as benefits for employees. Staff should be dissuaded from car travel by limiting provision of subsidised cars. For example, they should only pay car loans to those employees who need to use a car as part of their job. Similarly, staff may only qualify for these loans if they buy low emission fuel-efficient cars. Staff may also only qualify for car mileage payments if use of a car is essential for their trip / journey. Car mileage should also only be paid at a flat rate so as not to encourage staff to drive larger less fuel-efficient vehicles.

5.3 Mobility Plan Monitoring and Assessment

To enable the success of the various measures included in the Mobility Management Plan to be assessed and to help identify those measures that are performing most effectively, the Plan Co-ordinator will be responsible for ongoing monitoring and regular staff surveys. The monitoring should include items such as:

- Review the ongoing implementation of the Mobility Management Plan measures;
- Level of usage of cycle stands and lockers to determine demand;

- Car park surveys to establish car usage by employees and overall car parking demands; and
- Updated employee surveys to establish effective comparisons from earlier surveys, for example on mode of travel to the site.

A website could be established to post this information, which could then be accessed by all employers and employees. Future strategies can then be developed between the occupiers, the Local Authority and public transport operators.

6.0 Target Modal Split

Efforts can be made to reduce the reliance on car travel to the site. Table 2 shows the existing and target modal splits for the centre.

Table 2: Modal Split Targets for the Proposed Development

Mode of Travel	2006 – Existing Split	2008 – Target split with implementation of the MMP
	%	%
Car Driver	70	55
Car Passenger	10	15
Bus & Rail	16	22
Walk	2	4
Cycle	2	4

The targets for public transport, walking and cycling as commuter travel choices are based on the expectation of improvements to the public transport infrastructure and pedestrian / cycle facilities and the implementation of the Mobility Management Plan. These modes of transport will become more attractive to a larger number of staff who are likely to choose to live relatively close to their workplace.

Considering the efforts in Dublin to encourage drivers not to travel to work by car, and on the basis that the local authorities and public transport agencies are making substantial investments in the facilities for alternative modes of transport, the proposed modal split targets are considered realistic and achievable.

Chapter 5 outlines a series of recommendations to help achieve and maintain the 'Target Modal Split'.

7.0 Summary

This Mobility Management Plan identifies measures that will be introduced once the development is operational. These measures will be administered by the Mobility Management Plan Co-ordinator in co-operation with the management company, the Local Authority and public transport provider and include the following measures:

- Appoint a Mobility Management Plan Co-ordinator to administer, implement, monitor and review the Mobility Management Plan;
- Provide a shuttle bus service to and from appropriate locations so as to improve the accessibility of the development by public transport;

- Produce a Newsletter or Website to promote the Mobility Management Plan;
- Supply of information on public transport including timetable information, fares, bus stop location and route planning;
- Provision of annual and monthly public transport tickets to employees, which has tax benefits for both the employer and employee.
- Examining the feasibility of setting up a car-sharing scheme, either within each individual company or within Profile Park as a whole, to include a car-sharing database and providing facilities to match trip mates;
- Promoting the use of cycling among staff by providing secure sheltered cycle parking both at ground level and within the car park and providing showers and changing rooms for cyclists;
- Examining the feasibility of introducing a flexitime system for employees and investigate the scope for introducing a home working scheme of the each individual company.

Target modal splits for each mode of transport have been identified in this Mobility Management Plan. It has been estimated that without proactive measures to promote travel to work by non-car modes of transport, that approximately 70% of the workforce at the proposed development would be likely to drive to work. To improve on this projection, and to reduce the traffic impact of the development, a target modal split has been set at 55% car drivers, increasing the car expected car occupancy from 1.14 to 1.26 and increase the share by other modes from 20% to 30% by public transport, cycling and walking. Considering the widespread publicity in Dublin to encourage drivers not to travel to work by car, and on the basis that the local authorities and public transport agencies are making substantial investments in the facilities for alternative modes of transport, the proposed modal split targets are considered realistic and achievable.

Appendix 7.1 Flood Risk Assessment

PINNACLE
CONSULTING ENGINEERS



DB081
Profile Park, Grange Castle, Lucan, Co. Dublin

FLOOD RISK ASSESSMENT

June 2021

P210203

EQUINIX

STRUCTURAL · CIVIL · DUE DILIGENCE · ENGINEERING MASTERPLANNING
FLOOD MANAGEMENT · INFRASTRUCTURE DESIGN
PRE-DEVELOPMENT ENGINEERING · BIM · TRANSPORTATION

SOURCES OF DATA

Office of Public Works (OPW)	Brock McClure
Met Eireann	
Land Survey Services Ltd.	
Google	

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Executive Summary

This report was prepared for South Dublin County Council in connection with the planning application for a 3 storey (part 4 storey) data centre and addresses the potential flooding for the proposed development, located in Profile Park, Grange Castle, Dublin, near to the junction of the New Nangor Road.

Equinix (Ireland) Ltd. intend to apply for permission for development at this site of c.2.65ha on lands known as Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (the site is bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue). The development will consist of the following:

- Construction of a 3 storey (part 4 storey) data centre known as "DB8" to include data halls, electrical/plant rooms, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level. The total gross floor area excluding hot air plenums and external staircase is c.9,601sqm. The overall height of the data centre ranges from c.16m to c.20m to roof level and c.20m to c.24m including roof top plant, flues and lift overrun;
- Provision of 5 no. external generators, 8 no. fuel tanks and ancillary plant contained within a plant yard to the north of DB8;
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a sprinkler pump room (c.23sqm), 2 no. sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm). Total floor area of ancillary structures and plant (c.303sqm);
- Provision of a delivery yard and loading bays, 64 no. car parking spaces, 5 no. motorcycle spaces, bicycle shelter serving 14 no. spaces, smoke shelter, internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of existing vehicular entrances from Falcon Avenue;
- All associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing;
- No buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site;
- The area to the south west of the site is reserved for a future data centre, subject of a separate application to South Dublin County Council;
- This application is accompanied by a Natura Impact Statement.

The Report should be read in conjunction with all associated Planning Drawings, and deals with the potential flood risk and mitigation measures proposed for the subject site.

2 Flood Risk Assessment

The Planning System & Flood Risk Management Guidelines for Planning Authorities, dated November 2009, as published by the OPW, sets out the process to be followed in assessing proposed developments relating to flood risk.

These guidelines introduce comprehensive mechanisms incorporating flood risk identification, assessment and management into the planning process.

Planning authorities, in implementing these guidelines, are to ensure that where relevant, flood risk is a key consideration in the preparation of development and local area plans and also in the assessment of planning applications.

The guidelines will also serve to assist county and local authorities in preparing planning guidelines which should be utilised by developers and the general public in assessing flood risk when submitting development proposals / planning applications. Flood risk is summarised through various levels of the planning system as set out in Figure 1.1 below.

Policy Documents / Instruments	Flood Risk Assessment Technique	Decision-making Tools	Key Chapters
National Spatial Strategy, National Planning Guidelines	Flood Risk Management Guidelines	n/a	1 2
Regional planning guidelines	Regional Flood Risk Appraisal, Catchment Flood Risk Management Plans	Sequential approach, Strategic Environmental Assessment	3 4
City / county development plan	Strategic Flood Risk Assessment, Catchment Flood Risk Management Plans	Sequential approach, dev plan Justification Test, SEA	3 4
Local area plan	Strategic Flood Risk Assessment	Sequential approach, dev plan Justification Test, SEA	3 4
Master plan, non-statutory plan, site brief	Site-specific Flood Risk Assessment	Sequential approach, dev plan Justification Test, SEA / Env. Impact Assessment	3 5
Planning application	Site-specific Flood Risk Assessment	Sequential approach, dev management Justification Test, EIA	3 5

Fig. 1.1: Flood risk management and the planning system

3 Source-Pathway-Receptor Model

In assessing the potential flood risk to the site, the above model, as described in The Planning System & Flood Risk Management Guidelines for Planning Authorities, was used. The following flood sources were considered and necessary mitigating measures proposed, where required:-

- Coastal Flooding
- Fluvial Flooding
- Pluvial Flooding
- Ground Water Flooding

3.1 Coastal Flooding

In considering the risk from coastal flooding, it is necessary to relate the location of the site relative to the coast and the associated height above sea level. The subject site is located circa 15.5km from the nearest point on the Irish coast (Dublin Bay) to the east and the average elevation of the site above sea level is circa 75.00m O.D. Malin Head.

Further to the above, coastal flooding is not considered a risk to the subject site.

3.2 Fluvial Flooding

Fluvial flooding is defined as flooding from a river or other watercourse. Further to site inspections and topographical surveys, there are no rivers flowing through the site. There is a dry ditch forming the southern boundary of the site, which ultimately connects into a tributary of the Camac.

Further to the above, this is considered to be very low risk, given the fact that the records of fluvial flooding on the site or environs, i.e. 0.1% AEP Extreme Event (1:1000yr), indicates a water level of between 0.5m – 1m. Refer the attached CFRAMS mapping as contained in Appendix A.

From a levels perspective, it appears that the peak water level, as taken from the above mapping, is circa 74.50m on the east to 72m in the south. The lowest building finished floor level has been set at 75.50m, which is well in excess of the required 500mm above the highest known 1:1000yr flood level.

Further to the above, any flood extents indicated, in this instance only the 0.1% AEP Extreme Event (1:1000yr) is tabled, which indicates this flood event as displacing water well to the south of the subject site and not impacting on the proposed development.

Additionally, the topographical survey is based on ITM (Irish Transverse Mercator), GPS compatible mapping and is used extensively by Ordnance Survey Ireland, whereas, the CFRAM mapping relies on Lidar (Light Detection & Ranging) survey, which is not nearly as accurate as a topographical survey, as it is conducted by air. The accuracy of Lidar survey varies between 50mm – 200mm vertically and between 400mm – 1500mm horizontally.

4 Impact on Downstream Network

There are no impacts on the downstream network based on the following:-

- The site has been sustainably managed in accordance with the relevant guidelines and specifications of the time
- SuDS measures have been incorporated in the form of a surface water attenuation tank
- Surface water attenuation has been provided and sized based on a Q-bar run-off rate of 4.4 l/s
- A Hydrobrake mechanism has been installed to restrict the outflow into the existing network accordingly, i.e. 4.4 l/s
- Water quality is maintained as the outflow passes through approved Petrol / Oil Interceptors

The above methods will ensure that all surface water on-site will be sustainably managed and discharged off-site, via approved run-off rates into the existing Local Authority sewer network.

Appendix A

OPW - CFRAM Mapping

302600 302800 303000 303200 303400 303600 303800 304000

230600 230400 230200 230000 229800 229600 229400

For flooding from the Griffeen River see also Baldonnel AFA flood extent maps

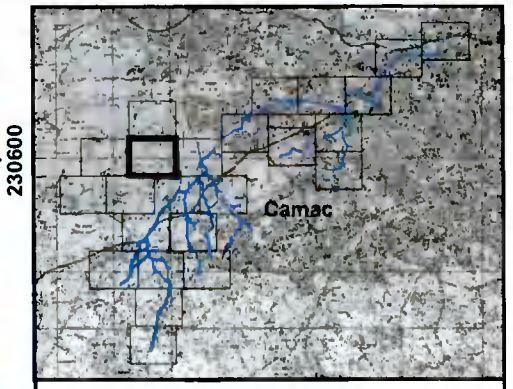
AUNGIERSTOWN and BALLYBANE
Baile Áinséir agus An Baile Bán

KILMACTALWAY
Cill Mhic Thalmhaigh

KILBRIDE
Cill Bhríde

BALDONNEL UPPER

0 50 100 200 300 400 500 Metres



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

0.1% AEP Fluvial Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

Modelled River Centreline

AFA Extents

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY

OPW

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:	**Camac Fluvial Flood Depths**
Map Type:	**DEPTH**
Source:	**FLUVIAL**
Map Area:	**HPW**
Scenario:	**CURRENT**
Drawn By :	**C.C. Date : 27 October 2017**
Checked By :	**A.S. Date : 27 October 2017**
Approved By :	**S.P. Date : 27 October 2017**
Drawing No. :	**E09CAM_DPFCD001_F1_13**
Map Series :	**Page 13 of 24**
Drawing Scale :	**1:5,000 @A3**

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302600 302800 303000 303200 303400 303600 303800 304000

230600 230400 230200 230000 229800 229600 229400

For flooding from the Griffeen River
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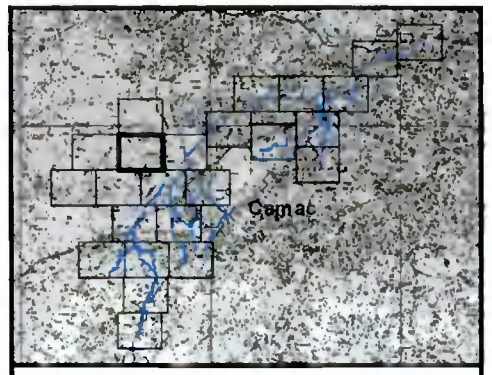
Cill Bhríde

KILMACTALWAY
Cill Mhic Thaimhaigh

BALDONNEL UPPER

0 50 100 200 300 400 500 Metres



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Embankment
- Wall
- Defended Area
- 1% AEP — Standard of Protection of Flood Defence
- 1% AEP — (Walls / Embankments)
- Node Point
- Node ID — Node Label

FINAL

REV:	NOTE	DATE:
01	SOP label updated (Pg 21) Removal of Def. Area (Pg 21)	13/11/2017

EASTERN CFRAM STUDY

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W www.rpsgroup.com
E ireland@rpsgroup.com

Map:	Camac Fluvial Flood Extents
Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By :	C.C. Date : 13 November 2017
Checked By :	A.S. Date : 13 November 2017
Approved By :	S.P. Date : 13 November 2017
Drawing No. :	E09CAM_EXFCD_F1_13
Map Series :	Page 13 of 24
Drawing Scale :	1:5,000 @A3

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302600 302800 303000 303200 303400 303600 303800 304000

232000 231800 231600 231400 231200 231000 230800

GRANGE
An Ghráinseach

CLUTTERLAND
Talamh Chlutair

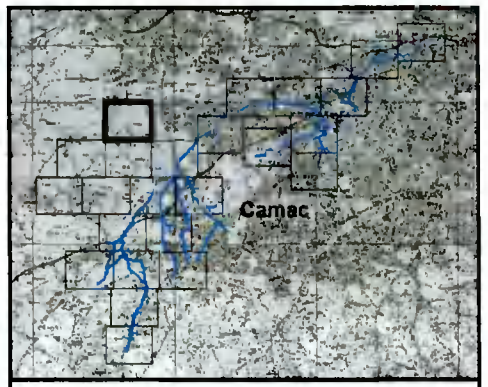
BALLYBANE
An Baile Bán

MILLTOWN
PART OF
Baile an Mhuilinn

TTERLAND

For flooding from the Griffeen River see also Baldonnel AFA flood extent maps.

0 50 100 200 300 400 500 Metres



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- >2m

Modelled River Centreline

AFA Extents

FINAL

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Map Type:	DEPTH
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Checked By :	A.S. Date : 27 October 2017
Approved By :	S.P. Date : 27 October 2017
Drawing No. :	E09CAM_DPFCD100_F1_15
Map Series :	Page 15 of 24
Drawing Scale :	1:5,000 @A3

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302600 302800 303000 303200 303400 303600 303800 304000

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For flooding from the Griffeen River
see also Baldonnel AFA flood extent maps.

0 50 100 200 300 400 500 Metres

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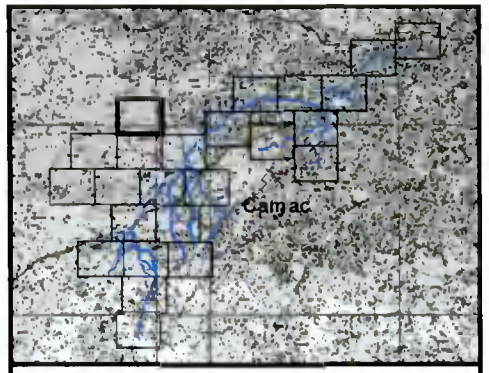

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Legend

- 10% Fluvial AEP Event
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- AFA Extents
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- Wall
- Defended Area
- 1% AEP — Standard of Protection of Flood Defence (Walls / Embankments)
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- Node ID — Node Label

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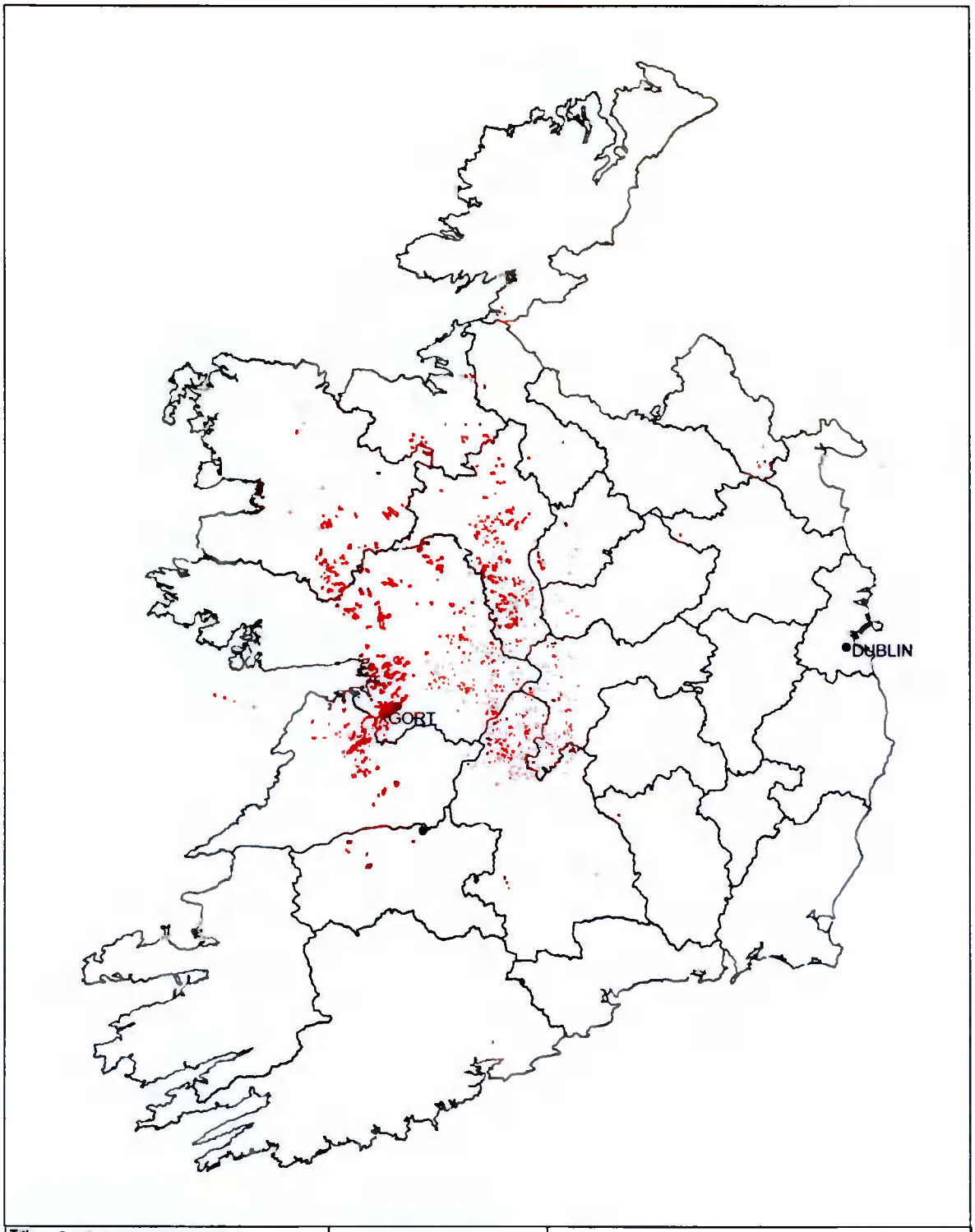
Approved By :	S.P. Date : 13 November 2017
Drawing No. :	E09CAM_EXFCD_F1_15
Map Series :	Page 15 of 24
Drawing Scale :	1:5,000 @A3

Appendix B

OPW – Preliminary Groundwater Flood Hazard Map



Title	Preliminary Groundwater Flood Hazard Map		
Figure 6.6	Size A4	Drawn	RAH
		Checked	SB
Drawing No: 262128BA/2.1		Approved	SB
Date: 24/06/2010		Rev No	01

Mott MacDonald
Water & Environment
Demeter House, Station Road
Cambridge CB1 2RS
Tel +44 (0) 1223 463500
Fax +44 (0) 1223 461007
www.mottmac.com

Legend

- County boundary
- Location
- Area at risk of groundwater flooding

5 Conclusion

In conclusion, the proposed development of the site will be carried out in a wholly sustainable manner, as described and will not pose any flooding issues. This holds true for the developable site itself or for any lands / properties downstream of the proposed development.

Any fluvial flooding adjacent to the environs of the site is considered to be of an extreme nature, i.e. 1:1000 year storm event and would not jeopardise the proposed development of the site, particularly as the site will be positively drained and surface water will be contained within the overall sites drainage network and managed in a sustainable manner in accordance with all relevant guidelines and specifications.

Further to the above, based on the indicative flood mapping, the development site is located within Flood Zone C "Low Probability". Additionally, as mentioned, the site is classified as "Less Vulnerable" and therefore the development is classified as appropriate.

3.3 Pluvial Flooding

This type of flooding is applicable to all sites and is caused by summer thunderstorms or high intensity rainfall during longer duration events. This flooding is then generated by overland flows prior to the run-off entering watercourses / sewers (pipe networks).

Further to the above, any future occurrence of this form of flooding taking place, will be mitigated by the fact that the proposed development has been designed in accordance with the relevant guidelines and specifications of the time, with a surface water attenuation pond being provided, together with a hydrobrake flow control mechanism limiting the total outflow to the Q-bar run-off rate of 4.4 l/s. These measures have been utilised in the sites overall network drainage system in order to mitigate pluvial flooding and provide for a wholly sustainable development.

3.4 Ground Water Flooding

This form of flooding is not considered to be of any risk to the site. This is borne out by the fact that trial holes had previously been dug on the site and the results gathered from this excavation work have indicated that minimal groundwater was encountered.

Additionally, the OPW Preliminary Flood Risk Assessments Groundwater Flooding Report concludes that ground water flooding is largely confined to the West Coast of Ireland, due to the hydrogeology of the area.

Refer Appendix B for the Groundwater Flood Hazard map, clearly indicating that ground water flooding is not considered a risk in this area of County Dublin.

Using the sequential approach as described in Chapter 3 of the aforementioned guideline document, including confirmation that the site is classified as "Less Vulnerable" and therefore classified as appropriate and in conjunction with assessing available flood data, i.e. OPW, PFRA & CFRAMS mapping etc., it has been determined that the site has been categorised as falling into Zone C, (see Flood Zone definitions below), from a flooding perspective. It is proposed to apply the Source-Pathway-Receptor Model in providing the necessary mitigating measures.

Flood zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three types or levels of flood zones defined for the purposes of these Guidelines.

Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).

Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and

Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.



Fig. 2.3: Indicative flood zone map extract

1 Introduction

The applicant proposes to construct a 3 storey (part 4 storey) data centre, which will be accessed off Falcon Avenue adjacent to and to the west of the site. Profile Park is located in Grange Castle and connects to the New Nangor Road to the north. The purpose of this report is to address any potential flooding elements of the proposed data centre development, on lands as indicated on the site location map below.

The total subject site area extends to circa 6.55 acres (2.65 ha), with the site being greenfield.

The location of the site is indicated indicatively on the map extract below - Figure 1.

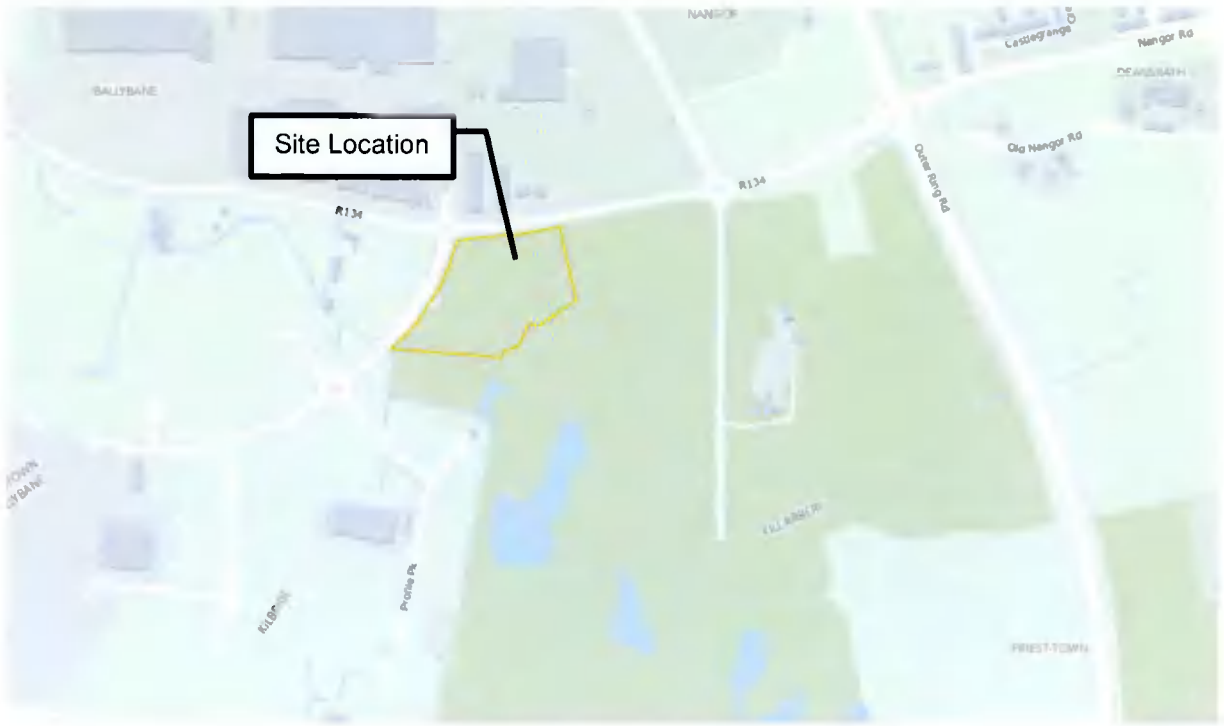


FIGURE 1 - Site Location (Source Google Maps)

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Appendix B – OPW – Preliminary Groundwater Flood Hazard Map **13**

CONTACT DETAILS

Name	Position	Email	Telephone	Mobile
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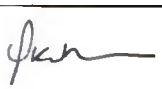
APPROVALS

	Name	Signature	Position	Date
Prepared by	S. O'Reilly		Associate	08/06/2021
Reviewed by	J. Mayer		Director	10/06/2021
Approved by	J. Mayer		Director	12/06/2021

REVISIONS

Revision By	Date	Context

VERSIONS

Number	By	Date	Context
1	S. O'Reilly	16/06/2021	Planning Submission

Appendix 7.2 Confirmation of Feasibility CDS20007552

Declan Malley

19-20 Hogan Place
Lower Grand Canal St
Dublin 2
Dublin

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

13 January 2021

Re: CDS20007552 pre-connection enquiry - Subject to contract | Contract denied

Connection for Business Connection of 1 unit at DBR Plot 100, Profile Business Park, Dublin

Dear Sir/Madam,

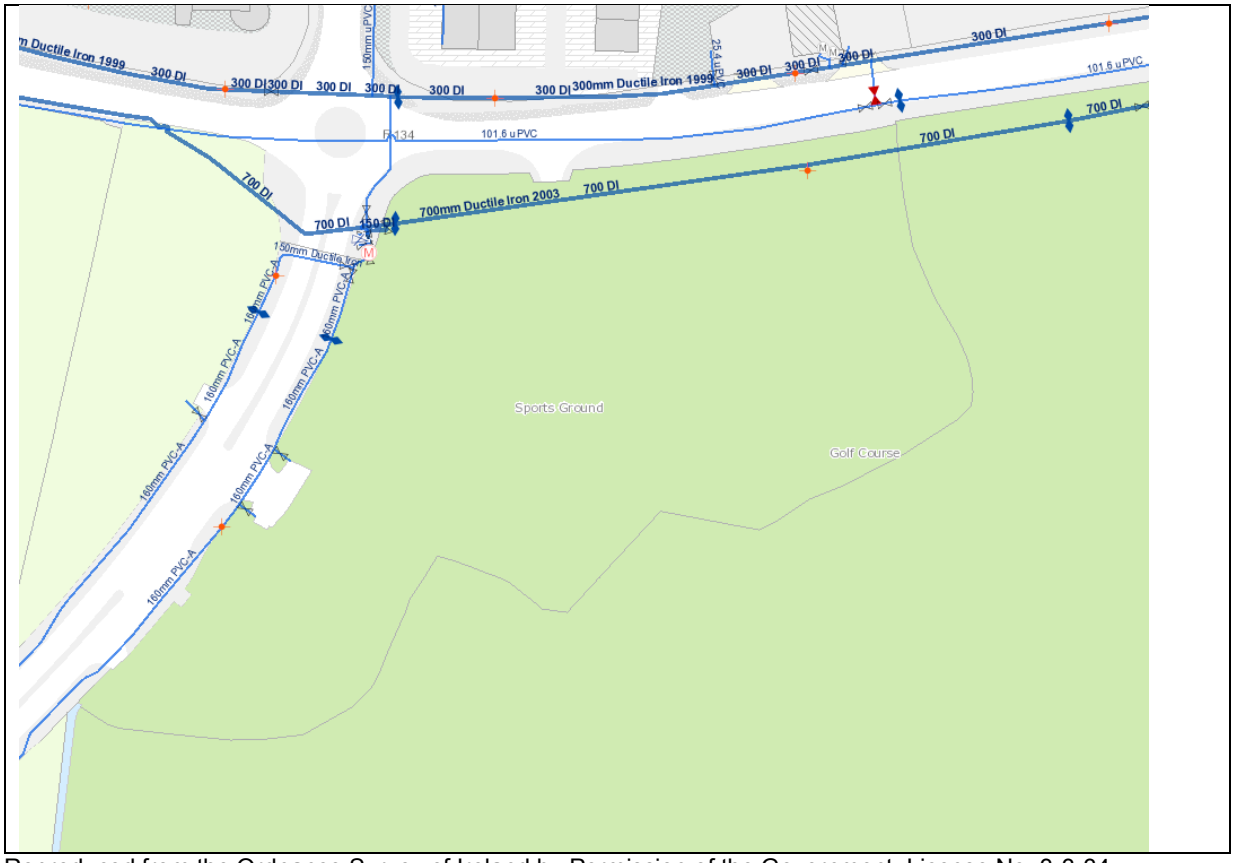
Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at DBR Plot 100, Profile Business Park, Dublin (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
Water Connection	• The Development should be connected to 300mm DI main in R134 road with installation of a bulk meter and associated telemetry system. • On site water storage will be required for the average day peak week demand rate of the business section for 24 hour period with a re-fill time of 12 hours. • The proposed development indicates that an important Irish Water asset is present on the site (700 mm DI main). The Developer has to demonstrate that proposed structures and works will not inhibit access for maintenance or endanger structural or functional integrity of the infrastructure during and after the works. A wayleave in favour of Irish Water will be required over the infrastructure that is not located within the Public Space.

Stiúrthóirí / Directors: Cathal Marley (Chairman), Niall Gleeson, Eamon Gallen, Yvonne Harris, Brendan Murphy, Maria O'Dwyer
Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin 1, D01 NP86
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares.
Uimhir Chláraithe in Éirinn / Registered in Ireland No.: 530363

Wastewater Connection	• The proposed Development connects via private wastewater infrastructure within Grange Castle Business Park. Please be advised that at connection application stage you have to provide written confirmation from the owner of the infrastructure that you have received legal permission to connect to and that the infrastructure has capacity and integrity to cater the additional load from the Development.
The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.	

The map included below outlines the current Irish Water infrastructure adjacent to your site:



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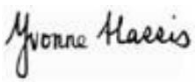
Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Marina Byrne from the design team via email mzbyrne@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



Yvonne Harris

Head of Customer Operations

APPENDIX 8.1 – GLOSSARY OF ACOUSTIC TERMINOLOGY

ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
broadband	Sounds that contain energy distributed across a wide range of frequencies.
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 µPa).
dB L_{pA}	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
impulsive noise	A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).
$L_{Ar,T}$	The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.
L_{AF90}	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.
L_{AT}(DW)	equivalent continuous downwind sound pressure level.
L_{fT}(DW)	equivalent continuous downwind octave-band sound pressure level.
L_{day}	L_{day} is the average noise level during the day time period of 07:00hrs to 19:00hrs
L_{night}	L_{night} is the average noise level during the night-time period of 23:00hrs to 07:00hrs.
low frequency noise	LFN - noise which is dominated by frequency components towards the lower end of the frequency spectrum.
noise	Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.

noise sensitive location NSL – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.

octave band A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

rating level See $L_{Ar,T}$.

sound power level The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m^2 where:

$$Lw = 10Log\frac{P}{P_0}\ \text{dB}$$

Where: p is the rms value of sound power in pascals; and
P_0 is 1 pW.

sound pressure level The sound pressure level at a point is defined as:

$$Lp = 20Log\frac{P}{P_0}\ \text{dB}$$

specific noise level A component of the ambient noise which can be specifically identified by acoustical means and may be associated with a specific source. In BS 4142, there is a more precise definition as follows: 'the equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval ($L_{Aeq,T}$)'.

tonal Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.

$^1/_3$ octave analysis Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one–third of an octave each.

APPENDIX 8.2 – NOISE MODELLING DETAILS & ASSUMPTIONS

Noise Model

A 3D computer-based prediction model has been prepared in order to quantify the noise level associated with the proposed building. This section discusses the methodology behind the noise modelling process.

DGMR iNoise

Proprietary noise calculation software has been used for the purposes of this modelling exercise. The selected software, DGMR iNoise, calculates noise levels in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*.

DGMR iNoise is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. iNoise calculates noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of A weighted sound power levels (LWA);
- the distance between the source and receiver;
- the presence of obstacles such as screens or barriers in the propagation path;
- the presence of reflecting surfaces;
- the hardness of the ground between the source and receiver;
- Attenuation due to atmospheric absorption; and
- Meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

Brief Description of ISO9613-2: 1996

ISO9613-2:1996 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT}(DW)$, for the following conditions:

- wind direction at an angle of ±45° to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
- wind speed between approximately 1ms-1 and 5ms-1, measured at a height of 3m to 11m above the ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground based temperature inversion, such as commonly occurs on clear calm nights.

The basic formula for calculating $L_{AT}(DW)$ from any point source at any receiver location is given by:

$$L_{fT}(DW) = LW + Dc - A \qquad \textbf{Eqn. A}$$

Where:

$L_{fT}(DW)$ is an octave band centre frequency component of $L_{AT}(DW)$ in dB relative to $2x10^{-5}$Pa;
L_W is the octave band sound power of the point source;
D_c is the directivity correction for the point source;
A is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects.

The estimated accuracy associated with this methodology is shown in Table 1:

Height, h*	Distance, d†	
	0 < d < 100m	100m < d < 1,000m
0<h<5m	±3dB	±3dB
5m<h<30m	±1dB	±3dB

Table 1 Estimated Accuracy for Broadband Noise of L_{AT}(DW)

***** h is the mean height of the source and receiver. † d is the mean distance between the source and receiver.
N.B. These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.

Input Data and Assumptions

The noise model has been constructed using data from various source as follows:

Site Layout The general site layout has been obtained from the drawings forwarded by the project architects.

Local Area The location of noise sensitive locations has been obtained from a combination of site drawings provided by the project architects and others obtained from Ordinance Survey Ireland (OSI).

Heights The heights of buildings on site have been obtained from site drawings forwarded by the project architects. Off-site buildings have been assumed to be 8m high with the exception of industrial buildings where a default height of 15m has been assumed.

Contours Site ground contours/heights have been obtained from site drawings forwarded by the project architects where available.

The final critical aspect of the noise model development is the inclusion of the various plant noise sources. Details are presented in the following section.

Source Sound Power Data – Data Centre

The noise modelling competed indicates the following limits in relation to various items of plant associated with the data centre. Plant items will be selected in order to achieve the stated noise levels and or appropriate attenuation will be incorporated into the design of the plant/building in order that the plant noise emission levels are achieved on site (including any system regenerated noise).

Source	L_{WA} - Octave Band Centre Frequency								dB (A)
	63	125	250	500	1k	2k	4k	8k	
Air Cooled Chillers Note A	--	108	95	91	92	87	82	78	97
Generator Intake Note B	81	80	76	73	63	61	55	69	85
Generator Rear Note B	84	78	68	67	69	67	70	62	86
Generator Stack Note B	84	78	68	67	69	67	70	62	86
Generator Sides & Roof Note B	78	87	86	82	76	65	53	55	91
Outdoor Condenser 1 Note C	104	93	91.5	90	83.5	81.5	77	72	91
DC AHU Supply Note D	66	62	71	64	57	55	48	42	66
DC AHU Exhaust Note D	68	68	77	74	76	72	68	64	80
AHU Supply Note E	65	71	68	79	80	76	75	64	84
AHU Exhaust Note E	60	70	64	76	78	75	74	62	82
HRU Supply Note E	66	82	69	78	79	74	71	62	82
HRU Exhaust Note E	64	76	66	76	76	72	68	59	80
Outdoor Condenser 2 Note F	--	--	--	--	73	--	--	--	73
Electrical Room Extract Fan Ground Floor Note G	74	76	72	69	67	65	60	55	72
Electrical Room Extract Fan Second Floor Note H	80	86	79	76	79	79	78	73	85

Table 2 L_{wA} levels Utilised in Noise Model – Data Centre

Note A: 9 chillers are proposed. It is advised only 7 chillers will operate at any one time.

Note B: Generator data assumed from AWN database in absence of specific data. Data based on a Cummings unit. Unit assumed relates to a unit with an average noise level of some 75 dB(A) at 1m.

Note C: Assumed unit will operate on a 75% load. Based on data to hand this would indicate a 8 dB reduction in the noise levels presented. This has been assumed as part of the modelling exercise.

Note D: 4 systems proposed. It is assumed that the exhaust element will incorporate additional attenuation that offers the minimum sound insertion loss presented in Table 3.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Attenuator	4	6	11	20	21	17	11	10

Table 3 Sound Insertion Loss for Additional Attenuation

Note E: 1 system proposed. It is assumed that the exhaust element will incorporate additional attenuation that offers the minimum sound insertion loss presented in Table 3.

Note F: 4 systems proposed.

Note G: 4 systems proposed.

Note H: 4 systems proposed. It is assumed that the exhaust element will incorporate additional attention that offers the minimums sound insertion loss presented in Table 3. A 3.5 m high solid acoustic screen is proposed around the chiller yard. In addition, a 4.5m high louvred screen is proposed around the containerized generator units at ground floor level. A suitable screen is as follows:

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Louvred Screen at Generator Yard	5	6	12	16	22	18	15	14

Table 4 Sound Insertion Loss for Generator Yard Screen

Source Sound Power Data – OSPG

The noise modelling competed indicates the following limits in relation to various items of plant associated with the OSPG compound. Plant items will be selected in order to achieve the stated noise levels and or appropriate attenuation will be incorporated into the design of the plant/building in order that the plant noise emission levels are achieved on site (including any system regenerated noise). It is assumed that noise from any plant associated with the development is neither tonal nor impulsive in nature. Note that a 5.0 m high solid wall surrounds the compound.

Source	L_{wA} - Octave Band Centre Frequency								dB (A)
	63	125	250	500	1k	2k	4k	8k	
Generator Front and Rear Note A	59	59	60	68	67	66	68	68	75
Generator Sides Note A	67	67	67	75	75	73	75	75	82
Generator Roof Note A	65	66	66	74	74	72	74	74	81
Generator Stack Note A	68	81	82	85	84	81	75	75	90
Air Cooler Front and Rear Note A	34	47	52	56	59	53	47	47	62
Air Cooler Sides Note A	38	51	56	60	63	57	51	51	66
Air Cooler Top Note A	42	55	60	64	67	61	55	55	70
Transformer Note B	43	58	64	70	67	63	58	49	73
HVAC (5 Per Unit) Note B	41	58	55	55	53	49	40	26	62
Inverter Note B	66	73	81	84	84	84	86	77	91
Station Transformer Note B	55	70	77	82	79	75	70	61	85
VAR Unit Note C	--	--	--	78	--	--	--	--	78

Table 5 L_{wA} levels Utilised in Noise Model – OPSG

Note A: 10 generators are proposed, each with an air cooler unit.

Note B: Data assumed from AWN database in absence of specific data.

Note C: Where no spectrum data is available, predictions are based on an attenuation figures for 500Hz in accordance with ISO 9613-2:1996 *Acoustics – Attenuation of Sound during propagation outdoors*.

APPENDIX 8.3 – NOISE MODEL PARAMETERS

Prediction calculations for noise emissions have been conducted in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*. The following are the main aspects that have been considered in terms of the noise predictions presented in this instance.

Directivity Factor: The directivity factor (D) allows for an adjustment to be made where the sound radiated in the direction of interest is higher than that for which the sound power level is specified. In this case the sound power level is measures in a down wind direction, corresponding to the worst case propagation conditions and needs no further adjustment.

Ground Effect: Ground effect is the result of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on source height receiver height propagation height between the source and receiver and the ground conditions. The ground conditions are described according to a variable defined as G, which varies between 0.0 for hard ground (including paving, ice concrete) and 1.0 for soft ground (includes ground covered by grass trees or other vegetation) Our predictions have been carried out using various source height specific to each plant item, a receiver heights of 1.6m for single storey properties and 4m for double. An assumed ground factor of G = 0.5 has been applied off site. Noise contours presented in the assessment have been predicted to a height of 4m in all instances. For construction noise predictions have been made at a level of 1.6m as these activities will not occur at night.

Geometrical Divergence This term relates to the spherical spreading in the free-field from a point sound source resulting in attenuation depending on distance according to the following equation:

$$A_{geo} = 20 \times \log(\text{distance from source in meters}) + 11$$

Atmospheric Absorption Sound propagation through the atmosphere is attenuated by the conversion of the sound energy into heat. This attenuation is dependent on the temperature and relative humidity of the air through which the sound is travelling and is frequency dependent with increasing attenuation towards higher frequencies. In these predictions a temperature of 10°C and a relative humidity of 70% have been used, which give relativity low levels of atmosphere attenuation and corresponding worst case noise predictions.

Temp (°C)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	70	0.12	0.41	1.04	1.93	3.66	9.66	32.77	116.88

Table 1 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Barrier Attenuation The effect of any barrier between the noise source and the receiver position is that noise will be reduced according to the relative heights of the source, receiver and barrier and the frequency spectrum of the noise.

APPENDIX 8.4 – INDICATIVE CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN

This Noise and Vibration Management Plan (NVMP) details a *'Best Practice'* approach to dealing with potential noise and vibration emissions during the construction phase of the development. The Plan should be adopted by all contractors and sub-contractors involved in construction activities on the site. The Site Manager should ensure that adequate instruction is provided to contractors regarding the noise and vibration control measures contained within this document.

The environmental impact assessment report (EIA Report) conducted for the construction activity has highlighted that the construction noise and vibration levels can be controlled to within the adopted criteria. However, mitigation measures should be implemented, where necessary, in order to control impacts to nearby sensitive areas within acceptable levels.

Nearby sensitive properties in the vicinity of the proposed development are summarised in Figure 8.5.1 below:



Figure 1 Sensitive Receptors

Construction Noise Criteria

As referenced in the EIA Report prepared for the site, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the TII publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[1] which indicates the following criteria and hours of operation.

Days and Times	Noise Levels (dB re. 2x10-5 Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00hrs to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00hrs to 14:00hrs	65	75

Table 8.5.1 Construction Noise Limit Values

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

[1] Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (2014), Transport Infrastructure Ireland (TII).

Construction Vibration Criteria

It is recommended in the EIA Report that vibration from construction activities to off-site residences be limited to the values set out in Table 8.5.2. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

Table 8.5.2 Construction Vibration Limit Values

Hours of Work

The proposed general construction hours are 07:00 to 19:00hrs, Monday to Friday and 08:00 to 14:00 on Saturdays. However, there are also weekday evening works proposed (19:00 to 22:00hrs), permission for which will be required from South Dublin County Council.

Weekday evening activities should be significantly reduced and generally only involve internal activities and concrete pouring which will be required during certain phases of the development. As a result noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

Best Practice Guidelines for the Control of Noise & Vibration

BS5228 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- control of noise sources;
- screening;
- hours of work;
- liaison with the public, and;
- monitoring.

Detailed comment is offered on these items in the following paragraphs. Noise and vibration control measures that will be considered include the selection of suitable plant, enclosures and screens around noise sources, limiting the hours of work and monitoring.

Selection of Quiet Plant

This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

General Comments on Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration should be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

BS5228 states that *"as far as reasonably practicable sources of significant noise should be enclosed"*. In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators. Demountable enclosures will also be used to screen operatives using hand tools and will be moved around site as necessary.

In practice, a balance may need to be struck between the use of all available techniques and the resulting costs of doing so. As with Ireland's Environmental Protection Act legislation, we propose that the concept of "*best available techniques not entailing excessive cost*" (BATNEEC) be adopted. Furthermore, proposed noise control techniques should be evaluated in light of their potential effect on occupational safety etc.

BS5228 makes a number of recommendations in relation to "use and siting of equipment". These are all directly relevant and hence are reproduced in full. These recommendations will be adopted on site.

> "Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas. Special care will be necessary when work has to be carried out at night.
>
> Circumstances can arise when night-time working is unavoidable. Bearing in mind the special constraints under which such work has to be carried out, steps should be taken to minimise disturbance to occupants of nearby premises.
>
> Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.
>
> Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.
>
> Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.
> Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."

All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen should be bent around the source. The height of any screen should be such that there is no direct line of sight between the source and the receiver.

BS5228 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier should be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice screens constructed of materials with a mass per unit of surface area greater than 7 kg/m^2 will give adequate sound insulation performance.

In addition, careful planning of the site layout should also be considered. The placement of site buildings such as offices and stores and in some instances materials such as topsoil or aggregate can provide a degree of noise screening if placed between the source and the receiver.

Vibration

The vibration from construction activities will be limited to the values set out in Table 2. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage, these limits may need to be reduced by up to 50%.

Liaison with the Public

The Contractor will provide proactive community relations and will notify the public and sensitive premises before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works. The Contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.

A designated noise liaison should be appointed to site during construction works. Any complaints should be logged and followed up in a prompt fashion. In addition, prior to particularly noisy construction activity, e.g. rock breaking, piling, etc., the site contact should inform the nearest noise sensitive locations of the time and expected duration of the works.

Noise Monitoring

During the construction phase consideration should be given to noise monitoring at the nearest sensitive locations.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2007: *Acoustics – Description, measurement and assessment of environmental noise* and be located a distance of greater than 3.5m away from any reflective surfaces, e.g. walls, in order to ensure a free-field measurement without any influence from reflected noise sources.

Vibration Monitoring

During the construction phase consideration should be given to vibration monitoring at the nearest sensitive locations.

Vibration monitoring should be conducted in accordance with BS7385-1 (1990) *Evaluation and measurement for vibration in buildings — Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings* or BS6841 (1987) *Guide to measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock*.

The mounting of the transducer to the vibrating structure should comply with BS ISO 5348:1998 *Mechanical vibration and shock – Mechanical mounting of accelerometers*. In summary, the following ideal mounting conditions apply:

- the transducer and its mountings are as rigid as possible;
- the mounting surfaces should be as clean and flat as possible;
- simple symmetric mountings are best, and;
- the mass of the mounting should be small in comparison to that of the structure under test.

In general the transducer will be fixed to the floor of a building or concrete base on the ground using expansion bolts. In instances where the vibration monitor will be placed outside of a building a flat and level concrete base with dimensions of approximately 1m x 1m x 0.1m will be required.

APPENDIX 9.1

DESCRIPTION OF THE AERMOD MODEL

The AERMOD dispersion model has been recently developed, in part, by the U.S. Environmental Protection Agency (USEPA, 2021). The model is a steady-state Gaussian model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement on the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources. The 2005 Guidelines on Air Quality Models has promulgated AERMOD as the preferred model for a refined analysis from industrial sources, in all terrains.

Improvements over the ISCST3 model include the treatment of the vertical distribution of concentration within the plume. ISCST3 assumes a Gaussian distribution in both the horizontal and vertical direction under all weather conditions. AERMOD, however, treats the vertical distribution as non-Gaussian under convective (unstable) conditions while maintaining a Gaussian distribution in both the horizontal and vertical direction during stable conditions. This treatment reflects the fact that the plume is skewed upwards under convective conditions due to the greater intensity of turbulence above the plume than below. The result is a more accurate portrayal of actual conditions using the AERMOD model. AERMOD also enhances the turbulence of night-time urban boundary layers thus simulating the influence of the urban heat island.

In contrast to ISCST3, AERMOD is widely applicable in all types of terrain. Differentiation of the simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. In the dividing-streamline concept, flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. Extensive validation studies have found that AERMOD performs better than ISCST3 for many applications and as well or better than CTDMPLUS for several complex terrain data sets (USEPA, 1999).

AERMOD has made substantial improvements in the area of plume growth rates in comparison to ISCST3 (USEPA 2021). ISCST3 approximates turbulence using six Pasquill-Gifford-Turner Stability Classes and bases the resulting dispersion curves upon surface release experiments. This treatment, however, cannot explicitly account for turbulence in the formulation. AERMOD is based on the more realistic modern planetary boundary layer (PBL) theory which allows turbulence to vary with height. This use of turbulence-based plume growth with height leads to a substantial advancement over the ISCST3 treatment.

Improvements have also been made in relation to mixing height (USEPA 2021). The treatment of mixing height by ISCST3 is based on a single morning upper air sounding each day. AERMOD, however, calculates mixing height on an hourly basis based on the morning upper air sounding and the surface energy balance, accounting for the solar radiation, cloud cover, reflectivity of the ground and the latent heat due to evaporation from the ground cover. This more advanced formulation provides a more realistic sequence of the diurnal mixing height changes.

AERMOD also contains improved algorithms for dealing with low wind speed (near calm) conditions. As a result, AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s, but still greater than the instrument threshold.

APPENDIX 9.2

DESCRIPTION OF AERMET

AERMOD incorporates a meteorological pre-processor AERMET. AERMET allows AERMOD to account for changes in the plume behaviour with height. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, convective (CBL) and stable boundary layer (SBL) height and surface heat flux. AERMOD uses this information to calculate concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. A morning sounding from a representative upper air station, latitude, longitude, time zone, and wind speed threshold are also required.

Two files are produced by AERMET for input to the AERMOD dispersion model. The surface file contains observed and calculated surface variables, one record per hour. The profile file contains the observations made at each level of a meteorological tower, if available, or the one-level observations taken from other representative data, one record level per hour.

From the surface characteristics (i.e. surface roughness, albedo and amount of moisture available (Bowen Ratio)) AERMET calculates several boundary layer parameters that are important in the evolution of the boundary layer, which, in turn, influences the dispersion of pollutants. These parameters include the surface friction velocity, which is a measure of the vertical transport of horizontal momentum; the sensible heat flux, which is the vertical transport of heat to/from the surface; the Monin-Obukhov length which is a stability parameter relating the surface friction velocity to the sensible heat flux; the daytime mixed layer height; the nocturnal surface layer height and the convective velocity scale which combines the daytime mixed layer height and the sensible heat flux. These parameters all depend on the underlying surface.

The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g. urban, cultivated land etc.) and vary with seasons and wind direction. The assessment of appropriate land-use types was carried out in line with USEPA recommendations.

Surface roughness

Surface roughness length is the height above the ground at which the wind speed goes to zero. Surface roughness length is defined by the individual elements on the landscape such as trees and buildings. In order to determine surface roughness length, the USEPA recommends that a representative length be defined for each sector, based on an upwind area-weighted average of the land use within the sector, by using the eight land use categories outlined by the USEPA. The inverse-distance weighted surface roughness length derived from the land use classification within a radius of 1km from Casement Aerodrome Meteorological Station is shown in Table A9.1.

Sector	Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
0-360	100% Grassland	0.050	0.100	0.010	0.010

Note 1: Winter defined as periods when surfaces covered permanently by snow whereas autumn is defined as periods when freezing conditions are common, deciduous trees are leafless and no snow is present (Iqbal, 1983). Thus for the current location autumn more accurately defines "winter" conditions at the proposed facility.

Table A9.1 Surface Roughness based on an inverse distance weighted average of the land use within a 1km radius of Casement Aerodrome Meteorological Station.

Albedo

Noon-time albedo is the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Albedo is used in calculating the hourly net heat balance at the surface for calculating hourly values of Monin-Obuklov length. A 10km x 10km square area is drawn around the meteorological station to determine the albedo based on a simple average for the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Casement Meteorological Station is shown in Table A9.2.

Area-weighted Land Use Classification	Spring	Summer	Autumn	Winter[1]
0.5% Water, 30% Urban, 0.5% Coniferous Forest 38% Grassland, 19% Cultivated Land	0.155	0.180	0.187	0.187

(1) For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A9.2 Albedo based on a simple average of the land use within a 10km × 10km grid centred on Casement Aerodrome Meteorological Station.

Bowen Ratio

The Bowen ratio is a measure of the amount of moisture at the surface of the earth. The presence of moisture affects the heat balance resulting from evaporative cooling which, in turn, affects the Monin-Obukhov length which is used in the formulation of the boundary layer. A 10km x 10km square area is drawn around the meteorological station to determine the Bowen Ratio based on geometric mean of the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Casement Meteorological Station is shown in Table A9.3.

Geometric Mean Land Use Classification	Spring	Summer	Autumn	Winter[1]
0.5% Water, 30% Urban, 0.5% Coniferous Forest 38% Grassland, 19% Cultivated Land	0.549	1.06	1.202	1.202

(1) For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A9.3 Bowen Ratio based on a geometric mean of the land use within a 10km × 10km grid centred on Casement Aerodrome Meteorological Station.

APPENDIX 9.3

THERMAL PLUME MODELLING OF DATA CENTRE AND PROPOSED ENERGY CENTRE

PREPARED BY AWN CONSULTING LTD.

THERMAL PLUME MODELLING OF PROPOSED EQUINIX DB8 ON-SITE POWER GENERATION

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Technical Report Prepared By

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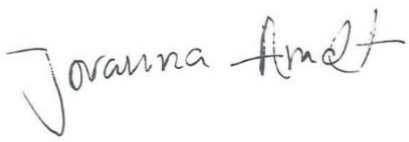
Signature		
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Date	17 October 2022	17 October 2022

EXECUTIVE SUMMARY

This report, prepared by AWN Consulting Ltd, provides an assessment of the potential impact of the plumes associated with the operational phase of the proposed Equinix DB8 on-site power generation (OSPG) facility adjacent to the DB8 data centre site located off the Nangor Road, Grangecastle, Co. Dublin on aircraft in the vicinity of Casement Aerodrome. Both aeroplanes and helicopters will be likely to use Casement Aerodrome. However, it is helicopters which are at most risk from industrial plumes due to the risk of reduced oxygen and high temperatures and vertical velocities.

The issue of plume characteristics and the effect on the operation of helicopters in particular in the region of the site and Casement Aerodrome has been assessed below. An assessment has been undertaken to determine the region surrounding the facility where levels of excess temperature, turbulence (vertical velocity) and reduced oxygen could potentially be encountered. Studies undertaken by the MITRE Corporation (MITRE, 2012) and outlined in the user manual for the "Exhaust-Plume-Analyzer" model detail the likely impact of an exhaust plume on aircraft based on a range of parameters / criteria including the thermal buoyancy and temperature of the plume.

The current study is based on detailed site-specific information. The site-specific study, using the Cambridge Environmental Research Consultants (CERC) AMDS-5 model for oxygen, temperature and vertical velocity, allows the actual emission data for the facility to be used as input into the model. In addition, meteorological data for the region, based on 3 years of data from Casement Aerodrome meteorological station (2019 – 2021) and building data also forms part of the inputs to the model to allow an accurate representation of the impact of the facility in the surrounding environment. As discussed in detail below, the site-specific risk heights have been found to be limited to a distance of 9 metres from the stack top. As the diesel generators have a greater stack height, the maximum height above ordnance datum is 104.2 m Ordnance Datum (OD) (based on a base elevation of 95.2 m OD, a stack height of 20 m and the temperature exclusion zone of 9 m above stack top) and this defines the relevant exclusion zone due to these emission points.

Conclusion

Thus, in summary the results of the analysis are as follows:

- **Oxygen Content –** within 1 metre of the stack top the oxygen concentration will increase above the 12% risk level for oxygen for both gas engines (89 m OD) and diesel generators (96.2 m OD).

- **Temperature –** the temperature of the plume will drop to less than 50°C beyond 10 metres (99 m OD) of the stack top for the gas engines and beyond 9 metres (104.2 m OD) of the stack top for the diesel generators.

- **Vertical Velocity –** the critical vertical velocity of 4.3 m/s will not be exceeded beyond 14 metres (103 m OD) from the stack top of the gas engines and beyond 1 metre (96.2 m OD) from the stack top of the diesel generators.

Thus, the maximum extent of the risk zone of the plume for each parameter is shown below based on a full year of meteorological data covering all meteorological conditions including pressure/temperature inversions:

- Risk Zone for Oxygen **– < 1 metre (96.2 m OD)**

- Risk Zone for Temperature **– 9 metres (104.2 m OD)**

- Risk Zone for Vertical Velocity **– 14 metres (103 m OD)**

- **COMBINED RISK ZONE – within 9 metres above stack top and 104.2 m OD.**

In summary, beyond 9 m above the stack top (104.2 m OD), the levels of oxygen, temperature and vertical velocity will have returned to accepted/ambient levels.

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1.0 INTRODUCTION

This report, prepared by AWN Consulting Ltd, provides an assessment of the potential impact of the plumes associated with the operational phase of the proposed Equinix DB8 on-site power generation (OSPG) facility adjacent to the DB8 data centre site located off the Nangor Road, Grangecastle, Co. Dublin on aircraft in the vicinity of Casement Aerodrome. Both aeroplanes and helicopters are likely to use Casement Aerodrome. However, it is helicopters which are at most risk from industrial plumes due to the risk of reduced oxygen and high temperatures and vertical velocities.

The issue of plume characteristics and the effect on the operation of helicopters in particular in the region of the site and Casement Aerodrome has been assessed below. An assessment has been undertaken to determine the region surrounding the facility where levels of excess temperature, turbulence (vertical velocity) and reduced oxygen could potentially be encountered. Studies undertaken by the MITRE Corporation (MITRE, 2012) and outlined in the user manual for the "Exhaust-Plume-Analyzer" model detail the likely impact of an exhaust plume on aircraft based on a range of parameters / criteria including the thermal buoyancy and temperature of the plume.

The current study is based on detailed site-specific information. The site-specific study, using the Cambridge Environmental Research Consultants (CERC) AMDS-5 model for oxygen, temperature and vertical velocity, allows the actual emission data for the facility to be used as input into the model. In addition, meteorological data for the region, based on 3 years of data from Casement Aerodrome (2019 – 2021) and building data also forms part of the inputs to the model to allow an accurate representation of the impact of the facility in the surrounding environment.

2.0 METHODOLOGY

The parameters of the plume which are most relevant to helicopters has been investigated by the Mitre Corporation as part of the development of the "*Expanded Model For Determining The Effects Of Vertical Plumes On Aviation Safety*" (MITRE, 2012). These parameters have been reviewed below.

2.1 Oxygen

The Mitre Corporation report confirms that oxygen levels below 12% are potentially hazardous to helicopters (MITRE, 2012) and thus the oxygen content of the plume with distance from the stack has been investigated.

In relation to the gas engines, the oxygen content of the plume at stack top will typically be 9.9% and has been assumed in the assessment. In relation to the diesel generators, the oxygen content of the plume at stack top will typically be 5.5% and has been assumed in the assessment.

2.2 Temperature

The Mitre Corporation report confirms that temperatures in excess of 50°C are potentially hazardous to helicopters (MITRE, 2012) and thus the temperature of the plume with distance from the stack has been investigated.

In relation to the gas engines, the temperature of the plume at stack top is 707.15K (434°C). In relation to the diesel generators, the temperature of the plume at stack top is 736.15K (463°C).

2.3 Vertical Velocity

High vertical velocities are also a concern when considering helicopter / plume interactions as they can lead to increased turbulence in the atmosphere. The literature (CASA, 2012) suggests that the critical level for vertical velocities is 4.3 m/s. Thus, modelling has been undertaken to understand the worst-case vertical velocities of both the gas engine plume and diesel generator plume with distance from the stack.

The change in each of these parameters with distance from the stack has been reviewed below. The ADMS-5 model has the capability to process calm conditions by setting the wind speed to 0.3 m/s and allowing an equal probability for all wind directions. This option has been used in this assessment for oxygen assessment, temperature assessment and the vertical velocity assessment. The model was also run with a receptor grid based on 25m horizontal spacing and 40m vertical spacing, with an overall size of approx. 2.36 km x 2.85 km, shown in Figure 1.

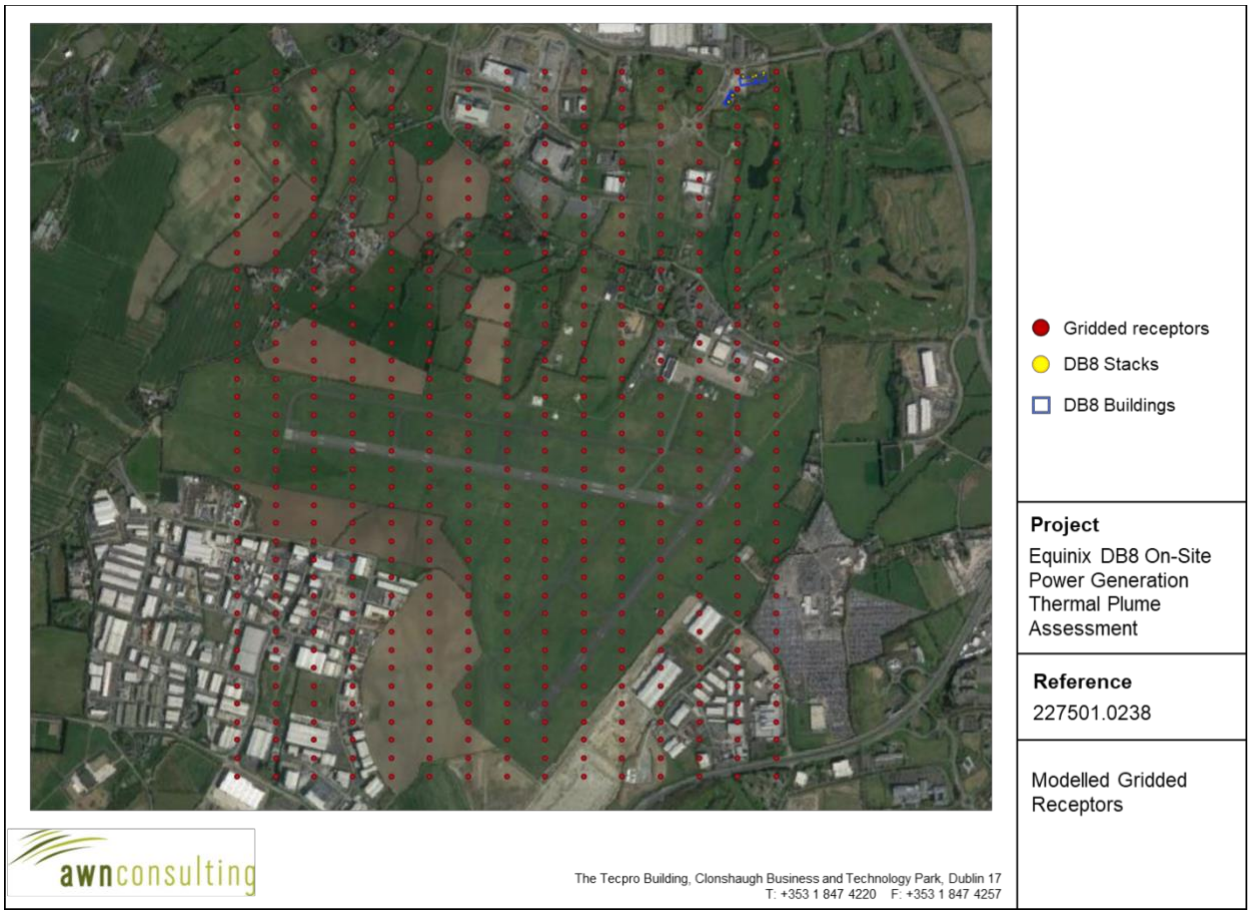


Figure 1. Study area – modelled gridded receptors

2.4 Meteorology

For each of the model parameters, 3 full years of meteorological conditions have been used in the analysis including periods of atmospheric pressure/temperature inversions. Meteorological data for the years 2019 – 2021 for Casement Aerodrome meteorological station has been used in the analysis for all scenarios outlined.

Casement Aerodrome meteorological station, which is located approximately 1.5 km south of the site, collects data in the correct format and has a data collection of greater than 90% (Met Eireann, 2022). Long-term hourly observations at Casement Aerodrome meteorological station provide an indication of the prevailing wind conditions for the region

(see Figure 2). Results indicate that the prevailing wind direction is westerly to south-westerly in direction over the period 2019 – 2021. The mean wind speed is approximately 5.5 m/s over the period 2019 - 2021.

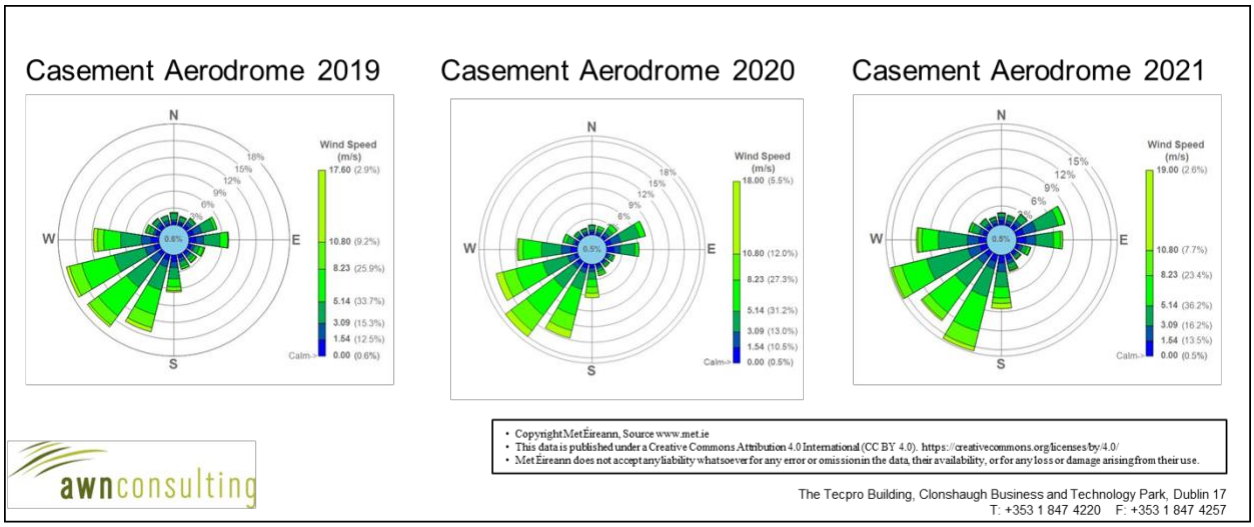


Figure 2. Casement Aerodrome Wind Roses 2019 -2021

3.0 PROCESS EMISSIONS

The proposed energy centre facility will have 8 operational gas engines which will have a stack height of 14 m. The proposed emergency diesel generators will have a maximum of 7 operational generators at which will have a stack height of 20 m. The source information for the modelled emission points has been summarised in Table 1.

Table 1. Summary of Source Information For The Gas Engine & Diesel Generator Plumes

Stack Reference	Height Above Ground Level (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temp (K)	Max Volume Flow (Nm^3/hr)	Exit Velocity (m/sec actual)	NO_2	
							Concentration (mg/Nm^3)	Mass Emission (g/s)
Gas Engines	14 (89 m OD)	0.4	0.13	707.15	14,790	50.4	95	0.38
Diesel Generators	20 (95.2 m OD)	0.6	0.28	736.15	19,396	20.8	1,355	7.30

Note Reference conditions are 273.15K, dry gas, 15% O_2.

4.0 RESULTS & DISCUSSION

4.1 Oxygen / Plume Interaction

The Mitre Corporation report (MITRE, 2012) confirms that depleted oxygen is generally of greatest concern when considering helicopter / plume interactions. The Mitre Corporation report confirms that at an oxygen content below 12% oxygen there is a risk of engine cut-out whilst above this level there is no risk to helicopter engines. Thus, modelling has been undertaken to determine the oxygen percentage of both the gas engines and diesel generators plume with distance from the stacks.

The following equation is used to model the % of oxygen in the plume with distance from the stack top. For a given emission concentration of any pollutant *e* (in μg/m^3), the oxygen content *O* (%), is related to the plume concentration *c* (in μg/m^3) by the following relationship (9.9 is the worst-case plume oxygen percentage at release for the gas engines):

$$c / e = (20.95 - O) / (20.95 – 9.9)$$

Thus, the calculation can be re-arranged to determine the oxygen content (%) of the plume as a function of distance from the stack top. The re-arranged equation is:

$$O\ (\%) = 20.95 - [(c/e) * (9.75)]$$

AMDS-5 was thus run to calculate the pollutant concentration and identify the distance from the plume centreline where the 12% oxygen level was exceeded for both the gas engines and diesel generators. Modelling was undertaken using Casement Aerodrome meteorological data for 2019 – 2021 with the worst-case year reported. Shown in Figure 3 is the result for the full year for the gas engines and in Figure 4 is the result for the full year for the diesel generators.

For the gas engines, within 1 m the oxygen content is greater than 12% oxygen. This analysis is based on every hour of the year for 2020 (worst-case year) and includes all meteorological conditions including pressure / temperature inversions.

For the diesel engines, within a distance of 1 m from the stack top, the oxygen content of the diesel generator plume will be 12% or greater. This analysis is based on every hour of the year for 2020 (worst-case year) and includes all meteorological conditions including pressure/temperature inversions.

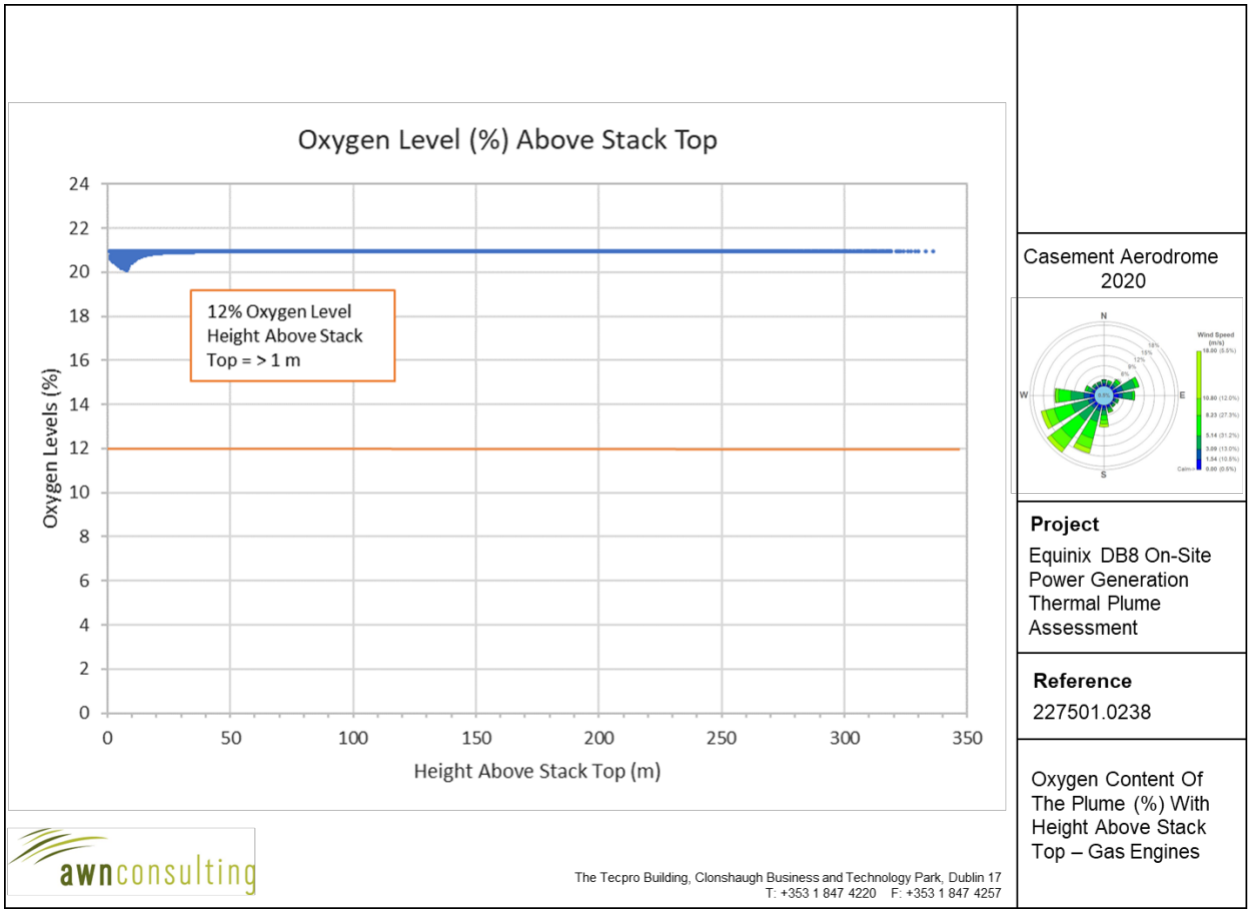


Figure 3. Oxygen Content Of The Plume (%) With Height Above Stack Top – Gas Engines

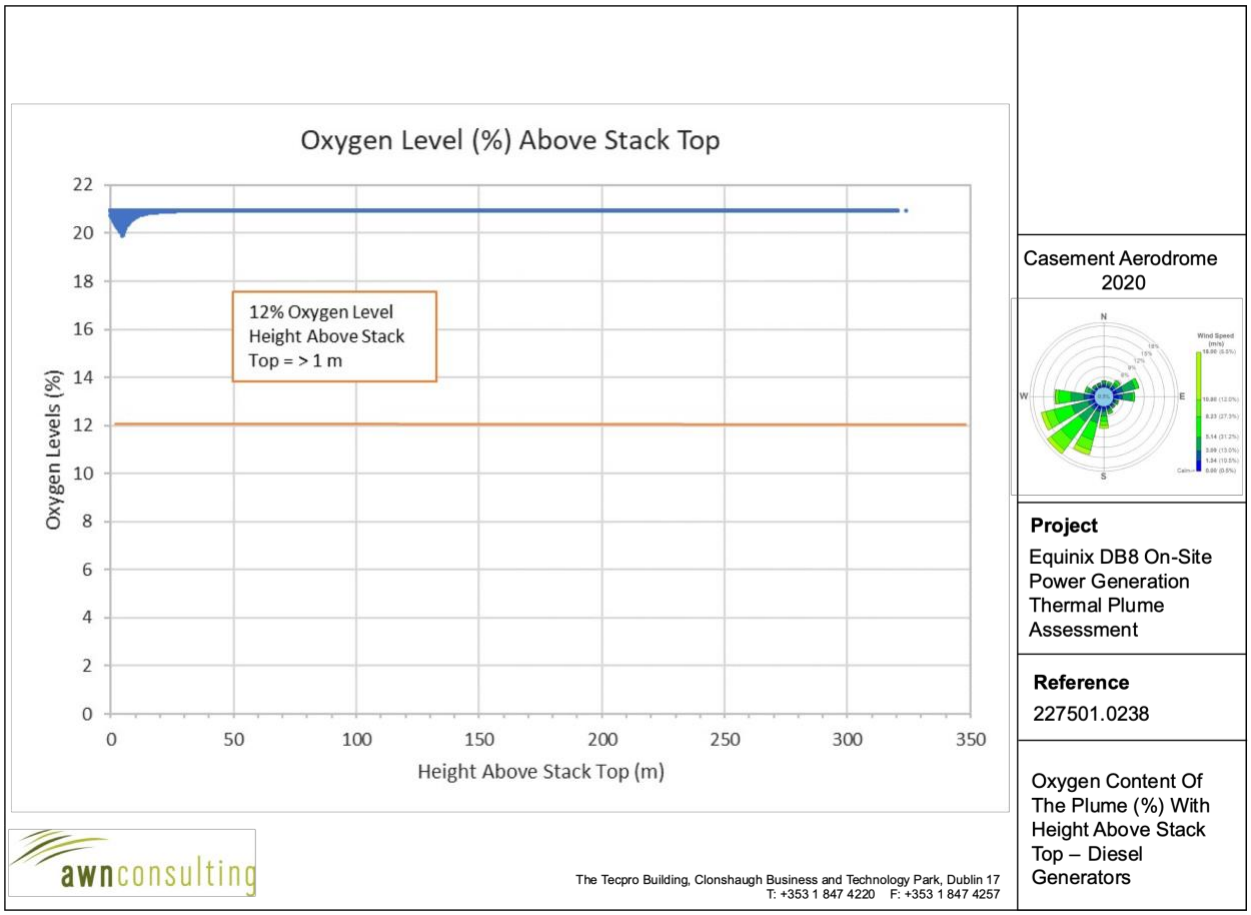


Figure 4. Oxygen Content Of The Plume (%) With Height Above Stack Top – Diesel Generators

4.2 Temperature / Plume Interaction

Temperatures in excess of 50°C are potentially hazardous to helicopters and thus the decrease in the initial temperature of both the gas engines plume (434°C) and the diesel generators plume (463°C) with distance from the stack has been investigated. Modelling of the temperature of the plume with distance from the stack has been undertaken using the CERC ADMS-5 model for every hour of the year based on Casement Aerodrome 2019 – 2021 meteorological data. The model has a specific temperature module which can, as part of the model output, give the temperature of the plume centreline with distance from the stack top.

The results are outlined below in Figure 5 and Figure 6 for 2020 (worst-case year) for the gas engines and in Figure 7 and Figure 8 for the diesel generators.

The results confirm that the plume will be below 50°C within 10 metres of the stack top and within 5 metres of the stack itself for every hour over the year for the gas engines and the plume will be below 50°C beyond 9 metres above the stack top and beyond 9 metres above the stack itself for every hour over the year for the diesel generators, including all meteorological conditions including pressure/temperature inversions for the worst-case year of 2020.

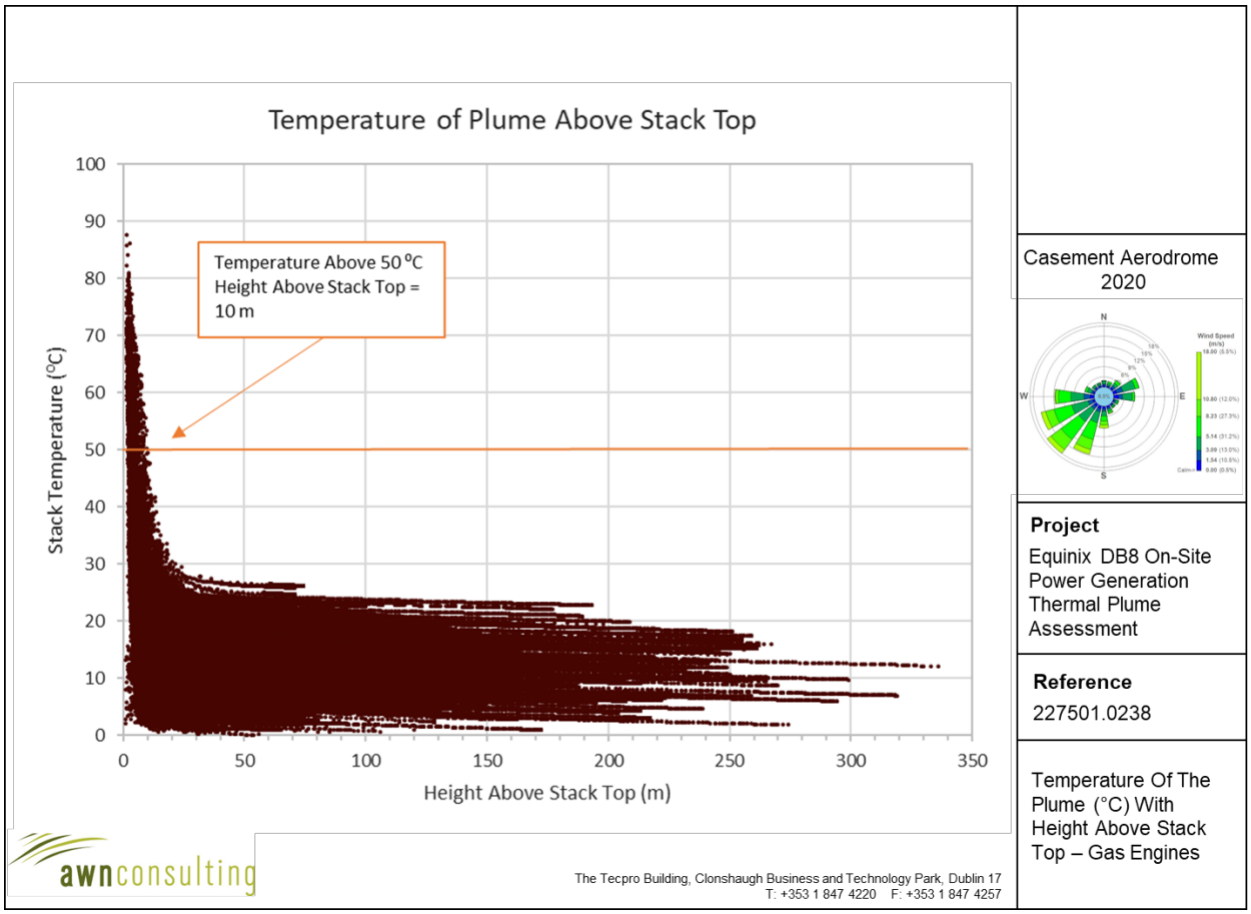


Figure 5. Temperature Of The Plume (°C) With Height Above Stack Top – Gas Engines

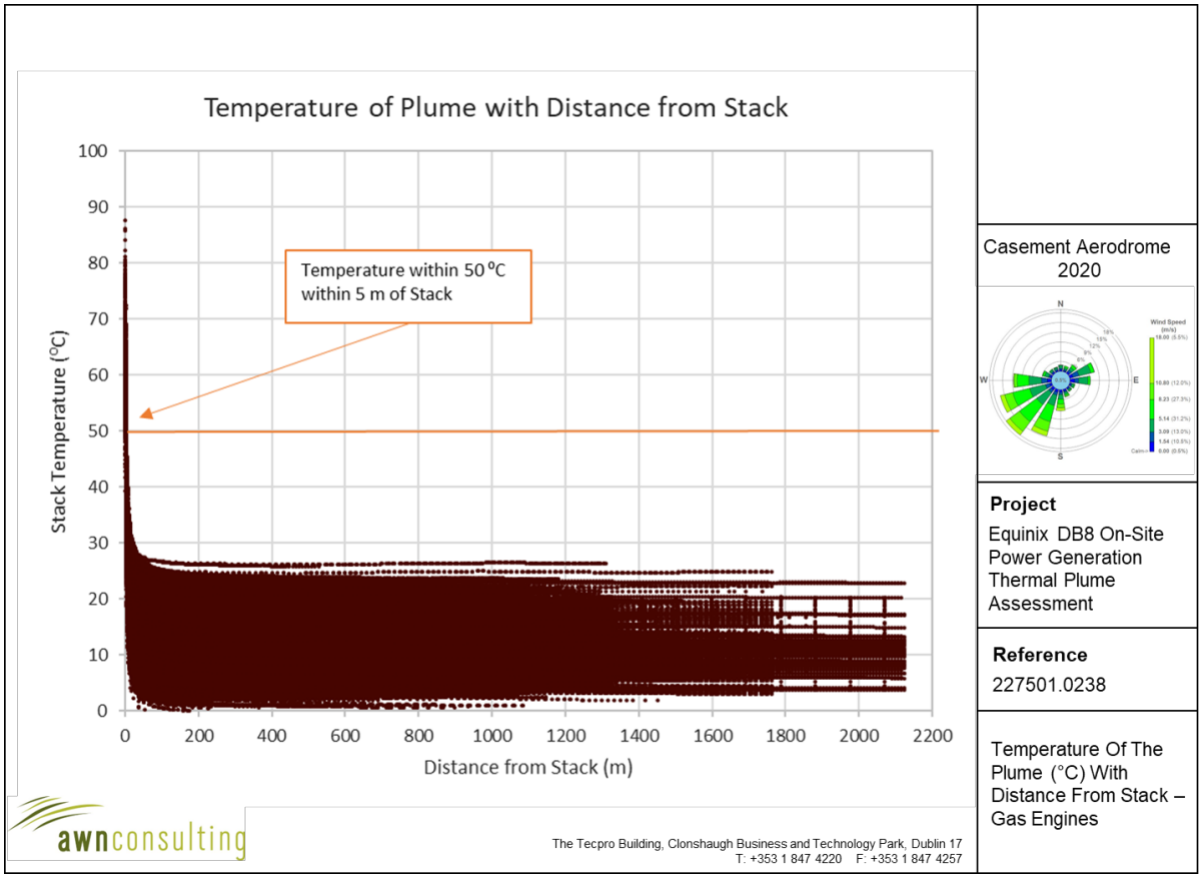


Figure 6. Temperature Of The Plume (°C) With Distance from Stack – Gas Engines

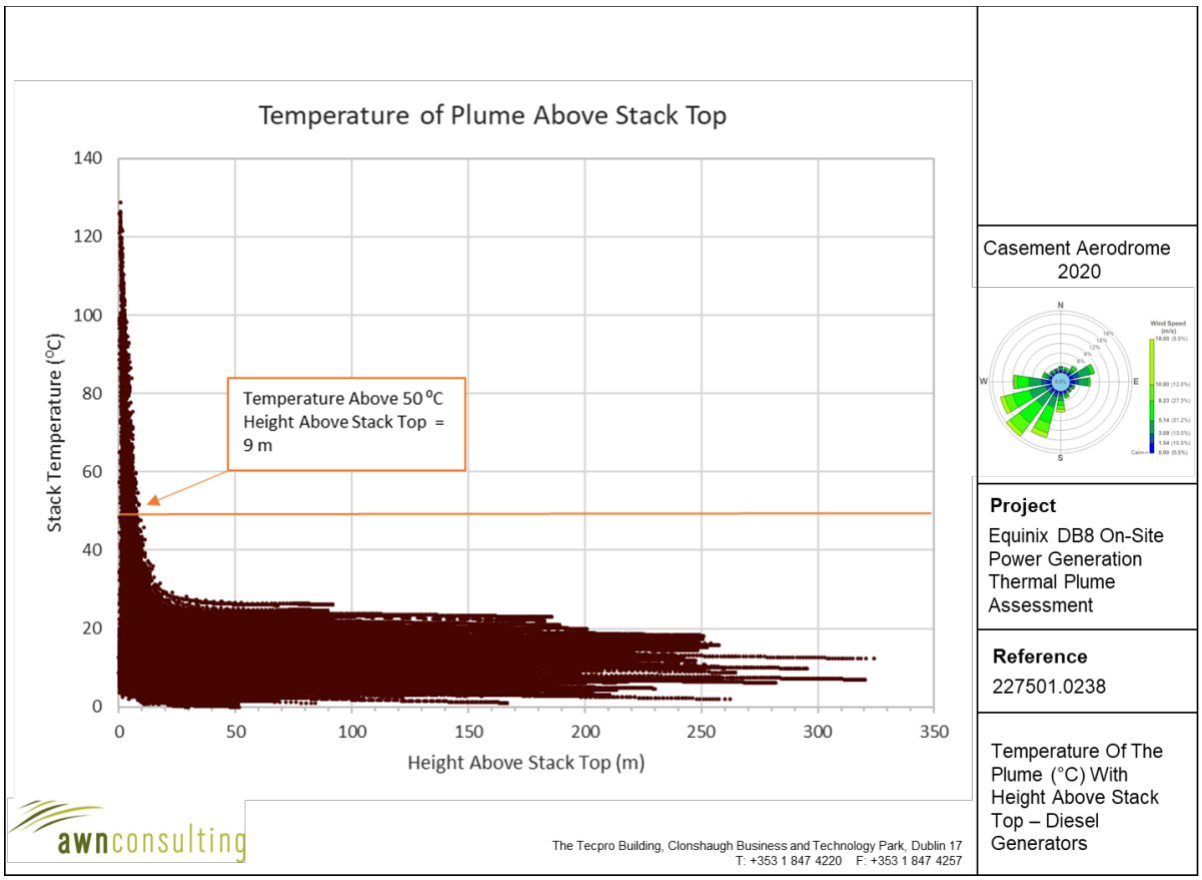


Figure 7. Temperature Of The Plume (°C) With Height Above Stack Top – Diesel Generators

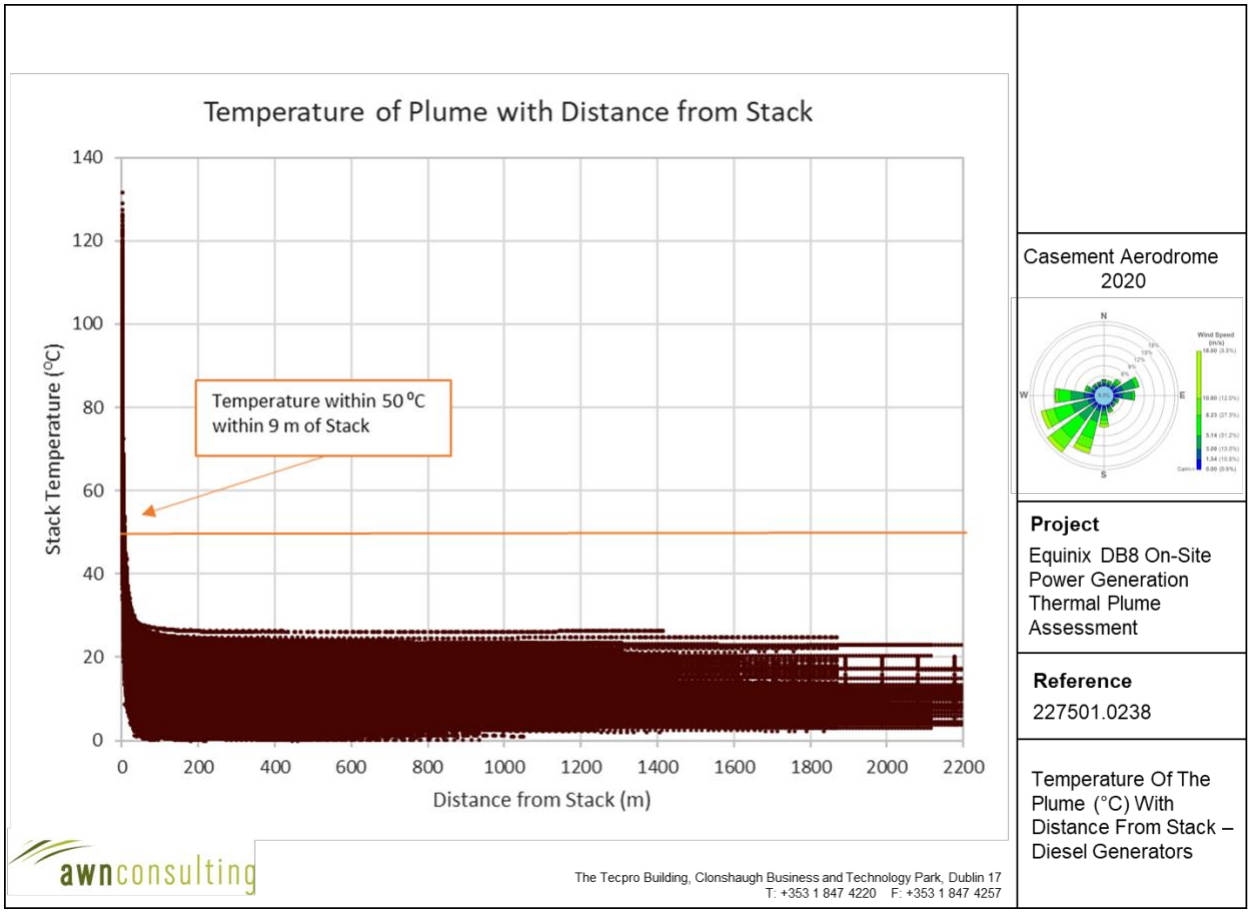


Figure 8. Temperature Of The Plume (°C) With Distance from Stack – Diesel Generators

4.3 Vertical Velocity / Plume Interaction

High vertical velocities are also relevant when considering helicopter / plume interactions. The Australian CASA (CASA, 2012) consider that the critical level for vertical velocity is 4.3 m/s. Thus, modelling has been undertaken to understand the vertical velocity of the plume with distance from the stack.

Cambridge Environmental Research Consultants (CERC), the developers of the EPA approved AMDS-5 model, were contacted to determine whether vertical velocity could be derived indirectly from the travel time of the plume with distance from the stack. CERC confirmed that the vertical velocity (in m/s) could be derived from an analysis of the plume centreline height (in metres) and the plume travel time (in seconds). The vertical velocity has been calculated for every hour of the year using Casement Aerodrome meteorological data for the period 2019 – 2021 as presented in Figure 9 and Figure 10 below for the gas engines and in Figure 11 and Figure 12 for the diesel generators for the worst-case year assessed (2020).

The results confirm that the vertical velocity of the plume will be below 4.3 m/s within 14 metres of the stack top and within 5 metres of the stack itself for every hour over the year for the gas engines and the plume will be below 4.3 m/s beyond 1 metre above the stack top and beyond 1 metre above the stack itself for every hour over the year for the diesel generators, including all meteorological conditions including pressure/temperature inversions for the worst-case year of 2020.

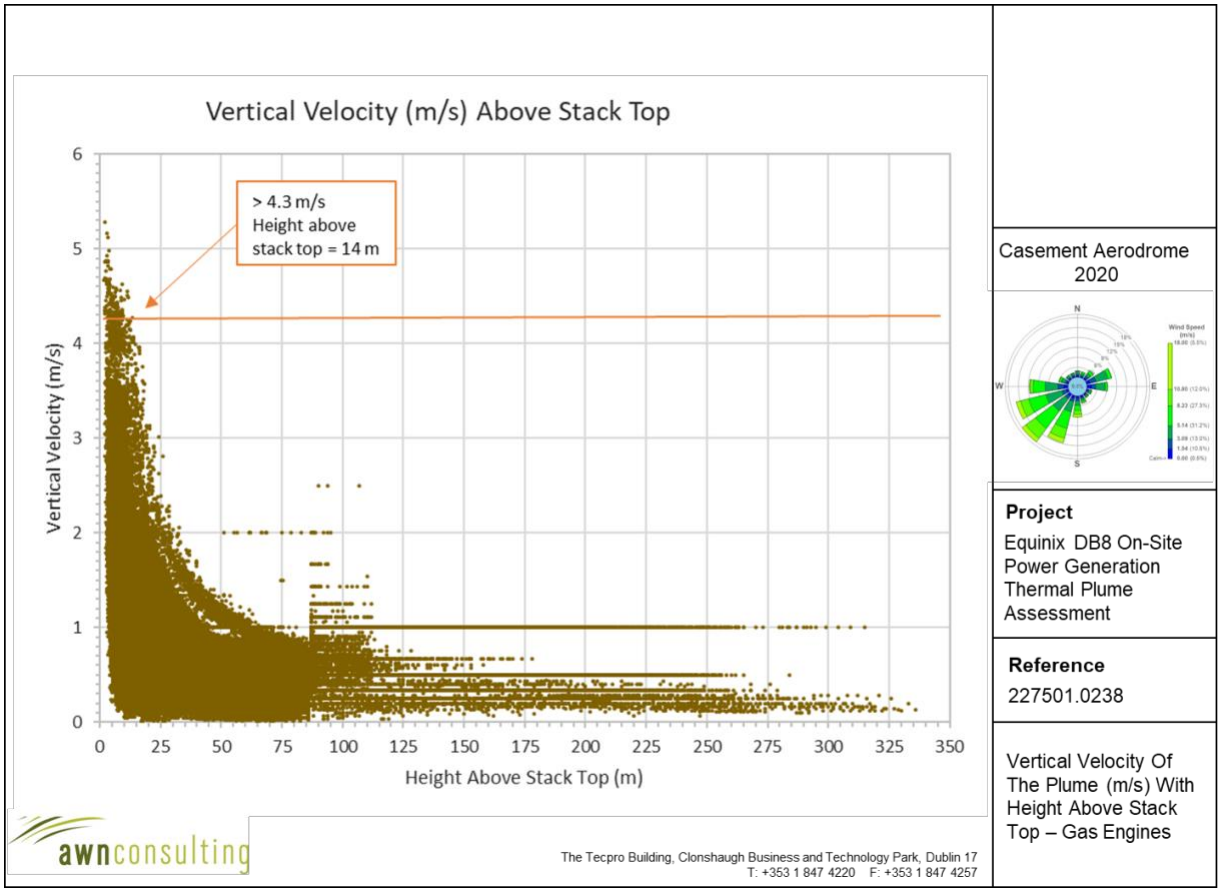


Figure 9. Vertical Velocity Of The Plume (m/s) With Height Above Stack Top – Gas Engines

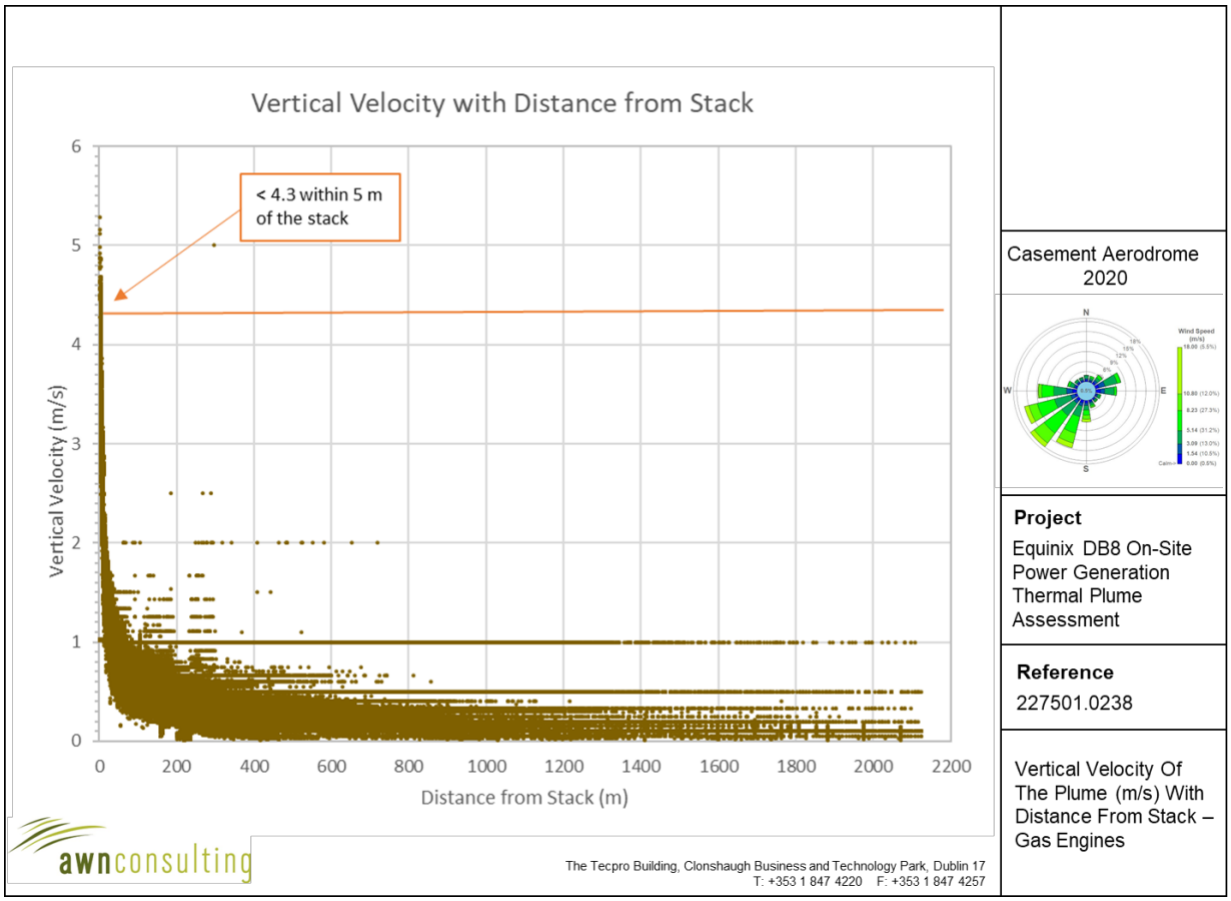


Figure 10. Vertical Velocity Of The Plume (m/s) With Distance from Stack – Gas Engines

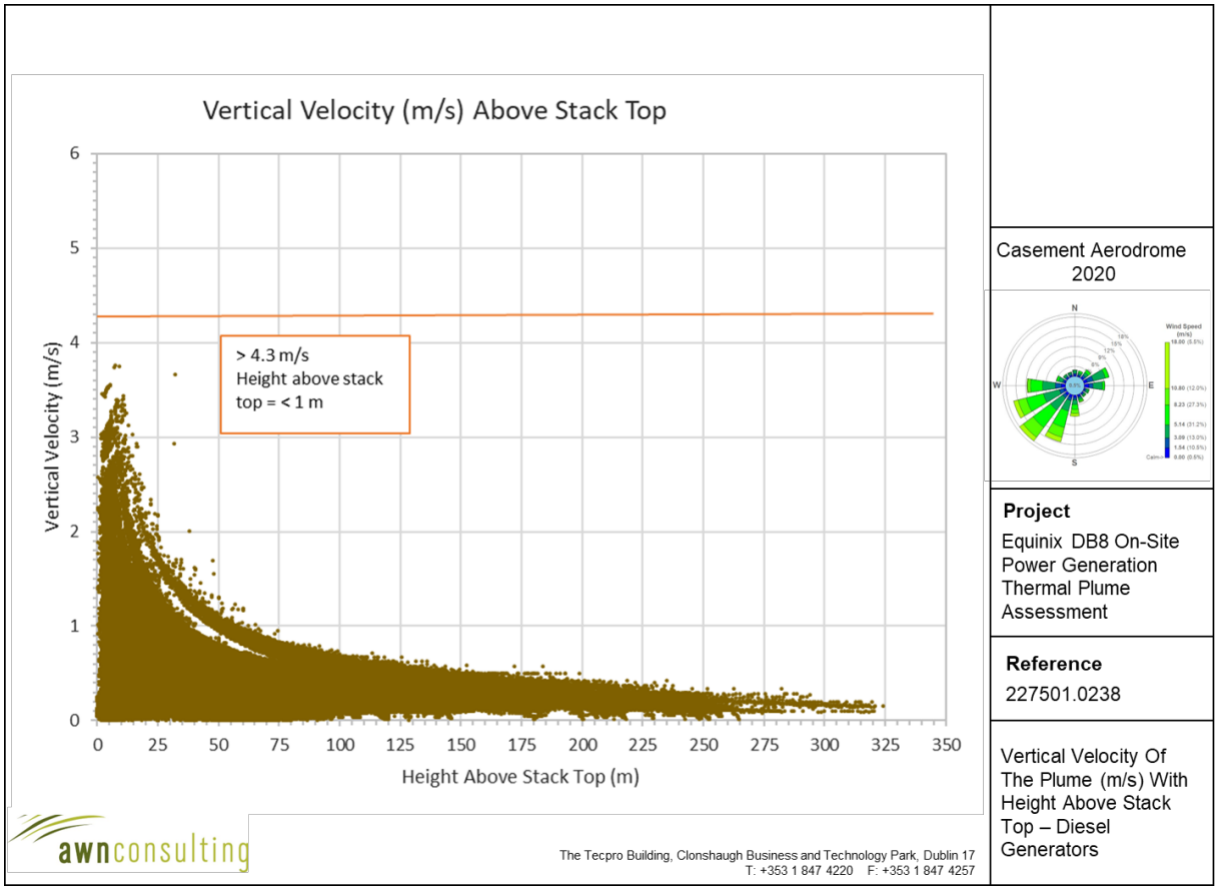


Figure 11. Vertical Velocity Of The Plume (m/s) With Height Above Stack Top – Diesel Generators

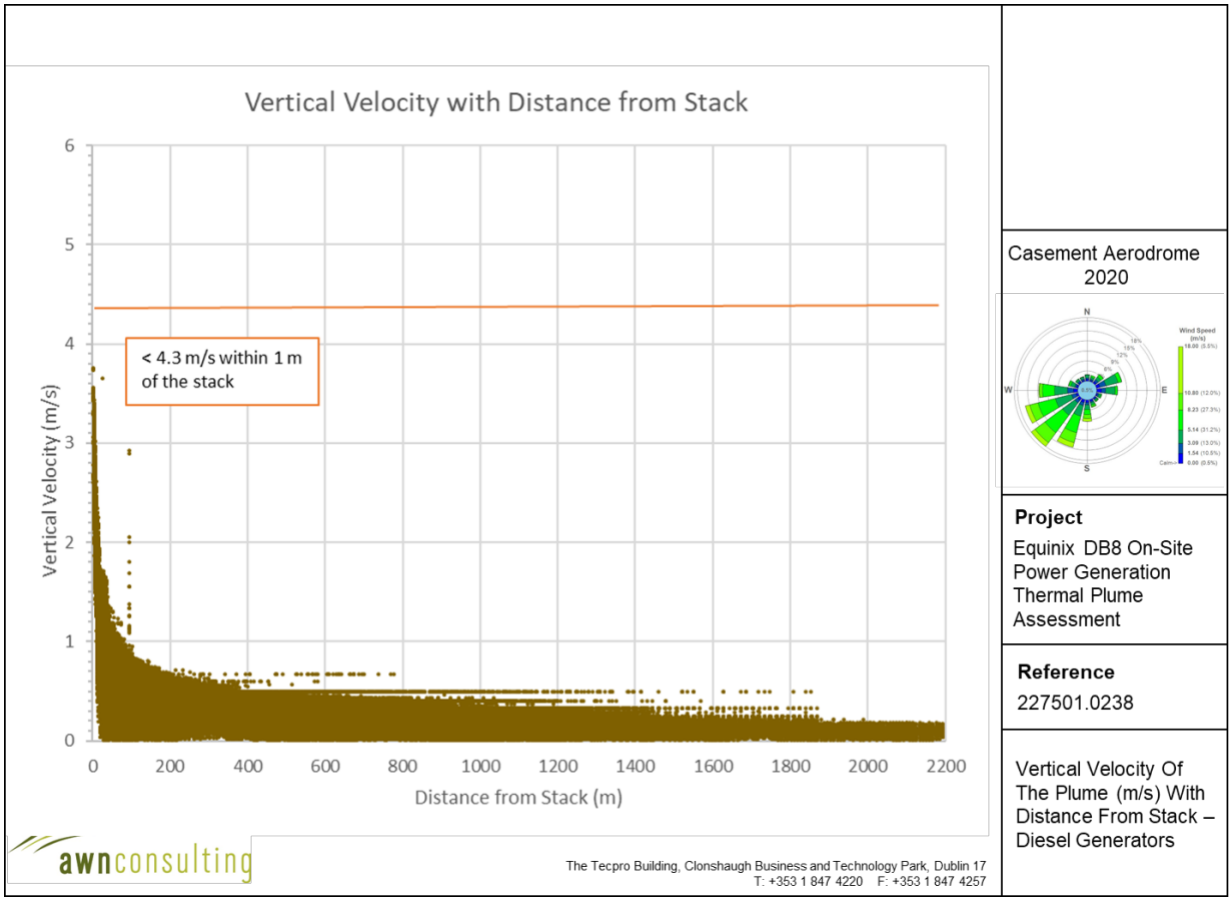


Figure 12. Vertical Velocity Of The Plume (m/s) With Distance from Stack – Diesel Generators

5.0 SUMMARY

Thus, in summary the results of the analysis are as follows:

- **Oxygen Content –** within 1 metre of the stack top the oxygen concentration will increase above the 12% risk level for oxygen for both gas engines (90 m OD) and diesel generators (96.2 m OD).
- **Temperature –** the temperature of the plume will drop to less than 50°C beyond 10 metres (99 m OD) of the stack top for the gas engines and beyond 9 metres (104.2 m OD) of the stack top for the diesel generators.
- **Vertical Velocity –** the critical vertical velocity of 4.3 m/s will not be exceeded beyond 14 metres (103 m OD) from the stack top of the gas engines and beyond 1 metre (96.2 m OD) from the stack top of the diesel generators.

Thus, the maximum extent of the risk zone of the plume for each parameter is shown below based on a full year of meteorological data covering all meteorological conditions including pressure/temperature inversions:

- Risk Zone for Oxygen **– < 1 metre (96.2 m OD)**
- Risk Zone for Temperature **– 9 metres (104.2 m OD)**
- Risk Zone for Vertical Velocity **– 14 metres (103 m OD)**
- **COMBINED RISK ZONE – within 9 metres above stack top and 104.2 m OD.**

In summary, beyond 9 m above the stack top (104.2 m OD), the levels of oxygen, temperature and vertical velocity will have returned to accepted/ambient levels.

6.0 References

CASA (2012) Guidelines For Conducting Plume Rise Assessments AC139-05(1) April 2012

CERC (2016) ADMS-5 User Guide

EPA (2020) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)

Met Éireann (2022) Met Éireann Website: www.met.ie

MITRE (2012) Expanded Model For Determining The Effects Of Vertical Plumes On Aviation Safety

USEPA (2018) AERMOD Description of Model Formulation

Appendix 11.1 - Photomontages prepared by Digital Dimensions Ltd. as submitted together with the planning application (original planning, lodged May 2021)

Equinix DB8 Data Centre
Profile Park, Dublin 22



Method Statement - Photo-montage production.

1. Photographs are taken from locations as advised by the client with a full frame SLR digital camera and prime lens. The photographs are taken horizontally with a survey level attached to the camera. The photographic positions are marked (for later surveying), the height of the camera and the focal length of the image recorded.

2. In each photograph, a minimum of 3no. visible fixed points are marked for surveying. These are control points for model alignment within the photograph. All surveying is carried out by a qualified topographical surveyor using Total Station / GPS devices.

3. The photographic positions and the control points are geographically surveyed and this survey is tied in to the site topographical survey supplied by the Architect / client.

4. The buildings are accurately modelled in 3D cad software from cad drawings supplied by the Architect. Material finishes are applied to the 3D model and scene element are place like trees and planting to represent the proposed landscaping.

5. Virtual 3D cameras are positioned according to the survey co-ordinates and the focal length is set to match the photograph. Pitch and rotation are adjusted using the survey control points to align the virtual camera to the photograph. Lighting is set to match the time of day the photograph is taken.

6. The proposed development is output from the 3D software using this camera and the image is then blended with the original photograph to give an accurate image of what the proposed development will look like in its proposed setting.

7. In the event of the development not being visible, the roof line of the development will be outlined in red if requested.

8. The document contains:

a) Site location map with view locations plotted.
b) Photo-montage sheet with existing or proposed conditions.
c) Reference information including field of view/focal length, range to site / development, date of photograph.

9. The proposed view will contain the building where visible or partially visible. Where the building is not visible or where the visible proportion of the building is not perceptible then a redline will indicate the extent of the proposed development in the background. Where there are other developments in the vacinity with planning permission or under construction a blue line and or grey massing will represent the adjacent development.



Location Map

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 1 Existing	09-06-2021	73°	24mm	281m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 1 as permitted	09-06-2021	73°	24mm	281m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 1 Proposed	09-06-2021	73°	24mm	281m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 2 Existing	09-06-2021	73°	24mm	24.5m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 2 as permitted	09-06-2021	73°	24mm	24.5m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 2 Proposed	09-06-2021	73°	24mm	24.5m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 3 Existing	09-06-2021	73°	24mm	51.6m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 3 as permitted	09-06-2021	73°	24mm	51.6m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 3 Proposed	09-06-2021	73°	24mm	51.6m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 4 Existing	09-06-2021	73°	24mm	258.8m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 4 as permitted	09-06-2021	73°	24mm	258.8m	Canon EOS 5DS

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 4 Proposed	09-06-2021	73°	24mm	258.8m	Canon EOS 5DS

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 5 Existing	09-06-2021	73°	24mm	604m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 5 as permitted	09-06-2021	73°	24mm	604m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 5 Proposed	09-06-2021	73°	24mm	604m	Canon EOS 5DS

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 5a Existing	09-06-2021	73°	24mm	686m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 5a as permitted	09-06-2021	73°	24mm	686m	Canon EOS 5DS

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 5a Proposed	09-06-2021	73°	24mm	686m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 6 Existing	09-06-2021	73°	24mm	152m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 6 as permitted	09-06-2021	73°	24mm	152m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 6 Proposed	09-06-2021	73°	24mm	152m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 7 Existing	22-10-2021	73°	24mm	41m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 7 as permitted	22-10-2021	73°	24mm	41m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 7 Proposed	22-10-2021	73°	24mm	41m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 8 Existing	22-10-2021	73°	24mm	564m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 8 as permitted	22-10-2021	73°	24mm	564m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 8 Proposed	22-10-2021	73°	24mm	564m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 9 Existing	22-10-2021	73°	24mm	799m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 9 as permitted	22-10-2021	73°	24mm	799m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 9 Proposed	22-10-2021	73°	24mm	799m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 10 Existing	22-10-2021	73°	24mm	1273m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 10 as permitted	22-10-2021	73°	24mm	1273m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 10 Proposed	22-10-2021	73°	24mm	1273m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation

Appendix 11.2 - Photomontages prepared by Digital Dimensions Ltd. as submitted for Further Information of Amendment Planning Application.

Equinix DB8 Data Centre, Profile Park, Dublin 22

Additional Photomontages in response to Further Information Request

Method Statement - Photo-montage production.

1. Photographs are taken from locations as advised by the client with a full frame SLR digital camera and prime lens. The photographs are taken horizontally with a survey level attached to the camera. The photographic positions are marked (for later surveying), the height of the camera and the focal length of the image recorded.

2. In each photograph, a minimum of 3no. visible fixed points are marked for surveying. These are control points for model alignment within the photograph. All surveying is carried out by a qualified topographical surveyor using Total Station / GPS devices.

3. The photographic positions and the control points are geographically surveyed and this survey is tied in to the site topographical survey supplied by the Architect / client.

4. The buildings are accurately modelled in 3D cad software from cad drawings supplied by the Architect. Material finishes are applied to the 3D model and scene element are place like trees and planting to represent the proposed landscaping.

5. Virtual 3D cameras are positioned according to the survey co-ordinates and the focal length is set to match the photograph. Pitch and rotation are adjusted using the survey control points to align the virtual camera to the photograph. Lighting is set to match the time of day the photograph is taken.

6. The proposed development is output from the 3D software using this camera and the image is then blended with the original photograph to give an accurate image of what the proposed development will look like in its proposed setting.

7. In the event of the development not being visible, the roof line of the development will be outlined in red if requested.

8. The document contains:

a) Site location map with view locations plotted.
b) Photo-montage sheet with existing or proposed conditions.
c) Reference information including field of view/focal length, range to site / development, date of photograph.

9. The proposed view will contain the building where visible or partially visible. Where the building is not visible or where the visible proportion of the building is not perceptible then a redline will indicate the extent of the proposed development in the background. Where there are other developments in the vacinity with planning permission or under construction a blue line and or grey massing will represent the adjacent development.





View Location Map

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 11 Existing	02-09-2022	73°	24mm	51.6m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 11 Proposed	02-09-2022	73°	24mm	51.6m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 12 Existing	02-09-2022	73°	24mm	22m	Canon EOS 5DS



Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 12 Proposed	02-09-2022	73°	24mm	22m	Canon EOS 5DS

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation

View 13

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation



View 14

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation

View 15

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation

View 16

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

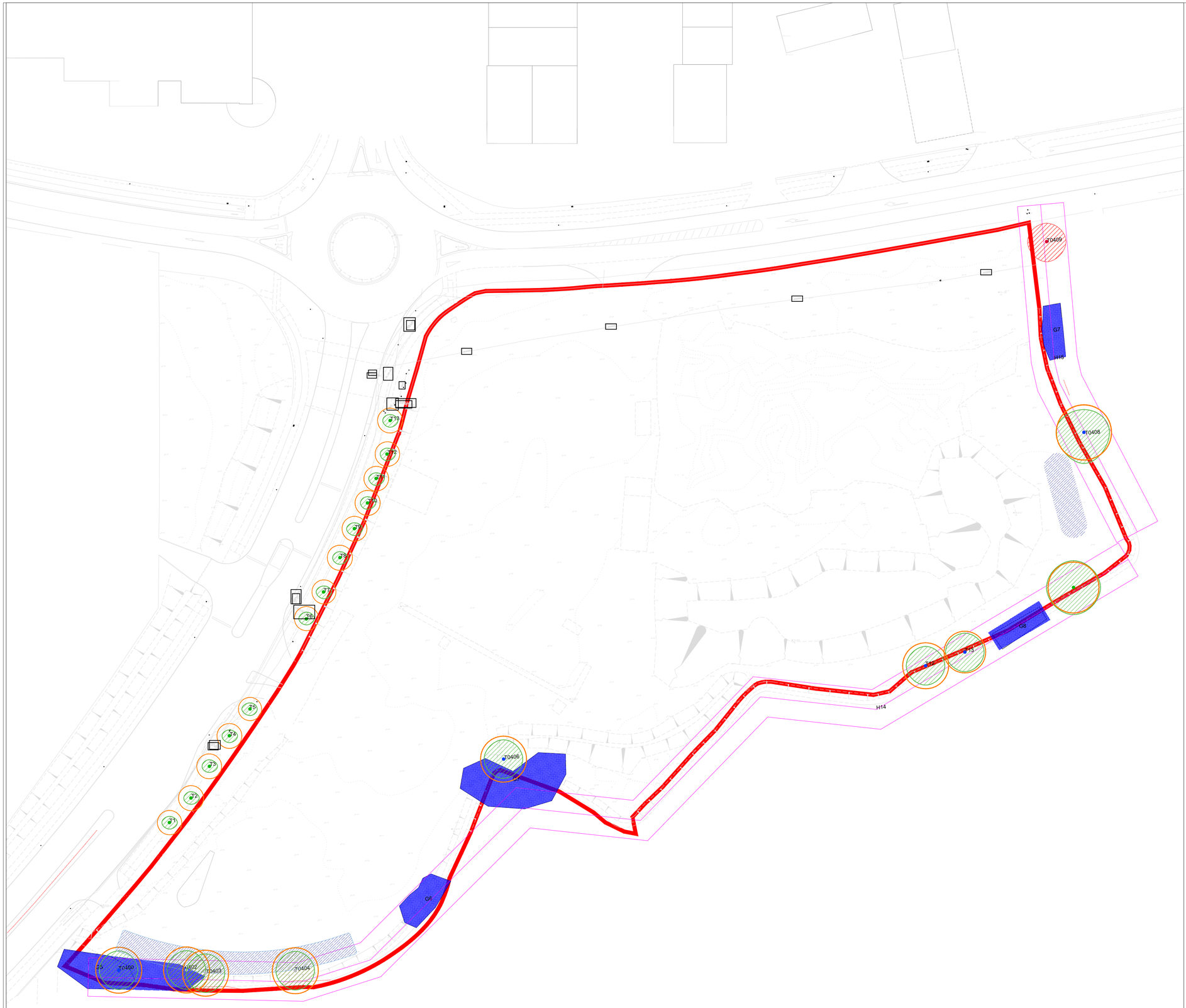
digital dimensions
architectural visualisation

View 17

Project: Equinix DB8 Data Centre, Profile Park, Dublin 22

digital dimensions
architectural visualisation

Appendix 11.3 - Tree Survey Plan prepared by Murray Associates (drawing number DB80-MA-LS-XX-DR-V-PLNT-1040, revision P01)



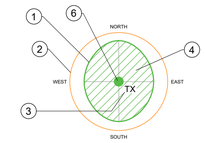
LEGEND:

Category (A, A1, A2, A3)
Those of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40 years)

Category (C, C1, C2, C3)
Those of low quality and value: currently in adequate condition to remain until new planting could be established (a minimum of 10 years) or young trees with a stem diameter below 150mm

Category (B, B1, B2, B3)
Those of moderate quality and value: those in such a condition as to make a significant contribution (a minimum of 20 years)

Category (U)
Those in such condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reason of sound arboricultural management



AGE GROUPINGS
Y = YOUNG
MA = MIDDLE AGE
M = MATURE
OM = OVER MATURE
V = VETERAN



1. EXISTING TREE CANOPY BASED ON DIMENSIONS GATHERED ON SITE IN 4 DIRECTIONS, NORTH, SOUTH, EAST AND WEST
2. TREE PROTECTION BARRIER
3. TREE TAG NUMBER
4. TREE TO BE RETAINED
5. TREE TO BE REMOVED
6. TREE CATEGORY BASED ON BS:5837 2012 CRITERIA
7. DECIDUOUS TREE CANOPY
8. EVERGREEN TREE CANOPY

TREE GROUP

HEDGE

SITE BOUNDARY

Client:

EQUINIX

HAZARD IDENTIFICATION LEGEND:

HAZARD IDENTIFICATION (if none state 'none relevant')	CONTROL AND MITIGATION MEASURES

NOTE:
Hazards listed above are only those considered significant risks and:

a) not likely to be obvious to a competent contractor or other designers;
b) unusual; or
c) likely to be difficult to manage effectively

REV	DATE	DESCRIPTION	DWN	CHK	APP
P02	27/05/22	Issued for Planning	MA	JW	JW
P01	17/06/21	Issued for Planning	HM	JW	JW

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Key:

True. North

Project:
Equinix DB8

Drawing Title:
Tree Survey Plan

Drawing Number:
DB080-MA-LS-XX-DR-V-PLNT-1040

Scale:	Paper Size:	Purpose:	Revision:
1:500	A1	S4	P02

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Appendix 11.4 - Arboricultural Impact Plan prepared by Murray Associates (drawing number DB80-MA-LS-XX-DR-V-PLNT-1041, revision P03)



1:500

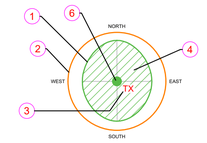
LEGEND:

Category (A, A1, A2, A3)
Those of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40 years)

Category (C, C1, C2, C3)
Those of low quality and value: currently in adequate condition to remain until new planting could be established (a minimum of 10 years) or young trees with a stem diameter below 150mm

Category (B, B1, B2, B3)
Those of moderate quality and value: those in such a condition as to make a significant contribution (a minimum of 20 years)

Category (U)
Those in such condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reason of sound arboricultural management



AGE GROUPINGS
Y = YOUNG
MA = MIDDLE AGE
M = MATURE
OM = OVER MATURE
V = VETERAN



1. EXISTING TREE CANOPY BASED ON DIMENSIONS GATHERED ON SITE IN 4 DIRECTIONS, NORTH, SOUTH, EAST AND WEST
2. TREE PROTECTION BARRIER
3. TREE TAG NUMBER
4. TREE TO BE RETAINED
5. TREE TO BE REMOVED
6. TREE CATEGORY BASED ON BS:5837 2012 CRITERIA
7. DECIDUOUS TREE CANOPY
8. EVERGREEN TREE CANOPY

TREE GROUP
HEDGE
SITE BOUNDARY
TREE PROTECTION FENCING

D1 02 TREE PROTECTION FENCING
Scale 1:50

TREE PROTECTION FENCING - BS 5837:2012 Trees in relation to design, demolition and construction

All tree protection works to be in accordance with BS 5837:2012 and approved by Contract Administrator / Project Arborist / Landscape Architect.

All trees to be retained on site are to be protected by effective fencing defining the Construction Exclusion Zone (CEZ). The fencing excludes construction activities from the Root Protection Area (RPA) which contains sufficient rooting volume to ensure the survival of the tree.

Fencing is to be installed before any materials or machinery are brought onto the site and before any demolition or development commences.

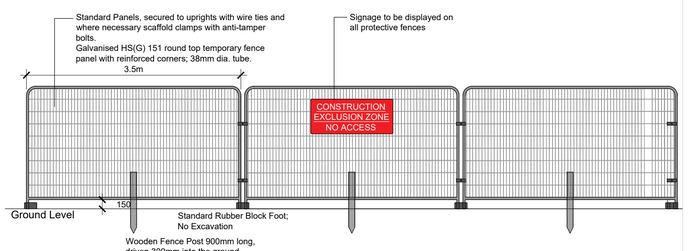
Once erected, fencing is to be regarded as sacrosanct, and should not be removed or altered without the prior consultation with the consulting Arborist or Landscape Architect.

No access is to be permitted for workers to areas behind fencing line (except for specific works such as construction of no-dig paths or planting or with written authorisation from Contract Administrator / Project Arborist / Landscape Architect), no works may be carried out in this area, no materials, machinery, tools, soil or other objects can be stored here and absolutely no excavation may be carried out.

Protective fencing should consist of galvanised steel mesh panels in accordance with drawing (right) comprising a vertical and horizontal framework, staked in place and braced to resist impacts.

Notices should be erected on the fence with following wording:
CONSTRUCTION EXCLUSION ZONE: NO ACCESS

TREE PROTECTIVE BARRIER - BS 5837:2012 TREES IN RELATION TO CONSTRUCTION
Item Nos. 4.6 Root Protection Area



TREE PROTECTIVE BARRIER - BS 5837:2012 TREES IN RELATION TO CONSTRUCTION
Item Nos. 6.2 *Technical Design* and 7 *Demolition and construction in proximity to existing trees*

Client:

EQUINIX

HAZARD IDENTIFICATION LEGEND:

HAZARD IDENTIFICATION (if none state 'none relevant')	CONTROL AND MITIGATION MEASURES

NOTE:
Hazards listed above are only those considered significant risks and:

a) not likely to be obvious to a competent contractor or other designers;
b) unusual; or
c) likely to be difficult to manage effectively

REV	DATE	DESCRIPTION	DWN	CHK	APP
P03	27/05/22	Issued for Planning	MA	JW	JW
P02	15/02/22	Clarification of Information	HM	JW	JW
P01	17/06/21	Issued for Planning	HM	JW	JW

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Key:

True North

Project:
Equinix DB8

Drawing Title:
Arboricultural Impact Plan

Drawing Number:
DB080-MA-LS-XX-DR-V-PLNT-1041

Scale:	Paper Size:	Purpose:	Revision:
As Shown	A1	S4	P03

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Appendix 11.5 - Arboricultural Inventory and Impact assessment incorporating Tree Protection Strategy prepared by Murray Associates

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landscape architecture

DB080-MA-LS-XX-RP-V-PLNT-7040

ARBORICULTURAL INVENTORY AND IMPACT ASSESSMENT

Incorporating a

TREE PROTECTION STRATEGY

At

DB8 PROFILE PARK DUBLIN 22

FOR

RKD ARCHTECTS

Murray & Associates
Landscape Architecture

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Member of the Irish Landscape Institute

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Scope 1
Proposed Development 2
Methodology Employed 3
Work Recommendations 5
Tree Survey Results 8
Conclusions 8

ISSUE SHEET

Rev. No.	Issue Status	Date	Prepared By	Checked By
P01	Issue for Planning	18-06-21	HM/JW	JW
P02	Further Information	18-02-22	HM	JW
P03	Issue for Planning	27-05-22	MA	JW

Introduction

The trees and hedgerows were surveyed on the 21st April by the undersigned. The findings of this survey and assessment have been summarised and recorded in the following report. A number of mature trees and hedgerows on the development site area were surveyed and assessed. None of the trees on the subject site will be removed to facilitate the proposed development, but a large majority of the trees are Ash and are showing signs of dieback. Over the next 12-24 months there is a high probability that these trees will die and need to be removed.

Scope

The site is the subject of a planning permission. The trees and hedgerows lie along the northern and western boundaries along the boundary with Grangecastle Golf Club. This area forms a buffer between the two sites.

The purpose of this assessment is to provide an analysis of any potential impact of the proposed development on the existing trees and hedgerows. The report will provide recommendations for preservation and or removal of trees and hedgerows. It will present a written report on the inspection of the trees. The report will provide a tree protection plan highlighting which trees are to be removed and/or retained

This report should be read with reference to the findings summarised and recorded in the Tree and Hedgerow Assessment report, conducted on 21st April 2021. The report should also be read in conjunction with the following drawings:

Landscape Plan (REF: **DB080-MA-LS-XX-DR-L-PLNT-1050)**;
Tree Surevy: (REF. **DB080-MA-LS-XX-DR-V-PLNT-1040**);
Arboricultural Impact Plan: (REF. **DB080-MA-LS-XX-DR-V-PLNT-1041**);

Proposed Development

The Development will consist of:

- Modifications to the permitted data centre granted under SDCC Reg. Ref. SD21A/0186 comprising the following:
    - Reconfiguration and alterations to the data centre building to include removal of front of house offices at third floor level, alterations to floor levels at second floor to provide consistency between front of house and data halls, parapet height increase of front of house to c.16.8m, provision of storage at second floor level in lieu of relocated internal generators to the external generator yard and associated elevational alterations.
    - Extension of loading dock at ground floor level by c.60sqm in area with minor height increase to c.5.3m .
    - Removal of 3 no. air plenums to the front (north) elevation and provision of screening to generator flues in lieu of omitted plenums.
    - Alterations at roof level to include removal of 2m high gantry screening.
    - Alterations to the permitted generator plant yard to the north of the data centre to include the removal of fuel tanks, reconfiguration of plant and generators, provision of 2 no. additional external generators (increase from 5 to 9 no. external generators), provision of 4 no. additional external plant rooms, provision of diesel pump tank cabinets and stepover, relocation of generator yard doors and enlarged generator yard to accommodate the proposed modifications.
    - Reconfiguration of plant within the permitted chiller plant yard to the south of the data centre.
    - Removal of 1 no. sprinkler/water tank and removal of stairs and door to the side of the waste compound.
    - Reconfiguration of car parking and motorcycle spaces and removal of 1 no. accessible space. 64 no. total number of car parking spaces.
- The proposal also includes provision of on-site gas power generation compound (c.2,604sqm in area) in the area previously reserved for a future data centre. The compound comprises 7 no. modular plant rooms (totalling c.180sqm in area), 10 no. gas fired generators and associated flues c.14.7m high, gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and 2 no. vehicular access points including general and emergency access.

All associated site development works, services provision, drainage works, access, landscaping and boundary treatment works.
No buildings are proposed above the existing ESB and SDCC wayleaves to the west and north of the site.
Overall Gross Floor Area of the development is reduced by c. 44sqm to c.9,795sqm from previously permitted under SDCC Reg.Ref. SD21A/0186
The application is accompanied by a Natura Impact Statement.

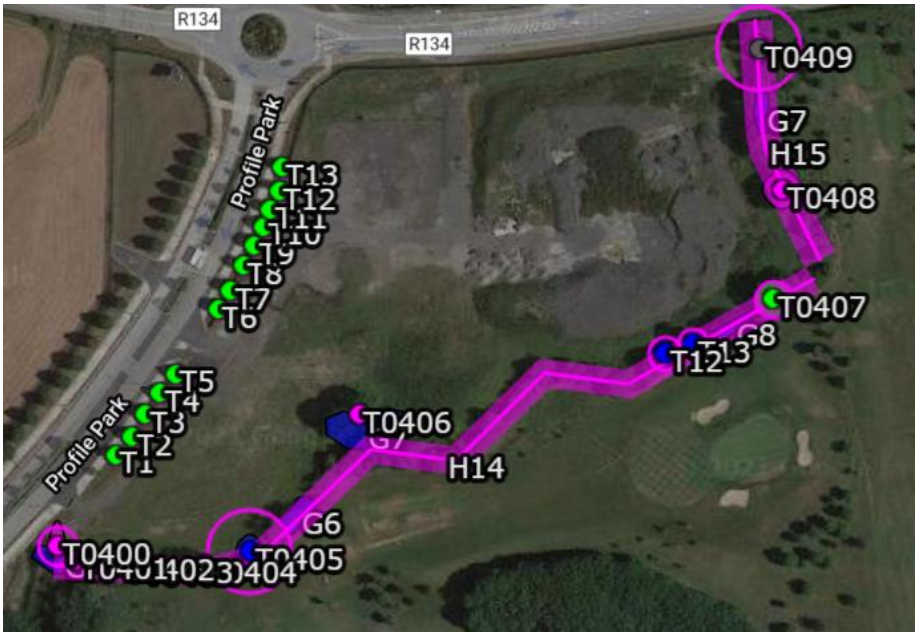

Figure 1 – Site location plan

Methodology Employed

An initial tree survey and visual condition assessment was on the 21st April 2021. For the purpose of this report the trees were assessed in accordance with BS 5837: 2012 Trees in relation to design, demolition and construction. Only trees with diameters of 75mm or greater were surveyed, and those smaller than this were noted in the survey. In accordance with section 4.4.2.3 of the British standard document where trees formed obvious groups these were assessed and recorded as groups.

Section 4.4.2.3 of BS 5837: 2012 states:

Trees growing as groups or woodland should be identified and assessed as such where the arboriculturist determines that this is appropriate. However, an assessment of individuals within any group should still be undertaken if there is a need to differentiate between them, e.g. in order to highlight significant variation in attributes (including physiological or structural condition).

NOTE: The term “group” is intended to identify trees that form cohesive arboricultural features either aerodynamically (e.g. trees that provide companion shelter), visually (e.g. avenues or screens) or culturally, including for biodiversity (e.g. parkland or wood pasture), in respect of each of the three subcategories.

Tree Survey Methodology

Tree Species

Common and botanical names of the tree species were recorded.

Tree Crown Dimensions

Tree height (Ht), crown clearance (Cl) and crown-spread (NESW cardinal points) measurements are in metres and are estimated.

Stem Diameter (Dbh)

Measurements are in millimetres and taken at 1.5m from ground level, multiple stems (St) are recorded as a function of the BS:5837 RPA formulae described below.

Tree age classes were recorded as:

Y	Young	Recently planted (with 5 years or so)
SM	Semi-Mature	Well established young tree
EM	Early Mature	Established tree not yet fully grown
M	Mature	Full or near full grown tree
LM	Late Mature	Older specimen in full maturity
OM	Over Mature	Reached full maturity now declining through natural causes
Vet	Veteran	Notable due to large size, old age, ecological importance

Tree Physiological and Structural condition was graded as :

Good:	No obvious defects visible, vigour and form of tree good.
Fair:	Tree in average condition for its age and the environment.
Poor:	Tree shows signs of ill health/structural defect
Bad:	Tree in seriously bad health/major structural problem

Work Recommendations

Preliminary management recommendations are made where necessary and pertain to current site conditions unless otherwise stated.

Estimated Remaining Contribution (ERC)

The approximate number of years that a tree should continue to live and contribute amenity, conservation or landscape value to the site under current site condition.

The tree retention category system grades a tree's suitability for retention within a development:

A Indicates a tree of high quality and value. These are trees that are particularly good examples of their species, which also provide landscape value. These trees are in such a condition as to be able to make a substantial contribution. (A minimum of 40 years is suggested)

B Indicates a tree of moderate quality and value. Trees that might be included in the high category, but are downgraded because of impaired condition. These trees are in such a condition as to make a significant contribution. (A minimum of 20 years is suggested)

C Indicates a tree of low quality and value - trees with an estimated remaining life expectancy of at least 10 years, or trees with a stem diameter of below 150mm and/or <10m in height.

U Trees that are in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.

Sub Categories

Tree categories may be further categorised using the following sub-categories (e.g. C1, C2 or C3)

1 mainly Arboricultural qualities,

2 mainly landscape qualities,

3 mainly cultural values.

The Root Protection Area (RPA) is the minimum area around individual trees to be protected from disturbance during construction works; RPA is recorded as a radius in metres measured from the tree stem and is shown on the tree survey/constraints drawing as a circle with the tree stem in the centre. For single stem trees, the root protection area (RPA) should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter.

For trees with more than one stem, one of the two calculation methods below should be used. The calculated RPA for each tree should be capped to 707 m2.

For trees with two to five stems, the combined stem diameter should be calculated as follows:

√ ((stem diameter 1)2 + (stem diameter 2)2 ... + (stem diameter 5)2)

For trees with more than five stems, the combined stem diameter should be calculated as follows:

√ ((mean stem diameter)2 × number of stems)

The survey concentrated primarily on the significant trees located within the development area. The objective of this survey was to gather information regarding the tree's location on the proposed development site and the impact the proposed development may have on the trees. Please refer to appendix 1 for the tree inventory. Significant trees can be equated as those trees whose visual importance to the surrounding area is enough to justify special efforts to protect/preserve and whose loss would have an irremediable adverse impact on the local environment. Significance can also be placed depending on the trees age, another variable to imply significance can be the aesthetic merit of the tree based on its unusual size, intrinsic physical features or outstanding appearance or occurring in a unique location or context, and thus provides a special contribution as a landmark or landscape feature.

Tree diameters (DBH) were estimated at 1.5 meter above grade as per standard arboricultural practice. Tree height was measured with the use of a digital clinometer. The trees were categorized in accordance with BS5837:2012.

Tree Survey Results

Category	Number of trees	Trees to be removed
A	14	0
B	6 groups + 4 trees	0
C	5	3
U	-	-

Table 1. Category of the Trees surveyed (BS 5837:2012, Item 4.5 Tree categorisation method)

The trees within the site area are in fair to good condition. The majority of the trees on the site are Ash (Fraxinus excelsior). In relation to the Ash on the site, a number of these specimens are showing signs of Ash Dieback (Chlara). This is a serious disease that causes rapid decline and failure of Ash. The main recommendation of this report is that the Ash on-site need to be monitored for this disease and removed if they succumb to it. While it is a notifiable disease, it has become so endemic in the wider landscape that it would be academic at this point to report an occurrence of it. On discussion with the client and ecologist, it has been confirmed monitoring will take place and appropriate strategy implemented as dieback progresses, for possible retention of stumps and deadwood in the biodiversity buffer zone, where deemed appropriate. Three category C Ash trees all showing signs of Ash Dieback are marked for removal to accommodate a swale at the southwest corner of the site, native replacement planting is proposed for this area.
See landscape masterplan: DB080-MA-LS-XX-DR-L-PLNT-1050

Conclusions

The proposed development will have minimal impact on the existing tree cover on the site. Additional replanting will works will mitigate any loss of trees as a result of the Ash Dieback, and will be a net positive to the tree cover in this particular location. The proposed landscape plan details the planting of a significant number of new native broadleaf trees.

BS5837:2012 Table 1 – Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see [BS5837:2012]* ***4.5.7****.*			
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A **Trees of high quality** with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefit	Trees with no material conservation or other cultural value	

Disclaimers

This report is intended solely for the benefit of the parties to whom it is addressed, and no responsibility is extended to any third party for the whole or any part of its contents. The conclusions and recommendations in this report are only valid for a period of one year. This period of validity may be reduced in the case of any change in conditions to or in proximity to the tree. In the event of adverse weather conditions, there is the possibility of any tree despite good report surveys, falling over.

In the event of a falling tree causing damage to residential or non-residential buildings in their proximity, no liability will attach to this firm, in the event of damage by such trees, to any person, any building public or private, or any mechanical vehicle or otherwise. Recommendations made in this report are subject to the knowledge and expertise of the qualified Arborist that carried out the above inspections.

Signed_____

Dated: 18th January 2022
John Ward

ISA Certified Arborist

Appendix 11.6 - Landscape Architects Design report, incorporating Landscape Specifications and Landscape Management Plan, prepared by Murray Associates

murray & associates
landscape architecture

DB080-MA-LS-XX-RP-L-PLNT-8050

LANDSCAPE ARCHITECT'S DESIGN REPORT

At

DB8 EQUINIX DATA CENTRE

INCLUDING:

Landscape Design Report

Appendix A: Landscape Specifications Landscape Management Plan

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Note: Text in red refer to the new landscape elements for this application

Rev. No.	Issue Status	Date	Prepared By	Checked By
P01	S4- Issued for Planning	18/06/21	HM	JW
P02	S4- Issued for Planning	27/05/22	MA	JW

Introduction: Existing Site and Context

DB8 Data Centre Infrastructure development is proposed as part of the existing Profile Park, located in Kilcarbery, Dublin 22. The site is set up for development with infrastructure provided by the Profile Park development. The sites is bound by the Nangor Road to the north and Profile Park's main access road to the west, the south and east boundary is shared with Grange Castle Golf Course. The site is well connected by the N7 and adjoining M50 roads, and nearby bus stops are serviced by the 13, 68 and 68X bus routes. Existing vegetation on site include a screening boundary hedgerow and line of ash trees along the south-east boundary. An avenue of established small leaved limes planted during the development of profile park line the west boundary.



Figure 1 – Profile Park



Figure 2 –DB8 Arial Site Location

Proposed Development

The Development will consist of:

- Modifications to the permitted data centre granted under SDCC Reg. Ref. SD21A/0186 comprising the following:
    - Reconfiguration and alterations to the data centre building to include removal of front of house offices at third floor level, alterations to floor levels at second floor to provide consistency between front of house and data halls, parapet height increase of front of house to c.16.8m, provision of storage at second floor level in lieu of relocated internal generators to the external generator yard and associated elevational alterations.
    - Extension of loading dock at ground floor level by c.60sqm in area with minor height increase to c.5.3m .
    - Removal of 3 no. air plenums to the front (north) elevation and provision of screening to generator flues in lieu of omitted plenums.
    - Alterations at roof level to include removal of 2m high gantry screening.
    - Alterations to the permitted generator plant yard to the north of the data centre to include the removal of fuel tanks, reconfiguration of plant and generators, provision of 2 no. additional external generators (increase from 5 to 9 no. external generators), provision of 4 no. additional external plant rooms, provision of diesel pump tank cabinets and stepover, relocation of generator yard doors and enlarged generator yard to accommodate the proposed modifications.
    - Reconfiguration of plant within the permitted chiller plant yard to the south of the data centre.
    - Removal of 1 no. sprinkler/water tank and removal of stairs and door to the side of the waste compound.
    - Reconfiguration of car parking and motorcycle spaces and removal of 1 no. accessible space. 64 no. total number of car parking spaces.
- The proposal also includes provision of on-site gas power generation compound (c.2,604sqm in area) in the area previously reserved for a future data centre. The compound comprises 7 no. modular plant rooms (totalling c.180sqm in area), 10 no. gas fired generators and associated flues c.14.7m high, gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and 2 no. vehicular access points including general and emergency access.

All associated site development works, services provision, drainage works, access, landscaping and boundary treatment works.

No buildings are proposed above the existing ESB and SDCC wayleaves to the west and north of the site.

Overall Gross Floor Area of the development is reduced by c. 44sqm to c.9,795sqm from previously permitted under SDCC Reg.Ref. SD21A/0186

The application is accompanied by a Natura Impact Statement.



Figure 3 –Proposed Landscape Plan

(See DB080-MA-LS-XX-DR-L-PLNT-1050 for details)

Landscape Strategy

The landscape strategy is focused on providing usable open spaces for the employees at DB8 Data center, while also providing increased biodiversity value to the site. The Pocket Park a breakout zone to gather and relax and take lunch in the outdoors, while benches and a loop walk in the green buffer provide a more intimate and contemplative space to escape the work day. Landscape elements were also used to increase screening. A berm and avenue of trees along the Nangor road creates a visual boundary. The existing green boundary along the grange castle golf course will be planted with additional native woodland trees to increase screening, biodiversity value and diversify the tree species. The Pocket Park is located at the center of the site between the buildings main entrance and parking, allowing for maximum use and to take advantage of the aspect of the site. Making use of raised planters creates a sense of enclosure around the park. Seating is set back into the planters, there associated planting creates a soft boundary and sense of enclose and safety for those using the bench. Feature trees on mounding at the center of the park is a focal point, planted with feature trees to provide year round interest. Green trellises and green roofs are proposed to address the noise insulation, temperature moderation and the filtration of air-borne

pollutants. Those features will enhance the biodiversity of the site, providing foraging opportunities, shelter and resting habitats for the wildlife. Furthermore, The Landscape design takes advantage of attenuation needed on site by providing wetland tree and marginal planting along the boundary of the surface level attenuation feature, naturalization of this element increases biodiversity and amenity value. Spending time near water bodies is thought to lower levels of stress and release endorphins, by providing benches at the edge of the water an oasis for workers has been provided.



Figure 3 –Proposed Pocket Park Plan
(See DB080-MA-LS-XX-DR-L-PLNT-1052 for details)

The OSPG compound will be surrounded by a solid enclosure screened by a wire trellis system mounted on the wall with a combination of fast-growing climbers. This green system can reach the full height of the enclosure wall and it will provide visual and acoustic screening.
A row of native trees in front of the compound will enhance the above purpose.





(See DB080-MA-LS-XX-DR-L-PLNT-7053 for details)

Planting Palette

Soft buffer planting of ornamental grasses and ferns has been selected to screen and soften building edges, while maintaining a sophisticated architectural aesthetic.



Figure 4– Precedent Image Screening Planting

Ground cover planting has been selected for planting under tree canopies. Planting such as Viburnum Davidii, dogwood and periwinkle will grow low to the ground and well in shade, while providing flowering interest in a colour pallet of white, pink and purple.



Figure 5– Precedent Ground cover Planting

Decorative planting in shades of purple and pinks is provided through shrub planting. Lavender, Rosemary, and heather provide colour, sent, and interest through structure while not in flower.



Figure 6– Precedent Decorative Planting

Ornamental trees create a feature element at the center of the pocket park evergreen magnolia provides flower and year round lush foliage, Japanese maple provides vibrant colour in the autumn, while the flowering cherry takes center stage in the spring.



Figure 7– Feature ornamental trees with year round interest

Planting has been used not just for aesthetic purposes in this scheme but has had a major role in the proposed increase of biodiversity value of the site. Native wildflower seed planting will provide bee and butterfly friendly planting, while creation of a new surface water attenuation feature allows for marginal wetland planting creating a new habitat. Please refer to the Ecological Impact assessment for further details of habitats.



Figure 8–Biodiversity Native flowers and wetland marginal planting

Green roof planting is a native origin Irish wildflower seed mixture that include the following species:

Common Bent Grass

Burnet Saxifrage*

Centaury*

Wild Chamomile*

Corn Pansy*

Cowslip

Eyebright*

Lady's Bedstraw

Ox-eye Daisy

Red Bartsia*

Yellow Rattle*

Selfheal

Sheep's Bit Scabious

White Stonecrop

Blackstonia*

Fairy Foxglove

Sea Campion

Ivy Leaved Toadflax

Quaking Grass

Wall Pennywort

Storksbill*

Thyme (Wild)

Sweet Violet

Dog Violet

Allium carinatum

Harebell

Cat's Ear

Corn Spurry*

Fairy Flax

Lesser Yellow Clover or 'shamrock'*

*Denotes a species that is either of diminished national geno-type or specific to only a few sites, or who's habitat is increasingly threatened, or the species is uncommon, rare, becoming rare, is endangered, reintroduced or saved from extinction.

The planting beds of the wire trellis system will be a combination of vigorous climbers, Chinese wisteria (Wisteria sinensis) and Persian ivy (Hedera colchica), non-native ornamental species that will provide a source of nectar for pollinator.

The green buffer and hedgerow between the site and Grange Castle golf course will be enhanced with native woodland planting, Bitch, Oak, Field Maple and Bird cherry. This will strengthen the green corridor, provide additional screening as well as diversifying the tree species along this boundary. While Ash trees are likely to be affected by Ash die back disease in the coming years replanting the boundary in anticipation will ensure its maintenance into the future.



Figure 9– Native Irish Trees Forming The Woodland Boundary

Materials Palette

The hardscape materials were selected to complement the function of spaces and contribute to sustainable urban drainage. Permeable paving is sued in the parking bays and pedestrian zones. Hard surfacing within the biodiversity zone to provide access paths consists of an understated buff colour self-binding gravel path to compliment the natural surroundings. Raised Planters provide screening and create a soft division of space, while creating a backdrop and sense of safety and enclosure to benches. Bespoke timber benches are designed to fit seamlessly with the raised planters, while the same materials are carried through to the benches in the biodiversity green buffer zone for consistency across the development.



Figure 10- Precedent Image Hard Landscape Materials

Conclusion

The landscape design provides a variety of spaces to benefit both the workers and local biodiversity. Maintenance and replanting of the green buffer and hedgerow at the south east boundary will enhance local biodiversity, while new habitats are introduced through wildflower meadow seeding and additional attenuation feature creating area for marginal wetland planting.

Overall, the development will provide appropriate infrastructure to the intended use of the site, while also providing additional amenity and biodiversity value, contributing to the overall aesthetics and function of the local area.

Appendix A

Landscape Specifications Landscape Management Plan

Table of Contents

A. **OUTLINE LANDSCAPE SPECIFICATION** **a.1**
B. **PRELIMINARY LANDSCAPE MANAGEMENT PLAN** **a.12**

Preamble

This document has been prepared for submission as part of the planning application for DB8 Equinix Data Center Development and should be read in conjunction with the landscape plans prepared by Murray & Associates, Landscape Architecture. The intent is to provide technical information for the implementation and the management of the landscape scheme proposed in the application. To this end, the following sections of this document include an outline landscape specification which details the standards of supply and workmanship that will be required, and a landscape management plan which will be the basis for the maintenance and management of the landscape following completion.

Any changes that occur to the proposed landscape design as a result of compliance with planning conditions or detailed design may result in changes to the following documents. Any substantial changes will be agreed with the local authority as necessary.

A. OUTLINE LANDSCAPE SPECIFICATION

1. SPECIFICATIONS FOR SUPPLY OF NURSERY STOCK

1.1. Supply of nursery stock:

The nursery stock material will be delivered following consultation between the employer's representative, landscape Contractor and the selected nursery. It is intended to serve notice of delivery by means of phased orders at least two months prior to commencement of the dormant season in November of that year. Delivery will be at all times by means of covered vehicles, and all plant material will be clearly labelled. The source of origin must be from the selected nursery, as no other additional stock from other nurseries will be permitted without prior inspection and approval

1.2. Nursery stock:

All plant material shall be good quality nursery stock, free from fungal, bacterial or viral infection, aphids, red spider or other insect pests and any physical damage. It shall comply with the requirements of B.S. 3936: Parts 1-10: 1965 Specification for Nursery Stock, where applicable.
All plants shall have been nursery grown in accordance with good practice and shall be supplied through the normal channels of the wholesale nursery trade. They shall have the habit of growth that is normal for the species. Country of origin must be shown in all cases for species grown from seed.
Unless otherwise stated, the plant materials shall be supplied in accordance with the following codes where stated:

1+0 1 Year old seedling

1+1 1 Year old seedling lined out for 1 year 1+2 1 Year old seedling lined out for 2 years

1+1+1 1 Year old seedling lined out for 1 year, lifted and lined out for one further year 2+2 2 Year old seedling lined out for 2 years

0/1 1 Year old Hardwood cutting 0/2 2 Year old Hardwood cutting 2X Twice transplanted tree

3X Three times transplanted tree 4X Four times transplanted tree P9 Containerised plant in 9cm pot CG / c/g Containerised plant

gt. Girth

ht. Height RB / r/b Rootball BR / b/r Bareroot

MS Multi-stemmed

Ftd Feathered trees

1.3. Species:

All plants supplied shall be exactly true to name as shown in the plant schedules. Unless stipulated, varieties with variegated and/or coloured leaves will not be accepted, and any plant found to be of this type upon leafing out shall be replaced by the contractor at his/her own expense.

Bundles of plants shall be marked in conformity with B.S. 3936: Part 1: 1965 and B.S. 3936: part 4: 1966. The nursery supplier shall replace any plants which, on leafing out, are found not to conform to the labels. Definitions of all terms used are in accordance with the following British Standards: -

B.S. No. 3936: Part 1: 1992 entitled "Nursery Stock- Trees and Shrubs"

B.S. No. 3936: Part 4: 1984 entitled "Nursery Stock- Forest Trees"

B.S. No. 3936: 1992 entitled "Specification for Nursery Stock"

1.4. Tree and Shrub Specifications:

Trees shall have a sturdy, reasonably straight stem, and a well-defined straight and upright central leader, with branches growing out of the stem with reasonable symmetry. The crown and root systems shall be well formed. Roots shall be in reasonable balance with the crown and shall be conductive to successful transplantation. All trees shall be clearly labelled.

1.4.1. Root-Balled Trees

Trees shall have a clear stem from ground level to the lowest branch and a total height as appropriate to the girth size, and the minimum girth as specified shall be measured at 1.0m above ground level– all as required under BS3936: Part 1. Trees shall be well furnished with lateral fibrous roots, and shall be lifted without severance of major roots. All nursery stock trees shall have been undercut and provided with a rootball of min. diameter appropriate to girth and height. All rootballs shall be wire and hessian-wrapped.

1.4.2. Multistem Trees - Rootballed

Multistem trees shall have a minimum of 3no. stems originating from or near ground level (<0.3m) and be of reasonable bushiness and health, with a well grown root system and a total height as specified on the drawings and schedules. Trees shall be well furnished with lateral fibrous roots, and shall be lifted without severance of major roots. All rootballs shall be wire and hessian-wrapped. All multistem trees stock trees shall have been undercut a minimum of 3no. times and

provided with a rootball of sufficient size and diameter to enable healthy transplanting and successful establishment and growth. All rootballs shall be wire and hessian-wrapped.

1.4.3. Container grown Shrubs, Ferns, Grasses, Perennials, Bamboo, Hedging

Containerised Shrubs and Climbers shall be of the size specified in the schedules, with several stems originating from or near ground level and of reasonable bushiness, healthy, vigorous and with a sound root system. Pots or containers shall be appropriate to the size of shrub supplied and clearly labelled. Shrubs shall not be pot bound or with girdled or restricted roots. Shoots and aerial parts shall be free of disease, and/or damaged leaves or shoots.

1.4.4. Hedging Stock – Bare-Root

Hedging stock shall be of size specified in the schedules, with several stems originating from or near ground level, with reasonable bushiness, healthy, vigorous and with a sound root system. Shoots, roots and aerial parts shall be free of disease, and/or damaged leaves or shoots. Transplants shall be not less than one year old. Trees of species not listed in B.S. 3936: Part 4: shall be sturdy, with a balanced root and shoot development. Size shall conform to the schedules. Trees shall be well furnished with lateral fibrous roots, and shall be lifted without severance of major roots. Roots shall be of the habit normal for the species, without deformation. Transplants shall be clearly labelled and wrapped in polythene from the time of lifting until planting to conserve moisture. Shoots, roots and aerial parts shall be free of disease, and/or damaged leaves or shoots.

1.4.5. Hedging Stock – Rootballed

Hedging stock shall be of size specified in the schedules, with several stems originating from or near ground level, with reasonable bushiness, healthy, vigorous and with a sound root system. Shoots, roots and aerial parts shall be free of disease, and/or damaged leaves or shoots. Such hedging shall be provided with a rootball of sufficient size and diameter to enable healthy transplanting and successful establishment and growth. Rootballs shall be hessian- wrapped only for any plant under 1m in height.

1.4.6. Bulbs and Corms

Bulbs and Corms should be supplied whole and entire, certified disease and disorder free, dry, and in a dormant, leafless, rootless state. Bulbs must be viable and provenance certification may be required to ensure that bulbs have not been stored too long or become unviable.

2. SPECIFICATIONS FOR CARE OF NURSERY STOCK

2.1. Protection:

The interval between the lifting of stock at the nursery and planting on site is to be kept to an absolute minimum. Plants shall be protected from drying out and from damage in transport. All stock awaiting transport shall be protected from the wind and frost and from drying out.

2.2. Damage

On completion of lifting of plants in the nursery, any broken shoots or severed roots shall be pruned, areas of damaged bark neatly pared back to sound tissue.

2.3. Inspections

The Employer's representative will inspect the hardy nursery stock during the execution of the works. **Only plants selected and approved in the landscape contractors selected nursery will be accepted on the site.**

2.4. Delivery and heeling in

All plants will be delivered on a phased basis as called up in advance in agreement with the Employer's representative and the appointed Landscape Contractor. In the event of the Employer's representative being dissatisfied with the care and attention given to the stocks, following heeling-in or arrival on site, he shall notify the Landscape Contractor who shall take steps to ensure careful heeling-in procedures. Any damaged plants must be replaced by the Landscape Contractor entirely at his own expense.

The preparation of the heeling-in area and its subsequent maintenance is the sole responsibility of the Landscape contractor. No responsibility for the maintenance of stock delivered to site will attach to the employer whilst stock is protected on site, even if the stock requires protection beyond the normal planting season.

3. SPECIFICATIONS FOR SITE OPERATIONS

3.1. Setting out:

Setting out shall be in accordance with site meetings with the Employer's Representative, and the drawings listed in the preliminaries. No planting works shall take place when the soil /fill is in a waterlogged condition or the ground is frozen. Transplants in mixtures shall be planted in staggered rows. Species shall be planted in groups, as indicated in the planting drawings. No planting shall take place until all planting holes (with ameliorants) have been inspected and approved by the Employer's Representative, or a person appointed by him as a representative, to ensure accordance with the specifications. No planting shall take place when ground conditions are frozen or waterlogged. All planting holes shall be opened and closed on the same day.

3.2. Earthworks, Soil and Grading

3.2.1. Stripping and storage of existing soil on-site

All soil removed during grading works is to be placed in storage bunds on-site. Topsoil must be stripped separately from subsoil for re-use in landscape works and must be fit for purpose. Topsoil would be defined as soil that has a high content of organic material, usually corresponding to the 'O' and/or 'A' horizon of the soil profile. Subsoil would be all mineral soils that do not have a substantial organic component. Where the difference between topsoil and subsoil is unclear, consult the Employer's Representative.

Subsoil that is excess to fill requirements is to be stored on-site in a designated location, to be agreed with the Employer's Representative. Subsoil shall be stored in stable mounds with side slopes of gradient no more than 1:2 and an overall height of no more than 2m. Mounds to be seeded with wildflower seed as per clause 3.3.3.

Topsoil shall be stripped using a tracked vehicle to avoid subsoil compaction. Avoid tracking over or compaction of the topsoil. Topsoil should be stripped and dumped to form the berms using the dump and back-actor method. Double handling of topsoil is to be avoided. Topsoil that has been compacted shall be removed off site and replaced at the contractor's expense.

Topsoil shall be stored in stockpiles of dimensions no greater than 10m long x 5m wide x 0.5m high, such that a long, narrow and low berm is created to preserve the intrinsic qualities (structure and soil life) of the topsoil whilst in storage. The topsoil shall be loose tipped to create the berm and lightly compacted with the back of a digger bucket to create a degree of compaction suitable for storage, with side slopes of gradient no more than 1:2. No machinery shall be run over the soil berm. Berms shall be seeded with grass seed as per clause 3.3.2.

3.2.2. Subsoil

(a) Supply of Subsoil

Existing subsoil shall be used for all grading works.

Imported subsoil – if required - shall be sourced from a reputable source and be free of waste, chemicals, large stones, builder's rubble and any other detritus.

(b) Formation of Slopes/Mounds

Subsoil to be used to form even slopes or mounding to contours shown on drawings. Subsoil to be formed to smooth contours to 150mm below finished levels indicated on drawings, where the area is to be grassed or 300mm.

(c) Formation of Grassed Areas

Subsoil to be graded accurately to contours / levels / falls / crossfalls shown on drawings.

3.2.3. Topsoil

(a) Supply of Topsoil

Existing topsoil may be used for all grading and planting works, if it complies with the following specification, which would also apply to imported topsoil, as required. It is expected that imported topsoil will be required for all planting areas.

Topsoil shall be sourced from a reputable source and be free of waste, chemicals, large stones, builder's rubble and any other detritus. Topsoil shall have good structure, be friable, fresh and free-draining with at least 20% organic content. Imported topsoil shall comply with BS3882: 1994, and shall be free draining sandy loam, clay or other approved. It shall be free of stones over 40 mm diameter, and stones over 10 mm diameter shall not exceed 5% by weight. It shall be free from subsoil, sods, roots of trees and shrubs, and rubbish. Topsoil shall be from the original surface layer of grassland or cultivated land, to a maximum depth of 200 mm. Soils from woodland, heathland, bog or contaminated land will not be acceptable.

(b) Removal of topsoil:

In areas to be regraded, all topsoil should be stripped and stored as per following clauses.

(c) Weather and Soil Conditions

All work involving topsoil shall not be carried out, unless the Employer's Representative permits otherwise:

- Where areas have been exposed to a cumulative rainfall exceeding 60mm over the preceding 28 days

measured at a point approved by the Employer's Representative; or

- Where soil moisture content is wetter than the Plastic Limit (PL) of the soil less 3%. The PL of the soil can be assessed in the field as the minimum moisture content at which the soil can be rolled and moulded into a thin thread approximately 3mm in diameter without breaking or cracking and in a laboratory according to BS 1377:Part 2.
- When heavy rain is falling;
- During periods of severe frost when the soil is frozen. Handling frozen soil will cause damage to the soil structure.

(d) Topsoil Spreading

Topsoil shall be moved and spread only in dry weather. Before topsoiling, remove all stones, rubble and rubbish over 75mm diameter from the surface of the subsoil formation. Dig out any areas polluted by oil or chemicals and make up with clean soil. Loaders shall load from the base of the soil storage berm only. Placement of soil should be carried out using a tracked vehicle to avoid subsoil compaction. Reinstated areas of topsoil shall not to be tracked over. The topsoil shall be allowed to settle to a thickness of 300mm and the contractor shall make full allowance for such settlement in applying the topsoil. Uneven areas shall be topped up as necessary.

(e) Topsoil Depths & Provision

The following depths should be provided for topsoiled areas:

(i) Grassed Areas: 150mm

(ii) Bare-root planting: 300mm

(iii) Shrub planting: 450mm

(iv) Tree planting: Pit to specified size, depending on size of tree (see relevant Clauses)

(f) Grading

Topsoil to be graded accurately to contours / levels / falls / crossfalls shown on drawings. Glazed / compacted areas of subsoil to be roughened or ripped as necessary. (Drainage to be installed where necessary to Engineer's specification.) Any compacted areas to be ripped after placing of soil.

(g) Compacted areas

Any areas identified as compacted following completion shall be deep ripped and re-graded or re-soiled as necessary, to ensure a free-draining soil gradient and to avoid anaerobic conditions developing in the topsoil.

3.2.4. Structural Soil / Tree Pits

Structural Soil to consist of the following, in the proportions determined by the manufacturer:

Range of use	Tree planting pits under high traffic areas
Material	Crushed stone, sandy clay loam, peat-free compost
Total pore volume	> 35% Vol
Moisture Content	12-20%
Key data	Total Nitrogen 500 mg/L Phosphorous 300mg/L Potassium 450 mg/L Magnesium 200 mg/L Calcium 3000 mg/L Sulphur 250 mg/L
Organic content (LOL)	3-7 % w/w
pH value	6.5-7.8
Water permeability	1.7 x 10 m/s
California Bearing Ratio	greater than 50
Bulk density	Approx. 1.8ton/m3

The structural soil shall be placed to the line and graded as shown on the plans or as directed by the Landscape Architect / Engineer.

- Install structural soil in 150mm (6”) lifts and compact each lift. Compact all materials to 90-95% compaction from a standard AASHTO Compaction Curve (AASHTO T 99). Adequate compaction can be achieved with the use of a standard pedestrian plate compactor.
- No placement or compaction shall occur when moisture content exceeds 2% above the optimum compaction moisture content as determined by AASHTO T 99 (ASTM D698).
- Protect Structural Soil during delays in compaction with plastic or plywood as directed by the Engineer.
- Field tested permeability shall be within 12 - 25mm (0.5" and 1") per hour.

Engineering specifications for pavement installation call for a high degree of compaction which is generally specified as 95% Proctor or peak density, to ensure that pavements would not subside, crack, or fail. When CU-Structural Soil is correctly installed and compacted to 95% - 100% Proctor Density, it has a CBR (California Bearing Ratio) of 50 or greater.

NOTE RE STRUCTURAL SOIL: Alternative specification may be agreed at construction stage, subject to agreement with Planning Authority.

3.3. Surface cultivation of Topsoil

Surface cultivation will consist of ploughing or rotovating the topsoil to a minimum depth of 450mm over shrub areas or 150mm over grass areas. Care to be taken to ensure that the subsoil is not brought to the surface. It shall then be worked to reduce the topsoil to a fine tilth. After cultivation, all debris, perennial weeds and stones over 25mm in any dimension are to be removed off site.

Final grading is to be carried out to ensure the true specified level and slope and to avoid minor ridges, dishing or other depressions where water may collect.

Unless otherwise stated, finished levels of grass and shrub planting areas will be 50mm above adjoining paving or kerbs, retaining wall copings, manhole covers etc. and levels will be arranged to give gentle falls for drainage and to avoid ponding hollows. Any area unduly compacted during the work of grading will be loosened by forking or harrowing. The use of heavy rollers to roll out mounds will not be permitted.

Unless otherwise stated, finished levels of topsoil, after settlement, to be:

1. 50mm above adjoining pavements and kerbs
2. 300mm higher for shrubs than for adjoining grass areas
3. married in with adjoining soil areas
4. all stones above 50mm diameter to be removed off site by the landscape contractor.

3.4. Seeding:

3.4.1. Amenity Grass Areas

Fine cut areas to be sown with Coburns 'Greenlawn' Grass Seed Mixture as detailed below or equal at a rate of 40g/sq.m together with fertiliser 10:10:20 at a rate of 50g/Sq.m

15% Dwarf Perennial Ryegrass

15% Dwarf Perennial Ryegrass

20% Dwarf Perennial Ryegrass

25% Strong Creeping Red Fescue

20% Chewings Fescue

5% Browntop Bentgrass

4. SPECIFICATIONS FOR PLANTING OPERATIONS

4.1. Tree Support:

All trees in pavement tree pits shall be anchored by means of root ball guying. Rootball is anchored by a timber frame (or equivalent support system – e.g. Platipus system) located around the top surface of the rootball, which is fastened by wires (4mm galvanised cable guying wire) to 'dead man' anchors, kerbstones or timber beams located below the rootball.

4.2. Stakes:

Round stakes shall be of peeled larch, pine or Douglas fir, preserved with a water-borne copper chrome arsenic composition in accordance with I.S. 131. All trees to be double staked with crossbar 100x25mm securely attached to uprights with galvanised nails. Stakes shall be round, 1.8m long, 75mm in diameter. Stakes shall be pointed at the butt end. Set stakes vertically in the pit and drive before planting. Drive stake with a wooden maul or cast-iron headed drive. Sledgehammer should not be used. Stakes shall be driven into the excavated planting pit to a depth of 1000mm.

4.3. Tree ties:

Tree ties shall be of rubber, PVC or proprietary fabric laminate composition and shall be strong and durable enough to hold the tree securely in all weather conditions for a period of three years. They shall be flexible enough to allow proper tightening of the tie. Ties shall be min. 25mm wide for 120cms – 150cm height trees and min. 38mm for larger sizes. They shall be fitted with a simple collar spacer to prevent chafing. Two ties per tree shall be applied to standards; for staked transplants, one tie per tree is required.

4.4. Protection:

The interval between the lifting of stock at the heeling-in area and planting on site is to be kept to an absolute minimum. Plants shall be protected from drying out and from damage in transport. All stock awaiting planting on site shall be stored in a sheltered place **protected from the wind and frost and from drying out.**

All transplants shall be wrapped in polythene from the time of lifting to conserve moisture. Except when heeled-in, they shall be protected in polythene at all times until planted into their final position on site.

4.5. Damage:

On completion of planting any broken branches shall be pruned, areas of damaged bark neatly pared back to sound tissue.

4.6. Watering / Fertilisers:

All trees and shrubs shall be soaked in water for one hour prior to planting. Fertilisers shall conform to BS 5581: 1981. Fertiliser must be mixed through and incorporated into the base of the planting hole and covered with soil in order to avoid roots of plants coming in direct contact. Follow manufacturer's instructions for all chemical products.

4.7. Tree planting:

Trees shall be planted at the same depth as in the nursery, indicated by the soil mark on the stem of the tree. They shall be planted in the centre of the planting pit and planted upright. Stones or other rubbish over 75mm shall be removed. Supply and install the staking / guying system as per clauses 4.1-4.4. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plant into position. Upon completion of planting, all pits shall be raked over lightly to leave an even surface and neat appearance. All stones greater than 25mm dia. to be removed. Provision should be made for the watering of root-balled trees in the first year following planting.

4.8. Specimen Trees

Excavate tree pits to 1200mm x 1200mm x 1000mm deep. Farmyard manure 80mm deep and 100g of 0.10.20 shall be applied to each tree pit prior to planting. Farmyard manure shall consist predominantly of faecal matter and shall be free of loose, dry straw and undigested hay. It shall be free of surplus liquid effluent. Install tree support system as per clause 4.1. Fill planting hole with topsoil as per clause 3.2.2, and remove all stones and debris, firming plant into position.

4.8.1. Small Trees / Large Shrubs

Excavate tree pits to 750mm x 750mm x 750mm deep. Farmyard manure 60mm deep and 100g of 0.10.20 shall be applied to each tree pit prior to planting. Farmyard manure shall consist predominantly of faecal matter and shall be free of loose, dry straw and undigested hay. It shall be free of surplus liquid effluent. Install tree support system as per clause 4.1. Fill planting hole with topsoil as per clause 3.2.2, and remove all stones and debris, firming plant into position.

4.9. Container Grown Shrubs, Grasses, Ferns, Perennials P9 / 20-30 / 30-40cm

Excavate planting hole to a depth of 300mm x 300mm x 300mm deep; the base to be broken to a depth of 50mm and glazed sides roughened. Apply FYM to base of hole to a depth of 150mm and 30g of 0:10:20 per planting pit. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plant into position.

4.10. Containerised Shrubs, 40-60cm

Excavate planting hole to a depth of 500mm x 500mm x 500mm deep; the base to be broken to a depth of 50mm and glazed sides roughened. Apply FYM to base of hole to a depth of 150mm and 50g of 0:10:20 per planting pit. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plant into position.

4.11. Hedging 25-30cm, 40-60cm

Excavate trench to a depth of 300mm x 300mm wide; the base to be broken to a depth of 50mm and glazed sides roughened. Incorporate 200mm depth of well-rotted FYM into base and cover with 150mm soil min. Apply 100g 0:10:20 per metre into backfill. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plants into position.

4.12. Hedging 90-120cm

Excavate trench to a depth of 500mm x 500mm wide; the base to be broken to a depth of 50mm and glazed sides roughened. Incorporate 200mm depth of well-rotted FYM into base and cover with 150mm soil min. Apply 100g 0:10:20 per Sq.m into backfill. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plants into position.

4.13. Bulb and Corm Planting

Bulbs to be planted in single species drifts of 100-300no. bulbs. Excavate hole wide and deep enough for the bulbs. Bulbs to be planted at a depth three times longer than the bulb, measured from base to tip. Place the bulbs in the hole with the shoot facing upwards, spaced at least twice the bulb's own width apart. Replace the soil and gently firm with the back of a rake. Avoid treading on the soil following planting as this can damage the bulbs.

4.14. Ground finish:

Upon completion of planting, all ground finish shall include for the removal of stones greater than 25mm excavated during the course of the digging for planting purposes. All soil surfaces should be even and free of mounds, rutting or hollows.

4.15. Spraying:

Following planting, weed free circles to be formed around individual plants, as directed, using an approved broad-spectrum contact herbicide, as approved by the Employer's representative, in mid-spring following planting. Herbicide to be applied using controlled drop applicator. The contractor shall be responsible for keeping the ground (1m diameter circle) around all planted material weed free by means of herbicidal application, using approved sprays, during the course of the contract. Weeds to be removed include grasses ,broad-leaved annual and perennial weeds and all noxious weeds.

4.16. Weed control fabric

The weed control fabric shall be 105gsm and shall suppress weeds whilst allowing water, air and nutrients to pass through. MypexTM, PlantexR or equal woven fabric product acceptable. Cut with a scissors or knife. All sharp objects should be removed from the surface soil prior to laying the weed suppressing geotextile. Overlap adjacent rolls by at least 10cm. Membrane to be pegged to ground using proprietary plastic pegs.

When planting into the geotextile membrane an 'X' shaped notch should be cut into the membrane for each individual plant, to allow for excavation. Planting should resume as per species specification. Excavated material should not be stored on geotextile and the membrane area should be thoroughly swept of any residual material prior to application of finished aggregate or mulch.

Membrane to be applied to all planting and gravel areas.

4.17. Bark mulch

Bark Mulch to be 'Golden Pine Bark' by Growise or equal and approved. The product shall consist of matured Conifer Bark with an even nominal particle size distribution of 5-75mm with less than 5% dust and fines and less than 15% wood content. The pH to be between 4.5 and 5.5. The product shall be pest, disease and weed free and not have been treated with Methyl Bromide or any additives. The product shall have been tested in accordance with the requirements of BS 4790:1987, for fire resistance.

The natural heat treatment maturing process shall have been sufficient to ensure that excess volatile substances are driven from the product. During the process, temperatures within the product heaps must exceed 50°C for a minimum 14 day period, followed by a further period of stabilisation.

Lay Bark Mulch to a finished depth of 75mm allowing at least 10% for settlement after 30 days. All such mulch of good quality from an approved source will be inspected by the Employer's representative prior to delivery. All product volumes to be calculated using The Bulk Density method, as set out in BS EN 12579:2000 and BS EN 12580:2000. Slow release Nitrogen fertiliser to be applied to soil prior to mulching.

B. PRELIMINARY LANDSCAPE MANAGEMENT PLAN

1. Introduction

The purpose of this Preliminary Landscape Management Plan is to provide guidance and specifications for the maintenance requirements of the landscape elements of the proposed development at North West Logistics Park – Unit 635. This will cover all of the landscape typologies (trees, shrubs, hedging, grass, bulbs, etc.) on-site to ensure that all maintenance operations required for the efficient and effective management of the landscape are characterised and defined. The plan will provide a set of measurable performance standards that can be applied to evaluate landscape maintenance works carried out on the site.

2. Nature of Site

New landscape spaces associated with the development include:

Landscape areas surrounding the proposed developments are planted with native trees and shrubs, to soften and screen the development over time. The car parks will have verges of low maintenance shrubs and native trees.

Hard landscape works to be maintained include feature paving, lighting, footpaths, road carriageway areas and drainage elements.

3. Timeframe & Programming

The proposed landscape spaces and infrastructure, including the landscape works, will be managed and maintained by the applicant. A detailed programme of works will be agreed with the Contractor prior to maintenance operations commencing in each year.

Where the roads proposed as part of this application are to be used as construction access to sites, the performance standards and specifications contained in this document will be amended for the duration as it would be wasteful of resources to maintain roads that are part of a construction site to the level specified herein. During such periods, protection of trees in verges will be prioritised and strict conditions requiring tree protection from construction vehicles, compaction, etc. will be enforced as part of construction contracts.

4. Aims & Objectives

4.1 General

Fundamentally, the aim of landscape management is to ensure that all external areas are kept in good condition, as perceived and expected by the management, users and local authorities. The Landscape Management Plan aims to provide a manual for the maintenance requirements of all landscape spaces associated with the development. It will define and specify all necessary

operations for the efficient and effective management of the landscape in order to ensure that each area is appropriately and sustainably maintained.

4.2 Horticultural / Sylvicultural Objectives

Horticultural and sylvicultural aims relate to the appropriate management operations for all plants and trees. The specific horticultural objectives are as follows:

- All plants to be maintained so that they remain in good health;
- All plants to have a habit and form consistent with species type and aesthetic objectives;
- Specialist operations for particular types of plants where necessary to achieve the aesthetic or functional objectives,
- e.g. pruning, dead-heading of flowering plants, formative clipping, etc. are included in the plan;
- Areas surrounding plants are to be maintained in such a way that potential threats to plant viability are addressed,
- e.g. weed control (particularly invasive and noxious weeds);
- Recognition of planting (including trees) at the end of its viable life is important to ensure that it is removed and replaced in a timely manner to avoid eyesores.

4.3 Performance Standards

Performance Standards can be defined as follows in the context of this plan: **written specifications of the conditions that will exist when satisfactory works are completed**. Performance standards will be measurable against the specified outcomes required for a particular operation, within a particular area. Performance standards must be upheld by the contractor at all times and will be monitored on an ongoing basis through regular site inspections.

Performance standards are specified in section 5 of this document. All required maintenance operations are defined and detailed to provide both specifications for the landscape contractor to follow and a set of measurable outcomes to appraise and value the contractor's performance against the requirements of the contract.

4.4 Environmental Considerations

Responsible and sustainable landscape management is about balancing the performance standards with the required standard of maintenance. The following principles have guided the development of the specification:

- **Minimise use of non-renewable resources**
  - e.g. reduce lawn areas to reduce consumption of fossil fuels, reduce use of chemical inputs such as pesticides, where possible.
- **SuDS**
  - Sustainable Drainage systems have been included in the design and are an integral part of the landscape. It is imperative that these are managed and maintained to ensure that they are not compromised in their functioning.
- **Utilise low input systems**
  - Includes measures such as: mulching instead of herbicide use, where possible; encourage rough-cut or meadow grass where appropriate to avoid regular mowing.
- **Green waste recycling / mulching / composting**
  - Avoids excessive transportation and use of landfill
- **Use of environmentally friendly products where possible**
  - e.g. biodegradable herbicides, biodegradable tree ties, timber stakes.
- **Biodiversity & Nature Conservation**
  - Project ecologist will be consulted for any replacement planting or operations that could disturb wildlife in order to comply with best practice; All works involving tree surgery or removal of trees / hedgerows will be carried out outside the nesting season (unless required for health and safety or is unavoidable).
- **Control of Invasive Species**
  - It is an objective of this plan to control and prevent the spread of invasive species, and in particular, Giant Hogweed, in order to protect the biodiversity of the landscape.
- **Protection of site resources**
  - Appropriate maintenance will result in the protection of existing trees, vegetation and soil resource of the site.

5. Specifications for Landscape Maintenance Operations

5.1 Grass and Lawn Areas

(i) ***General***

At all times grass to look lush, vigorous and of fine quality with a minimum weed content, and a minimum variation in height of the sward during the growing season. Cutting should take place on a regular basis. Grass cutting areas shall be cleared of litter and rubbish prior to grass-cutting taking place.

No ruts are to be caused due to poor ground conditions. During periods of poor weather, no grass is to remain lodged following cutting. In periods of prolonged wet weather or where ground is waterlogged, consult with Property Manager prior to engaging in grass cutting operations.

Noxious and competitive weeds such as Ragwort, Gorse, Thistle, Dock, Nettle, Briar, Horsetail and Dandelion shall not be allowed to establish in any grass areas.

*(ii)****Amenity Lawn Areas***

Criterion	Performance Standards
Aesthetic / functional requirements	Amenity lawn areas are those grass areas which will be maintained for general access and amenity purposes, to create a lawn which is neat, healthy, close-cut and with minimal weed content.
Permitted mower type	Cylinder mower, Rotary mower, ride-on mower, tractor-pulled gang mower (note: subject to ground conditions; hand-mowing required in designated areas and/or where ground is soft)
Height of Cut	Minimum 20mm; maximum permissible height 50mm. At the commencement of the contract, following flowering cycle of seasonal bulbs or if grass cutting has been forestalled due to poor ground conditions resulting in the grass growing above the maximum permissible height, it shall be cut to 50mm on the initial cut, then to 25mm on the subsequent cut. Such initial long grass shall be collected and removed off site.
Frequency	Mow weekly during spring; summer and autumn; only when necessary in winter. Mowing is not permitted when ground conditions are very soft, waterlogged or frozen, or during spells of cold, drying winds or when the grass is frosty or wet.

Finish	Even finish. Vary direction/pattern of cutting every 3 months. Grass shall be trimmed from around the bases of walls and fences, back of footpaths and kerbs, litter bins, sluice valves and hydrant markers, trees, poles, signage and public lighting columns, etc., and this interface between grass and walls, fences, etc., as noted above, kept in a neat and tidy condition. This trimming shall be deemed to be included for at every grass-cutting. The Landscape Contractor is bound to comply with this instruction and herbicide application is not permitted to achieve this.
Clippings	To be gathered at every cut and disposed of in designated area or off-site. Box to be emptied regularly during cutting to avoid clumps being left on the grass.
Fertiliser	In mid-spring (late March to April), use a proprietary lawn fertiliser at the manufacturer's recommended rates, to be approved by the ER. Apply fertilisers when the soil is moist, or when rain is expected. If grass loses vigour and freshness between late spring and late summer (often May to August), repeat the application of lawn fertiliser.
Weed Control	Minimum weed content permitted i.e.: (1) <5% of species content; (2) <10% of total grass area. When necessary and agreed with ER, use a selective herbicide, with the active ingredient Mecoprop-C, MCPA, 2-4-D or Dicamba to control broad-leaved weeds in the sward. Weeds resistant to herbicide to be dug out by hand in autumn.
Scarifying	Scarifying to be carried out to keep levels of thatch (old grass stems, dead moss and other debris) at an acceptable level (i.e. less than 1cm deep). To remove thatch, rake vigorously but carefully with a power-scarifier. Recommended to be carried out in autumn only.
Aeration	Spiking with holes 10-15cm (4-6in) apart and deep to be carried out once per annum.
Rolling	Amenity grass areas should be reasonably even, with no variations greater than 25mm over a 1m straight edge. In September, to repair any uneven areas of the lawn, use an edging iron to slice through the turf and roll it back. Fork over the underlying ground and add or remove soil

	as needed. Replace the turf, pressing the edges together, roll with lawn roller (nominally 100kg, subject to site conditions) and water thoroughly.
Edging	Lawn to be edged by hand or edging machine regularly to leave an even, straight edge and to ensure that the grass or soil does not protrude over the edge by more than 25mm.
Over-seeding	After moss or weeds have been removed, or where grass is growing sparsely, over-seeding may be necessary. (Early autumn or mid-spring). Break up the surface with a fork and rake to leave a fine, even tilth; Sow grass seed at half the recommended rate (usually 10- 15g/sq.m); lightly rake to incorporate the seed into the surface; water if weather remains dry for 2-3 days following seeding.
Watering	Watering to be carried out when required. Ensure that the water reaches a depth of 10cm (4in) after each watering. Rate: max. 20 litres per square metre.

Indicators of under-performance:
Excessive weeds or weeds such as clover or moss indicate poor sward health; bare patches may indicate scalping or lack of vigour; yellowing or browning of sward may indicate drying out, under-feeding, herbicide drift or inappropriate use of herbicide; thatch build-up greater than 1cm depth; rutting of the surface, wheel marks or poor drainage may indicate compaction of soil caused by mowing in wet weather or use of unsuitable mower type.

(iii) ***Rough Cut Grass Areas***

Criterion	**Performance Standards**
Aesthetic / functional requirements	Rough cut grass areas are those grass areas which will not usually be accessed by users and will usually be in low priority areas, or in the background. These areas are to be maintained to create a grass area which is healthy and with minimal weed content, with grass allowed to grow relatively long between infrequent and regular cuts.
Permitted mower type	Strimmer, Rotary mower, ride-on mower, tractor-pulled gang mower (note: subject to ground conditions; strimming required in designated areas, areas of slope gradient greater than 1:3 and/or where ground is soft)
Height of Cut	Grass areas shall be cut to a height of c. 75mm
Frequency	5no. times during the growing season, at regular intervals of approximately 6 weeks
Finish	Rough cut shall mean grass of minimum height 75mm, with informal appearance
Clippings	To be gathered at every cut and disposed of in designated area or off-site.
Fertiliser	In mid-spring (late March to April), use a proprietary lawn fertiliser at the manufacturer's recommended rates, to be approved by the ER. Apply fertilisers when the soil is moist, or when rain is expected.
Weed Control	Minimum weed content permitted i.e.: (1) <5% of species content; (2) <15% of total grass area. When necessary and agreed with ER, use a selective herbicide, with the active ingredient Mecoprop-C, MCPA, 2-4-D or Dicamba to control broad-leaved weeds in the sward. Noxious or invasive weeds to be spot treated by controlled droplet applicator or glove

	with Glyphosate (Round-Up or equal) in May, June and August and prevented from flowering.
Edging	Rough-cut grass areas to be edged by hand or edging machine regularly to leave an even, straight edge and to ensure that the grass or soil does not protrude over the edge by more than 25mm

5.2 Shrub Planting

(i) Groundcover / Mixed Borders / Mass Shrub Plantation

Criterion	Performance Standards
Aesthetic / functional requirements	Shrub planting areas shall be kept clean at all times, with an even finish. Plants to have a healthy, lush appearance, typical for plant species and time of year.
Weed Control	Weeds shall not be allowed to cover more than 5% of the ground at any one time, neither shall weeds exceed 50mm in height. Residual herbicide permitted for established shrub areas.
Bark Mulch	Required – min. 50mm deep; to be kept topped up at all times.
Fertiliser	Annual feeding with 50g/sq.m of general-purpose fertiliser in February. (Rake back mulch prior to application.)
Pruning / Clipping	Pruning once per annum to maintain the typical size and form of the plant, for sightlines and for plant health; all clippings to be gathered at every pruning and disposed of in designated area or off-site.
Edging	Beds to be edged by hand or edging machine twice per annum to leave an even, straight edge. Shrubs or soil not to protrude past the edge by more than 50mm.
Watering	Watering required only in periods of prolonged drought (i.e. after more than 2 weeks)

(ii) Specimen Shrubs

Criterion	Performance Standards
Aesthetic / functional requirements	Specimen shrub planting areas shall be kept clean at all times, with an even finish. Shrubs to have a healthy, lush appearance at all times, typical for plant species and time of year.
Weed Control	No weeds permitted in the shrub area. Established shrub areas may be treated with an approved residual herbicide to provide year round weed control.
Bark Mulch	Required – 75mm deep; to be kept topped up at all times.
Fertiliser	Annual feeding with 50-100g/sq.m of general-purpose fertiliser in February. (Rake back mulch prior to application.)
Pruning / Clipping	Regular pruning as necessary to maintain the typical size, habit and form of the plant, for health and to maintain best appearance; all clippings to

	be gathered at every pruning and disposed of in designated area or off-site.
Watering	Watering required to ensure consistent availability of water to plant during periods of drought (i.e. after more than 5 days) - minimum

(iii) ***Hedge – Free Growing***

Criterion	Performance Standards
Aesthetic / functional requirements	Even, clean finish to ground plane. Hedge to have a healthy, lush appearance, typical for plant species and time of year. Relatively informal habit acceptable.
Weed Control	No weeds permitted in the hedge area. Established hedge areas may be treated with an approved residual herbicide to provide year round weed control.
Bark Mulch	Required – 50mm deep; to be kept topped up at all times.
Fertiliser	Annual feeding with 50g/sq.m of general-purpose fertiliser in February. (Rake back mulch prior to application.)
Pruning / Clipping	Pruning once per annum as necessary to maintain the required height and width, and prevent “leggy” growth; all clippings to be gathered at every pruning and disposed of in designated area or off-site. Laying may be required for Hawthorn and Blackthorn hedges if hedge growth becomes thin at the base.
Watering	Watering required only in periods of prolonged drought (i.e. after more than 2 weeks)

(iv) ***Native Shrub Plantation***

Criterion	Performance Standards
Aesthetic / functional requirements	Even, clean finish to ground plane. Hedge to have a healthy, lush appearance, typical for plant species and time of year. Relatively informal habit acceptable.
Weed Control	Weeds shall not be allowed to cover more than 5% of the ground at any one time, neither shall weeds exceed 50mm in height. Residual herbicide permitted for established areas.
Bark Mulch	Required for high prominence areas; recommended for medium areas – 50mm deep; to be kept topped up at all times.

Fertiliser	Not required.
Pruning / Clipping	Pruning once per annum for shrubs such as Dogwood and Guelder Rose or to control height and spread when necessary.
Watering	Watering required only in periods of prolonged drought (i.e. after more than 2 weeks)

(v) Scrub - naturally occurring

No maintenance operations required, except to ensure that any edge plants are kept cut back at least 1m from road edges and tidy where visible or prominent.

5.3 Trees & Woodlands

(i) General:

- Canopies overhanging a pedestrian path to be maintained to 2.2m and canopies overhanging vehicular access to 4m.
- Limb damage caused by wind, passing traffic, etc. to be pruned resulting in a clean even wound.
- No signs, security boxes, etc. to be attached to trees.
- Surface tree roots not to cause a trip or mowing hazard. In grass areas, top up soil over roots and re-seed.
- Raised paviors or cracked/bulging walls due to root growth are to be reported to the Contract Administrator.
- Exposed roots from construction works to be kept moist by wrapping damp hessian around roots until soil is backfilled and then apply a one off generous application of water. Root damage to be pruned resulting in a clean even wound prior to backfilling / topsoiling.
- Control of ivy and suckering on the trunks of trees within falling distance of activity
- Informal monitoring of trees for change of condition or evidence of a fungal fruiting body.

(ii) Specimen, Solitary and Avenue Trees

All trees to be maintained in accordance with requirements for species and habit to be maintained in accordance typical form for tree. Tree trunk will be kept visible for defect inspection with control of ivy and removal of suckering. Mulch 1m diameter will be maintained around all individual trees within grassed areas. Stakes and ties to be retained for a maximum period of 3 years, with tie loosened annually and both stake and tie to be removed after 3 year period. All nursery marking,

bamboo and labels to be removed off all trees. Tree grilles in hard surface areas to be maintained weed free.

Any visible change in condition to be reported.

(iii) Tree Groups, Woodland, Grid, Hedgerow Trees

Such areas shall be kept free of noxious and pernicious weeds at all times. Mulch or spray rings 1m diameter will be maintained along group perimeter and around all plants in young woodland areas where canopy cover has not been achieved. Established woodland areas shall not be treated with herbicide except where necessary for the removal of noxious and invasive weeds including Ragwort, Gorse, Thistle, and Dock, hogweed, bramble and any others. Japanese knotweed shall not be allowed to establish in any woodland areas. Bramble should not exceed 20% of ground cover of any woodland. Ivy shall be controlled and shall not be allowed to establish itself on trees along the perimeter and within falling distance of activity within woodland areas. Understorey (excluding saplings) not to exceed 1m in height in order to retain visibility for user safety in areas of activity. Tree numbers not to exceed 4 per sq.m of trees with a girth of less than 250mm and numbers not to exceed 2 per sq.m for trees with a girth of over 300mm. Fallen or felled trees in woodland areas to be maintained on-site where permissible, for reasons of biodiversity and ecology which contribute to the overall health of the woodland.

5.4 Herbaceous Perennial Planting (including Ferns and Ivy)

(i) Bulbs

Watering: Ensure that bulbs have adequate water throughout growth period, up until cutting back occurs (see below). Fertiliser: Apply approved general purpose fertiliser to all bulb areas at nominal rate of 35g/sq.m in late February.

Cutting Back: Cut back dead foliage to ground level six weeks after the end of flowering (or earlier if foliage is yellow and straw-like). Do not tie or knot the leaves.

Note: Herbicides may not be used in or around bulb areas.

5.5 Hard Landscape Surfaces & Signage

Hard Standing including roads, paved areas, pavements, and kerb-lines - shall be kept clean at all times, with no growth of weeds and without moss infestation. Roads and kerb lines shall be kept free of litter and build up of grit and debris through the implementation of a regular sweeping program.

(i) Weed Control

All paved areas such as footpaths, kerb lines, feature paving, gravel areas, etc., throughout the site are to be maintained weed free at all times. The application of a suitable broad-spectrum herbicide e.g. Glyphosate (Roundup Bi-Active or equal and approved) shall be applied 3no. times per annum to achieve this. Once per annum a suitable chemical to treat moss shall be applied

where it has established on hard surfaces. An initial physical treatment, such as scraping using a spade, will be required to remove existing moss growth prior to spraying.

(ii) ***Sweeping***

Sweeping shall mean sweeping of feature paving areas, footpaths and kerb lines along all public roads (edge of road) and removal of all grit, rubbish and leaves from these areas. Soil wash from beds on to paved areas should also be swept. This work to be executed fortnightly.

Note: Particular attention is required during the period of October/ November to deal with leaf fall.

(iii) ***Cleaning***

Cleaning shall mean the removal of paper, plastic bags and all other rubbish. Cleaning shall be carried out as follows:

- Fine cut grass areas, all paved and hard standing areas, footpaths and kerb lines: This work to be executed prior to grass cutting on each grass cutting visit. Cleaning shall be carried out 36no. times per annum, including winter.
- Rough cut grass areas: prior to each scheduled grass cut, minimum 8no. times per annum.
- Tree groups, boundary tree areas, shrub maintenance areas, all other areas: 8no. times per annum.

Cleaning shall also include the removal of grit and rubbish from road gullies, drains, Aco drains and collapsible bollards twice per year.

(iv) ***Signage***

All signs are to be cleaned to a high standard 4 times per year.

(v) ***Gullies***

All gullies are to be inspected monthly and if full or blocked, must be cleared out as appropriate.

5.6 Natural Areas

No maintenance operations are permitted within areas designated as natural zones. Neither is dumping of any arisings, storage of materials or any other related activity.

5.7 Weed Control

5.7.1 ***General***

Minimal amount of herbicidal chemicals are to be utilised on the site, with non-chemical means of weed control to be preferred (mulching, mechanical control, hand weeding, etc. where feasible). Biodegradable herbicides are to be preferred where herbicide use is required. Prior to

executing weed control involving the use of herbicides, details of the products to be used including a Material Safety Data Sheet (MSDS) for each product is to be provided to the Contract Administrator for each of the herbicides proposed. A sample herbicide information chart is included in Addendum A.

Where translocated herbicides are applied, spray drift should be avoided and spray guards fitted to apparatus. Where feasible, spot treatment using CDA (Controlled Droplet Applicator) or glove preferred. Use of residual herbicides shall not be used in areas of herbaceous planting, in the initial year following planting of new shrubs or over areas of bare ground within shrub beds where replacement planting is to be carried out. Hand weeding in planting beds will be required where there is a large component of herbaceous material, bulbs or prostrate groundcover plants.

5.7.2 Invasive Weeds

Several invasive species that are currently on the Invasive Species Ireland Amber List (i.e. not a significant threat at present) have been identified on-site, including: Cotoneaster, Buddleia, Winter Heliotrope (Petasites fragrans) and Sycamore (Acer pseudoplatanus). These plants will be removed from the site and disposed of in accordance with the requirements with the of the Project Ecologist and relevant authorities.

Monitoring for invasive weeds of any kind, most particularly Japanese Knotweed, Giant Hogweed, Himalayan Balsam and other notable invasive plants shall not be allowed to establish in any area of the site. It will be the responsibility of the contractor to be able to identify same and treat at first sign of emergence. Methodology for removal of invasive plants is to be agreed with the Project Ecologist and relevant authorities.

6. Monthly Maintenance Operations Schedule

The following tables give an indicative outline of the required monthly maintenance operations, based on the specification outlined above.

Maintenance Program - January

Item	Description
1.1	Yearly maintenance Shrub and tree planting
	Tree pruning
	Hedge cutting
1.2	Weed free circles around trees/whips
	Check tree stakes and ties
1.3	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Road/Paved area sweep 1
	Road Gulley cleaning

Maintenance Program - February

Item	Description
2.1	Yearly maintenance Shrub and tree planting
	Tree pruning
	Check tree stakes and ties
2.2	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Road/Paved area sweep 1
	Road Gulley cleaning

Maintenance Program - March

Item	Description
3.1	Yearly maintenance Shrub and tree planting
	Shrub Pruning
	Tree pruning
	Hedge cutting
	Hedgerow cutting
	Hand Weeding in shrub areas
	Weed free circles around trees/whips
3.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
	Grass trimming
	Grass edging
	Weed control to rough cut/rough ground areas
3.3	Grass reinstatement
3.4	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Weed/Moss control to hard landscape areas
	Clean all signs

Maintenance Program - April

Item	Description
4.1	Yearly maintenance Shrub and tree planting
	Shrub Pruning
	Hedgerow cutting
	Herbicide application to shrub/woodland areas
	Hand Weeding in shrub areas
	Weed free circles around trees/whips
	Apply fertiliser
4.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
	Cut 3
	Cut 4
	Grass trimming
	Grass edging
	Weed/Moss Control
	Fertiliser Application
4.3	Grassed areas – Rough Cutting
	Weed control to rough cut/rough ground areas
4.4	Grass reinstatement
4.5	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Weed/Moss control to hard landscape areas

Maintenance Program - May

Item	Description
5.1	Yearly maintenance Shrub and tree planting
	Hedge cutting
	Herbicide application to shrub/woodland areas
	Hand Weeding in shrub areas
	Apply fertiliser
	Watering
5.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
	Cut 3
	Cut 4
	Grass trimming 1
	Grass trimming 2
	Weed/Moss Control
	Fertiliser Application
5.3	Grassed areas – Rough Cutting
	Weed control to rough cut/rough ground areas
5.4	Grass reinstatement
5.5	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Weed/Moss control to hard landscape areas
	Road/Paved area sweep 1
5.6	Watering

Maintenance Program - June

Item	Description
6.1	Yearly maintenance Shrub and tree planting
	Tree pruning
	Herbicide application to shrub/woodland areas
	Hand Weeding in shrub areas
	Weed free circles around trees/whips
	Apply fertiliser
	Watering
6.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
	Cut 3
	Cut 4
	Grass trimming
	Weed/Moss Control
6.3	Grassed areas – Rough Cutting
	Weed control to rough cut/rough ground areas
6.4	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Weed/Moss control to hard landscape areas
	Road/Paved area sweep 1
	Clean all signs
6.5	Watering of all trees & shrubs

Maintenance Program - July

Item	Description
7.1	Yearly maintenance - Shrub and tree planting
	Hand Weeding in shrub areas
	Watering
7.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
	Cut 3
	Cut 4
	Grass trimming 1
	Grass trimming 2
	Grass edging
7.3	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
7.4	Watering of all trees & shrubs

Maintenance Program - August

Item	Description
8.1	Yearly maintenance Shrub and tree planting
	Shrub Pruning
	Hand Weeding in shrub areas
	Weed free circles around trees/whips
	Watering
8.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
	Cut 3
	Cut 4
	Grass trimming
8.3	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Road/Paved area sweep 1
8.4	Watering of all trees & shrubs

Maintenance Program - September

Item	Description
9.1	Yearly maintenance Shrub and tree planting
	Shrub Pruning
	Hedge cutting
	Herbicide application to shrub/woodland areas
	Hand Weeding in shrub areas
	Weed free circles around trees/whips
	Apply fertiliser
	Watering
9.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
	Cut 3
	Cut 4
	Grass trimming 1 as per clause 3.3 (c)
	Grass trimming 2 as per clause 3.3 (c)
	Weed/Moss Control
	Fertiliser Application
9.2	Grassed areas – Rough Cutting
	Weed control to rough cut/rough ground areas
9.4	Grass reinstatement
9.5	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Weed/Moss control to hard landscape areas
	Road/Paved area sweep 1
	Road Gulley cleaning
	Clean all signs
9.6	Watering of all trees & shrubs
9.7	Attenuation Pond - cleaning, removal of detritus

Maintenance Program - October

Item	Description
10.1	Yearly maintenance Shrub and tree planting
	Tree pruning
	Hedge cutting
	Hedgerow cutting
	Herbicide application to shrub/woodland areas
	Hand Weeding in shrub areas
	Weed free circles around trees/whips
	Apply fertiliser
10.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
	Grass trimming
	Grass edging
10.3	Grassed areas – Rough Cutting
	Weed control to rough cut/rough ground areas
10.4	Grass reinstatement
10.5	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Weed/Moss control to hard landscape areas
	Road/Paved area sweep 1
	Road/Paved area sweep 2

Maintenance Program - November

Item	Description
11.1	Yearly maintenance Shrub and tree planting
	Hedgerow cutting
	Check tree stakes and ties
11.2	Grassed areas – Fine Cutting
	Cut 1
	Cut 2
11.3	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Road/Paved area sweep 1
	Road/Paved area sweep 2
	Road/Paved area sweep 3

Maintenance Program - December

Item	Description
12.1	Yearly maintenance Shrub and tree planting
	Tree pruning
	Check tree stakes and ties
12.2	Grassed areas – Fine Cutting
	Cut 1
	Grass trimming as per clause 3.3 (c)
12.3	Hard Standing Maintenance and Cleaning
	Litter pick 1
	Litter pick 2
	Litter pick 3
	Road/Paved area sweep 1
	Clean all signs

Appendix 11.7 - Landscaping Masterplan (drawings number DB80-MA-LS-XX-DR-L-PLNT-1050, revision P04



LEGEND

Site Boundary Line

Newly proposed elements subject to this planning application
see Architect pack for detail

Newly Landscape proposed elements subject to this planning application

HARD LANDSCAPE

PAVING

PAV1
Permeable Flag Paving
Product: Hydropave textured Flag, .Supplier: Tobermore, similar or equal
Colour: Natural, Finish: Textured,
DIM: 400x400x65

PAV2
Areas where surface is specified by engineers

PAV3
Self Binding Gravel Path with Timber edging.
Materials: Limestone chip and Softwood treated timber,
Dim:4-8mm Gravel Chips

PAV4
Tactile Paving, Material: Concrete,
DIM: 400x200x50
Blister Flag, Colour:Buff, Finish:Blister

PAV5
Permable surface
Grass crete

PAV6
Gravel Surface
To engineers specification

Extent of Constructed Tree Pits
see detail 14, pg.3

FURNITURE

PLANTERS

PL1 Raised Planter
Modular planter in aluminum with powder coated finish, dim. height: 200mm to 450mm, length varies
Light integrated into planter (as per M&E specifications)

BE1 Timber Bench
Free standing timber bench, Hartcast or similar approved, Materials: recycled composite timber, Coated steel.

BK1 (X no. stands)
Product: Sheffield Cycle Stands, Material: Graded stainless steel Finish: Brush Polished. Fixing: Above surface flange fixed
DIM: W950mm x H825mm

BARRIERS

Root Barrier System-
Plastic root barrier edge to be installed upon planting of trees to prevent roots infringing on wayleave

FE1- Security fence (to Architects specification)

FE2- Wooden safety fencing,
1.2m high, timber rail fence see D11

FE3- Decorative metal railing,
1.2 m high, see D12

KERB
To Latter Detail

Existing Fence to be Retained

SOFT LANDSCAPE

Attenuation Pond- 628 sq/m

Attenuation Pond Native Planting-

Marginal / Emergent Plants-105 sq/m
Marsh Marigold- *Caltha palustris*
Yellow Flag Iris- *Iris pseudacorus*
Flowering Rush- *Butomus umbellatus*
Bog Bean- *Menyanthes trifoliata*
Marsh Cinquefoil- *Potentilla palustris*
Water Mint-*Mentha aquatica*
Arrowhead- *Sagittaria sagotifolia*

Oxygenating Plants- 33 sq/m
Curled Pondweed- *Potamogeiton crispus*
Lesser Pondweed- *Potamogeiton perfoliatus*

Floating / Deep Water Plants - 10% surface, 9 sq/m
Brandy Bottle - *Nuphar lutea*
White Water Lilly- *Nymphaea alba*

Boundary Wetland Trees (no.12)
Black Alder- Alnus glutinosa
Goat Willow- Salix Caprea

Biodiversity Zone Planting- 3946 sq/m
Bee friendly Native Wildflower Mix

Swales Planting
Design by nature EC05 Wetland Wild Flora Mix

Planting Beds for Green Trellis System - 115 ln/m
Wisteria sinensis 'Prolific', single row, 1m c/c
Hedera colchica 'Dentata Variegata', single row, 0.5m c/c
(see detail 15 sheet 04)

Green Roof
See PD3/D7 and Architects pack for details.

Hibernaculum/ Habitat Piles
To support amphibian life (Refer to ecologists report)

Thorny Hedge Mix- 335 ln/m
Blackthorn-*Prunus spinosa*
Holly-*Ilex aquifolium*
Hawthorn- *Crataegus monogyna*

Woodland/Hedgerow Planting (no. 82)
Double staggered row, 6m c/c,14-16 girth
T1 Birch - *Betula Pendula*
T2 Oak - *Quercus Robur*
T3 Bird Cherry- *Prunus padus*
T4 Field Maple- *Acer campestre*

Street Trees (11 no.)
Turkish Hazel- *Corylus columa*
Field Maple- *Acer Campestre*
Small leaved lime-*Tilia Cordata Greenspire*

Screening Trees (29 no.)
Single row, 4m c/c,14-16 girth
Birch - *Betula pendula*

Ornamental trees(9 no.)

Cherry Blossom - *Prunus*

Japanese Maple - *Acer Palmatum*

Evergreen Magnolia - *Magnolia grandiflora*

Crab Apple- Malus

Hedge- 305 ln/m
Beech- *Fagus sylvatica*

Screening Planting- 304 sq/m
Feather reed grass- *Calamagrostis x acutiflora 'Karl Foerster*
Oriental Fountain Grass- *Pennisetum 'Karley Rose'*
Ribbon Grass- *Phalaris feesey*
Male Fern- *Dryopteris filix-mas*

Ground Cover Planting- 96sq/m
Creeping Dogwood- *Cornus canadensis*
Ivy- *Hedera helix*
Periwinkle- *Vinca minor*
Davids viburnum- *Viburnum davidii*

Ornamental planting- 206 sq/m
Lavender- *Lavendula Hidcote*
Rosemary- *Roomarus Officianalus*
Heather- *Erica sp.x*
Balkan clary- *Salvia nemorosa 'Ostfriesland'*

Amenity Lawn- 707 sq/m

Grass Crete- 127 sq/m

Existing Mature Hedge to be Retained

TREE SURVEY- Existing Ash Trees



Client:

EQUINIX

HAZARD IDENTIFICATION LEGEND:

HAZARD IDENTIFICATION (if none state 'none relevant')	CONTROL AND MITIGATION MEASURES

NOTE:
Hazards listed above are only those considered significant risks and:

a) not likely to be obvious to a competent contractor or other designers;
b) unusual; or
c) likely to be difficult to manage effectively

P04	27/05/22	Issue for Planning	MA	JW	JW
P03	17/02/22	Issue for CFI	HM	JW	JW
P02	09/11/21	Planning Compliance	HM	JW	JW
P01	17/06/21	Issued for Planning	HM	JW	JW
REV	DATE	DESCRIPTION	DWN	CHK	APP

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Key:

True North

Project:
Equinix DB8

Drawing Title:
Proposed Landscape Masterplan

Drawing Number:
DB080-MA-LS-XX-DR-L-PLNT-1050

Scale:	Paper Size:	Purpose:	Revision:
1:500	A1	S4	P04

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Appendix 11.8 - Preliminary Construction Environmental Management Plan (pCEMP) prepared by Malone O'Regan Environmental Consultants.

May 2022

DN080-MOR-LS-XX-RP-V-XXXX-8062

Construction Environmental Management Plan

Proposed Development (Equinix DB8)

RKD

On behalf of

RKD Architects Ltd.

Profile Park, Co. Dublin

MALONE O'REGAN ENVIRONMENTAL

QUALITY
I.S. EN ISO 9001:2015
NSAI Certified

MALONE O'REGAN

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

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Title: Construction Environmental Management Plan, Proposed Development (Equinix DB8), RKD Architects Ltd.

Job Number: E1739

Prepared By: Emma Murphy **Signed:** E Murphy

Checked By: Sarah de Courcy **Signed:**

Approved By: Dyfrig Hubble **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	26/05/22	CEMP Report	Final	EM	SDC	DH

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Construction Environmental Management Plan

Proposed Development (Equinix DB8)

RKD Architects Ltd.

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APPENDICES

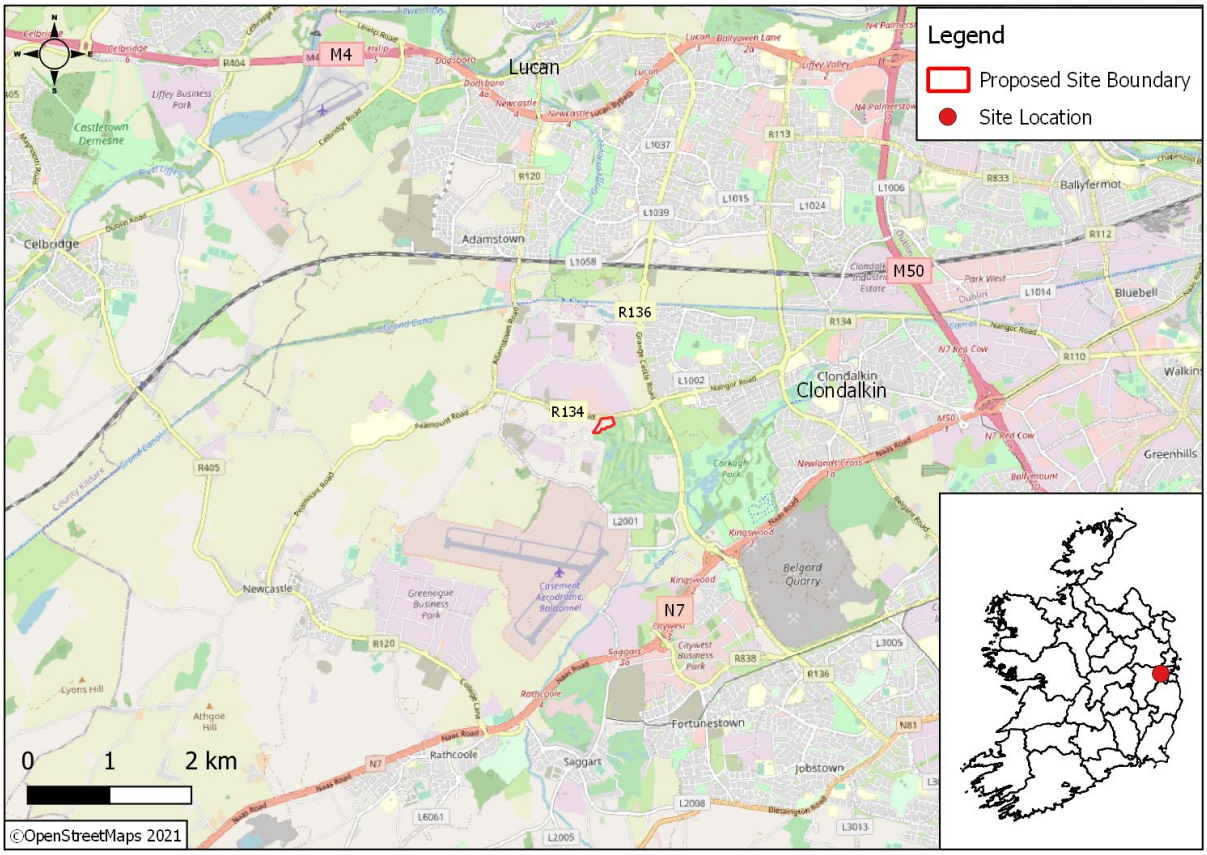
Appendix A: Site Layout and Drainage Layout.

1 INTRODUCTION

Malone O'Regan Environmental (MOR) were commissioned by RKD Architects Ltd on behalf of Equinix (Ireland) Ltd. to undertake an Ecological Impact Assessment (EcIA) for the construction of an onsite power generation plant and all auxiliary works (Proposed Development), at Profile Park, Kilcarbery, Dublin, Co. Dublin (OS Reference O 04052 30807).

This report contains modifications to the planning application (SD21A/0186), which proposed to construct a 3-4No. storey data centre, plant room, ESB substation, parking facilities and all other auxiliary works within the boundary outlined below (Figure 1-1). This planning application has been granted as of the 24th of March 2022.

The location of the Proposed Development ('the Site') is shown in Figure 1-1.



1.1 Scope and Objective

The key objective of this CEMP is to ensure that all potential construction phase environmental impacts will be addressed in accordance with current legislative requirements and best practice guidelines. It will assist in the control of environmental risks that may arise during construction to ensure that these works do not result in an environmental incident, environmental damage or undue nuisance to the local environment.

This document contains a careful assessment of the likely risks onsite, it outlines procedures for monitoring the effectiveness of the environmental protection measures and for the dissemination of information to all relevant personnel during the construction programme. In assessing risks to watercourses in the vicinity of the Site, full cognisance has been taken of:

- C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [1];
- CIRIA C741- Environmental Good Practice on Site (4th edition) [2];

- Guidance for the Treatment of Bats Prior to the Construction of National Road Schemes [3]; and,
- Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes [4].
- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads [5]; and,
- All works will be undertaken in accordance with the 'Requirements for the Protection of Fisheries Habitat during Construction and Development' [6].

To achieve this objective the CEMP will:

- Provide a method of documenting compliance with the Environmental Commitments / Environmental Management / Best Practice Guidelines;
- Ensure compliance with current legislation;
- Effectively minimise any potential adverse environmental effects during construction including how Site-specific method statements will be developed to avoid, minimise and mitigate construction effects on the environment; and,
- Communicate key environmental obligations that apply to all contractor organisations, their sub-contractors and employees while carrying out any form of construction activity.

Further guidance mentioned in the Natura Impact Assessment (NIS) and Ecological Impact Assessment (EcIA) regarding the protection of particular species may also be applicable to the construction period.

To achieve this objective the CEMP will:

- Provide a method of documenting compliance with the Environmental Commitments / Environmental Management Requirements / Best Practice Guidelines;
- Ensure compliance with current legislation;
- Effectively minimise any potential adverse environmental effects during construction including how site-specific method statements will be developed to avoid, minimise and mitigate construction effects on the environment; and,
- Communicate key environmental obligations that apply to all contractor organisations, their sub-contractors and employees while carrying out any form of construction activity.

This CEMP will be used by the appointed contractor to prepare an updated and comprehensive CEMP prior to the commencement of any on-site works, it should be used as a working document. If required by the conditions of the grant of planning permission, the updated plan will be approved by the Planning Authority in advance of any works commencing on-site. The approved CEMP will be implemented for the duration of the construction works to protect the receiving environment from potential impacts arising during the construction works.

1.2 Report Structure

The adopted construction stage CEMP should be considered by the appointed contractor as a 'living' document with reviews being undertaken at predetermined intervals and data added as appropriate. The measures identified in the CEMP should be:

- Viewed as mandatory and common practice onsite; and,

- Embedded within the construction company's policies and Site procedures, e.g. within an existing environmental management system framework.

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Granted Planning

The following development has been granted planning permission under the South Dublin County Council (ref. SD21A/0186) within the Site boundary. The following elements are proposed for construction as part of this development:

- Construction of a 3 storey (part 4 storey) data centre known as 'DB8.' The total gross floor area excluding hot air plenums and external staircase is ca.9,601m^2. The overall height of the data centre ranges from ca.16m to ca.20m to roof level and ca.20m to ca.24m including roof top plant, flues and lift overrun. This building will include:
    - Data halls,
    - Electrical / plant rooms,
    - Offices,
    - Lobbies,
    - Ancillary staff areas including breakrooms and toilets,
    - Stores,
    - Stair/lift cores throughout and photovoltaic panels at roof level.
- Provision of 5No. external generators, 8No. x 75m^3 fuel tanks and ancillary plant contained within a plant yard to the north of DB8;
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a sprinkler pump room (ca.23m^2), 2No. sprinkler tanks (ca.12m high each), heat recovery plant room (ca.17m^2), ESB substation (ca.44m^2), waste/bin stores (ca.52m^2). Total floor area of ancillary structures and plant (ca.303m^2);
- Provision of a delivery yard and loading bays, 64No. car parking spaces, 5No. motorcycle spaces, bicycle shelter serving 14No. spaces, smoke shelter, internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of an existing vehicular entrance from Falcon Avenue; and,
- All associated Site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing.

The 8No. fuel tanks, with a capacity of 75m^3, will be installed and utilised onsite during the operational phase of this development. These tanks will be double skinned and have a minimum of 10% additional capacity. In addition, these tanks will be stored on an area of hardstanding and will be protected by a wall to the north. There is also a dedicated refuelling point for these tanks, which is located within an area of hardstanding.

2.2 Proposed Development

The Proposed Development will consist of:

- Modifications to the permitted data centre granted under SDCC Reg. Ref. SD21A/0186 comprising the following:
    - Reconfiguration and alteration to the data centre building to include removal of front of house offices at third floor level, alterations to floor levels at second floor to provide consistency between front of house and data halls, parapet height increase of front of house to ca.16.8m, provision of storage at second

floor level in lieu of relocated internal generators to the external generator yard and associated elevational alterations.

- Extension of loading dock at ground floor level by ca.60m^2 in area with minor height increase to ca.5.3m.
- Removal of 3No. air plenums to the front (north) elevation and provision of screening to generator flues in lieu of omitted plenums.
- Alterations at roof level to include removal of 2m high gantry screening.
- Alterations to the permitted generator plant yard to the north of the data centre to include the removal of fuel tanks, reconfiguration of plant and generators, provision of 2No. additional external generators (increase from 5 to 9No. external generators), provision of 4No. additional external plant rooms, provision of diesel pump tank cabinets and stepover, relocation of generator yard doors and enlarged generator yard to accommodate the proposed modifications.
- Reconfiguration of plant within the permitted chiller plant yard to the south of the data centres.
- Removal of 1No. sprinkler/ water tank and removal of stairs and door to the side of the waster compound.
- Reconfiguration of car parking and motorcycle spaces and removal of 1No. accessible space. 64No. total number of car parking spaces.

- The proposal also includes provision of on-site gas power generation compound (ca.2604m^2 in area) in the area previously reserved for a future data centre. The compound comprises 7No.modular plant rooms (totalling ca.180m^2 in area), 10No. gas fired generators and associated flues ca.14.7m high, gas skid, associated modular plant, boundary treatment surrounding the compound ca.6.5m high and 2No. vehicular access points including general and emergency access.
- All associated site development works, services provision, drainage works, access, landscaping and boundary treatment works.
- No buildings are proposed above the existing ESB and SDCC wayleaves to the west and north of the Site.
- Overall Gross Floor Area of the development is reduced by ca.44m^2 to ca. 9795m^2 from previously permitted under SDCC Reg. Ref. SD21A/0186.

Refer to Appendix A for Site Layout.

2.2.1 Drainage

2.2.1.1 Surface Water

The On-Site Power Generation (OSPG) covers a site area of 2 604m². The runoff generated from this area and surface water storage requirements have already been included in the site attenuation pond and overall drainage scheme of the site, as granted under Planning Registration No. SD21A/0186. Thus, no additional attenuation storage elements are required for the proposed OSPG development, in order to meet the GDSDS requirements.

The OSPG will drain by pipes, gulley's and channels towards the central pond where storage capacity for a 1:100yr storm event + 20% climate change has already been catered for. The central pond provides a storage volume of circa 756m³ and is adequately sized to cater for this development, particularly as this area was considered as being 100% hardstanding under the aforementioned granted application and now, as can be seen, this area consists largely of

concrete plinths and gravel type surfaces - refer to Dwg. No.'s DB080-PIN-00-ZZ-DR-C-PLAN-1207 Rev. P04 & DB080-PIN-00-ZZ-DR-C-PLAN-1295 Rev. P04.

The overall site QBar is 3.9l/s and the total site surface water drainage will be restricted to this discharge rate. Please refer to the Planning Letter prepared by Pinnacle Consulting Engineers for further details.

2.2.2 External Lighting

The external lighting will be installed as per the original grant of planning (Planning Registration No. SD21A/0186.

2.2.3 Landscaping

The Proposed Development design includes for boundary landscaping works. The proposed layout masterplan, reference DB080-MA-LS-XX-DR-L-PLNT-1050, presents both boundary and internal Site breakout landscaping works.

3 CONSTRUCTION WORKS

3.1 Construction Management Plan

During the construction phase, the methods of working will comply with all relevant legislation and best practice in reducing the environmental impacts of the works. Although construction phase impacts are generally of a short-term duration and are localised in nature, the impacts will be reduced as far as practicable through compliance with current construction industry guidelines.

Works will be limited to:

- Monday - Friday 07:00 hours – 19:00 hours
- Saturday 09:00 hours – 13:00 hours
- Sundays and Public Holidays Closed

An Ecological Clerk of Works (ECoW) will be appointed to the project and inspect the Sites in advance of works commencing and will undertake monthly Site inspections during the works as well as being present during any works adjacent to or near waterbodies or treelines to ensure that these works are completed in line with the mitigation measures detailed within this CEMP, the NIS and EcIA. In addition, the ECoW will also supervise the works associated with the BMP.

3.1.1 Temporary Compound

A temporary construction compound will be set up within the northern section of the Site away from the Baldonnell Stream.

4 ENVIRONMENTAL MANAGEMENT FRAMEWORK

4.1 Environmental Policy

The project will be carried out in accordance with the policies / objectives listed below:

- South Dublin County Council's Environmental Policy and Procedures; and,
- The appointed Contractor's Environmental Policy and procedures.

4.2 Objectives and Targets

Environmental objectives for the construction phase will be developed and should refer to legal compliance and environmental good practice, these may include:

- Zero pollution incidents;

- Minimise disruption to residents (and their complaints);
- Reduce / avoid impacts on biodiversity; and,
- Minimise waste sent to landfill.

Monitoring of the construction processes against the project environmental objectives will be the responsibility of the Appointed Project Manager.

4.3 Structure and Responsibilities

A management structure that includes an organisational chart encompassing all staff responsible for environmental work will be included within the CEMP. This will set out the respective roles and responsibilities with regard to the environment and identify the nominated Construction Environmental Manager. Illustrative key roles and responsibilities are set out in Table 4-1 below.

Table 4-1: Roles and Responsibilities

Role	Responsibility
Project Manager (Appointed Contractor)	Responsible for management of the construction phase of the project. Has overall responsibility for the environmental performance of the project. Responsible for implementing the Site Waste Management Plan during the construction phase to ensure that waste is disposed of legally, economically and safely. Ensure compliance with environmental legislation, consents, objectives, targets and other environmental commitments, including those arising from the Environmental Report. Responsible for reporting incident responses and where required, communicating the incident details to relevant regulatory authorities. Monitoring of the construction processes against the project objectives. Liaison with all staff and local stakeholders dealing with any complaints or queries from the public.
Site Staff (Assigned by Appointed Contractor)	To receive general environmental awareness training and undertake work in accordance with Method Statement Briefings and toolbox talks. Trained personnel to manage particular tasks such as refuelling plant and equipment, managing the stores, water quality monitoring and supervising the segregation and collection of waste.
Health and Safety and Environmental Officer (Assigned by Appointed Contractor)	The Contractor's appointed Health and Safety Office will report to the Project Manager. They will be responsible for the following: • Carrying out duty of health and safety coordinator during the construction works; • Safety Induction of all staff and personnel on Site; • Implementing the contractor's Health and Safety Plan; and, • Auditing the Site Health and Safety Plan and updating as necessary.
Environmental Consultant (Assigned by Appointed Contractor) (MOR)	To provide information relevant to construction that may assist the Contractor to manage environmental aspects of the scheme and to ensure that the Contractor complies with all the relevant legal requirements, commitments and targets agreed for the scheme.

4.4 Communication

The CEMP will be distributed to the project team, including sub-contractors, to ensure that the environmental requirements are communicated effectively. Key activities and environmentally sensitive operations will also be briefed to staff and Contractors. Project, client and company environmental policies, where available, should be displayed onsite.

The Contractor will define procedures for internal and external communication. The client may require that any communication with external parties such as environmental regulators or the public will be undertaken through a nominated client representative.

During the construction phase, internal communication will include regular progress meetings, which should cover:

- Training undertaken;
- Progress reports;
- Inspections, audits and non-conformance;
- Complaints received;
- Visits by external bodies and the outcome or feedback from such visits;
- Objective / target achievement, including reporting on environmental performance; and,
- External communication, including letter drops or meetings, and liaison with statutory authorities will be overseen by the Project Manager.

5 ENVIRONMENTAL RISK ASSESSMENT

5.1 Risk Classification

The classification of the environmental risks, arising from the construction phase will follow the definitions of significance as outlined by the Environmental Protection Agency (EPA) for Environmental Impact Statements [7] as shown below in Table 5-1.

Table 5-1: Rating Magnitude of Impact

Magnitude of Impact	Importance / Sensitivity of Resource			
	High	**Moderate**	**Low**	**Negligible**
Large	Very Substantial	Substantial	Moderate	Slight
Medium	Substantial	Substantial	Moderate	Slight
Small	Moderate	Moderate	Slight	Slight
Negligible	Slight	Slight	Slight	Negligible

In addition to the assessment of risk arising from known sources, an assessment of risk for an unplanned event/incident onsite were also assessed. These were rated as per the EPA 'Guidance on assessing and costing environmental liabilities,' [8]. The methodology for the rating of likelihood and consequence are shown in Tables 5-2 and 5-3.

Table 5-2: Rating of Likelihood of Risk Occurring

Rating	Likelihood	
	Category	**Description**
1	Trivial	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring.
3	Medium	Medium chance of hazard occurring.
4	High	High chance of hazard occurring
5	Very High	Very high chance of hazard occurring.

Table 5-3: Rating of Consequence of Risk Occurring

Rating	Consequence	
	Category	**Description**
1	Trivial	No impact or negligible change to the environment.
2	Minor	Minor impact / localised or nuisance.
3	Moderate	Moderate impact to environment.
4	Major	Severe impact to the environment
5	Massive	Massive impact to a large area, irreversible in medium term.

5.2 Risk Identification

In developing this CEMP, the following Site-specific aspects are considered relevant to the construction phase:

- The location of the Site in context of the surrounding area;
- Pluvial flood risk posed by heavy rainfall and associated surface water ponding;
- Water quality impairment during construction and operation;
- The watercourses within and adjacent to the Site boundaries;
- An increase to noise emissions during the construction stage; and,
- The biodiversity value of the Site and its surrounding habitats.

Mitigation measures to prevent and manage likely environmental risks are outlined within Table 5-4. Additionally, the following detailed Site-specific plans will be completed by the appointed Principal Contractor:

- Construction Management Plan (CMP);
- Outline Construction Methodology; and,
- Final Construction Environmental Management Plan (CEMP).

These plans will be supplied to South Dublin County Council prior to the commencement of site works. They will be prepared by the appointed contractor to ensure best practicable policies are incorporated in the management of the Site.

The specific risks to the environment are outlined in Table 5-4 below. The methodologies to control these risks and pertinent Site relevant factors to the construction area limiting these risks are also outlined in Table 5-4. Likelihood of each of the risks occurring is related to the scope of the risk and the Site-specific conditions.

Table 5-4: Site Specific Environmental Risk Assessment and Management

Aspect of Construction	Potential Hazard	Magnitude	Likelihood	Risk Management Procedures – Mitigation Measures
1. Site Operations and Design	**a.** Potential nuisance towards public (out of hour's activities).	Slight	Low	• Normal construction hours will be restricted to 07:00 to 19:00 Monday to Friday and 07:00 to 14:00 on Saturdays.
	b. Traffic	Moderate	Low	• Best practice measures will be implemented; • Hydrocarbon spill kits shall be in place on all Site vehicles / plant; and, • Adequate signage shall be provided on the public network identifying the Site, access, speed limits etc.
2. Water Quality – Suspension solids	**a.** Suspended sediment due to run-off from construction areas entering the drainage ditches causing potential detriment to water quality.	Moderate	Low	• Silt traps will be placed on all outflows from the Site; • A silt fence will be erected below along the south and east boundaries; • Existing vegetation will be retained where possible; • The working area will be clearly defined, and construction activities will be carefully planned to minimise ground disturbance; and, • Runoff will be diverted away from stripped areas. • Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows.
	b. Run-off entering Baldonnell stream, affecting water quality of Grifeen River and River Liffey.	Moderate	Low	• Weather conditions will be considered when planning construction activities to minimise risk of runoff from Site; • All materials shall be stored at the main contractor compound and transported to the works zone immediately prior to construction; • Run-off will be diverted away from stripped areas; • All valves should be of steel construction and the open and close positions should be clearly marked; and, • No surface water runoff will be discharged onto public roads, foul sewers or adjacent property.
3. Water Quality - Oil	**a.** Oil Spill to ground / surface water. Oil pollution is known to cause significant damage aquatic habitats and communities and loss	Moderate	Low	• All materials shall be stored at the main contractor compound and transported to the works zone immediately prior to construction;

Aspect of Construction	Potential Hazard	Magnitude	Likelihood	Risk Management Procedures – Mitigation Measures
	of bulk stored oil or oil from construction vehicles will likely have an adverse impact on the aquatic environment.			• Any chemical / oils to be stored onsite will be placed within a bund on an area of hardstanding to ensure there is no seepage of pollutants into groundwater or surface water; • All bunds will have a capacity of the largest tank volume plus 10 percent, at a minimum, with additional capacity to hold 30mm of rainfall; • Steel tanks will be protected from corrosion; • All valves should be of steel construction and the open and close positions should be clearly marked; • All drainage from bund area must be directed to secure containment prior to suitable disposal; • Preventative maintenance and relevant maintenance logs will be kept for all onsite plant and equipment; • Adequate spill kits including absorbent booms and other absorbent material will be maintained onsite; • All contractor workers will be appropriately trained in the use of spill kits; • Fuels, lubricants and hydraulic fluids for equipment used in the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice; • Any sediments adversely effected by contamination will be excavated and stored in appropriate sealed containers for disposal offsite in accordance with all relevant waste management legislation; • Prior to any works commencing, all construction equipment will be checked to ensure that they are mechanically sound, to avoid leaks of oil, fuel, hydraulic fluids and grease; and, • In order to prevent potential water pollution risk when drainage lines are in place but not fully commissioned, no discharges to the surface water drainage system at the Site will be made until all trains are fully connected to the proposed approved petrol interceptor.

Aspect of Construction	Potential Hazard	Magnitude	Likelihood	Risk Management Procedures – Mitigation Measures
	b. Oil spill during refuelling operations.	Moderate (low volume)	Low	• Adequate fuel storage facilities and re-fuelling protocols will be provided; • Fuel will be delivered onsite by a dedicated tanker or in a delivery bowser dedicated to that purpose; • Emergency Response Procedures will be put in place to enable trained response in the event of a spill by Site operatives; • Vehicle or equipment maintenance work will be carried out in a designated area on the Site. In the event that refuelling is required outside this area a spill tray will be employed during the refuelling operation; • The Appointed Contactor will put in place a specific, step-by-step refuelling procedure which will be communicated to all relevant employees onsite.
3. Water Quality - Cement	**a.** Cement and Concrete entering waters resulting in water pollution and contamination to the environment.	Moderate	Low	• Concrete pours will be adequately planned and executed; • Washouts of equipment used for concrete operations will be done either offsite or within a designated washout area, which will comprise a container that will capture the washout material / water for reused or disposal offsite; • Any spillage of cementitious materials will be cleaned-up immediately; • Any pouring of concrete will only be carried out in dry weather; • Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows.
5. Waste Management	**a.** Incorrect management of general Municipal Wastes / welfare facilities resulting in litter onsite and / or attraction of rodents	Slight	Medium	• Waste materials will be collected and stored in suitable receptacles before they are taken off Site; • Waste materials will not be allowed to accumulate because of the fire/vermin risk; • The waste will be separated into recycling types and general waste in designated general waste and refuse and recycling stores; and • Measures will be implemented to minimise waste and ensure correct handling, storage and disposal of waste.

Aspect of Construction	Potential Hazard	Magnitude	Likelihood	Risk Management Procedures – Mitigation Measures
	b. Welfare – Toilet waste.	Slight	Trivial	• Welfare facilities will be available at the Construction Compound, it is proposed that these facilities will be used for the duration of the works. • There will be no foul effluent discharge arising from the initial Site development works – portable toilet facilities will be used (emptied as required).
6. Nuisance – Dust / Dirt	**a.** Generation of dust / dirt onsite adversely affecting water quality within surrounding watercourses and further downstream to the SAC.	Slight	Low	• Earth movements and soil stripping operations will not be carried out during dry and windy weather without suitable mitigation measures; • Stockpiles, tips and mounds will be constructed in such way to minimise dust creation; and, • Water bowsers, sprays and mists will be used to suppress dust arising from stockpiles, and screening activities, during dry weather as required.
	b. Generation of dust from truck movements to and from Site could adversely affect waterbodies if left uncontrolled.	Slight	Low	• Speed restrictions within and around the Site; • Maintenance of good road surfaces; • Dampening of access road by bowser during dry periods; and, • Heavy plant will be fitted with upswept exhausts and radiator fan shields.
7. Nuisance - Noise	**a.** Generation of noise resulting in disturbance to protected species during construction	Slight	Medium	• A Site Representative will be appointed to receive and respond to noise complaints and enquiries during construction by local residents, the Local Authority and any other regulatory body. Relevant details will be provided to the Local Authority prior to construction, and will be made available to third parties, including local residences; • Activities and deliveries to the Site to occur only during permitted hours; • All plant where possible shall be low noise rated; • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;

Aspect of Construction	Potential Hazard	Magnitude	Likelihood	Risk Management Procedures – Mitigation Measures
				• Compressors will be attenuated models, fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers; • Where necessary the use of enclosures and noise screens shall be used to control noise from plant; • Evaluation of construction methods to ensure the quietest option is utilised; • Onsite policy for all plant and equipment, including Site delivery vehicles, to power off rather than to be left with idling engines; and, • All plant and vehicles on the Site will be in a fit condition for use, to prevent the addition of noise from maintenance issues.
8. Nuisance - Vibration	Generation of vibration resulting in disturbance to humans / local fauna during construction	Slight	Medium	• Appropriate vibration isolation shall be applied to plant, where feasible; and, • Cut off trenches to isolate the vibration transmission path shall be installed where required.
9. Biodiversity Protection	General Measures	Medium	Low	• All activities will comply with all relevant legislation and best practice to reduce any potential environmental impacts. The mitigation measures detailed within this EcIA and the NIS will be fully adhered to; • The Site manager shall ensure that all personnel working onsite will be trained and made aware of the mitigation measures detailed within this EcIA and the NIS; • An ECoW will be appointed for the construction works and will be available as required. If protected or notable species are encountered during operations at the Site, the ECoW will be contacted for advice; • Protected and notable species posters will be erected on the Site notice board and maintained throughout the duration of the works; and, • In advance of works, all Site personnel will receive a toolbox talk regarding notable and protected species. Everybody working onsite must understand the role and authority of the ECoW.
	a. Hedgerow / Treeline	Medium	Low	• Trees, treelines and hedgerows to be retained that will be in close proximity to the construction areas will be fenced off by effective

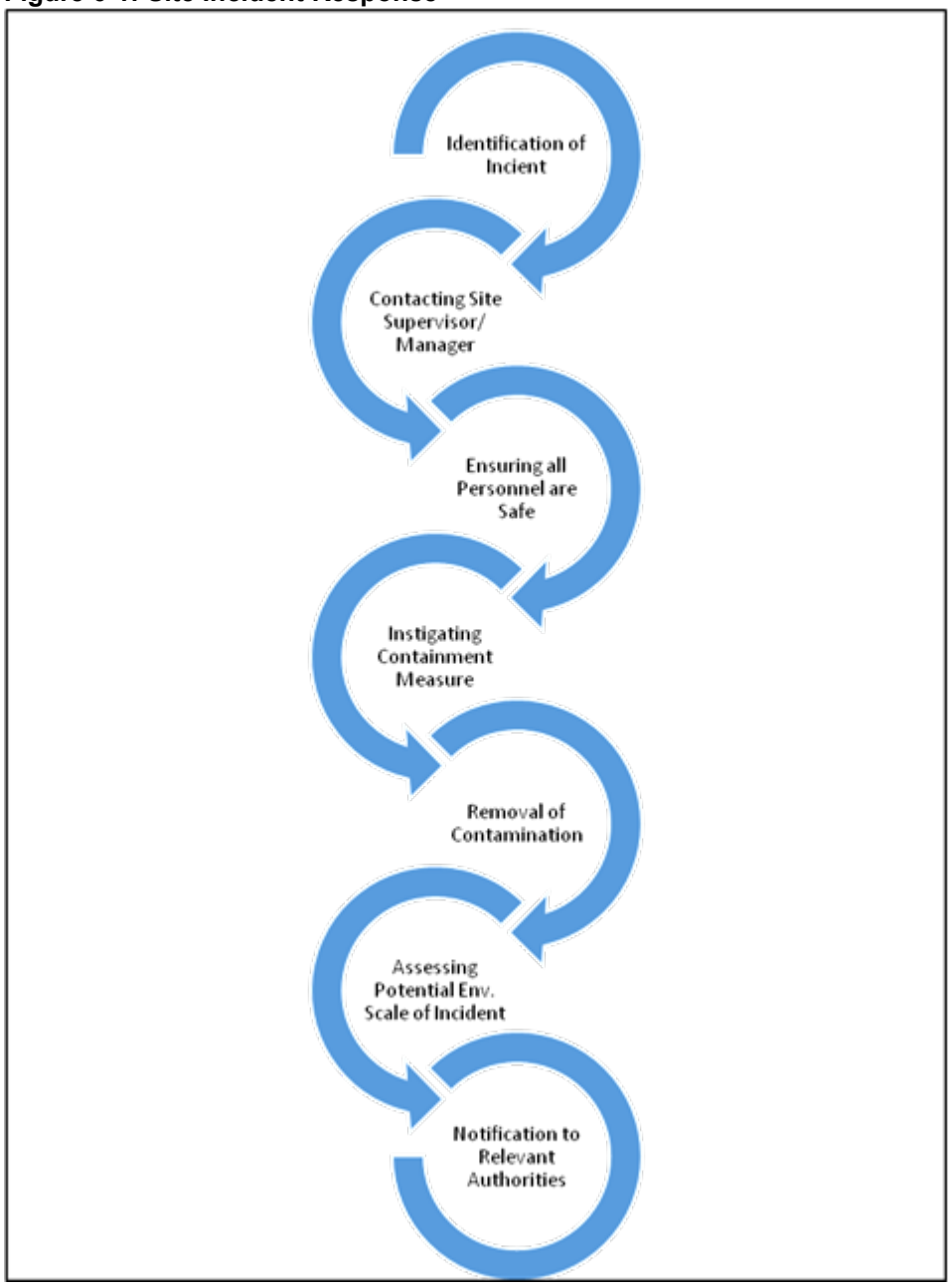
Aspect of Construction	Potential Hazard	Magnitude	Likelihood	Risk Management Procedures – Mitigation Measures
				construction proof barriers before construction works commence. These barriers will remain in place for the duration of the works to prevent accidental disturbance and define the limits for construction vehicles and other construction staff; • Care will be required to prevent disturbance to root systems – a buffer zone / construction exclusion zone of unexcavated ground will be maintained along the retained hedgerows and mature tree; • Where machinery access has to encroach areas within close proximity to the retained hedgerows / treelines or the mixed broadleaved woodland, a Root Protection Area (RPA) will be established and suitable ground protection will be put in place to prevent any significant soil compaction or root damage. This should take the form of suitable strength ground protection mats or cellular confinement system capable of supporting the appropriate weight; • All weather notices will be erected on the fences, and the fencing will be inspected on a regular basis during the construction process; • Trench digging or other excavation works for services etc. will not be permitted within close proximity to retained trees and hedgerows unless approved and supervised using methods outlined in BS5837: Trees in relation to design, demolition and construction (2012); • No materials, equipment or machinery will be stored within close proximity to retained hedgerows and trees; • In order for treeline protection measures to work effectively, all personnel associated with the operation of heavy plant machinery must be familiar with the above principles for the protection of treelines; • Care will be taken when planning Site operations to ensure that wide or tall loads or plant with booms, jibs and counterweights can operate without coming into contact with retained trees. Such contact can result in serious damage to them and might make their safe retention impossible; • Notice boards, wires, etc. will not be attached to any trees. Site offices, materials and contractor parking will all be outside the Construction Exclusion Zone; and, • The retained trees will be assessed following the completion of the construction works.

Aspect of Construction	Potential Hazard	Magnitude	Likelihood	Risk Management Procedures – Mitigation Measures
	b. Impacts on Badgers/Terrestrial Mammals	Medium	Low	• Where deep excavations will be required onsite, appropriate measures to protect mammals from ingress will be installed; • Should construction works be required outside of daylight hours, the appointed project ECoW will be consulted as required; and, • If unidentified burrows are identified within the works area during construction, works will cease within that area and the project ECoW will be contacted for advice.
	c. Impacts on Amphibians	Low	Low	• Should amphibians be encountered during the construction works, a suitable qualified ecologist should be consulted for advice; • Hibernacula and habitat piles will be installed in the wider area surrounding the Site to support any potential amphibians in the area;
10. Invasive Species	**a.** Spread of Invasive Alien Species	Slight	Low	• All vehicles, machinery and any other equipment used for the works will be washed prior to its use at the Site to prevent the import of plant material or seeds. • Before machinery or equipment is unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris has been removed. • Any vehicles and machinery that are not clean will not be permitted entry to the Site. • All materials to be imported to the Site including additional planting will be sourced from a reputable supplier and records of all material and supplies will be maintained. • Measures outlined in Section 3.1 of C744 (Invasive non-native species) will be considered.

6 EMERGENCY MANAGEMENT PLAN

Although the Site will be managed, there remains a low risk from the unexpected occurrences, such as accidental spillages onsite, that may result in environmental pollution. Incidents onsite will follow a similar emergency response template. This template is outlined in the schematic presented in Figure 6-1 below.

Figure 6-1: Site Incident Response



6.1 Incident Response

Where an environmental incident is identified then it will be reported to the on-duty Project Manager and thereafter the Health and Safety Officer. Each incident will have the following information gathered and reported:

- Location of the incident;
- Time and date;
- Scale of the incident;
- Nature of the incident, including any specific environmental dangers;
- Remediation actions taken;
- Name of personnel noting the incident, and who they work for; and,
- Any other relevant details.

Works in the vicinity of the incident must be stopped until the incident is resolved and an all clear is issued by the Health and Safety Officer. All personnel in the immediate area of the release/spill shall be alerted to the circumstances and any dangers to them (Health and Safety) and to the environment.

The Project Manager will ensure, where required, that the incident details are communicated to the relevant regulatory authorities.

7 MONITORING AND IMPLEMENTATION OF THE CEMP

7.1 Complaints, Comments and Enquiries

Any complaint related to the Site will be dealt with by the Project Manager. The source of the complaint will be investigated immediately. If possible, the source of the complaint will be stopped, moved or modified immediately. All complaints must be recorded including details of the complaint and any required corrective actions.

7.2 Site Visits and Evaluation of Compliance

A pre-construction Site walkover by a suitably qualified environmental professional and Ecologist will take place followed by additional Site visits as required. The aim of these visits will be to ensure compliance with procedures set out in the CEMP and environmental conditions established under planning.

This will be done by means of a Site inspection and the auditing of different aspects of the works including documentation. Checklists for compliance will be drawn up, corrective actions will be required for any non-compliances identified and follow-up surveys will be scheduled to ensure compliance.

All monitoring results and reports detailing the compliance or otherwise of the works will be maintained at the Site office. In the event of an incident, an incident report will be completed and that will document both the cause of the incident and the corrective action taken to address the incident. These incident forms will be available for inspection within the Site office.

7.3 Control of Records

Environmental records, including waste management records, will be maintained in accordance with the respective company procedure and legal requirements. The records are to be maintained, in either hard copy or electronic format as required by the individual procedure that the records relate to, in such a way that they are readily identifiable, retrievable and protected against damage, deterioration or loss. The procedure that the records relate to also specifies the retention time for the records and who has the authority to dispose of them.

8 IMPLEMENTATION, REVIEW AND TRAINING

The Appointed Project Manager will be responsible for developing an updated Site-specific CEMP prior to commencement of Site works. The Site Manager will be responsible for ensuring compliance with the CEMP with Ecological support provided by the Ecological Clerk of Work (ECoW) as required. Each sub-contractor will be responsible for appointing a point of contact for matters related to environmental protection.

Copies of the CEMP will be made available to all personnel onsite. All Site personnel and sub-contractors will be instructed about the objectives of the CEMP and informed of the responsibilities which fall upon them as a consequence of its provisions. All staff will be required to have the appropriate training and certification to undertake their specific roles.

All staff will receive environmental awareness training as part of their Site induction to ensure they are aware of their responsibilities under the CEMP. This will include:

- Site induction, including relevant environmental issues;
- Environmental posters and site notices;
- Method statement and risk assessment briefings;
- Toolbox talks, including instruction on incident response procedures; and,
- Key project specific environmental issues briefings.

Furthermore, the provision of an Environmental Induction Sheet informing them of the specific measures which have been put in place and that must be adhered to.

The CEMP will be reviewed on an as needed basis if the scope of works changes significantly or if the need is identified following a Site audit.

8.1 Training Awareness and Competence

Site personnel shall be trained appropriately to ensure they are competent to perform tasks that have the potential to cause a significant environmental impact as part of the Proposed Development. Competence is defined in terms of appropriate education, training and experience.

All managers and supervisors will be briefed on the CEMP.

Method Statements will be prepared for specific activities prior to the works commencing and will include environmental management / best practice measures and emergency preparedness appropriate to the activity covered. The Construction Manager will review key Method Statements prior to their issue.

Method Statement briefings will be given before personnel carry out key activities for the first time.

9 CONCLUSIONS

This CEMP document outlines the management procedures to enable the Appointed Project Manager to respond to potential environmental risks from construction activities onsite. The final CEMP will cover all aspects of the construction development.

In assessing risks onsite, full cognisance has been taken of best practice guidance including:

- C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [1];
- CIRIA C741- Environmental Good Practice on Site (4th edition) [2];
- Guidance for the Treatment of Bats Prior to the Construction of National Road Schemes [3]; and,
- Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes [4].
- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads [5];
- BS 5228-1+A1:2014: Code of Practice for noise and vibration control on construction and open sites- Part 1: Noise [9] and Part 2 Vibration [9];
- All works will be undertaken in accordance with the Inland Fisheries Ireland (IFI) 'Requirements for the Protection of Fisheries Habitat during Construction and Development' [6]; and,
- The recommendations included within the National Roads Authority (NRA) Guidelines for the Crossing of Watercourses [10].

The Appointed Contractor will be required to develop an updated CEMP prior to the commencement of any construction works and this will be submitted to South Dublin County Council for approval.

The implementation of all the environmental management measures outlined in this CEMP will ensure that the construction programme will be completed without significant adverse effects on the surrounding environment.

10 REFERENCES

[1] CIRIA, “C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors,” 2011.

[2] CIRIA, “C741 - Environmental Good Practice on Site (4th edition).,” 2015.

[3] NRA, “Guidelines for the Treatment of Bats prior to the Construction of National Road Schemes,” National Roads Authority , Dublin, 2006.

[4] NRA, “Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes,” National Roads Authority, Dublin, 2006.

[5] NRA, “Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads,” National Roads Authority, 2010.

[6] IFI, “Guidance and Protection of Fisheries during Construction Works in an adjacent to Water,” Inland Fisheries Ireland, Dublin, 2016.

[7] EPA, “Revised Guidelines on the Information to be Contained in Environmental Impact Statements (Draft),” Environmental Protection Agency, Dublin, 2015.

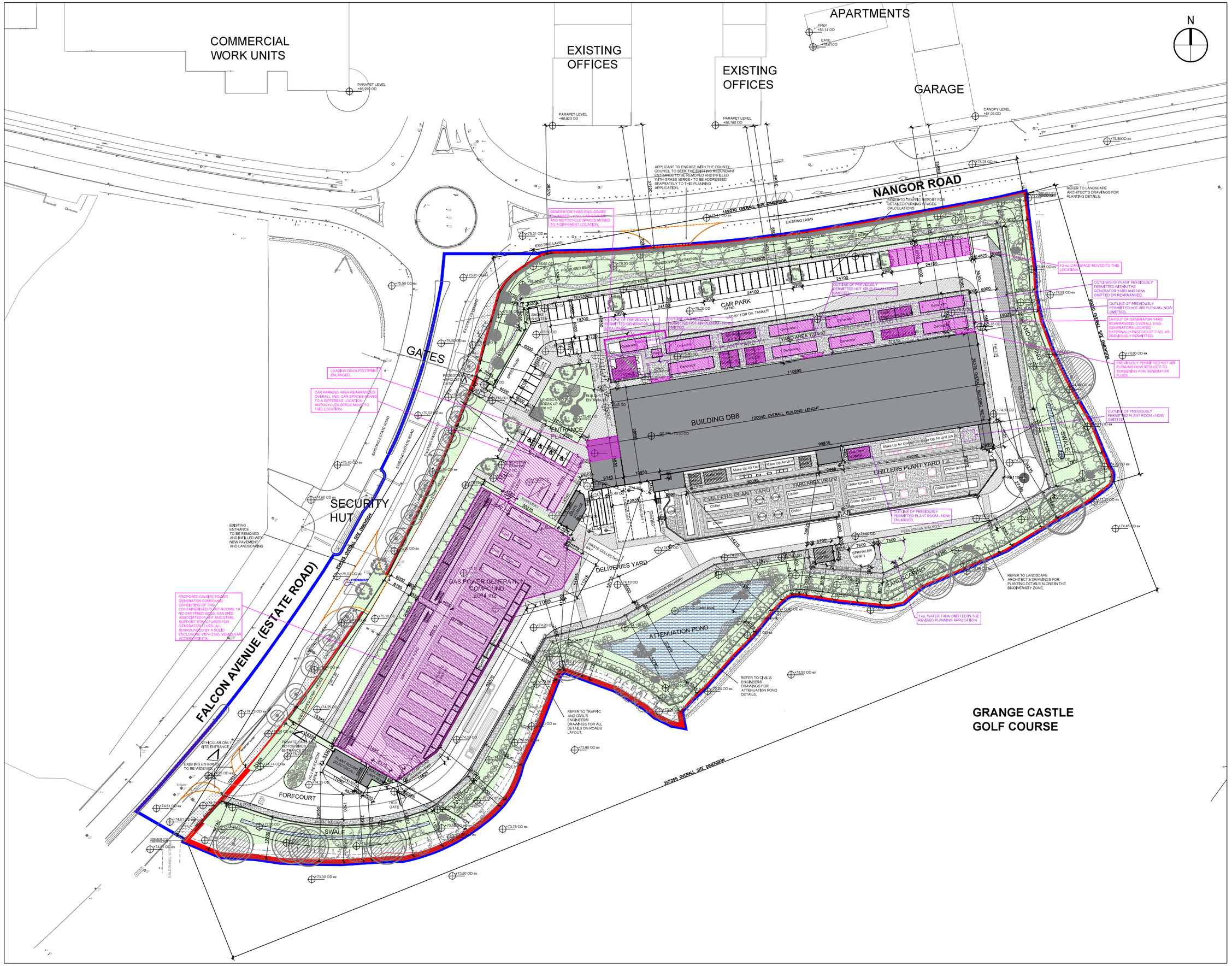
[8] EPA, Guidance on assessing and costing environmental liabilities, Dublin: EPA, 2014.

[9] BSI, BS 5228-2:2009 2009 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration, London: British Standard, 2009.

[10] NRA, “Guidelines for the Crosssing of Watercourses during the Constrcution of National Road Schemes,” National Roads Authority, Dublin, 2005.

APPENDICES

APPENDIX A



Client:

EQUINIX

HAZARD IDENTIFICATION LEGEND:

HAZARD IDENTIFICATION (if none state 'none relevant')	CONTROL AND MITIGATION MEASURES

NOTE:
Hazards listed above are only those considered significant risks and:

a) not likely to be obvious to a competent contractor or other designers;
b) unusual; or
c) likely to be difficult to manage effectively

LEGEND

- SITE BOUNDARY SITE AREA = 6,545 acres
- AREA IN OWNERSHIP OF CLIENT - AS PER OS MAP AREA = 7,360 acres
- NEWLY PROPOSED ELEMENTS SUBJECT TO THIS PLANNING APPLICATION
- AMENDMENTS TO PREVIOUSLY APPROVED PLANNING APPLICATION REG. REF. SD21A/0186
- PROPOSED BUILDINGS
- CONTAINERIZED PLANT ROOMS
- FEATURE PAVING
- PAINTED WALKWAYS 1.8/2M WIDE
- CONCRETE PATHS IN PLANT YARDS
- GRAVEL
- GRASS-CRETE
- EXISTING LANDSCAPED AREA
- PROPOSED LANDSCAPED AREA
- PROPOSED ATTENUATION POND /SWALES
- SECURITY FENCE
- TIMBER RAIL FENCE
- EXISITNG METAL RAILING
- EXISITNG TREES - REFER TO LANDSCAPE DRWG FOR DETAILS.
- PROPOSED TREES AND SHURBS - REFER TO LANDSCAPE DRWG.

REV	DATE	DESCRIPTION	DWN	CHK	APP
P04	20/05/22	Issued for planning (II)	MB	JS	JS
P03	24/02/22	Clarification for Further Information	MB	JS	JS
P02	25/11/21	Issued for Further Information	MB	JS	JS
P01	21/06/21	Issued for planning	MB	JS	JS

All dimensions to be checked on site. Figured dimensions take preference over scaled dimensions. Any errors or discrepancies to be reported to the Architects. This drawing may not be edited or modified by the recipient.

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Key:

Project:
Equinix DB8

Drawing Title:
Proposed Site Layout Plan

Drawing Number:
DB080-RKD-00-ZZ-DR-A-SITE-1035

Scale:	Paper Size:	Purpose:	Revision:
1:500	A1	S4	P04

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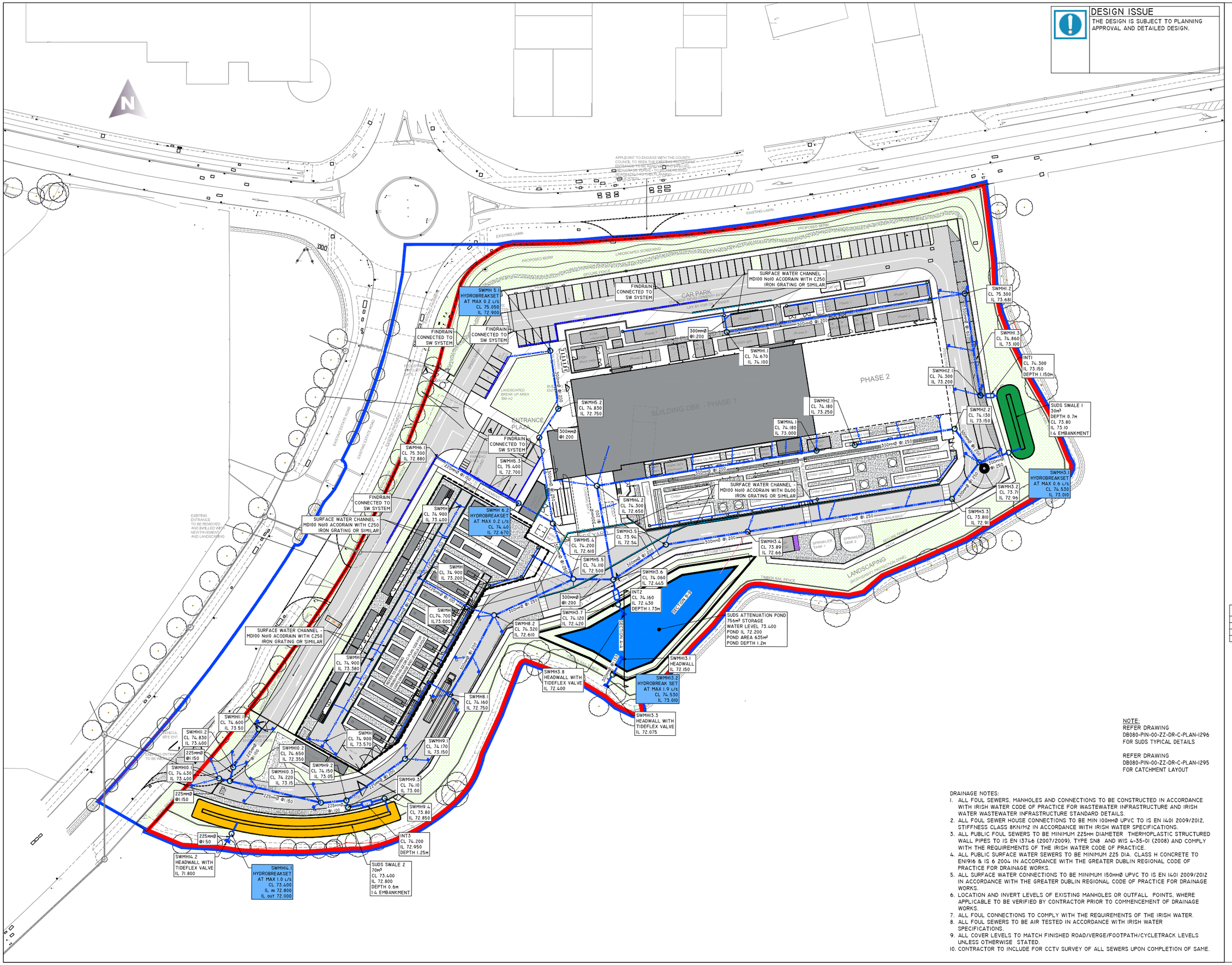


DESIGN ISSUE

THE DESIGN IS SUBJECT TO PLANNING APPROVAL AND DETAILED DESIGN.

Client: EQUINIX

HAZARD IDENTIFICATION LEGEND:

HAZARD IDENTIFICATION (if none state 'none relevant')	CONTROL AND MITIGATION MEASURES

NOTE:
Hazards listed above are only those considered significant risks and:

a) not likely to be obvious to a competent contractor or other designers;
b) unusual; or
c) likely to be difficult to manage effectively

LEGEND

- PROPOSED PRIVATE SURFACE WATER SEWER
- PROPOSED PRIVATE FOUL SEWER
- EXISTING PRIVATE FOUL WATER SEWER
- EXISTING PRIVATE SURFACE WATER SEWER
- EXISTING PUBLIC FOUL SEWER
- EXISTING PUBLIC SURFACE WATER SEWER
- MANHOLE BACKDROP (BDI)
- DRAINAGE CHANNEL
- FIN DRAIN
- TX — INTERNAL FOUL GULLY PIPE
- G — ROAD GULLY
- RE — RODDING EYE
- SU — SUMP UNIT WITH RODDABLE AIR TRAP
- SVP — SOIL VENT PIPE
- SS — STUB STACK
- AAV — AIR ADMITTANCE VALVE
- FIT — FOUL INTERCEPTOR TRAP
- RWP — RAINWATER DOWNPIPE
- SRWP — SIPHONIC RAINWATER DOWNPIPE
- 69.200 — PROPOSED LEVEL
- 69.200 — EXISTING TIE IN LEVEL
- + 67.72 — EXISTING LEVEL
- SITE BOUNDARY
- SUDS ATTENUATION POND
- SUDS ATTENUATION SWALE 1
- SUDS ATTENUATION SWALE 2

PLANNING REGISTRATION REFERENCE:
SD21A/0186

REV	DATE	DESCRIPTION	DWN CHK APP
P04	26.04.22	SITE LAYOUT REVISED, SW LAYOUT UPDATED	FJ/RUM
P03	06.01.22	CFR RESPONSE	FJ/RUM
P02	17.09.21	ISSUED FOR TENDER	FJ/RUM
P01	20.08.21	ISSUED FOR FORMAL REVIEW	FJ/RUM

Key:

NOTE:
REFER DRAWING DB080-PIN-00-ZZ-DR-C-PLAN-1296 FOR SUDS TYPICAL DETAILS

REFER DRAWING DB080-PIN-00-ZZ-DR-C-PLAN-1295 FOR CATCHMENT LAYOUT

DRAINAGE NOTES:
1. ALL FOUL SEWERS, MANHOLES AND CONNECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND IRISH WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS.
2. ALL FOUL SEWER HOUSE CONNECTIONS TO BE MIN 100mmØ UPVC TO IS EN 1401 2009/2012, STIFFNESS CLASS 8KN/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS.
3. ALL PUBLIC FOUL SEWERS TO BE MINIMUM 225mm DIAMETER THERMOPLASTIC STRUCTURED WALL PIPES TO IS EN 13746 (2007/2009). TYPE SN8 AND WIS 4-35-01 (2008) AND COMPLY WITH THE REQUIREMENTS OF THE IRISH WATER CODE OF PRACTICE.
4. ALL PUBLIC SURFACE WATER SEWERS TO BE MINIMUM 225 DIA. CLASS H CONCRETE TO EN1916 & IS 6 2004 IN ACCORDANCE WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS.
5. ALL SURFACE WATER CONNECTIONS TO BE MINIMUM 150mmØ UPVC TO IS EN 1401 2009/2012 IN ACCORDANCE WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS.
6. LOCATION AND INVERT LEVELS OF EXISTING MANHOLES OR OUTFALL POINTS, WHERE APPLICABLE TO BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF DRAINAGE WORKS.
7. ALL FOUL CONNECTIONS TO COMPLY WITH THE REQUIREMENTS OF THE IRISH WATER.
8. ALL FOUL SEWERS TO BE AIR TESTED IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS.
9. ALL COVER LEVELS TO MATCH FINISHED ROAD/VERGE/FOOTPATH/CYCLETRACK LEVELS UNLESS OTHERWISE STATED.
10. CONTRACTOR TO INCLUDE FOR CCTV SURVEY OF ALL SEWERS UPON COMPLETION OF SAME.

Project:
EQUINIX DB081

Drawing Title:
SURFACE WATER SITE DRAINAGE

Drawing Number:
DB080-PIN-00-ZZ-DR-C-PLAN-1207

Scale:	Paper Size:	Purpose:	Revision:
1:500	A1	D2	P04

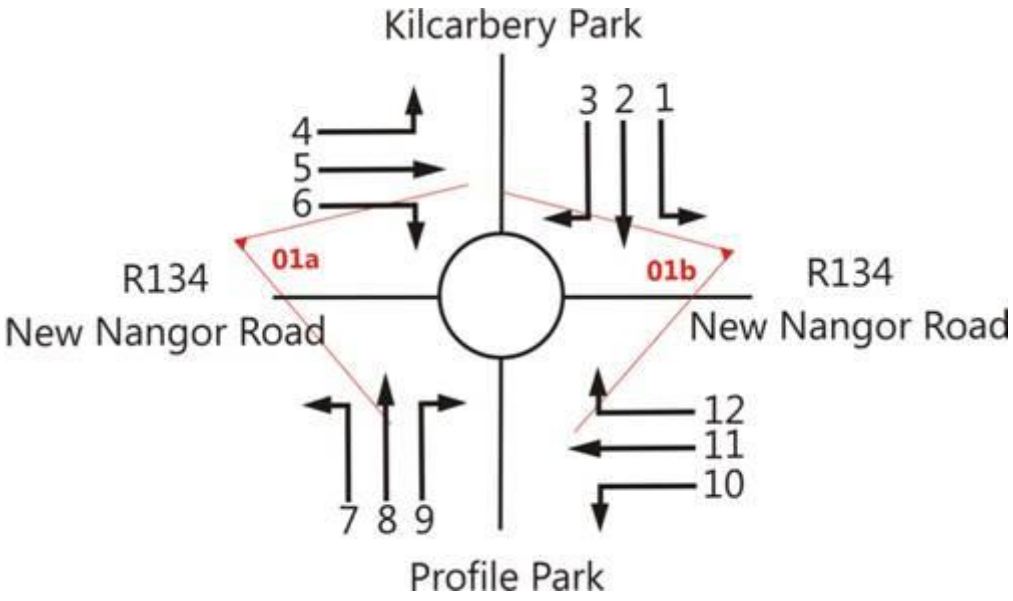
PINNACLE CONSULTING ENGINEERS
SIXTH FLOOR PROSPECT HOUSE 100 NEW OXFORD STREET LONDON WC1A 1HB **Tel:** 0207 0433410

Appendix 12.1 Site Map

Site Location



Movements



	Job number: TRA/23/060	Job Date: 16th March 2023	Drawing No: TRA/23/060-01	traffinomics.ie
	Client: Pinnnacle	Job Day: Thursday	Author: SPW	

Appendix 12.2 Traffic Counts

TRAFFINOMICS LIMITED

PROFILE PARK TRAFFIC COUNT **MARCH 2023**
MANUAL CLASSIFIED JUNCTION TURNING COUNT **TRA/23/060**

SITE: 01 DATE: 16th March 2023

LOCATION: R134 New Nangor Road/Profile Park DAY: Thursday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	1	3	5	2	0	11	16	0	0	0	0	0	0	0	0	0	0	1	0	1	2
07:15	2	2	0	3	1	8	13	0	0	0	0	0	0	0	1	0	1	1	0	3	5
07:30	1	1	2	3	0	7	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	2	4	1	2	0	9	12	0	0	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	6	10	8	10	1	35	53	0	0	0	0	0	0	0	1	1	1	2	0	5	8
08:00	1	2	0	2	2	7	12	0	0	0	0	0	0	0	0	1	0	2	0	3	6
08:15	3	1	1	2	0	7	10	0	0	0	0	0	0	0	0	0	1	0	0	1	2
08:30	1	2	0	2	0	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	3	4	2	2	0	11	15	0	0	0	0	0	0	0	1	2	1	2	0	6	9
H/TOT	8	9	3	8	2	30	44	0	0	0	0	0	0	0	1	3	2	4	0	10	16
09:00	3	1	1	1	0	6	8	0	0	0	0	0	0	0	1	2	0	0	0	3	3
09:15	3	1	3	2	0	9	13	0	1	0	0	0	1	1	3	2	0	2	0	7	10
09:30	4	4	0	2	0	10	13	0	0	0	0	0	0	0	2	2	0	1	0	5	6
09:45	3	3	4	2	0	12	17	0	0	0	0	0	0	0	1	1	0	1	0	3	4
H/TOT	13	9	8	7	0	37	50	0	1	0	0	0	1	1	7	7	0	4	0	18	23
P/TOT	27	28	19	25	3	102	147	0	1	0	0	0	1	1	9	11	3	10	0	33	48

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
16:00	24	3	0	1	0	28	29	0	0	0	0	0	0	0	3	1	1	0	0	5	6
16:15	15	3	0	3	1	22	27	0	0	0	0	0	0	0	1	0	0	0	0	1	1
16:30	21	0	2	1	1	25	28	0	0	0	0	0	0	0	3	1	0	1	0	5	6
16:45	21	2	0	2	1	26	30	0	0	0	0	0	0	0	6	0	2	0	0	8	9
H/TOT	81	8	2	7	3	101	114	0	0	0	0	0	0	0	13	2	3	1	0	19	22
17:00	33	3	1	1	1	39	42	0	0	0	0	0	0	0	6	1	0	1	0	8	9
17:15	21	1	0	2	0	24	27	0	0	0	0	0	0	0	8	0	0	0	0	8	8
17:30	6	1	1	0	0	8	9	0	0	0	0	0	0	0	3	0	1	1	0	5	7
17:45	10	3	1	3	0	17	21	0	0	0	0	0	0	0	2	0	0	0	0	2	2
H/TOT	70	8	3	6	1	88	98	0	0	0	0	0	0	0	19	1	1	2	0	23	26
18:00	14	2	0	1	0	17	18	0	0	0	0	0	0	0	4	2	0	1	0	7	8
18:15	7	0	1	1	0	9	11	0	0	0	0	0	0	0	1	0	1	0	0	2	3
18:30	6	1	0	0	0	7	7	0	0	0	0	0	0	0	1	0	1	0	0	2	3
18:45	1	1	0	5	0	7	14	0	0	0	0	0	0	0	2	0	0	1	0	3	4
H/TOT	28	4	1	7	0	40	50	0	0	0	0	0	0	0	8	2	2	2	0	14	18
P/TOT	179	20	6	20	4	229	262	0	0	0	0	0	0	0	40	5	6	5	0	56	66

PROFILE PARK TRAFFIC COUNT **MARCH 2023**
MANUAL CLASSIFIED JUNCTION TURNING COUNT **TRA/23/060**

SITE: 01 DATE: 16th March 2023

LOCATION: R134 New Nangor Road/Profile Park DAY: Thursday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	5	0	0	0	0	5	5	58	14	5	4	4	85	97	0	1	0	0	0	1	1
07:15	5	0	0	0	0	5	5	82	15	9	2	6	114	127	0	0	0	0	0	0	0
07:30	6	1	0	0	0	7	7	75	14	7	5	3	104	117	0	0	0	0	0	0	0
07:45	6	1	2	0	0	9	10	77	10	8	4	4	103	116	0	0	0	0	0	0	0
H/TOT	22	2	2	0	0	26	27	292	53	29	15	17	406	457	0	1	0	0	0	1	1
08:00	9	0	0	0	0	9	9	83	9	8	1	6	107	118	0	0	0	0	0	0	0
08:15	3	0	0	1	0	4	5	72	15	9	3	3	102	113	0	0	0	0	0	0	0
08:30	6	0	0	2	0	8	11	75	11	3	3	4	96	105	0	0	0	0	0	0	0
08:45	8	1	0	0	0	9	9	56	16	4	3	4	83	93	0	0	0	0	0	0	0
H/TOT	26	1	0	3	0	30	34	286	51	24	10	17	388	430	0	0	0	0	0	0	0
09:00	5	2	0	0	0	7	7	73	19	8	4	2	106	117	0	0	0	0	0	0	0
09:15	4	0	1	0	0	5	6	78	16	3	4	2	103	112	1	0	0	0	0	1	1
09:30	5	2	0	0	0	7	7	46	14	3	7	1	71	83	2	0	0	0	0	2	2
09:45	1	1	0	0	0	2	2	42	6	5	4	1	58	67	1	0	0	0	0	1	1
H/TOT	15	5	1	0	0	21	22	239	55	19	19	6	338	378	4	0	0	0	0	4	4
P/TOT	63	8	3	3	0	77	82	817	159	72	44	40	1132	1265	4	1	0	0	0	5	5

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
16:00	0	0	0	1	0	1	2	65	11	1	5	4	86	97	1	0	0	0	0	1	1
16:15	0	0	1	0	0	1	2	63	13	2	5	3	86	97	0	0	0	0	0	0	0
16:30	1	1	1	0	0	3	4	87	18	5	0	3	113	119	0	0	0	0	0	0	0
16:45	1	0	2	0	0	3	4	59	11	4	0	4	78	84	0	0	0	0	0	0	0
H/TOT	2	1	4	1	0	8	11	274	53	12	10	14	363	396	1	0	0	0	0	1	1
17:00	0	0	1	0	0	1	2	82	11	2	1	3	99	104	0	0	0	0	0	0	0
17:15	0	1	1	1	0	3	5	60	13	3	0	2	78	82	0	1	1	0	0	2	3
17:30	0	0	0	0	0	0	0	64	5	1	0	3	73	77	0	0	0	0	0	0	0
17:45	2	0	0	1	0	3	4	60	4	2	0	2	68	71	0	0	0	0	0	0	0
H/TOT	2	1	2	2	0	7	11	266	33	8	1	10	318	333	0	1	1	0	0	2	3
18:00	0	0	0	0	0	0	0	68	15	1	1	4	89	95	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	48	7	1	0	3	59	63	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	57	5	0	2	0	64	67	2	0	0	0	0	2	2
18:45	1	0	0	1	0	2	3	47	5	2	0	0	54	55	0	0	0	0	0	0	0
H/TOT	1	0	0	1	0	2	3	220	32	4	3	7	266	279	2	0	0	0	0	2	2
P/TOT	5	2	6	4	0	17	25	760	118	24	14	31	947	1008	3	1	1	0	0	5	6

PROFILE PARK TRAFFIC COUNT **MARCH 2023**
MANUAL CLASSIFIED JUNCTION TURNING COUNT **TRA/23/060**

SITE: 01 DATE: 16th March 2023

LOCATION: R134 New Nangor Road/Profile Park DAY: Thursday

	MOVEMENT 7							MOVEMENT 8							MOVEMENT 9						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	0	0	2	2
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	2	0	1	0	0	3	4	0	0	0	0	0	0	0	2	0	0	0	0	2	2
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
09:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	2	2
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	1	1	0	0	0	2	2	0	0	0	0	0	0	0	1	3	0	0	0	4	4
P/TOT	3	1	1	0	0	5	6	0	0	0	0	0	0	0	5	3	0	0	0	8	8

	MOVEMENT 7							MOVEMENT 8							MOVEMENT 9						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
16:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1
16:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	2	2
16:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
H/TOT	3	0	0	0	0	3	3	0	0	0	0	0	0	0	4	1	0	0	0	5	5
17:00	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3
17:30	1	0	0	0	0	1	1	1	0	0	0	0	1	1	4	0	0	0	0	4	4
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	2	0	0	0	0	2	2	2	0	0	0	0	2	2	7	1	0	0	0	8	8
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	0	0	2	2
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	0	0	2	2
P/TOT	6	0	0	0	0	6	6	2	0	0	0	0	2	2	13	2	0	0	0	15	15

PROFILE PARK TRAFFIC COUNT **MARCH 2023**
MANUAL CLASSIFIED JUNCTION TURNING COUNT **TRA/23/060**

SITE: 01 DATE: 16th March 2023

LOCATION: R134 New Nangor Road/Profile Park DAY: Thursday

	MOVEMENT 10							MOVEMENT 11							MOVEMENT 12						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	1	0	0	0	1	1	38	11	3	2	2	56	62	15	3	0	3	0	21	25
07:15	0	1	0	0	0	1	1	32	12	3	3	0	50	55	16	0	0	0	1	17	18
07:30	0	1	0	0	0	1	1	54	18	1	3	2	78	84	16	2	0	6	0	24	32
07:45	1	2	0	0	0	3	3	65	16	5	1	0	87	91	18	1	2	4	0	25	31
H/TOT	1	5	0	0	0	6	6	189	57	12	9	4	271	293	65	6	2	13	1	87	106
08:00	1	0	0	0	0	1	1	47	10	5	1	2	65	71	21	1	3	5	2	32	42
08:15	1	0	0	0	0	1	1	53	13	4	2	0	72	77	15	6	0	1	0	22	23
08:30	0	0	0	0	0	0	0	76	8	3	6	2	95	106	23	3	2	3	0	31	36
08:45	0	0	0	0	0	0	0	73	10	5	3	1	92	99	20	5	3	1	0	29	32
H/TOT	2	0	0	0	0	2	2	249	41	17	12	5	324	353	79	15	8	10	2	114	133
09:00	0	0	0	0	0	0	0	61	12	5	5	0	83	92	19	6	1	5	0	31	38
09:15	2	1	0	0	0	3	3	42	10	6	6	0	64	75	11	5	2	3	0	21	26
09:30	0	1	0	0	0	1	1	46	13	4	6	3	72	85	9	4	3	3	0	19	24
09:45	1	2	0	0	0	3	3	44	16	2	4	0	66	72	12	4	1	0	0	17	18
H/TOT	3	4	0	0	0	7	7	193	51	17	21	3	285	324	51	19	7	11	0	88	106
P/TOT	6	9	0	0	0	15	15	631	149	46	42	12	880	970	195	40	17	34	3	289	345

	MOVEMENT 10							MOVEMENT 11							MOVEMENT 12						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
16:00	2	0	0	0	0	2	2	80	18	3	3	1	105	111	3	1	1	1	1	7	10
16:15	0	0	0	0	0	0	0	62	18	1	5	0	86	93	1	2	1	0	0	4	5
16:30	0	0	0	0	0	0	0	97	16	6	2	0	121	127	3	1	0	0	2	6	8
16:45	0	0	0	0	0	0	0	92	10	5	4	0	111	119	5	2	1	1	0	9	11
H/TOT	2	0	0	0	0	2	2	331	62	15	14	1	423	450	12	6	3	2	3	26	33
17:00	0	0	0	0	0	0	0	85	16	5	3	0	109	115	2	1	1	4	1	9	16
17:15	0	0	0	0	0	0	0	107	11	2	3	2	125	132	3	0	0	1	0	4	5
17:30	0	0	0	0	0	0	0	99	14	0	3	0	116	120	4	3	1	1	0	9	11
17:45	0	0	0	0	0	0	0	89	15	2	2	0	108	112	2	1	0	1	0	4	5
H/TOT	0	0	0	0	0	0	0	380	56	9	11	2	458	479	11	5	2	7	1	26	37
18:00	0	0	0	0	0	0	0	96	10	1	0	0	107	108	0	0	0	4	0	4	9
18:15	0	0	0	0	0	0	0	92	7	4	2	0	105	110	1	0	0	1	0	2	3
18:30	3	0	0	0	0	3	3	87	10	2	0	0	99	100	0	1	2	2	0	5	9
18:45	1	0	0	0	0	1	1	63	9	0	1	1	74	76	1	0	1	0	0	2	3
H/TOT	4	0	0	0	0	4	4	338	36	7	3	1	385	393	2	1	3	7	0	13	24
P/TOT	6	0	0	0	0	6	6	1049	154	31	28	4	1266	1322	25	12	8	16	4	65	94

PCU's Through Junction
212
224
256
264
956
258
232
266
258
1014
266
247
224
184
921
2891

PCU's Through Junction
260
226
292
258
1037
291
264
229
216
999
238
189
190
159
775
2811

Appendix 12.3 Traffic Flow Diagrams

	Arm 2			Arm 2			Arm 3			Arm 4			
	1	2	3	4	5	6	7	8	9	10	11	12	
AM	53	0	8	27	457	1	4	0	2	6	293	106	956
PM	50	0	18	3	279	2	1	0	2	4	393	24	775
AM	61			485			6			405			956
PM	67			284			3			421			775
2025													
AM	64			508			6			424			1002
PM	70			298			3			441			

61 485 6 405
67 284 3 421

PM	3	2	1
	18	0	50
AM	8	0	53

Arm 1 - Kilcarbery Park

Arm 2 - R134 WEST

	PM	AM
4	3	27
5	279	457
6	2	1

Arm 4 - R134 EAST

AM	PM	
106	24	12
293	393	11
6	4	10

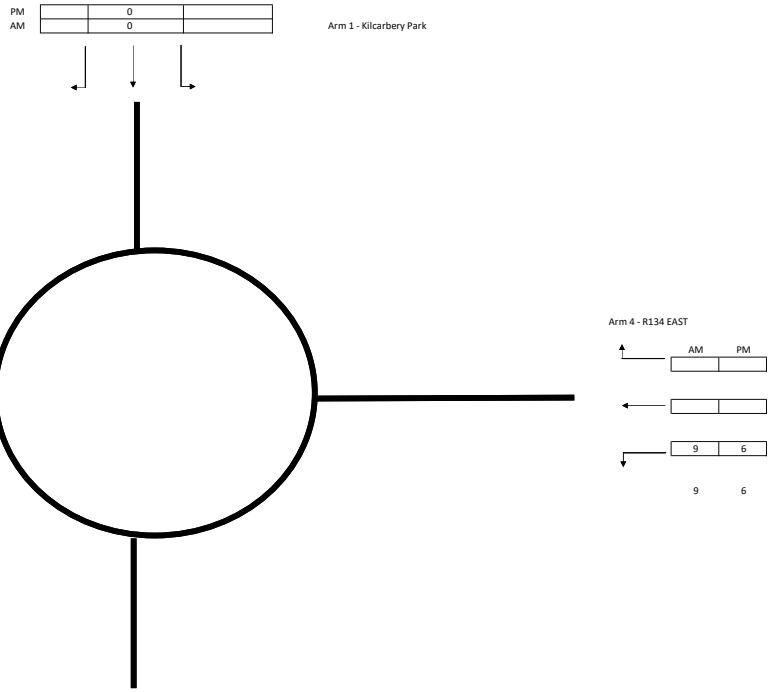
AM	4	0	2
PM	1	0	2
	7	8	9

Arm 3 - Profile Park

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2023	AM/PM	Survey
Appendix:	Appendix 12.2.1		

	Arm 1	Arm 2	Arm 3	Arm 4	Total
AM	0	2	13	9	24
PM	0	4	5	6	15

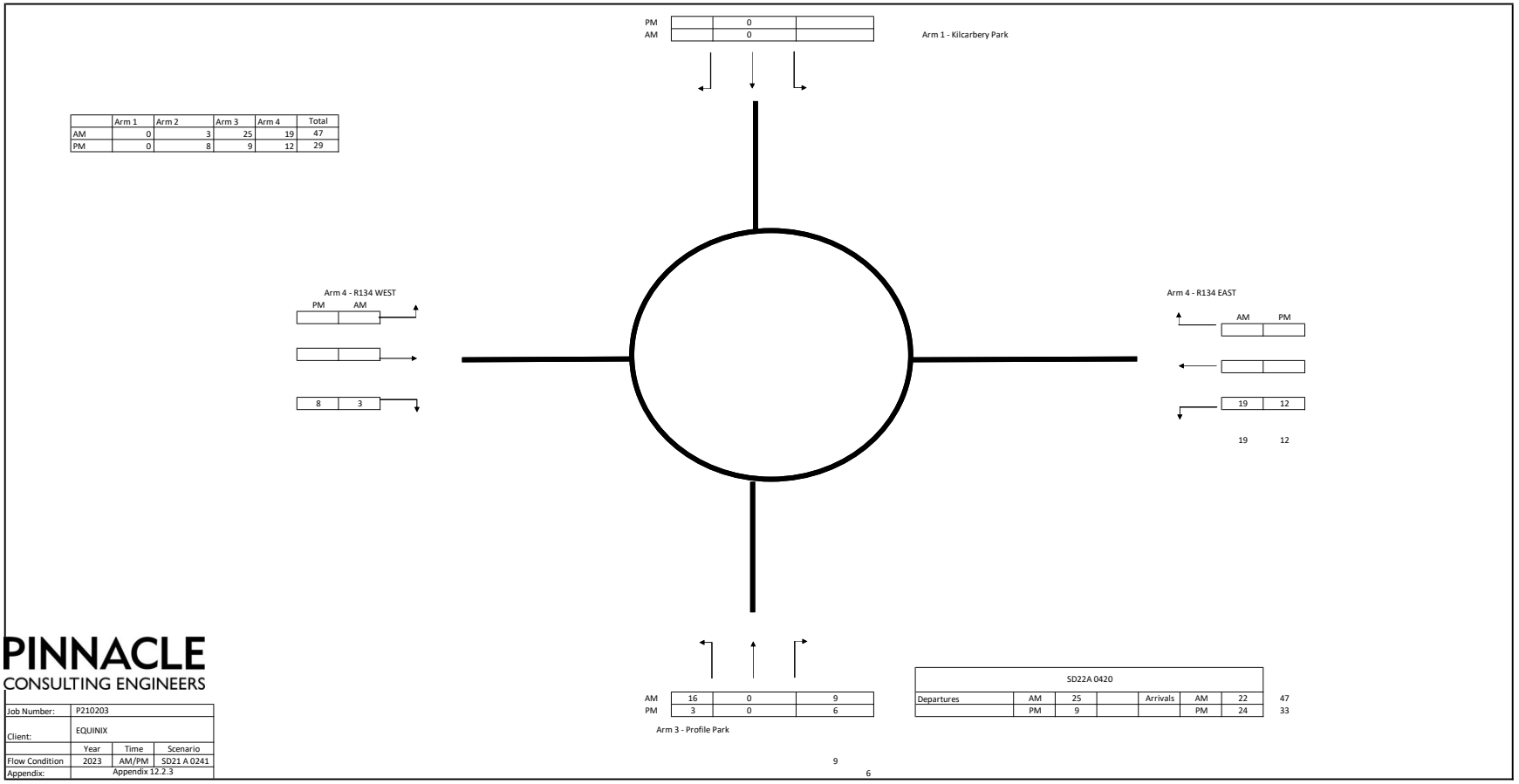


SD22A 0420							
Departures	AM	13		Arrivals	AM	11	24
	PM	5			PM	12	17

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2023	AM/PM	SD22A/0420
Appendix:	Appendix 12.2.2		

	Arm 1	Arm 2	Arm 3	Arm 4	Total
AM	0	3	25	19	47
PM	0	8	9	12	29

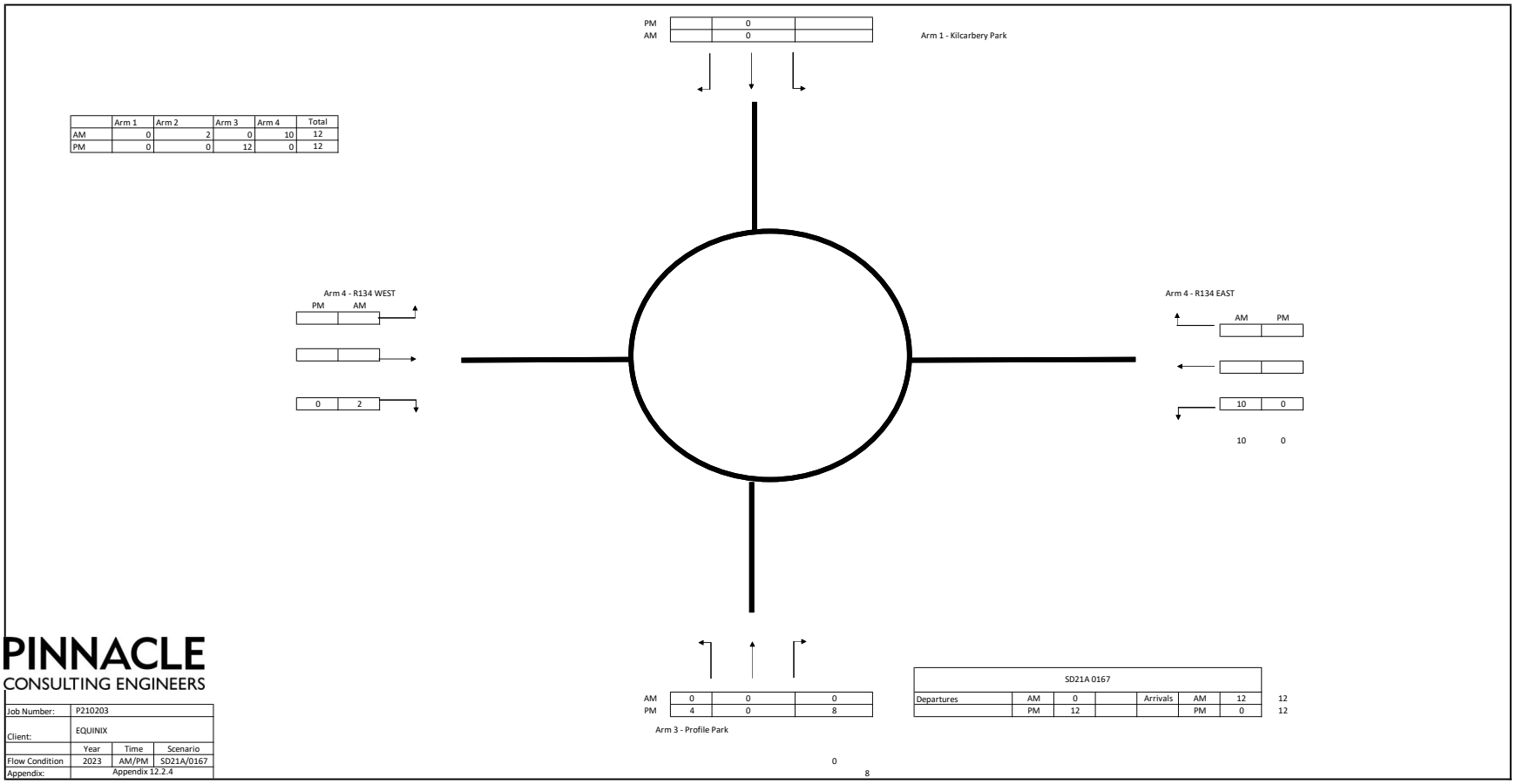


SD22A 0420							
Departures	AM	25		Arrivals	AM	22	47
	PM	9			PM	24	33

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2023	AM/PM	SD21 A 0241
Appendix:	Appendix 12.2.3		

	Arm 1	Arm 2	Arm 3	Arm 4	Total
AM	0	2	0	10	12
PM	0	0	12	0	12



SD21A 0167							
Departures	AM	0		Arrivals	AM	12	12
	PM	12			PM	0	12

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2023	AM/PM	SD21A/0167
Appendix:	Appendix 12.2.4		

	Arm 1	Arm 2	Arm 3	Arm 4	Total
AM	0	5	33	28	66
PM	0	5	33	28	66

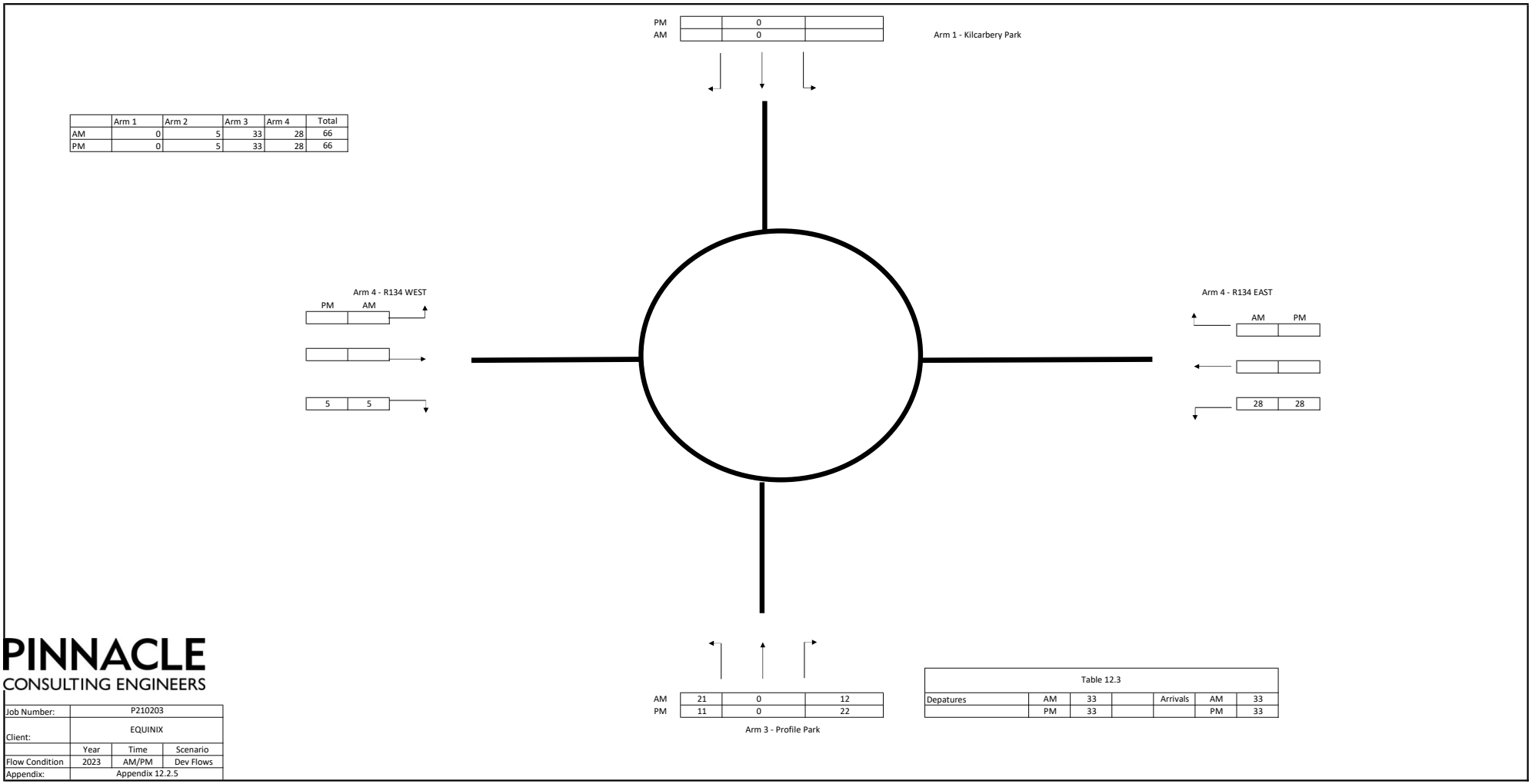


Table 12.3						
Depatures	AM	33		Arrivals	AM	33
	PM	33			PM	33

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2023	AM/PM	Dev Flows
Appendix:	Appendix 12.2.5		

	Arm 1	Arm 2	Arm 3	Arm 4	Total
AM	0	6	38	39	83
PM	0	12	26	18	56

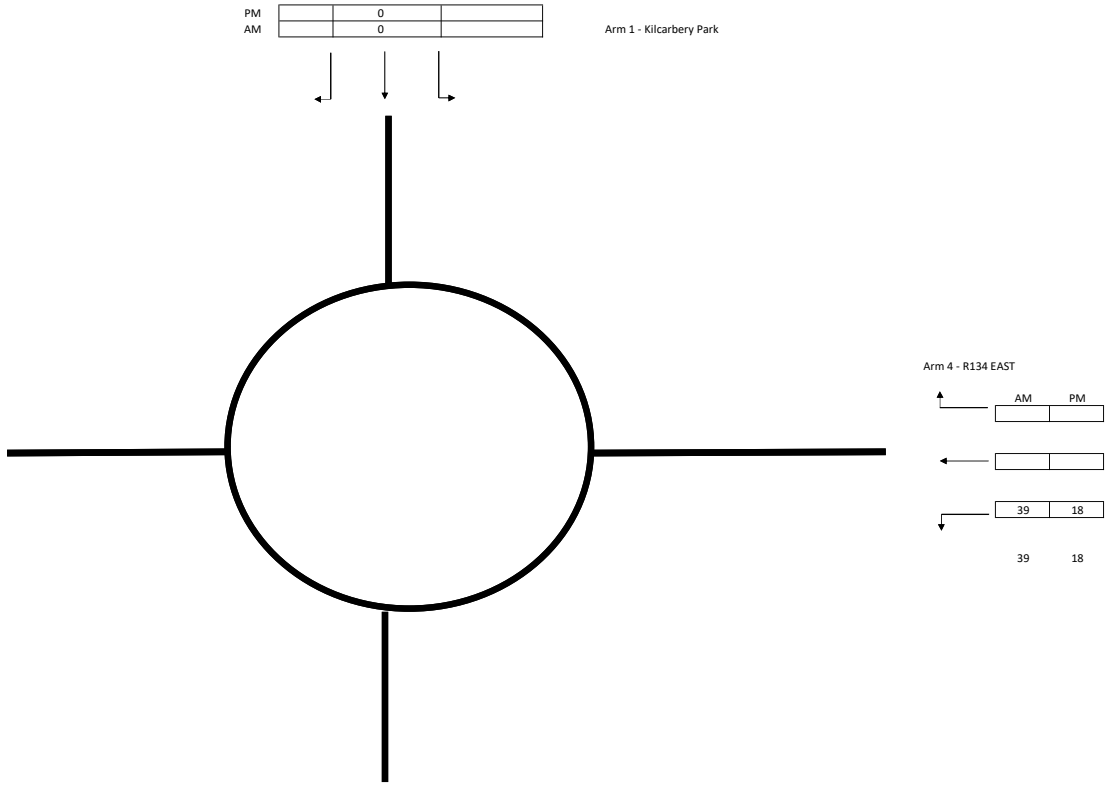


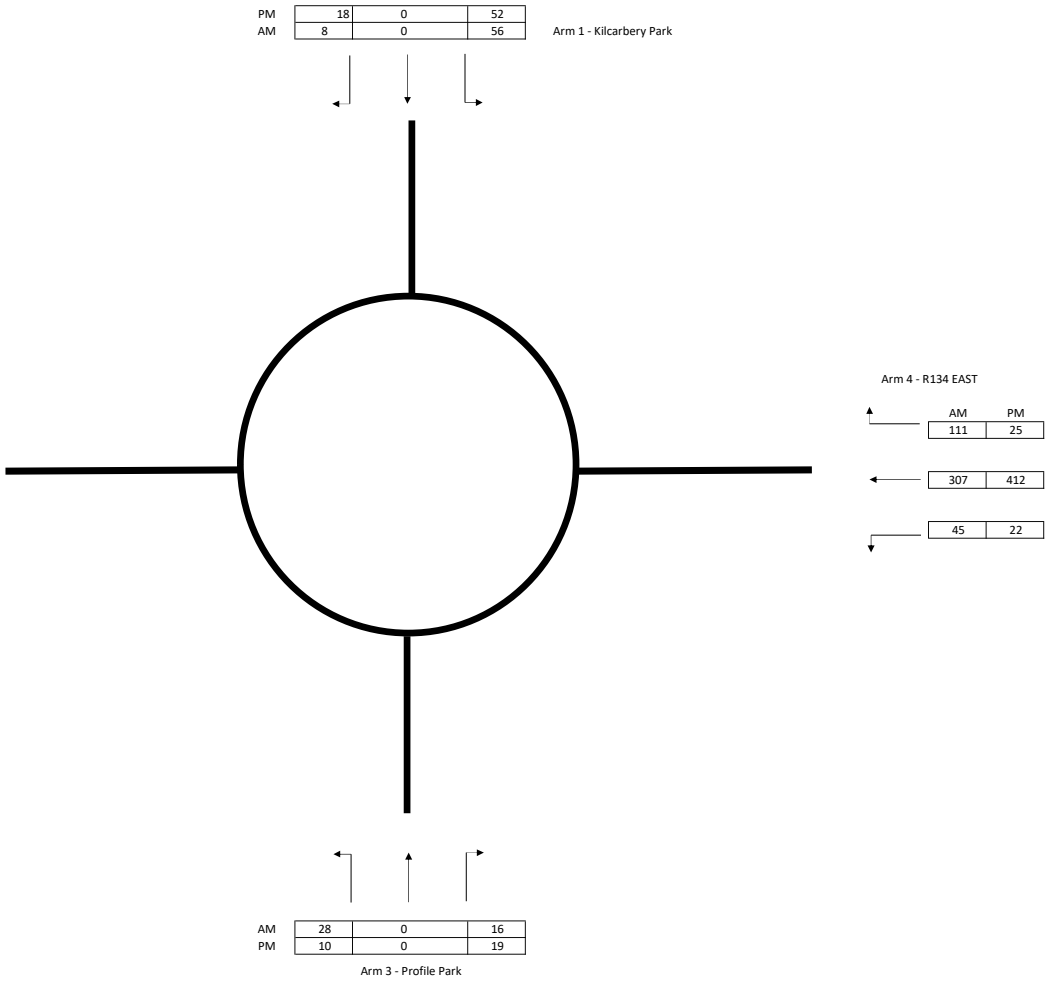
Table 12.4							
Departures	AM	38		Arrivals	AM	45	83
	PM	26			PM	36	62

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2023	AM/PM	Committed
Appendix:	Appendix 12.2.6		

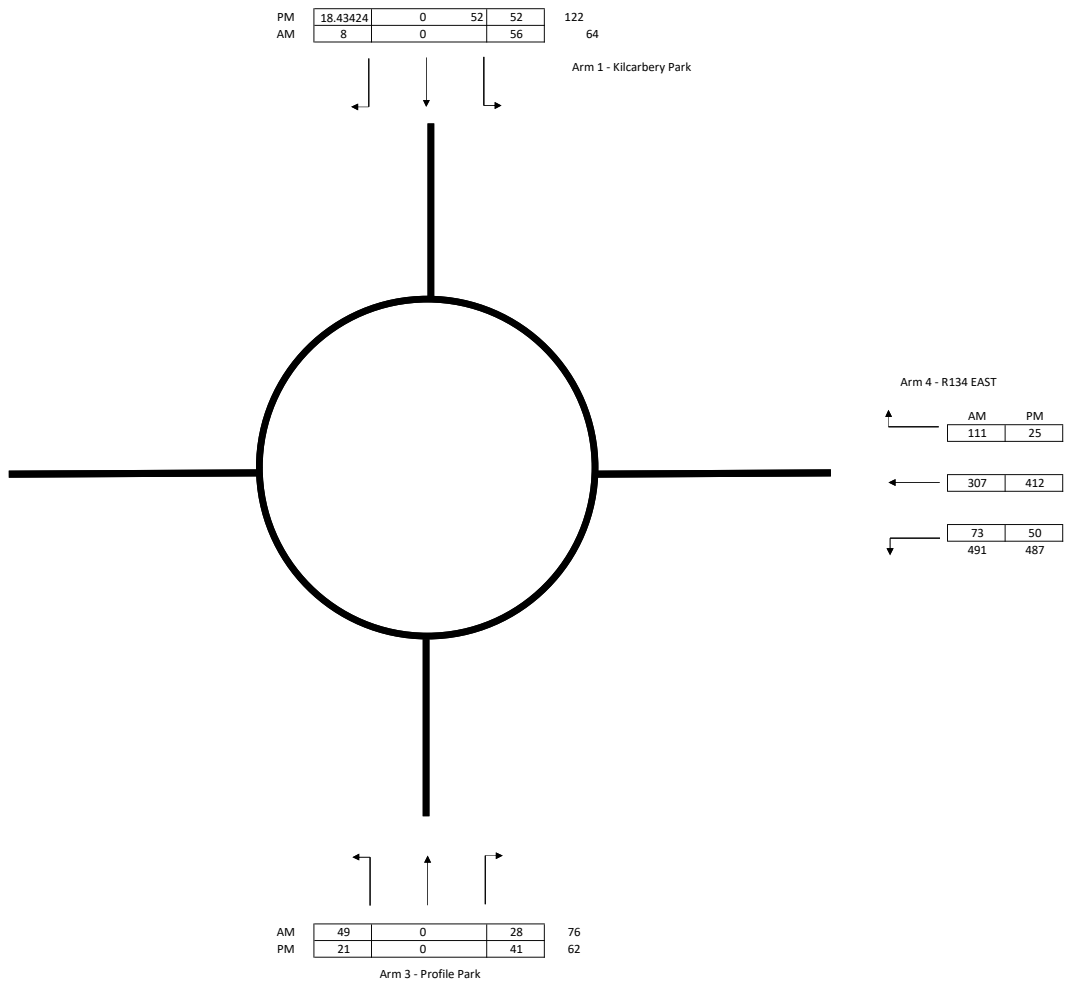
	Arm 1	Arm 2	Arm 3	Arm 4	Total
AM	64	521	43	462	1090
PM	70	322	29	459	880

Baseline Flows	
AM	1090
PM	880



PINNACLE
CONSULTING ENGINEERS

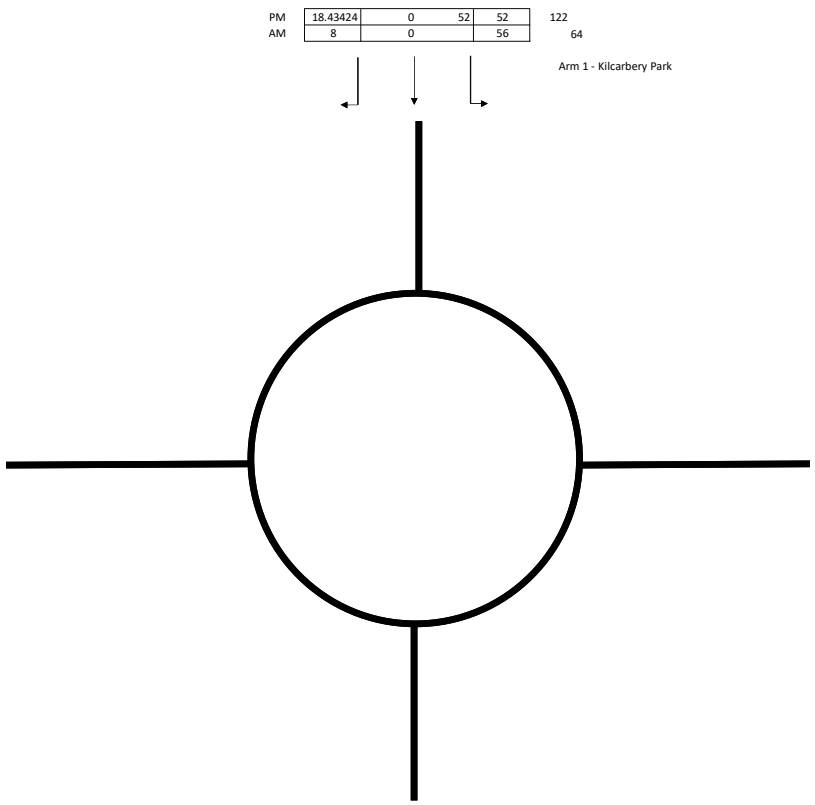
Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2025	AM/PM	No Dev
Appendix:	Appendix 12.2.7		



	Survey Flows	Development Flows	% Increase
AM	1090	66	6.05%
PM	880	66	7.50%

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2025	AM/PM	With Dev
Appendix:	Appendix 12.2.8		



	Survey Flows	Cumulative Impact	% Increase
AM	1008	149	14.73%
PM	514	128	24.82%

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2025	AM/PM	Cumulative Impact
Appendix:	Appendix 12.2.10		

	Arm 2			Arm 2			Arm 3			Arm 4			
	1	2	3	4	5	6	7	8	9	10	11	12	
AM	53	0	8	27	457	1	4	0	2	6	293	106	956
PM	50	0	18	3	279	2	1	0	2	4	393	24	775
AM	61			485			6			405			956
PM	67			284			3			421			775
2025													
AM	64			508			6			424			1002
PM	70			298			3			441			

61 485 6 405
67 284 3 421

	3	2	1
AM	8	0	56
PM	18	0	52

Arm 1 - Kilcarbery Park

Arm 2 - R134 WEST

	PM	AM
4	3	28
5	292	479
6	2	1

Arm 4 - R134 EAST

AM	PM	
111	25	12
307	412	11
6	4	10

Baseline Flows	
AM	1008
PM	514

AM	4	0	2
PM	1	0	2
	7	8	9

Arm 3 - Profile Park

PINNACLE
CONSULTING ENGINEERS

Job Number:	P210203		
Client:	EQUINIX		
	Year	Time	Scenario
Flow Condition	2025	AM/PM	Background
Appendix:	Appendix 12.2.9		

Appendix 12.4 Modelling Results

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.4.1693
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Filename: P210203 - DUBLIN - DB8, Profile Park, Grange Castle Modelling Am 07-00-08-00.j10
Path: S:\02.Projects\2021 Projects\P210203 - DUBLIN - DB8, Profile Park, Grange Castle\5.0 Calculations\5.3 Higways
Report generation date: 18/04/2023 21:48:18

»2023 -Survey , AM
»2025 - Baseline, AM
»2025 - Baseline with Dev, AM
»2025 - Background, AM
»2025 - Cumulative Impact , AM

Summary of junction performance

	AM			
	Queue (PCU)	Delay (s)	RFC	Junction Delay (s)
	2023 -Survey			
Arm 1	0.3	2.48	0.24	2.47
Arm 2	0.0	7.15	0.01	
Arm 3	0.4	2.44	0.27	
Arm 4	0.0	2.04	0.02	
	2025 - Baseline			
Arm 1	0.4	2.61	0.27	2.76
Arm 2	0.1	7.92	0.10	
Arm 3	0.4	2.53	0.29	
Arm 4	0.0	2.13	0.04	
	2025 - Baseline with Dev			
Arm 1	0.4	2.67	0.29	2.98
Arm 2	0.2	8.61	0.17	
Arm 3	0.4	2.54	0.29	
Arm 4	0.0	2.14	0.04	
	2025 - Background			
Arm 1	0.3	2.41	0.21	2.42
Arm 2	0.0	6.93	0.01	
Arm 3	0.4	2.41	0.27	
Arm 4	0.0	2.11	0.04	
	2025 - Cumulative Impact			
Arm 1	0.4	2.76	0.29	3.08
Arm 2	0.2	8.61	0.17	
Arm 3	0.4	2.67	0.29	

Arm 4	0.0	2.15	0.04	

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages.

File summary

File Description

Title	
Location	
Site number	
Date	30/03/2023
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	PINNACLE\ronan.kearns
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2023 -Survey	AM	ONE HOUR	00:00	01:30	15
D3	2025 - Baseline	AM	ONE HOUR	00:00	01:30	15
D5	2025 - Baseline with Dev	AM	ONE HOUR	00:00	01:30	15
D9	2025 - Background	AM	ONE HOUR	00:00	01:30	15
D11	2025 - Cumulative Impact	AM	ONE HOUR	00:00	01:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2023 -Survey , AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	2.47	A

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	2.47	A

Arms

Arms

Arm	Name	Description	No give-way line
1	R134 EAST		
2	Profile Park		
3	R134 EAST		
4	Kilcarbery Park		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1	4.50	7.90	12.0	17.0	38.7	27.6		
2	3.00	3.00	0.0	3.0	38.7	25.5		
3	4.49	8.50	19.0	16.0	38.7	24.8		
4	5.26	9.70	10.0	21.0	38.7	27.4		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.685	1903
2	0.359	671
3	0.726	2098
4	0.743	2174

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2023 -Survey	AM	ONE HOUR	00:00	01:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	405	100.000
2		✓	6	100.000
3		✓	485	100.000
4		✓	31	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	6	293	106
	2	2	0	4	0
	3	457	1	0	27
	4	23	0	8	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.24	2.48	0.3	A
2	0.01	7.15	0.0	A
3	0.27	2.44	0.4	A
4	0.02	2.04	0.0	A

Main Results for each time segment

00:00 - 00:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	305	7	1899	0.161	304	0.2	2.256	A
2	5	306	561	0.008	4	0.0	6.462	A
3	365	81	2039	0.179	364	0.2	2.149	A
4	23	345	1917	0.012	23	0.0	1.899	A

00:15 - 00:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	364	8	1898	0.192	364	0.2	2.346	A
2	5	366	540	0.010	5	0.0	6.733	A
3	436	97	2027	0.215	436	0.3	2.262	A
4	28	413	1867	0.015	28	0.0	1.957	A

00:30 - 00:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	446	10	1896	0.235	446	0.3	2.481	A
2	7	448	510	0.013	7	0.0	7.144	A
3	534	119	2011	0.266	534	0.4	2.436	A
4	34	506	1798	0.019	34	0.0	2.040	A

00:45 - 01:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	446	10	1896	0.235	446	0.3	2.481	A
2	7	448	510	0.013	7	0.0	7.145	A
3	534	119	2011	0.266	534	0.4	2.436	A
4	34	506	1798	0.019	34	0.0	2.041	A

01:00 - 01:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	364	8	1898	0.192	364	0.2	2.347	A
2	5	366	540	0.010	5	0.0	6.736	A
3	436	97	2027	0.215	436	0.3	2.263	A
4	28	414	1866	0.015	28	0.0	1.957	A

01:15 - 01:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	305	7	1899	0.161	305	0.2	2.260	A
2	5	307	561	0.008	5	0.0	6.466	A
3	365	81	2038	0.179	365	0.2	2.153	A
4	23	347	1916	0.012	23	0.0	1.903	A

2025 - Baseline, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	2.76	A

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	2.76	A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2025 - Baseline	AM	ONE HOUR	00:00	01:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	463	100.000
2		✓	44	100.000
3		✓	521	100.000
4		✓	64	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	45	307	111
	2	16	0	28	0
	3	479	14	0	28
	4	56	0	8	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.27	2.61	0.4	A
2	0.10	7.92	0.1	A
3	0.29	2.53	0.4	A
4	0.04	2.13	0.0	A

Main Results for each time segment

00:00 - 00:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	349	17	1892	0.184	348	0.2	2.330	A
2	33	320	556	0.060	33	0.1	6.873	A
3	392	95	2028	0.193	391	0.2	2.198	A
4	48	382	1890	0.025	48	0.0	1.954	A

00:15 - 00:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	416	20	1890	0.220	416	0.3	2.442	A
2	40	383	534	0.074	39	0.1	7.282	A
3	468	114	2015	0.232	468	0.3	2.327	A
4	58	457	1834	0.031	58	0.0	2.026	A

00:30 - 00:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	510	24	1887	0.270	509	0.4	2.614	A
2	48	469	503	0.096	48	0.1	7.917	A
3	574	140	1996	0.287	573	0.4	2.530	A
4	70	560	1758	0.040	70	0.0	2.133	A

00:45 - 01:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	510	24	1887	0.270	510	0.4	2.614	A
2	48	469	503	0.096	48	0.1	7.922	A
3	574	140	1996	0.287	574	0.4	2.530	A
4	70	560	1757	0.040	70	0.0	2.133	A

01:00 - 01:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	416	20	1890	0.220	417	0.3	2.443	A
2	40	383	534	0.074	40	0.1	7.291	A
3	468	114	2015	0.232	469	0.3	2.330	A
4	58	458	1834	0.031	58	0.0	2.028	A

01:15 - 01:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	349	17	1892	0.184	349	0.2	2.334	A
2	33	321	556	0.060	33	0.1	6.888	A
3	392	96	2028	0.193	392	0.2	2.201	A
4	48	383	1889	0.026	48	0.0	1.957	A

2025 - Baseline with Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	2.98	A

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	2.98	A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2025 - Baseline with Dev	AM	ONE HOUR	00:00	01:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	491	100.000
2		✓	77	100.000
3		✓	519	100.000
4		✓	64	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	73	307	111
	2	28	0	49	0
	3	479	12	0	28
	4	56	0	8	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.29	2.67	0.4	A
2	0.17	8.61	0.2	A
3	0.29	2.54	0.4	A
4	0.04	2.14	0.0	A

Main Results for each time segment

00:00 - 00:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	370	15	1893	0.195	369	0.2	2.361	A
2	58	320	556	0.104	58	0.1	7.210	A
3	391	104	2022	0.193	390	0.2	2.205	A
4	48	390	1884	0.026	48	0.0	1.960	A

00:15 - 00:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	441	18	1891	0.233	441	0.3	2.483	A
2	69	383	534	0.130	69	0.1	7.745	A
3	467	125	2007	0.232	466	0.3	2.336	A
4	58	466	1827	0.031	58	0.0	2.033	A

00:30 - 00:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	541	22	1888	0.286	540	0.4	2.670	A
2	85	469	503	0.169	85	0.2	8.599	A
3	571	153	1987	0.288	571	0.4	2.543	A
4	70	571	1750	0.040	70	0.0	2.143	A

00:45 - 01:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	541	22	1888	0.286	541	0.4	2.670	A
2	85	469	503	0.169	85	0.2	8.610	A
3	571	153	1986	0.288	571	0.4	2.543	A
4	70	571	1749	0.040	70	0.0	2.144	A

01:00 - 01:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	441	18	1891	0.233	442	0.3	2.484	A
2	69	383	534	0.130	69	0.2	7.758	A
3	467	125	2007	0.233	467	0.3	2.340	A
4	58	467	1827	0.031	58	0.0	2.036	A

01:15 - 01:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	370	15	1893	0.195	370	0.2	2.365	A

2	58	321	556	0.104	58	0.1	7.231	A
3	391	105	2021	0.193	391	0.2	2.209	A
4	48	391	1883	0.026	48	0.0	1.963	A

2025 - Background, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	2.42	A

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	2.42	A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D9	2025 - Background	AM	ONE HOUR	00:00	01:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	365	100.000
2		✓	6	100.000
3		✓	508	100.000
4		✓	64	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	**2**	**3**	**4**
From	**1**	0	6	307	52
	2	2	0	4	0
	3	479	1	0	28
	4	56	0	8	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.21	2.41	0.3	A
2	0.01	6.93	0.0	A
3	0.27	2.41	0.4	A
4	0.04	2.11	0.0	A

Main Results for each time segment

00:00 - 00:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	275	7	1899	0.145	274	0.2	2.214	A
2	5	276	572	0.008	4	0.0	6.340	A
3	382	41	2068	0.185	382	0.2	2.133	A
4	48	362	1905	0.025	48	0.0	1.938	A

00:15 - 00:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	328	8	1898	0.173	328	0.2	2.293	A
2	5	330	553	0.010	5	0.0	6.575	A
3	457	49	2062	0.221	456	0.3	2.241	A
4	58	433	1852	0.031	58	0.0	2.005	A

00:30 - 00:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	402	10	1896	0.212	402	0.3	2.408	A
2	7	404	526	0.013	7	0.0	6.927	A
3	559	59	2054	0.272	559	0.4	2.407	A
4	70	530	1780	0.040	70	0.0	2.105	A

00:45 - 01:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	402	10	1896	0.212	402	0.3	2.408	A
2	7	404	526	0.013	7	0.0	6.928	A

3	559	59	2054	0.272	559	0.4	2.407	A
4	70	531	1780	0.040	70	0.0	2.106	A

01:00 - 01:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	328	8	1898	0.173	328	0.2	2.295	A
2	5	330	553	0.010	5	0.0	6.577	A
3	457	49	2062	0.221	457	0.3	2.244	A
4	58	434	1852	0.031	58	0.0	2.007	A

01:15 - 01:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	275	7	1899	0.145	275	0.2	2.217	A
2	5	276	572	0.008	5	0.0	6.346	A
3	382	41	2068	0.185	383	0.2	2.137	A
4	48	363	1904	0.025	48	0.0	1.941	A

2025 - Cumulative Impact , AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	3.08	A

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	3.08	A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D11	2025 - Cumulative Impact	AM	ONE HOUR	00:00	01:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	491	100.000
2		✓	77	100.000
3		✓	526	100.000
4		✓	64	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	73	307	111
	2	28	0	49	0
	3	479	19	0	28
	4	56	0	8	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	5	0
	2	0	0	0	0
	3	5	0	0	0
	4	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.29	2.76	0.4	A
2	0.17	8.61	0.2	A
3	0.29	2.67	0.4	A
4	0.04	2.15	0.0	A

Main Results for each time segment

00:00 - 00:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	370	20	1889	0.196	369	0.2	2.439	A
2	58	320	556	0.104	58	0.1	7.210	A
3	396	104	2022	0.196	395	0.3	2.312	A
4	48	395	1880	0.026	48	0.0	1.964	A

00:15 - 00:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	441	24	1887	0.234	441	0.3	2.566	A
2	69	383	534	0.130	69	0.1	7.745	A
3	473	125	2007	0.236	473	0.3	2.452	A
4	58	473	1823	0.032	58	0.0	2.039	A

00:30 - 00:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	541	30	1883	0.287	540	0.4	2.763	A
2	85	469	503	0.169	85	0.2	8.599	A
3	579	153	1987	0.292	579	0.4	2.673	A
4	70	579	1744	0.040	70	0.0	2.150	A

00:45 - 01:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	541	30	1883	0.287	541	0.4	2.763	A
2	85	469	503	0.169	85	0.2	8.610	A
3	579	153	1986	0.292	579	0.4	2.673	A
4	70	579	1744	0.040	70	0.0	2.151	A

01:00 - 01:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	441	24	1887	0.234	442	0.3	2.570	A
2	69	383	534	0.130	69	0.2	7.760	A
3	473	125	2007	0.236	473	0.3	2.454	A
4	58	473	1822	0.032	58	0.0	2.041	A

01:15 - 01:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	370	20	1889	0.196	370	0.3	2.442	A
2	58	321	556	0.104	58	0.1	7.231	A
3	396	105	2021	0.196	396	0.3	2.315	A
4	48	396	1879	0.026	48	0.0	1.965	A

Appendix 13.1 Resource Waste Management Plan

RESOURCE WASTE MANAGEMENT PLAN FOR A DATA CENTRE AND ONSITE POWER GENERATION FACILITY

"PROPOSED OSPG AT PROFILE PARK, NANGOR ROAD, DUBLIN 22"

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APPENDIX 13.1

Report Prepared For

Equinix (Ireland) Ltd.

Report Prepared By

Chonaill Bradley
Principal Environmental Consultant

Our Reference

CB/227501.00238WMR01

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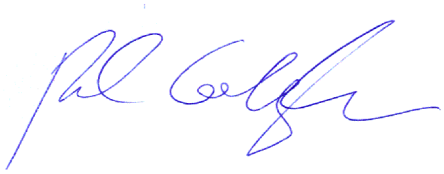
Signature		
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Title	Principal Environmental Consultant	Director
Date	1 February 2023	1 February 2023

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1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Resource Waste Management Plan (RWMP) on behalf of Equinix (Ireland) Ltd. The proposed development will consist of Modifications to the permitted data centre granted under SDCC Reg. Ref. SD21A/018on lands known as Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (the site is bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to

This plan will provide information necessary to ensure that the management of Construction & Demolition (C&D) waste at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Eastern-Midlands Region Waste Management Plan 2015 – 2021* [4]. In particular, this plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This RWMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and makes recommendations for management of different waste streams. The RWMP should be viewed as a live document and should be regularly revisited throughout a project's lifecycle so that opportunities to maximise waste reduction / efficiencies are exploited throughout, and that data is collected on an ongoing basis so that it is as accurate as possible

2.0 RESOURCE & WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998*, Changing Our Ways* [5], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [6] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, *'A Waste Action Plan for a Circular Economy'* [7] (WAPCE), replaces the previous national waste management plan, *"A Resource Opportunity"* (2012), and was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) [8] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

The Circular Economy and Miscellaneous Provisions Act 2022 [9] was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

The Environmental Protection Agency (EPA) of Ireland issued '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' in November 2021* [10]. These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006 [11]. The guidelines provide a practical approach which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the deconstruction of a project. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Design teams roles and approach;
- Relevant EU, national and local waste policy, legislation and guidelines;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for Resource Waste Manager (RM) and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, Local Authority, etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a RWMP for developments. The new guidance classifies developments on a two-tiered system. Developments which do not exceed any of the following thresholds may be classed as Tier 1 development:

- New residential development of less than 10 dwellings.
- Retrofit of 20 dwellings or less.
- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m^2; and
- Demolition projects generating in total less than 100m^3 in volume of C&D waste.

A development which exceeds one or more of these thresholds is classed as Tier-2 projects.

This development requires a RWMP as a Tier 2 development as it is above following criterion:

- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.

Other guidelines followed in the preparation of this report include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'* [12], published by FÁS and the Construction Industry Federation in 2002 and the previous guildines, 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.2 Regional Level

The proposed development is located in the Local Authority area of South Dublin County Council (SDCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the SDCC area published in May 2015. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices expect to publish the final plan in December2022.

The regional plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015.*

The *South Dublin County Council Development Plan 2022– 2028* [13] sets out a number of objectives for the South Dublin area in line with the objectives of the waste management plan.

Policy and Objectives

Policy IE7: Waste Management

Implement European Union, National and Regional waste and related environmental policy, legislation, guidance and codes of practice to improve management of material resources and wastes.

- IE7 Objective 1

  To encourage a just transition from a waste management economy to a green circular economy to enhance employment and increase the value, recovery and

recirculation of resources through compliance with the provisions of the Waste Action Plan for a Circular Economy 2020 – 2025 and to promote the use of, but not limited to, reverse vending machines and deposit return schemes or similar to ensure a wider and varying ways of recycling.

- IE7 Objective 2

  To support the implementation of the Eastern Midlands Region Waste Management Plan 2015-2021 or as amended by adhering to overarching performance targets, policies and policy actions.

- IE7 Objective 4

  To provide for and maintain the network of bring infrastructure (e.g. civic amenity facilities, bring banks) in the County to facilitate the recycling and recovery of hazardous and non-hazardous municipal wastes.

- IE7 Objective 7

  To require the appropriate provision for the sustainable management of waste within all developments, ensuring it is suitably designed into the development, including the provision of facilities for the storage, separation and collection of such waste.

- IE7 Objective 8

  To adhere to the recommendations of the National Hazardous Waste Management Plan 2014-2020 and any subsequent plan, and to co-operate with other agencies including the EPA in the planning, organisation and supervision of the disposal of hazardous waste streams, including hazardous waste identified during construction and demolition projects.

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 (No. 10 of 1996) as amended.
- Environmental Protection Act 1992 (No. 7 of 1992) as amended.
- Litter Pollution Act 1997 (No. 12 of 1997) as amended.
- Planning and Development Act 2000 (No. 30 of 2000) as amended [13].
- Circular Economy and Miscellaneous Provisions Act 2022.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996 - 2001* and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the developer ensures that the waste contractors engaged by construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a

contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a waste or IE licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 Design Approach

The client and the design team have integrated the *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* guidelines into the design workshops, to help review processes, identify and evaluate resource reduction measures and investigate the impact on cost, time, quality, buildability, second life and management post construction. Further details on these design principals can be found within the aforementioned guidance document.

The design team have undertaken the design process in line with the international best practice principles to firstly prevent wastes, reuse where possible and thereafter sustainably reduce and recover materials. The below sections have been the focal point of the design process and material selections and will continued to be analysed and investigated throughout the design process and when selecting material.

The approaches presented are based on international principles of optimising resources and reducing waste on construction projects through:

- Prevention;
- Reuse;
- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

3.1 Designing For Prevention, Reuse and Recycling

Undertaken at the outset and during project feasibility and evaluation the Client and Design Team considered:

- Establishing the potential for any reusable site assets (buildings, structures, equipment, materials, soils, etc.);
- The potential for refurbishment and refit of existing structures or buildings rather than demolition and new build;
- Assessing any existing buildings on the site that can be refurbished either in part or wholly to meet the Client requirements; and
- Enabling the optimum recovery of assets on site.

3.2 Designing for Green Procurement

Waste prevention and minimisation pre-procurement have been discussed and will be further discussed in this section. The Design Team will discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise

sustainable approaches. They should also discuss options for packaging reduction with the main Contractor and subcontractors/suppliers using measures such as 'Just-in-Time' delivery and use ordering procedures that avoid excessive waste. The Green procurement extends from the planning stage into the detailed design and tender stage and will be an ongoing part of the long-term design and selection process for this development.

3.3 Designing for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use offsite construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement which are being investigated as part of the planning stage design process are listed as follows:

- Modular buildings as these can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.;
    - Modular buildings are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site.
- Use of pre-cast structural concrete panels which can reduce the residual volumes of concrete blocks, mortars, plasters, etc.;
- The use of prefabricated composite panels for walls and roofing to reduce residual volumes of insulation and plasterboards;
- Using pre-cast hollow-core flooring instead of in-situ ready mix flooring or timber flooring to reduce the residual volumes of concrete/formwork and wood/packaging, respectively; and
- Designing for the preferential use of offsite modular units.

3.4 Designing for Materials Optimisation During Construction

To ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite as outlined in section 3.1, structures should be designed with the intent of designing out waste. This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of off-site manufacture.

3.5 Designing for Flexibility and Deconstruction

Design flexibility has and will be investigated throughout the design process to ensure that where possible products (including buildings) only contain materials that can be recycled and are designed to be easily disassembled. Material efficiency is being considered for the duration and end of life of a building project to produce; flexible, adaptable spaces that enable a resource-efficient, low-waste future change of use; durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

4.0 DESCRIPTION OF THE PROJECT

4.1 Location, Size and Scale of the Development

Equinix (Ireland) Ltd. intend to apply for a 10- year permission for development at this site of c.2.65ha on lands known as Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (the site is bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue). The Development will consist of:

- Modifications to the permitted data centre granted under SDCC Reg. Ref. SD21A/0186 comprising the following:
  - Reconfiguration and alterations to the data centre building to include removal of front of house offices at third floor level, alterations to floor levels at second floor to provide consistency between front of house and data halls, parapet height increase of front of house to c.16.8m, provision of storage at second floor level in lieu of relocated internal generators to the external generator yard and associated elevational alterations.
  - Extension of loading dock at ground floor level by c.60sqm in area with minor height increase to c.5.3m .
  - Removal of 3 no. air plenums to the front (north) elevation and provision of screening to generator flues in lieu of omitted plenums.
  - Alterations at roof level to include removal of 2m high gantry screening.
  - Alterations to the permitted generator plant yard to the north of the data centre to include the removal of fuel tanks, reconfiguration of plant and generators, provision of 2 no. additional external generators (increase from 5 to 9 no. external generators), provision of 4 no. additional external plant rooms, provision of diesel pump tank cabinets and stepover, relocation of generator yard doors and enlarged generator yard to accommodate the proposed modifications. Increase in plant areas by c.77sqm.
  - Reconfiguration of plant within the permitted chiller plant yard to the south of the data centre.
  - Removal of 1 no. sprinkler/water tank and removal of stairs and door to the side of the waste compound.
  - Reconfiguration of car parking and motorcycle spaces and removal of 1 no. accessible space. 64 no. total number of car parking spaces.
- The proposal also includes provision of on-site gas power generation compound (c.2,604sqm in area) in the area previously reserved for a future data centre. The compound comprises 7 no. modular plant rooms (totalling c.180sqm in area), 10 no. gas fired generators and associated flues c.14.7m high, gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and 2 no. vehicular access points including general and emergency access.
- All associated site development works, services provision, drainage works, access, landscaping and boundary treatment works.
- No buildings are proposed above the existing ESB and SDCC wayleaves to the west and north of the site.
- The overall Gross Floor Area of the development is reduced by c.44sqm to c.9,795sqm from previously permitted under SDCC Reg. Ref. SD21a/0186.



Figure 3.1 General Site Location (source; Google Earth)

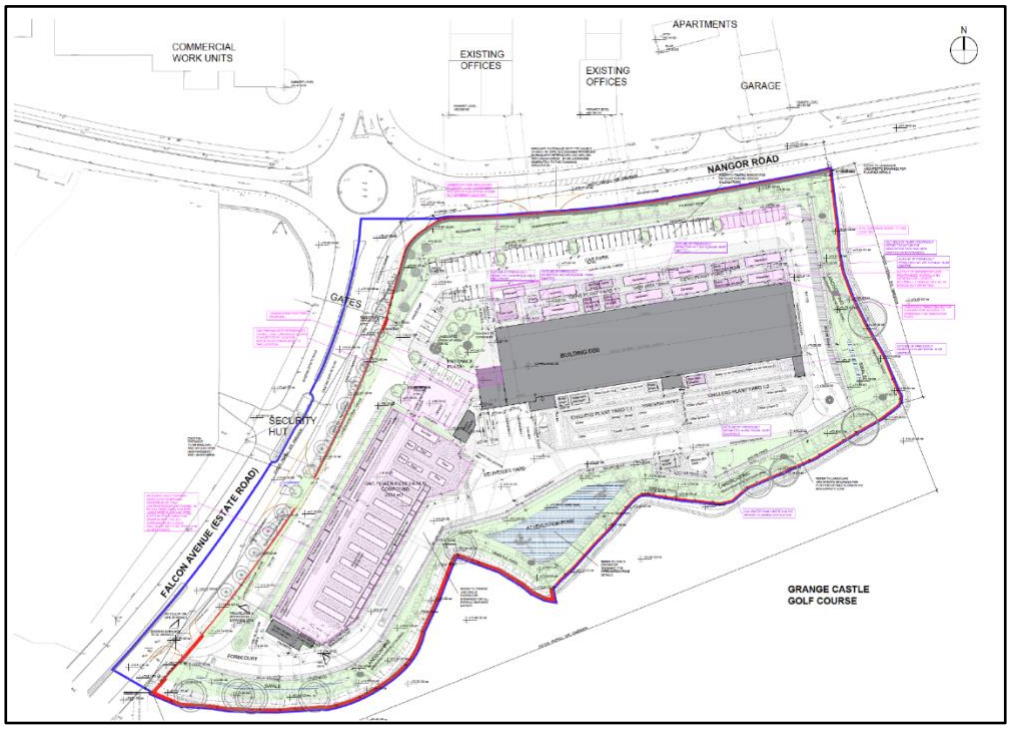


Figure 3.2 Proposed site layout

4.2 Details of the Non-Hazardous Wastes to be produced

There will be soil and stones excavated to facilitate construction of the new structure foundations, installation of services and carparks for the site. The volume of soil and stone to be excavated has been estimated by the project engineers (Pinnacle Consulting Engineer) to be approximately c. 10,314.24m^3. Any suitable excavated material will be reused on site, where possible, it is anticipated that c. 9,341.13m^3 of the excavated material will be kept onsite for use in landscaping and fill. Where excavated soil and stone (973.11m^3) are to be removed from site, it will be taken for appropriate, reuse, recovery and/or disposal offsite.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, broken concrete blocks, cladding, plastics, metals and tiles generated. There may also be excess concrete during construction which will need to be disposed of. Plastic and cardboard waste from packaging and supply of materials will also be generated.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

4.3 Potential Hazardous Wastes to be produced

4.3.1 Contaminated Soil

Site works were undertaken during the periods 17th-24th February 2021 (Phase 1) and 5th-8th July 2021 (Phase 2), under the supervision of a geo-environmental engineer from GES. Further information regarding soil quality can be found in chapter 7 Land & Soils, Geology & Hydrogeology of the submitted Environmental Impact Assessment Report.

If any potentially contaminated material is encountered, it will need to be segregated from clean/inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [13] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [14], which establishes the criteria for the acceptance of waste at landfills.

Where Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify SDCC and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

4.3.2 Fuel/Oils

As fuels and oils are classed as hazardous materials, any on-site storage of fuel/oil, all storage tanks and all draw-off points will be bunded (or stored in double-skinned tanks) and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil wastage at the site.

4.3.3 Invasive Plant Species

A site walkover was undertaken by Malone O'Regan Environmental in November 2020, June 2021 and March 2022. These surveys included a site walkover survey of the entire site, and around part of the outside perimeter to search for any invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011.

No Japanese Knotweed or any third schedule invasive species were detected. If any are detected during the construction phase of the development, then an invasive species management plan will be produced and submitted to SDCC.

4.3.4 Asbestos

As there is no demolition associated with the proposed development so it is unlikely that asbestos will be located on site.

If any ACMs or suspected ACMs are identified they will be required to be removed by a suitably trained and competent person prior to commencement of works. ACMs will only be removed from site by a suitably permitted waste haulier and will be brought to a suitably licenced facility. Where required, the HSA should be contacted in relation to the handling of asbestos and material should be dealt with in accordance with the *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006*, as amended and associated approved Codes of Practice. The contractor will also be required to refer to the *Construction & Demolition Management Plan* in relation to asbestos identification and removal.

4.3.5 Other known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner/cartridges, batteries (Lead, Ni-Cd or Mercury) and/or light bulbs and other mercury containing waste may be generated from during construction activities or temporary site offices. These wastes (if encountered) will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

5.0 Roles and Responsibilities

The *Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects* promotes that a RM should be appointed. The RM may be performed by number of different individuals over the life-cycle of the Project, however it is intended to be a reliable person chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project RWMP are complied with. The RM is assigned the requisite authority to meet the objective and obligations of the RWMP. The role will include the important activities of conducting waste checks/audits and adopting construction methodology that is designed to facilitate maximum reuse and/or recycling of waste.

5.1 Role of the Client

The Client are the body establishing the aims and the performance targets for the project.

- The Client has commissioned the preparation and submission of a preliminary RWMP as part of the design and planning submission;
- The Client is to commission the preparation and submission of an updated RWMP as part of the construction tendering process;
- The Client will ensure that the RWMP is agreed on and submitted to the local authority prior to commencement of works on site;
- The Client is to request the end-of-project RWMP from the Contractor.

5.2 Role of the Client Advisory Team

The Client Advisory Team or Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project;
- Appointing a RM to track and document the design process, inform the Design Team and prepare the RWMP.
- Including details and estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This should also include data on waste types (e.g. waste characterisation data, contaminated land assessments, site investigation information) and prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team;
- Handing over of the RWMP to the selected Contractor upon commencement of construction of the development, in a similar fashion to how the safety file is handed over to the Contractor;
- Working with the Contractor as required to meet the performance targets for the project.

5.3 Future Role of the Contractor

The future construction Contractors have not yet been decided upon for this RWMP. However, once select they will have major roles to fulfil. They will be responsible for:

- Preparing, implementing and reviewing the RWMP throughout the construction phase (including the management of all suppliers and sub-contractors) as per the requirements of these guidelines;
- Identifying a designated and suitably qualified RM who will be responsible for implementing the RWMP;
- Identifying all hauliers to be engaged to transport each of the resources / wastes off-site;
- Implementing waste management policies whereby waste materials generated on site are to be segregated as far as practicable;
- Renting and operating a mobile-crusher to crush concrete for temporary reuse onsite during construction and reduce the amount of HGV loads required to remove material from site;
- Applying for the appropriate waste permit to crush concrete onsite;
- Identifying all destinations for resources taken off-site. As above, any resource that is legally classified as a ‘waste’ must only be transported to an authorised waste facility;
- End-of-waste and by-product notifications addressed with the EPA where required;
- Clarification of any other statutory waste management obligations, which could include on-site processing;
- Full records of all resources (both wastes and other resources) should be maintained for the duration of the project; and
- Preparing a RWMP Implementation Review Report at project handover.

6.0 Key Materials & Quantities

6.1 Project Resource Targets

Project specific resource and waste management targets for the site have not yet been set and this information should be updated for these targets once these targets have

been confirmed by the client. However, it is expected for projects of this nature that a minimum of 70% of waste is fully re-used, recycled or recovered. Target setting will inform the setting of project-specific benchmarks to track target progress. Typical Key Performance Indicators (KPIs) that may be used to set targets include (as per guidelines):

- Weight (tonnes) or Volume (m^3) of waste generated per construction value;
- Weight (tonnes) or Volume (m^3) of waste generated per construction floor area (m^2);
- Fraction of resource reused on site;
- Fraction of resource notified as by-product;
- Fraction of waste segregated at source before being sent off-site for recycling/recovery; and
- Fraction of waste recovered, fraction of waste recycled, or fraction of waste disposed.

6.2 Main C&D Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in Table 6.1. The List of Waste (LoW) code (as effected from 1 June 2015) (also referred to as the European Waste Code or EWC) for each waste stream is also shown.

Table 6.1 Typical waste types generated and LoW codes (*individual waste types may contain hazardous substances)

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

7.0 WASTE MANAGEMENT

There will be no demolition associated with this development.

7.1 Construction Waste Generation

Table 7.1 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports, the GMIT [16] and* other research reports.

Table 7.1 Waste materials generated on a typical Irish construction site

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

Table 7.2 shows the predicted construction waste generation for the proposed development based on the information available to date along with the targets for management of the waste streams. The predicted waste amounts are based on an average largescale development waste generation rate per m^2, using the waste breakdown rates shown in Table 7.1 and the schedule of areas supplied by the project architects (RKD Architecture).

Table 7.2 Estimated off-site reuse, recycle and disposal rates for construction waste

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	141.2	10	14.1	80	113.0	10	14.1
Timber	119.8	40	47.9	55	65.9	5	6.0
Plasterboard	42.8	30	12.8	60	25.7	10	4.3
Metals	34.2	5	1.7	90	30.8	5	1.7
Concrete	25.7	30	7.7	65	16.7	5	1.3
Other	64.2	20	12.8	60	38.5	20	12.8
Total	427.9		97.1		290.5		40.2

In addition to the information in Table 7.2, the quantity of soil and stone generated is expected to be around c. 10,314.24m^3 as advised by the project engineers, as the site will require excavation for building foundations and installation of services. Any suitable excavated material will be temporarily stockpiled and reused on site, where possible, however it is anticipated that c. 973.11m^3 excavated material will be required to be removed offsite for appropriate reuse, recycling or disposal.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

7.2 Proposed Resource and Waste Management Options

Waste materials generated will be segregated on site, where it is practical. Where the on-site segregation of certain waste types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at source where feasible. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the SDCC Region that provide this service.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arising's requiring disposal off-site will be reused,

recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

Written records will be maintained by the contractor(s) detailing the waste arising throughout the construction phase, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and COR/permit or licence for the receiving waste facility for all waste removed off site for appropriate reuse, recycling, recovery and/or disposal

Dedicated bunded storage containers will be provided for hazardous wastes which may arise such as batteries, paints, oils, chemicals etc, if required.

The management of the main waste streams is outlined as follows:

Soil and Stone

The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

When material is removed off-site it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Regulation 27 (By-products), as amended, of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2011-2020, (Previously Article 27 of the European Communities (Waste Directive), which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Regulation 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Regulation 27. Regulation 27 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the *Waste Management Act 1996* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will

require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock
While it is not envisaged that bedrock will be encountered, if bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off- site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on- site, the appropriate mobile waste facility permit will be obtained from SDCC.

Silt & Sludge
During the construction phase, silt and petrochemical interception should be carried out on runoff and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed offsite.

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible. If concrete is to be crushed on-site, the appropriate waste facility permit will be obtained from SDCC.

Hard Plastic
As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber
Timber that is uncontaminated, i.e. free from paints, preservatives, glues etc., will be disposed of in a separate skip and recycled off-site.

Metal
Metals will be segregated where practical and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard
There are currently a number of recycling services for plasterboard in Ireland. Plasterboard from the construction phase will be stored in a separate skip, pending collection for recycling. The site manager will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass
Glass materials will be segregated for recycling, where possible.

Waste Electrical and Electronic Equipment (WEEE)
Any WEEE will be stored in dedicated covered cages/receptacles/pallets pending collection for recycling.

Other Recyclables
Where any other recyclable wastes such as cardboard and soft plastic are generated, these will be segregated at source into dedicated skips and removed off-site.

Non-Recyclable Waste
Construction waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team (see Section 9.0) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts

will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and/or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

On-Site Crushing

If the crushing of material is to be undertaken, a mobile waste facility permit will first be obtained from SDCC and the destination of the accepting waste facility will be supplied to the SDCC waste unit.

It should be noted that until a construction contractor is appointed it is not possible to provide information on the specific destinations of each construction waste stream. Prior to commencement of site works and removal of any waste offsite, details of the proposed destination of each waste stream will be provided to SDCC by the project team upon request.

7.3 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project Waste Manager (see Section 9.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996 - 2011*, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project waste manager (see Section 9.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority waste COR/permit or EPA Waste/IE Licence for that site will be provided to the nominated project waste manager (see Section 9.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from DCC (as the relevant authority on behalf of all local authorities in Ireland) and kept on-site along with details of the final destination (COR, permits, licences etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on site.

8.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is provided below.

The total cost of construction waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

8.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle/recovery/disposal costs associated with the requirement for a waste contractor to take the material off-site.

Clean and inert soils, gravel, stones etc. which cannot be reused on site may be used as access roads or capping material for landfill sites etc. This material is often taken free of charge or a reduced fee for such purposes, reducing final waste disposal costs.

8.2 Recycling

Salvageable metals will earn a rebate which can be offset against the costs of collection and transportation of the skips.

Clean uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes such as timber from a site than mixed waste.

8.3 Disposal

Landfill charges are currently at around €130 - €150 per tonne which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated construction waste usually costs less than municipal waste. Specific construction waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc. is also used as fill/capping material, wherever possible.

9.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the RM to ensure commitment, operational efficiency and accountability in relation to waste management during the construction phase of the development.

9.1 Resource Waste Manager Training and Responsibilities

The nominated RM will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The RM will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The RM will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The RM will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this RWMP.

9.2 Site Crew Training

Training of site crew in relation to waste is the responsibility of the Waste Manager and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the RWMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

10.0 TRACKING AND TRACING / RECORD KEEPING

Records will be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site.

A waste tracking log will be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver should stop at the site office and sign out as a visitor and provide the security personnel or RM with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Quantity
- Waste Contractor
- Company waste contractor appointed by, e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- EWC / LoW

The waste vehicle will be checked by security personal or the RM to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

The waste transfer dockets will be transferred to the RM on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the SDCC Waste Regulation Unit when requested.

Each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets / WTF maintained on file and available for inspection on site by the main contractor as required. These subcontractor logs will be merged with the main waste log.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times and will be periodically checked by the RM. Subcontractors who have engaged their own waste contractors, should provide the main contractor with a copy of the waste collection

permits and COR / permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

11.0 OUTLINE WASTE AUDIT PROCEDURE

11.1 Responsibility for Waste Audit

The appointed RM will be responsible for conducting a waste audit at the site during the construction phase of the proposed Project. Contact details for the nominated RM will be provided to the SDCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

11.2 Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site should be undertaken mid-way through the construction phase of the proposed Project.

If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery / reuse / recycling targets for the site. Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Upon completion of the construction phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the development.

12.0 CONSULTATION WITH RELEVANT BODIES

12.1 Local Authority

Once construction contractors have been appointed and have appointed waste contractors, and prior to removal of any construction waste materials off-site, details of the proposed destination of each waste stream will be provided to the SDCC Waste Regulation Unit.

SDCC will also be consulted, as required, throughout the excavation and construction phase in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

12.2 Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by the construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding the feasibility of recycling each material, the costs of recycling / reclamation, the means by which the wastes will be collected and transported off-site, and the recycling / reclamation process each material will undergo off-site.

.

13.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended.
2. Environmental Protection Agency Act 1992 as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – Recycling of Construction and Demolition Waste.
7. Department of Communications, Climate Action and Environment (DCCAE), Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025 (Sept 2020).
8. DCCAE, Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021)
9. The Circular Economy and Miscellaneous Provisions Act 2022
10. Environmental Protection Agency (EPA) 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)
11. Department of Environment, Heritage and Local Government, Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (2006).
12. FÁS and the Construction Industry Federation (CIF), Construction and Demolition Waste Management – a handbook for Contractors and site Managers (2002).
13. South Dublin County Council (SDCC), South Dublin County Council Development Plan 2016 – 2022 (2021).
14. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended
15. SDCC, Guidance Notes for Environmental Management of Construction Projects (2020)
16. EPA, Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2015)
17. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
18. Environmental Protection Agency (EPA), National Waste Database Reports 1998 – 2020.
19. EPA and Galway-Mayo Institute of Technology (GMIT), EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned (2015).

Appendix 14.1 ESB Communication

ESB NETWORKS

esbnetworks.ie

FORM NC3
SINGLE COMMERCIAL/INDUSTRIAL PREMISES

ESB Networks DAC requires the information requested on this application form to enable us to set up and manage your electricity supply connection. As the Distribution System Operator, this information is also required to enable ESB Networks DAC to manage the electricity network. The data controller is ESB Networks DAC. Please refer to our privacy policy at https://esbnetworks.ie/privacy

APPLICATION FOR:

Commercial/Industrial Connection [X]
Increased Capacity (MIC) [ ]
Reduced Capacity (MIC) [ ]

Please fill in ALL sections in BLOCK CAPITALS

FOR OFFICIAL USE ONLY
Job no:
Distance: R/U
Planner group:
MIC: MCC
Contacted on:

1. APPLICANTS FULL NAME & SITE ADDRESS FOR CONNECTION / MIC CHANGE (if a company or a partnership give full COMPANY OR TRADING NAME).

Moffash Ltd.
Lisgrew, Emyvale
Co. Monaghan

VAT No 3260001JH

Please ensure that the correct title - Ltd. company / partnership / sole trader is entered above, as the Final VAT invoice will issue in that name.

For MIC changes the applicants name and address must be as is registered with the electricity supplier.

2. CONTACT NAME & ADDRESS FOR CORRESPONDENCE (if different from above)

Title: Mr [X] Mrs [ ] Ms [ ] Company / Other Moffash Ltd,

Michael Treanor
Lisgrew, Emyvale
Co. Monaghan

Mobile number: 0877628855 Landline:

You will receive an SMS text to the mobile number provided above regarding your application

Email: Michael@mtadvisoryservices.com

3. OTHER CONTACTS

Engineering Consultant: Mott MacDonald Ireland Ltd.
Address: Rockfield, Dundrum, Dublin 16
Phone Number: 01 291 6700 Email: alan.ryan@Mottmac.com

Electrical Contractor: Phone Number:

4. NEW CONNECTION

[X] New Stand Alone Commercial / Industrial Premises (Please see Note 1 on Page 4)
[ ] Part of a Multi Unit Development (Please see Note 2 on Page 4)
[ ] A terminated MPRN is an installation that is disconnected greater than two years and will be treated as a new connection. If you have the MPRN for this premises please insert here
[ ] Other (Please explain)

EASTINGS: 304024 **NORTHINGS:** 230822 **FOR NEW CONNECTIONS**

Eastings and Northings refer to the Geographical location of your site from an Ordnance Survey mapping perspective. Filling in these figures is not obligatory but it will help us to locate your site.

5. SITE LOCATION AND SITE PLAN

New Connection / Terminated MPRN Please attach an Ordinance Survey map (Scale 1:2500 1:10560) showing the location of your site and a site plan (scale 1:100-1:500) showing the premises. **Note: We will not be able to process your application without these maps.**

Name of local Authority and Planning Application Number

South Dublin County Council

6. EXISTING CONNECTION

☐ INCREASE IN MIC ☐ REDUCTION IN MIC ☐ DUoS GROUP CHANGE ONLY

Please provide 11 digit MPRN no: | | | | | | | | | | | (Please see Note 3 on Page 4)

MPRN must be registered in Applicant's Name for existing connection. If not please contact your supplier to change.

7. NATURE OF BUSINESS

Data Centre

eg. manufacturing, retail, heavy industry, etc.

Expected energy usage Watts/m² 2000 (Please consult your electrical contractor.)

Production Hours 24 hours a day 7 days a week 52 weeks every year

8. LOAD DETAILS (Please complete as this is essential to the completion of your application)

General Summary	**Total Kilowatts (kW)**
Lighting	297
Heat Pumps	0
Unrestricted Space Heating	0
Night Storage Heating	0
Water Heating	0
Air Conditioned & Forced Ventilation	3762
Refrigeration	0
Cookers	0
Other (Power System & IT loads)	1485 & 4356

Are you planning to install Electric Vehicle Charging Facilities? Yes ☐ No ☒

Maximum Demand of EV Charging facilities _____ (kW)

Motive Power List the largest motor first followed by the smaller motor

Motor Rating (More than 10kW)	**Starting Demand Amps**	**Type of Starter** (direct on line, slip ring, star-delta or soft electronic start)	**Number of Starts Each Hour**	**General Purpose or Compressor**	**Quantity**	**Total kW**
None					0	0
None					0	0
None					0	0
None					0	0
Motors less than 10kW						
None					0	0

Disturbing Loads

Details of any welders, DC load, Thyristor controlled load or any load likely to cause voltage disturbance

Description	**kVA**	**Quantity**	**Total kVA**
IT Loads			4356

9. MAXIMUM IMPORT CAPACITY (MANDATORY: Applications cannot be processed until this area is completed)

Maximum Import Capacity (MIC) Required 9900 **kVA**

Single Phase ☐ Three Phase ☒

This figure should be based on the load details with diversity applied. Customers seeking an Increase/Reduction should state the new MIC required. A change in MIC may result in a tariff change from your supplier.

10. MAXIMUM EXPORT CAPACITY (Please visit website esbnetworks.ie)

Maximum Export Capacity (MEC) Required | | | | **kVA**

This is required if you intend to export electricity and or install embedded generation capacity.
Please refer to esbnetworks.ie for further information on generation connections.

11. TIME OF DAY ELECTRICITY TARIFF

Do you intend to avail of a time-of-day electricity tariff from your electricity supplier? Yes ☒ No ☐

12. GENERATION

Do you intend to have your own Standby Generation Yes [X] No [ ]

Are you installing any other types of generation? Yes [ ] No [X]

13. ELECTRICITY SUPPLIER

New Connections/Reconnections. **This application is for an electricity connection only.**
When you receive your 11 digit MPRN from ESB Networks DAC you need to register with an electricity supplier.
A list of electricity suppliers is available on CRU.ie

14. COMPLETION CERTIFICATE

In the interest of Safety and good practice, your electrical installation must comply with the relevant standards approved by the Electro-Technical Council of Ireland (ETCI). All new connections to the Distribution System Operator system will require the submission of a Completion Certificate, recognised by ETCI, in respect of the installation. This certificate should be signed by either a contractor who is registered for this purpose by a licensed regulatory body or an inspector of such a body. ESB Networks DAC will not complete your connection until we are in receipt of a valid Completion Certificate. The occupier or owner of the premises is responsible for its safety.

15. ADDITIONAL INFORMATION (Please supply any additional information that may help us process this application)

16. SIGNATURE OF OWNER / AUTHORIZED SIGNATORY

Signed: Michael Treanor **Full Name (BLOCK CAPITALS):** MICHAEL TREANOR

Position Held: COMPANY SECRETARY **Date:** 4/11/2020

You agree to let ESB Networks DAC connect the network to your equipment. You acknowledge that we are entitled to connect other customers to the network.

We may need evidence that you have the authority to sign this form. In relation to MIC changes, if you are a third party making this application please attach a letter of authority from the registered account holder.

DATA PROTECTION

ESB Networks DAC may use your personal data to the extent necessary (a) to set up and manage your connection agreement (b) for compliance with its licence and other legal obligations; and/or (c) for its legitimate interests (provided those interests do not conflict with your fundamental rights and freedoms) Personal data provided by you in this application form may be disclosed to other parties in the following circumstances:

- In performing its functions, ESB Networks DAC may utilise the services of contractors or other suppliers. ESB Networks DAC may disclose your data to these parties to the extent necessary to perform their functions and provided they are only permitted to use your data as instructed by ESB Networks DAC. They are also required to keep your data safe and secure.
- ESB Networks DAC may make available the existence, location and/or technical aspects of your connection to licensed electricity supply companies and other parties involved in your electricity supply. In the case of new connections, ESB Networks DAC will make available your telephone contact number to licensed electricity supply companies in order to facilitate energisation of the connection.
- ESB Networks DAC may be required by law, or our license obligations, to provide data that ESB Networks DAC holds about you, your electricity supply or connection, to government agencies or departments, the Commission for Regulation of Utilities or other third parties.
- Contact details may also be provided to a professional third party market research company for the purposes of researching your satisfaction with the services provided by ESB Networks DAC. This information may also be used to enhance our services as the Distribution System Operator.

NB PLEASE REMEMBER TO:

- **Sign and Date the Application Form**
- **Include your O.S. map and site plan for New Connection / Terminated MPRN**
- **Include your MPRN if it is a terminated installation or an increase/decrease in connection**
- **Fill in Load details in Section 8**
- **Fill in your MIC in Section 9**
- **Fill in all contact details (a valid telephone number is essential)**

PLEASE RETURN FORM TO:

ESB NETWORKS DAC, NEW CONNECTION APPLICATIONS, SARSFIELD ROAD, WILTON, CORK. T12E 367
Thank you for taking the time to fill out this application in full.

Incomplete applications will be returned. If applying for a new connection be sure to enclose maps as stated in section 5.

Business Application General Notes

NB: These notes are intended as a general guide. Please refer to the ESB Networks DAC website for a more detailed description of the application process: **esbnetworks.ie**

NOTE 1

- In the instance of a green field/stand alone application for a new connection where the MIC (Maximum Import Capacity) exceeds 150kVA, the customer will be required to provide a substation building on site.
- In the instance of a request for new/increased MIC in an existing development a substation building may be required. Please check with local office prior to making application.
- Where a substation building is required, electronic maps and paper copies of same should accompany all new applications. Email: developmentmaps@esb.ie

NOTE 2

- Applicants for a unit in an existing development should contact the developer/builder/management company for the relevant MPRN for the premises.
- The MPRN details contain the MIC and DUoS group for the premises.
- You will need to contact ESB Networks DAC if the MIC for the premise concerned differs from your requirements, and complete this application form (NC3) for any change required.
- Please contact your supplier of choice for registration of the MPRN, if the details on your MPRN are correct. The list of suppliers is available on CRU.ie
- Splitting existing units into further units requires completion of this application form (NC3) in total, including electronic/paper maps. Email: developmentmaps@esb.ie

NOTE 3

- ESB Networks DAC assigns a DUoS charge which is dependant on the MIC requested. Please see our website for further info: esbnetworks.ie
- 15kVA to 49kVA connections receive DUoS group DG5.
- Connections in excess of 49kVA Low Voltage receive DUoS group DG6.
- All MV Connections receive DUoS group DG7/DG8

MAXIMUM IMPORT CAPACITY (MIC)

What is it?

We offer customers a Connection designed around a specified capacity. The capacity of your connection is the total electrical loading for which your connection is designed. Capacity is measured in kilovolt-amps (kVA). A kilovolt-amp is similar to a kilowatt. The capacity level for customers is described as the Maximum Import Capacity (MIC).

Business customers agree a level with ESB Networks DAC according to their specific requirements.

Why is it important?

When applying for a connection, the most important decision is the capacity level you require. The capacity of your connection – Maximum Import Capacity – is an important figure for several reasons:

- This is the capacity that ESB Networks DAC commits itself to maintain to your premises at the connection point.
- The MIC places an upper limit on the total electrical load you can use in your premises.
- The chosen MIC is a factor in determining the cost of a connection and also ongoing DUoS (use of system) charges. These charges are published in our Statement of Charges document which is available for download from esbnetworks.ie .

How to estimate your capacity requirement

Ultimately each customer must choose the capacity which meets his/her needs. It will most likely be a much lower quantity than the sum of kilowatt ratings of all the equipment you plan to install. You may wish to discuss your required MIC further with your electrical contractor/ consultant.

NOTE 4

Safety Message

- If there are any overhead electricity lines on the site these may need to be diverted or put underground before any construction works commence. Requests for line alterations should be made to ESB Networks DAC at an early stage - see esbnetworks.ie for advice on how to initiate such requests.
- Refer to the HSA Approved **"ESB Networks Code of Practice for Avoiding Danger from Overhead Electricity Lines"** for safety guidance in relation work in the vicinity of overhead lines - available on the HSA and ESB Networks DAC websites or order free printed copies from ESB Networks DAC. Tel. 1850 372 757.
- Refer to "HSA Code of Practice for Avoiding Danger from Buried Services" for safety guidance in relation to underground electricity cables - available on the HSA website.
- ESB lines/cables map records are available from ESB Networks Central Site at Fax. 01-6388169 or by email to: dig@esb.ie.

PLEASE REMEMBER!

DON'T BUILD UNDER OR NEAR ELECTRICITY WIRES

STAY SAFE STAY CLEAR OF ELECTRICITY WIRES

ESB NETWORKS DAC

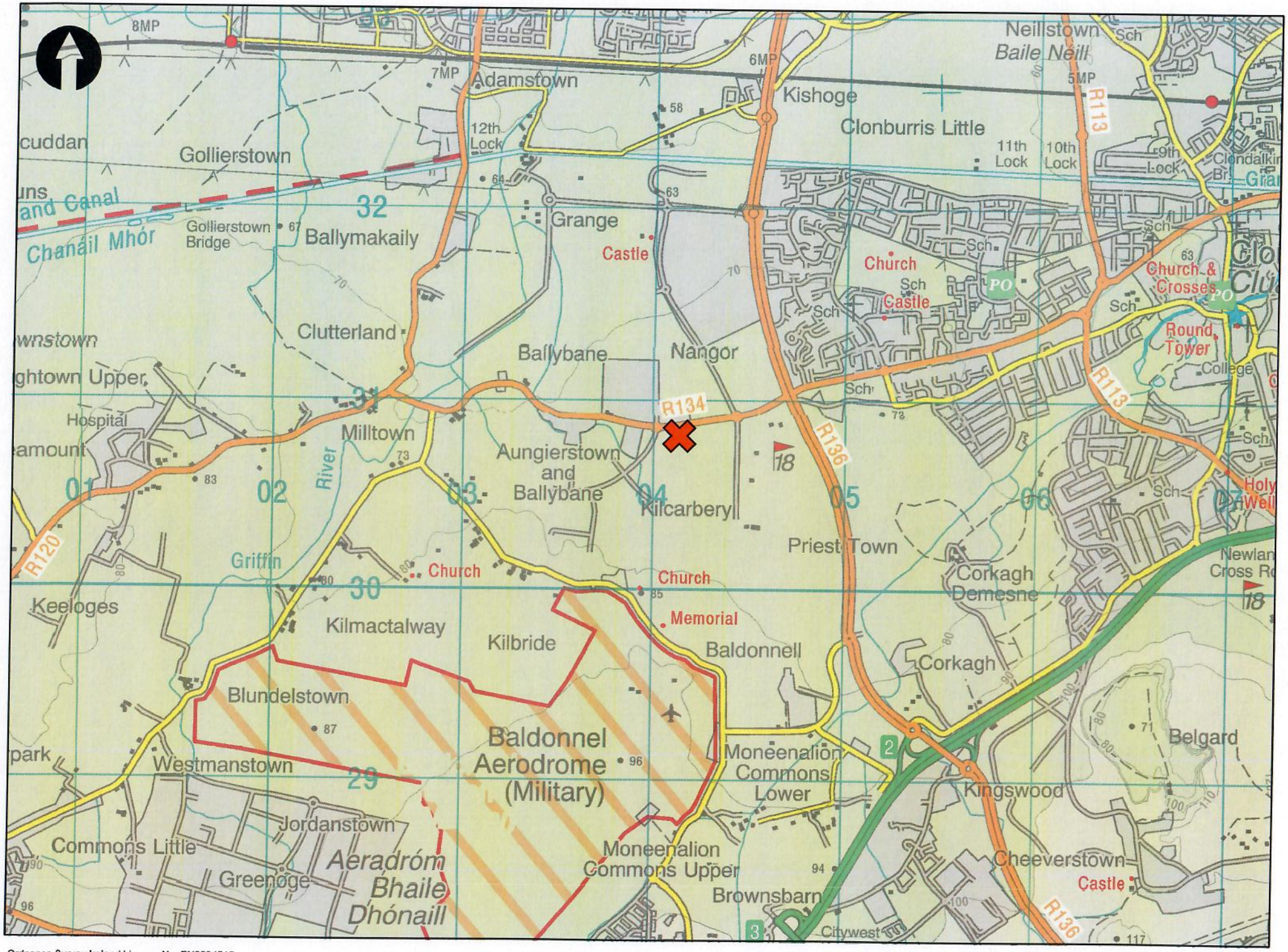


ESB Networks DAC
DIRECTORS: Jerry O'Sullivan (Chairman), Paddy Hayes, Paul Mulvaney, Caroline Spillane, Ian Talbot.

Registered Office: Clanwilliam House, Clanwilliam Court, Dublin 2, D02 CV61, Ireland

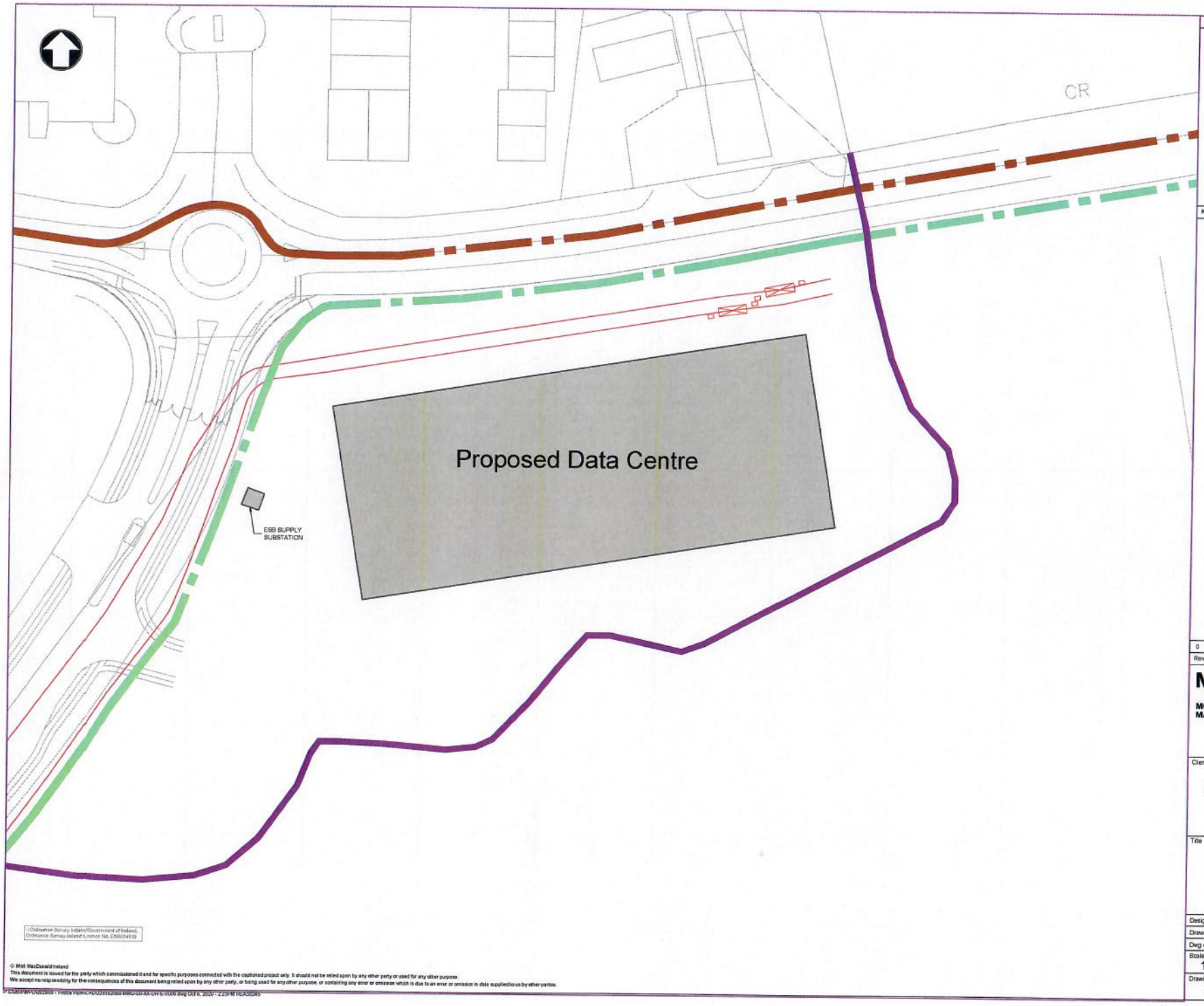
Registered In Ireland No. 465172

Part Number: ESB/9806659-8 Rev. 7 march 2020. DOC-130715-CAB



Ordnance Survey Ireland Licence No. EN0034518

Metres



Notes

Key to symbols

- Substation Boundary
- 220kV
- Existing T50 Duct
- Proposed T50 Duct

1:500 0 10m 25m 50m

Rev	Date	Drawn	Description	Ch'k'd	App'd
0	09/10/20	SHY	Issued for Connection Application	AR	AR

MOTT MACDONALD

South Block
Rosfield
Dundrum
Dublin 16
Ireland
T +353 (0)1 291 6700
F
W www.mottmac.com

Client

Profile Park

Title

Profile Park
ESBN Connection Application

Designed	H. Conceicao		Eng check	A. Ryan	
Drawn	S. Healy		Coordination	H. Conceicao	
Dwg check	H. Conceicao		Approved	A. Ryan	

Scale at A1	Status	Rev	Security
1:500	PRE	0	STD

Drawing Number
229382868-MMD-00-XX-DR-E-0006

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We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

P:\Dublin\MPO\229382868 - Profile Park\CAD\229382868-MMD-00-XX-DR-E-0006.dwg Oct 6, 2020 - 2:23PM REA30245

Appendix 14.2 GNI Contract and Drawings

EQUINIX (IRELAND) LIMITED
7 Kilcarbery Park
Nangor Road
Dublin 22

Ireland
Tel: +353 (0)1 461 1200
Email: www.equinix.com
IE6343301G

GAS NETWORKS IRELAND
NA
NA NA
IE

REMITTANCE ADVICE

Contact Email	emea.vendor.support@eu.equinix.com
Payment Number	2301005932
Payment Date	06/12/2021
Bank Account Details	
Bank Name	AIB BANK
Account#	XXXX1658
IBAN#	XXXXXXXXXXXXXXXXX1658
SWIFT/BIC#	AIBKIE2D

Invoice Number	Invoice Date	Amount
45489517	23/11/2021	[redacted]
	EUR Total	

Please allow at least three working days for the cleared funds to reach your account

Gas Networks Ireland

Agreement for the installation of natural gas pipeline and apparatus

in respect of industrial and commercial connection(s)

Agreement for the installation of natural gas pipeline and apparatus
in respect of industrial and commercial connection(s)

Block capitals only

Project Number	45489517 - (DB08 - Natural Gas Supply to Equinix Ireland Limited)
Applicant(s) Name	Equinix Ireland Ltd
Registered Office	Equinix Ireland Ltd, Units 6 & 7 Kilcarbery Business Park, Nangor Road, Dublin 22.
Address for Gas Installation	DB08: Plot 100, Profile Park, Nangor Road, Baldonnell, Dublin 22, Ireland
Number of Units	Connecting to the existing 4 bar distribution network, as per attached proposal letter and Plan

I/We hereby agree to the installation of a gas supply to the above site in accordance with the Plan and Specification, a copy of which is attached hereto on the terms and conditions herein and agree to pay the sum of [redacted] € (inclusive of VAT @ 13.5 %) ("the Contract Sum") as a non-refundable contribution to the capital cost to be incurred by Gas Networks Ireland in relation to the installation.

Signed for and on behalf of the Applicant by	Maurice Mortell *Maurice Mortell*
	Authorised Official/Company Secretary/Director
Witnessed by	Cristina Alonso
Address of Witness	Equinix Ireland Ltd, Units 6 & 7 Kilcarbery Business Park, Nangor Road, Dublin 22.
Date	23 November 2021

Conditions

1 The applicant warrants that it is the freehold owner of the site, which it wishes to have supplied with gas and shall on request execute a deed of easement in the format laid down by Gas Networks Ireland from time to time and preserve the title of Gas Networks Ireland to any mains or pipes installed on the property of other persons.

2. The applicant agrees to comply with all applicable statutes, directions, byelaws or other lawful requirements or instruction, whether of government or of any local or other lawful authority and agrees to obtain all necessary licences, permits or authorities that may be required for the installation.

3 The connected unit(s) will commence using gas within 6 months of the completion of the installation otherwise any discount will become payable.

4 Gas/installation downstream of meter shall be the sole responsibility of the applicant.

(a) Downstream installation must conform to I.S. 820 & I.S. 813.

(b) A declaration of conformance to I.S. 820 & I.S. 813 must be obtained and provided to Gas Networks Ireland by the applicant.

5 The position of the gas main in relation to other services to be agreed before pipe laying commences.

6 Only meter compartments approved by Gas Networks Ireland can be used on the development.

7 The applicant will not deviate from the plans and specification without the prior consent of Gas Networks Ireland.

8 Prior to construction commencing on site, a meeting to be held with Gas Networks Ireland sales and construction staff to agree construction procedures and programme.

9 **(a)** The applicant will be solely responsible at all times for maintaining and keeping excavations and reinstatements in a safe and secure condition and will indemnify and keep indemnified Gas Networks Ireland, its servants, agents and contractors against all claims, demands, proceedings, damages and expenses whatsoever in respect thereof.

(b) Gas Networks Ireland shall not be liable for any claim, whether brought against the applicant or against Gas Networks Ireland, either under any statute or common law by any person arising from any cause other than Gas Networks Ireland negligence or that of its employees and the applicant shall indemnify Gas Networks Ireland against any such claim and the costs of any legal proceedings.

(c) The applicant will effect insurance to cover the liability undertaken by the applicant under this clause and will, upon the request of Gas Networks Ireland at any time, produce for inspection the relevant policy and the receipt for premium paid.

10 Payment of all sums due to Gas Networks Ireland shall be made on the due date and any overdue accounts shall be subject to an interest payment at the rate of 2% per month or part thereof until payment.

11* The gas meter (meters) will only be fitted on completion of a gas supply agreement with the applicants gas supplier. The gas supplier will agree the meter fit date with Gas Networks Ireland.

12 Gas Networks Ireland shall make all reasonable efforts to complete the installation in accordance with the agreed programme but Gas Networks Ireland shall not be liable for any loss or damage suffered by the applicant in respect of delays resulting from any cause whatsoever.

13 **(a)** The contract sum shall be adjusted by the amount of any increase in the cost to Gas Networks Ireland of performing this connection due to increases after the date of this agreement.

(b) The contract sum shall be adjusted by the amount of any increase to the cost to Gas Networks Ireland of performing this agreement due to any alteration after the date of this agreement in the rate of VAT.

(c) The applicant shall indemnify Gas Networks Ireland against any costs, expenses, fees or charges under any enactment or any instrument, rule or order made under any enactment and any regulations and bye-laws of any local authority in connection with the installation.

(d) The applicant shall indemnify Gas Networks Ireland against all costs, expenses, fees or charges arising in connection with any archaeological investigation of the installation work.

14 The contract sum covers the items of the specification only and unless otherwise expressly stated, does not include any of the following ancillary works required to be carried out by other trades, supply and use of access of or lifting equipment, fuel, water, gas or electric current, lighting, fees of surveyor, insurance inspectors or any other inspecting authority, excavation, reinstatement or maintenance of any trench.

15 Gas Networks Ireland reserves the right to employ sub-contractors to carry out the whole or part of the work.

16 All apparatus, pipelines and materials delivered to the site shall be at the risk of the applicant. In the event of any loss or damage from any cause whatsoever to the said apparatus, pipelines or materials (other than arising from the negligent act or omission of Gas Networks Ireland) the applicant shall indemnify Gas Networks Ireland in respect thereof.

17 Gas Networks Ireland will repair, or at its option, replace free of charge any materials or work found to be defective, if the defect is due to faulty manufacture or workmanship and is brought to its attention within 12 months of the completion of the work provided nevertheless that Gas Networks Ireland:

(a) Shall not be liable for any consequential loss or damage caused directly or indirectly by any defect or otherwise,

(b) Shall not be liable for loss or damage direct or indirect from any extra work entailed due to the apparatus being put into operation by the applicant or by Gas Networks Ireland at its request before it is handed over for beneficial use;

(c) Accepts no responsibility for any drawing, design or specification not prepared by Gas Networks Ireland.

18 Unless expressly stated the plans and specifications shall not be binding as to detail.

19 **(a)** The title to and ownership of all apparatus and pipelines installed or to be installed at the site will at all times remain and vest in Gas Networks Ireland.

(b) The applicant shall not do or cause or permit to be done anything which causes damage or destruction to any apparatus or pipeline, interferes with its operation or materially interferes with Gas Networks Ireland access to same.

(c) Gas Networks Ireland shall have the right to install and keep installed, maintained, operate and repair the apparatus and pipeline and carry out work relating to the installation, maintenance, inspection, alteration, removal, extension and replacement of the apparatus and pipeline.

20 Gas Networks Ireland shall be entitled to terminate this agreement without liability by written notice to the applicant if in the opinion of Gas Networks Ireland it is not practicable or economic to provide the gas installation. In the event that Gas Networks Ireland exercises its right to terminate, then Gas Networks Ireland shall return the contract sum to the applicant.

21 Gas Networks Ireland a designated activity company, limited by shares, incorporated in Ireland with registered number 555744 and having its registered office at Gasworks Road, Cork T12 RX96. The rights and obligations of Gas Networks Ireland under this agreement are exercised and carried out by Gas Networks Ireland pursuant to and in accordance with law and approved by the Commission for Energy Regulation. Once the installation has been completed and you have been connected to natural gas the Gas Networks Ireland Conditions for Gas Users at Non-Daily Metered (NDM) Offtake Points, attached to these Conditions, will supersede these Conditions and will govern our relationship for so long as the Premises remains connected to the gas network. If you are a Local Authority you will ensure that the resident at the Premises is furnished with a copy of the Gas Networks Ireland Terms and Conditions for Gas Users at Non-Daily Metered (NDM) Offtake Points, attached to these Conditions, and that the resident is advised that those conditions will supersede these Conditions and will govern our relationship with the resident for so long as the Premises remains connected to the gas network.

businesslink
Bóthar Theampaill Mhaighréide
Fionnghlas
Baile Átha Cliath 11, D11 Y895
Éire

T +353 1850 411 511

businesslink
St. Margaret's Road
Finglas
Dublin 11, D11 Y895
Ireland

gasnetworks.ie

Líonraí Gáis Éireann | Gas Networks Ireland

Mr Maurice Mortell,
Equinix Ireland Ltd,
Units 6 & 7 Kilcarbery Business Park,
Nangor Road,
Dublin 22.

Attention:	Mr Maurice Mortell
Ref:	Natural Gas Supply to Equinix Ireland Limited, DBR, Profile Park, Grange Castle, Dublin 22.
Date:	6th September 2021

Subject to Contract/Contract Denied

Dear Mr Mortell,

Thank you for your enquiry in relation to a natural gas connection to the proposed development at Equinix Ireland Limited, DBR, Profile Park, Grange Castle, Dublin 22.

In follow up to your application, Gas Networks Ireland has completed its preliminary design of the requested natural gas connection to your development.

The high level solution involves:

- Connecting to the existing 4 bar distribution network
- Laying 250mm PE network to the customer site (circa 170m)
- Lay a valved service onto the customer site (customer to provide open trench on site)
- Construction of a new distribution metering compound with an SP3 skid
- Wayleave required

The total indicative estimated cost of the project is €57,466,64 excluding VAT.

As per section 2.2 of the Commission for the Regulation of Utilities approved Gas Networks Ireland Connections Policy, Equinix Ireland Limited are classified as a Medium and Small I&C Customer as their peak hourly demand is equal or less than 50MW thermal input or their connection pressure is lower than 16 barg. As a Medium and Small I&C Customer, Equinix Ireland Limited is required to make a standard contribution of 30% of the estimated full pipeline and ancillary equipment (including AGI) capital costs attributable to meeting the load and pressure requirements of the facility.

A reinforcement from Newlands Cross to Grange Castle of approximately 4.1 km has been identified as necessary. The proportionate allocated to Equinix Ireland Limited will be absorbed by GNI. The costs which will be absorbed by GNI for the re-enforcement and applicable discount are €1,447,253.48 excluding VAT.

Líonraí Gáis Éireann cuideachta ghníomhaíochta ainmnithe, faoi theorainn scaireanna, atá corpraithe in Éirinn leis an uimhir chláraithe 555744 agus a tá hoifig chláraithe ag Bóthar na nOibreacha Gáis, Corcaigh, T12 RX96. **Gas Networks Ireland** a designated activity company, limited by shares, incorporated in Ireland with registered number 555744 and having its registered office at Gasworks Road, Cork, T12 RX96.

Stiúrthóirí/ Directors: Mike Quinn (Chairman), Sean Casey, Brendan Murphy, Liam O'Sullivan, Michael G. O'Sullivan

The demand information provided by Equinix Ireland Limited in year 7 is shown below:

- Estimated Annual Consumption (EAC): 9,000,000 kWh
- Peak Day (Exit Capacity): 675,000 kWh
- Maximum Hourly Quantity (MHQ): 45,000 kWh

Should you wish to advance with the connection, Gas Networks Ireland will require:

- Equinix Ireland Limited to return a completed "Agreement for the installation of natural gas pipeline and apparatus in respect of industrial and commercial connections"
- Payment in full of the estimated cost of €57,466.64 ex VAT (13.5%)

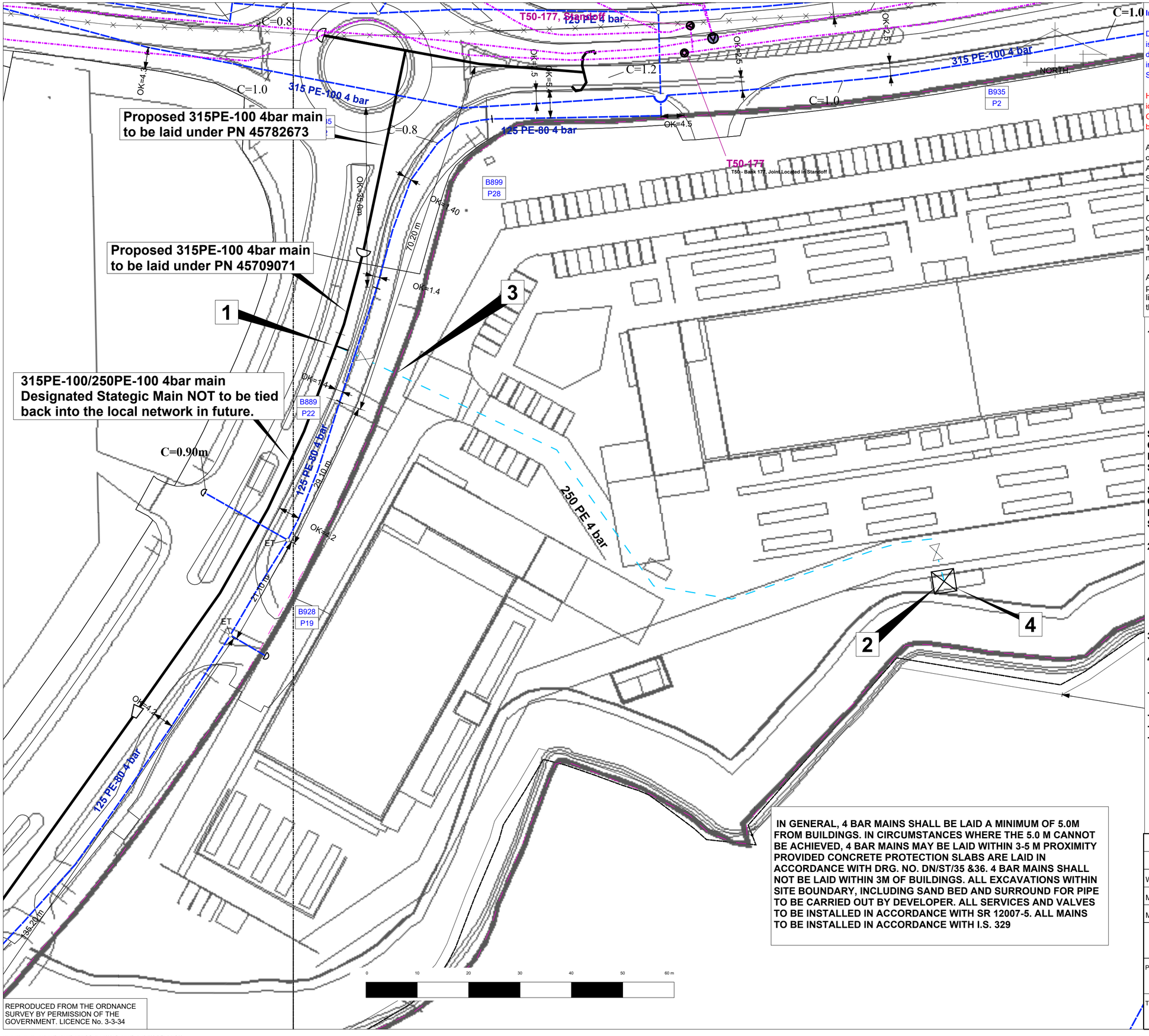
The estimated programme for the project, from conclusion of the contractual arrangements to commissioning of the supply on site, is expected to be approximately 10 months.

This offer is valid for 3 months from the date outlined above.

If you have any queries in relation to this or wish to discuss further, please do not hesitate to contact me.

Kind Regards,

Sean Crowley,
LIC Sales Manager,
Gas Networks Ireland



Important Safety Notice:

Damage to gas pipelines can result in serious injury or death. Gas network information is provided as a general guide. The exact location and depth of medium or low pressure distribution gas pipes must be verified on site by carrying out necessary investigations, including, for example, hand digging trial holes along the route of the pipe.
Service pipes are not generally shown but their presence should always be anticipated.

High pressure transmission pipelines are shown in red. If a transmission pipeline is identified within 10m of any intended excavations then work must not proceed before GNI has been consulted. The true location and depth of a transmission pipeline must be verified on site by a representative of GNI. Contact can be made through 1800 427 747.

All work in the vicinity of the gas network must be completed in accordance with the current edition of the Health & Safety Authority publication, Code of Practice For Avoiding Danger From Underground Services which is available from the Health and Safety Authority (01 614 7000) or can be downloaded at www.hsa.ie.

Legal Notice:

Gas Networks Ireland (GNI) and its affiliates, accept no responsibility for the accuracy of any information contained in this document including data concerning location and technical designation of the gas distribution and transmission network (the Information). The Information should not be relied on for accurate distance or depth of cover measurements.

Any representations and warranties, express or implied, are excluded to the fullest extent permitted by law. No liability shall be accepted for any loss or damage including, without limitation, direct, indirect or consequential loss, arising out of or in connection with the use or re-use of the Information.

1. Connect to proposed 315PE-100 4bar main (laid under PN45709071) with a 315PEx250PN16 branch saddle, and lay 1 no. 250PE-100 SDR17 4bar double valved service as per DN/ST/111 and install 1 no. modified G1600 SP3 MP T/S skid located externally as per DN/ST161A (Sheet 1 of 5) with palisade fence as per DN/ST/161A (Sheet 3 of 5). GNI shall supply concrete base as per DN/ST/161A (Sheet 3 of 5) and DN/ST/224. Install daily metering equipment. NRO Required.

Stream A:
Outlet set pressure = 400mbar.
Relief set pressure = 592mbar.
Slamshut set pressure = 643mbar

Stream B:
Outlet set pressure = 360mbar.
Relief set pressure = 592mbar.
Slamshut set pressure = 693mbar

2. Install ATEX Zone 2 sign per DN/ST/167 and safety sign per DN/ST/168. There shall be no window / door / vent openings or potential sources of ignition permitted within 2.5m from the vent tip per DN/ST/184 - Sheet 1 of 3. Relief valve to be vented to 3m above ground level as per DN/ST/160. NOTE: if mechanical air handling units exist in vicinity of meter location then the distance from the vent tip needs to be increased by 1m.

3. Client shall provide pre-ex trench from site boundary.

4. Client shall provide a 220v power supply to the edge of the skid base to facilitate daily metering as per DN/ST/220 (Sheet 1 of 2).

- Client shall provide clear access to the skid compound and parking space for 2 no. 6m long response vehicles for maintenance.
- Wayleave Required.
- Future Network Cost Recovery Applies.
- 315PE/250PE main laid into Profile Park is a DESIGNATED STRATEGIC MAIN and shall not be tied into the local network in future.

IN GENERAL, 4 BAR MAINS SHALL BE LAID A MINIMUM OF 5.0M FROM BUILDINGS. IN CIRCUMSTANCES WHERE THE 5.0 M CANNOT BE ACHIEVED, 4 BAR MAINS MAY BE LAID WITHIN 3-5 M PROXIMITY PROVIDED CONCRETE PROTECTION SLABS ARE LAID IN ACCORDANCE WITH DRG. NO. DN/ST/35 &36. 4 BAR MAINS SHALL NOT BE LAID WITHIN 3M OF BUILDINGS. ALL EXCAVATIONS WITHIN SITE BOUNDARY, INCLUDING SAND BED AND SURROUND FOR PIPE TO BE CARRIED OUT BY DEVELOPER. ALL SERVICES AND VALVES TO BE INSTALLED IN ACCORDANCE WITH SR 12007-5. ALL MAINS TO BE INSTALLED IN ACCORDANCE WITH I.S. 329

		LG	DB	DB
1	Construction Issue	19/07/21	11/08/21	11/08/21
ISSUE	REVISION	DRWN. BY DATE	CHECKED BY DATE	APPRD BY DATE

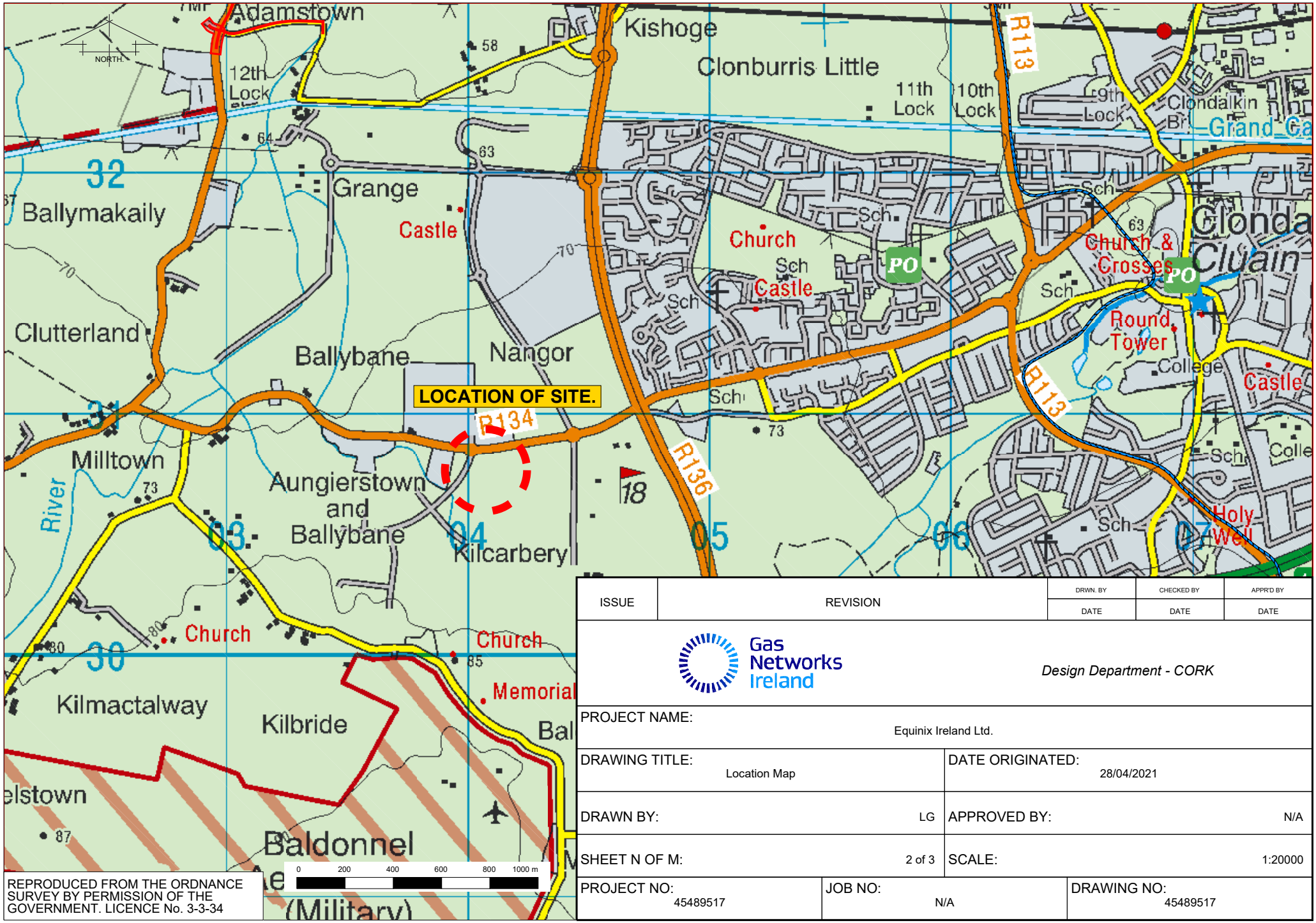
WAYLEAVE REQD:	No	O.S. REF. NO'S:	n/a
MATRLS. DELIVERY:	n/a	SURVEYED BY:	n/a
METER SIZE: SP4	SUPPLY PRESS: 4bar	OUTLET PRESS:	400mbar

Design Department - DUBLIN

Gas Networks Ireland

PROJECT: **Equinix Ireland Ltd.**	DATE: 19/07/2021	SCALE:	1:500
	DRAWN: LG	APPR.:	DB
TITLE: **Design Drawing**	DRG. NO. 45489517	PROJ. NO. 45489517	SH. 1 of 3

Not Archived - Alternative : |Designs|Dublin|I/C Projects|2021 Projects|Proj. 45489517 Equinix D22



REPRODUCED FROM THE ORDNANCE SURVEY BY PERMISSION OF THE GOVERNMENT. LICENCE No. 3-3-34

ISSUE	REVISION	DRWN. BY / DATE	CHECKED BY / DATE	APPR'D BY / DATE

Gas Networks Ireland

Design Department - CORK

PROJECT NAME:	Equinix Ireland Ltd.		
DRAWING TITLE:	Location Map	DATE ORIGINATED:	28/04/2021
DRAWN BY:	LG	APPROVED BY:	N/A
SHEET N OF M:	2 of 3	SCALE:	1:20000
PROJECT NO:	45489517	JOB NO: N/A	DRAWING NO: 45489517

Not Archived - Alternative : |Designs|Dublin|I/C Projects|2021 Projects|Proj. 45489517 Equinix D22

Appendix 17.1 Shadow Appendix V4

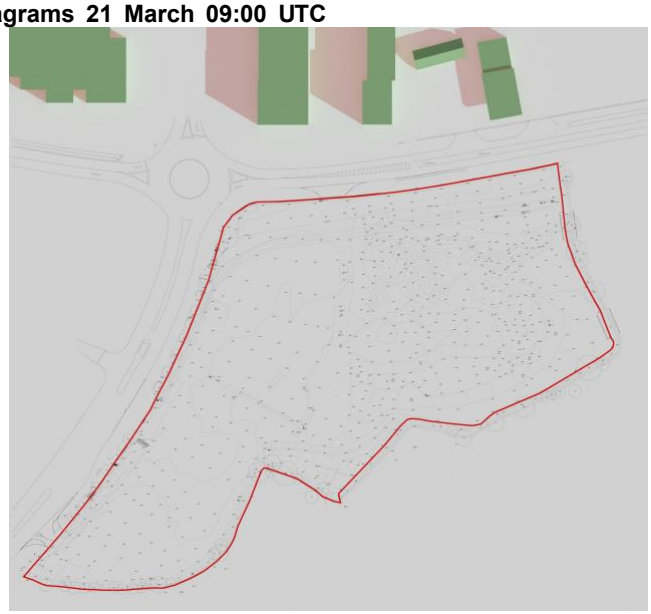
Appendix 17
Shadow Study of the Overall Project of a Data Centre Development at Kilcarbery, New Nangor Road, Dublin 22.

Prepared by John Healy
MSc Environmental Design of Buildings

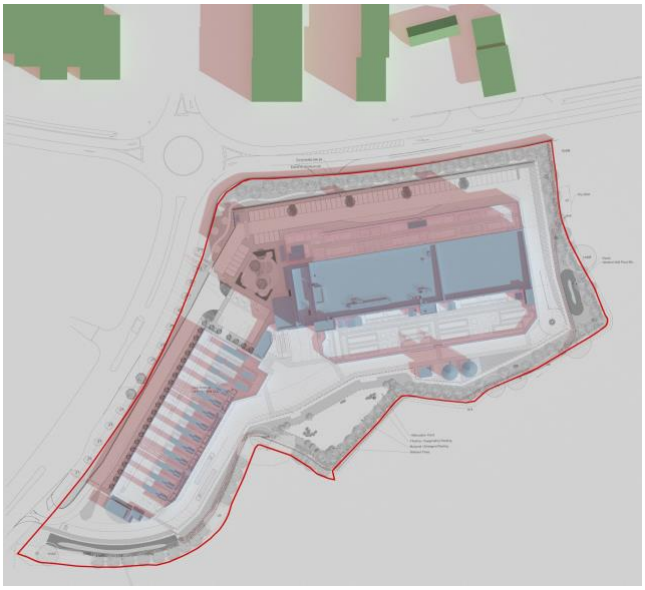
1 Rathmines Road Upper, Dublin 6, D06 Y5P5 tel 01 4965340 email mail@digitaldimensions.ie
web digitaldimensions.ie Digital Dimensions Ltd trading as Digital Dimensions.

Figure 17.8.1: Shadow diagrams 21 March 09:00 UTC

Baseline Scenario



Proposed Development



Overall Project

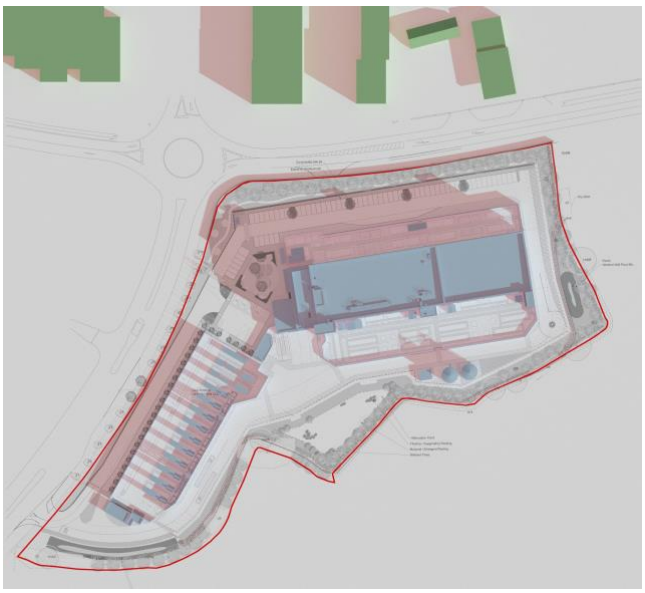
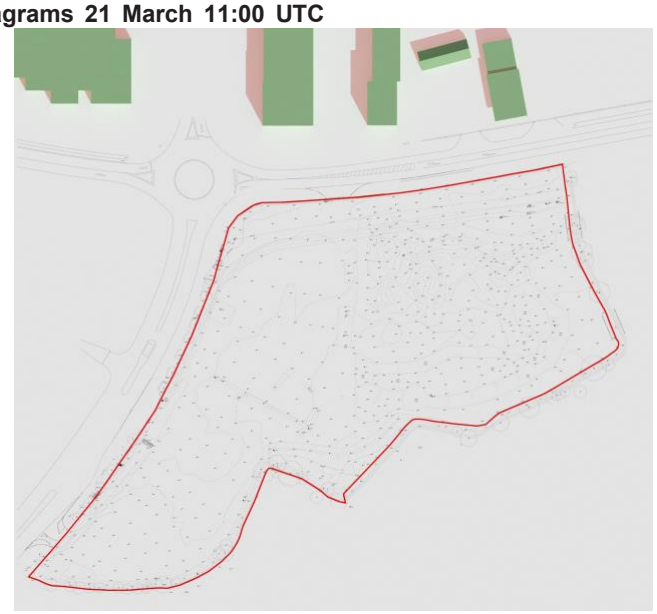


Figure 17.8.2: Shadow diagrams 21 March 11:00 UTC

Baseline Scenario



Proposed Development

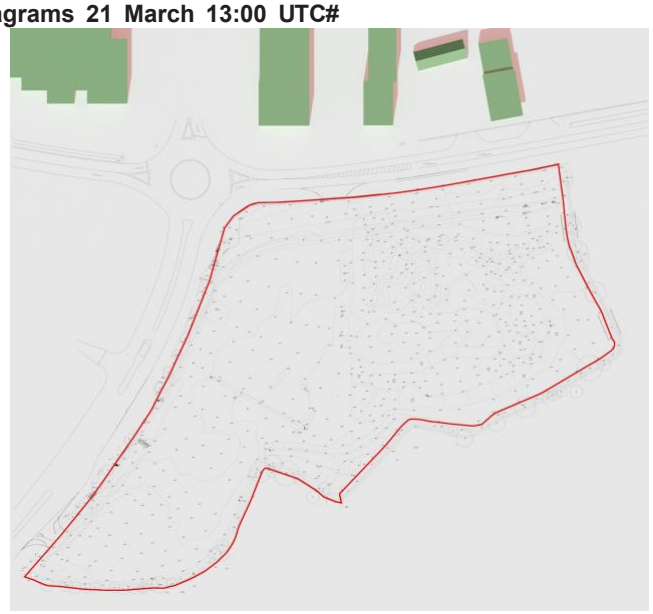


Overall Project



Figure 17.8.3: Shadow diagrams 21 March 13:00 UTC#

Baseline Scenario



Proposed Development

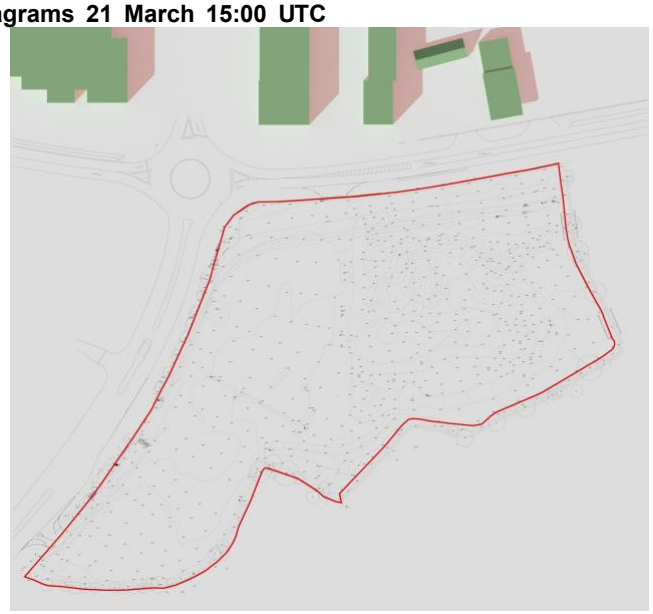


Overall Project



Figure 17.8.3: Shadow diagrams 21 March 15:00 UTC

Baseline Scenario



Proposed Development



Overall Project

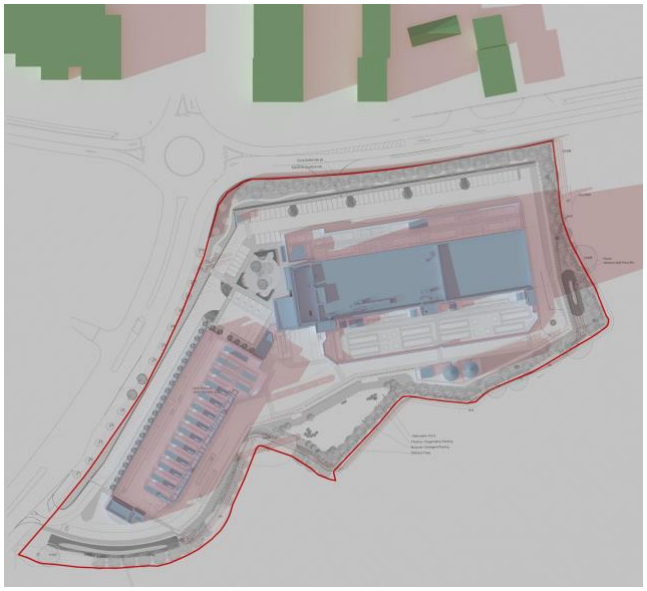


Figure 17.8.4: Shadow diagrams 21 March 17:00 UTC

Baseline Scenario



Proposed Development

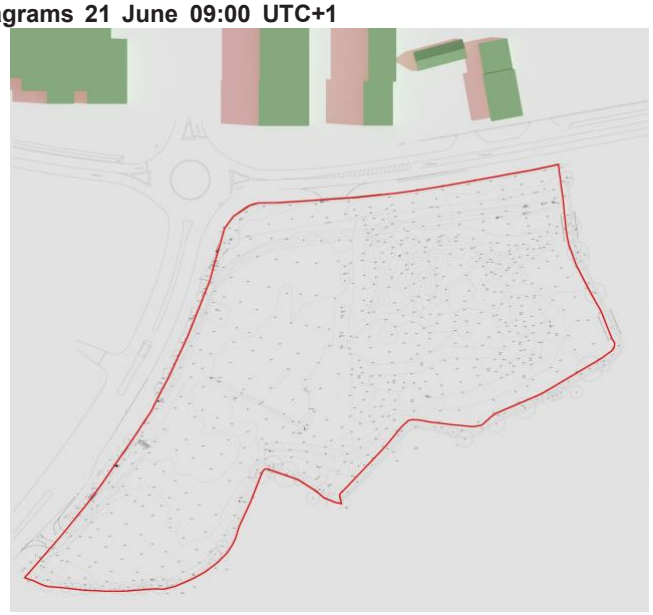


Overall Project



Figure 17.8.5: Shadow diagrams 21 June 09:00 UTC+1

Baseline Scenario



Proposed Development

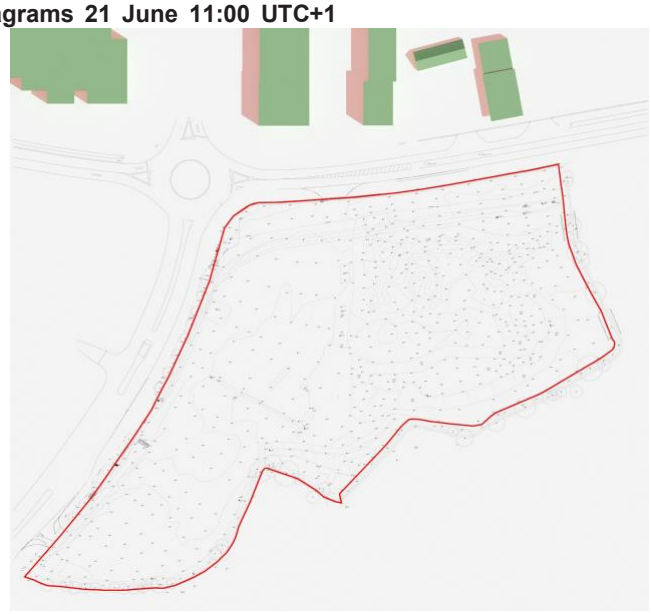


Overall Project



Figure 17.8.6: Shadow diagrams 21 June 11:00 UTC+1

Baseline Scenario



Proposed Development

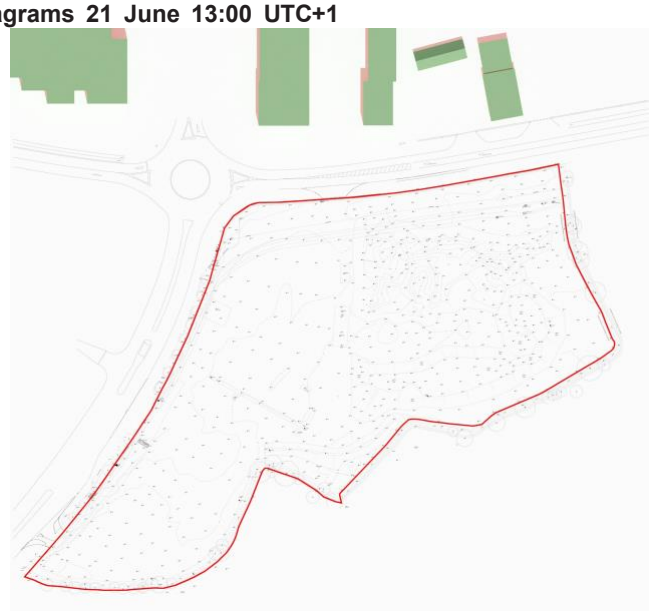


Overall Project



Figure 17.8.7: Shadow diagrams 21 June 13:00 UTC+1

Baseline Scenario



Proposed Development

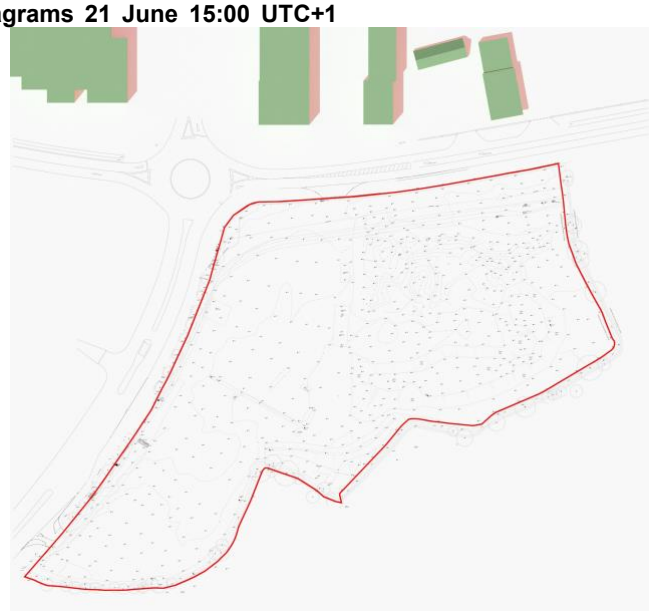


Overall Project



Figure 17.8.8: Shadow diagrams 21 June 15:00 UTC+1

Baseline Scenario



Proposed Development

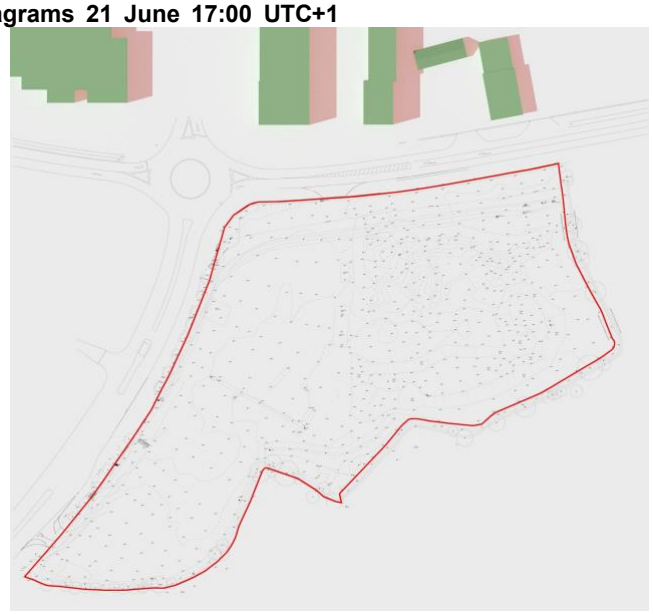


Overall Project



Figure 17.8.9: Shadow diagrams 21 June 17:00 UTC+1

Baseline Scenario



Proposed Development



Overall Project

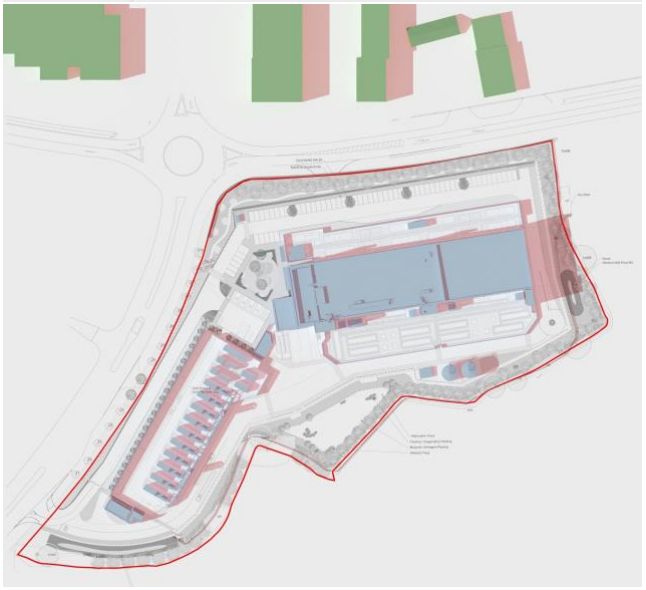
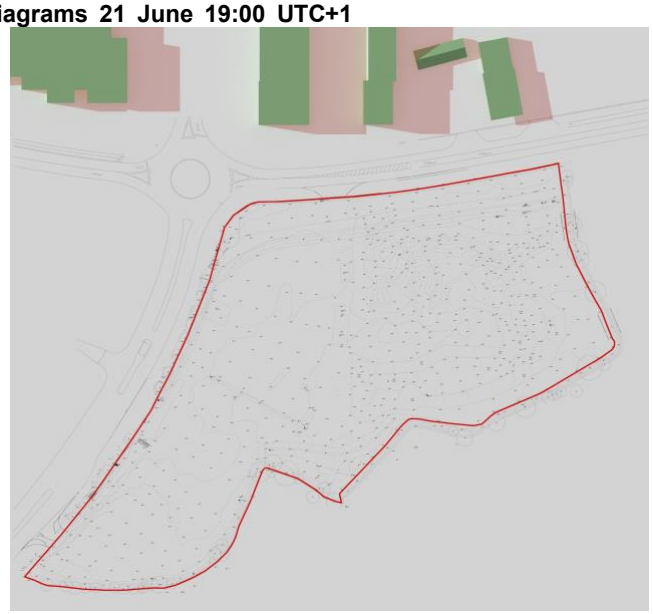


Figure 17.8.10: Shadow diagrams 21 June 19:00 UTC+1

Baseline Scenario



Proposed Development

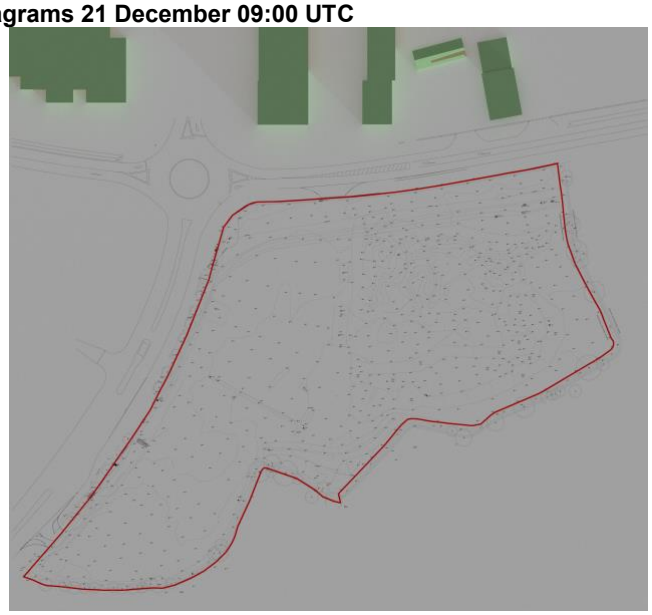


Overall Project



Figure 17.8.11: Shadow diagrams 21 December 09:00 UTC

Baseline Scenario



Proposed Development



Overall Project



Figure 17.8.12: Shadow diagrams 21 December 11:00 UTC

Baseline Scenario



Proposed Development

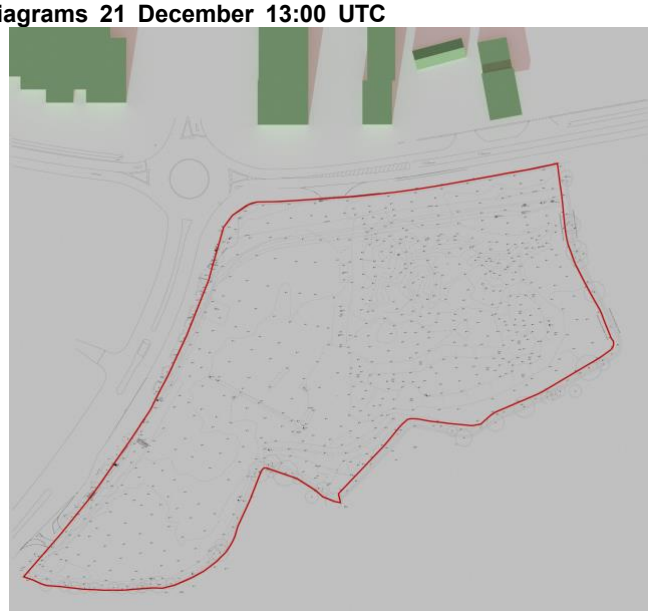


Overall Project



Figure 17.8.13: Shadow diagrams 21 December 13:00 UTC

Baseline Scenario



Proposed Development



Overall Project

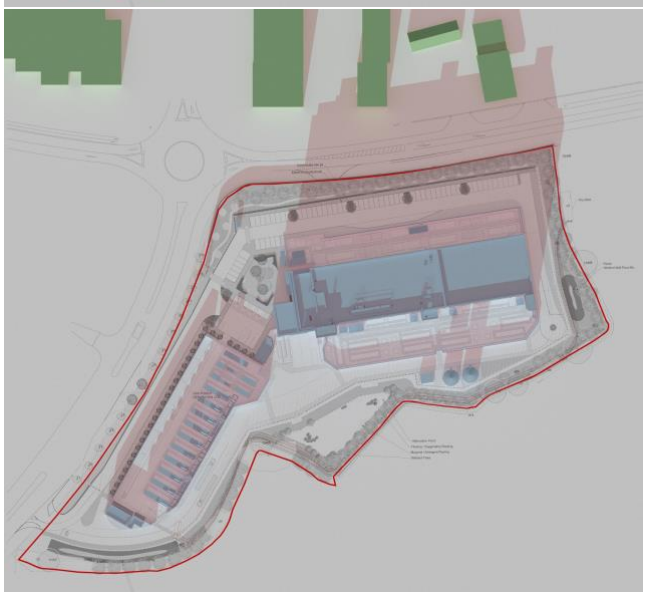
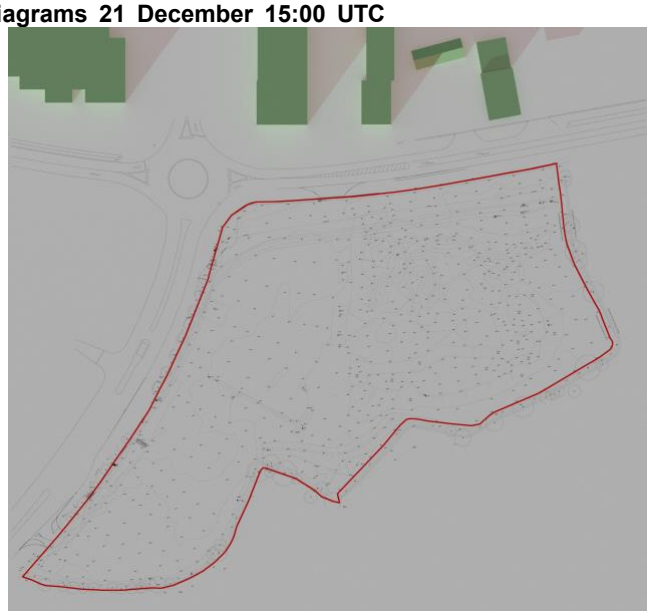


Figure 17.8.14: Shadow diagrams 21 December 15:00 UTC

Baseline Scenario



Proposed Development



Overall Project



19.1 Appendix 19.1 – List of Cumulative Developments - Proposed and Permitted Developments

The following list contains proposed and permitted planning applications which have the potential for cumulative effects with the Overall Project (Proposed OSPG development and Permitted Data Centre).

The criteria for identifying cumulative developments that are likely to overlap with the construction and operational phase of the Overall Project are as follows:

- Applications that have been submitted within the last 5 years (2018 onwards), and any developments that have been granted over 5 year permission prior to 2018,
- are within 2km from the subject site, in order to include all of the Data Centre developments in Profile Park,
- Significant developments (i.e. that are likely to cause effects on the environment) which would include the following type of developments:
    - Data Centres,
    - Infrastructure projects including roads or utilities,
    - Power Plants,
    - Commercial Developments over 2000sqm GFA,
    - Residential Developments over 50 units.
- Developments that are permitted and are likely to overlap with the construction and operational phase of the Overall Project,
- Developments currently under construction and are likely to overlap with the construction and operational phases of the Overall Project,
- Substantial development in the planning system (in order to capture developments that could potentially be granted before the proposed development that are likely to have an effect on the environment).

Table 19.1 - Proposed and Permitted Developments in The Surrounding Area of the Subject site

No.	Planning Ref. Applicant Distance from Site Apporx. Address/location	Project Description	Application Status
1.	SD21A/0186 Applicant Equinix Located on the Subject Site and forms part of the Overall Project	Construction of a 3 storey (part 4 storey) data centre known as 'DB8' to include data halls, electrical/plant rooms including internal generators, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level; the total gross floor area excluding hot air plenums and external staircase is c.9,601sq.m and the overall height of the data centre ranges from c.16m to c.20m to roof parapet level and up to c.24.48m including roof top plant, flues and lift overrun; provision of 5 external generators, 8 fuel tanks and ancillary plant contained within a plant yard to the north of DB8; provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8; provision of a water sprinkler pump room (c.23sqm), 2 sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm); total floor area of ancillary structures and plant (c.303sqm); provision of a delivery yard and loading bays, 64 car parking spaces, 5 motorcycle spaces, bicycle shelter serving 14 spaces, smoke shelter, internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of an existing vehicular entrance from Falcon Avenue; all associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing; no buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site; the area to the southwest of the site (temporary meadow) is reserved for a future data centre, subject of a separate application to South Dublin County Council on a site bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue. This application is accompanied by a Natura Impact Statement.	Granted 24/03/2022
2.	Planning Ref: SD23A/0035 Applicant: Vantage	Amendment and modification of SD21A/0241 including the replacement of the permitted 2 sprinkler tanks and pump room with a two storey battery energy storage system (435.56sq.m) over a single level basement that will contain a sprinkler system, water tanks and pump room that will serve the overall permitted development as granted under Ref. SD21A/0241; A single additional car parking space will be provided adjacent to the new building that will be accessed via permitted access road from Falcon Avenue within Profile Park that was granted under Ref. SD21A/0241; 2 new transformers to be located to the north of the permitted switch rooms; 1 life safety generator to be located adjacent to the permitted step up transformer compound within the site.	Further Information Requested: 18/04/2023

	Distance from Site: c. 20m west		
3.	Planning Ref: SD22A/0420 Applicant: Vantage Distance from Site: c. 20m west	Development on a Site that includes a two storey residential property on lands to the south of the New Nangor Road (R134), Dublin 22; and on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22 on an overall site of 3.79hectares; The development will consist of the demolition of the two storey dwelling (207.35sqm) and associated outbuildings and farm structures (348.36sq.m); and the construction of 1 two storey data center with plant at roof level and associated ancillary development that will have a gross floor area of 12,893sqm that will consist of the following, 1 two storey data center (Building 13) with a gross floor area of 12,893sqm. It will include 13 emergency back-up generators of which 12 will be double stacked and one will be single stacked within a compound to the south-western side of the data center with associated flues that each will be 22.316m in height and 7 hot-air exhaust cooling vents that each will be 20.016m In height; The data center will include data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator that will provide emergency power to the admin and ancillary spaces. Each generator will include a diesel tank and there will be a refuelling area to serve the proposed emergency generators; The data center will have a primary parapet height of 14.246m above ground level, with plant and screen around plus a plant room above at roof level. The plant room has an overall height of 21.571m; Construction of an internal road network and circulation areas, with a staff entrance off Falcon Avenue to the east, as well as a secondary vehicular access for service and delivery vehicles only across a new bridge over the Baldonnel Stream from the permitted entrance as granted under SDCC Planning Ref. SD21A/0241 from the south-west, both from within Profile Park that contains an access from the New Nangor Road (R134); Provision of 60 car parking spaces (to include 12 EV spaces and 3 disabled spaces), and 34 cycle parking spaces; Signage (5.7sq.m) at first floor level at the northern end of the eastern elevation of the data center building; Ancillary site development works will include footpaths, attenuation ponds that will include an amendment to the permitted attenuation pond as granted to the north of the Baldonnel Stream under SDCC Planning Ref. SD21 A/0241, as well as green walls and green roof. The installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the internal road network within Profile Park. Other ancillary site development works will include hard and soft landscaping that will include an amendment to the permitted landscaping as granted under SDCC Planning Ref. SD21A/0241, lighting, fencing, signage, services road, entrance gates, and sprinkler tanks; An Environmental Impact Assessment Report (EIAR) has been submitted with this application.	Further Information requested 12/01/2023
4.	Planning Ref: SD21A/0241 Applicant: Vantage Distance from Site: c. 20m west	Demolition of the abandoned single storey dwelling and associated outbuilding (206sqm); construction of 2 two storey data centers with plant at roof level of each facility and associated ancillary development which will have a gross floor area of 40,589sq.m consisting of 1 two storey data center (Building 11) which will be located to the south of the site and will have a gross floor area of 24,667sq.m. including 22 emergency generators located at ground floor level within a compound to the western side of the data center with associated flues that will be 22.3m in height; 1 two storey data center (Building 12) which will be located to the north of the site, and to the immediate north of Building 11 and will have a gross floor area of 12,915sq.m including 11 emergency generators located at ground floor level within a compound to the western side of the data center with associated flues that will be 22.3m in height; each of the two data centers will include data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility which will provide emergency power to the admin and ancillary spaces; each generator will include a diesel tank and there will be a refuelling area to serve the proposed emergency generators; the overall height of each data center apart from the flues and plant at roof level is c. 14.23m above	Granted 19/06/2022

		the finished floor level; the overall height of each data center apart from the flues and plant at roof level is c. 14.23m above the finished floor level; single storey step-up substation (38sq.m) as well as 2 single storey switch substations (121sq.m); AGI Gas Regulator compound that include 3 single storey buildings (134sq.m); construction of a gas powered generation plant in the form of a 13m high single storey building with a gross floor area of 2,714sq.m that will contain 10 gas generators with associated flues that will be 25m in height, and grouped in pairs and threes; the Gas Plant will be located to the west of Building 11; ancillary site development works, that will include reorientation of the Baldonnel Stream, biodiversity management initiatives, attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the internal road network within Profile Park; other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gates, sprinkler tanks and pump room; a temporary gas powered generation plant within a fenced yard containing 21 generator units in containers, each with associated flues (each 25m high), 12 transformers and 10 containers of controls to be located to the west of, and associated with the first phase of Building 11, and will be required for a period of up to 2 years if connection to the national grid is delayed; this temporary plant will not be built if the connection to the national grid is in place prior to the operation of Building 11 at this site that includes an abandoned single storey residential property on the New Nangor Road (R134), Dublin 22; and on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22 on an overall site of 8.7 hectares.	
5.	Planning Ref. SD20A/0124 Applicant: Moffash Ltd. Distance from Site: c. 40m west	(1) Demolition of existing single storey dwelling (c.108.5sq.m); (2) construction of a Distribution Warehouse Building comprising warehousing and ancillary areas at ground floor and support offices, staff areas and plant across two floors; (3) the development will be accessed from the existing Profile Park estate road; (4) provision of car parking, cycle parking, security gatehouse, landscaping and boundary treatments (including security fencing and gates); (5) all associated site development and services works (including diversion/culverting/reprofiling of existing stream on site); (6) total gross floor area of the development c.17,006sq.m.	Granted 17/12/2020 Permission not implemented on site. Superseded by Vantage Application
6.	Planning Ref. SD21A/0167 Applicant: Greener Ideas Limited Distance from Site: c. 115m South West	Construction of a gas fired power plant with an electrical output of up to 125MW with associated balance of plant, equipment and buildings including; an Engine Hall building with a height of 18.9m, comprising 6 gas engines and ancillary infrastructure; an Electrical Annex Building with a height of 18.7m; a Workshop building with a height of 5. 1m; a Tank Farm building with a height of 5.68m; a Security hut with a height of 3.27m; an Exhaust Stack with a height of 31.8m; a Gas AGI including a kiosk with height of 3.3m; Radiator Coolers with a height of 8.46m; 2 electrical transformers with a height of 4.98m; Tanks including 2 x Diesel Oil Storage Tanks (volume of 2500m3 combined); SCR Urea Tank (26m3); Lube Oil Storage Tank (26m3); Lube Oil Maintenance Tank (26m3); Pilot Oil Tank (26m3); Fire Water Storage Tank (1000m3); Effluent Collecting Tank (26m3); Underground Surface Water Attenuation Tank (490m3); 2 new access onto the existing private road network with Profile Park; 12 parking spaces, footpaths, landscaping; fencing and all other associated site development plant and equipment and other works including surface water and foul wastewater drainage. An EIAR was submitted with this application.	Granted: 30/08/2022

7.	Planning Ref. SD23A/0039 Applicant: Microsoft Distance from Site: c.900m	Provision of an establishment to which to European Communities (Major Accident Hazards involving Dangerous Substances) Regulations 2006 as amended by Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 apply, constituting a change of use; The new establishment will include all the existing and permitted buildings (SD13A/0143 as amended by SD13A/0265, SD14A/0194 as amended by SD15A/0343, SD16A/0088 as amended by AD17A/0318 & SD20A/0283, SD21A/0203 & SD21A/0288, all within an existing campus; The proposal relates to the total quantum of fuel oil to be stored within existing and permitted tanks across the existing and permitted buildings; For the avoidance of doubt no works or physical development is proposed and the application relates to an existing development which comprises or is for the purpose of an activity requiring an integrated pollution prevention and control (IE) licence.	Decision due 24 April 2023
8.	Planning Ref. SD21A/0203 Applicant: Microsoft Distance from Site: c.900m	Modifications and minor additions to previously approved scheme (Planning Register Reference SD20A/0283) at this site of c.16.23ha (in total) comprising of the following changes: Approved Central Administration Building (CAB), relocation of building to the east by approx. 7m; reconfiguration and setting out of building plans at all levels (including roof level) resulting in increase in building footprint of approximately 170sq.m (from 1,424sq.m to 1,594sq.m) associated changes to building elevations (design and finishes); approved single storey Cafeteria Element, additional basement level below cafeteria to accommodate plant; 9 rooflights (2.8 m diameter) and 9 rooflight (1.8m diameter), inclusion of MEP Plant on roof level including new flue extending approx. 1m above parapet; approved four-storey Office element, parapet at roof level to be raised by approx. 1.1m (increased from approved 19.5m in height to proposed 20.6m); overall increase in GIFA of 395sq.m; reconfiguration of area available for PV panels and sedum roof finish in order to accommodate required MEP equipment at roof levels. approved Data Centres - DUB14 and DUB15, reconfiguration and setting out affecting building locations and plans at all levels (including roof level) resulting in reduction in overall building footprint (for each building) by 48sq.m (from 13,442sq.m to 13,394sq.m), associated changes to staircases design, building elevations design and finishes, increase in parapet height of Vent Houses (at roof level) by approx. 350mm and omission of previously proposed zone of sedum roof finish; overall decrease in GIFA of 1,352sq.m in respect of DUB 14 and decrease of 1,453sq.m in respect of DUB 15; all plant equipment at ground level - reduced in height compared to approved layout so that the screening is deemed not required; DUB 14, reduction in height of approved flues by approx. 650mm, reduction in number of flues from 11 approved to 8 proposed; DUB 15, change to level of ground floor and associated increase in overall building height of approx. 700mm (parapet height increased from approved +83.0m O.D. to proposed +83.7m O.D.); reconfiguration of associated external plant at ground level (including generators / E-Houses & transformers) flues, omission of approved Modular Electrical Rooms (MERs) and associated screening serving approved Data Centres DUB14 &15; relocation, modifications to design and expansion of approved Water Treatment Building and associated plant to include, Water Treatment Tanks, 2 sprinkler tanks and relocated approved pump house (contained in the main Water Treatment Plant building) and 1 generator with additional proposed flue stack (height 30.75m) and 1 transformer; Gas Generator Compound - Relocation & reconfiguration of previously approved gas generator compound including, additional 4 generators (from 20 approved to 24 proposed), omission of approved E-houses; additional 7 electrical rooms, additional 7 flues (from 5 approved to 12 proposed); modifications to approved layout of internal site roads, yards and footpaths; relocation and modifications to design of approved Sprinkler Tanks and Pump Houses, Pump House serving DUB 14, relocated into proposed Water Treatment Building and compound, redesign of approved larger tank into proposed two smaller tanks; Pump House serving DUB 15, relocated to south of DUB15 the north facilitate space for electrical equipment redesign of approved larger tank into proposed two smaller tanks; relocation of Approved Gas Networks Ireland (GNI) gas skid & compound including approved 3 kiosk buildings; modifications to approved car park layouts and landscaping design; modifications to location and design of approved bicycle shelters; modifications to site development works, including underground water and building services provision, landscaping, internal security and	Granted 10/11/2021

		compound enclosure fencing, and associated works; the remainder of the development (including permitted temporary construction car parking) to be carried out in accordance with parent permission SD20A/0283. An Environmental Impact Assessment Report (EIAR) has been submitted with this application; The application relates to a development which comprises an activity requiring an integrated pollution prevention and control (IE) licence relating to lands located west of the existing MS Data Centre Campus and also a site located north of the main entrance to the business park from Grange Castle Road.	
9.	Planning Ref. SD20A/0283 Applicant: Microsoft Distance from Site: c.900m	Demolition of existing single storey vacant house, garage and outhouse (total gross floor area (GFA) c.291.2sq.m) and removal of existing temporary construction car park; Construction of a single 1-4 storey Central Administration Building and 2 2-storey (with mezzanine) data centres (DUB14 & DUB15) all to be located west of data centres DUB9, DUB10, DUB12 & DUB13 within the MS campus; The Central Administration Building (c.6.03m to c.19.85m high) will comprise central office administration, with staff cafeteria, staff gym and reception (GFA c.3,520sq.m), with provision of PV panels on the roof; each data centre (c.15.6m high to parapet height and c.18.65m to top of roof plant) will include data halls, admin blocks (comprising offices, canteen, loading dock, storage and ancillary areas) and a variety of mechanical and electrical plant areas/structures including Modular Electrical Rooms (MERs), battery rooms and transformer areas. GFA of DUB14 is c.28,072sq.m and GFA of DUB15 is c.28,173sq.m (c.56,246sq.m in total); DUB14 will also include 21 diesel generators and associated sub-stations (E-houses) and 11 mechanical flues (each c.30.75m high); Provision of a gas generator compound (to serve DUB15) containing 20 generators, 5 E-houses and 5 flues (c.25m max height); Provision of a Gas Networks Ireland gas skid including 3 kiosk buildings; Expansion of existing electrical sub-station compound (originally granted under SD07A/0632) to provide 3 additional transformer bays. 3 E-houses and 1 control room, 2 auxiliary transformers; 2 sprinkler tank and pump house areas, 1 additional rainwater harvesting plant; Provision of 168 permanent car parking spaces and 40 cycle parking spaces; Provision of additional western access to the MS campus (to serves the Central Administration Building) from the Business Park estate road (including bridge over the Griffeen River) with existing temporary access to be extinguished; Physical integration with the remainder of the existing MS campus (including internal access roads and landscaping) with associated modifications to the western boundary of the DUB09/DUB10/DUB12/DUB13 data centre development as permitted under SD16A/0088; Provision of a new temporary construction car park (with 802 car spaces, shuttle bus stop and shelter) on site north of the main entrance to the business park; Total gross floor area of the development will be c.59,766sq.m; All associated site development works, drainage and services provision, landscaping, boundary treatments (including security fencing) and associated works; An Environmental Impact Assessment Report (EIAR) has been submitted with this application; The application relates to a development which comprises an activity requiring an integrated pollution prevention and control (IE) licence.	Granted: 10/05/2021
10.	Planning Ref. ABP 309146 Applicant: CyrusOne Distance from Site c.700m west	The proposed development primarily comprises the provision of two 110kV transmission lines and a 110kV Gas Insulated Switchgear (GIS) substation compound along with associated and ancillary works and is described as follows: The proposed 110kV GIS Substation Compound is to be located on lands to the north-east of the two storey data centre facility and associated three storey office block that was permitted under SDCC Reg. Ref. SD18A/0134/An Bord Pleanála Ref. ABP-302813-18, and within an overall landholding bound to the north by the Grange Castle South Business Park access road; to the west by the Baldonnel Road and to the south by 3 residential properties and the Baldonnel Road; and to the east by the Google data centre facility within the Grange Castle South Business Park, Baldonnel, Dublin 22.	Granted 19/07/2021 Altered 14/04/2023
11.	Planning Ref.	Amendments and modifications to the permitted data centre development granted under Reg. Ref. SD18A/0134 - ABP Ref. ABP-302813-18 and the temporary substation permission granted under SD19A/0300 to include: Demolition of the two storey dwelling of Weston	Granted 26/04/2021

	SD20A/0295 Applicant: CyrusOne Distance from Site c.700m west	House; single storey dwelling and outbuildings/ stables of Weston Lodge; and the single storey dwelling and converted garage of Kent Cottage. Retention of sprinkler tank and pump house to the south-west of Building A Data Centre to replace 4 sprinkler tanks; Retention of 40kW(p) PV panels on the roof of Building A Data Centre; Retention of revised size of northern attenuation pond and loss of permitted landscaping to its south; Retention of ramped access to rear of temporary substation permitted under SD19A/0300; Retention of revised flue arrangement for Building A Data Centre from 2 associated flues per generator to 1 associated flue per generator (16 in total) and grouped into 8 towers of two flues each (each 20m high); Retention of revised position of security fence to north, west and south of Building A Data Centre; and retention and modifications of landscape berm along Baldonnel Road and to east of Weston House. Development will consist of new works to include: Modifications of permitted vehicular entrance to the data centre to include a new single storey guard house (37sq.m) and two internal entrance gates; Modification to car parking so that the permitted entrance to the parking area from the east is closed off; Modifications of flue arrangement for Building B Data Centre from 2 associated flues per generator to 1 associated flue per generator (16 in total) and grouped into 8 towers of two flues each (each 20m high); Modifications to permitted landscape scheme to north and south of Building A Data Centre; Removal of roadside entrance to Erganagh House (demolished), Kent Cottage, and the former scaffolding yard; and removal of roadside entrance to Weston House and its replacement with a new agricultural gate and fence to be erected to facilitate access for maintenance and security purposes only all on a site of 9.7Ha located within lands in the Grange Castle South Business Park and the residential properties of Weston House, Kent Cottage and Weston Lodge as well as the former scaffolding yard on land within the townlands of Aungierstown and Ballybane; Ballybane; and Milltown and bounding Baldonnel Road to the west and south and Grange Castle South access road to the north, Baldonnel, Dublin 22.	
12.	Planning Ref. SD18A/0134 ABP: 302813 Applicant: CyrusOne Distance from Site c.700m west	Demolition of the existing single storey house of 'Erganagh' and the construction of a two storey data centre and delivery bays with associated three storey office block and services that will have a gross floor area of 35,426sq.m on an overall site of 9.2 hectares. The two storey data centre facility and delivery bay (32,419sq.m) will be separated into two adjoined blocks over two floors with a single data hall on each floor of each data centre with service and technical space around each data hall (4 data halls overall) with a two storey delivery bay attached to the east of the data centre block. A three storey office block and delivery bay (2,882sq.m) is attached to the west of the data centre block. The data centre will be served by services and plant to the north of the data centre blocks that will include 32 standby generators with 2 associated flues per generator (64 in total) and grouped into 16 towers of flour flues each (each 20m high). There are proposed to be 32 acoustically attenuated chillers located on the upper level plant gantries to the north of the data hall blocks (eight on each gantry). The development will also include a new substation with associated transformer yard and single storey transformer building (125sq.m) that will be located to the northeast of the site. The development will be accessed from the Grange Castle South Access Road from the north via the Baldonnel Road and will also include ancillary site development works, including 2 attenuation ponds, to connect to existing Grange Castle infrastructural services as well as fencing, signage, services road, entrance gate, 70 car parking spaces including 3 disabled car parking spaces, and 30 sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west all on a site (9.2ha) located within lands in the Grange Castle Business Park South and the residential properties of Erganagh, Kent Cottage and Weston Lodge on land with the townlands of Aungierstown and Ballybane; Ballybane; and Milltown and bounding Baldonnel Road to the west and south and Grange Castle South Access Road to the north, Baldonnel, Dublin 22. An Environmental Impact Assessment Report (EIAR) has been submitted with this application.	Granted: 18/04/2019
13.			

14.	Planning Ref. SD17A/0377 Amendments to Applicant: Digital Realty Trust Distance from Site: c.160m south	Revisions and alterations of the permitted development of a data processing facility under planning Ref: SD12A/0002 on a 3.85 hectare site. The revised application consists of alterations to the DUB14 (previously DUB12) data centre/warehouse structure, granted in the previous application. The alterations to the DUB14 (Previously DUB12) include: (i) 2 data halls 2137 sq.m (increase of 180sq.m), (ii) offices/reception 478sq.m (decrease of 190 sq.m), (iii) support space/staff facilities and internal plant with a floor area of 953sq.m (increase of 84sq.m), (iv) external plant of 1,777sq.m (footprint increase of 35sq.m). The data centre part of the building is single storey reaching a maximum of 8.6 m in height. The plant area is to a maximum of 10.5m high and the office building has been lowered one storey and is 9.1m in height (decrease from 12.3m). The development will be constructed in 5 phases, currently Phases 1 & 2 have been completed with the enabling site works and 2 substations and single warehouse building to the North of the site. The subsequent phases will contain a single warehouse building starting with Phase 3, the application in which this Site Notice relates. A total of 84 (60 at the end of Phase 3) car parking spaces will be provided together with recycling storage and all ancillary services and landscaping. There will be 2 site entrances from vehicular accesses permitted as part of business park infrastructure (SD06A/0568).	Granted 30/01/2018 Constructed
15.	Planning Ref. SD12A/0002/EP Applicant: Digital Realty Trust Distance from Site: c.160m south	Revisions and alterations to the permitted development of a data processing facility under planning reference SD11A/0023 consisting on minor alterations to the four permitted data centre/warehouse structures, additional internal floor areas, alterations to sub-station structures and car park layout to be provided on a phased basis (it is proposed to extend the life of the planning permission to 7 years). The construction of the four data centre/warehouse buildings totals 23278 sq.m. (an increase of 2188sq.m.) and associated site works comprising the following areas: Two Type 'A' buildings each with 1872sq.m. of data halls, 697sq.m. of offices/recption, 1934sq.m. of support space/staff facilities/internal plant giving each a total internal floor area of 4503sq.m. (previously 3582sq.m.) and 1483sq.m. of external plant - total area for both Type 'A' is 11972sq.m. (previously 11094sq.m.); Two Type 'B' buildings each with 1872sq.m. of data halls, 419sq.m. (previously 67sq.m.) of offices/reception; 1879sq.m. support space/staff facilities/internal plant giving a total internal floor area of 4170sq.m. (previously 3005sq.m.) and 1483sq.m. of external plant - total area for both Type 'B' structures is 11306sq.m. (previously 9996sq.m.) The Data Centre part of the building is single storey reacing a maximum of 8.6m in height; the plant area is to a maximum of 10.7m high (increase from 9m) and th etallest building is Type 'A' office building is 12.5m in height (increase from 10m). 4 substations accessed from the estate road to facilitate the development are now proposed; each has an area of 49sq.m. and will be 3.75 metres in height. The development will be constructed in 5 phases initially with the enabling site works and 2 substations; the subsequent phases will contain a single warehouse building starting with the northern-most building. A total of 84 car parking spaces will be provided together with recycling storage and all ancillary services and landscaping. There will be 2 site entrances from vehicular accesses permitted as part of business park infrastructure (SD06A/0568).	Granted: 10/04/2012
16.	Planning Ref. SD11A/0023 Applicant: Digital Realty Trust	Development of a data processing facility on a 4.04ha site consisting of: the construction of four buildings totalling 21090sq.m. and associated site works comprising the following: two 'Type A' buildings each with a data hall (1870sq.m.), offices/reception (607sq.m.), support space/staff facilities and internal plant with a floor area of 3572sq.m. each and external plant 1975sq.m. each (total 'Type A' structures is 11094sq.m.); two 'Type B' buildings each with a data hall (1870sq.m.), reception (67sq.m.), support space/staff facilities and internal plant with a floor area of 3005sq.m. each and external plant of 1993sq.m. each (total Type B structures is 9996sq.m.). The Data Centre part is single storey reaching a maximum of 8.2 metres in height; the plant area is to a maximum of 9.2 metres and the office block is 10 metres in height. A substation to facilitate the development is also proposed with 16sq.m. area and will be 2.6 metres in height. The development will be constructed in two phases with building No.s 3. and 4 built initially. 84 car parking spaces will be provided	Granted: 15/06/2011

	Distance from Site: c.160m south	together with recycling storage. There will be 2 site entrances from the existing crossovers already established as part of business park infrastructure. Surface and foul drainage has been designed to utilize existing sewer system and all retention of surface water and drainage will be in accordance with the agreed design criteria. Lighting and landscaping have been designed with the approved masterplan and site owners.	
17.	Planning Ref. ABP: 308585 Applicant: UBC Properties Distance from Site: c.700m south	Provision of 2 no. 110kV transmission lines and 110kV Gas Insulated Switchgear (GIS) substation compound along with associated and ancillary works.	Granted 07/05/2012
18.	Planning Ref. SD20A/0121 Applicant: UBC Properties Distance from Site: c.700m south	Permission for a period of ten years for development at this site of 16.5 hectares that is located within lands in the Grange Castle South Business Park and includes the residential property of Ballybane, Old Nangor Road on land within the townlands of Milltown; Ballybane and; Aungierstown and Ballybane; and bounding Baldonnel Road to the west; both the Old and New Nangor Road to the north; and Grange Castle South Access Road to the South, Baldonnel, Dublin 22. The development will consist of the following: (1) The demolition of the existing two storey dwelling of Ballybane and associated farm buildings (565sq.m) and the construction of 3 two storey data centres with mezzanine floors at each level of each facility and associated ancillary development that will have a gross floor area of 80,269sq.m on an overall site of 16.5hectares. (2) 1 two storey data centre (Building A) that will be located to the south-west of the site and will have a gross floor area of 28,573sq.m. and will include 26 emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 26 ventilation shafts which will be located above the northern end of each emergency generator that will measure 20m in height. (3) 1 two storey data centre (Building B) which will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sq.m and which will include 18 emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 18 ventilation shafts which will be located above the southern end of each emergency generator that will measure 20m in height. (4) 1 two storey data centre (Building C) which will be constructed last, will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sq.m. It will include 26 emergency generators located at ground floor level within a compound to the western side of the data centre with associated flues that will be 25m in height. The facility will also include 26 ventilation shafts that will be located above the western end of each emergency generator that will measure 20m in height. (5) Each of the three data centres will include data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility which will provide emergency power to the admin and ancillary spaces. Each data centre will also include a diesel tank and a refuelling area to serve the proposed emergency generators. (6) The overall height of each data centre apart from the flues and plant at roof level is c. 19.85m above the finished floor level. (7) 1 temporary and single storey substation (29sq.m). (8) 3 single storey MV buildings (each 249sq.m - 747sq.m in total) which manage the supply of electricity from the substations to each data centre and are located to the immediate west of the generator compound within buildings	Granted: 09/09/2020 Construction in progress

		A and B, and to the south of the generator compound withing building C. (9) 8 prefabricated containerised electrical rooms (65sq.m each and 520sq.m overall) that are stacked in pairs to the immediate south of the temporary substation. (10) Ancillary site development works, which will include attenuation ponds and the installation and connection to the underground foul and storm water drainage network and installation of utility ducts and cables which will include the drilling and laying of ducts and cables under Baldonnel stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, service road, entrance gate, sprinkler tank house (72sq.m), security hut (30sq.m) and 150 car parking spaces and 78 sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west. The development will be accessed from the Grange Castle South Access Road from the south via the Baldonnel Road. An Environmental Impact Assessment Report (EIAR) has been submitted with this application.	
19.	Planning Ref: ABP: 312793 Applicant: Vantage Distance from Site: c. 400m south west	110kV Gas Insulated Switchgear (GIS) Substation compound and 110kV transmission lines along with associated and ancillary works.	Lodged 17/02/2022 Decision: Requires further consideration
20.	Planning Ref. SD21A/0217 and ABP-314461-22 Applicant: Digital Netherlands VIII B. V. Distance from Site: c. 50m west	10 year permission for development consisting of removal of an existing unused waste water treatment facility on site and the erection of two data centre buildings, gas powered energy generation compound, and all other associated ancillary buildings and works; the two data centre buildings, DUB 15 and DUB 16, will comprise a total floor area of c. 33,577sq.m over two storeys; the first 2 storey data centre building (DUB15), located to the southwest of the site, will comprise 16,865sq.m data storage use, ancillary office use and associated electrical and mechanical plant rooms, loading bays, maintenance and storage space; a second 2 storey data centre building (DUB16), located to the southeast of the site, will comprise 16,712sq.m data storage areas, ancillary office use and associated electrical and mechanical plant rooms, loading bays, maintenance and storage space; both data centre buildings will reach a height of 20m; emergency generators and associated emission flues and plant are proposed in compounds adjacent to each data centre building; gas powered energy generation is proposed to the north east corner of the site to provide electricity for the proposed development; the application proposes to re-route and widen an existing watercourse constructed following an earlier planning permission; it is proposed to reroute this watercourse along the eastern and southern boundary of the site; landscaping is proposed to the south of the site to screen the buildings; fencing and security gates are proposed around the site; new access roads within the site are proposed along with 71 car parking spaces and 26 cycle spaces, bin stores, site lighting, and all associated works including underground foul and storm water drainage attenuation and utility cables and all other ancillary works; a Natura Impact Statement will be submitted to the planning authority with the application.	Granted and Appealed Decision due: 03/04/2023

21.	SD14A/0198 Applicant: Bernadette and Liam Kelly Distance from Site: 40m west	Retention permission for existing palisade fence on the boundary with adjoining property and permission for relocation of existing palisade fence and reinstatement of original site entrance.	Granted Retension and Refuse Permission on 21/09/2015
22.	SD06A/0568/EP Applicant: DASNOC Limited	Provision of roads and services infrastructure to facilitate the future development of a business park, to be known as 'Profile Park' on these lands. The development includes the provision of 1,675 metres of internal distributor roads consisting of 267 metres to dual carriageway standard (at the main entrance) with a further 1,408 metres to single carriageway standard and one internal roundabout. The development also includes surface water drainage, foul drainage and water supply infrastructure, associated landscaping and all ancillary works, on a site of 39.84 hectares. Access to the site will be provided at the northern boundary off the existing roundabout to Kilcarbery Business Park. This application is accompanied by an Environmental Impact Statement.	Granted on 30/11/2006 Extension of duration gratned on 13/01/2012
23.	SD12A/0150 Applicant Crowe Howarth Located on the subject site.	Erection of a 2.4m high perimeter fence along Nangor Road boundary (approximately 250m long) with separate entrance gates for vehicular, bicycle and pedestrian access; construction of a single storey security hut with security barriers.	
24.	SD118/0001 Applicant South Dublin	Construct a new access road off the Nangor Road, Clondalkin Dublin 22 as described below:- • Construction of new single and dual carriageway in 2 phases; • Construction of cycletracks and footpaths; • Provision of drainage and associated features; • Provision of public lighting and signing; • Relocation of services where necessary; • Provision of other services where necessary.	Submitted under PVIII by South Dublin County Council on 16/05/2011
25.	SD07A/0665	A 'Trade Park' consisting of 35 units in 5 separate blocks and a single office/showroom building (5 units). The units range in scale from 171 sqm (gross floor area) to 1,519 sqm (gross floor area) with a total gross floor of approx. 10,998 sqm, and 336 no. parking spaces. Each trade park unit (in Blocks B to F) shall be for trade park use only comprising storage/enterprise/workshop use and customer service/showroom/sales space for both trade and public customers. Block A (804 sqm) is a signature two storey building comprising of	Granted 20/11/2007

	Distance from site c. 120m SW	4 no. units for office and showroom use and a coffee shop of approx. 120 sqm (in Unit 2); Block B (2,130 sqm) is a double height single storey building (including 534 sqm at mezzanine level) comprises of 9 no. units for trade park use; Block C (2,130 sqm) is a double height single storey building (including 534 sqm at mezzanine level) comprises of 9 no. units for trade park use; Block D (1,519 sqm) is a double height single storey unit for trade park use with single storey element to North elevation; Block E (3,195 sqm) is a double height single storey building (including 795 sqm at mezzanine level) and comprises of 15 no. units for trade park use; Block F (1,519 sqm) is a double height single storey unit for trade park use with single storey element to North elevation. The development also includes surface water drainage, 3 no. ESB substations, foul drainage and water supply infrastructure, yard areas, associated landscaping and all ancillary works, on a site of approx 3.54 hectares. Access to the site will be provided from the Northern boundary off the existing roundabout to Kilcarbery Business Park, via the internal road network permitted under Reg. Ref. SD06A/0568.	
26.	SD08A/0239 Dasnoc Limitied Distance from Site: c. 80m South	Temporary single storey prefabricated 'shomera' structure of 98.58sq.m. which will be used as a marketing suite/site office for the 'Profile Park' business park for a period of approximately 3-5 years. The structure is located adjacent to the eastern boundary of the business park, to the south and west of Grange Castle Golf Course. The development includes a temporary new access off the internal road network which amends the road layout permitted under planning application reg. ref. SD06A/0568, landscaping and site works, all on a site of approximately 1 hectare.	Granted 15/06/2008
27.	SD08A/0266 Dasnoc Limitied Distance from site: SW adjacent	Five storey headquarter office building which includes four storeys of office accommodation with a gross floor area of 2657.31sq.m. over a single storey level of undercroft car parking. The development also includes two no. single storey plant rooms of 69.42sq.m. at roof level. Access to the development is proposed from the Nangor Road via the internal Spine Road within the 'Profile Park' Business Park permitted under Planning Application Reg. Ref. SD06A/0568. The development includes 60 number car parking spaces which will be provided at undercroft level and 40 no. surface car parking spaces which will be provided at podium level above. The development also includes an ESB sub-station, all ancillary services, landscaping and site works on a site of 4899 hectares.	Granted 30/07/2008
28.	SD07A/0280 Applicant Percam Ltd.	Further Information - The proposed development now consists of: 43 Units in 7 blocks comprising 16 Industrial Units (Blocks 1, 2 and 7), 24 Warehouse Units (Blocks 4, 5 and 6) and 3 Science and Technology Units (Block 3) all with ancillary office space (total floor area approximately 12,558 sq. m.). Site development works including storm water attenuated works, water services, boundary fencing, temporary access haul road, estate roads and 2 no. E.S.B. sub-stations, 241 car parking spaces, all on a site of approx 3.314 hectares. (An increase in the overall floor area of the proposed development from 11,416 sq. m. to 12, 558 sq. m., increase in parking spaces from 168 to 241, a reduction in the number of units from 45 to 43, alterations to overall area and internal configuration of unit types A, B, C, D and D1, and reduction in floor area of ancillary office space, removal of 2 units onto internal access road (Block 4), relocation of unit from Block 5 to Block 3, relocation of waste collection area, cycle parking and 2 electricity sub-stations/switch rooms, and alterations to elevation onto internal access road, and alterations to internal access road layout).	Granted 23/10/2007

	Distance from Site: c.465m SW		
29.	SD08A/0113 Applicant Percam Ltd. Distance from Site: c.365m SW	1 no detached logistics / distribution warehouse unit with ancillary offices (total floor area c.1842 m.sq.m) and associated site works including storm - water , attenuation, water services and boundary fencing	Granted 20/05/2008
30.	SD08A/0052 Applicant Percam Ltd. Distance from Site: c.445m SW	(a) 2 no. semi-detached logistics / distribution warehouse units with ancillary offices (total floor c.3,574sq.m.) and associated site works including storm water attenuation, water services, boundary fencing; (b) extension of estate road previously permitted (SD07A/0280); (c) temporary access haul road previously permitted (SD07A/0280).	
31.	SD11A/0121 Applicant Elume Limtied Distance from Site: c.435m SW	Change of use of an existing logistics/distribution warehouse facility (approved under planning ref. no. SD08A/0052) to an electronic technology facility, associated works including modifications to existing structure. The development will consist of the following works and modifications to the existing building: installation of external plant over two storeys along the east and west elevations of the building on a new steel support system clad with acoustic louvered screens to match existing cladding colours; installation of a new first floor to provide additional plant areas; extension to the administration area at ground floor level with new windows to the south elevation to match existing; installation of additional windows at upper level over the existing administration area and existing roof lights removed; removal of existing doors to north facade and replacement with new cladding to colour match existing; associated internal alterations. Extent of site works includes: a sprinkler tank and pump house to the north east corner; extension of existing single storey substation in the south east corner to include a customer switch room; provision of a new main entrance to the east of the existing entrance to Unit 502, a new road layout, entrance gates and new entrance gates south of the building to access the car park; block existing main entrance to Unit 502 to provide set down area to access the ESB substation; construct a single storey security building to the east of the site with new gates and new visitor car parking; remove one existing dock leveller and an on-grade roller shutter door from the north west corner of the building with the existing depressed loading dock filled in; installation of self contained emergency stand by generators and other plant to the north west corner of the site, including all supporting structures for flues, and a 1.8m high fence and gate to generator enclosure; construct roadway around the building to the west, north and east of the site; boundary fencing around site with site landscaping; existing site entrance to Unit 503 to be retained as an alternative access point; divert existing culvert	Granted 02/08/2011

		along eastern side of the site to facilitate development; install a bicycle shelter to the south west of the site; increase in site area from 9131sq.m. to 13925sq.m.	
32.	SD14A/0023 Applicant Google Ireland Distance from Site c.405m SW	Construction of a two storey data storage facility (30,361sq.m.), a double height warehouse building (1,670 sq.m) and a HV Substation area with two buildings; 1 no. 2 storey building (968sq.m.) and 1 no. single storey building (190 sq.m) and associated site development works. Permission is also sought for a new site access and entrance gates, a security gatehouse, security gates, load bank garage, perimeter fencing, internal roadways, sprinkler tank, pump house, 10KV substation, water and fuel tanks, attenuation ponds, hard and soft landscaping, 83 no. new car parking spaces and bicycle shelter with ancillary site works. The highest point of any of the buildings is within 20m of the original ground level with the 25 no. stacks at 25m. Provision for a temporary construction entrance and haul road off the Baldonnel Road to the south of the site has been allowed for; an EIS (Environmental Impact Statement) will be submitted with this application, all on a 11.25 ha site.	Granted 15/05/2014
33.	SD14A/0284 Applicant Google Ireland Distance from site c. 405m SW	Alterations to previously granted Reg. Ref. SD14A/0023 consisting of alterations to the position of the security gatehouse and security gates, internal roads layout, attenuation ponds, access road to the two storey substation; alterations to the double height warehouse elevations plus an additional internal mezzanine level (floor area 165sq.m); alterations to the single storey substation building (increase in additional floor area of 88sq.m and compound area; alterations to the height of the Load Bank Garage Building; additional 27 car parking spaces; removal of previously granted MV substation to north west of site; all associated site development works required as part of the above mentioned alterations.	Granted 27/03/2015
34.	SD16A/0148 Applicant Google Ireland Distance from site c. 420m SW	The painting of 5 murals max. 12.25m high totalling (1,192sq.m) on external walls of existing building, smaller images on 3 external flues (total 10sq.m) also mural painting on a 7.5m high external sprinkler tank (surface area 250sq.m). The installation of an external fence1.8m high x 18m long inside the existing perimter fence at external dining area with mural painted on the internal face (area 33sq.m) Total area of all murals is 1485sq.m. The murals will be lit with light fittings either on the building or nearby poles or ground.	Granted 03/08/2016
35.	SD23A/0012 Applicant: MacCabe Durney Barnes	Construction of a new Battery Energy System Storage (BESS) and Power Trunk building and all associated elements; Demolition of all existing structures on site associated with the current golf centre - including main clubhouse and a number of ancillary structures (total 1,009.84sq.m); Construction of a two storey power trunk building (maximum height 10.3m) over basement of 1,982.61sq.m containing MV switchgear; Construction of a BESS to reach a total capacity of 186.3 MWe; The facility will be within an open three storey structure (maximum height of 17.3m), totalling 18,560.9sq.m in area, containing 63 battery containers, & 63 no containers containing power invertors, step up transformers and electrical switchgear and roof level array of 1384 PV panels; 1 two storey administrative welfare buildings (298.26sq.m) associated with the BESS facility; It will be provided with a pre-cast wastewater treatment plant (up to 6 P.E.)	Further Information Requested Application submitted 24/01/2023

	Distance from site c. 2.3km west	discharging to percolation area with polishing filter for foul effluent; 1 single storey Fire Pump and Water Service Plantroom of 174.1sq.m, with associated water tank -associated with the BESS facility; 1 underground rainwater harvesting tank (volume 125 cubic meters - associated with the BESS facility of 35sq.m; 9 car parking spaces (including 3 disabled and 2 electric vehicle charging parking spaces) and 8 cycle spaces; The removal of an existing 15m high telecommunication support structure; Internal road network and new servicing access road from an entrance on Peamount Lane - with amendments to the existing entrance, comprising widening the entrance, provision of new security checkpoint, setting back of the boundary to achieve sufficient visibility splays, and reinstatement of appropriate boundary treatment along the Peamount Lane frontage; Site landscaping, planting, berms and retaining walls along site boundaries and security fencing; and all associated site services, lighting, infrastructural works and attenuation (SUDS features, underground storage and an above ground pond).	
36.	SD16A/0236 Applicant: Pfizer 10 year permission Distance from site : 500m north	A new 5 storey bio-pharmaceutical manufacturing building to be built in two phases. Phase 1 sized 20,320sq.ms and 28.2 meters high including a single storey link sized 1,203sq.m, and Phase 2 sized 14,320sq.m and 28.2 meters high, including a single storey link sized 750sq.m, located to the south of their existing Drug Substance Building. A single storey warehouse extension located to the south of the existing warehouse including new docking facilities sized 1,142sq.m and 11.2 meter high. A three storey extension located to the east of the existing laboratory building sized 1,328sq.m and 17.6 meters high. A new south elevation with new windows on the fourth floor of the existing drug substance building. New site works including 565 new car parking spaces of which 282 are relocated car parking spaces - 282 spaces lost due to the development footprint - located to the north of the site, together with a new bicycle parking facility, a new permanent heavy goods entrance at the current construction entrance to the south boundary of the campus and new fencing, 2.1 meters high, to the east, west and south side boundaries. Permanent car parking of 350 spaces for sustaining construction and contract personnel utilising a portion of the existing temporary contractor car park. Upon completion of the construction and commissioning activities, the remainder of the contractor car park will be decommissioned. A new single storey security building sized 56sq.m and revisions and alterations to the existing road, services and landscaping and new items of plant and equipment located in the existing and proposed yards, and associated pipe bridges. All associated site works. A 10 year planning permission is sought for this proposed development. The application consists of a variation to a previously permitted development on an activity for which a licence under Part IV of the Environmental Protection Agency Act 1992 (as amended for the Protection of the Environment Act 2003) is required and full details of the proposed development and its anticipated environmental impacts will be notified to the Environmental Protection Agency. An Environmental Impact Statement accompanies this application, and it will be avialable for inspection or purchase at the office of the Planning Authority.	Granted: 31/08/2016 10 year permission
37.	SHD3ABP-305267-19 Applicant; Adwood Limitied Distance from site: 750m east	1034 residential units comprising of (578 houses: 449 3-bed & 129 4-bed), 456 apartments: 142 1-bed, 224 2-bed, 90 3-bed), 2 childcare facilities (1 temporary, 1 permanent), 1 retail unit, 1 community facility and all associated site works.	Granted: 05/12/2019
38.	SD22A/0333	Construction of 2 adjoined single storey data centres with associated office and service areas with an overall gross floor area of 15,274sq.m comprising of the construction of 2 adjoined single storey data centres with a gross floor area of 12,859sq.m that will include a single storey goods receiving area / store and single storey office area (2,415sq.m) with PV panels above, located to the east of the data centres as well as associated water tower, sprinkler tank, pump house and other services; The data centres will also include plant at roof level;	Additional Information

	Applicant: EdgeConnex Ireland Limited Distance from site: 1.9km north west	with 24 standby diesel generators with associated flues (each 25m high) that will be located within a generator yard to the west of the data centres; New internal access road and security gates to serve the proposed development that will provide access to 36 new car parking spaces (including 4 electric and 2 disabled spaces) and sheltered bicycle parking to serve the new data centres; New attenuation ponds to the north of the proposed data centres; Green walls are proposed to the south and east that will enclose the water tower and pump house compound; The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage; The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042; The site will remain enclosed by landscaping to all boundaries; The development will be accessed off the R120 via the permitted access granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SD21A/0042; An Environmental Impact Assessment Report (EIAR) has been submitted with this application.	Requested 10/10/2022
39.	SD22A/0105 Applicant: EdgeConnex Ireland Limited Distance from site: 1.9km North West	Amendments to the electrical substation compound and structures permitted under Reg. Ref. SD19A/0042 and ABP Ref. 305948-19 comprising of amendment to the layout and extent of the permitted substation compound, to include an extension of the compound area to c. 0.77 hectares; reorientation of the Gas Insulated Switchgear (GIS) substation building to a north-south orientation, and associated amendments to the building footprint, layout, and elevations, providing for a two storey building with a gross floor area (GFA) of c. 1,456 sq.m; alterations to the permitted single storey Client Control Building to provide for the substitution of this structure with 5 single storey modular client control units, with a combined total GFA of c. 231 sq.m (GFA of c. 46.2 sq.m per module); associated amendments to the permitted substation access arrangements (3 gated access points provided), transformers, security fencing (to be 2.6 metres high in place of the 2.4 metre high fencing permitted), lighting, services, MV substation, parking, utility cabling, amendments to permitted landscaping and berms adjoining the substation compound and associated and ancillary works.	Granted: 19/06/2019
40.	SD22A/0289 Applicant: EdgeConnex Ireland Limited Distance from site: 1.9km North West	The development will consist of the amendment of Condition no. 3 (ii) and 3 (iii) of the permission granted under Reg. Ref. SO21A/0042 that related to the Gas Plant of the overall permitted development only, so that these aspects of the new condition shall read as follows: Condition no. 3(ii) Within four (4) years from the date the first Gas Plant commences operation, the applicant or operator shall undertake a review with GNI of the ability to serve the Gas Plant with green gas and / or hydrogen (or similar fuels) shall be Investigated and reported to the Planning Authority. Any ability for the Gas Plant to be operated with green gas and/ or hydrogen (or similar fuels) shall be implemented within an agreed timeline agreed with GNI. Condition no. 3(iii) If the applicant receives a firm offer from Eirgrid under which the Gas Plant is not required, and the connection has been realized with capacity onsite from Eirgrid, then the Gas Plants shall be removed from the entire site within a year of the ceasing of operation. The nature and extent of the permitted Gas Plants, or any other element of the parent permission granted under Reg. Ref. SD21A/0042 will otherwise not be amended by this application. An EPA-Industrial Emissions (IE) licence will be applied for to facilitate the operation of the Gas Plant that Is subject of this amendment application.	Granted: 22/08/2022
41.	SD21A/0042	Construction of two single storey data centres with associated office and service areas; and three gas powered generation plant buildings with an overall gross floor area of 24,624sq.m that will comprise of the following: Demolition of abandoned single storey dwelling, remaining agricultural shed and derelict former farm building; Construction of 2 single storey data centres (12,797sq.m), both with associated plant at roof level, with 24 standby diesel generators with associated flues (each 25m high) that will be attached to a single	Granted: 19/01/2022

	Applicant: EdgeConnex Ireland Limited Distance from site: 1.9km North West	storey goods receiving area/store and a single storey office area (2,404sq.m) located to the west of the data centres as well as associated water tower and sprinkler tank and other services; Amendments to the internal access road and omission of access to loading bay permitted under SDCC planning Ref. SD19A/0042/ABP Ref. PL06S.305948 that include the relocation of permitted, and new, internal security gates; and new internal access roads to serve the proposed development that will provide access to 39 new car parking spaces (including 4 electric and 2 disabled spaces) and sheltered bicycle parking to serve the new data centres; The development will also include the phased development of 3 two storey gas powered generation plants (9,286sq.m) within three individual buildings and ancillary development to provide power to facilitate the development of the overall site to be located within the south-west part of the overall site. Gas plant 1 (3,045sq.m) will contain 20 generator units (18+2) with associated flues (each 25m high) will facilitate, once operational the decommissioning of the temporary Gas Powered Generation Plant within its open compound as granted under SDCC Planning Ref. SD19A/0042/ABP Ref. PL06S.305948. Gas plant 2 (3,045sq.m) will contain 20 generator units (18+2) with associated flues (each 25m high). and, Gas plant 3 (3,196sq.m) will contain 21 generator units (19+2) with associated flues (each 25m high). These plants will be built to provide power to each data centre, if and, when required. The gas plants will be required as back up power generation once the permitted power connection via the permitted substation is achieved; New attenuation pond to the north of the site; Green walls are proposed on the southern elevation of each power plant, as well as to the northern elevation of the generator compound of the data centres, and enclosing the water tower/pump room compound, and a new hedgerow is proposed linking east and west of the site; Proposed above ground gas installation compound to contain single storey kiosk (93sq.m) and boiler room (44sq.m). The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC planning Ref. SD19A/0042/ABP Ref. PL06S.305948. The site will remain enclosed by landscaping to all boundaries. The development will be accessed off the R120 via the permitted access granted under SDCC planning Ref. SD19A/0042/ABP Ref. PL06S.305948. An EPA-Industrial Emissions (IE) licence will be applied for to facilitate the operation of the gas powered generation plant. An Environment Impact Assessment Report (EIAR) has been submitted with this application. All on a site of 22.1hectares.	
42.	SD21A/0127 Applicant: EdgeConnex Ireland Limited Distance from Site: 1.1km	Retention of 1 standby diesel generator with an associated flue (15m high) within the permitted generator compound located to the east of the data centre granted under SDCC Reg. SD16A/0345 increasing the number of standby diesel generators from 5 to 6 within the permitted compound.	Granted permission for retention: 23/08/2021
43.	SD16A/0345 Applicant: EdgeConnex Ireland Limited	Construction of a new single storey data hall of 4,176sq.m as an extension to the immediate south of the data hall and single storey office (5,776sq.m) permitted under Reg. Ref. SD16A/0214 to create an overall development of 9,952sq.m. The new data hall will include plant at roof level, associated support services, 5 standby generators with associated flues (each 15m high) and services road. The development will also include a temporary gas powered generation plant within a walled yard containing 12 generator units with associated flues (each 15m high) to be located within and to the rear of the Takeda Ireland complex to the east side of the site. The development will also include a new two storey ESB substation (507sq.m) with associated transformer yard and single storey transformer building (157.5sq.m) to replace aforementioned temporary gas generation plant and will be located to north of entrance into the site from Grange Castle. The	Granted: 10/01/2017

	Distance from Site: 1.1km North West	development will also include ancillary site works, including attenuation pond, connections to existing Grange Castle infrastructural services as well as fencing, signage, and will include new vehicular access to the generator farm and sub-station off the permitted service road as granted under Reg. Ref. SD16A/0214. The development will be enclosed with landscaping to all frontages. An Environmental Impact Statement (EIS) has been submitted with this application.	

Appendix 19.1 List of Cumulative Developments