ENVIRONMENTAL IMPACT ASSESSMENT REPORT – VOLUME II (APPENDICES)

STRATEGIC HOUSING DEVELOPMENT & VILLAGE CENTRE

AT

PRIORSLAND, CHERRYWOOD, DUBLIN 18.

PREPARED BY

MCGILL PLANNING LTD.

IN ASSOCIATION WITH:

MOLA ARCHITECTS
PUNCH CONSULTING ENGINEERS
ALTEMAR ECOLOGISTS
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3D DESIGN BUREAU

APRIL 2022

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APPENDIX 5.1 BAT FAUNA SURVEY

Bat Fauna Survey for a proposed Strategic Housing Development (SHD) at Priorsland, Cherrywood, Dublin 18.

6th April 2022

Prepared by: Bryan Deegan (MCIEEM) of Altemar Ltd.
On behalf of: 1 Carrickmines Land Limited.

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SUMMARY

Structure:	The subject site consists of two fields surrounded primarily by hedgerows which are bisected by a treeline which contains the Carrickmines River.
Location:	Priorsland, Cherrywood, Dublin 18.
Bat species present:	None Roosting on site. Leislers bat/ Lesser Noctule (*Nyctalus leisleri*) and Soprano Pipistrelles (*Pipistrellus pygmaeus*) were noted foraging on site.
Proposed work:	Proposed Strategic Housing Development (SHD).
Impact on bats:	Consultation has taken place in relation to the potential impact of lighting on foraging particularly within the riparian corridor and treeline area. The proposed lighting has been modified to allow for foraging activity to continue on site. Increased disturbance and lighting may reduce foraging on site but is expected that foraging would continue on site given the low levels of lighting that have been applies in the riparian corridor area.
Survey by:	Bryan Deegan MCIEEM
Survey dates:	20th September 2020 & 9th July 2021

Receiving Environment

Background

1 Carrickmines Land Limited. intend to apply for planning permission for a proposed Strategic Housing Development at Priorsland, Cherrywood, Dublin 18.

The development will comprise a mixed-use village centre and residential development of 443 no. units comprising 6 no. blocks (A-F) of apartments (up to 5 storeys with basement/undercroft parking) providing 402 no. apartments units (146 no. 1-beds; 218 no. 2-beds and 38 no. 3-beds), and 41 no. houses (19 no. 3-beds and 22 no. 4-beds). All apartments provided with private balconies/terraces. Provision of indoor residential facilities to serve apartment residents.

The Village Centre and non-residential elements will comprise a supermarket, local retail/retail service units, non-retail commercial units, creche, gym, community space, and offices (High Intensity Employment) use.

Provision of car/bicycle/motorcycle parking; ESB sub-stations; bin storages areas, and all associated plant areas.

Provision of the first phase of Priorsland Park (on lands within the applicant's ownership) and other public and communal open spaces.

Construction of Castle Street through the subject lands and two road bridges across the Carrickmines Stream, one to serve the future school site/ park, the second to provide pedestrian and cyclist access to the Carrickmines Luas station and future Transport Interchange to the north. Provision of an additional pedestrian bridge to the park. Provision of an acoustic barrier along the southern/western edge of the site.

All associated site development works, landscaping, boundary treatments and services provision.

The proposed site outline, location, and layout plan are demonstrated in Figures 1 & 2.

Landscape

A Landscape Design Rationale has been prepared by Dermot Foley Landscape Architects to accompany this planning application. This document outlines the following landscape strategy for the proposed development:

'*The proposal for the Landscape at Priorsland strives to retain and enhance the existing character and quality of the site. In relation to the proposed use, the site must be re-examined through the lens of a small and sustainable microcosm landscape – a village centre with retail, schooling, recreation, housing, and amenity space. The existing Priorsland site has a number of particularly special existing features that must be maintained in this change of usage – including the protection of the particularly important row of Turkish Oak trees.*

The main objectives of the landscape strategy are:

1. *Proposed realistic retention of existing trees and replacement planting*
2. *Integration of the scheme within the wider context.*
3. *Maintain the distinct spatial character of the existing site, while enhancing the identity.*
4. *Provide a safe and accessible environment.*
5. *Provide new opportunities for the protection and establishment of habitat.*
6. *Creation of Priorsland Park.*'

Further, in relation to biodiversity, this document outlines the following:

'*The environment that the Priorsland development proposal intends to create is one with rich biodiversity. Coordination with a team of ecologists has been carried out to develop a strong plan for the continued growth and flourishing ecology within Priorsland (refer to Ecologist's report for steps taken to improve biodiversity and native vegetation). This biodiversity is linked to a greater network of green space within the Cherrywood SDZ – Tully park, Lehaunstown public open space, etc.*'

The proposed landscape masterplan is demonstrated in Figure 3.

Figure 1. *Proposed site outline and location*

Figure 2. *Proposed site layout plan*

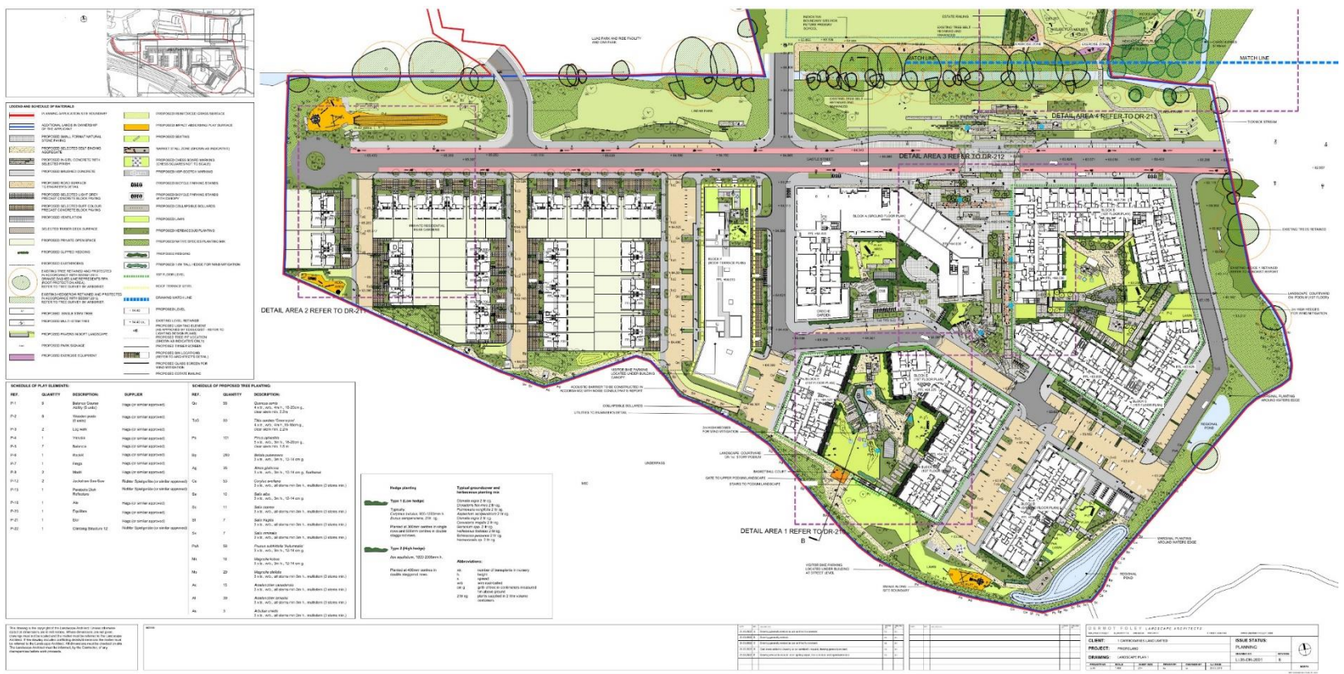

Figure 3. *Proposed landscape plan (1)*

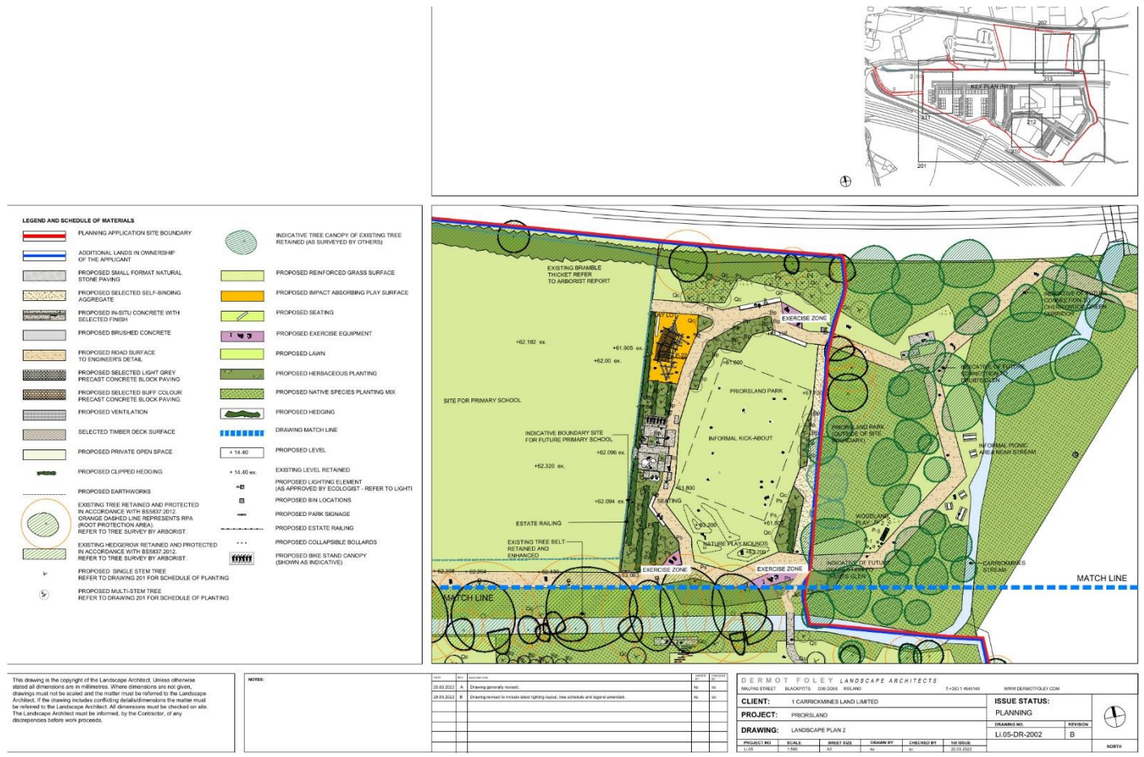

Figure 4. *Proposed landscape plan (2)*

Figure 5. *Proposed landscape sections*

Arborist

An Arboricultural Report has been prepared by The Tree File Ltd. to accompany this planning application. This report identifies the following development impacts to trees and outlines the following in relation to tree retention and loss:

'***Identification of Development Impacts to Trees***

*The expected tree impacts have been represented graphically on the tree impacts drawing "**Priorsland Tree Impacts Plan"**, as well as within the narrative of this report. This drawing combines the tree constraints plan information with the current stage development details including the architectural and services layouts below, thereby allowing for simple direct comparisons to be made between the existing site context and the development proposals in respect of new structures.*

In this drawing, trees denoted with "Broken Pink" crown outlines are to be removed and those denoted with "Continuous Green" crown outlines are to be retained.

The evaluation is primarily based on minimum protection ranges as defined paragraphs 4.6.1, 4.6.2 and 4.6.3 of BS 5837:2012. Any structure, action or apparent need to enter or otherwise disturb/convert the "root protection area" of a site tree has been considered likely to have a negative impact, with the potential to render a tree wholly unsuitable for retention, unsafe or unsustainable.

The broader assessment attempts to consider both direct and indirect implications, based on perceived construction requirements, as well as how a tree will likely interact with the development in respect of growth, hazard development, light blockage and other social concerns in respect of the changing context, including its effect on tree amenity value.

Tree Retention and Loss

The drawing "Priorsland Tree Impacts Plan" comprises the tree survey drawings overlaid by the development drawings, thus providing a graphic representation of the relationship between tree constraints and the development elements. In this drawing, the trees that will be removed, are highlighted in "pink dashed" outlines.

The nature and extent of the proposed development and its unavoidable need to convert or otherwise disturb the existing site conditions effectively requires the removal of all site trees as outlined below-

The site as reviewed, currently supports 104no. trees or tree groups, as well as 3no. multi-plant groups such as woodlands or hedges. The individually described trees include-

- *1no. category A trees*
- *24 no. category B trees*
- *56 no. category C trees*
- *23 no. category U trees*

The category "U" (unsustainable or unsuitable for retention) trees that are recommended for removal include Nos.1, 10, 14, 17, 23, 33, 34, 39, 45, 65, 67, 68, 69, 70, 71, 84, 85, 95, 96, 97, 98 and 99.

Note must be made that of the above trees, numbers 39, 65, 67, 68, 69, 70, 71, 84 and 85 are located at positions directly adjoining but outside of the site red line. Therefore, and whilst their removal is recommended, such removals are beyond the jurisdiction of the site and can only be undertaken by the lawful tree owners.

Additionally and though of poor condition, Oak No.6 offer limited sustainability with structural pruning as an alternative to immediate removal (see survey).

The site supports only one category "A" tree, No.74 that appears retainable within the proposed development context.

Of the site's category "B" trees, the development will require the loss of Nos.32, 36, 37, 50, 52 and 53.

Of the site's category "C" trees the development will require the removal of Nos.31, 35, 51, 58, 78, 79, 80, 86, 93, 94 and 95.

Located outside of the site further trees may be affected including tree nos.39 (category U), 58 (category C) and 86 (category C). Some of these appear likely to be removed in line with future works and developments of adjoining sites.'

The Tree Constraints Plan, Tree Impact Plan, and Tree Protection Plan (East & West) prepared by The Tree File Ltd. to accompany this planning application are demonstrated in Figures 6 - 11 below.

Lighting

A Site Services - Public Lighting Layout has been prepared by Fallon Design M & E Engineering to accompany this planning application and is demonstrated in Figure 12. Lighting is not proposed in the northern field (openspace area) or in the riparian area of the Carrickmines River, with the exception of the bridge crossings.

Figure 6. Tree constraints plan - East

Figure 7. Tree constraints plan - West

Figure 8. Tree impacts plan - East

Figure 9. Tree impacts plan - West

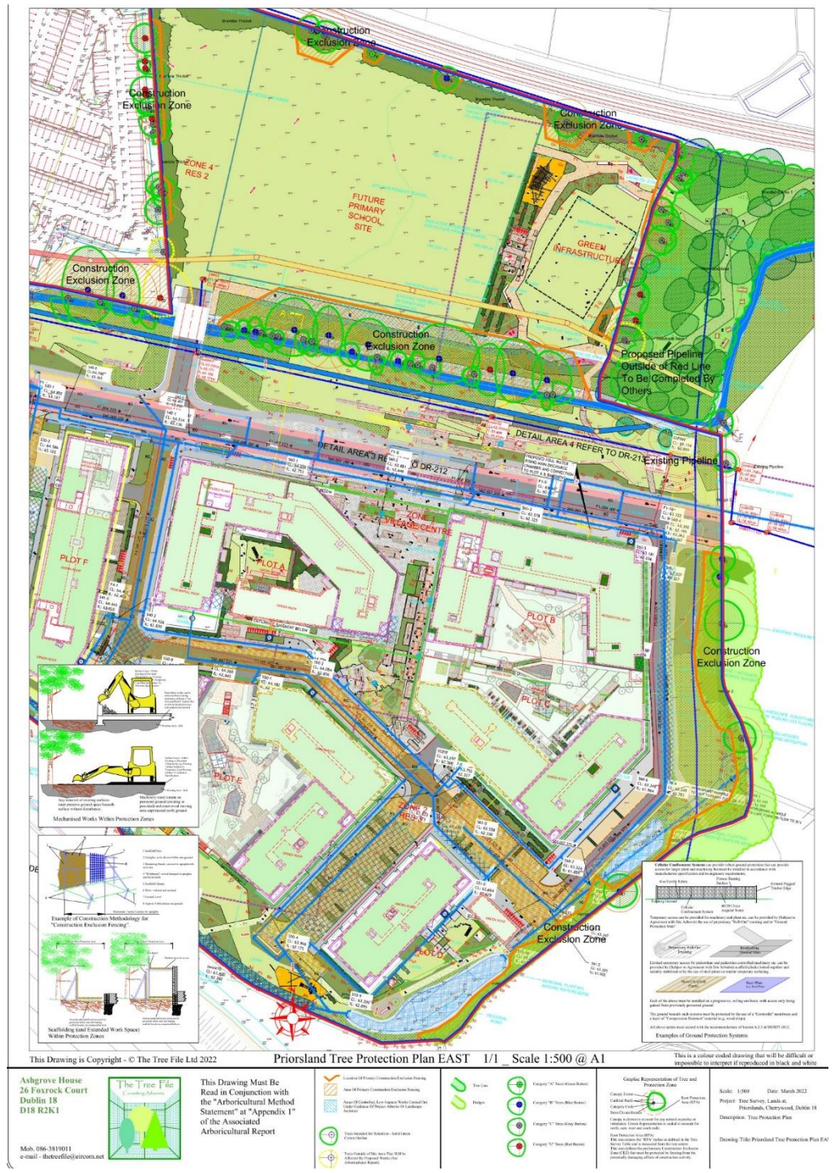

Figure 10. Tree protection plan - East

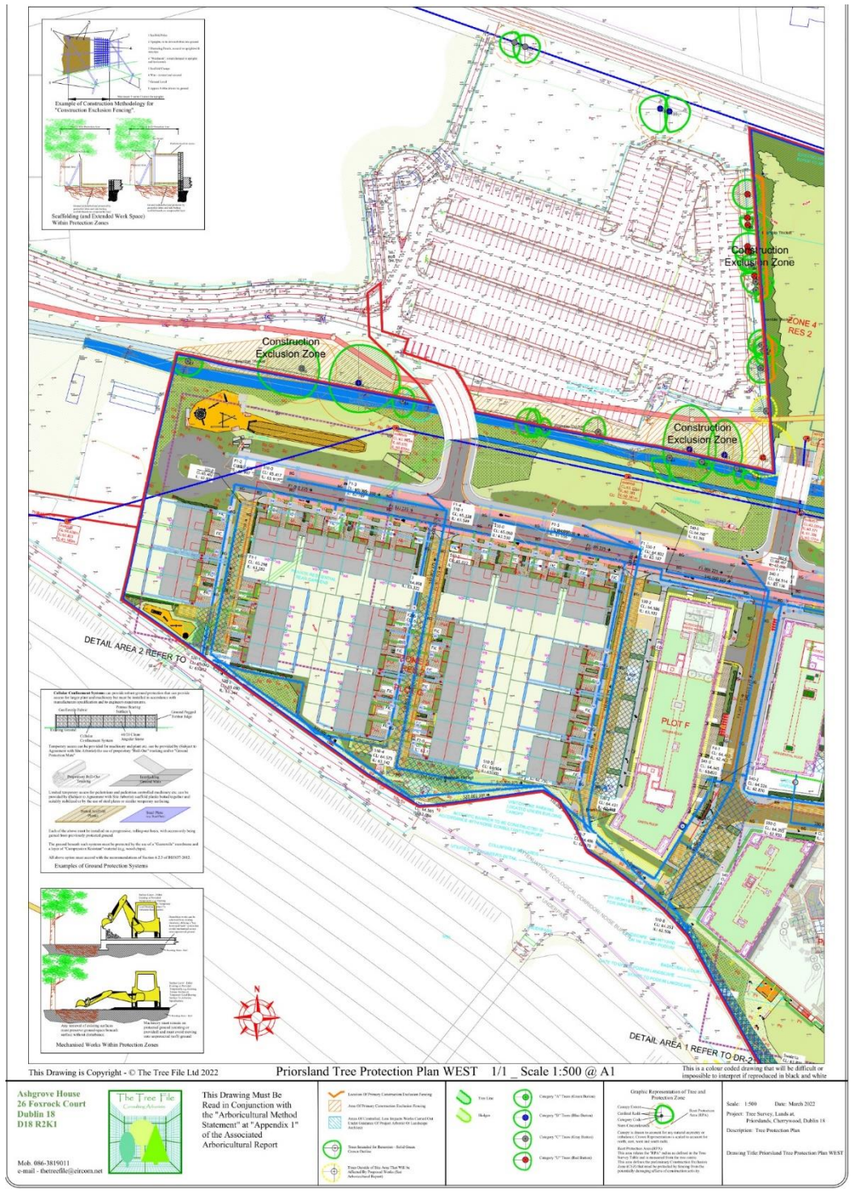

Figure 11. Tree protection plan - West

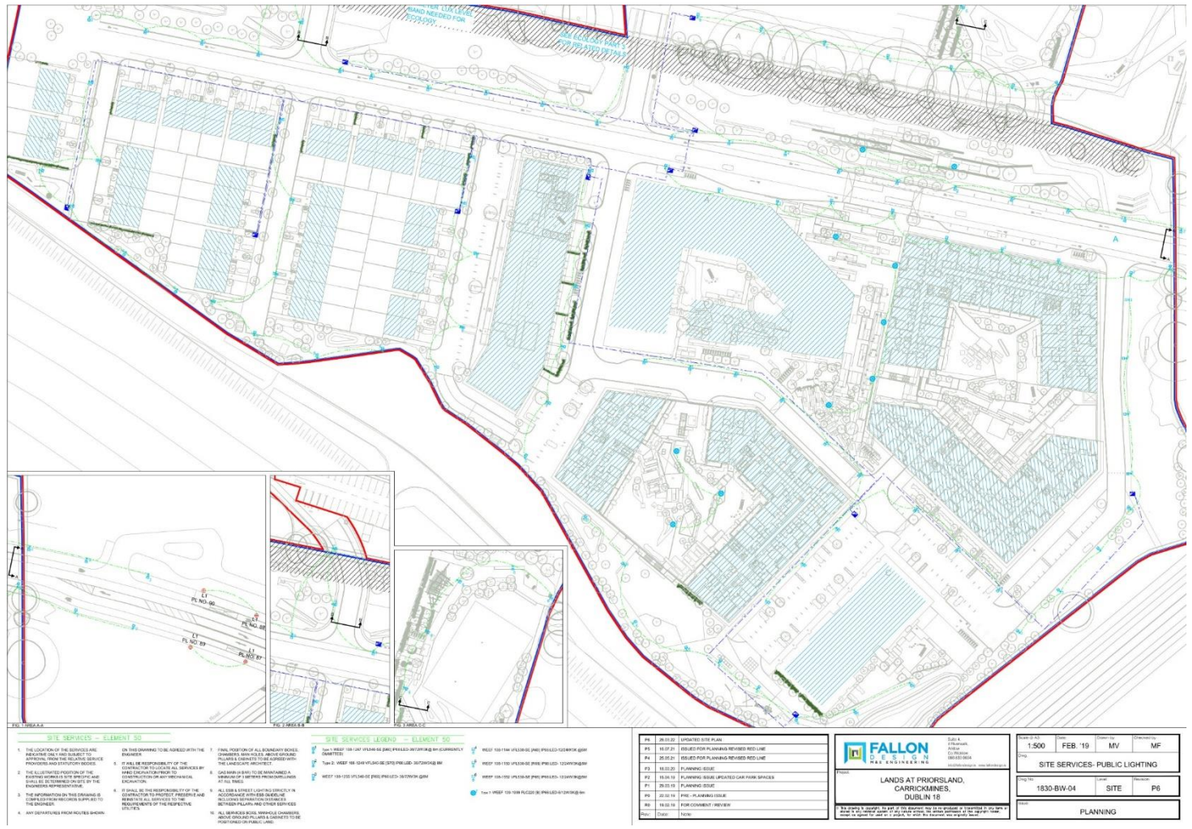

Figure 12. Site services – public lighting

Competency of Assessor

This report has been prepared by Bryan Deegan MSc, BSc (MCIEEM). Bryan has over 27 years of experience providing ecological consultancy services in Ireland. He has extensive experience in carrying out a wide range of bat surveys including dusk emergence, dawn re-entry and static detector surveys. He also has extensive experience reducing the potential impact of projects that involve external lighting on Bats. Bryan trained with Conor Kelleher author of the Bat Mitigation Guidelines for Ireland (Kelleher and Marnell (2007)) and Bryan is currently providing bat ecology (impact assessment and enhancement) services to Dun Laoghaire Rathdown County Council primarily on the Shanganagh Park Masterplan. The desk and field surveys were carried out having regard to the guidance: Bat Surveys for Professional Ecologists – Good Practice Guidelines 3rd Edition (Collins, J. (Ed.) 2016) and Kelleher and Marnell (2007), Bat Mitigation Guidelines for Ireland.

Legislative Context

Wildlife (Amendment) Act 2000.

Bats in Ireland are protected by the Wildlife (Amendment) Act 2000. Based on this legislation it is an offence to wilfully interfere with or destroy the breeding or resting place of any species of bat. Under this legislation it is an offence to "*Intentionally kill, injure or take a bat, possess or control any live or dead specimen or anything derived from a bat, wilfully interfere with any structure or place used for breeding or resting by a bat, wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose. "*

Habitats Directive- Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora transposed into Irish Law i.e. European Communities (Natural Habitats) Regulations, 1997 (SI No. 64/1997).

Annex II of the Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) lists animal and plant species of Community interest, the conservation of which requires the designation of Special Areas of Conservation (SACs); Annex IV lists animal and plant species of Community interest in need of strict protection. All bat species in Ireland are listed on Annex IV of the Directive, while the Lesser Horseshoe Bat (*Rhinolophus hipposideros*) is protected under Annex II which related to the designation of Special Areas of Conservation for a species.

Under section 23 of SI No. 64/1997 all bats are listed under the first schedule of Section 23 which makes it an offence to:

- deliberately capture a bat
- deliberately disturb a bat,
- damage or destroy a breeding site or resting place of a bat.

Bat survey

This report presents the results of two bat hand held emergent and detector surveys (20th September 2020 & 9th July 2021), undertaken by Bryan Deegan (MCIEEM). Bat detector and emergent detector survey used an Echo Meter Touch 2 Pro in addition to a *Batbox Duet* heterodyne/frequency division detector to determine bat activity.

Tree Roosting Potential Survey

The survey on July 2021 also highlighted trees of bat roosting potential on site. In relation to bat roosting potential, the site comprised of large fields surrounded by mature hedgerows with a treeline and the Carrickmines River bisecting the site. It should be noted that the treeline in the centre of the site of Turkey Oaks is considered to be the most important feature for bats. No bats were observed emerging from trees on site

A derogation licence is not required to fell the trees of roosting potential, as no bat were actually observed emerging from the trees. However, it recommended that a pre-construction inspection is carried out and the trees are studied in detail to ensure that roosts are not present at the time of felling, if required. If a bat roost is found to be present during the pre-construction survey the tree must not be felled until a derogation licence had been granted and the bat specialist has approved the felling post mitigation.

Survey constraints

The detector surveys were all undertaken during the active bat season. Weather conditions were good with temperatures greater than 10°C. Winds were light and there was no rainfall during the surveys.

Bat assessment findings

Review of local bat records

The review of existing bat records (sourced from Bat Conservation Ireland's National Bat Records Database) within two 2km^2 grid (Reference grids O22G & O22H) encompassing the study area reveals that six of the nine known Irish species have been observed locally (Table 1). Two reference grids were assessed as the subject site does not fall entirely into one reference grid. The National Biodiversity Data Centre's online viewer was consulted in order to determine whether there have been recorded bat sightings in the wider area. This is visually represented in Figures 13 - 15. The following species were noted in the wider area: Brown Long-eared Bat (*Plecotus auritus*), Daubenton's Bat (*Myotis daubentonii*), Natterer's Bat (*Myotis nattereri*), Lesser Noctule (*Nyctalus leisleri)*, and Soprano Pipistrelle (*Pipistrellus pygmaeus*) (Figures 13-15).

Table 1a. *Bat species recorded within Reference Grid O22G*

Species name	Record count	Date of last record
None	None	N/A

Table 1b. *Bat species recorded within Reference Grid O22H*

Species name	Record count	Date of last record
Brown Long-eared Bat (*Plecotus auritus*)	3	01/05/2012
Daubenton's Bat (*Myotis daubentonii*)	1	17/09/2005
Natterer's Bat (*Myotis nattereri*)	1	17/09/2005
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	5	01/05/2012
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	5	01/05/2012

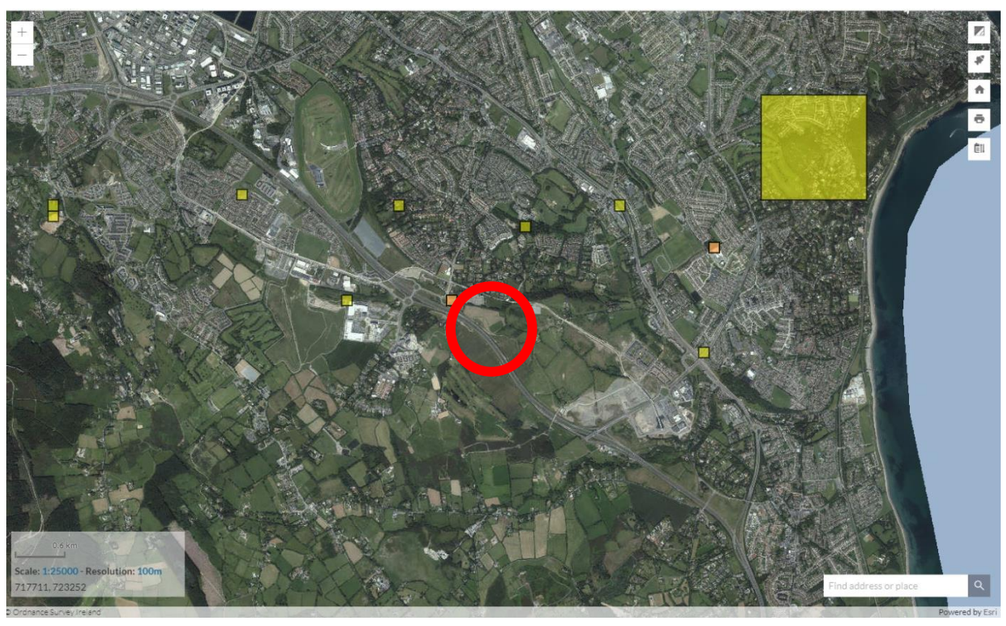

Figure 13. Daubenton's Bat (*Myotis daubentonii*) (purple), Brown Long-eared Bat (*Plecotus auritus*) (yellow), and both Daubenton's Bat and Brown Long-eared Bat (orange) (Source NBDC) (Site – red circle)

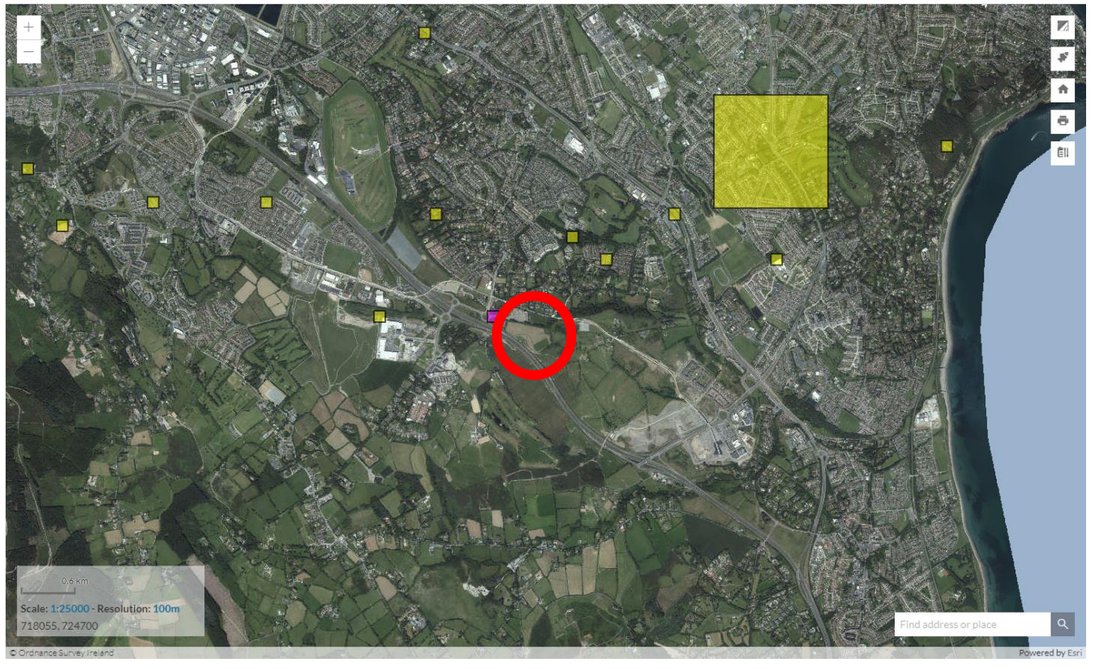

Figure 14. Natterer's Bat (*Myotis nattereri*) (purple) and Lesser Noctule (*Nyctalus leisleri*) (yellow) (Source NBDC) (Site – Red circle)

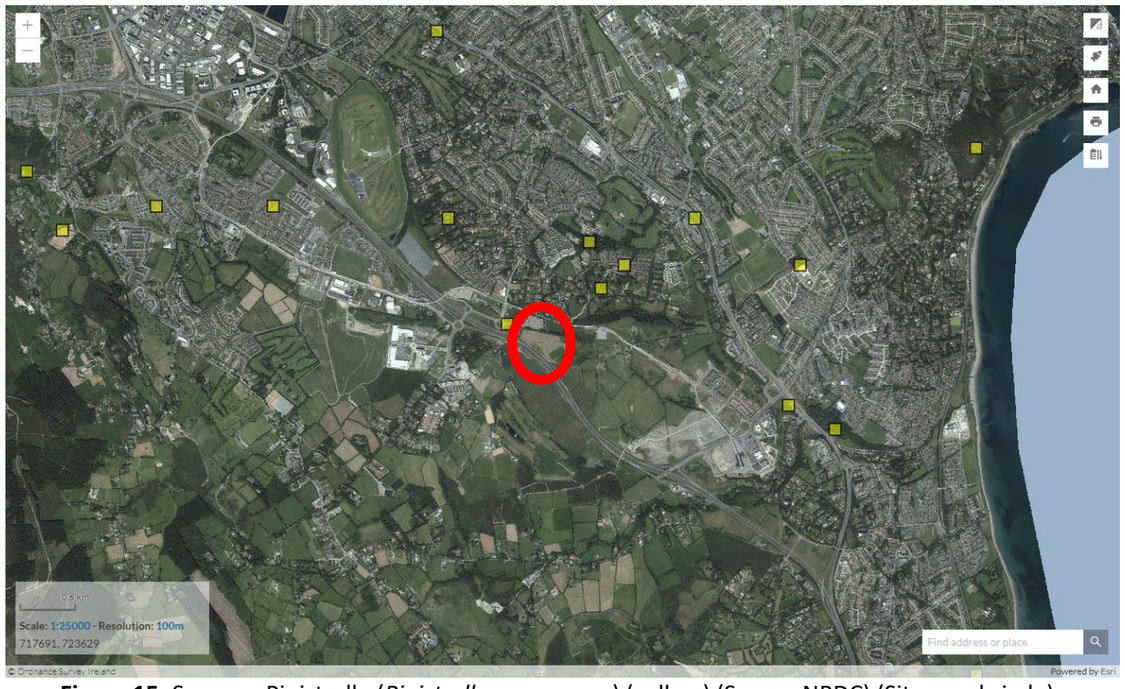

Figure 15. Soprano Pipistrelle (*Pipistrellus pygmaeus*) (yellow) (Source NBDC) (Site – red circle)

Specifically, NBDC records show sightings of bat species in locations that are in close proximity to the subject site:

1. Soprano Pipistrelle (*Pipistrellus pygmaeus)* in grid reference O220240. Recorded on 17/09/2005 and located 60m West of the subject site.
2. Natterer's Bat (*Myotis nattereri*) in grid reference O220240. Recorded on 17/09/2005 and located 60m West of the subject site.
3. Brown Long-eared Bat (*Plecotus auritus*) in grid reference O220240. Recorded on 17/09/2005 and located 60m West of the subject site.
4. Daubenton's Bat (*Myotis daubentonii*) in grid reference O220240. Recorded on 17/09/2005 and located 60m West of the subject site.

Cherrywood Strategic Development Zone Biodiversity Plan

The Cherrywood Strategic Development Zone (SDZ) Biodiversity Plan was prepared by Scott Cawley Ltd. to accompany the Cherrywood Planning Scheme. This Plan '*This Plan forms part of the draft Planning Scheme Documentation and should be read alongside maps and sections of the Scheme where appropriate. The function of this Plan is to provide a summary of the strategy behind the design of the Planning Scheme in terms of the retention, protection and management of ecological resources. Its objectives are to achieve the following during the implementation of the draft Planning Scheme: a) Avoid or minimise the disturbance to or loss of semi-natural habitats; b) Avoid or minimise the disturbance to or loss of protected flora and fauna; c) To encourage retention of existing habitats of ecological importance as part of green infrastructure and hence create ecological corridors; d) To promote management of retained and newly created habitats in order to maximise their biodiversity potential and minimise the net loss of biodiversity in the area.*'

This Plan outlines the following in relation to bats:

All of Ireland's bat species, with the exception of Nathusius' Pipistrelle (*Pipistrellus nathusii*) and Lesser Horseshoe Bat (*Rhinolopus hipposideros*), were recorded within the Cherrywood SDZ Lands during surveys undertaken to inform the Cherrywood Planning Scheme Biodiversity Plan[1] (Dun Laoghaire-Rathdown County Council, 2014). This Biodiversity Plan outlines the following:

'*Roosts were recorded at several locations in the SDZ lands but it is thought that bats may make occasional use of many more trees and structures than were recorded in the surveys in 2010. All bat surveys represent snapshots of bat activity and small roosts used by low numbers of individual bats may remain undetected despite repeated attempts to look for them.*'

The Biodiversity Plan indicates that the Priorsland lands were surveyed by Scott Cawley Ltd. in 2006. The following results were noted:

- **Results of Daytime internal / external surveys:** No exterior or interior evidence for bats in main house or outbuildings. Evidence for pipistrelle and Brown long-eared bats using stable block.
- **Results of Dusk / Dawn Surveys:** Unknown number of Common pipistrelle bats recorded entering roosts under eaves on the North-East corner and South-East corner of the main house.

The Biodiversity Plan outlines the following in relation to potential bat roosts:'*Potential roosts within trees were not directly surveyed but groups of trees or isolated mature trees were surveyed if they appeared to offer high roosting potential for bats. Roosting potential for trees was based on the following characteristics:*

- *Natural holes*
- *Cracks/splits in major limbs*
- *Loose bark*
- *Behind dense, thick-stemmed ivy*
- *Hollows/cavities*
- *Within dense epicormic growth*
- *Bird and bat boxes (from BCT, 2008)*

The best examples were the line of trees (including Turkey Oaks Quercus cerris) near Priorsland, trees in Druid's Glen and those surrounding Lehaunstown Park. Due to the difficulties in detecting tree roosts using standard techniques, it will be important to adopt a precautionary approach with regard to future development affecting these trees.'

Following the surveys completed in 2010, it was confirmed that a bat roost was present in Priorsland House. Further, in relation to bat activity recorded along the Carrickmines River valley, this report outlines the following: '***Carrickmines River valley (lower):*** *Bat activity was abundant around the area of the calcareous springs and along the upper treeline. Species included Pipistrelle bats, Leisler's bat and Daubenton's bats*.' Additionally: '*Bats were found flying and feeding across almost all areas of the SDZ but were found in highest numbers around dense linear treelines and hedgerow and around the wooded river valleys.*'

[1] https://www.dlrcoco.ie/sites/default/files/atoms/files/cherrywood_biodiversity.pdf

Detector survey

As seen in Figure 16, bat activity on site was concentrated in the darker areas of the site away from the M50 and Luas parking area. No bats emerging onsite trees was were noted. Two species were noted foraging on site, Soprano pipistrelle (*Pipistrellus pygmaeus*) and Lesser Noctule (*Nyctalus leisleri*).

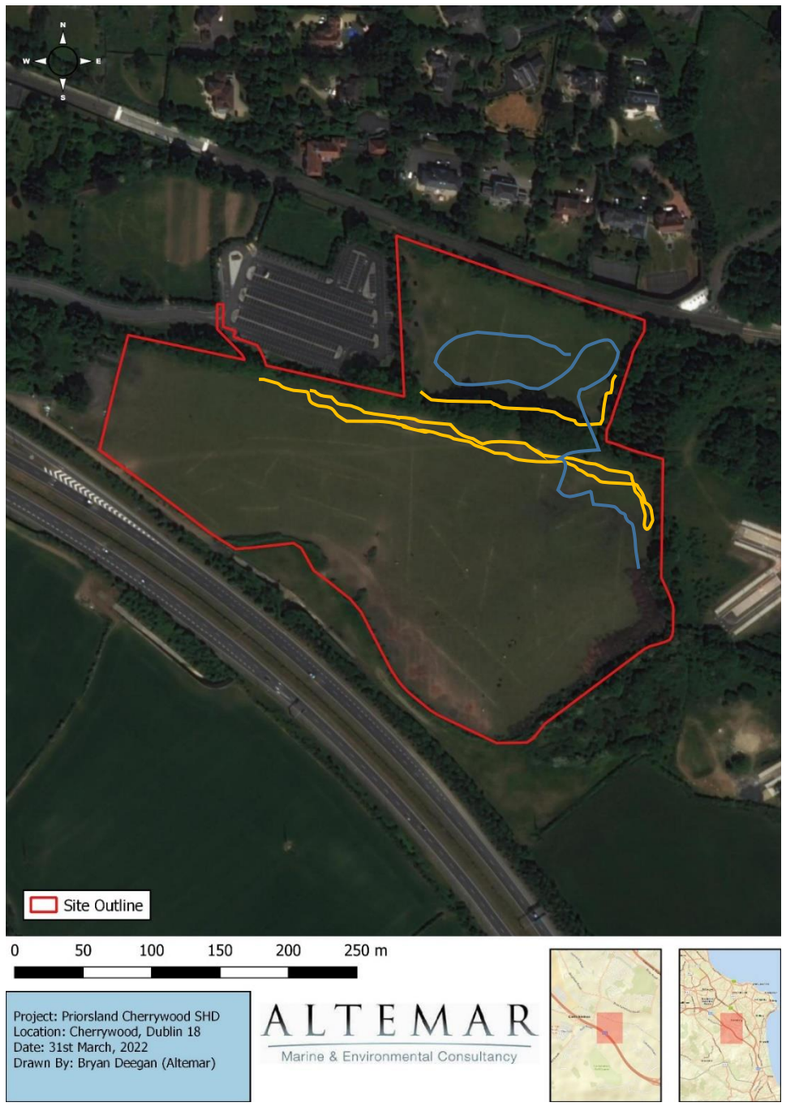

Figure 16. Bat activity on site.- Soprano pipistrelle, orange line and blue line Leisler's bat

Potential impacts of proposed redevelopment on bats

No bats emerging onsite trees were observed. No definitive bat roosts were noted on site.The southern portion of the site borders the M50 motorway and the northern portion of the site is bordered by the LUAS line. Trees on site have the potential for bat roosting. The proposed development could lead to increased lighting during construction and operation thus reducing foraging on site. Trees will be removed from the proposed development site. There is a possibility that trees of bat roosting potential will be lost. The trees of bat roosting potential are concentrated within the main treeline along the Carrickmines River. As the vast majority of thei treeline is being maintained the removal of several trees within this treeline to allow for bridge access would not be deemed to be a significant impact. However, mitigation must be in place.

Mitigation measures

A pre-construction inspection of trees to be felled will be carried out. A derogation licence will be acquired for acquired for trees if bat roosts are present. Lighting has been restricted on site to avoid the riparian corridor, with the exception of bridge crossings, and areas of open space in the northern filed will also remain unlit. Mitigation will include:

- Pre Construction inspection of any trees to be felled for bats
- NPWS will be notified and conditions carried out if bats found in any trees to be felled.
- Lighting at all stages should be done sensitively on site with no direct lighting of hedgerows and treelines.

Predicted and residual impact of the proposal

With bat mitigation measures the proposed development will potentially reduce its impact on local bat populations. If bat mitigation measures are strictly applied, the potential impact of the proposed development will be Permanent minor adverse not significant impact.

Legal status and conservation issues – bats

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat is further listed under Annex II.

The current status and legal protection of the known bat species occurring in Ireland is given in the following table.

Common and scientific name	Wildlife Act 1976 & Wildlife (Amendment) Acts 2000/2010	Irish Red List status	Habitats Directive	Bern & Bonn Conventions
Common pipistrelle *Pipistrellus pipistrellus*	Yes	Least Concern	Annex IV	Appendix II
Soprano pipistrelle *P. pygmaeus*	Yes	Least Concern	Annex IV	Appendix II
Nathusius pipistrelle *P. nathusii*	Yes	Not referenced	Annex IV	Appendix II
Leisler's bat *Nyctalus leisleri*	Yes	Near Threatened	Annex IV	Appendix II
Brown long-eared bat *Plecotus auritus*	Yes	Least Concern	Annex IV	Appendix II
Lesser horseshoe bat *Rhinolophus hipposideros*	Yes	Least Concern	Annex II Annex IV	Appendix II

Common and scientific name	Wildlife Act 1976 & Wildlife (Amendment) Acts 2000/2010	Irish Red List status	Habitats Directive	Bern & Bonn Conventions
Daubenton's bat *Myotis daubentonii*	Yes	Least Concern	Annex IV	Appendix II
Natterer's bat *M. nattereri*	Yes	Least Concern	Annex IV	Appendix II
Whiskered bat *M. mystacinus*	Yes	Least Concern	Annex IV	Appendix II
Brandt's bat *M. brandtii*	Yes	Data Deficient	Annex IV	Appendix II

Also, under existing legislation, the destruction, alteration or evacuation of a known bat roost is a notifiable action and a derogation licence has to be obtained from the *National Parks and Wildlife Service* before works can commence.

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 licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS. The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "*Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences*" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007.

Furthermore, on 21st September 2011, the Irish Government published the European Communities (Birds and Natural Habitats) Regulations 2011 which include the protection of the Irish bat fauna and further outline derogation licensing requirements re: European Protected Species.

References

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979
EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive) 1992
European Communities (Birds and Natural Habitats) Regulations 2011 Government of Ireland, Dublin
Kelleher, C. and Marnell, F. 2007 *Bat Mitigation Guidelines for Ireland – Irish Wildlife Manuals No. 25*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin
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Bat Mitigation Guidelines for Ireland (NPWS, 2006) https://www.npws.ie/sites/default/files/publications/pdf/IWM25.pdf
Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006).
https://www.tii.ie/technical-services/environment/planning/Best_Practice_Guidelines_for_the_Conservation_of_Bats_in_the_Planning_of_National_Road_Schemes.pdf

APPENDIX 5.2 WINTER BIRD SURVEYS

Priorsland (Cherrywood) Winter Bird Surveys 2020-2022

Introduction

Between October 2020 and March 2022, a total of 22 winter bird surveys were conducted at lands at Priorsland at Cherrywood, South County Dublin by Hugh Delaney, a freelance ecologist (Birds primarily) with an experienced background in bird surveying on numerous sites with ecological consultancies over 10+ years. Hugh, a lifelong birder, is local to the Dun Laoghaire-Rathdown area in Dublin and is especially familiar with the bird life and its ecology in the environs going back over 30 years.

Winter Bird Survey Methodology

Winter bird surveys are conducted from soon after sunrise until late in the afternoon before sunset, the site is monitored throughout the day and all bird species utilizing the site recorded, including species flying through overhead. Checks are also made on suitable habitat nearby or adjacent the site for comparative purposes and to monitor any interchange of birds between sites. Target species (species of more special interest) utilizing the site will be mapped and estimates of the time these species frequented the site recorded.

Site Location

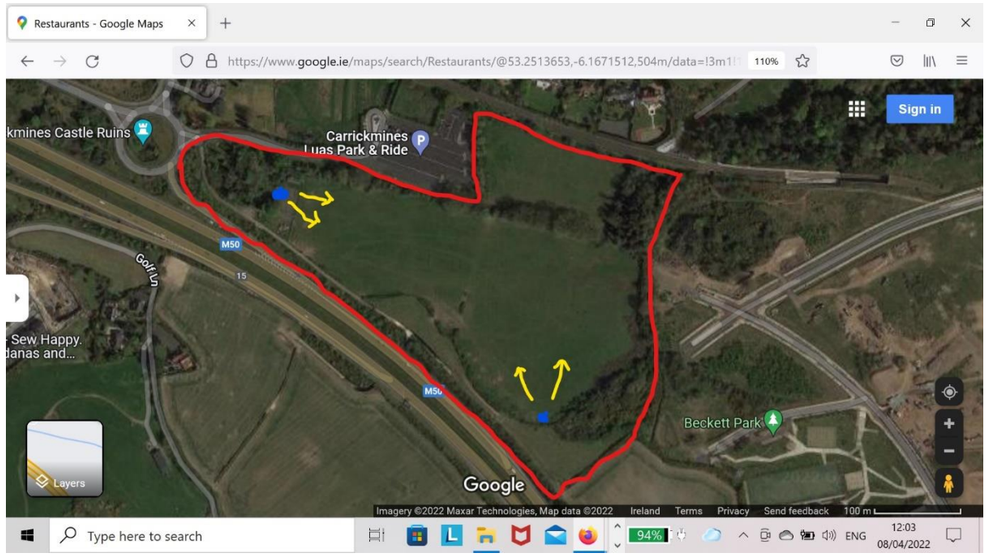

Figure 1. Priorsland site – The sites marked in blue are the optimal vantage points for the site, giving optimal viewing over the largest area of the site.

Site Description

A large green field with a smaller adjacent field bordering the Luas Line to the north. A stream borders the length of the larger field on its northern side that flows east. Interspersed hedgerow and trees around the site, notably some large Oak trees between the large field and small field. Mixed patch of Trees and low cover at the western corner of the site. A hedgerow with a few larger trees borders the large field at its western side.

Specific site survey methodology

Observations made from the vantage points alternately each 1-2 hours during the surveys. The site was also traversed every few hours around the boundary of large field and small field and then vantage point observations resumed.

Survey results

October 22nd, 2020

Sunrise- 08.05hrs/Sunset 18.12hrs. Weather – Wind F3 Southwest, Cloud 6/8, Dry, 10c, Excellent visibility. On-site 08.15hrs – 16.15hrs.

Species recorded – Black-headed Gull, Robin, Goldcrest, Tree Sparrow, Blue Tit, Great Tit, Coal Tit, Long-tailed Tit, Grey Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Wren, Goldfinch, Bullfinch, Siskin, Redpoll, Linnet, Woodpigeon, Dunnock, Buzzard, Blackcap, Starling.

Observations from 08.15hrs – 12.00hrs –

Survey commenced with a walk around of site, followed by vantage point observations. Primary species noted foraging on main (larger) field were Jackdaw and Starling, small numbers of Jackdaw early in morning (<10) with a maximum count of 22 noted at 11.55hrs. Foraging Starling flock maximum count was 110 on the west side of the main field at 11.26hrs. 6 Linnet and 4 Chaffinch were foraging at the east end of the main field from 11.00hrs. A Tree Sparrow at the west end of the site at 09.45hrs was noteworthy (locally very scarce). Small numbers of Black-headed Gull noted passing over the site (<10). A Buzzard was noted soaring over the southeast corner of the main field at 11.01hrs. Only species noted foraging in small field were small numbers (<5) of Jackdaw. A Grey Wagtail was noted foraging on the stream throughout the morning. Other species recorded were Robin (<4), Blackbird (<2), Goldcrest (<1), Long-tailed tit (<1), Wren (<1), Blue Tit (<5), Goldfinch (<4), Blackcap (<1), Woodpigeon (<8), Dunnock (<3), Hooded Crow (<2) and Rook (<5).

Observations from 12.00hrs – 16.15hrs –

Three Redpoll were observed at the west end from 12.04-12.20hrs. In afternoon, again Jackdaw and Rook were the primary species foraging on the main field with smaller numbers of Jackdaw (<10) foraging on the small field. Maximum count was Jackdaw (<80) and Rook (<18) foraging on main field at 13.30hrs. A Jay was noted foraging along north side of main field at 14.04hrs with Siskin (<1) and Bullfinch (<1) noted foraging in same area. Other species recorded – Goldfinch (<8), Blue Tit (<3), Great Tit (<2), Coal Tit (<1), Siskin (<1), Wren (<4), Robin (<4), Mistle Thrush (<1), Dunnock (<5) and Woodpigeon (<15).

October 31st, 2021

Sunrise- 07.22hrs/Sunset 16.53hrs. Weather – Wind F3 Southeast, Cloud 7/8, Light showers, 11c, Excellent visibility. On-site 07.30hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Coal Tit, Long-tailed Tit, Grey Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Greenfinch, Blackbird, Mistle Thrush, Song Thrush, Wren, Goldfinch, Bullfinch, Redpoll, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Pied Wagtail, Starling.

Observations from 07.30hrs – 12.00hrs –

Small numbers of Jackdaw and Rook foraging on the main field in the morning (<10 each), later in morning numbers building to a peak at 11.40hrs of Jackdaw (<65) and Rook (<8) feeding at west end of field. Two Jay foraging in southeast corner of main field at intervals during morning. Single Grey Wagtail noted at west side of main field near culvert under M50. Other species recorded (mainly in hedgerows/tree line) – Bullfinch (<5), Blue Tit (<6), Dunnock (<6), Song Thrush (<4), Blackbird (<8), Wren (<3), Robin (<5), Meadow Pipit (<4), Goldcrest (<3), Redpoll (<9), Chaffinch (<8), Greenfinch (<1), Long-tailed Tit (<10), Goldfinch (<12), Linnet (<1), Hooded Crow (<2), Magpie (<3) and Woodpigeon (<5).

Observations from 12.00hrs – 15.30hrs –

Peak count of Jackdaw (<32), Rook (<8), Hooded Crow (<2) and Black-headed Gull (<3) recorded foraging at west end of main field at 14.10hrs. Other species recorded included Starling (<10 foraging on main field), Dunnock (<5), Blackbird (<4), Song Thrush (<2), Goldcrest (<1), Chaffinch (<5 foraging at west end main field), Goldfinch (<2), Robin (<3) and Pied Wagtail (<1). Small numbers of Black-headed Gull (<15) and Herring Gull (<10) passing east over site in late afternoon.

November 13th, 2020

Sunrise- 07.47hrs/Sunset 16.31hrs. Weather – Wind F4 Southwest, Cloud 7/8, Dry, 9c, Excellent visibility. On-site 07.15hrs – 15.15hrs.

Species recorded – Black-headed Gull, Herring Gull, Mediterranean Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Pheasant, Hooded Crow, Chaffinch, Siskin, Tree Sparrow, Blackbird, Mistle Thrush, Song Thrush, Wren, Goldfinch, Bullfinch, Redpoll, Linnet, Woodpigeon, Stock Dove, Dunnock, Meadow Pipit, Starling, Buzzard, Sparrowhawk, Kestrel, Grey heron, Snipe.

Observations from 07.15hrs – 12.00hrs –

A flock of 11 Black-headed Gulls foraging on the main field at 08.10hrs increased to 52 birds and a Mediterranean Gull at 08.37hrs, with the gulls then moving off-site. 3 Grey Wagtail were noted foraging near culvert under M50 at 08.08hrs. A Pheasant, 4 Redpoll, 5 linnet and a Chaffinch were foraging at the west end of the main field at 08.15hrs. A Snipe was flushed from a wet area at the southeast corner of the main field at 08.22hrs. A Tree Sparrow was observed at the next to the vantage point at the west end of the site at 09.46hrs (likely same bird as on 22/10/20). A Buzzard was noted soaring along the north side of the main field at 10.20hrs. A peak count of 37 Jackdaw and 8 Magpie were noted foraging on the main field at 10.43hrs. A Sparrowhawk was recorded perched next to the west end vantage point at 11.09hrs and a Kestrel was observed just east of the east end of the main field at 11.39hrs (off-site). Other species recorded – Stock Dove (<1), Robin (<7), Blackbird (<2), Goldcrest (<1), Bullfinch (<2), Mistle Thrush (<2), Goldfinch (<18), Dunnock (<3) and Woodpigeon (<8).

Observations from 12.00hrs – 15.15hrs –

A foraging flock of 40 Starling were noted on the main field at 13.20-14.05hrs, with small numbers (<15) Jackdaw foraging also during afternoon. A Grey Heron was noted at stream at entrance to site at west end at 12.45hrs. Other species recorded – Grey Wagtail (<1), Dunnock (<4), Blackbird (<3), Bullfinch (<1) and Jay (<1).

November 25th, 2020

Sunrise- 08.08hrs/Sunset 16.15hrs. Weather – Wind F2 West, Cloud 7/8, Dry, 7c, Excellent visibility. On-site 07.30hrs – 15.15hrs.

Species recorded – Black-headed Gull, Herring Gull, Lesser black-backed Gull, Robin, Goldcrest, Blue Tit, Great Tit, Long-tailed Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Redwing, Wren, Goldfinch, Bullfinch, Redpoll, Linnet, Chiffchaff, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard.

Observations from 07.30hrs – 12.00hrs –

At the main field the only foraging species noted during the morning were a flock of 37 Black-headed Gull from 10.01hrs-10.20hrs. Other species noted around the site in the hedgerows (mainly east end of main field) and tree lines were – Redwing (<3), Robin (<12), Wren (<5), Rook (<2), Starling (<15), Magpie (<4), Jackdaw (<10), Blackbird (<12), Dunnock (<14), Meadow Pipit (<1), Bullfinch (<2), Grey Wagtail (<1), Mistle Thrush (<3), Chaffinch (<15), Goldfinch (<3), Jay (<2), Song Thrush (<3), Redpoll (<1), Lesser black-backed Gull (<1), Blue Tit (<1), Woodpigeon (<5) and Goldcrest (<2).

Observations from 12.00hrs – 15.15hrs –

A peak count of foraging Jackdaw on main field was 27 birds at 14.30hrs, smaller numbers (<10) intermittently at other times during afternoon. Chaffinch (<10), Pheasant (<3) and Stock Dove (<1) foraging at east end of main field at 12.15hrs. Other species noted around the site – Goldcrest (<2), Blackbird (<7), Robin (<4), Magpie (<4), Dunnock (<6), Linnet (<2), Bullfinch (<3), Wren (<4), Song Thrush (<2), Buzzard (<1), Chiffchaff (<1), Blue Tit (<2) and Mistle Thrush (<1). Small numbers (<10) of Herring Gull noted passing east over the site from 14.15hrs.

December 2nd, 2020

Sunrise- 08.19hrs/Sunset 16.10hrs. Weather – Wind F2 West, Cloud 3/8, Dry, 8c, Excellent visibility. On-site 08.15hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Great Tit, Long-tailed Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Wren, Goldfinch, Bullfinch, Redpoll, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard, Kestrel.

Observations from 08.15hrs – 12.00hrs –

Foraging flocks of Black-headed Gulls on the main field were a flock of 13 at 09.00hrs, increasing to 16 at 10.48hrs and to 24 at 11.03hrs. A Kestrel landed next to the west vantage point at 08.39hrs, but was not seen to hunt on-site. Peak count of Jackdaw foraging on the main field was 30 at 11.15hrs accompanied by 5 Rook. A Buzzard passed north over the middle of the site at 09.26hrs. Other species noted on site were –

Goldfinch (<3), Dunnock (<10), Robin (<8), Blackbird (<12), Mistle Thrush (<1), Song Thrush (<2), Chaffinch (<1), Blue Tit (<1), Wren (<2), Grey Wagtail (<2), Meadow Pipit (<1), Goldcrest (<3), Great Tit (<1), Bullfinch (<1), Starling (<5), Linnet (<7), Woodpigeon (<6), Pied Wagtail (<1), Magpie (<4) and Pheasant (<3).

Observations from 12.00hrs – 15.30hrs –

Black-headed Gulls foraging on the main field in the afternoon peaked at 15 at 13.40hrs. Small numbers of Jackdaw (<10), Rook (<6), Hooded Crow (<5), Meadow Pipit (<2), Pied Wagtail (<1) and Magpie (<3) foraging intermittently also. Other species recorded – Redpoll (<2), Song Thrush (<4), Blackbird (<8), Mistle Thrush (<2), Woodpigeon (<10), Goldfinch (<7), Dunnock (<6), Wren (<3), Grey Wagtail (<1), Jay (<1), Long-tailed Tit (<8), Goldcrest (<2), Herring Gull (<11 passing over site).

December 18th, 2020

Sunrise- 08.37hrs/Sunset 16.07hrs. Weather – Wind F4 South, Cloud 8/8, Light showers, 12c, Excellent visibility. On-site 08.30hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Lesser black-backed Gull, Common Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Redwing, Wren, Goldfinch, Bullfinch, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard, Sparrowhawk.

Observations from 08.30hrs – 12.00hrs –

At the main field foraging Black-headed Gulls increased from 20 at 08.40hrs to 43 (including one Common Gull and one Lesser black-backed Gull) at 09.15hrs and peaking at 60 birds at 11.25hrs. Jackdaw were also noted foraging in the main and smaller field with a peak count of 32 birds at 09.32hrs, smaller numbers (<5) of Rook also noted on the main the field. A Sparrowhawk was noted hunting at the west end of the site at 08.35hrs and at the east end at 09.37hrs. Other species noted were- Blackbird (<3), Mistle Thrush (<3), Pied Wagtail (<2), Robin (<4), Dunnock (<4), Pheasant (<3), Woodpigeon (<10), Grey Wagtail (<1), Chaffinch (<5), Meadow Pipit (<1), Redwing (<1), Jay (<1), Goldcrest (<3), Hooded Crow (<2), Magpie (<1), Song Thrush (<1), Blue Tit (<1), Starling (<25), Goldfinch (<1) and Long-tailed Tit (<1).

Observations from 12.00hrs – 15.30hrs –

In the afternoon at the main field the peak number of corvids foraging on site was at the west end at 12.40hrs with Jackdaw (<22), Rook (<2), Magpie (<7) and Hooded Crow (<1). No foraging gulls noted. Other species recorded on-site were – Buzzard (<1 in small field at 12.40hrs), Dunnock (<3), Blackbird (<6), Robin (<4), Mistle Thrush (<4), Goldfinch (<1), Bullfinch (<2), Redwing (<4), Pied Wagtail (<2), Chaffinch (<8), Woodpigeon (<3), Jay (<1), Grey Wagtail (<1) and Blue Tit (<1).

January 6th, 2021

Sunrise- 08.38hrs/Sunset 16.23hrs. Weather – Wind F2 North, Cloud 7/8, Light showers, 3c, Excellent visibility. On-site 08.45hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Lesser black-backed Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Redwing, Wren, Blackcap, Goldfinch, Redpoll, Linnet, Woodpigeon, Stock Dove, Dunnock, Meadow Pipit, Starling, Pheasant, Snipe, Buzzard.

Observations from 08.45hrs – 12.00hrs –

At the center of the main field from 09.20hrs a foraging flock of Gulls grew from 16 Black-headed Gull to a peak of 48 at 11.10hrs through the morning, joining the flock also were 1-3 Herring Gull and a single Lesser black-backed Gull. Also foraging on the main field were Meadow Pipit (<3), Mistle Thrush (<2) and a Snipe was flushed from the southeast corner at 10.30hrs. Small numbers of Jackdaw (<8) also recorded foraging. Other species recorded on-site were Blackbird (<6), Song Thrush (<4), Jay (<2), Woodpigeon (<15), Stock Dove (<2), Hooded Crow (<4), Rook (<6), Redwing (<4 foraging in small field at 09.45hrs), Wren (<6), Goldfinch (<8), Chaffinch (<14), Redpoll (<4), Linnet (<15 foraging at east end main field), Pheasant (<1), Starling (<30), Dunnock (<8), Robin (<7) and Great Tit (<1).

Observations from 12.00hrs – 15.30hrs –

Jackdaw numbers foraging on main field peaked at 26 at 13.48hrs, small numbers (<5) Rook also associating with the Jackdaw flock. A flock of Starling (<50) were foraging at center of main field intermittently from 13.00-15.00hrs. Small numbers (<5) of Black-headed Gulls occasionally landing into main field in afternoon to forage. Other species recorded on-site in afternoon – Woodpigeon (<25), Blackbird (<6), Song Thrush (<2), Chaffinch (<12), Goldfinch (<16), Redpoll (<1), Goldcrest (<2), Blue Tit (<4), Robin (<3), Blackcap (<1), Buzzard (<2 soaring over east end main field at 14.40hrs), and Long-tailed Tit (<8).

January 19th, 2021

Sunrise- 08.28hrs/Sunset 16.44hrs. Weather – Wind F4 Southwest, Cloud 8/8, Light showers, 10c, Excellent visibility. On-site 08.30hrs – 16.00hrs.

Species recorded – Black-headed Gull, Herring Gull, Mediterranean Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Song Thrush, Redwing, Wren, Goldfinch, Redpoll, Linnet, Siskin, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard.

Observations from 08.30hrs – 12.00hrs –

At the west end of the main field a flock of Chaffinch (<25) were foraging from 09.05hrs-09.30hrs. A flock of foraging Black-headed Gull (<30) were present in the center of the main field from 09.10-10.45hrs. Two Buzzard circled over the small field at 09.19hrs. A minimum of 20 Jackdaw and 25 Woodpigeon were foraging at intervals on the main field during the morning. Other species recorded – Blackbird (<3), Long-tailed Tit (<2), Pied Wagtail (<2), Dunnock (<3), Song Thrush (<1), Robin (<3), Redwing (<14), Wren (<2), Goldfinch (<4), Goldcrest (<1), Magpie (<4) and Blue Tit (<2).

Observations from 12.00hrs – 16.00hrs –

A flock of 25 Woodpigeon were noted foraging in the small field from 14.25-1515hrs. A flock of 17 Black-headed Gull at the west end of the main field at 15.05hrs increased to 86 birds by 15.30hrs accompanied by Mediterranean Gull (<1) and Herring Gull (<3). Other species recorded on-site were – Song Thrush (<1), Blackbird (<3), Great Tit (<1), Siskin (<1), Redpoll (<3), Linnet (<5), Hooded Crow (<2), Wren (<2), Dunnock (<4), Robin (<5), Pheasant (<1), Meadow Pipit (<1) and Grey Wagtail (<1).

February 4th, 2021

Sunrise- 08.04hrs/Sunset 17.14hrs. Weather – Wind F2 Southwest, Cloud 5/8, Dry, 8c, Excellent visibility. On-site 09.30hrs – 18.15hrs.

Species recorded – Black-headed Gull, Herring Gull, Lesser black-backed Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Song Thrush, Chiffchaff, Siberian Chiffchaff, Redwing, Wren, Goldfinch, Redpoll, Linnet, Bullfinch, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Mallard, Woodcock.

Observations from 09.30hrs – 12.00hrs –

At the main field 29 Woodpigeon were recorded foraging in center from 10.45hrs to 11.15hrs, small numbers of Jackdaw (<12) and Rook (<5) foraging also on main field at intervals during the morning. At the east end of the main field a foraging flock of 8 Chaffinch and 2 Goldfinch was present from 11.35hrs, a Siberian Chiffchaff was also in this area at 11.20hrs (scarce winter visitor). Other species recorded – Pied Wagtail (<1), Grey Wagtail (<1), Chiffchaff (<1), Blackbird (<6), Pheasant (<3), Dunnock (<5), Mistle Thrush (<2), Goldcrest (<2), Song Thrush (<4), Robin (<1), Goldfinch (<3), and Blue Tit (<1).

Observations from 12.00hrs – 18.15hrs –

The foraging flock of 15 Chaffinch and 5 Goldfinch still present at east end of main field in the afternoon from 13.10hrs. A flock of 25 Redwing and a Mistle Thrush were recorded foraging in the southeast corner of the main field from 13.15-14.00hrs. No Gull flocks recorded on main field in afternoon (occasional birds passing over only), small flocks of Jackdaw (<6) recorded foraging at intervals. A late stay on the site to dark (to attempt to record Owls, Woodcock etc.) resulted in a Mallard being recorded at 17.49hrs landing into a small pool at the southeast corner of the main field and a Woodcock was recorded flying out from the woodland at the southeast corner of main field at 17.54hrs, it flew across the main field towards M50 out of sight going southwest. Other species recorded – Robin (<6), Siberian Chiffchaff (<1), Bullfinch (<3), Redpoll (<1), Linnet (<2), Blue Tit (<2), Song Thrush (<4), Great Tit (<1), Pied Wagtail (<2), Blackbird (<5) and Woodpigeon (<2).

February 22nd, 2021

Sunrise- 07.27hrs/Sunset 17.49hrs. Weather – Wind F2 Southwest, Cloud 5/8, Dry, 8c, Excellent visibility. On-site 07.45hrs – 16.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Coal Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Jay, Chaffinch, Blackbird, Song Thrush, Redwing, Wren, Goldfinch, Redpoll, Linnet, Siskin, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard, Sparrowhawk.

Observations from 07.45hrs – 12.00hrs –

Flock of 32 Jackdaw and 6 Rook foraging in center of main field from 08.30hrs, continuing to forage in same area throughout the morning, with a peak count of 38 Jackdaw, 6 Rook, 3 Hooded Crow and 4 Magpie at 10.15hrs. Two Buzzard were observed soaring over the southeast corner at 11.25hrs. Foraging flock of 18 Chaffinch, 8 Goldfinch and 2 Redpoll recorded at the east end of the main field from 08.40hrs remained throughout the morning. Other species recorded – Blackbird (<6), Song Thrush (<2), Dunnock (<7), Redwing (<3), Goldcrest (<2), Robin (<5), Linnet (<8), Pied Wagtail (<1), Wren (<4), Pheasant (<2), Starling (<15), Long-tailed Tit (<8), Blue Tit (<5) and Woodpigeon (<10).

Observations from 12.00hrs – 16.30hrs –

A flock of 25 Black-headed Gull and 1 Herring Gull were observed foraging in the center of the main field from 12.50hrs-13.30hrs. Flocks of Jackdaw (maximum count <15) recorded foraging on main field at intervals during the day joined by occasional Rooks (<4) and Hooded Crow (<2). A Sparrowhawk was noted hunting along hedgerow at the east end of the main field at 15.40hrs. Foraging flock of a minimum 15 Chaffinch and 10 Goldfinch present at the east end of the main field throughout the afternoon. Other species recorded- Jay (<2), Song Thrush (<8), Blackbird (<6), Robin (<6), Redpoll (<2), Siskin (<3 foraging in small field), Woodpigeon (<15), Pied Wagtail (<1), Meadow Pipit (<2 on main field), Goldcrest (<2), Dunnock (<7), Wren (<5), Coal tit (<1) and Blue Tit (<3).

March 1st, 2021

Sunrise- 07.12hrs/Sunset 18.03hrs. Weather – Wind F1 East, Cloud 3/8, Dry, 9c, Excellent visibility. On-site 07.45hrs – 16.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Lesser black-backed Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Coal Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Raven, Jay, Chaffinch, Blackbird, Song Thrush, Redwing, Wren, Goldfinch, Redpoll, Linnet, Greenfinch, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard, Lapwing.

Observations from 07.45hrs – 12.00hrs –

Two Raven passed over the main field going east at 10.09hrs. Two Buzzard were soaring over the southeast corner of the main field at 10.20hrs. At 11.05hrs 4 **Lapwing** arrived on-site, feeding on the main field towards the east end, at 11.40hrs 5 birds were present, the 5 birds remained feeding in the area until 13.15hrs when they moved off-site flying in a southeasterly direction. Small flocks of Woodpigeon (<8) noted foraging on main field during the morning, no significant foraging flocks of corvids or gulls recorded. Other species recorded on-site – Robin (<2), Magpie (<7), Greenfinch (<1), Song Thrush (<3), Goldfinch (<2), Linnet (<4), Dunnock (<9), Starling (<3), Grey Wagtail (<1), Meadow Pipit (<1), Chaffinch (<2), Goldcrest (<1), Redwing (<2), Mistle Thrush (<1), Blue Tit (<2),

Observations from 12.00hrs – 16.30hrs –

A flock of 35 Woodpigeon were foraging at the west end of the main field from 14.45-15.00hrs. Foraging flocks of Jackdaw peaked at 18 birds at 15.20hrs with smaller numbers (<10) intermittently at other times. No foraging Gull flocks were recorded, small numbers of Herring, Lesser black-backed, and Black-headed Gull noted passing over the site (<10 of each species). Other species recorded – Starling (<3), Pied Wagtail (<1), Pheasant (<2), Grey Wagtail (<1), Chaffinch (<6), Robin (<3), Blue Tit (<1), Great Tit (<2), Goldfinch (<3), Redpoll (<1), Song Thrush (<2) and Mistle Thrush (<2).

March 15th, 2021

Sunrise- 06.39hrs/Sunset 18.38hrs. Weather – Wind F2 West, Cloud 8/8, Dry, 11c, Excellent visibility. On-site 09.30hrs – 18.40hrs.

Species recorded – Herring Gull, Lesser black-backed Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Coal Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Jay, Raven, Chaffinch, Bullfinch, Blackbird, Song Thrush, Redwing, Wren, Goldfinch, Redpoll, Linnet, Siskin, Greenfinch, Woodpigeon, Stock Dove, Dunnock, Meadow Pipit, Starling.

Observations from 09.30hrs – 12.00hrs –

Foraging flock of 20 Redwing, 8 Starling and 2 Mistle Thrush recorded at the north side of the main field from 11.00-12.15hrs. No foraging gull flocks or larger foraging corvid flocks recorded, small numbers of Jackdaw (<8) noted foraging in the same field. Herring Gull (<14) and Lesser black-backed Gull (<3) noted passing over the site, most birds moving east to west. Other species recorded – Woodpigeon (<4), Robin (<3), Pied Wagtail (<2), Blackbird (<4), Redpoll (<3), Stock Dove (<1), Chaffinch (<2), Meadow Pipit (<2), Song Thrush (<4), Dunnock (<1), Greenfinch (<1), Goldfinch (<18), Goldcrest (<1), Blue Tit (<2) and Wren (<1).

Observations from 12.00hrs – 18.40hrs –

Remained on site until dark looking for nocturnal emerging species like Owls and Woodcock (none recorded), during afternoon only corvids recorded foraging on the main field with a peak count of 11 Jackdaw at 13.35hrs. Other species recorded – Jay (<1), Robin (<5), Mistle Thrush (<1) Blackbird (<3), Song Thrush (<1), Dunnock (<3), Chaffinch (<2), Bullfinch (<4), Linnet (<6), Wren (<2), Great Tit (<1) and Blue Tit (<2).

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November 18th, 2021

Sunrise- 07.55hrs/Sunset 16.24hrs. Weather – Wind F3 Southwest, Cloud 7/8, Light showers, 12c, Excellent visibility. On-site 08.30hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Common Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Coal Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Pheasant, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Redwing, Wren, Goldfinch, Bullfinch, Redpoll, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Buzzard, Sparrowhawk.

Observations from 08.30hrs – 12.00hrs –

At the main field a foraging flock of Black-headed Gull (<42) and Common Gull (<4) were present in the center from 09.35hrs-10.50hrs. Small numbers of Herring Gull (<10) were noted passing over site from east to west. A Buzzard was noted foraging in the small field from 11.10hrs-11.30hrs. Three Jays were noted foraging in the Oak tree line separating the fields intermittently throughout the morning. Other species recorded – Song Thrush (<10 foraging south side main field), Blackbird (<6), Redwing (<2), Mistle Thrush (<1), Goldcrest (<1), Pheasant (<2), Goldfinch (<12), Magpie (<8), Blue Tit (<3), Dunnock (<7) and Robin (<4).

Observations from 12.00hrs – 18.40hrs –

A Sparrowhawk was noted hunting at the east end of the main field at 13.25hrs and seen perched at the east side of the small field at 14.10hrs. Black-headed Gulls foraging on the main field peaked at 36 birds at 14.50hrs, smaller numbers (averaging <15) present intermittently during the afternoon. A flock of 15 foraging Woodpigeon was noted in the small field at 12.30hrs and smaller numbers (<10) noted foraging intermittently on the main field during the afternoon. Other species recorded – Song Thrush (<6), Blackbird (<8), Starling (<20), Dunnock (<9), Robin (<6), Wren (<3), Pied Wagtail (<1), Grey Wagtail (<1 on stream), Bullfinch (<2), Redpoll (<3), Linnet (<5) and Chaffinch (<8), Coal Tit (<1) and long-tailed Tit (<6).

November 29th, 2021

Sunrise- 08.16hrs/Sunset 16.12hrs. Weather – Wind F3 West, Cloud 6/8, Light showers, 12c, Excellent visibility. On-site 08.30hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Raven, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Wren, Goldfinch, Bullfinch, Linnet, Woodpigeon, Dunnock, Stonechat, Meadow Pipit, Starling, Buzzard, Sparrowhawk.

Observations from 08.30hrs – 12.00hrs –

At the main field during morning only corvids noted foraging with a peak count of 34 Jackdaw and 8 Rook recorded at 10.05hrs, smaller numbers (<10) of Jackdaw recorded intermittently at other times. A foraging flock of 18 Woodpigeon noted foraging in the southeast corner of the main field at 11.40hrs. A Stonechat was recorded on the south side of the main field was a new species record for the site. Other species recorded – Song Thrush (<4), Blackbird (<6), Dunnock (<8), Robin (<4), Blue Tit (<6), Wren (<7), Grey Wagtail (<1), Chaffinch (<15), Goldfinch (<8), Linnet (<13), Starling (<30) and Meadow Pipit (<1).

Observations from 12.00hrs – 15.30hrs –

Two Buzzard were noted soaring low over the west end of the main field at 12.36hrs. A Sparrowhawk was noted hunting in the small field at 13.15hrs. Two Buzzard were noted soaring at the east end of the main field at 15.31hrs. A Raven was recorded passing north over the main field at 16.18hrs. The Stonechat remained on the south side of the main field throughout the afternoon. No significant corvid or gull flocks noted foraging on the main field. Other species recorded – Dunnock (<5), Goldcrest (<5 foraging along tree line separating fields), Long-tailed Tit (<8), Blue Tit (<2), Goldfinch (<5), Bullfinch (<2), Chaffinch (<8), Starling (<22), Pied Wagtail (<1) and Robin (<2).

December 11th, 2021

Sunrise- 08.30hrs/Sunset 16.06hrs. Weather – Wind F1 Southeast, Cloud 8/8, Dry, 6c, Excellent visibility. On-site 08.45hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Common Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Wren, Goldfinch, Bullfinch, Linnet, Redpoll, Woodpigeon, Dunnock, Stonechat, Meadow Pipit, Starling, Buzzard.

Observations from 08.45hrs – 12.00hrs –

A flock of foraging Black-headed Gull (<30), Herring Gull (<2) and Common Gull (<3) were present on the main field from 09.40hrs-10.30hrs. Smaller numbers of Black-headed (<10) then present until 12.30hrs. A flock of Woodpigeon (<15) were recorded foraging in the small field from 11.00-11.30hrs. Small numbers of Jackdaw (<6) were foraging intermittently on the main field throughout the morning. At the east end of the main field a flock of 20 Chaffinch, 7 Goldfinch and 2 Redpoll were recorded foraging in hedgerow and rank vegetation adjacent from 10.20hrs-12.45hrs. Other species recorded – Blackbird (<5), Song Thrush (<8), Robin (<2), Dunnock (<6), Meadow Pipit (<3 in center of main field), Pied Wagtail (<1), Blue Tit (<2), Long-tailed Tit (<12) and Woodpigeon (<10).

Observations from 12.00hrs – 15.30hrs –

Two Buzzard were seen soaring over the east end of the main field at 13.05hrs with a bird also recorded perched at west end of small field at 13.20hrs. Black-headed Gulls numbers foraging on the main field peaked at 14.10hrs with 44 Black-headed Gull and 1 Common Gull recorded. A Stonechat was recorded at the south side of the main field. A foraging flock of a minimum 50 Starling were recorded intermittently on the main field feeding at the south end during the afternoon. Other species recorded – Dunnock (<6), Song Thrush (<10), Blackbird (<4), Mistle Thrush (<1), Chaffinch (<22), Meadow Pipit (<2), Grey Wagtail (<1 on stream), Woodpigeon (<12), Robin (<4) and Magpie (<6).

December 23rd, 2021

Sunrise- 08.39hrs/Sunset 16.09hrs. Weather – Wind F2 Southeast, Cloud 7/8, Dry, 9c, Excellent visibility. On-site 09.15hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Great Tit, Blue Tit, Long-tailed Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Jay, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Wren, Goldfinch, Bullfinch, Linnet, Siskin, Redpoll, Woodpigeon, Dunnock, Meadow Pipit, Starling, Buzzard, Sparrowhawk, Snipe.

Observations from 09.15hrs – 12.00hrs –

Two Snipe were flushed from the east end of the main field at 09.40hrs (birds flew east off-site). A flock of foraging Black-headed Gulls in center of the main field increased from 15 birds at 10.20hrs to a peak of 55 at 11.45hrs joined then by 2 Herring Gulls. Jackdaws foraging peaked at 22 birds at 11.10hrs at the west end of the main field. A Sparrowhawk was noted hunting in the small field at 11.30hrs. A foraging finch flock at the east and southeast corner of the main field from 10.00hrs numbered 18 Chaffinch, 10 Linnet, 15 Goldfinch and 2 Bullfinch. Other species recorded – Blackbird (<6), Song Thrush (<7), Pied Wagtail (<1), Goldcrest (<2), Siskin (<1), Jay (<2 in small field), Woodpigeon (<13), Grey Wagtail (<1), Rook (<20) and Dunnock (<8).

Observations from 12.00hrs – 15.30hrs –

Corvids foraging on the main field peaked in number at 13.40hrs with 38 Jackdaw, 4 Rook, 2 Hooded Crow and 2 Magpie foraging at the center of the main field. Small numbers of Black-headed Gull (<10) were recorded foraging intermittently on the main field during the afternoon. A Buzzard was perched at the east end of the main field from 14.15-14.25hrs. Other species recorded were – Song Thrush (<5), Blackbird (<8), Meadow Pipit (<1), Jay (<2), Goldcrest (<3), Robin (<4), Woodpigeon (<20), Starling (<30), Blue Tit (<4), long-tailed Tit (<3) and Great Tit (<1).

January 6th, 2022

Sunrise- 08.38hrs/Sunset 16.23hrs. Weather – Wind F2 North, Cloud 7/8, Light showers, 3c, Excellent visibility. On-site 08.45hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Redwing, Wren, Goldfinch, Redpoll, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard.

Observations from 08.45hrs – 12.00hrs –

Foraging Black-headed Gulls increased from 17 birds at 09.20hrs to a peak of 38 birds at 10.15hrs. Two Buzzard were present at the east end from 10.40-11.15hrs. Four Redwing foraging at the east end of main field at 14.00hrs.

Observations from 12.00hrs – 15.30hrs –

A peak count of 58 Black-headed Gull and 4 Herring Gull were recorded at 12.50hrs. Smaller gull numbers (Black-headed Gull) recorded thereafter maximum counts of 15 recorded.

January 22nd, 2022

Sunrise- 08.24hrs/Sunset 16.49hrs. Weather – Wind F2 West, Cloud 7/8, Dry, 6c, Excellent visibility. On-site 09.00hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Redwing, Mistle Thrush, Song Thrush, Redwing, Wren, Goldfinch, Redpoll, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard.

Observations from 09.00hrs – 12.00hrs –

56 Black-headed Gull foraging at east end of main field at 11.20hrs with 2 Herring was the peak count in the morning. Two Buzzard noted foraging in small field from 10.10-10.30hrs.

Observations from 12.00hrs – 15.30hrs –

Minimal numbers of gulls in the afternoon recorded with a maximum of 8 Black-headed recorded on the main field at 13.50hrs. Flock of 15 Redwing noted foraging in the small field from 14.30-15.00hrs.

February 6th, 2022

Sunrise- 08.01hrs/Sunset 17.18hrs. Weather – Wind F4 West, Cloud 3/8, Light showers, 8c, Excellent visibility. On-site 08.45hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Redwing, Wren, Goldfinch, Redpoll, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard.

Observations from 08.45hrs – 12.00hrs –

Peak count of 42 Black-headed and 5 Herring Gull noted foraging on the main field at 09.25hrs. Smaller numbers (<15 Black-headed) after that time.

Observations from 12.00hrs – 15.30hrs –

Two Buzzard at the west end of the main field at 13.45hrs, no foraging gulls recorded.

February 27th, 2022

Sunrise- 07.17hrs/Sunset 17.59hrs. Weather – Wind F3 Southeast, Cloud 6/8, Dry, 7c, Excellent visibility. On-site 07.45hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Mediterranean Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Redwing, Wren, Goldfinch, Greenfinch, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard.

Observations from 07.45hrs – 12.00hrs –

Black-headed Gull numbers foraging on the main field peaked at 24 at 09.50hrs, with smaller numbers (<10) noted intermittently during the morning.

Observations from 12.00hrs – 15.30hrs –

Peak of 25 Black-headed Gull recorded at 13.25hrs accompanied by 1 Herring and 1 Mediterranean Gull. Three Buzzard present at the east end of the main field from 14.15-14.40hrs.

March 6th, 2022

Sunrise- 07.01hrs/Sunset 18.12hrs. Weather – Wind F4 West, Cloud 3/8, Dry, 1c, Excellent visibility. On-site 07.30hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Redwing, Wren, Goldfinch, Redpoll, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Pheasant, Buzzard, Kestrel, Snipe.

Observations from 07.30hrs – 12.00hrs –

Peak count of 34 Black-headed Gull and 1 Herring foraging on the main field at 10.55hrs. A Kestrel passed west over the main field at 11.00hrs.

Observations from 12.00hrs – 15.30hrs –

A Snipe was flushed from the center of the main field at 12.20hrs. Peak counts of Black-headed Gull were 26 foraging at east end of main field at 15.10hrs.

March 26th, 2022

Sunrise- 06.13hrs/Sunset 18.49hrs. Weather – Wind F1 North, Cloud 4/8, Light showers, 8c, Excellent visibility. On-site 07.15hrs – 15.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Goldcrest, Blue Tit, Long-tailed Tit, Great Tit, Grey Wagtail, Pied Wagtail, Jackdaw, Rook, Magpie, Jay, Hooded Crow, Chaffinch, Blackbird, Mistle Thrush, Song Thrush, Wren, Goldfinch, Linnet, Woodpigeon, Dunnock, Meadow Pipit, Starling, Buzzard, Sparrowhawk.

Observations from 07.15hrs – 12.00hrs –

A Sparrowhawk was observed hunting at the east end of the main field at 10.10hrs. Peak gull numbers foraging on the main field were 15 Black-headed Gull and 5 Herring Gull at 09.40hrs.

Observations from 12.00hrs – 15.30hrs –

No foraging gulls recorded in the afternoon, Jackdaw maximum counts peaking at 20 at 13.15hrs. Three Buzzard at east end of main field at 14.50hrs.

Comments and observations on survey results

44 bird species were recorded in the survey area covered by these 22 winter bird surveys. A good proportion of the species utilizing the mature hedgerow habitat bordering the fields on the site. In the context of wintering bird species that are red listed as species of conservation concern in the revised Birdwatch Ireland List of birds of conservation concern in Ireland (2020-2026) Redwing, Snipe and Lapwing were recorded. Four gull species listed in the amber wintering species category were recorded, these being Herring, Lesser black-backed, Common and Black-headed Gull. Results from the surveys suggest that the site is not an ex-situ foraging or roosting site for species of qualifying interest from nearby Special protection areas (SPA's).

APPENDIX 5.3 HABITAT MANAGEMENT PLAN

PRIORSLAND CHERRYWOOD SHD - ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Introduction

The following Habitat Management Plan has been prepared to accompany a planning application for a proposed Strategic Housing Development (SHD) at Priorsland, Cherrywood, Dublin 18. The proposed Priorsland development is within the Cherrywood Strategic Development Zone (SDZ) area, which is covered under the Cherrywood SDZ Biodiversity Plan. The objectives of the biodiversity plan are to achieve the following during the implementation of the draft Planning Scheme:

a. Avoid or minimise the disturbance to or loss of semi-natural habitats;
b. Avoid or minimise the disturbance to or loss of protected flora and fauna;
c. To encourage retention of existing habitats of ecological importance as part of green infrastructure and hence create ecological corridors;
d. To promote management of retained and newly created habitats in order to maximise their biodiversity potential and minimise the net loss of biodiversity in the area.

The overall Biodiversity Strategy for the SDZ includes four underlying principles:

1. To retain and manage existing semi-natural habitats wherever possible and to integrate them into the layout, design and development of the SDZ so that ecosystem, habitat and species diversity, richness and abundance are maintained and that ecological corridors are permitted to function through and beyond the area.

2. To protect species that are protected by law or deemed to be endangered, rare or threatened.

3. Promote the restoration of disturbed areas following construction to replace lost biodiversity.

4. Promote the creation of new features in the landscape that allow for biodiversity gain.

The purpose of the Habitat Management Plan is to assist the proposed developers in minimising impacts on species and habitats of biodiversity value that may be impacted by the proposed development. It also details the practical reinstatement and management solutions that will need to be incorporated to enhance and retain biodiversity on site. The following Habitat and Management Plan is cognisant of the following objectives under the Cherrywood Biodiversity Plan (CBP):

BP01 *Require the preservation, as indicated in Figure 12 in Appendix 1 of existing hedgerows, treelines, woodland, scrub and other semi-natural habitats.*

BP02 *Require that all developments acknowledge the ecological value of other semi-natural habitats and species within and adjacent to development plots in the design of the development and retain them were reasonably practicable.*

BP03 *The applicant must provide a Habitat Management Plan detailing how retained habitats will be retained, protected and managed.*

BP05 *Require an assessment of potential impacts of lighting on bats where development is proposed within 100m of known or suspected roosts. At these locations, potential adverse impacts on bats must be avoided. If adverse impacts are anticipated, a derogation licence must be obtained from the NPWS.*

BP13 *Require the planting of new grassland to include native species that are appropriate to the soil chemistry and the function of the grassland.*

The following Habitat Management Plan has been prepared in tandem with the other reporting elements of the project. However, it should be studied in conjunction with the following:

1) Biodiversity Chapter (Chapter 5) of the EIAR and AA Screening / NIS
2) Bat Survey
3) Construction Environmental Management Plan
4) Landscape Report and drawings

Existing Habitats and Species on site

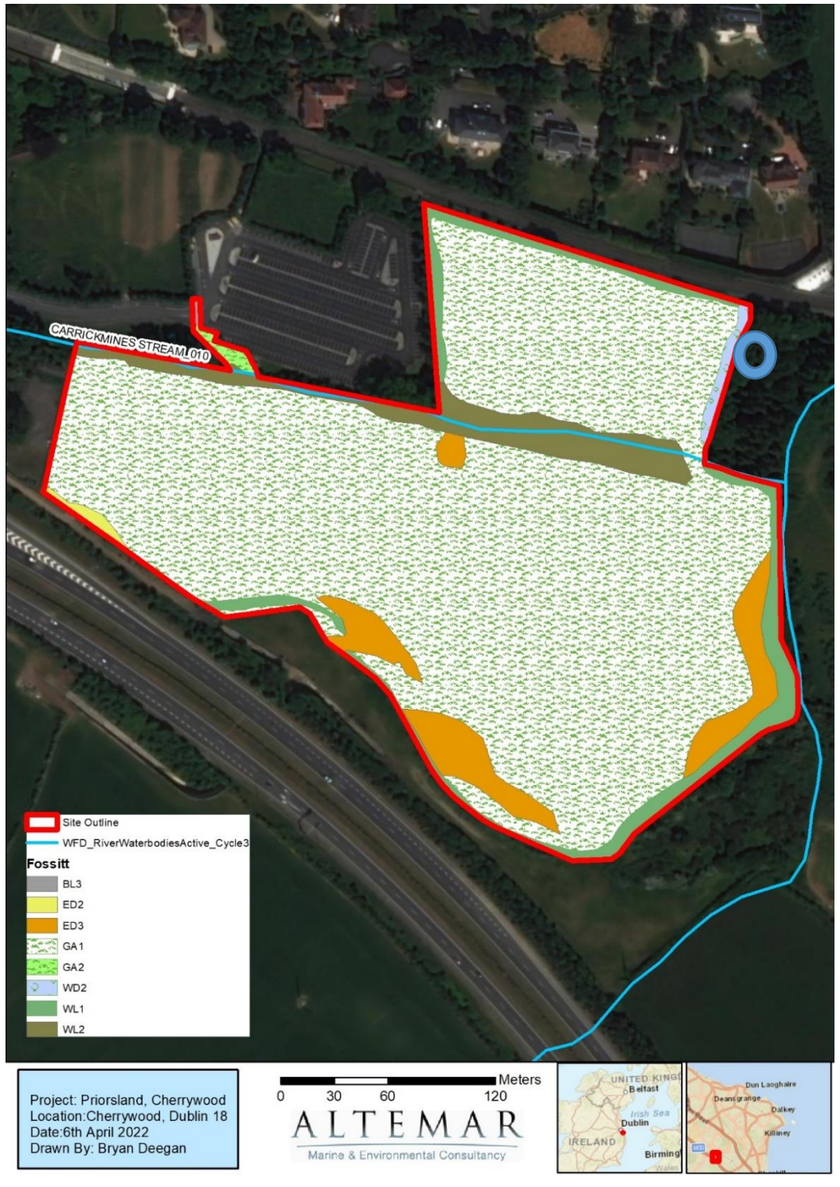


Figure 1 Fossitt (2000) Habitats within the proposed development (badger sett blue circle)

Site visits were carried out on the 20th September 2020, 9th July 2021, 2nd April 2022. The site consists of two unmanaged fields that are being grazed by horses, which are surrounded primarily by hedgerows and bisected by a treeline which contains a watercourse (Carrickmines Stream). The Ticknick Stream is on the south eastern boundary. The Fossitt (2000) habitat map seen in Figure 5.11 is based on the site visit on the 2nd April 2022. This included flora and habitat assessments. The following habitat types (Fossitt, 2000) were noted within the proposed development site:

- Improved Agricultural Grassland (GA1)
- Hedgerow (WL1)
- Treelines (WL2)
- Spoil and Bare Ground (ED2)
- Recolonising Bare Ground (ED3)
- Watercourses (FW)
- Amenity Grassland (GA2)
- Scrub (WS1)

Improved Agricultural Grassland (GA1)
The two fields on site consists primary of unmanaged Improved Agricultural Grassland (GA1) that is being grazed by horses. Species within the Improved Agricultural Grassland included rape (*Brassica napus*), clovers (*Trifolium sp*.), common ragwort (*Jacobaea vulgaris*), nettle (*Urtica dioica*), lesser burdock (*Arctium minus*), plantain (*Plantago lanceolata*), creeping buttercup (*Ranunculus repens*), spear thistle (*Cirsium vulgare*), docks (*Rumex sp*.), common napweed (*Centaurea nigra*), fairy flax (*Linum catharticum*) and self-heal (*Prunella vulgaris*).

Plate 1. Improved Agricultural Grassland (GA1)

A small patch of well maintained amenity grassland was observed within the site outline, to the south of the Carrickmines Luas Park and Ride. Species included clovers (*Trifolium sp*.), nettle (*Urtica dioica*), lesser plantain (*Plantago lanceolata*), creeping buttercup (*Ranunculus repens*), spear thistle (Cirsium vulgare), daisy (Bellis perennis) and docks (Rumex sp.).

Plate 2. Hedgerows (WL1)

Hedgerows (WL1)

Hedgerows are located around the majority of the perimeter of the site. These hedgerows appear to not have been maintained in recent years and have a bramble scrub at their base in many locations. Species included in the hedgerows were bramble (*Rubus fruticosus agg*.), elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*), oak (*Quercus sp*.), sycamore (*Acer pseudoplatanus*), European ash (*Fraxinus excelsior*), beech (Fagus sylvatica), blackthorn (*Prunus spinosa*), wych elm (*Ulmus glabra*), dog-rose (*Rosa canina*), gorse (*Ulex europaeus*), honeysuckle (*Lonicera periclymenum*), cleavers (*Galium aparine*) Hart's-tongue (*Asplenium scolopendrium*) and ivy (*Hedera helix*).

Treelines (WL2)

A single treeline forms a prominent biodiversity feature on the site. This treeline which bisects the two fields, is dominated by mature Turkey Oaks (*Quercus cerris*) where the ground flora is limited. However, the section to the west of the oaks particularly on the western portion of the treeline which borders the LUAS park contains the species outlined within the hedgerows above but the trees are of larger size. Importantly this treeline also contains the Carrickmines Stream and would be considered to be the most important habitat area within the proposed development site.

Plate 3. Mature Turkey Oak treeline.

Plate 4. Turkey Oaks clad in ivy (i.e. bat roosting potential).

Watercourses (FW)

The Carrickmines Stream and the Ticknick Stream are located within the proposed development site. The Ticknick Stream, is located on the south eastern boundary, within the hedgerow area and flows in a southerly direction. The Carrickmines Stream (Plate 5) runs west-east alongside a treeline of Turkey Oaks, in the centre of the site. The Carrickmines Stream and treeline in this part of the site are considered to be of significant local biodiversity importance. This section of the stream would be classed as an eroding upland stream due to the relatively fast flow and lack of significant deposition. However, there are distinct areas of pools, riffles and glides which would be importanct for biodiversity of the watercourse. The WFD status for the watercourse is moderate. Both otter (*Lutra lutra*) and brown trout (*Salmo trutta*) have been recorded downstream of the proposed development site. The watercourse (IE_EA_10C040350) has been a moderate water quality status under the Waterframework Directive and provides an important biodiversity corridor within the Dun Laoghaire Rathdown County Council area. The riparian strip of vegetarion would also deemed to be important as it would protect the watercourse and biodiversity from disturbance, overheating during summer months and act as a biodiversity corridor

Plate 5. Carrickmines Stream

Recolonising Bare Ground (ED3) and Spoil and Bare Ground (ED2)
Section of the site appear to have been over grazed and other areas have undergone minor soil movements/deposition. Species included nettle (*Urtica dioica*), rosebay willowherb (*Chamaenerion angustifolium*), willow (Salix. Sp.), cow parsley (*Anthriscus sylvestris*) and docks (*Rumex sp*.)

Mixed Broadleaved/Conifer Woodland (WD2)
To the east of the northern field (on the site boundary) is a small area of woodland. Species included were bramble (*Rubus fruticosus agg*.), elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*), sycamore (*Acer pseudoplatanus*), European ash (*Fraxinus excelsior*), hazel (Corylus avellana), Norway spruce (*Picea abies*) dog-rose (Rosa canina), honeysuckle (*Lonicera periclymenum*), Hart's-tongue (Asplenium scolopendrium), and ivy (Hedera helix). Of particular importance within this habitat is a badger sett (*Meles meles*), which was first outlined in the Cherrywood SDZ Biodiversity Action Plan. This was shown to be active and trails were also noted in the grassland in the south east corner of the northern field. Scott Cawley also recorded the sett as being active in 2019. This habitat would also be considered to be of importance as it also forms a biodiversity corridor associated with the Carrickmines Stream.

Scrub (WS1)

Bramble (*Rubus fruticosus agg*.) scrub was located along the fringe of hedgerows , Areas of older scrub included areas blackthorn (*Prunus spinosa*).

Terrestrial Mammals

No badger setts or otter holts were noted within the site outline. Evidence of fox (*Vulpes vulpes*) activity was noted on site. No evidence of otter (*Lutra lutra*) activity was noted on site. Several mammal trails were noted in the south eastern corner of the northern field. There is a badger sett within 30m of the site outline to the east of the northern field in the woodland. Grey squirrel (*Sciurus carolinensis*) were also noted on site. This is considered to be an invasive species.

Amphibians and Reptiles
No amphibians or reptiles were noted on site. No ponds were noted on site. Two streams were noted on site and it is possible that frogs may be present on site.

Bats
The bat assessment is seen in Appendix 5.1. There were no seasonal or climatic constraints as survey was undertaken within the active bat season in good weather conditions with surveying temperatures of greater than 10^{o}C. Soprano Pipistrelle and Leisler's bats were noted on site. No definitive bat roosts were noted on site and no bats were observed emerging from onsite trees. However, the Turkey Oaks on site are considered to have moderate bat roosting potential.

Birds
The following bird species were noted on site (Table 5.5) during Altemar site visits. As outlined in Appendix 5.2 '*44 bird species were recorded in the survey area covered by these 22 winter bird surveys. A good proportion of the species utilizing the mature hedgerow habitat bordering the fields on the site. In the context of wintering bird species that are red listed as species of conservation concern in the revised Birdwatch Ireland List of birds of conservation concern in Ireland (2020-2026) Redwing, Snipe and Lapwing were recorded. Four gull species listed in the amber wintering species category were recorded, these being Herring, Lesser black-backed, Common and Black-headed Gull. Results from the surveys suggest that the site is not an ex-situ foraging or roosting site for species of qualifying interest from nearby Special protection areas (SPA's).*'

Common Name	Conservation Status[1]	Common Name	Conservation Status
Woodpigeon	Green	Chaffinch	Green
Robin	Green	Hooded Crow	Green
Great Tit	Green	Magpie	Green
Wren	Green	Blackbird	Green
Rook	Green	Song Thrush	Green
Wren	Green	Blue Tit	Green
Jackdaw	Green	Coal Tit	Green
Robin	Green	Raven	Green

Table *1.* Species of Birds noted during on-site surveys

Flora
No flora of conservation importance were noted on site.

Invasive Species
No invasive plant or animal species listed under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) Section 49, the Third Schedule: Part 1 Plants, Third Schedule: Part 2A Animals were noted on site. No terrestrial or aquatic invasive species such as Japanese knotweed, giant rhubarb, Himalayan balsam, giant hogweed etc. that could hinder removal of soil from the site during groundworks were noted.

Discussion Species and habitats

[1] Birds of Conservation Concern in Ireland 2020-2026 https://birdwatchireland.ie/app/uploads/2021/04/BOCCI4-leaflet-2-1.pdf

As can be seen from Figure 5.11 the proposed development site consists primarily of Improved Agricultural Grassland (GA1), Hedgerow (WL1), Treelines (WL2), Scrub (WS1). Of significant importance are the watercourses and the associated riparian corridors and woodland. This importance is primarily as these areas form important biodiversity corridors for biodiversity. It should be noted however that no flora species of conservation importance or invasive species were noted on site by the NPWS or NBDC or during site surveys. No amphibians or reptiles were noted on site but the site is likely to have frogs on site dure to the presence of watercourses. No resting or breeding places of terrestrial mammals of conservation importance were noted on site. However, a badger sett is located proximate to the site and it is likely that the badgers utilise the northern field for foraging as distinct trails were noted in the grassland proximate to the woodland. The site would be considered to be locally important for bats with two species being noted on site and several trees of bat roosting potential are noted on site. Bat roosts were not confirmed on site.

The Proposed Development

1 Carrickmines Land Limited. intend to apply for planning permission for a proposed Strategic Housing Development at Priorsland, Cherrywood, Dublin 18.

The development will comprise a mixed-use village centre and residential development of 443 no. units comprising 6 no. blocks (A-F) of apartments (up to 5 storeys with basement/undercroft parking) providing 402 no. apartments units (146 no. 1-beds; 218 no. 2-beds and 38 no. 3-beds), and 41 no. houses (19 no. 3-beds and 22 no. 4-beds). All apartments provided with private balconies/terraces. Provision of indoor residential facilities to serve apartment residents.

The Village Centre and non-residential elements will comprise a supermarket, local retail/retail service units, non-retail commercial units, creche, gym, community space, and offices (High Intensity Employment) use.

Provision of car/bicycle/motorcycle parking; ESB sub-stations; bin storages areas, and all associated plant areas.

Provision of the first phase of Priorsland Park (on lands within the applicant's ownership) and other public and communal open spaces.

Construction of Castle Street through the subject lands and two road bridges across the Carrickmines Stream, one to serve the future school site/ park, the second to provide pedestrian and cyclist access to the Carrickmines Luas station and future Transport Interchange to the north. Provision of an additional pedestrian bridge to the park. Provision of an acoustic barrier along the southern/western edge of the site.

All associated site development works, landscaping, boundary treatments and services provision.

This application relates to development in the Cherrywood Strategic Development Zone (SDZ) and is subject to the Cherrywood Planning Scheme 2014 (as amended).

Altemar have worked with Dermot Foley Landscape Architects in preparation of the Landscape Design Rationale report and Landscape Plan which are submitted in conjunction with this report.

Habitat Management Plan

Due to the fact that there are no habitats of biodiversity importance within the site outline the principle aims of the Habitat Management Plan are to:

1) Protect Adjacent Habitats and species.
2) Outline the biodiversity enhancement features
3) Describe the management features

1) Protection of adjacent habitats and species

There are two main sensitive receptors in the vicinity of the proposed works:

A) As bats have been noted within the Priorsland site outline, it is proposed to maintain the large treeline on site which contains trees of bat roosting potential and limit the light spill in this area.
B) The Carrickmines Stream traverses through the subject site and the Ticknick Stream flows along the eastern boundary of the site. After attenuation onsite, surface water drainage will outfall to the Ticknick Stream. As part of the Interim Proposals, it is proposed to construct vehicular and pedestrian bridges across the Carrickmines Stream. Further, in-stream works are proposed as it is proposed to extend an existing surface water culvert underneath the Carrickmines Stream. As part of the Permanent Proposals, it is proposed to construct a vehicular and pedestrian bridge across the Ticknick Stream. There is the potential for concrete, dust, and contaminated surface water runoff to enter proximate watercourses. However, mitigation measures that will be incorporated as part of the construction and operational phases of the project to protect the Carrickmines Stream and Ticknick Stream will be in place. Additional biodiversity features include ponds proximate to the Ticknick Stream.
C) A robust series of mitigation measures to protect biodiversity are outlined in the CEMP.

2) Biodiversity enhancement features

A) Landscape

The Landscape Design Rationale report and Landscape Plan (Dermot Foley Landscape Architects) accompanying this submission should be consulted in relation to all aspects of site clearance, site preparation and the maintenance of all planting on site. Altemar has worked with the Landscape Architect to provide appropriate native species lists. In addition to extensive tree planting throughout the proposed development, a mix of herbaceous planting, wild-flower meadows and shade-tolerant plants are proposed within the public realm and communal amenity spaces.

This document outlines the following landscape strategy for the proposed development:

'*The proposal for the Landscape at Priorsland strives to retain and enhance the existing character and quality of the site. In relation to the proposed use, the site must be re-examined through the lens of a small and sustainable microcosm landscape – a village centre with retail, schooling, recreation, housing, and amenity space. The existing Priorsland site has a number of particularly special existing features that must be maintained in this change of usage – including the protection of the particularly important row of Turkish Oak trees.*

The main objectives of the landscape strategy are:

1. *Proposed realistic retention of existing trees and replacement planting*
2. *Integration of the scheme within the wider context.*
3. *Maintain the distinct spatial character of the existing site, while enhancing the identity.*
4. *Provide a safe and accessible environment.*
5. *Provide new opportunities for the protection and establishment of habitat.*
6. *Creation of Priorsland Park.*'

Further, in relation to biodiversity, this document outlines the following:

'*The environment that the Priorsland development proposal intends to create is one with rich biodiversity. Coordination with a team of ecologists has been carried out to develop a strong plan for the continued growth and flourishing ecology within Priorsland (refer to Ecologist's report for steps taken to improve biodiversity and native vegetation). This biodiversity is linked to a greater network of green space within the Cherrywood SDZ – Tully park, Lehaunstown public open space, etc.*'

The scheme presents numerous opportunities to deliver ecological enhancements for the benefit of local people and biodiversity.

Some of these opportunities are, Wild flower meadows, Native planting, Shelter for birds, bat, Insect hotels, Aquatic species through SuDS and Flowers / plants specifically to encourage local Bees

Other enhancements will also be adopted to maximise the opportunities the scheme brings, and to set a high benchmark for other developments within the wider area. Altemar has worked with the Landscape Architect to provide appropriate native species lists. In addition to extensive tree planting throughout the proposed development, a mix of herbaceous planting, wild-flower meadows and shade-tolerant plants are proposed within the public realm and communal amenity spaces.

These include: - A selection of native trees and shrubs will be selected to provide a dynamic range of suitable nesting habitat for bird species while also providing a winter food resource. Species include hazel, crabapple, rowan, elder, silver birch and spindle, with additional supplementary hedgerows of blackthorn and hawthorn.

The feeding resource would be supplemented by lower shrubs including cotoneaster, pyracantha. Climbers including native honeysuckle, ivy have been chosen to cover fencing in appropriate areas. In addition to white jasmine, dogrose have also been introduced to support biodiversity. Species within the meadow grass and amenity grassland area will include pollinator friendly species including dandelion, vetch, bird's foot trefoil, clovers, oxeye daisy, self-heal and larger seed bearing species such teasle and mullion will also be placed within the meadow grass area.

Additional nesting resources for birds by providing specific nest boxes for a range of garden bird species that would be placed in strategic locations on site proximate to appropriate habitat for that bird species. In addition, swift boxes (8) would be placed within the site. - A key element to the ecology of the site is to encourage connectivity through the site. This would be achieved primarily with the watercourses and riparian buffers on site.

A long grass policy will be maintained along the riparian areas where grassland is proposed and meadow grass areas and within the amenity grassland area a 6 week mowing policy will be put in place. This mowing policy will encourage the wildflowers such as clovers, dandelion and bird's foot trefoil to flower within the amenity grassland, while still allowing the area to be used for amenity purposes."

Insects
Insect hotels and log piles will be positioned in strategic locations across the scheme and in proximity to the watercourses. The inclusion of these types of habitat will help cross pollination of the planting, help sustain other wildlife and provide an interesting educational tool for children living in the new development. The design, scale and location to be confirmed and developed post planning in collaboration with an ecologist to

maximise the benefits associated with this habitat type. These can be creatively designed as focal points, or sculptural elements which may also provide connections for engagement with local school programmes or nature groups.

Bird Boxes
Bird boxes will be provided on site. The ultimate number of bird boxes and their positioning will need to be confirmed with an ecologist.

Biodiversity Officer
Prior to the development of the site the landscape architect and the onsite ecologist will meet with DLR Biodiversity Officer to refine the proposed Habitat Management Plan to further enhance biodiversity features in line with DLR's most up to date enhancement policies.

Habitat & Biodiversity Protection and Maintenance during Construction
As outlined in the Biodiversity Chapter of the EIAR and CEMP mitigation measures will be incorporated into the proposed project to minimise the potential for negative impacts on the ecology within the site. It should be noted that a project ecologist will be in place and will discuss the proposed project, HMP, and biodiversity mitigation with the DLRCC Biodiversity Officer prior to construction commencing on site. In addition, mitigation will be in place to protect the biodiversity within the watercourses and downstream of the watercourses.

APPENDIX 5.4 FISHERIES PROTECTION / CONSTRUCTION METHOD STATEMENT

Background

The following Fisheries Protection/Construction Method Statement has been prepared to accompany a planning application for the proposed Strategic Housing Development (SHD) at Priorsland, Cherrywood, Dublin 18. The proposed Priorsland development is within the Cherrywood Strategic Development Zone (SDZ) area, which is covered under the Cherrywood SDZ Biodiversity Plan. The objectives of the biodiversity plan are to achieve the following during the implementation of the draft Planning Scheme:

i. Avoid or minimise the disturbance to or loss of semi-natural habitats;
ii. Avoid or minimise the disturbance to or loss of protected flora and fauna;
iii. To encourage retention of existing habitats of ecological importance as part of green infrastructure and hence create ecological corridors;
iv. To promote management of retained and newly created habitats in order to maximise their biodiversity potential and minimise the net loss of biodiversity in the area.

As outlined in the Biodiversity Chapter (Chapter 5) of the accompanying EIAR and Appropriate Assessment Screening / Natura Impact Statement, the development of Priorsland SHD will involve works in the vicinity of the Carrickmines Stream and Ticknick Stream. The Carrickmines Stream traverses through the subject site and the Ticknick Stream flows along the eastern boundary of the site.

It should be noted that the proposed drainage strategy has been separated into “Interim Proposals” and “Permanent Proposals”. Following consultation with the design team, it was confirmed that the “Interim Proposals” outlined by PUNCH Consulting Engineers are works proposed as part of this application and within the red line defined. The “Permanent Proposals”, which has been included by PUNCH Consulting Engineers for reference, relate to the longer term permanent solutions which would require third party lands to complete.

After attenuation onsite, surface water drainage will outfall to the Ticknick Stream. As part of the Interim Proposals, it is proposed to construct vehicular and pedestrian bridges across the Carrickmines Stream. Further, in-stream works are proposed as it is proposed to extend an existing surface water culvert underneath the Carrickmines Stream. As part of the Permanent Proposals, it is proposed to construct a vehicular and pedestrian bridge across the Ticknick Stream. There is the potential for concrete, dust, and contaminated surface water runoff to enter proximate watercourses.

Specifically in relation to reducing the potential impact of proposed developments on watercourses the Cherrywood Biodiversity Plan stipulates:

“BP11 *Where works are taking place within 10m of the edge of a watercourse or tributary thereof, a Fisheries Protection/Construction Method Statement must be prepared demonstrating how pollution of watercourses during and after the construction period will be prevented and/or mitigated. This shall be developed in consultation with Inland Fisheries Ireland at application stage.”*

The following Fisheries Protection/Construction Method Statement has been prepared by Bryan Deegan (MCIEEM) who is an aquatic biologist and environmental scientist. He has over 27 years’ experience in Irish environmental consultancy and has significant experience in relation to construction impacts on watercourses and has developed in-house Appropriate Assessment and Environmental Impact Assessment procedures for Inland Fisheries Ireland.

He is currently the sole “external expert” working with Inland Fisheries Ireland providing consultancy in relation to environmental assessment and impact. All proposals are in line with standard Inland Fisheries Ireland methodologies but are subject to final pre construction approval with Inland Fisheries Ireland prior to commencement of works on site.

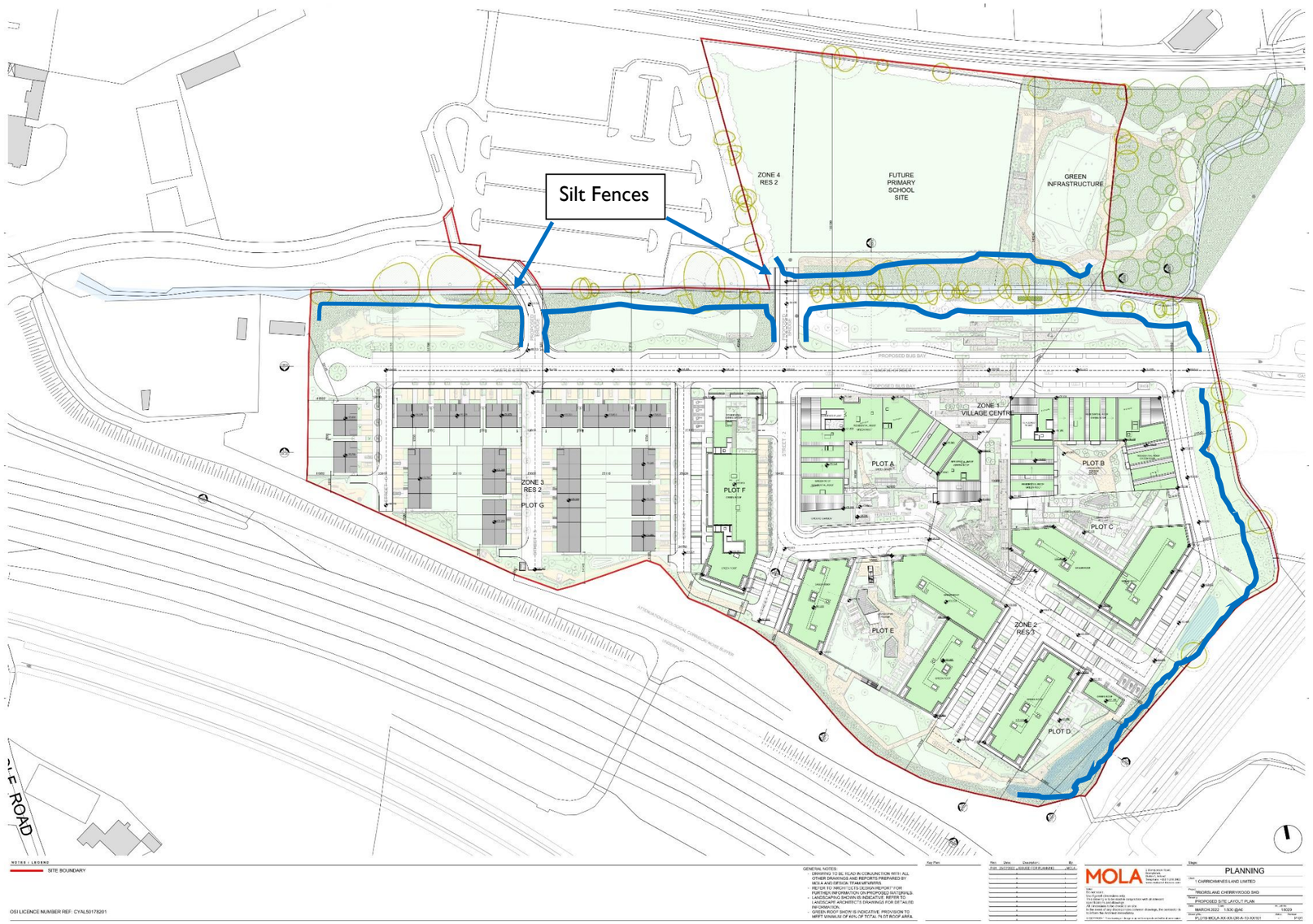
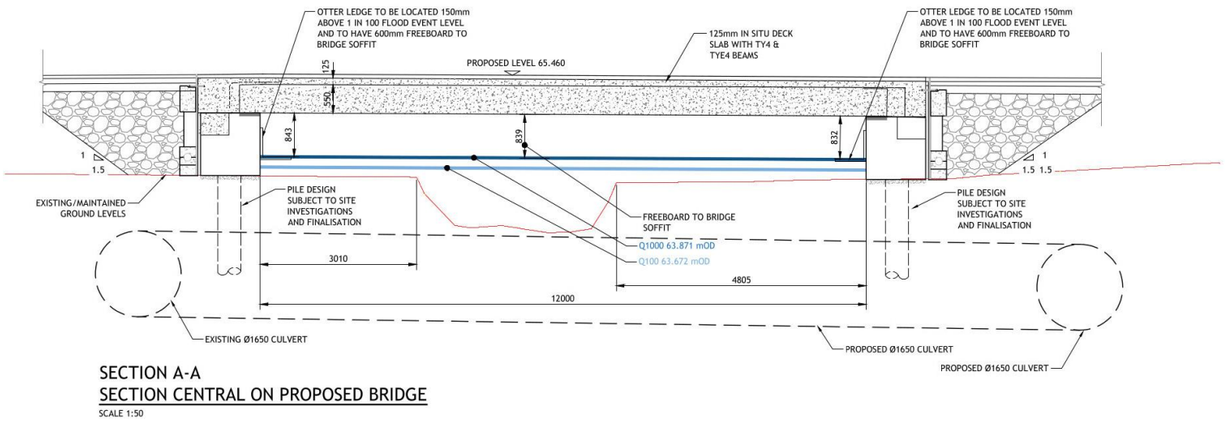


Figure AII-1: Proposed mitigation measures for Fisheries Protection

The watercourse and proposed works

The following is a summary of the proposed works and should be read in conjunction with the Biodiversity Chapter (Chapter 5) of the EIAR and CEMP. As seen in Figure A-1 the Carrickmines stream traverses through the subject site and the Ticknick Stream flows along the eastern boundary of the site. After attenuation onsite, surface water drainage will outfall to the Ticknick Stream. As part of the Interim Proposals, it is proposed to construct vehicular and pedestrian bridges across the Carrickmines Stream. Further, in-stream works are proposed as it is proposed to extend an existing surface water culvert underneath the Carrickmines Stream. As part of the Permanent Proposals, it is proposed to construct a vehicular and pedestrian bridge across the Ticknick Stream. Given that in-stream works are proposed, it is proposed to outfall surface water drainage to the Ticknick Stream (during operation and after attenuation), there is the potential for concrete, dust, and contaminated surface water runoff to enter proximate watercourses.

Three bridge crossings are proposed. It should be noted that these are bridges and not full box culvert installations. As a result the level of instream works will be limited and this would also limit the potential for downstream impacts. However, there is a proposal to place a 1650mm pipe beneath the bridge of one section (Figure 1).



SECTION A-A
SECTION CENTRAL ON PROPOSED BRIDGE
SCALE 1:50

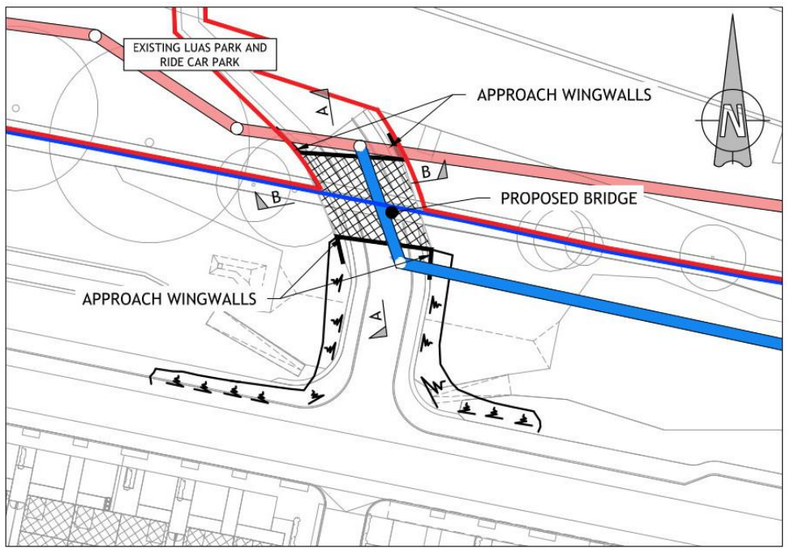


Figure 1. Cross section of bridge and culvert crossing

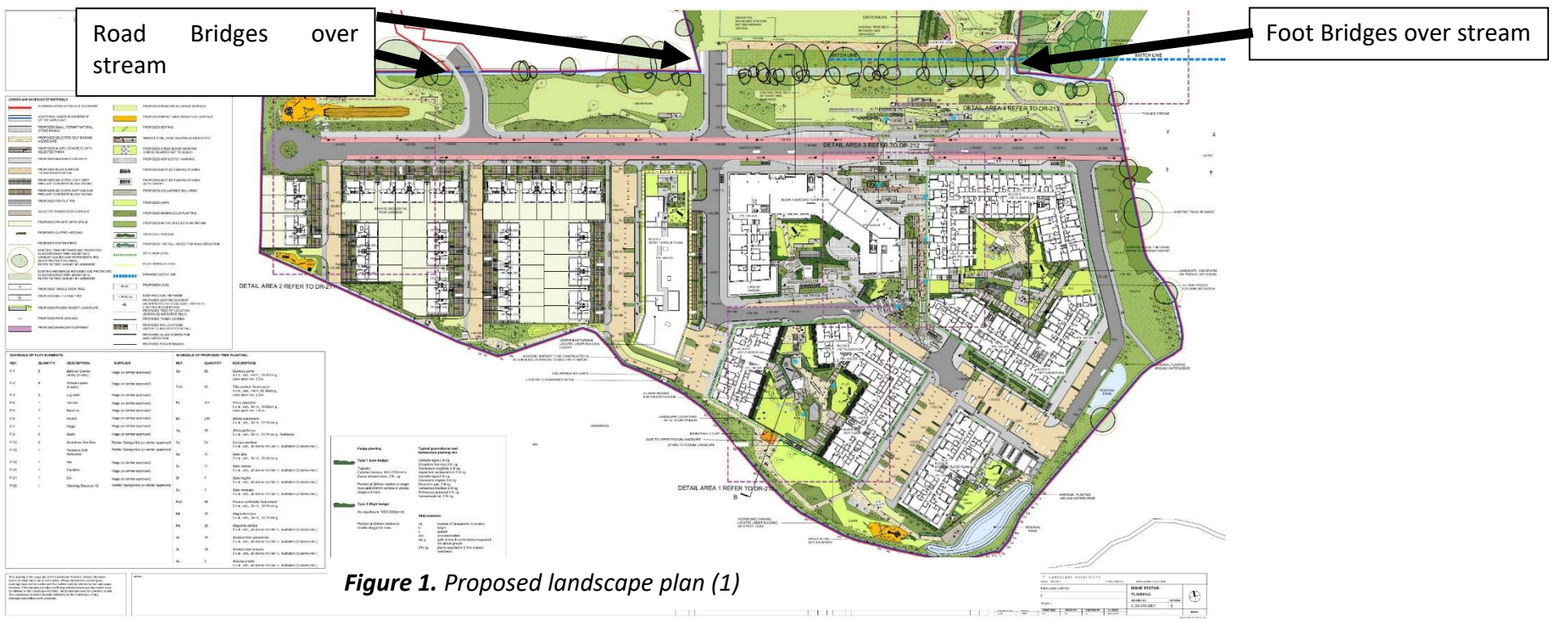


Figure 1. *Proposed landscape plan (1)*

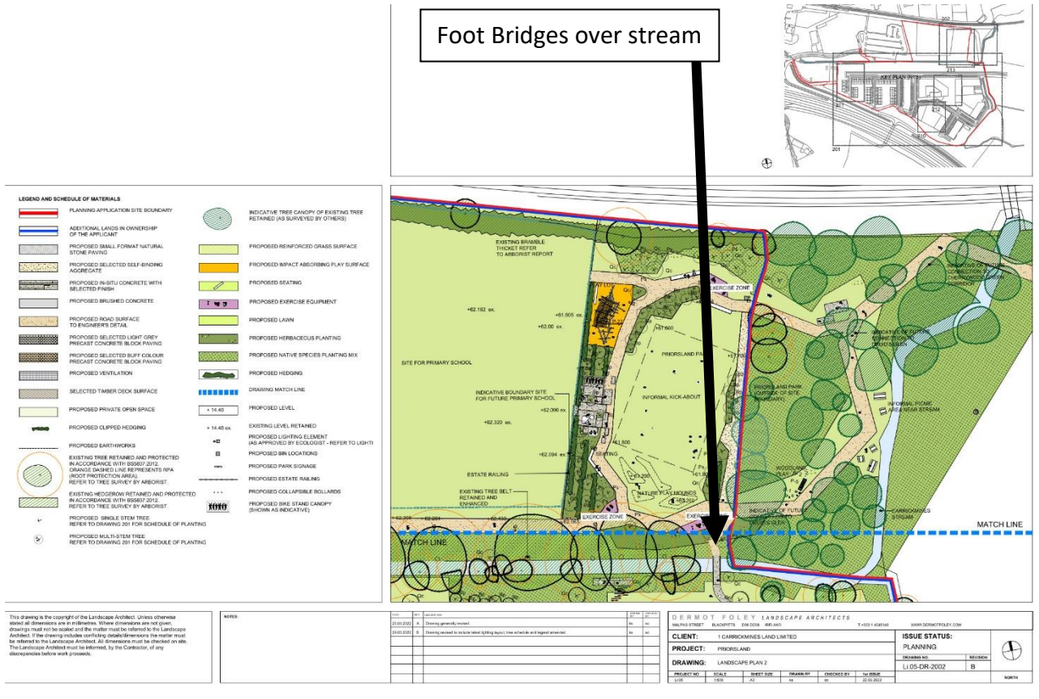


Figure 2. *Proposed landscape plan (2)*

Figure 3. *Proposed landscape sections*

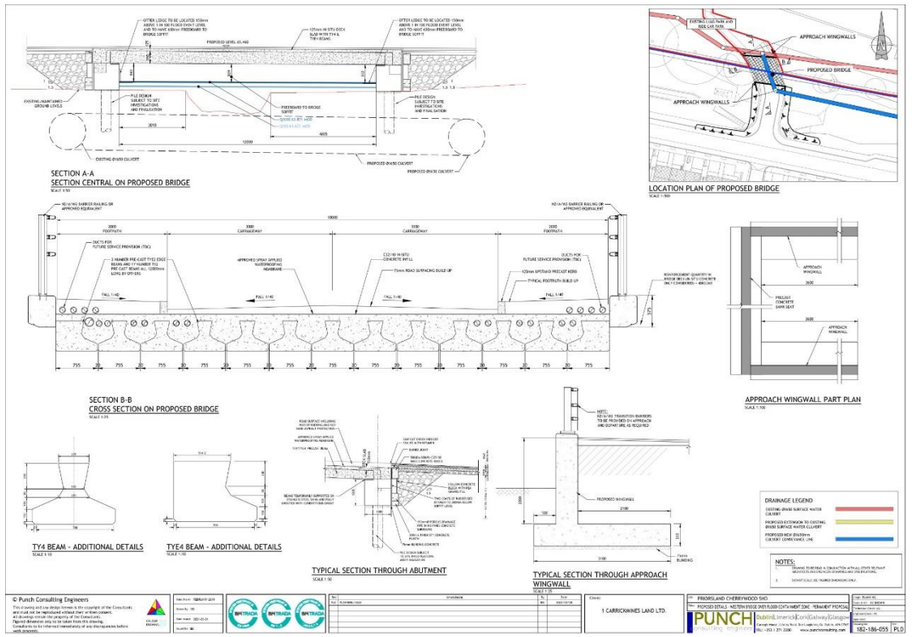


Figure 4. *Proposed western bridge – Permanent Proposal*

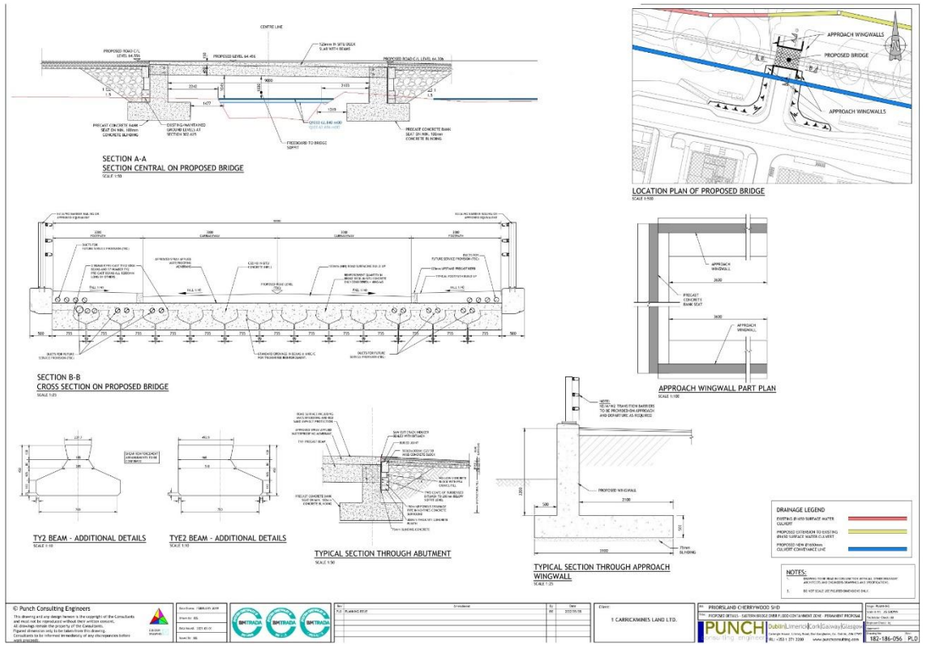


Figure 5. *Proposed eastern bridge – Permanent Proposal*

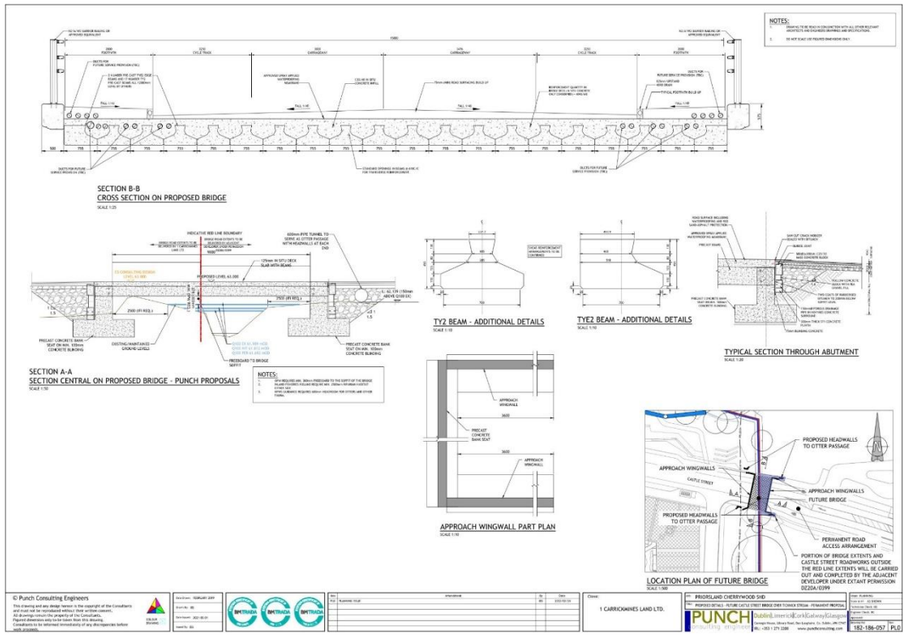


Figure 6. *Proposed future Castle Street bridge over Ticknick Stream – Permanent Proposal*

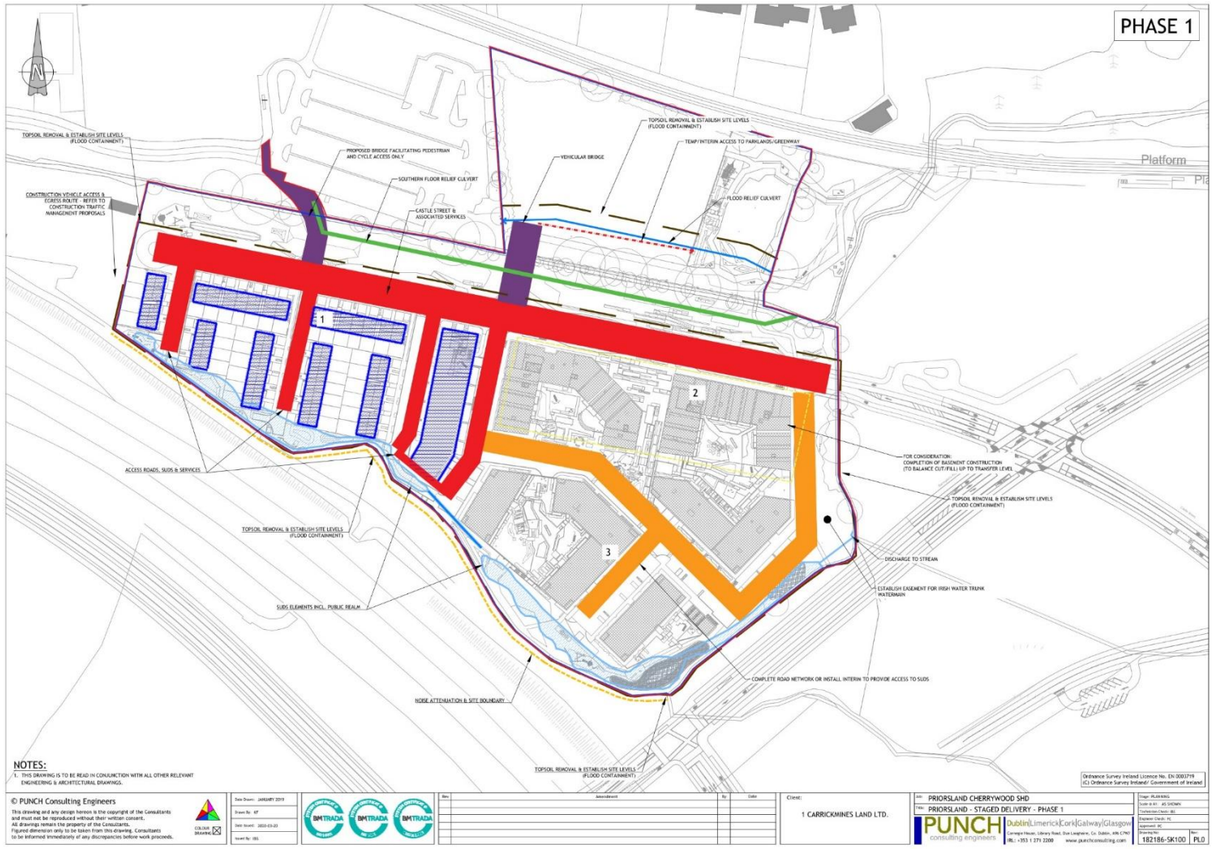


Figure 7. *Staged Delivery – Phase 1*

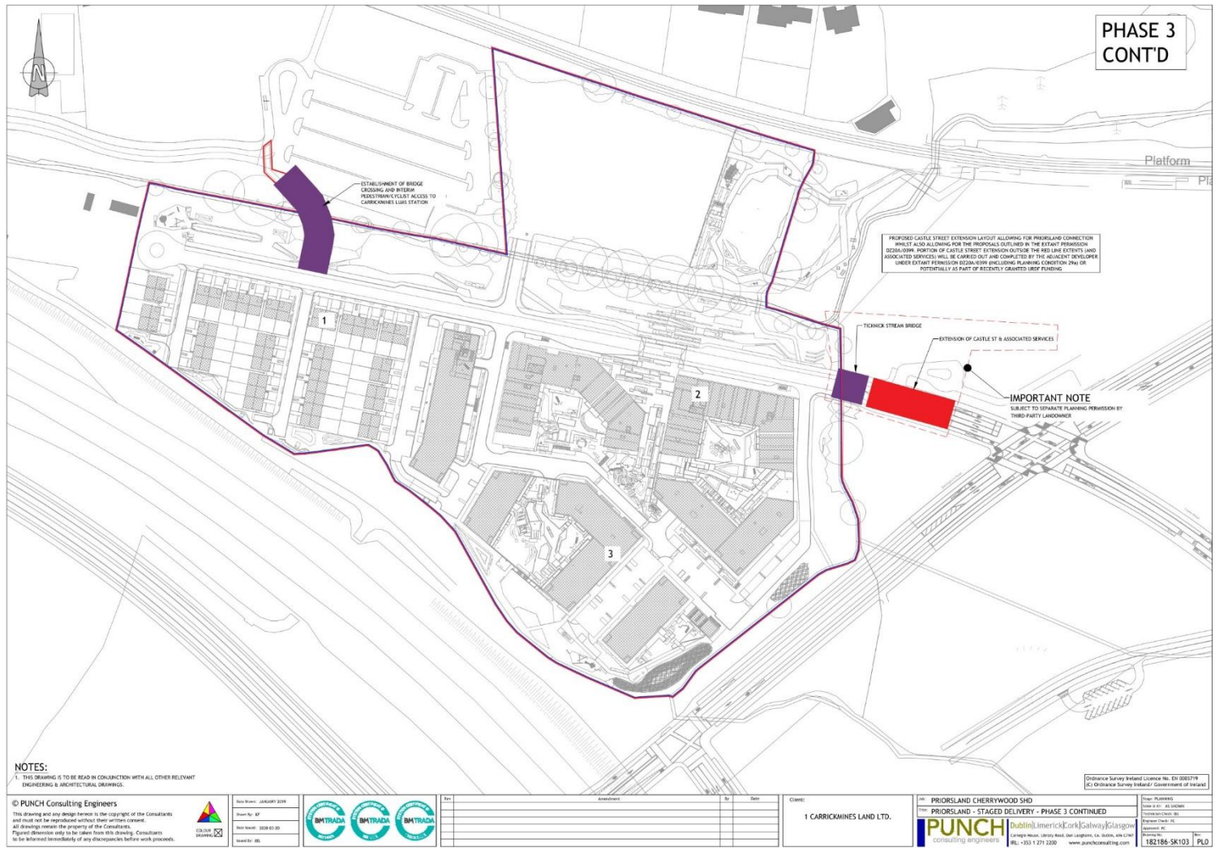


Figure 8. *Staged Delivery – Phase 3 (ctd.)*

Risk of surface water contamination during construction		
Activity	**Risk**	**Mitigation Measures**
1. Excavations and construction	Silt laden runoff enters the stream	1) A robust silt barrier fence would be placed along the edge of the watercourses. This would not impact on but would work with the tree constraints plan in relation to tree protection. It would passively remove silt from the runoff. 2) As back up to the barrier, there would be a sump pump with a float switch at the lowest point of the fence. The sump would be in a 60cm diameter vertical pipe placed uphill of the fence, the top of the pipe would be 40 cm above the ground level at the silt curtain. Water would only enter it in extreme weather if water is building up behind the silt fence. The outlet of the pump leads to a large silt bag that would need to be downstream of the curtain and maintained. 3) Inspection of the integrity of the silt fence will be a requirement of the daily on site checklist and twice daily during periods of heavy rain. Repairs if required are to be made as a matter of urgency. Spare fencing is to be retained on site in a location that is easily accessible. 4) Twice daily turbidity readings will be made in the watercourse, upstream, downstream and within the site. Photographs will be taken at the same time and catalogued. 5) IFI are to be notified immediately of breaches in the silt fence that have resulted in silt laden runoff entering proximate watercourses. 6) An aquatic ecologist will be appointed to oversee all instream works and the implementation of the initial on site mitigation measures.
2. Dewatering of trenches and excavations	Surface water contaminated with silt/petrochemicals is discharged to the drainage network.	Water from trenches and excavations will not flow directly into drains or watercourses without settlement interception. Vigilance will be required due to the proximity of the Carrickmines Stream and Ticknick Stream. Any petrochemical spills are to be cleaned up immediately.
3. Construction of pavements	Contamination of watercourses.	All pavement construction within 20m of the watercourses are required to take place during dry weather. This minimises the risk to watercourses and contamination of runoff. All associated plant to be cleaned and washed down in a controlled environment and at a designated location greater than 30m from a watercourse/drain leading to a watercourse.
4. Use of generators and small plant on site.	Oil/diesel spillages and risk of ground and surface water contamination	Drip trays placed below all small plant. Spill kits will be present on all working sites to clean up spillages. A record of all spillages will be kept and monitored. Generators and small plant not be used within 10m of watercourses.
5. Plant refuelling activities	Oil/diesel spillages and risk of ground and surface water contamination	All mobile plant to be refuelled in a central refuelling area in the contractor's compound where a spillage containment sump will be constructed within the refuelling area. All collected fuel will be disposed offsite under license. A record of all spillages will be kept and monitored.
6. Saw cutting, coring and grooving	Waste and suspended solids being washed into watercourses	On roads and car park areas and saw cutting, coring and grooving operations will be supported by the use of suction sweepers/cleaning equipment to immediately collect any detritus generated by these works. The silt barrier is to remain in place during all construction works.
7. Storage of materials	Material, sediment being washed into watercourses.	Stockpiling of loose materials will be kept to a minimum of 40m from watercourses and drains. In the event that stockpiles are required, they will have suitable barriers to prevent runoff of fines into the drainage system and watercourses. Damping down of stockpiles will take pace in dry windy weather to prevent wind blown movement of fines.

Risk of surface water contamination during construction		
Activity	**Risk**	**Mitigation Measures**
	Spillages that could contaminate watercourses.	Fuel, oil and chemical storage will be sited within a bunded area. The bund must be able to take the volume of the largest container plus 10% and be located at least 10m away from drains, ditches, excavations and other locations where it may cause pollution. Bunds will be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination.
8. Foul water	Contamination of watercourses	No foul water will be discharged on site, unless through nominated and secure sewer connection. It will not be discharged to drains or watercourses.

Risk of surface water contamination during operation		
Activity	**Risk**	**Proposed Mitigation**
Petrochemical Spills/leaks	Contamination of surface water	A regularly serviced petrochemical interceptor will be placed on a drainage network discharging to a watercourse, or drain leading to a watercourse. The site drainage on site will comply with SUDS through the use of: • Green roofs • Permeable paving • Infiltration trenches • Engineered swales • Tree root structural cell systems • Attenuation tanks

Instream Works Methodology:

The following methodology will apply to all works within 10m of the watercourses on site:

- The onsite aquatic ecologist will be informed of all works within 10m of the watercourses at least 1 month in advance of works.
- Submit detailed methodology statement to IFI 2 weeks prior to works.
- Notify IFI one week in advance of each culvert works commencing.
- Electrofish the water within the full extent of the works location at the start of the project (if required). Remove any fish and transport downstream
- For large instream works e.g. the culvert, a diversion will be required. It is considered likely at this stage that due to the trees on site that an instream flume system will be reuired to allow for the works to take place without the need for digging a temporary diversion, as this would impact on the trees.
- Prior to works commencing a net will be installed upstream and downstream of the works to prevent fish from entering the works location and will maintained for the entire length of works.

Culvert works

There are four stages to the proposed works, namely;
1. Pre-works.
2. Initial damming and re-diversion of the stream into flume pipes.
3. Laying and backfilling of proposed Fuel Pipelines

4. Removal of flume pipes and reinstatement of area.

The proposed methodologies will be overseen by the project ecologist who will liaise directly with Inland Fisheries Ireland throughout the project. The ecologist will submit an Ecological Clerk of Works Report to Inland Fisheries Ireland following the installation of the culvert and bridges.

In general construction works will be carried out in accordance with the Pollution Control Plan – appended.

1. Pre Works;

- Obtain twice daily Met –Eireann 5 day forecasts
- Works will not be undertaken in flood conditions. Plan work dates (each phase), such that rainfall event is less than 5mm in any 6 hour period.
- Monitor weather window on a continuous basis.
- Deliver 1 No. 1200mm approx.. diameter flume pipe to site
- Have all remaining materials (with exception of concrete surround), listed in procedures below, on site prior to commencement.

2. Initial Damming and Re-diversion of Stream into Flume Pipes (3 to 5 days);

- Select suitable weather window and stream depth prior to commencing work.
- Install silt interception measures downstream and then the pipe, nominally 8m long (approx..) in stream– purpose is to create initial flow route for stream and minimize turbidity during set-up works.
- Form upstream pre-dam to direct flow into pipe using concrete 'sand bags working from pipe back towards far bank.
- Lay sand bags across stream at both upstream and downstream locations,
- Place clay to rear of sandbags to minimize water ingress into area between dams.
- Excavate trough within dammed area but upstream of proposed culvert works to collect water that may flow into works area.
- Any such water is to be pumped out of works area and into pre-prepared skip with baffles located on banks. The flow from this baffled skip will be discharged through geotextile and silt bags prior discharge over grassed area.
- All excavated instream material will not be reused for stream reinstatement.
- Laying and backfilling of proposed Fuel Pipelines (2 days);
- Confirm weather window prior to commencing this stage of works.
- Excavated material to be disposed of off-site to licensed facility.
- Lay pipes, in lengths such that they extend a minimum of 2m beyond the extent of works in each direction.
- Backfill with imported granular material, to stream bed level.

4. Removal of Flume Pipes and Reinstatement of Area (3 to 5 days);

- Select suitable weather window and stream depth prior to commencing work.
- Excavate out clay used to minimize water ingress.
- Excavated material to be disposed of off-site to licensed facility.
- Remove sand bags from both upstream and downstream dams.
- Remove both upstream and downstream dams.
- Remove diameter flume pipes.

- Remove upstream dam (sand bags) – working from far bank to pipe.
- Remove pipe.
- Remove baffle skip, geotextile mat and silt bags.
- Reinstate banks.
- Remove instream silt interception.
- In stream netting will be inspected daily and remain in place until all works have been completed.

The following documentation should be reviewed by the project manager on site to ensure that the potential impacts are addressed and mitigation measures are effective:

- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI,2016): http://www.fisheriesireland.ie/fisheries-management-1/624-guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters/file

- Planning for Watercourses in the Urban Environment http://www.fisheriesireland.ie/fisheries-management-1/86-planning-for-watercourses-in-the-urban-environment-1.html

APPENDIX 5.5 COMPLIANCE WITH CHERRYWOOD BIODIVERSITY PLAN

No.	Objective	Relevance to proposal
1	**BP01** Require the preservation, as indicated in Figure 12 in Appendix 1 of existing hedgerows, treelines, woodland, scrub and other semi-natural habitats.	Please see Biodiversity Chapter in EIAR
2	**BP02** Require that all developments acknowledge the ecological value of other semi-natural habitats and species within and adjacent to development plots in the design of the development and retain them were reasonably practicable.	Please see Biodiversity Chapter in EIAR
3	**BP03** The applicant must provide a Habitat Management Plan detailing how retained habitats will be retained, protected and managed.	See Habitat Management Plan in the EIAR
4	**BP04** Require the re-survey of buildings identified as being bat roosts, or suitable for bats at an appropriate time of year (at least 2 surveys separated by a minimum of a week carried out between May and September) by a qualified bat worker, should these roosts be potentially affected by development proposals.	No buildings are present on site.
5	**BP05** Require an assessment of potential impacts of lighting on bats where development is proposed within 100m of known or suspected roosts. At these locations, potential adverse impacts on bats must be avoided. If adverse impacts are anticipated, a derogation licence must be obtained from the NPWS.	The site is over 100m from a known bat roost.
6	**BP06** Require that a badger survey is carried out by developers prior to submitting applications for development to account for any changes to sett activity or establishment of new setts within the application site and up to 150m outside of the boundary of the site. Appropriate mitigation measures may be required in some cases.	Several specific mammal surveys have been carried out including those carried out by Scott Cawley 15th January 2019 and Altemar on the 10th February 2021 and 2nd April 2022
7	**BP07** Ensure the protection of badgers, their setts, paths and feeding areas are taken account of within the design and delivery of developments. Setts cannot be disturbed or removed without permission from the National Parks and Wildlife Service.	This has been taken into account in the project design.
8	**BP 08** Where habitat that could be used by breeding birds must be removed or disturbed during the breeding season (generally February-August), a qualified ecologist must check the habitat concerned to ensure that no nests are present. The NPWS must be consulted if nests are found to determine the course of action.	This has been taken into account in the biodiversity chapter of the EIAR.
9	**BP09** Should any areas of permanent or semi-permanent standing water require infilling then they must be first checked by an ecologist for presence of Newts and/or frogs or evidence of their breeding. If required, a licence permitting their removal should be applied for from the NPWS. Developers must ensure that there is no net loss of breeding sites in the delivery of development projects in the SDZ.	No Newts and/or frogs or evidence of their breeding activity was noted on site.
10	**BP10** Ensure that crossing points identified in the Biodiversity Plan are retained in the SDZ and that they connect to landscaped grassy verge or hedgerow habitats at each end. Developments near (within 50m) of the crossing points should be designed to take account of the sensitivity of some species to light and disturbance.	Not Applicable (p43 of BAP)

No.	Objective	Relevance to proposal
11	**BP11** Where works are taking place within 10m of the edge of a watercourse or tributary thereof, a Fisheries Protection/Construction Method Statement must be prepared demonstrating how pollution of watercourses during and after the construction period will be prevented and/or mitigated. This shall be developed in consultation with Inland Fisheries Ireland at application stage.	This has been included.
12	**BP12** Require the planting of new hedgerows to take the form of a double line of native tree with shrub species. Translocation of existing hedgerows and their seed banks to new locations should be considered where feasible.	See Landscape Plan.
13	**BP13** Require the planting of new grassland to include native species that are appropriate to the soil chemistry and the function of the grassland.	See Habitat Management Plan in the EIAR.
14	**BP14** Cycleways/footpaths within the southern buffer zone at Druid's Glen will be designed to be no more than 10m from the southern edge of the buffer zone. Supplementary planting will help to screen the path from the main body of woodland.	Not Applicable
15	**BP15** Any proposals for lighting within 70m of the river on the north side of Druid's Glen must be supported by data showing how background light levels can be maintained at the river.	Not Applicable
16	**BP16** Require that the detailed design of the crossing over the Loughlinstown River addresses the ecological features on the north side including the marsh and calcareous springs and that these features are retained as far as possible, taking into account other environmental factors such as visual impacts.	Not Applicable
17	**BP17** Require the monitoring of specific ecological parameters to measure the success of certain aspects of the Biodiversity Plan and the overall ecological 'health' of the SDZ lands.	Not Applicable

APPENDIX 6.1 SITE INVESTIGATIONS REPORT - IGSL LTD.

IGSL Limited

Punch Consulting Engineers

Priorsland Residential

Site Investigation Report

Project No. 21319

January 2019

Report

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Document Verification

Project: Priorsland Residential

Project No. 21319

Revision	Date	Title		
Rev 0	22/01/2019	Report		
	Copies	Document Format	Prepared By	Reviewed By
	1	Digital	Brian Green Chartered Engineer	David Green Chartered Engineer
	To	Punch Consulting Engineers		
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			

Report on Site Investigation
For
Priorsland Residential
Development
On behalf of
Punch Consulting Engineers

Report No. 21319

Contents

Identity Code BG

Report on Site Investigation
For
Priorsland Residential Development
On behalf of
Punch Consulting Engineers

Report No. 21319 Date January 2019

1.0 Introduction

An investigation of ground conditions was carried out at the site of the proposed residential development at Priorsland, located within the Cherrywood development in Dublin 18. The investigation entailed the following fieldworks.

- Boreholes were constructed in a total of twelve locations using light cable tool techniques.
- Rotary techniques were employed adjacent to four of the boreholes to ascertain the presence of bedrock within the scheduled depths.
- Trial pits were excavated in an additional thirty seven locations to permit close examination of the upper soils and to facilitate the recovery of large bulk samples.
- Dynamic probing was used adjacent to each of the trial pits to obtain a measure of the condition of the sub-soils.
- Infiltration tests were performed in five locations to assess the suitability of the sub-soils for soakaway purposes.

This report contains the fieldwork records and the results of associated geotechnical and environmental tests. Also included is a discussion of ground conditions in relation to the proposed development.

2.0 Fieldwork

2.1 Boreholes

The boreholes were constructed in the locations indicated on the site plan enclosed in Appendix 8 while the descriptions and depths of the various soils encountered are shown on the boring records enclosed in Appendix 1. Also shown on these records are the depths at which samples were recovered, the results of in-situ Standard Penetration Tests, and the groundwater conditions observed during the course of boring operations.

The boreholes encountered topsoil overlying thin layers of soft to firm sandy clay. Penetration of these deposits revealed stiff gravelly clay, grading to sandy gravel with cobbles and boulders. The boreholes were terminated on obstructions, at depths ranging from 4.2 metres to 5.5 metres.

Groundwater ingress was noted at various depths and at various rates, rising in places, during the 20 minute monitoring period. A summary of groundwater observations is presented in Table 1. Because the relatively short duration of boring operations, standpipes were installed in BH02 and BH07 to facilitate long-term monitoring.

Borehole No.	Water Ingress (m bgl)	Rate of ingress	Rose to (m bgl)	End of boring (m bgl)	Standpipe
BH01A	3.4	Rapid	2.3	1.4	
BH02	2.0	Seepage	2.0		SP
BH03	1.7	Slow	1.7	1.2	
BH04	3.9	Rapid	0.8	1.3	
BH05	2.4	Seepage	2.4		
BH06	1.8	Slow	1.4	1.2	
BH07	1.2	Slow	0.9	0.6	SP
BH08	None			3.0	
BHRC01	2.8	Seepage	1.8	0.6	
BHRC02	3.8	Seepage	0.8	1.2	
BHRC03	3.2	Moderate	2.6	1.3	
BHRC04	3.1	Moderate	2.6	1.1	

Table 1

2.2 Rotary

Adjacent to four borehole locations, numbered BHRC01 to BHRC04, rotary techniques were used to penetrate the obstructions on which the boreholes were terminated, and to ascertain the depth, composition and condition of bedrock. In each location, Symmetrix open hole drilling techniques were employed to penetrate the overburden soils, changing to rotary methods on the first indication of rock in the flush returns. The rotary records, RC01 to RC04, are enclosed in Appendix 2.

The records indicate that the boreholes were terminated on obstructions within the coarse granular deposits, at depths ranging from 4.4 metres to 5.5 metres. Using open hole drilling techniques, depths of 5.0 metres to 6.3 metres were achieved, classifying the obstructing material as coarse granular soil or residual rock. Using coring techniques the intact rock was identified as medium strong to strong fine to medium grained Granite with some localised weathering.

Location	Bored Depth (m bgl)	Symmetrix Depth (m bgl)	Cored Depth	Water strike Rotary hole (m bgl)	Standpipe
BHRC01	4.4	5.2	5.2 to 14.5	4.9	
BHRC02	4.4	6.2	6.2 to 14.3	None	SP
BHRC03	5.5	6.3	6.3 to 14.9	None	SP
BHRC04	4.5	5.0	5.0 to 14.7	2.0 and 4.2	

Table 2

The ground conditions are summarised in Table2 which also shows the groundwater conditions and the locations of standpipe installations.

2.3 Trial Pits

The trial pits revealed topsoil overlying layers of gravelly sandy silt and clay, grading in places to sandy gravel with cobbles and boulders. In all locations, the pits met obstructions within two metres of the surface.

2.4 Dynamic Probing

Dynamic probing was utilised adjacent to each of the trial pits to obtain values of soil resistance.

The dynamic probe utilised by IGSL Ltd complies with the requirements of ISO 22476-2: 2005+A1: 2011 – Geotechnical Investigation and testing – Field testing - Part 2: Dynamic probing. DPH probing comprises a 50 kg drop weight, 500mm drop height and a 43.7mm diameter (90°) cone.

In accordance with the standards, the number of blows required to drive the probe through each 100mm increment of penetration is recorded. Probing is generally terminated when blow counts, N_{100} values, exceed 25, in order to avoid damage to equipment. Detailed probe records are provided on which the blow counts are recorded both numerically and graphically.

Probe results are used primarily in conjunction with known information on soil composition and stratification, to define more accurately the soil profile, and to detect any soft or loose zones. However, several authors have published relationships between blow-counts and strength parameters for both granular and fine grained soils.

All of the probes recorded low or moderate resistance within the upper metre. However, below this upper zone, resistance increased rapidly, with refusal at depths ranging from 1.2 metres (DP29) to 2.4 metres (DP13).

2.5 Infiltration Tests

Infiltration tests were performed in four locations to ascertain the suitability of the sub-soils for soakaway purposes. Testing was performed in accordance with BRE Digest 365 ‘Soakaway Design’.

To obtain a measure of the infiltration rate of the sub-soils, water was poured into each test pit to ensure total saturation of the sub-soils. This procedure was repeated twice more, and records were taken of the fall in water level against time. The results for the final stages of testing, following the saturation periods, are enclosed in Appendix 5

The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second. The results for the final monitored stages are summarised in Table 3.

Location	Test pit Depth (m bgl)	Infiltration Rate (m/min)	Soil Type
SA01	1.5	0.00057	Sandy gravelly SILT/CLAY
SA02	1.4	0	Sandy gravel over possible rock
SA03	1.5	0.00025	Silty sandy GRAVEL
SA04	1.5	0.00017	Silty sandy GRAVEL
SA05	1.5	0.00091	Sandy Gravel

Table 3

3.0 Laboratory Test Results (Geotechnical)

3.1 Particle Size Distributions

Grading curves for selected samples show considerable variations in the composition of the sub-soils. It is also important to appreciate that, for practical reasons, cobbles and boulders were omitted from the test specimens.

3.2 Index Properties

The results of plastic and liquid limit tests classify the sub-soils as non-plastic.

3.3 Shear box tests

Small shear box tests (60mm x 60mm) were undertaken on four samples recovered from the trial pits. Tests were performed in accordance with BS1377:1990 Part 7 Clause 4.

The tests were used to determine the cohesion, c' and angle of internal shearing resistance (φ'). Two samples were prepared by compacting the sample into the shear box, while two were lightly tamped into the mould.

The results revealed φ' values in the range 38 to 44 degrees. Cohesion intercepts (c') ranged between 7 and 19 kPa.

3.4 Rock Testing

The Point Load Index Test provides a rapid, and accurate, strength index from rock fragments unlike the Uniaxial Compression test (UCS) which requires careful preparation of intact lengths of core. The test specimen is compressed between two cones loaded from a hydraulic hand pump. The core fails due to the tensile forces over the diametral area between the points. The strength at failure is expressed as the point load index Is. For purposes of comparison the Is values are corrected to give the equivalent strength for a 50 mm diameter specimen. This is the Is_{50} value. From research by several workers relationships have been formulated, relating the Is values to UCS.

The equivalent UCS values recorded from fragments of the bedrock vary from 16MPa to 120MPa, classifying the rock as weak to very strong. However, most of the results lie within the medium strong to strong range.

3.5 Chemical Analysis

The results of chemical testing generally showed mostly low concentrations of soluble sulphates. In addition, the pH values indicated near neutral conditions.

Where the soluble sulphate concentrations were significantly below 0.5 g/l, and pH values were above 2.5, a Design Sulphate Class of DS-1 may be assumed in accordance with Table C1 of BRE Special Digest 1 Concrete in Aggressive Ground: 2005.

Assuming a static groundwater table, an ACEC (Aggressive Chemical Environment for Concrete) Classification of AC-1s is applicable

The exception was a sample from a depth of 1.0 metres in TP24 where a soluble sulphate concentration of 0.77 g/l was recorded, classifying the sample as Class DS-2 and an ACEC of AC-1s.

4.0 Laboratory Test Results (Environmental)

Environmental testing was scheduled on selected samples. The samples underwent a Waste Acceptance Criteria (WAC) analyses in accordance with the RILTA Suite, which can be used to fully assess the waste disposal requirements of soils destined for landfill.

Included in the test suite are Heavy Metals, Speciated TPH, Mineral Oil, BTEX, PCB and Total Organic Carbon (TOC) carried out on dry soil samples. Also included are leachate analyses, whereby leachate is generated in accordance with CEN 10:1 specification and this is tested for the presence of recognised contaminants including Heavy Metals, Dissolved Organic Carbon (DOC) and Total Dissolved Solids (TDS). An Asbestos screen is also included in the RILTA suite.

5.0 Discussion

The investigation revealed weathered upper deposits, composed of gravelly silts and clays. These deposits were underlain by sandy gravel with cobbles and boulders. While the trial pits were terminated on obstructions encountered within two metres of the surface, the boreholes achieved depths ranging from 4.2 metres to 5.5 metres. Using rotary drilling and coring techniques, the boreholes were extended through coarse granular deposits and weathered rock, revealing intact granite at depths ranging from 5.0 metres to 6.3 metres. Granite, generally in medium strong to strong condition, was cored to depths of 14.5 metres to 14.9 metres.

Groundwater was encountered at various depths in the boreholes, rising to within 0.6 metres of the surface in places. Water ingress was also noted in the core holes. Standpipes were installed in selected locations to facilitate long-term monitoring.

5.1 Structural Foundations

While the sub-soils have a high granular content and will provide support for conventional strip or pad foundations, it will be important to ensure that all foundations are placed below any weathered soils or organic layers. The results of standard penetration tests in the boreholes indicate that, in all areas, founding depths should be less than 2.0 metres below existing ground level and the dynamic probe results suggest founding depths within 1.5 metres in most areas.

While variations in the composition and condition of the upper soils can be expected, the transition to competent material should be visually discernible. For foundations placed on the stiff gravelly clays or medium dense to dense granular deposits, a bearing resistance of 150 kN/m^2 can be presumed. This figure may be increased subject to visual inspection of foundation excavations. Incorporation of steel reinforcing in foundation concrete will minimise the effects of any differential movements.

In view of the instances of water ingress in the boreholes, provision should be made for dewatering of foundation excavations, if required.

5.2 Infiltration

Soakaways are generally designed in accordance with “BRE Digest 365 - Design of soakaways".

The digest suggests that a soakaway should be designed to accommodate the immediate storm-water run-off and permit infiltration into the surrounding ground sufficiently quickly to provide the necessary capacity to receive run-off from a subsequent storm. The required soakaway capacity is obtained by calculating the inflow and outflow for a range of storm durations and choosing the storm period which gives the maximum storage requirement. Rainfall statistics are obtained from Met Eireann and calculations are usually carried out for a 30 year return period.

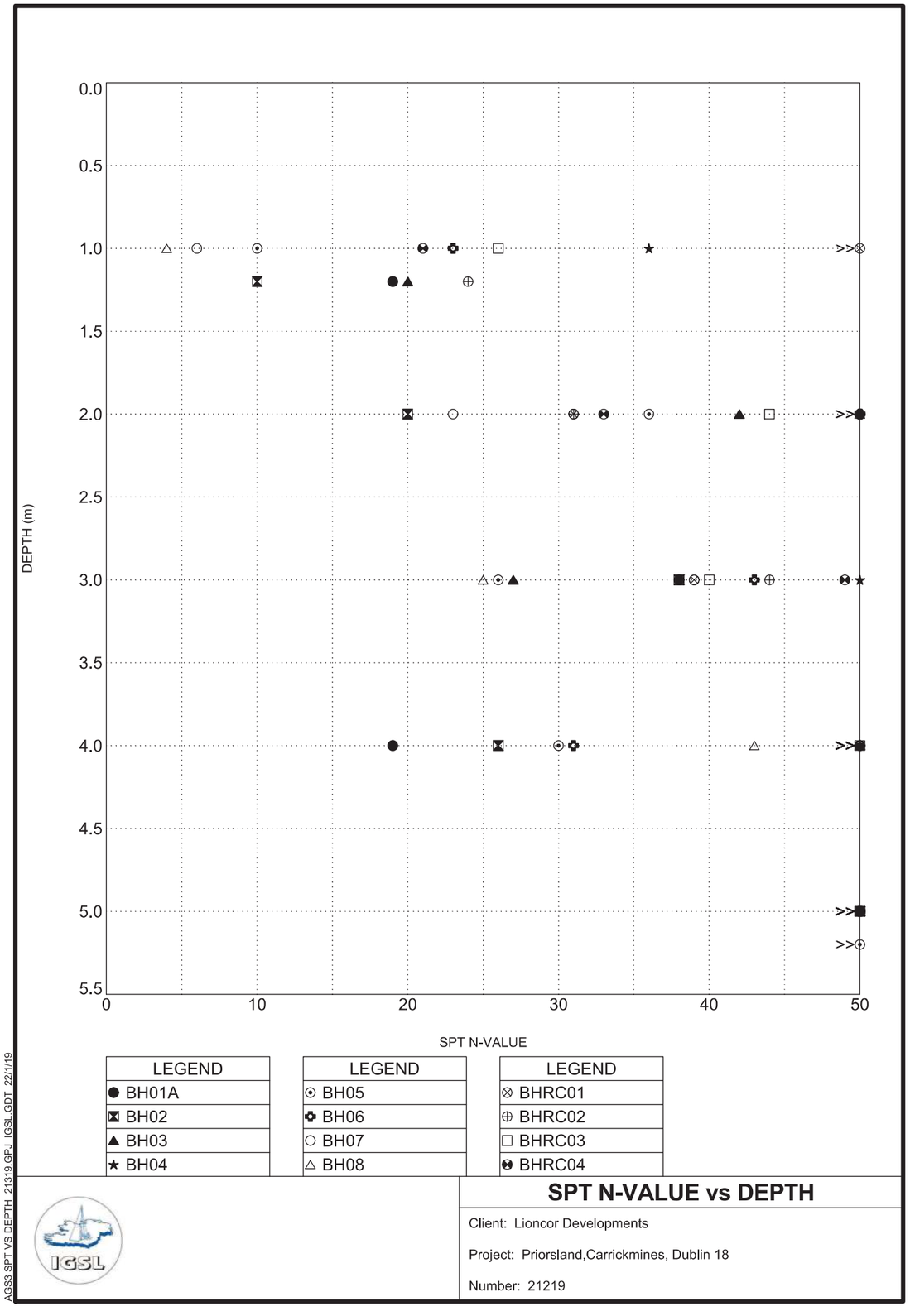
The measured infiltration rates were moderate, with no measurable movement where the sub-soil had the appearance of weathered rock.

Where the design of soakaways is considered impractical, it will be necessary to discharge run-off water to an existing surface water system, using attenuation techniques to regulate the flow.

5.3 Environmental Issues

The results of WAC analyses showed that all samples generally satisfy the criteria for inert waste as stipulated in the European Landfill Directive. However, since several samples showed elevated levels of dissolved organic carbon (DOC), this material will not be automatically accepted by a licensed inert landfill. Consultation with the chosen landfill would be advised.

It should be noted that the chosen landfill should be furnished with the WAC results in advance of any soils being removed from site. Depending on the extent and depth of excavation, the landfill may require additional testing to achieve the frequency of analysis (i.e. number of samples per unit volume of excavation) that meets their license requirements.



Appendix 1 Boring Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 1
CO-ORDINATES	722,131.18 E 724,009.82 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	63.90	**BOREHOLE DEPTH (m)**	0.90
		DATE COMMENCED	22/10/2018
		DATE COMPLETED	22/10/2018
CLIENT	Lioncor Developments	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	D.Tolster
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		63.70	0.20						
	Brown sandy SILT/CLAY with gravel and some cobbles and occasional boulders		63.00	0.90	AA93613	B	0.50			
1	Obstruction End of Borehole at 0.90 m									
2										
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.7	0.9	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Standing 3hrs on access.CAT scanned location and hand dug inspection pit completed.Obstruction encountered at 0.90m. Moved 4m to BH01A and attempted rebore.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**BOREHOLE NO.**	**BH01A**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)		**BOREHOLE DEPTH (m)**	5.10
		DATE COMMENCED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**SPT HAMMER REF. NO.**	
		BORED BY	D.Tolster
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.15						
	Firm brown very sandy SILT/CLAY with occasional gravel			1.20	AA93614	B	1.00		N = 19 (3, 4, 4, 3, 4, 8)	
1	Firmbrown sandy SILT/CLAY with gravel and occasional cobbles			2.00	AA93615	B	2.00		N = 50 (12, 13, 8, 10, 15, 17)	
2	Very stiff brown very sandy SILT/CLAY with gravel and occasional cobbles and boulders			3.00	AA93616	B	3.00		N = 38 (10, 10, 10, 8, 8, 12)	
3	Dense grey/brown fine to coarse sandy GRAVEL with some cobbles			3.70	AA93617	B	3.70			
	Medium dense black fine to coarse sandy clayey GRAVEL with cobbles			4.00	AA93618	B	4.00		N = 19 (4, 5, 4, 5, 4, 6)	
4	Dense grey/brown fine to coarse sandy GRAVEL with some cobbles and occasional boulders			5.10	AA93619	B	5.00		N = 50/75 mm (25, 50)	
5	Obstruction End of Borehole at 5.10 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.4	2.5	1	
4.9	5.1	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.40	3.40	No	2.30	20	Rapid

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
23-10-18	5.10	Nil	1.40	End of BH

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**BOREHOLE NO.**	**BH02**
		SHEET	Sheet 1 of 1
CO-ORDINATES	722,180.53 E 723,998.88 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	63.24	**BOREHOLE DEPTH (m)**	5.30
		DATE COMMENCED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**SPT HAMMER REF. NO.**	
		BORED BY	D.Tolster
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		63.14	0.10						
	Soft light brown sandy SILT/CLAY with occasional gravel		62.04	1.20	AA93620	B	1.00		N = 10 (2, 2, 2, 2, 3, 3)	
1	Firm brown sandy SILT/CLAY with some gravel		61.24	2.00	AA93621	B	2.00		N = 20 (4, 2, 3, 3, 7, 7)	
2	Stiff brown sandy CLAY with gravel and occasional cobbles and boulders		60.54	2.70	AA93622	B	2.70		N = 38 (10, 10, 10, 8, 8, 12)	
3	Dense grey/brown fine to coarse sandy GRAVEL with cobbles and occasional boulders		59.24	4.00	AA93623	B	3.50			
	Medium dense black fine to coarse sandy clayey GRAVEL with cobbles and occasional boulders		58.94	4.30	AA93624	B	4.00		N = 26 (9, 6, 6, 8, 6, 6)	
4	Dense grey/brown fine to coarse sandy GRAVEL with cobbles and occasional boulders		57.94	5.30	AA93625	B	5.00		N = 50/150 mm (7, 9, 31, 19)	
5	Obstruction End of Borehole at 5.30 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.4	3.5	1	
5.1	5.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.00	2.00	No	No	20	Seepage

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
24-10-18	5.30	1.00	5.30	50mm SP

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

BOREHOLE NO. BH03
SHEET Sheet 1 of 1

CO-ORDINATES 722,351.77 E
723,962.63 N
GROUND LEVEL (m AOD) 63.61

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 4.20

DATE COMMENCED 31/10/2018
DATE COMPLETED 31/10/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY D.Tolster
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		63.51	0.10						
	Light brown sandy SILT/CLAY with occasional gravel		63.11	0.50						
	Firm light and dark sandy SILT/CLAY with some fine gravel				AA93637	B	0.50			
1					AA93638	B	1.00		N = 20 (2, 2, 4, 5, 5, 6)	
	Stiff grey sandy SILT/CLAY with cobbles		62.41	1.20						
			61.61	2.00	AA93639	B	2.00		N = 42 (7, 8, 10, 10, 10, 12)	
2	Medium dense to dense grey/brown fine to coarse sandy GRAVEL with some cobbles and occasional boulders									
3					AA93640	B	3.00		N = 27 (4, 6, 5, 6, 8, 8)	
					AA93641	B	3.50			
4			59.41	4.20	AA93642	B	4.00		N = 25/75 mm (12, 25, 25)	
	Obstruction End of Borehole at 4.20 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.4	2.6	1.5	
4	4.2	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
1.70	1.70	2.00	No	20	Slow

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
31-10-18	4.20	Nil	1.20	End of BH

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

BOREHOLE NO. BH04
SHEET Sheet 1 of 1

CO-ORDINATES 722,153.21 E
723,959.25 N
GROUND LEVEL (m AOD) 63.60

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 4.50

DATE COMMENCED 08/11/2018
DATE COMPLETED 08/11/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY J.O'Toole
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		63.40	0.20						
	Firm brown SILT/CLAY with occasional fine gravel									
1					AA96674	B	1.00		N = 36 (2, 7, 9, 9, 9, 9)	
			62.20	1.40						
	Stiff to very stiff grey/brown SILT/CLAY with some gravel and occasional cobbles		61.80	1.80						
2	Dense grey/brown fine to coarse very sandy GRAVEL with occasional cobbles (Possibly very gravelly sand)				AA96675	B	2.00		N = 52 (7, 9, 12, 15, 10, 15)	
3					AA96676	B	3.00		N = 50 (6, 12, 13, 12, 13, 12)	
			59.60	4.00						
4	Dense angular COBBLES and BOULDERS		59.10	4.50	AA96677	B	4.00		N = 50/150 mm (10, 12, 24, 26)	
	Obstruction End of Borehole at 4.50 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.3	4.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.90	3.90	No	0.80	20	Rapid

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08-11-18	4.50	Nil	1.30	End of BH

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

BOREHOLE NO. BH05
SHEET Sheet 1 of 1

CO-ORDINATES 722,119.27 E
723,936.65 N
GROUND LEVEL (m AOD) 64.24

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 5.30

DATE COMMENCED 25/10/2018
DATE COMPLETED 25/10/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY D.Tolster
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		64.04	0.20						
1	Firm light brown sandy SILT/CLAY with occasional gravel		62.94	1.30	AA93626	B	1.00		N = 10 (2, 2, 2, 2, 3, 3)	
2	Stiff brown sandy SILT/CLAY with some gravel and occasional cobbles		61.74	2.50	AA93627	B	2.00		N = 36 (3, 9, 11, 9, 8, 8)	
3	Medium dense grey/brown fine to coarse sandy GRAVEL with some cobbles and occasional boulders		60.24	4.00	AA93628 AA93629	B B	2.50 3.00		N = 26 (7, 8, 6, 5, 8, 7)	
4	Medium dense brown fine to coarse sandy clayey GRAVEL with cobbles		59.94	4.30	AA93630	B	4.00		N = 30 (1, 4, 5, 8, 9, 8)	
5	Dense white fine to coarse sandy GRAVEL with cobbles and boulders		58.94	5.30	AA93631	B	5.00		N = 50/75 mm (25, 50)	
6	Obstruction End of Borehole at 5.30 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.4	2.5	1	
5.1	5.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.40	2.40	2.40	No	0	Seepage

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

BOREHOLE NO. BH06
SHEET Sheet 1 of 1

CO-ORDINATES 722,253.79 E
723,982.68 N
GROUND LEVEL (m AOD) 63.25

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 4.90

DATE COMMENCED 30/10/2018
DATE COMPLETED 30/10/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY D.Tolster
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		63.10	0.15						
1	Firm light brown sandy SILT/CLAY with occasional gravel		62.05	1.20	AA93632	B	1.00		N = 23 (4, 4, 4, 5, 6, 8)	
2	Stiff brown sandy SILT/CLAY with some gravel and occasional cobbles		61.45	1.80	AA93633	B	2.00		N = 50 (11, 14, 10, 10, 15, 15)	
3	Medium dense to dense grey/brown fine to coarse GRAVEL with some cobbles and occasional boulders				AA93634	B	3.00		N = 43 (4, 5, 10, 13, 11, 9)	
4					AA93635	B	4.00		N = 31 (3, 5, 5, 8, 7, 11)	
5	Obstruction End of Borehole at 4.90 m		58.35	4.90	AA93636	B	4.90		N = 50/225 mm (1, 3, 10, 18, 22)	
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.4	2.5	1	
4.7	4.9	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
1.80	1.80	2.00	1.40	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
30-10-18	4.80	Nil	1.20	End of BH

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

BOREHOLE NO. BH07
SHEET Sheet 1 of 1

CO-ORDINATES 722,425.16 E
723,947.09 N
GROUND LEVEL (m AOD) 62.19

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 4.20

DATE COMMENCED 01/11/2018
DATE COMPLETED 01/11/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY D.Tolster
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		62.09	0.10						
	Soft brown slightly sandy peaty SILT/CLAY with occasional gravel				AA93643	B	0.50			
1					AA93644	B	1.00		N = 6 (0, 1, 1, 1, 2, 2)	
	Stiff brown sandy SILT/CLAY with some gravel and occasional cobbles		60.89	1.30						
2					AA93645	B	2.00		N = 23 (2, 2, 2, 6, 9, 6)	
	Medium dense to dense grey/brown fine to coarse sandy GRAVEL with cobbles and occasional boulders		59.49	2.70						
3					AA93646	B	3.00		N = 39 (3, 6, 9, 12, 9, 9)	
4					AA93647	B	4.00		N = 50/75 mm (12, 12, 50)	
	Obstruction End of Borehole at 4.20 m		57.99	4.20						
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4	4.2	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
1.20	1.20	2.00	0.90	20	Slow

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
01-11-18	4.20	Nil	0.60	End of BH

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
01-11-18	4.20	1.00	4.20	50mm SP

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

BOREHOLE NO. BH08
SHEET Sheet 1 of 1

CO-ORDINATES 722,320.18 E
723,816.27 N
GROUND LEVEL (m AOD) 63.06

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 5.40

DATE COMMENCED 02/11/2018
DATE COMPLETED 02/11/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY D.Tolster
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		62.86	0.20						
	Soft brown sandy SILT/CLAY with some gravel				AA93648	B	0.50			
1			61.86	1.20	AA93649	B	1.00		N = 4 (1, 1, 1, 0, 1, 2)	
	Stiff mottled black/brown/yellow SILT/CLAY with gravel and occasional large boulders		61.56	1.50						
	Very stiff to hard brown sandy gravelly CLAY with some cobbles and boulders		61.06	2.00						
2	Medium dense grey/brown fine to coarse sandy GRAVEL with cobbles and occasional boulders				AA93650	B	2.00		N = 35/150 mm (25, 15, 18, 17)	
3					AA93651	B	3.00		N = 25 (4, 4, 5, 6, 6, 8)	
4					AA93652	B	4.00		N = 43 (15, 10, 12, 13, 9, 9)	
5					AA93653	B	5.00		N = 50/75 mm (10, 10, 50)	
	Obstruction End of Borehole at 5.40 m		57.66	5.40						
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2 5.2	2.2 5.4	1 2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
02-11-18	5.40	Nil	3.00	End of BH

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**BOREHOLE NO.**	**BHRC01**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)		**BOREHOLE DEPTH (m)**	4.40
		DATE COMMENCED	10/11/2018
		DATE COMPLETED	10/11/2018
CLIENT	Lioncor Developments	**BORED BY**	J.O'Toole
ENGINEER	Punch C.E	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.20						
	Soft brown SILT/CLAY with occasional fine gravel			0.80						
1	Firm black/grey sandy SILT/CLAY with some gravel			1.10					N = 50/150 mm (10, 8, 15, 35)	
	Dense large COBBLES and BOULDERS			1.80	AA96682	B	1.20			
2	Medium dense to dense grey fine to coarse sandy GRAVEL with occasional cobbles				AA96683	B	2.00		N = 31 (4, 7, 7, 9, 8, 7)	
3					AA96684	B	3.00		N = 39 (3, 7, 9, 10, 9, 11)	
4				4.10	AA96685	B	4.00		N = 30/150 mm (10, 12, 22, 8)	
	Dense large angular COBBLES/BOULDERS			4.40						
5	Obstruction End of Borehole at 4.40 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.1	1.8	1.5	
4.2	4.4	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.80	2.80	No	1.80	20	Seepage

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
10-11-18	4.40	Nil	0.60	End of BH

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**BOREHOLE NO.**	**BHRC02**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)		**BOREHOLE DEPTH (m)**	4.60
		DATE COMMENCED	09/11/2018
		DATE COMPLETED	09/11/2018
CLIENT	Lioncor Developments	**BORED BY**	J.O'Toole
ENGINEER	Punch C.E	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.20						
	Soft brown SILT/CLAY with occasional fine gravel			0.50						
	Firm black sandy SILT/CLAY with some gravel			1.20	AA96675	B	1.00		N = 24 (1, 2, 4, 6, 7, 7)	
1	Medium dense to dense grey fine to coarse sandy GRAVEL with occasional cobbles									
2					AA96676	B	2.00		N = 31 (2, 4, 7, 7, 9, 8)	
3					AA96677	B	3.00		N = 44 (3, 7, 11, 10, 12, 11)	
4				4.10	AA96678	B	4.00		N = 35/150 mm (9, 18, 26, 9)	
	Dense angular COBBLES and BOULDERS			4.40						
5	Obstruction End of Borehole at 4.60 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.4	4.6	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.80	3.80	No	0.80	20	Seepage

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
09-11-18	4.60	Nil	1.20	End of BH

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

BOREHOLE NO. BHRC03
SHEET Sheet 1 of 1

CO-ORDINATES
GROUND LEVEL (m AOD)

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 5.50

DATE COMMENCED 11/11/2018
DATE COMPLETED 11/11/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY J.O'Toole
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.20						
	Brown SILT/CLAY			0.60						
1	Soft to firm grey/black SILT/CLAY with occasional fine gravel			1.20	AA96686	B	1.00		N = 26 (2, 4, 6, 6, 7, 7)	
2	Medium dense to dense grey fine to coarse very sandy GRAVEL (Possibly very gravelly sand)			2.80	AA96687	B	2.00		N = 44 (3, 9, 10, 11, 11, 12)	
3	Dense grey fine to coarse sandy slightly silty GRAVEL with some cobbles			3.90	AA96688	B	3.00		N = 40 (2, 7, 10, 10, 8, 12)	
4	Dense grey/black angular COBBLES and BOULDERS				AA96689	B	4.00		N = 50/150 mm (6, 25, 10, 40)	
5				5.50	AA91709	B	5.00		N = 30/75 mm (18, 20, 30)	
	Obstruction End of Borehole at 5.50 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.2	4.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.20	3.20	No	2.60	20	Moderate

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
11-01-18	5.50	Nil	1.30	End of BH

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

BOREHOLE NO. BHRC04
SHEET Sheet 1 of 1

CO-ORDINATES
GROUND LEVEL (m AOD)

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 4.50

DATE COMMENCED 12/11/2018
DATE COMPLETED 12/11/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY J.O'Toole
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.20						
	Soft brown sandy SILT/CLAY			0.50						
	Firmbrown/grey sandy SILT/CLAY with occasional fine gravel			1.10	AA96690	B	1.00		N = 21 (3, 4, 4, 5, 6, 6)	
1	Medium dense to dense grey fine to coarse very sandy GRAVEL with some cobbles (Possibly very gravelly sand)									
2					AA96691	B	2.00		N = 33 (4, 6, 7, 7, 9, 10)	
3					AA96692	B	3.00		N = 49 (3, 10, 14, 13, 12, 10)	
				4.00						
4	Dense angular COBBLES and BOULDERS			4.50	AA96693	B	4.00		N = 50/150 mm (10, 25, 30, 20)	
	Obstruction End of Borehole at 4.50 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.3	4.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.10	3.10	No	2.60	20	Moderate

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
12-11-18	4.50	Nil	1.10	End of BH

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug inspection pit completed.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21319BH.GPJ IGSL.GDT 16/11/18

Appendix 2 Rotary Records

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**DRILLHOLE NO**	**RC01**
		SHEET	Sheet 1 of 2
CO-ORDINATES		**DATE DRILLED**	20/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	20/11/2018
CLIENT	Lioncor Developments	**DRILLED BY**	Petersen
ENGINEER	Punch C.E	**LOGGED BY**	D.O'Shea
RIG TYPE	Knebel		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm silty TOPSOIL	0.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm brown silty sandy CLAY	1.00			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm grey silty very sandy gravelly CLAY	1.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of dense grey/brown silty sandy GRAVEL				
2		0	0	0								
3												
4									4.70			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of weak highly weathered ROCK	4.90			
5	5.20							SYMMETRIX DRILLING: No recovery, observed by driller as returns of strong fresh ROCK	5.20			
		100	96	85				Strong to medium strong, thickly to thinly bedded (flow banded), grey/white/brown/black, fine to medium-grained, GRANITE, fresh to locally moderately weathered (at 7.61-7.74m).				
6	6.70											
		100	92	92	950			Discontinuities are widely to closely spaced, smooth, planar to undulose. Apertures are tight to locally moderately open, locally clay smeared, commonly strong penetrative iron-oxide staining. Dips are subhorizontal & 70°.				
7												
8	8.20				709.9999999999							
		100	100	97	780.0000000001							
9	9.70											

REMARKS

Hole cased 0.00-5.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.90	4.90	N/S			Rapid

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC FI 10M 21319.GPJ IGSL.GDT 11/12/18

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

DRILLHOLE NO RC01
SHEET Sheet 2 of 2

CO-ORDINATES

GROUND LEVEL (mOD)

CLIENT Lioncor Developments
ENGINEER Punch C.E

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 20/11/2018
DATE LOGGED 20/11/2018
DRILLED BY Petersen
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								Strong to medium strong, thickly to thinly bedded (flow banded), grey/white/brown/black, fine to medium-grained, GRANITE, fresh to locally moderately weathered (at 7.61-7.74m).				
11	11.00	100	89	70				Discontinuities are widely to closely spaced, smooth, planar to undulose. Apertures are tight to locally moderately open, locally clay smeared, commonly strong penetrative iron-oxide staining. Dips are subhorizontal & 70°. *(continued)*				
12	12.50	100	98	95								
13	13.90	100	96	91								
14	14.50	100	100	100					14.50			
								End of Borehole at 14.50 m				
15												
16												
17												
18												
19												

REMARKS

Hole cased 0.00-5.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.90	4.90	N/S			Rapid

GROUNDWATER DETAILS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 21319.GPJ IGSLGDT 11/12/18

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

DRILLHOLE NO RC02
SHEET Sheet 1 of 2

CO-ORDINATES

GROUND LEVEL (mOD)

CLIENT Lioncor Developments
ENGINEER Punch C.E

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 16/11/2018
DATE LOGGED 19/11/2018
DRILLED BY Petersen
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm TOPSOIL	0.20			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of soft to firm brown silty sandy CLAY	1.20			
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of medium dense grey/brown sandy GRAVEL				
3		0	0	0					3.10			
4								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm grey silty very sandy gravelly CLAY				
5									5.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of medium strong slightly weathered ROCK	5.60			
6	6.20							SYMMETRIX DRILLING: No recovery, observed by driller as returns of strong fresh ROCK	6.20			
7	7.50	100	100	72				Strong to medium strong, thickly to thinly bedded (flow banded), grey/white/brown/black, fine to medium-grained, GRANITE, fresh to locally moderately weathered (at 12.09-12.12m).				
8		100	100	86				Discontinuities are widely to closely spaced, smooth, planar to undulose. Apertures are tight to locally moderately open, locally clay smeared, commonly strong penetrative iron-oxide staining. Dips are subhorizontal & 70°.				
9	9.00	100	96	86								

REMARKS

Hole cased 0.00-6.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-18	14.30	5.30	14.30	50mm SP

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 21319.GPJ IGSLGDT 11/12/18

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

DRILLHOLE NO RC02
SHEET Sheet 2 of 2

CO-ORDINATES

GROUND LEVEL (mOD)

CLIENT Lioncor Developments
ENGINEER Punch C.E

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 16/11/2018
DATE LOGGED 19/11/2018

DRILLED BY Petersen
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.40				1040			Strong to medium strong, thickly to thinly bedded (flow banded), grey/white/brown/black, fine to medium-grained, GRANITE, fresh to locally moderately weathered (at 12.09-12.12m). Discontinuities are widely to closely spaced, smooth, planar to undulose. Apertures are tight to locally moderately open, locally clay smeared, commonly strong penetrative iron-oxide staining. Dips are subhorizontal & 70°. *(continued)*				
11		100	93	83								
12	11.90	100	96	56								
13	13.30	100	76	32								
14	14.30							End of Borehole at 14.30 m	14.30			
15												
16												
17												
18												
19												

REMARKS

Hole cased 0.00-6.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-18	14.30	5.30	14.30	50mm SP

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 21319.GPJ IGSL.GDT 11/12/18

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 21319

CONTRACT Priorsland,Carrickmines, Dublin 18

DRILLHOLE NO RC03
SHEET Sheet 1 of 2

CO-ORDINATES

GROUND LEVEL (mOD)

CLIENT Lioncor Developments
ENGINEER Punch C.E

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 22/11/2018
DATE LOGGED 22/11/2018

DRILLED BY Petersen
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm sandy TOPSOIL	0.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm brown silty very sandy CLAY	0.80			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of medium dense brown sandy GRAVEL with cobbles				
2												
3		0	0	0								
4												
5									5.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of medium strong slightly weathered ROCK	5.70			
6	6.30							SYMMETRIX DRILLING: No recovery, observed by driller as returns of strong fresh ROCK	6.30			
7	7.30	95	70	36	660			Strong to medium strong, thickly to thinly bedded (flow banded), grey/white/brown/black, fine to medium-grained, GRANITE, fresh to locally slightly weathered. Discontinuities are widely to closely spaced, smooth, planar to undulose. Apertures are tight to locally moderately open, locally clay smeared, locally slight iron-oxide staining. Dips are subhorizontal & 70°.				
8	8.60	100	105	57								
9	9.60	100	100	91								

REMARKS

Hole cased 0.00-6.30m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
	14.90	5.90	14.90	50mm SP

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 21319.GPJ IGSL.GDT 11/12/18

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**DRILLHOLE NO**	**RC03**
		SHEET	Sheet 2 of 2
CO-ORDINATES		**DATE DRILLED**	22/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	22/11/2018
CLIENT	Lioncor Developments	**DRILLED BY**	Petersen
ENGINEER	Punch C.E	**LOGGED BY**	D.O'Shea
RIG TYPE	Knebel		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)
10		100	100	95	Strong to medium strong, thickly to thinly bedded (flow banded), grey/white/brown/black, fine to medium-grained, GRANITE, fresh to locally slightly weathered. Discontinuities are widely to closely spaced, smooth, planar to undulose. Apertures are tight to locally moderately open, locally clay smeared, locally slight iron-oxide staining. Dips are subhorizontal & 70°. *(continued)*	
11	10.90	100	100	92		
12	12.40	100	95	63		
13	13.90	100	96	66		
14	14.90					14.90
15					End of Borehole at 14.90 m	
16						
17						
18						
19						

Fracture Spacing Log (mm): 0 250 500

Non-intact Zone: 699.999999999999 660 620.000000000000 530.000000000000

Elevation | Standpipe Details | SPT (N Value)

REMARKS

Hole cased 0.00-6.30m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
	14.90	5.90	14.90	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 21319.GPJ IGSLGDT 11/12/18

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**DRILLHOLE NO**	**RC04**
		SHEET	Sheet 1 of 2
CO-ORDINATES		**DATE DRILLED**	15/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	16/11/2018
CLIENT	Lioncor Developments	**DRILLED BY**	Petersen
ENGINEER	Punch C.E	**LOGGED BY**	D.O'Shea
RIG TYPE	Knebel		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)
0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm TOPSOIL	0.20
1					SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm brown silty sandy CLAY	1.10
2		0	0	0	SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm grey silty very sandy gravelly CLAY	1.40
3					SYMMETRIX DRILLING: No recovery, observed by driller as returns of dense to very dense brown sandy GRAVEL with cobbles	3.10
4					SYMMETRIX DRILLING: No recovery, observed by driller as returns of medium dense grey/brown silty sandy GRAVEL	4.20
5	5.00				SYMMETRIX DRILLING: No recovery, observed by driller as returns of medium strong slightly weathered ROCK	5.00
6	6.50	93	74	35	Strong to medium strong, thickly to thinly bedded (flow banded), grey/white/brown/black, fine to medium-grained, GRANITE, fresh to locally slightly weathered. Discontinuities are widely to closely spaced, smooth, planar to undulose. Apertures are tight to locally moderately open, locally clay smeared, locally slight iron-oxide staining. Dips are subhorizontal & 70°.	
7		100	81	17		
8	8.00	100	94	48		
9	9.50					

Fracture Spacing Log (mm): 0 250 500

Non-intact Zone

Elevation | Standpipe Details | SPT (N Value)

REMARKS

Hole cased 0.00-5.00m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.00	2.00	N/S			Moderate
4.20	4.20	N/S			Rapid

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 21319.GPJ IGSLGDT 11/12/18

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER	21319
CONTRACT	Priorsland,Carrickmines, Dublin 18
DRILLHOLE NO	RC04
SHEET	Sheet 2 of 2
CO-ORDINATES	
GROUND LEVEL (mOD)	
RIG TYPE	Knebel
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78
DATE DRILLED	15/11/2018
DATE LOGGED	16/11/2018
CLIENT	Lioncor Developments
ENGINEER	Punch C.E
DRILLED BY	Petersen
LOGGED BY	D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								Strong to medium strong, thickly to thinly bedded (flow banded), grey/white/brown/black, fine to medium-grained, GRANITE, fresh to locally slightly weathered.				
11	11.00	100	97	78				Discontinuities are widely to closely spaced, smooth, planar to undulose. Apertures are tight to locally moderately open, locally clay smeared, locally slight iron-oxide staining. Dips are subhorizontal & 70°. *(continued)*				
12	12.00	100	69	41								
13	13.50	100	91	72								
14	14.70	100	68	37					14.70			
15								End of Borehole at 14.70 m				
16												
17												
18												
19												

REMARKS

Hole cased 0.00-5.00m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.00	2.00	N/S			Moderate
4.20	4.20	N/S			Rapid

GROUNDWATER DETAILS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

Date	Hole Depth	Casing Depth	Depth to Water	Comments

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RC01 Box 1 of 4 – 5.20-8.20m

RC01 Box 2 of 4 – 8.20-11.00m

RC01 Box 3 of 4 – 11.00-13.90m

RC01 Box 4 of 4 – 13.90-14.50m

21319 - Priorsland, Carrickmines, Dublin 18 – Core Photography

RC02 Box 1 of 3 – 6.20-9.00m

RC02 Box 2 of 3 – 9.00-11.90m

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RC02 Box 3 of 3 – 11.90-14.30m

RC03 Box 1 of 4 – 6.30-9.10m

21319 - Priorsland, Carrickmines, Dublin 18 – Core Photography

RC03 Box 2 of 4 – 9.10-11.90m

RC03 Box 3 of 4 – 11.90-14.70m

IGSL Ltd.

RC03 Box 4 of 4 – 14.70-14.90m

RC04 Box 1 of 4 – 5.00-8.00m

21319 - Priorsland, Carrickmines, Dublin 18 – Core Photography

RC04 Box 2 of 4 – 8.00-10.70m

RC04 Box 3 of 4 – 10.70-13.50m

IGSL Ltd.

RC04 Box 4 of 4 – 13.50-14.70m

Appendix 3 Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,106.86 E 724,014.00 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	64.25
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	63.95						
Brown very sandy slightly gravelly CLAY/SILT with medium cobble content and rare boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm		0.70	63.55		AA85651	B	0.70		
1.0 Brown very sandy slightly gravelly CLAY/SILT with medium cobble content and firm dark brown sandy SILT lenses. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA85653	B	1.40		
OBSTRUCTION		1.89	62.36						
2.0 End of Trial Pit at 1.90m		1.90	62.35						
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP02**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,156.07 E 724,004.00 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	64.12
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	63.82						
Brown very sandy slightly gravelly CLAY/SILT with medium cobble content and rare boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <700mm						Env	0.60		
		0.85	63.27		AA85652	B	0.60		
1.0 Clayey gravelly SAND with high cobble and low boulder content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm									
OBSTRUCTION		1.79	62.33		AA80657	B	1.70		
2.0 End of Trial Pit at 1.80m		1.80	62.32						
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,204.99 E 723,993.70 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	63.25
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Brown very sandy slightly gravelly CLAY/SILT with medium cobble content and rare boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm		0.30	62.95		AA80658	B	0.40		
Silty clayey gravelly SAND. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.75	62.50		AA80659	B	0.90		
1.0 Silty clayey gravelly gravelly SAND with medium cobble content and occasional boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm.		1.10	62.15		AA80660	B	1.50		
OBSTRUCTION - Large quantities of cobble and boulders		1.79	61.46						
End of Trial Pit at 1.80m		1.80	61.45						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,229.46 E 723,988.52 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	63.45
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Brown very sandy slightly gravelly CLAY/SILT with medium cobble content and rare boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm		0.30	63.15						
		0.50	62.95		AA80661	B Env	0.40 0.50		
Silty clayey gravelly SAND. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.80	62.65						
1.0 Very gravelly SAND with medium cobble content and occasional boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <450mm.				1 (Slow)	AA80662	B	1.00		
OBSTRUCTION		1.79	61.66						
End of Trial Pit at 1.80m		1.80	61.65						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability
Unstable at 1.1m

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP05**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,280.88 E 723,978.17 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	63.13
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	62.83						
Light brown very sandy slightly gravelly CLAY/SILT with medium cobble content and rare boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm		0.70	62.43		AA80663	Env B	0.50 0.50		
1.0 Dark brown very sandy very gravelly CLAY/SILT with medium cobble content and rare boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <350mm				1 (Slow)	AA80664	B	1.20		
OBSTRUCTION		1.39	61.74						
End of Trial Pit at 1.40m		1.40	61.73						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability
Slightly unstable at 1.0m

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP06**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,302.85 E 723,972.98 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.85
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	62.55						
Light brown very sandy slightly gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.65	62.20		AA80665	B	0.50		
Clayey very sandy GRAVEL with high cobble and boulder content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm.						Env	0.75		
1.0				1 (Seepage)	AA80666	B	1.00		
OBSTRUCTION		1.39	61.46						
End of Trial Pit at 1.40m		1.40	61.45						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP07**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,327.30 E 723,967.81 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.21
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Light brown very sandy slightly gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	61.91						
Clayey very sandy GRAVEL with high cobble and boulder content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm.		0.70	61.51		AA80667	B	0.65		
1.0					AA80668	B	1.10		
OBSTRUCTION		1.49	60.72						
End of Trial Pit at 1.50m		1.50	60.71						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability
Slightly unstable at 0.85m

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP08**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,376.24 E 723,957.40 N
		DATE STARTED	01/11/2018
		DATE COMPLETED	01/11/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.31
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	62.01		AA85666	B	0.50		
1.0					AA85667	B	1.00		
Brown sandy slightly gravelly CLAY with high cobble and boulder content <450mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		1.10	61.21						
OBSTRUCTION - Large quantities of cobble and boulders		1.48	60.83						
End of Trial Pit at 1.50m		1.50	60.81						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP09**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,400.41 E 723,951.97 N
		DATE STARTED	01/11/2018
		DATE COMPLETED	01/11/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.21
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
		0.30	61.91						
Medium grained SAND		0.45	61.76						
Grey/green very sandy SILT. Sand is fine to medium.		0.60	61.61						
Dark brown fiberous peaty SILT.					AA85668	Env B	0.70 0.70		
1.0 Clayey very sandy GRAVEL with high cobble and boulder content <350mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		1.00	61.21						
				1 (Slow)	AA85669	B	1.50		
OBSTRUCTION - Large quantities of cobble and boulders		1.73	60.48						
End of Trial Pit at 1.75m		1.75	60.46						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP10**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,449.62 E 723,941.91 N
		DATE STARTED	01/11/2018
		DATE COMPLETED	01/11/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.02
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
		0.30	61.72						
Grey brown mottled orange very sandy SILT. Sand is fine to medium.					AA85649	B	0.40		
		0.60	61.42						
Dark brown fiberous peaty SILT.						Env	0.70		
					AA80650	B	0.70		
1.0 Cayey very sandy GRAVEL with high cobble and boulder content <350mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		1.00	61.02						
OBSTRUCTION - Large quantities of cobble and boulders		1.58	60.44						
End of Trial Pit at 1.60m		1.60	60.42						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP11**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,101.00 E 723,989.00 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	64.12
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	63.82						
Brown very sandy slightly gravelly CLAY/SILT with medium cobble content and rare boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm		0.85	63.27		AA80654	B Env	0.70 0.75		
1.0 Clayey gravelly SAND with high cobble and low boulder content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm					AA80655	B	1.20		
2.0 OBSTRUCTION End of Trial Pit at 2.00m		1.99 2.00	62.13 62.12						
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP12**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,174.80 E 723,974.50 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	63.13
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.25	62.88						
Light brown very sandy slightly gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA80669	B	0.60		
1.0 Clayey very sandy GRAVEL with high cobble and boulder content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <350mm.		1.20	61.93		AA85653	B	1.10		
					AA85654	B	1.50		
2.0 OBSTRUCTION End of Trial Pit at 1.90m		1.89 1.90	61.24 61.23						
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP13**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,248.26 E 723,958.98 N
		DATE STARTED	23/10/2018
		DATE COMPLETED	23/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30							
Light brown very sandy slightly gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.95			AA85655	B	0.60		
1.0 Dark brown very sandy very gravelly CLAY/SILT with medium cobble content and rare boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <350mm				1 (Seepage)	AA85656	B	1.20		
OBSTRUCTION		1.49							
End of Trial Pit at 1.50m		1.50							
2.0									
3.0									
4.0									

Groundwater Conditions

Stability
Slightly unstable at 1.0m

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP14**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,345.80 E 723,938.31 N
		DATE STARTED	30/10/2018
		DATE COMPLETED	30/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.28
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	61.98						
Brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.50	61.78						
Light brown mottled grey very sandy very gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.70	61.58		AA80694	Env B	0.60 0.60		
1.0 Silty very sandy GRAVEL with high cobble content. Sand is fine to coarse, angular to subrounded.					AA85658	B	1.20		
OBSTRUCTION		1.38	60.90						
End of Trial Pit at 1.40m		1.40	60.88						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability
Unstable at 1.2

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP15**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,419.50 E 723,922.73 N
		DATE STARTED	30/10/2018
		DATE COMPLETED	30/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.20
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Dark brown/orange/grey fiberous peaty SILT.		0.30	61.90						
Grey sandy very gravelly SILT/CLAY with medium cobble content and occasional boulder.		0.50	61.70		AA85671	B	0.45		
1.0						Env	1.00		
					AA85672	B	1.30		
OBSTRUCTION		1.58	60.62						
End of Trial Pit at 1.60m		1.60	60.60						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP16**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,120.28 E 723,960.52 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	63.45
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Light brown very sandy slightly gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	63.15						
						Env	0.70		
Grey/brown silty gravelly SAND with medium cobble content and occasional boulder < 250mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.90	62.55		AA85657	B	0.70		
1.0									
					AA80670	B	1.50		
OBSTRUCTION		1.99	61.46						
End of Trial Pit at 2.00m		2.00	61.45						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP17**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,169.21 E 723,950.16 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	64.13
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL		0.30	63.83						
Light brown very sandy slightly gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA80673	B	0.70		
Fine grained SAND		1.10	63.03						
Very gravelly SAND with medium cobble content and occasional boulder. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <450mm.		1.45	62.68		AA80674	B	1.30		
					AA80675	B	2.00		
OBSTRUCTION		2.19	61.94						
End of Trial Pit at 2.20m		2.20	61.93						

Groundwater Conditions

Stability

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP18**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,242.59 E 723,934.60 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	63.01
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL		0.30	62.71						
Light brown very sandy very gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.75	62.26						
Brown mottled orange sandy gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA80692	B	0.90		
Very silty very sandy GRAVEL with high cobble and boulder content. Sand is fine to coarse, angular to subrounded. Boulders are <500mm.		1.50	61.51						
		1.68	61.33		AA80693	B	1.60		
OBSTRUCTION - Large quantities of cobble and boulders		1.70	61.31						
End of Trial Pit at 1.70m									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP19**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,340.32 E 723,913.02 N
		DATE STARTED	30/10/2018
		DATE COMPLETED	30/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.29
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.20	62.09						
Brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.40	61.89						
Light brown mottled grey very sandy very gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.80	61.49		AA80696	B	0.80		
Silty very sandy GRAVEL with high cobble content. Sand is fine to coarse, angular to subrounded.						Env	1.00		
1.0					AA80695	B	1.00		
OBSTRUCTION		1.43	60.86						
End of Trial Pit at 1.45m		1.45	60.84						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP20**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,413.83 E 723,898.38 N
		DATE STARTED	30/10/2018
		DATE COMPLETED	30/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.14
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	61.84						
Brown/grey/orange sandy slightly gravelly SILT/CLAY. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.60	61.54		AA85673	B	0.50		
Silty very sandy GRAVEL with high cobble and boulder content <400mm. Sand is fine to coarse, angular to subrounded.				1 (Slow)	AA85674	B	1.20		
1.0									
OBSTRUCTION		1.58	60.56						
End of Trial Pit at 1.60m		1.60	60.54						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability
Unstable at 1.0

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP21**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,139.64 E 723,931.74 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	64.24
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	63.94						
Light brown very sandy slightly gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.						Env	0.60		
					AA80671	B	0.80		
1.0 Grey/brown silty gravelly SAND with medium cobble content and occasional boulder < 250mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		1.05	63.19						
					AA80672	B	1.50		
OBSTRUCTION - Large quantities of cobble and boulders		1.69	62.55						
End of Trial Pit at 1.90m		1.70	62.54						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP22**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,261.40 E 723,905.09 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.21
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	61.91						
Light brown very sandy very gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA80688	B	0.50		
		0.65	61.56			Env	0.60		
Brown mottled orange sandy gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.									
1.0					AA80687	B	1.00		
		1.45	60.76						
Very silty very sandy GRAVEL with high cobble and boulder content. Sand is fine to coarse, angular to subrounded. Boulders are <500mm.				▼1 (Slow)					
OBSTRUCTION - Large quantities of cobble and boulders		1.88	60.33		AA80688	B	1.80		
End of Trial Pit at 1.90m		1.90	60.31						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP23**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,212.47 E 723,915.45 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.15
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Light brown mottled grey very sandy slightly gravelly CLAY/SILT with low cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	61.85		AA80676	B Env	0.50 0.60		
1.0 Very gravelly SAND with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		1.20	60.95	1 (Seepage)	AA80677	B	1.50		
OBSTRUCTION - Large quantities of cobble and boulders		1.88	60.27		AA80678	B	1.80		
2.0 End of Trial Pit at 1.90m		1.90	60.25						
3.0									
4.0									

Groundwater Conditions

Stability
Unstable at 1.7m

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP24**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,236.94 E 723,910.27 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.25
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Light brown very sandy very gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	61.95		AA80679	Env B	0.60 0.60		
1.0 Brown/grey/orange SILT.		1.00	61.25		AA80680	B	1.30		
Grey/brown silty very sandy GRAVEL with medium cobble content and occasional boulder < 250mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		1.60	60.65	1 (Slow)	AA80681	B	1.70		
OBSTRUCTION - Large quantities of cobble and boulders		1.88	60.37						
2.0 End of Trial Pit at 1.90m		1.90	60.35						
3.0									
4.0									

Groundwater Conditions

Stability
Unstable at 1.7m

General Remarks

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TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP25**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,285.86 E 723,899.92 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.27
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	61.97						
Light brown very sandy very gravelly CLAY/SILT with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA80682	B	0.40		
						Env	0.60		
1.0					AA80683	B	0.90		
Light brown very sandy very gravelly CLAY/SILT with high cobble content and low boulder <400mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		1.30	60.97						
		1.58	60.69		AA80684	B	1.50		
OBSTRUCTION		1.60	60.67						
End of Trial Pit at 1.60m									
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP26**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,310.33 E 723,894.74 N
		DATE STARTED	24/10/2018
		DATE COMPLETED	24/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.52
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	62.22						
Light brown very sandy very gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.50	62.02		AA80685	B	0.40		
Dark brown very sandy very gravelly CLAY/SILT. Sand is fine to coarse, angular to subrounded.									
1.0					AA80686	B	1.00		
Silty very sandy GRAVEL with high cobble and boulder content <400mm. Sand is fine to coarse, angular to subrounded.		1.20	61.32						
					AA80687	B	1.40		
				1 (Moderate)					
OBSTRUCTION - Large quantities of cobble and boulders		1.88	60.64						
End of Trial Pit at 1.90m		1.90	60.62						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability
Unstable at 1.4m

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP27**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,358.23 E 723,882.74 N
		DATE STARTED	30/10/2018
		DATE COMPLETED	30/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.54
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Light brown/grey very sandy very gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	62.24		AA80697	B	0.50		
Silty very sandy GRAVEL with high cobble content. Sand is fine to coarse, angular to subrounded.		1.40	61.14	1 (Slow)	AA80699	B	1.50		
OBSTRUCTION - Large quantities of cobble and boulders		1.68	60.86						
End of Trial Pit at 1.70m		1.70	60.84						
1.0									
2.0									
3.0									
4.0									

Groundwater Conditions

Stability
Unstable at 1.5

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP28**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,383.92 E 723,879.74 N
		DATE STARTED	31/10/2018
		DATE COMPLETED	31/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.09
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Light brown/grey very sandy very gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	61.79			Env	0.70		
Silty very sandy GRAVEL with high cobble content. Sand is fine to coarse, angular to subrounded.		0.90	61.19		AA80700	B	0.70		
					AA85659	B	1.10		
OBSTRUCTION - Large quantities of cobble and boulders		1.48	60.61						
End of Trial Pit at 1.50m		1.50	60.59						
1.0									
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP29**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,433.22 E 723,868.41 N
		DATE STARTED	30/10/2018
		DATE COMPLETED	30/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.57
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Brown very sandy slightly gravelly CLAY/SILT.Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	62.27		AA85660	B	0.30		
						Env	0.60		
Brown mottled orange sandy gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.75	61.82		AA85661	B	0.60		
1.0									
					AA85662	B	1.40		
OBSTRUCTION		1.53	61.04						
End of Trial Pit at 1.55m		1.55	61.02						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP30**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,458.42 E 723,863.68 N
		DATE STARTED	30/10/2018
		DATE COMPLETED	30/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.73
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Brown very sandy slightly gravelly CLAY/SILT with dark grey sandy SILT lenses.Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.30	62.43		AA85663	B	0.40		
Very sandy GRAVEL with high cobble content and occasional boulder <350mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.80	61.93			Env	1.00		
1.0					AA85664	B	1.00		
					AA85665	B	1.60		
OBSTRUCTION		1.73	61.00						
End of Trial Pit at 1.75m		1.75	60.98						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP31**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,329.12 E 723,865.21 N
		DATE STARTED	01/11/2018
		DATE COMPLETED	01/11/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.26
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Brown/grey/orange sandy slightly gravelly SILT/CLAY. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.35	61.91			Env	0.50		
Grey sandy very gravelly SILT/CLAY with medium cobble content and occasional boulder.		0.60	61.66		AA85683	B	0.80		
1.0 Clayey very sandy GRAVEL with high cobble and boulder content <350mm. Sand is fine to medium. Gravel is fine to coarse, rounded to subrounded.		1.20	61.06		AA85684	B	1.40		
OBSTRUCTION - Large quantities of cobble and boulders		1.83	60.43	1 (Moderate)					
End of Trial Pit at 1.85m		1.85	60.41						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP32**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,402.51 E 723,849.67 N
		DATE STARTED	01/11/2018
		DATE COMPLETED	01/11/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.31
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Brown/grey/orange sandy slightly gravelly SILT/CLAY. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.35	61.96			Env	0.60		
Clayey very sandy GRAVEL with high cobble and boulder content <350mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.85	61.46		AA85687	B	0.60		
1.0					AA85688	B	1.40		
OBSTRUCTION - Large quantities of cobble and boulders		1.68	60.63	1 (Slow)					
End of Trial Pit at 1.70m		1.70	60.61						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP33**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,323.46 E 723,840.85 N
		DATE STARTED	31/10/2018
		DATE COMPLETED	31/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.79
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.40	62.39						
Light brown/grey very sandy very gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		0.65	62.14			Env	0.60		
Silty very sandy GRAVEL with high cobble content. Sand is fine to coarse, angular to subrounded.					AA85680	B	0.60		
1.0					AA85681	B	1.40		
				1 (Seepage)					
2.0 OBSTRUCTION - Large quantities of cobble and boulders End of Trial Pit at 2.00m		1.98 2.00	60.81 60.79						
3.0									
4.0									

Groundwater Conditions

Stability
Unstable at 1.8

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP34**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,293.34 E 723,825.31 N
		DATE STARTED	01/11/2018
		DATE COMPLETED	01/11/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.32
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	62.02						
Brown/grey/orange sandy slightly gravelly SILT/CLAY with rare boulder <350mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA85685	Env B	0.70 0.80		
1.0 Clayey very sandy GRAVEL with high cobble and boulder content <350mm. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.		1.05	61.27		AA85686	B	1.50		
				1 (Slow)					
2.0 OBSTRUCTION - Large quantities of cobble and boulders End of Trial Pit at 2.10m		2.08 2.10	60.24 60.22						
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP35**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	72,223.34 E 723,821.67 N
		DATE STARTED	31/10/2018
		DATE COMPLETED	31/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.01
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	61.71						
Brown mottled grey sandy gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA85678	B	0.60		
1.0 Silty very sandy GRAVEL with high cobble content. Sand is fine to coarse, angular to subrounded.		1.50	60.51		AA85679	B	1.60		
OBSTRUCTION - Large quantities of cobble and boulders		1.78	60.23						
End of Trial Pit at 1.80m		1.80	60.21						
2.0									
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP36**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,342.27 E 723,811.31 N
		DATE STARTED	31/10/2018
		DATE COMPLETED	31/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.75
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.40	62.35						
Brown mottled grey sandy gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA85650	B Env	0.60 0.70		
1.0 Silty very sandy GRAVEL with high cobble content. Sand is fine to coarse, angular to subrounded.		1.05	61.70	▼1 (Slow)					
2.0 OBSTRUCTION - Large quantities of cobble and boulders		2.08	60.67						
End of Trial Pit at 2.10m		2.10	60,65						
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

TRIAL PIT RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland,Carrickmines, Dublin 18	**TRIAL PIT NO.**	**TP37**
		SHEET	Sheet 1 of 1
LOGGED BY	SC	**CO-ORDINATES**	722,366.73 E 723,806.13 N
		DATE STARTED	31/10/2018
		DATE COMPLETED	31/10/2018
CLIENT	Lioncor Developments	**GROUND LEVEL (m)**	62.64
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.40	62.24						
Brown mottled grey sandy gravelly CLAY/SILT. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded.					AA85675	Env B	0.80 0.80		
1.0 Clayey gravelly SAND with high cobble and low boulder content. Sand is fine to medium. Gravel is fine to coarse, angular to subrounded. Boulders <400mm		1.30	61.34	1 (Slow)					
2.0 OBSTRUCTION End of Trial Pit at 2.05m		2.03 2.05	60.61 60.59						
3.0									
4.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 21319BH.GPJ IGSL.GDT 16/11/18

Appendix 4 Dynamic Probe Records

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP01**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	2
						0.20	3
						0.30	2
						0.40	2
						0.50	1
						0.60	2
						0.70	4
						0.80	4
						0.90	3
1.0						1.00	1
						1.10	5
						1.20	14
						1.30	21
						1.40	18
						1.50	17
						1.60	34
	End of Probe at 1.80 m					1.70	25
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25; 34

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP011**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	
GROUND LEVEL (mOD)		**DATE LOGGED**	
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	2
						0.20	2
						0.30	2
						0.40	1
						0.50	5
						0.60	5
						0.70	2
						0.80	12
						0.90	13
1.0						1.00	31
						1.10	26
						1.20	28
	End of Probe at 1.40 m					1.30	25
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25; 31; 26; 28

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP02**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	2
						0.20	2
						0.30	2
						0.40	2
						0.50	2
						0.60	2
						0.70	5
						0.80	9
						0.90	7
1.0						1.00	14
						1.10	16
						1.20	18
						1.30	22
						1.40	28
						1.50	25
	End of Probe at 1.60 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25 (28)

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP03**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	2
						0.20	3
						0.30	3
						0.40	1
						0.50	0
						0.60	1
						0.70	1
						0.80	2
						0.90	5
1.0						1.00	3
						1.10	2
						1.20	3
						1.30	3
						1.40	4
						1.50	9
						1.60	17
						1.70	23
						1.80	25
	End of Probe at 1.90 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP04**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	6	
						0.10	3	
						0.20	3	
						0.30	3	
						0.40	2	
						0.50	1	
						0.60	1	
						0.70	0	
						0.80	0	
						0.90	5	
1.0						1.00	7	
						1.10	3	
						1.20	2	
						1.30	2	
						1.40	3	
						1.50	2	
						1.60	6	
						1.70	12	
						1.80	29	29
						1.90	31	31
2.0	End of Probe at 2.10 m					2.00	25	
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP05**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	0	
						0.10	2	
						0.20	2	
						0.30	3	
						0.40	2	
						0.50	2	
						0.60	2	
						0.70	2	
						0.80	1	
						0.90	1	
1.0						1.00	1	
						1.10	0	
						1.20	0	
						1.30	7	
						1.40	13	
						1.50	23	
						1.60	27	27
						1.70	31	31
2.0	End of Probe at 1.90 m					1.80	25	
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP06**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	2
						0.20	2
						0.30	2
						0.40	4
						0.50	3
						0.60	2
						0.70	1
						0.80	1
						0.90	4
1.0						1.00	9
						1.10	17
						1.20	18
						1.30	21
						1.40	31
						1.50	25
	End of Probe at 1.60 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25 — 31

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP07**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	3
						0.20	2
						0.30	3
						0.40	2
						0.50	7
						0.60	2
						0.70	1
						0.80	2
						0.90	2
1.0						1.00	5
						1.10	14
						1.20	17
						1.30	26
						1.40	25
						1.50	25
	End of Probe at 1.60 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25 — 26

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP08**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	1
						0.20	0
						0.30	0
						0.40	11
						0.50	9
						0.60	4
						0.70	3
						0.80	6
						0.90	12
1.0						1.00	23
						1.10	17
						1.20	14
						1.30	15
						1.40	13
						1.50	16
						1.60	21
						1.70	23
						1.80	25
	End of Probe at 1.90 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP09**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	2
						0.20	5
						0.30	4
						0.40	2
						0.50	0
						0.60	0
						0.70	2
						0.80	6
						0.90	2
1.0						1.00	3
						1.10	12
						1.20	15
						1.30	14
						1.40	19
						1.50	22
						1.60	24
						1.70	25
	End of Probe at 1.80 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP10**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	1	
						0.10	2	
						0.20	1	
						0.30	3	
						0.40	4	
						0.50	2	
						0.60	1	
						0.70	1	
						0.80	2	
						0.90	1	
1.0						1.00	3	
						1.10	5	
						1.20	7	
						1.30	5	
						1.40	9	
						1.50	21	
						1.60	27	27
	End of Probe at 1.80 m					1.70	25	
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP12**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	0	
						0.10	2	
						0.20	3	
						0.30	2	
						0.40	2	
						0.50	0	
						0.60	1	
						0.70	2	
						0.80	3	
						0.90	3	
1.0						1.00	2	
						1.10	2	
						1.20	4	
						1.30	12	
						1.40	16	
						1.50	21	
						1.60	25	
	End of Probe at 1.80 m					1.70	25	
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP13**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	2
						0.20	3
						0.30	2
						0.40	2
						0.50	2
						0.60	2
						0.70	3
						0.80	1
						0.90	1
1.0						1.00	0
						1.10	3
						1.20	4
						1.30	1
						1.40	7
						1.50	3
						1.60	3
						1.70	4
						1.80	12
						1.90	11
2.0						2.00	14
						2.10	19
						2.20	23
						2.30	25
	End of Probe at 2.40 m						
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP14**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	30/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	30/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	2
						0.30	0
						0.40	0
						0.50	0
						0.60	0
						0.70	1
						0.80	13
						0.90	11
1.0						1.00	22
						1.10	26
						1.20	29
						1.30	25
	End of Probe at 1.40 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT Priorsland , Carrickmines,Dublin

PROBE NO. DP15
SHEET Sheet 1 of 1

CO-ORDINATES

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE DRILLED 29/11/2018
DATE LOGGED 29/11/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	0
						0.40	0
						0.50	0
						0.60	0
						0.70	2
						0.80	5
						0.90	12
1.0						1.00	18
						1.10	21
	End of Probe at 1.30 m					1.20	25
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT Priorsland , Carrickmines,Dublin

PROBE NO. DP16
SHEET Sheet 1 of 1

CO-ORDINATES

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE DRILLED 29/11/2018
DATE LOGGED 29/11/2018

CLIENT Lioncor Developments
ENGINEER Punch C.E

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	2
						0.10	2
						0.20	2
						0.30	2
						0.40	1
						0.50	1
						0.60	1
						0.70	2
						0.80	2
						0.90	7
1.0						1.00	11
						1.10	11
						1.20	11
						1.30	7
						1.40	9
						1.50	10
						1.60	21
						1.70	23
						1.80	25
2.0	End of Probe at 1.90 m						
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP17**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
HAMMER MASS (kg)	50		
CLIENT	Lioncor Developments	**INCREMENT SIZE (mm)**	100
ENGINEER	Punch C.E	**FALL HEIGHT (mm)**	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	1
						0.20	3
						0.30	2
						0.40	3
						0.50	1
						0.60	2
						0.70	2
						0.80	2
						0.90	3
1.0						1.00	3
						1.10	9
						1.20	9
						1.30	10
						1.40	8
						1.50	10
						1.60	9
						1.70	9
						1.80	8
						1.90	9
2.0						2.00	16
	End of Probe at 2.20 m					2.10	25
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP18**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
HAMMER MASS (kg)	50		
CLIENT	Lioncor Developments	**INCREMENT SIZE (mm)**	100
ENGINEER	Punch C.E	**FALL HEIGHT (mm)**	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	2
						0.30	2
						0.40	3
						0.50	2
						0.60	2
						0.70	1
						0.80	0
						0.90	0
1.0						1.00	1
						1.10	2
						1.20	3
						1.30	4
						1.40	7
						1.50	9
						1.60	14
						1.70	18
						1.80	21
						1.90	28
2.0						2.00	25
	End of Probe at 2.10 m						
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP19**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	2
						0.50	2
						0.60	2
						0.70	8
						0.80	4
						0.90	13
1.0						1.00	22
						1.10	22
						1.20	25
	End of Probe at 1.30 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP20**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	1
						0.40	1
						0.50	1
						0.60	3
						0.70	6
						0.80	12
						0.90	15
1.0						1.00	16
						1.10	20
						1.20	25
	End of Probe at 1.30 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP21**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	0	
						0.10	2	
						0.20	2	
						0.30	2	
						0.40	0	
						0.50	1	
						0.60	1	
						0.70	1	
						0.80	1	
						0.90	0	
1.0						1.00	1	
						1.10	19	
						1.20	31	31
						1.30	25	
	End of Probe at 1.40 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP22**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	0	
						0.10	2	
						0.20	2	
						0.30	2	
						0.40	1	
						0.50	2	
						0.60	2	
						0.70	2	
						0.80	2	
						0.90	2	
1.0						1.00	1	
						1.10	1	
						1.20	3	
						1.30	8	
						1.40	14	
						1.50	17	
						1.60	23	
						1.70	31	31
						1.80	25	
	End of Probe at 1.90 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP23**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	2
						0.10	3
						0.20	2
						0.30	2
						0.40	2
						0.50	2
						0.60	1
						0.70	1
						0.80	1
						0.90	3
1.0						1.00	6
						1.10	8
						1.20	6
						1.30	9
						1.40	8
						1.50	7
						1.60	8
						1.70	12
						1.80	13
						1.90	21
2.0						2.00	23
	End of Probe at 2.20 m					2.10	25
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP24**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	3
						0.20	2
						0.30	3
						0.40	2
						0.50	2
						0.60	3
						0.70	2
						0.80	1
						0.90	0
1.0						1.00	3
						1.10	6
						1.20	9
						1.30	7
						1.40	6
						1.50	7
						1.60	16
						1.70	18
						1.80	21
						1.90	23
2.0						2.00	25
	End of Probe at 2.10 m						
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP25**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	2	
						0.10	2	
						0.20	2	
						0.30	2	
						0.40	3	
						0.50	2	
						0.60	2	
						0.70	3	
						0.80	4	
						0.90	7	
1.0						1.00	9	
						1.10	14	
						1.20	28	28
						1.30	25	
	End of Probe at 1.40 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP26**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	0	
						0.10	0	
						0.20	1	
						0.30	2	
						0.40	2	
						0.50	3	
						0.60	3	
						0.70	8	
						0.80	11	
						0.90	12	
1.0						1.00	14	
						1.10	18	
						1.20	27	27
						1.30	25	
	End of Probe at 1.40 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP27**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	6
						0.40	7
						0.50	9
						0.60	7
						0.70	8
						0.80	13
						0.90	17
1.0						1.00	17
						1.10	18
						1.20	21
	End of Probe at 1.40 m					1.30	25
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP28**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	0
						0.40	0
						0.50	0
						0.60	0
						0.70	0
						0.80	2
						0.90	3
1.0						1.00	12
						1.10	17
						1.20	19
	End of Probe at 1.50 m					1.30	23
						1.40	25
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP29**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	29/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	29/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	2
						0.20	2
						0.30	1
						0.40	1
						0.50	0
						0.60	2
						0.70	7
						0.80	15
						0.90	22
1.0						1.00	24
	End of Probe at 1.20 m					1.10	25
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP30**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	28/11/2018
GROUND LEVEL (mOD)		**DATE LOGGED**	28/11/2018
CLIENT	Lioncor Developments	**HAMMER MASS (kg)**	50
ENGINEER	Punch C.E	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	2
						0.10	3
						0.20	3
						0.30	3
						0.40	2
						0.50	1
						0.60	2
						0.70	3
						0.80	9
						0.90	9
1.0						1.00	20
	End of Probe at 1.30 m					1.10	24
						1.20	25
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP31**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	28/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	28/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	1	
						0.10	2	
						0.20	2	
						0.30	2	
						0.40	2	
						0.50	3	
						0.60	1	
						0.70	3	
						0.80	3	
						0.90	4	
1.0						1.00	3	
						1.10	4	
						1.20	7	
						1.30	8	
						1.40	8	
						1.50	12	
						1.60	12	
						1.70	13	
						1.80	14	
	End of Probe at 1.90 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP32**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	28/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	28/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	2	
						0.10	3	
						0.20	5	
						0.30	5	
						0.40	4	
						0.50	4	
						0.60	1	
						0.70	1	
						0.80	5	
						0.90	15	
1.0						1.00	20	
						1.10	22	
						1.20	25	
	End of Probe at 1.30 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP33**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	28/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	28/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	2
						0.10	1
						0.20	1
						0.30	1
						0.40	1
						0.50	6
						0.60	8
						0.70	8
						0.80	6
						0.90	7
1.0						1.00	10
						1.10	11
						1.20	13
						1.30	15
						1.40	19
						1.50	25
	End of Probe at 1.60 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP34**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	28/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	28/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	3
						0.10	3
						0.20	4
						0.30	4
						0.40	4
						0.50	2
						0.60	0
						0.70	0
						0.80	0
						0.90	0
1.0						1.00	0
						1.10	0
						1.20	2
						1.30	11
						1.40	23
						1.50	25
	End of Probe at 1.60 m						
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP35**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	28/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	28/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	1	
						0.10	2	
						0.20	1	
						0.30	1	
						0.40	2	
						0.50	3	
						0.60	0	
						0.70	0	
						0.80	1	
						0.90	2	
1.0						1.00	4	
						1.10	5	
						1.20	9	
						1.30	12	
						1.40	18	
						1.50	25	
	End of Probe at 1.60 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP36**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	28/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	28/11/2018
CLIENT	Lioncor Developments		
ENGINEER	Punch C.E	**PROBE TYPE**	DPH
	INCREMENT SIZE (mm) 100		
	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	0	
						0.10	3	
						0.20	2	
						0.30	3	
						0.40	1	
						0.50	2	
						0.60	1	
						0.70	3	
						0.80	3	
						0.90	2	
1.0						1.00	4	
						1.10	7	
						1.20	8	
						1.30	14	
						1.40	21	
						1.50	29	29
	End of Probe at 1.70 m					1.60	25	
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21319

CONTRACT	Priorsland , Carrickmines,Dublin	**PROBE NO.**	**DP37**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**DATE DRILLED**	28/11/2018
GROUND LEVEL (mOD)	**HAMMER MASS (kg)** 50	**DATE LOGGED**	28/11/2018
CLIENT	Lioncor Developments	**INCREMENT SIZE (mm)**	100
ENGINEER	Punch C.E	**FALL HEIGHT (mm)**	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
0.0	.					0.00	3	
						0.10	4	
						0.20	4	
						0.30	3	
						0.40	3	
						0.50	3	
						0.60	2	
						0.70	1	
						0.80	0	
						0.90	0	
1.0						1.00	0	
						1.10	2	
						1.20	4	
						1.30	9	
						1.40	13	
						1.50	21	
						1.60	18	
						1.70	1	
						1.80	25	
	End of Probe at 1.90 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21319DP.GPJ IGSL.GDT 3/12/18

Appendix 5 Infiltration Test Results

Soakaway Design f -value from field tests (F2C) IGSL

Contract: Priorsland, Rathmines, Dublin 18 Contract No. 21319
Test No. SA01
Client Lioncor Developments
Date: 30/10/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.25	Topsoil	
0.25	1.50	Stiff brown sandy slightly gravelly SILT/CLAY.	None

Field Data

Depth to Water (m)	Elapsed Time (min)
0.81	0.00
0.82	0.50
0.825	1.00
0.83	1.50
0.835	2.00
0.84	2.50
0.845	3.00
0.85	3.50
0.85	4.00
0.855	4.50
0.855	5.00
0.855	10.00
0.87	15.00
0.885	20.00
0.9	25.00
0.915	30.00
0.93	40.00
0.945	50.00
0.96	60.00

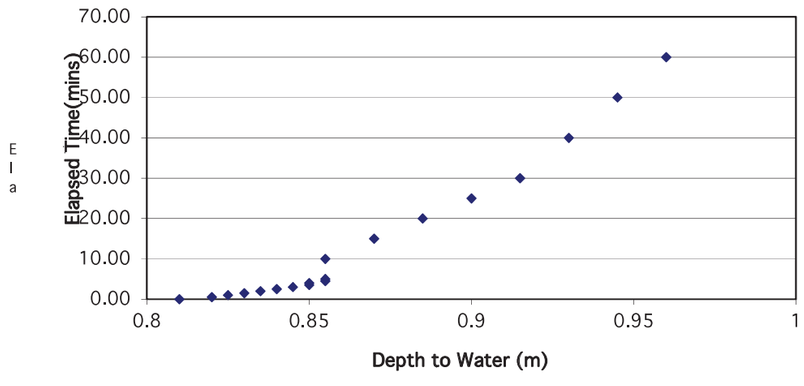
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.45	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.81	m
Final depth to water =	0.96	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.9	m2
*Av. side area of permeable stratum over test period	3.0135	m2
Total Exposed area =	3.9135	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00057 m/min or 9.582E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Priorsland, Rathmines, Dublin 18 Contract No. 21319
Test No. SA05
Client Lioncor Developments
Date: 30/10/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.25	Topsoil	
0.25	0.50	Firm dark brown sandy peaty SILT/CLAY	1.35m
0.50	1.40	Dense very sandy GRAVEL with medium cobble content	

Notes: Refusal at 1.4m - Obstruction - Possible bedrock

Field Data

Depth to Water (m)	Elapsed Time (min)
0.61	0.00
0.615	0.50
0.615	1.00
0.62	1.50
0.62	2.00
0.62	2.50
0.62	3.00
0.62	3.50
0.62	4.00
0.62	4.50
0.62	5.00
0.625	10.00
0.625	15.00
0.625	20.00
0.63	25.00
0.63	30.00
0.63	40.00
0.63	50.00
0.63	60.00

Field Test

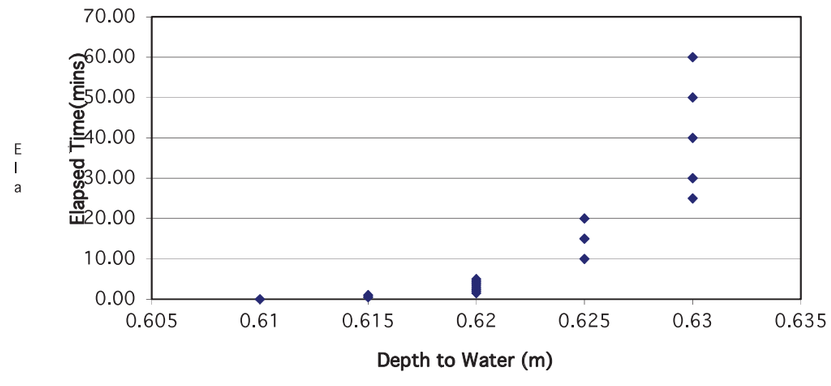
Depth of Pit (D)	1.40	m
Width of Pit (B)	0.45	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.61	m
Final depth to water =	0.63	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.9	m2
*Av. side area of permeable stratum over test period	3.822	m2
Total Exposed area =	4.722	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 6.4E-05 m/min or 1.059E-06 m/sec

Note: No fall in water after 25 minutes

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Priorsland, Rathmines, Dublin 18 Contract No. 21319
Test No. SA03
Client Lioncor Developments
Date: 01/10/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	Topsoil	None encountered
0.30	0.60	Stiff brown sandy slightly gravelly SILT/CLAY.	
0.60	1.50	Dense silty very sandy GRAVEL	

Notes:

Field Data

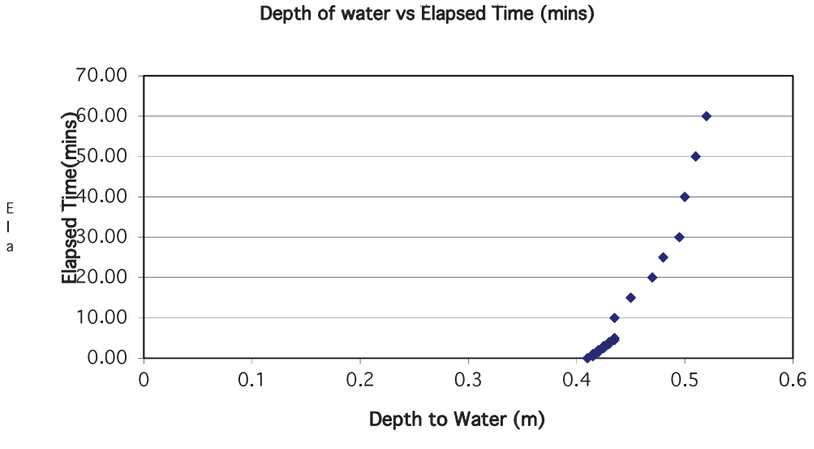
Depth to Water (m)	Elapsed Time (min)
0.41	0.00
0.415	0.50
0.415	1.00
0.42	1.50
0.42	2.00
0.425	2.50
0.425	3.00
0.43	3.50
0.43	4.00
0.435	4.50
0.435	5.00
0.435	10.00
0.45	15.00
0.47	20.00
0.48	25.00
0.495	30.00
0.5	40.00
0.51	50.00
0.52	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.41	m
Final depth to water =	0.52	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.8	m2
*Av. side area of permeable stratum over test period	4.968	m2
Total Exposed area =	5.768	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00025 m/min or 4.238E-06 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Priorsland, Rathmines, Dublin 18 Contract No. 21319
Test No. SA04
Client Lioncor Developments
Date: 01/10/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	Topsoil	None encountered
0.30	0.60	Stiff brown sandy slightly gravelly SILT/CLAY.	
0.60	1.50	Dense silty very sandy GRAVEL	

Notes:

Field Data

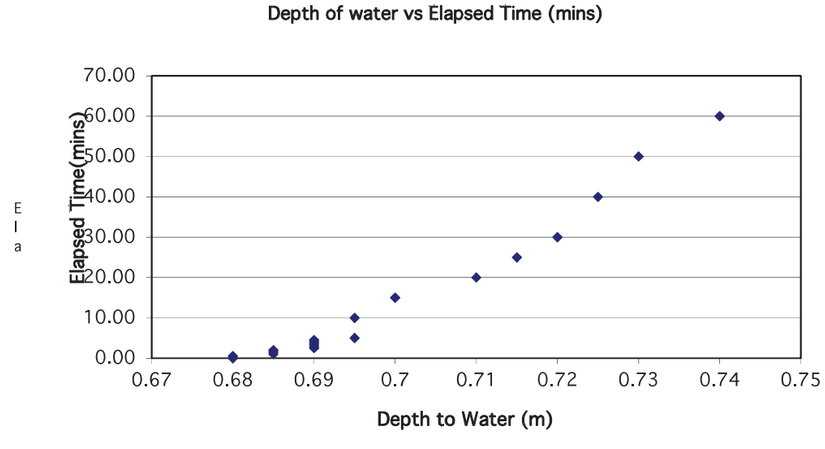
Depth to Water (m)	Elapsed Time (min)
0.68	0.00
0.68	0.50
0.685	1.00
0.685	1.50
0.685	2.00
0.69	2.50
0.69	3.00
0.69	3.50
0.69	4.00
0.69	4.50
0.695	5.00
0.695	10.00
0.7	15.00
0.71	20.00
0.715	25.00
0.72	30.00
0.725	40.00
0.73	50.00
0.74	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.68	m
Final depth to water =	0.74	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.8	m2
*Av. side area of permeable stratum over test period	3.792	m2
Total Exposed area =	4.592	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00017 m/min or 2.904E-06 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Priorsland, Rathmines, Dublin 18 Contract No. 21319
Test No. SA05
Client Lioncor Developments
Date: 01/11/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	Topsoil	None encountered
0.30	0.85	Stiff brown sandy slightly gravelly SILT/CLAY.	
0.85	1.50	Dense sandy GRAVEL with low cobble content	

Notes:

Field Data

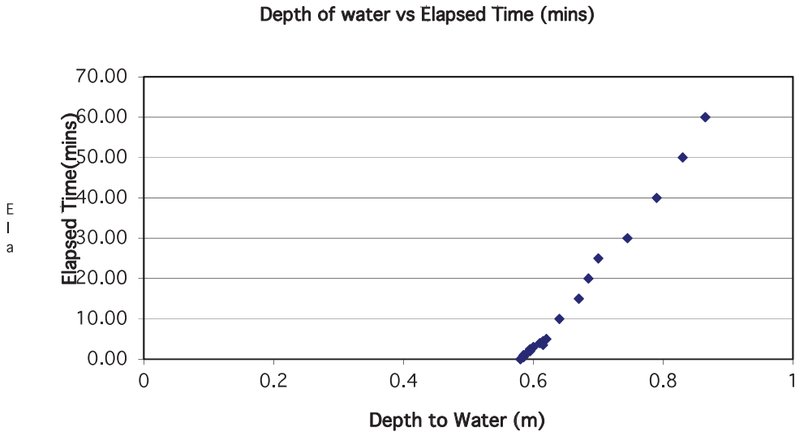
Depth to Water (m)	Elapsed Time (min)
0.58	0.00
0.585	0.50
0.585	1.00
0.59	1.50
0.595	2.00
0.595	2.50
0.6	3.00
0.615	3.50
0.61	4.00
0.615	4.50
0.62	5.00
0.64	10.00
0.67	15.00
0.685	20.00
0.7	25.00
0.745	30.00
0.79	40.00
0.83	50.00
0.865	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.45	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.58	m
Final depth to water =	0.87	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.9	m2
*Av. side area of permeable stratum over test perio	3.80975	m2
Total Exposed area =	4.70975	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00091 m/min or 1.513E-05 m/sec



Appendix 6 Laboratory Test Results (Geotechnical)

IGSL Ltd
Materials Laboratory
Unit J5, M7 Business Park
Newhall, Naas
Co. Kildare
045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2*, 4.3, 4.4 & 5.3

Report No. **R96603** Contract No. 21319 Contract Name: Priorsland , Carrickmines,Co.Dublin

Customer Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin

Samples Received: 30/11/18 Date Tested: 05/12/18

BH/TP	Sample No.	Depth (m)	Lab. Ref	Sample Type	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
BH01A	AA93615	2.0	A18/9346	B	13	37	NP	NP	25	WS	4.4		Brown very sandy gravelly SILT
BH03	AA93638	1.0	A18/9349	B	13	46	NP	NP	40	WS	4.4		Brown sandy gravelly SILT
BH05	AA93627	2.0	A18/9353	B	6.4	29	NP	NP	28	WS	4.4		Brown sandy very gravelly SILT
BH07	AA93645	2.0	A18/9357	B	4.4	32	NP	NP	24	WS	4.4		Brown silty, sandy, GRAVEL with many cobbles
BHRC04	AA96690	1.0	A18/9365	B	23	28	NP	NP	97	WS	4.4		Brown sandy gravelly SILT
TP01	AA85653	1.4	A18/9367	B	20	50	NP	NP	50	WS	4.4		Brown sandy, slightly gravelly, SILT
TP05	AA80664	1.0	A18/9370	B	6.4		NP	NP					Grey brown silty, very sandy, GRAVEL with some cobbles
TP13	AA85655	0.6	A18/9374	B	14	50	28	22	47	WS	4.4	M I	Brown sandy gravelly SILT
TP22	AA80687	1.0	A18/9376	B	21	32	NP	NP	84	WS	4.4		Brown sandy gravelly SILT
TP24	AA80680	1.0	A18/9377	B	23	28	NP	NP	98	WS	4.4		Dark brown SILT
TP26	AA80686	1.0	A18/9378	B	12	45	NP	NP	31	WS	4.4		Dark brown sandy gravelly SILT
TP29	AA85662	1.4	A18/9379	B	9.3	45	NP	NP	27	WS	4.4		Mottled brown silty, sandy, GRAVEL with some cobbles
TP31	AA85683	0.8	A18/9380	B	16	26	NP	NP	83	WS	4.4		Black sandy gravelly SILT

Notes: Preparation: WS - Wet sieved; AR - As received; NP - Non plastic
Liquid Limit Clause: 4.3 Cone Penetrometer definitive method; 4.4 Cone Penetrometer one point method
Sample Type: B - Bulk Disturbed; U - Undisturbed

Remarks:

NOTE: *Clause 3.2 of BS1377 is a "withdrawn" standard due to publication of ISO17892-1:2014
Opinions and interpretations are outside the scope of accreditation.
The results relate to the specimens tested. Any remaining material will be retained for one month.

IGSL Ltd Materials Laboratory

Persons authorized to approve reports: H Byrne (Laboratory Manager)

Approved by	Date	Page
H Byrne	2/1/19	1 of 1

TEST REPORT

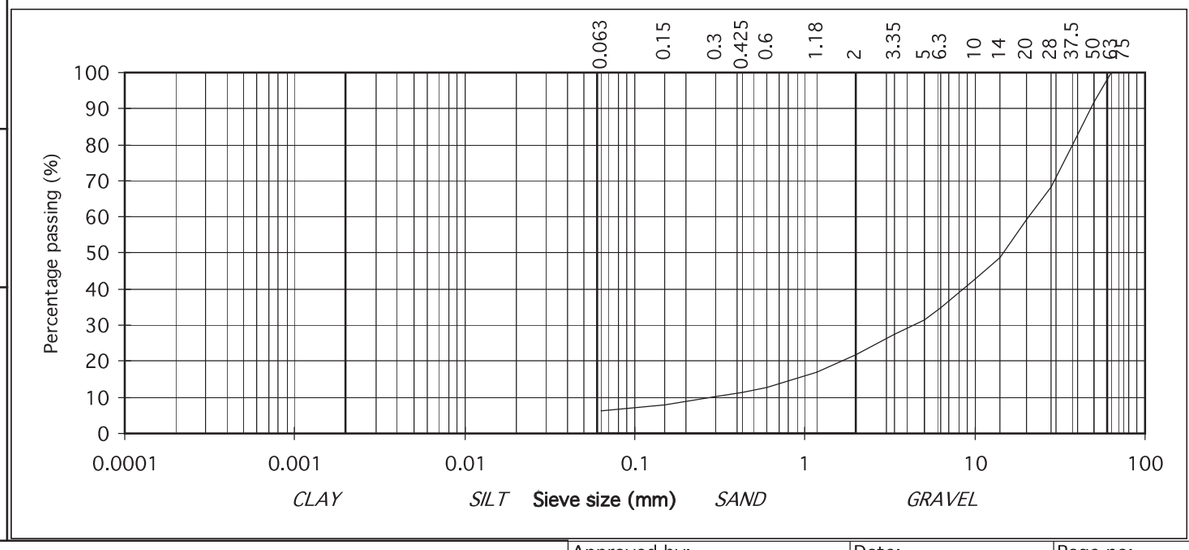
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	92	GRAVEL
37.5	80	
28	68	
20	59	
14	49	
10	43	
6.3	35	
5	32	
3.35	28	
2	22	
1.18	17	SAND
0.6	13	
0.425	11	
0.3	10	
0.15	8	
0.063	6	SILT/CLAY

Contract No: 21319 Report No. R96628
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH01A
Sample No. AA93618 Lab. Sample No. A18/9354
Sample Type: B
Depth (m) 4.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 03/12/2018
Description: Dark brown clayey/silty, sandy, GRAVEL

Remarks: Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

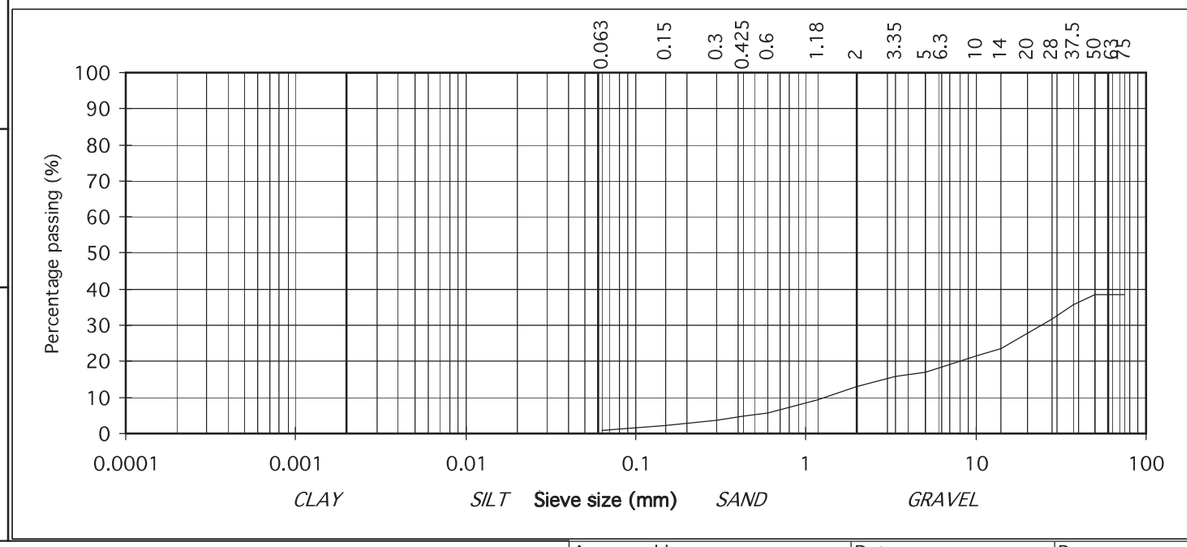
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1377

particle size	% passing	
75	38	COBBLES
63	38	
50	38	GRAVEL
37.5	36	
28	32	
20	28	
14	24	
10	22	
6.3	18	
5	17	
3.35	16	
2	13	
1.18	9	SAND
0.6	6	
0.425	5	
0.3	4	
0.15	2	
0.063	1	SILT/CLAY

Contract No: 21319 Report No. R96629
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH02
Sample No. AA93623 Lab. Sample No. A18/9348
Sample Type: B
Depth (m) 3.50 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 03/12/2018
Description: COBBLES with black slightly clayey/silty, sandy, gravel

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

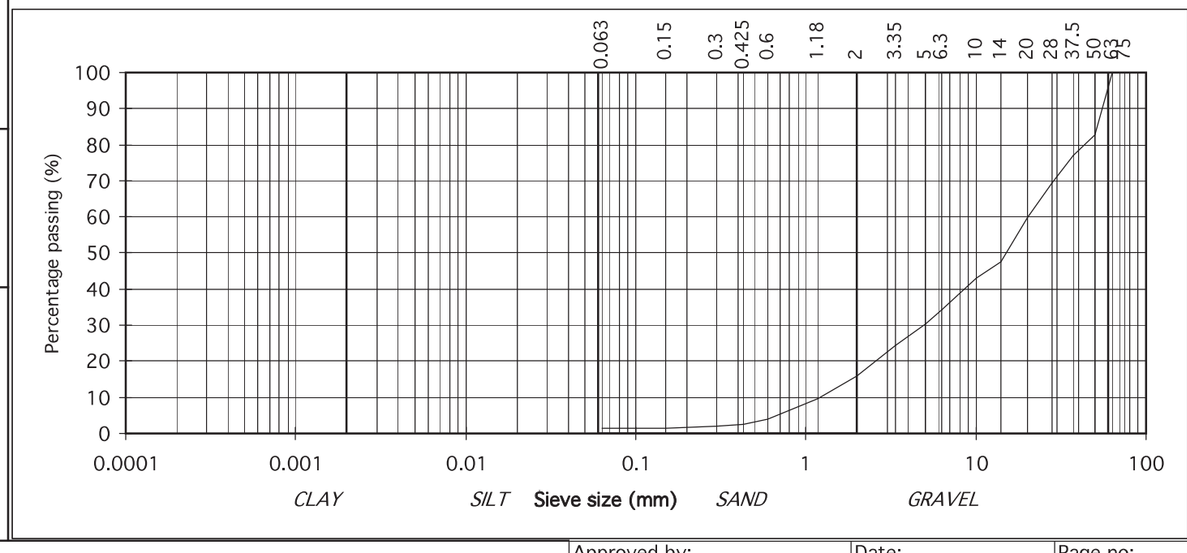
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1377

particle size	% passing	
75	100	COBBLES
63	100	
50	83	GRAVEL
37.5	77	
28	69	
20	60	
14	48	
10	43	
6.3	34	
5	30	
3.35	24	
2	16	
1.18	10	SAND
0.6	4	
0.425	3	
0.3	2	
0.15	2	
0.063	1	SILT/CLAY

Contract No: 21319 Report No. R96630
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH03
Sample No. AA93640 Lab. Sample No. A18/9350
Sample Type: B
Depth (m) 3.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 03/12/2018
Description: Black slightly clayey/silty, sandy, GRAVEL

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

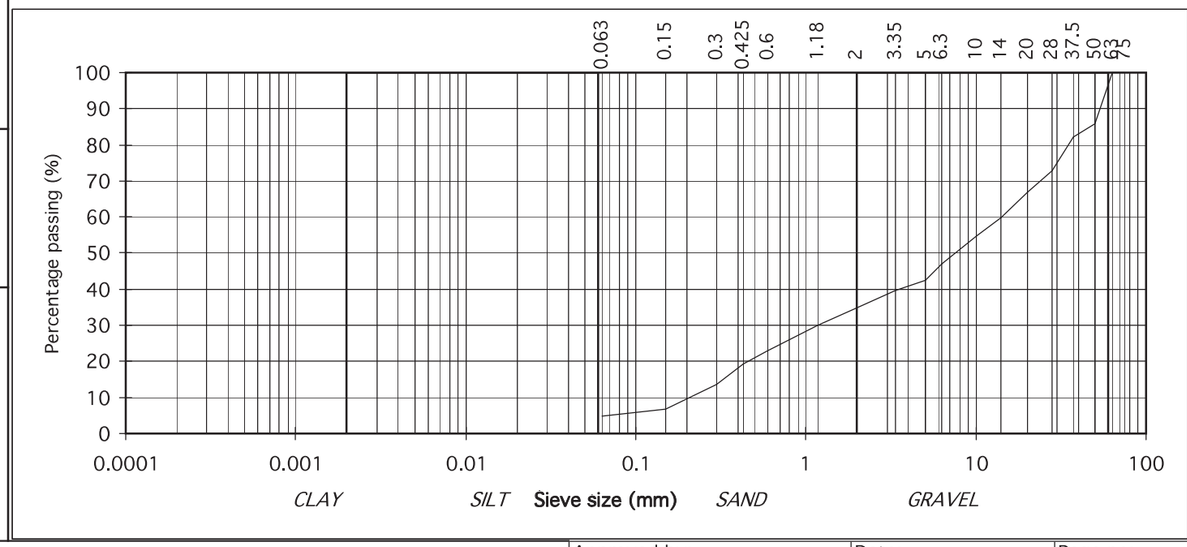
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	86	GRAVEL
37.5	82	
28	73	
20	67	
14	60	
10	55	
6.3	47	
5	43	
3.35	40	
2	35	
1.18	30	SAND
0.6	23	
0.425	19	
0.3	14	
0.15	7	
0.063	5	SILT/CLAY

Contract No: 21319 Report No. R97444
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH04
Sample No. AA96675 Lab. Sample No. A18/9351
Sample Type: B
Depth (m) 2.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Grey brown slightly clayey/silty, very sandy, GRAVEL

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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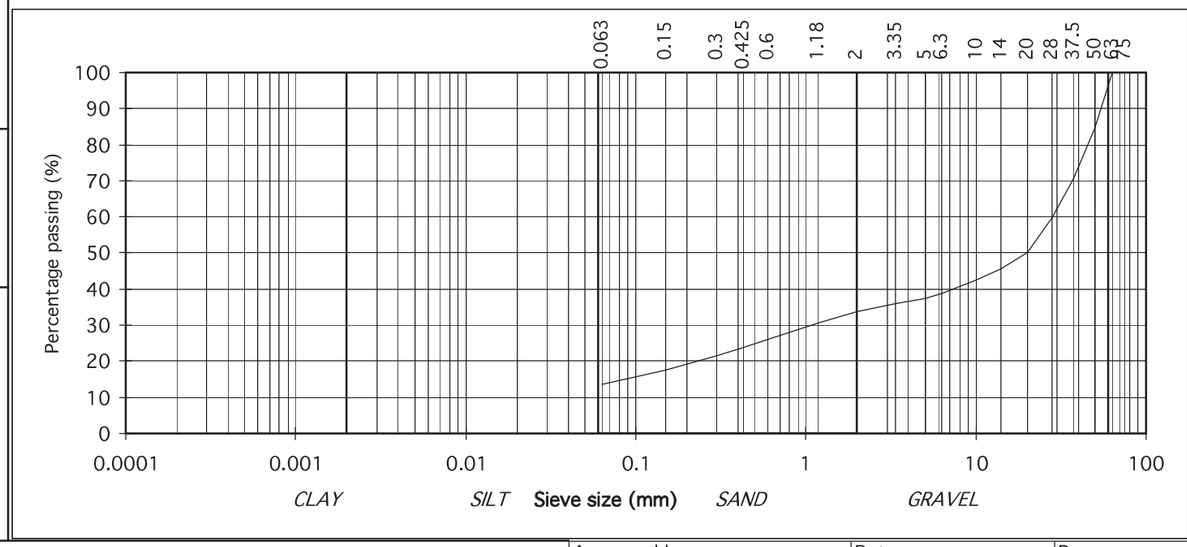
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	85	GRAVEL
37.5	71	
28	60	
20	50	
14	46	
10	42	
6.3	39	
5	37	
3.35	36	
2	34	
1.18	31	SAND
0.6	26	
0.425	24	
0.3	21	
0.15	18	
0.063	14	SILT/CLAY

Contract No: 21319 Report No. R96631
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH04
Sample No. AA96676 Lab. Sample No. A18/9352
Sample Type: B
Depth (m) 3.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Black clayey/silty, very sandy, GRAVEL

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

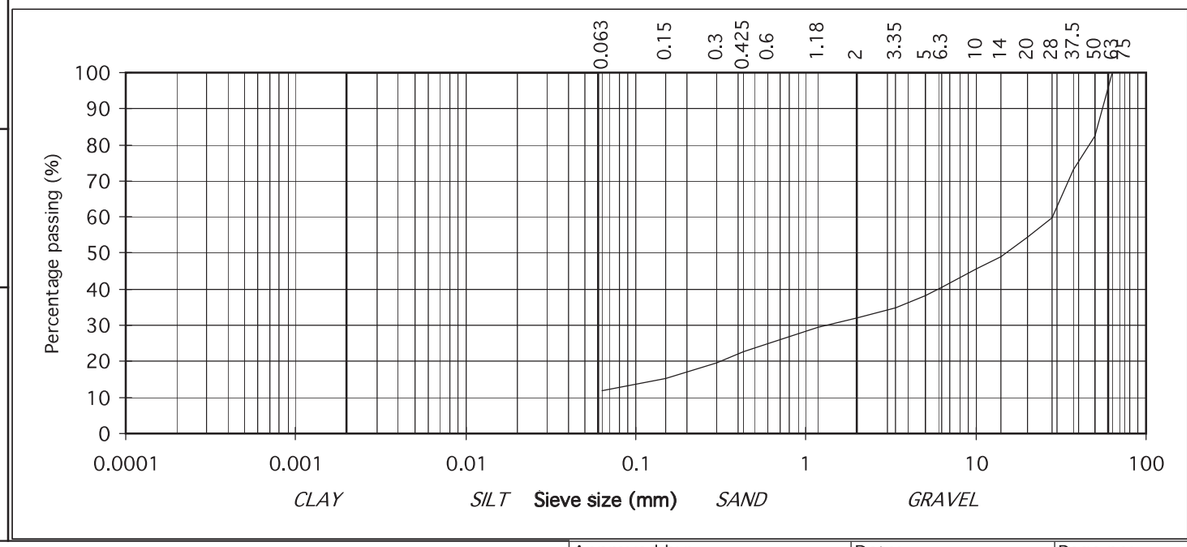
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	82	GRAVEL
37.5	73	
28	60	
20	54	
14	49	
10	46	
6.3	40	
5	38	
3.35	35	
2	32	
1.18	30	SAND
0.6	25	
0.425	23	
0.3	20	
0.15	15	
0.063	12	SILT/CLAY

Contract No: 21319 Report No. R96632
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH05
Sample No. AA93627 Lab. Sample No. A18/9353
Sample Type: B
Depth (m) 2.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 03/12/2018
Description: Brown silty, sandy, GRAVEL

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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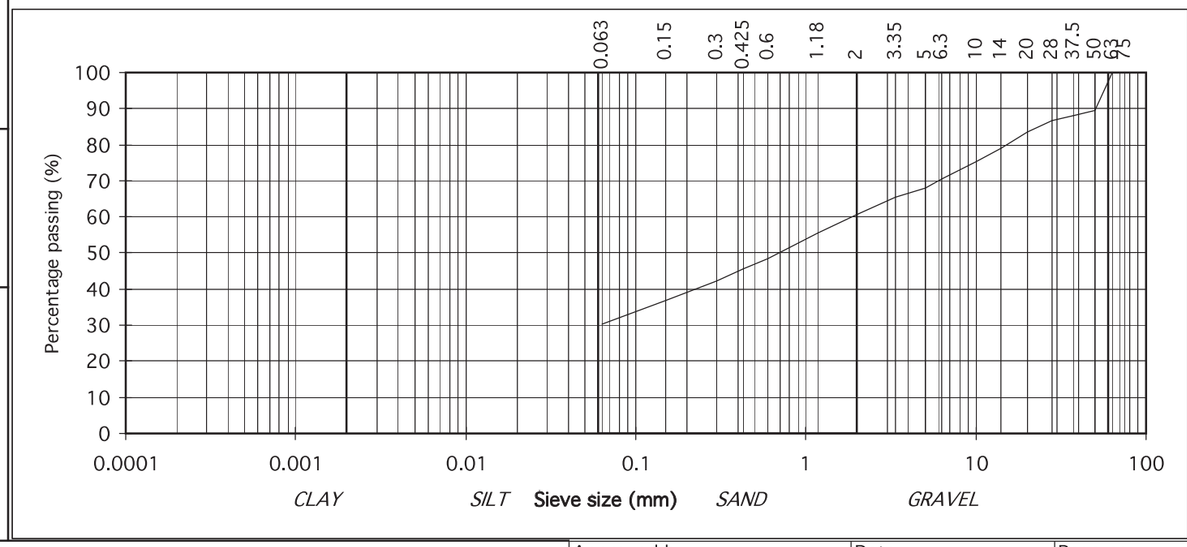
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	90	GRAVEL
37.5	88	
28	87	
20	83	
14	79	
10	75	
6.3	71	
5	68	
3.35	65	
2	61	
1.18	56	SAND
0.6	49	
0.425	46	
0.3	42	
0.15	37	
0.063	30	SILT/CLAY

Contract No: 21319 Report No. R96602
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH05
Sample No. AA93630 Lab. Sample No. A18/9354
Sample Type: B
Depth (m) 4.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 16/11/2018 Date Testing started 30/11/2018
Description: Brown/grey slightly sandy, gravelly, SILT/CLAY

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

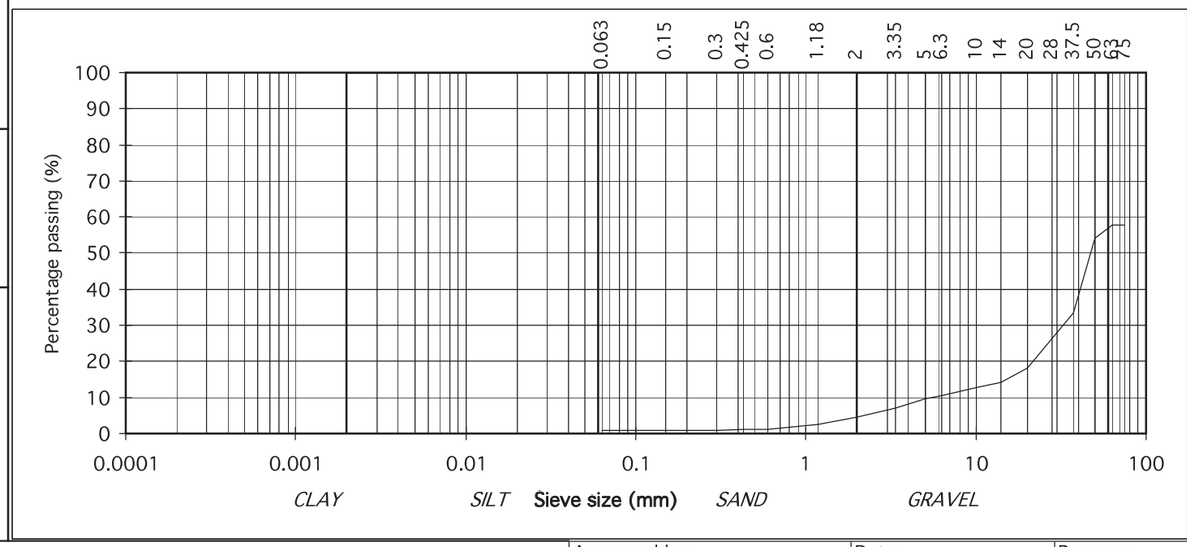
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	58	COBBLES
63	58	
50	54	GRAVEL
37.5	33	
28	26	
20	18	
14	14	
10	13	
6.3	11	
5	10	
3.35	7	
2	5	
1.18	3	SAND
0.6	1	
0.425	1	
0.3	1	
0.15	1	
0.063	1	SILT/CLAY

Contract No: 21319 Report No. R96633
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH06
Sample No. AA93633 Lab. Sample No. A18/9355
Sample Type: B
Depth (m) 2.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 03/12/2018
Description: Dark brown/black slightly clayey/silty, slightly sandy, GRAVEL with many cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
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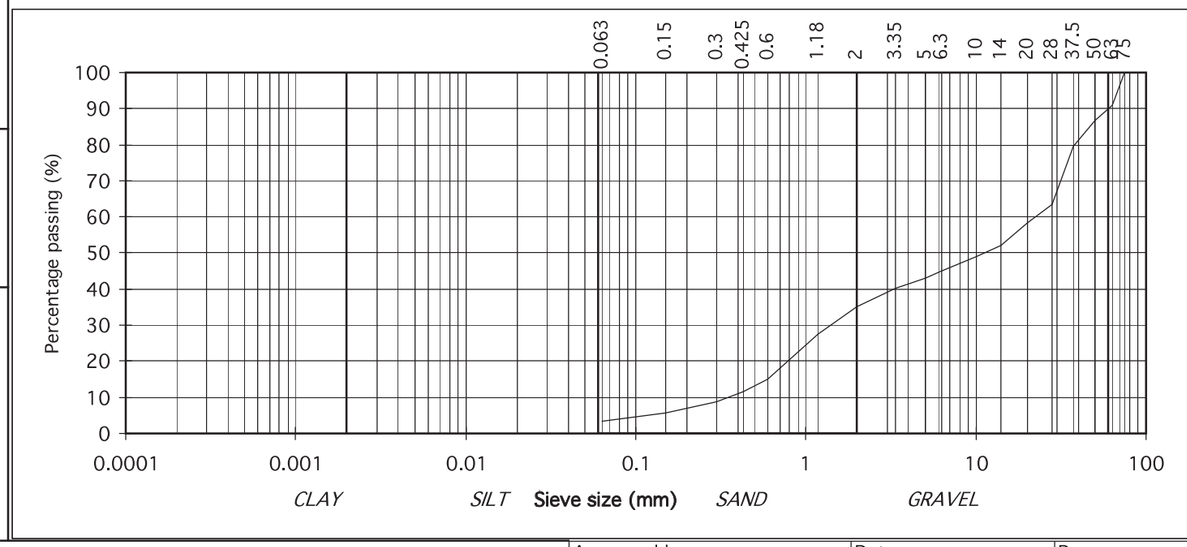
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	91	
50	87	GRAVEL
37.5	79	
28	64	
20	58	
14	52	
10	49	
6.3	45	
5	43	
3.35	40	
2	35	
1.18	28	SAND
0.6	15	
0.425	12	
0.3	9	
0.15	6	
0.063	3	SILT/CLAY

Contract No: 21319 Report No. R96634
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH06
Sample No. AA93635 Lab. Sample No. A18/9356
Sample Type: B
Depth (m) 4.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 30/11/2018
Description: Brown slightly clayey/silty, very sandy, GRAVEL with some cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

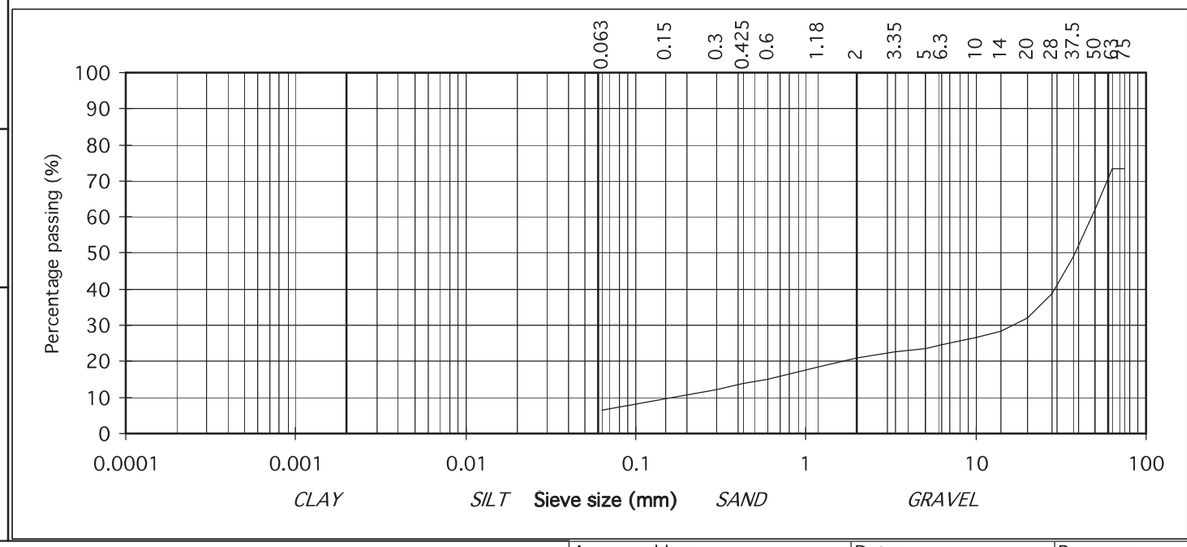
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1337

particle size	% passing	
75	73	COBBLES
63	73	
50	62	GRAVEL
37.5	49	
28	39	
20	32	
14	28	
10	27	
6.3	25	
5	24	
3.35	23	
2	21	
1.18	18	SAND
0.6	15	
0.425	14	
0.3	12	
0.15	10	
0.063	7	SILT/CLAY

Contract No: 21319 Report No. R96635
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH07
Sample No. AA93645 Lab. Sample No. A18/9357
Sample Type: B
Depth (m) 2.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Brown silty, sandy, GRAVEL with many cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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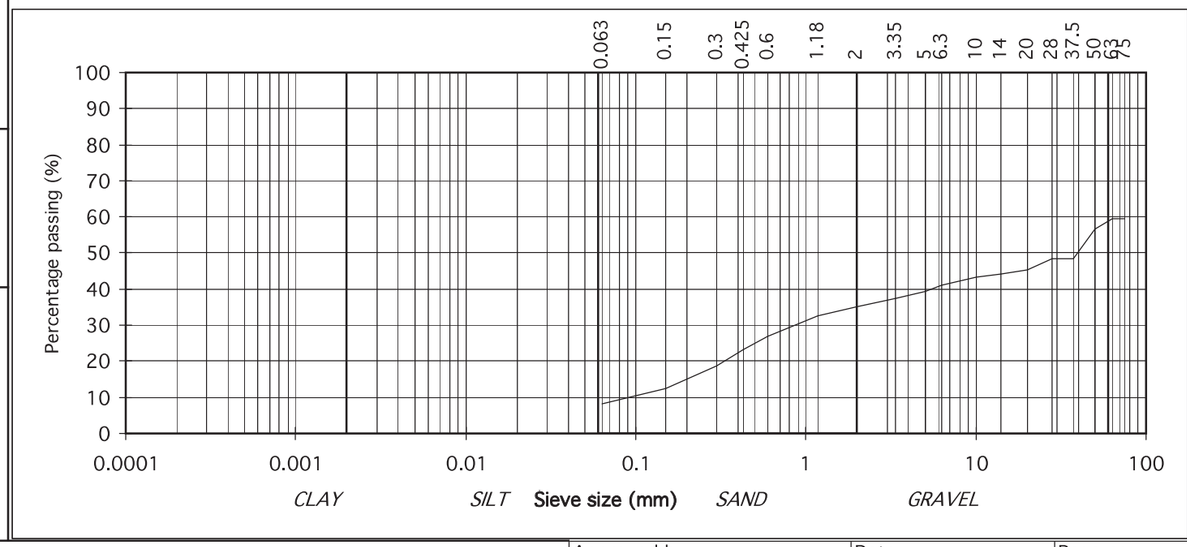
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	60	COBBLES
63	60	
50	57	GRAVEL
37.5	48	
28	48	
20	45	
14	44	
10	43	
6.3	41	
5	39	
3.35	37	
2	35	
1.18	32	SAND
0.6	27	
0.425	23	
0.3	19	
0.15	13	
0.063	8	SILT/CLAY

Contract No: 21319 Report No. R96637
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH08
Sample No. AA93650 Lab. Sample No. A18/9354
Sample Type: B
Depth (m) 2.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Grey/brown clayey/silty, very gravelly, SAND with many cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

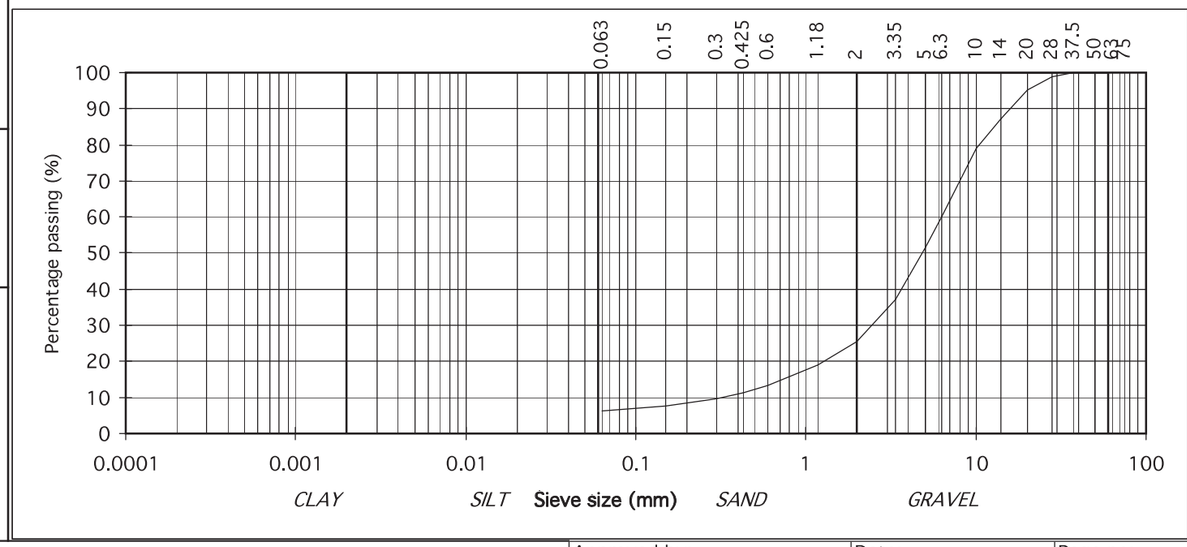
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	99	
20	95	
14	87	
10	79	
6.3	60	
5	52	
3.35	37	
2	25	
1.18	19	SAND
0.6	13	
0.425	11	
0.3	10	
0.15	8	
0.063	6	SILT/CLAY

Contract No: 21319 Report No. R96638
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH08
Sample No. AA93652 Lab. Sample No. A18/9360
Sample Type: B
Depth (m) 4.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 03/12/2018
Description: Black clayey/silty, sandy, GRAVEL

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



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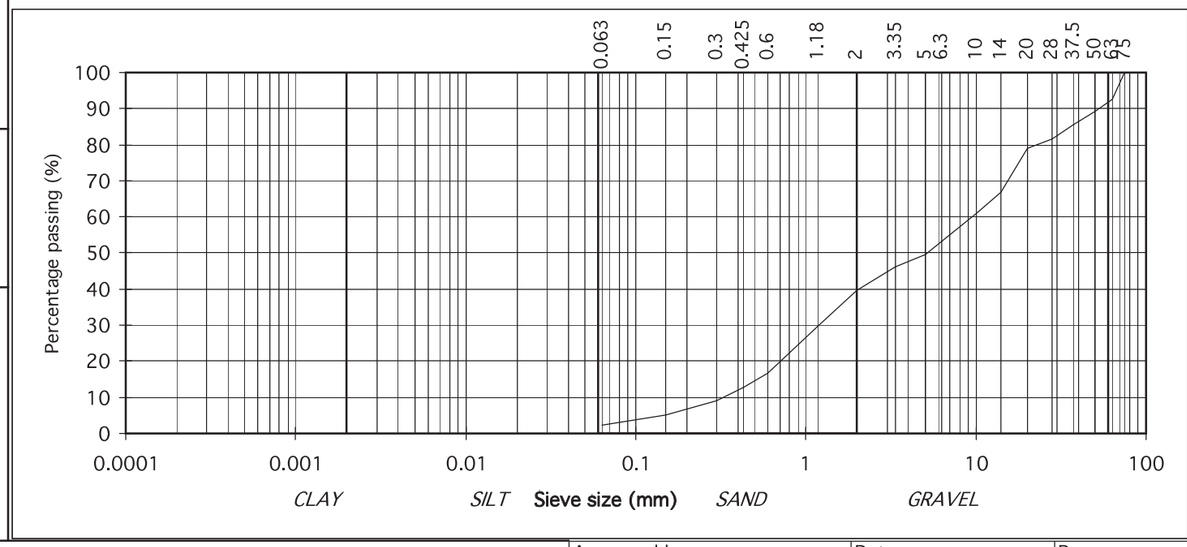
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	93	
50	89	GRAVEL
37.5	86	
28	82	
20	79	
14	67	
10	61	
6.3	53	
5	50	
3.35	46	
2	40	
1.18	30	SAND
0.6	17	
0.425	13	
0.3	9	
0.15	5	
0.063	2	SILT/CLAY

Contract No: 21319 Report No. R96636
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BH07
Sample No. AA93646 Lab. Sample No. A18/9358
Sample Type: B
Depth (m) 3.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Brown slightly clayey/silty, very sandy, GRAVEL with some cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

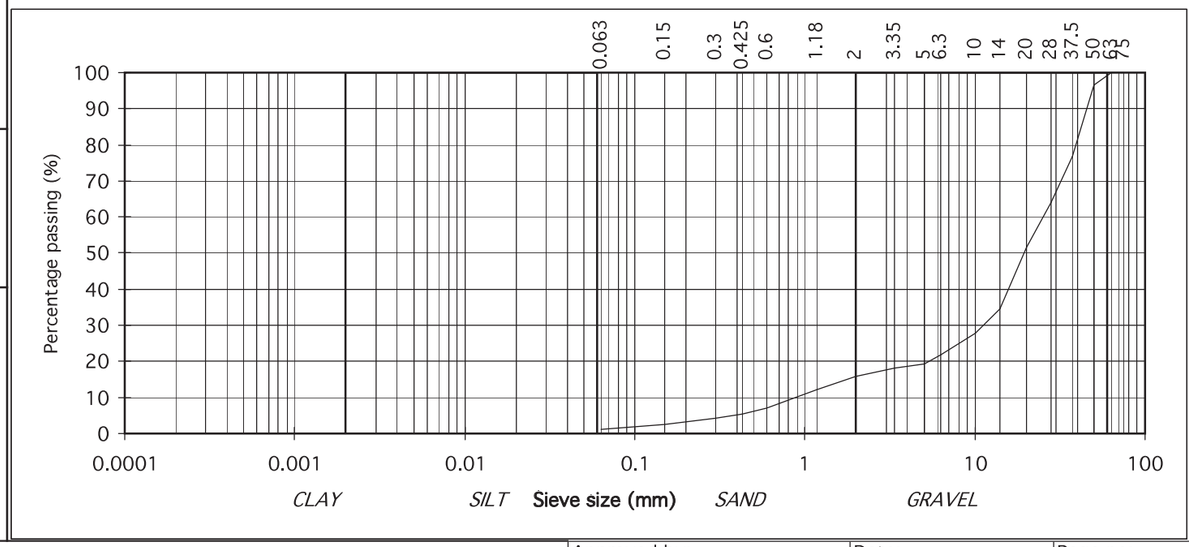
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	97	GRAVEL
37.5	77	
28	64	
20	52	
14	34	
10	28	
6.3	22	
5	19	
3.35	18	
2	16	
1.18	12	SAND
0.6	7	
0.425	5	
0.3	4	
0.15	2	
0.063	1	SILT/CLAY

Contract No: 21319 Report No. R96639
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BHRC01
Sample No. AA96684 Lab. Sample No. A18/9361
Sample Type: B
Depth (m) 3.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 03/12/2018
Description: Black/brown slightly clayey/silty, sandy, GRAVEL

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



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Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

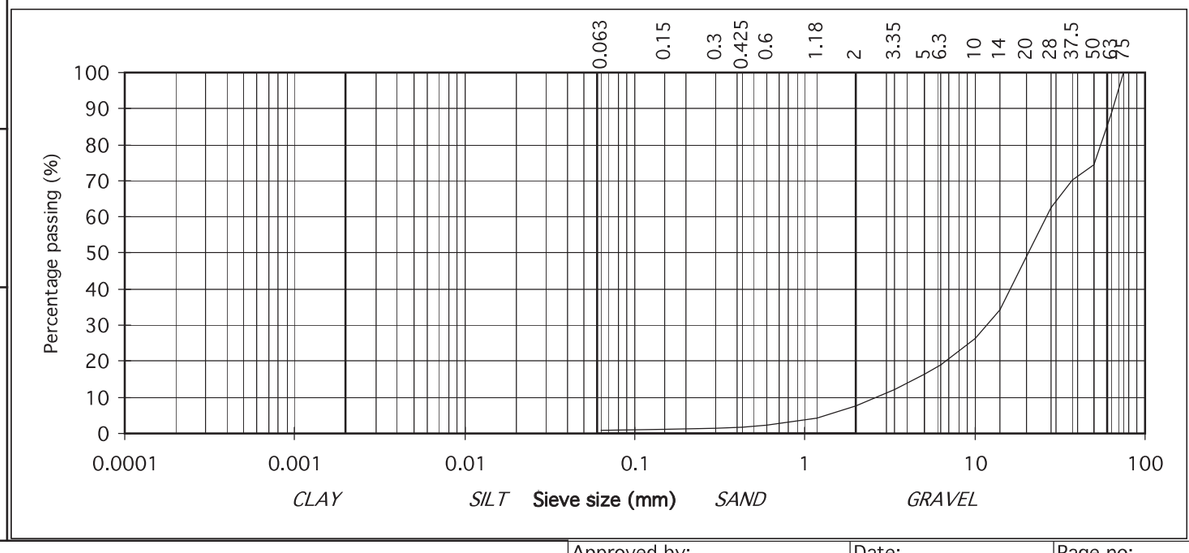
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	89	
50	75	GRAVEL
37.5	70	
28	63	
20	49	
14	34	
10	26	
6.3	19	
5	16	
3.35	12	
2	8	
1.18	4	SAND
0.6	2	
0.425	2	
0.3	1	
0.15	1	
0.063	1	SILT/CLAY

Contract No: 21319 Report No. R97005
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BHRC02
Sample No. AA96677 Lab. Sample No. A18/9362
Sample Type: B
Depth (m) 3.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 12/12/2018
Description: Grey/brown slightly clayey/silty, sandy, GRAVEL with some cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

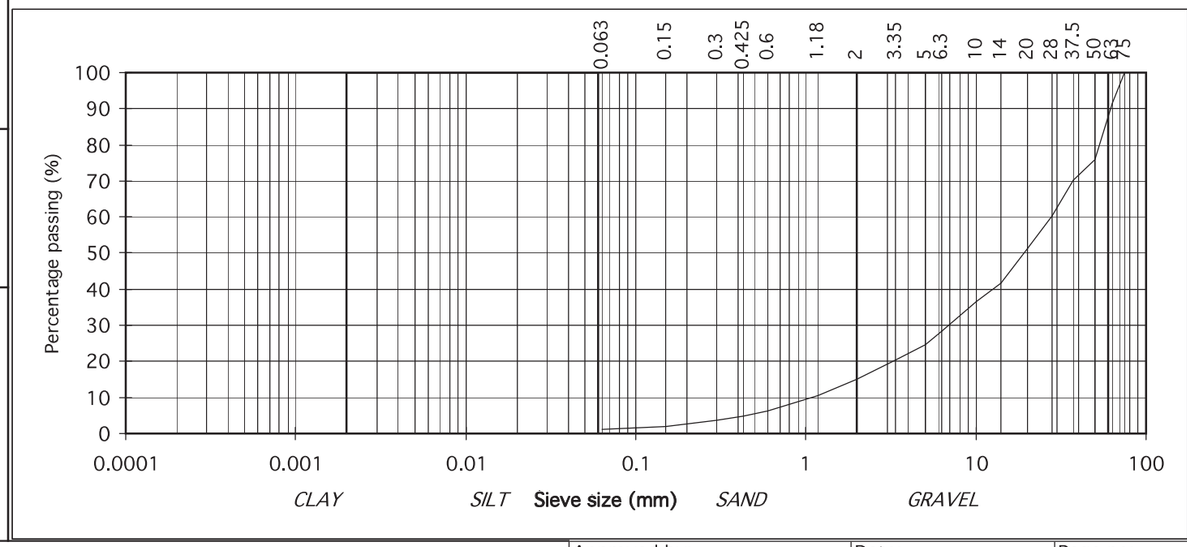
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	92	
50	76	GRAVEL
37.5	70	
28	60	
20	51	
14	42	
10	37	
6.3	28	
5	25	
3.35	20	
2	15	
1.18	10	SAND
0.6	6	
0.425	5	
0.3	4	
0.15	2	
0.063	1	SILT/CLAY

Contract No: 21319 Report No. R96640
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BHRC03
Sample No. AA96687 Lab. Sample No. A18/9363
Sample Type: B
Depth (m) 2.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Black/brown slightly clayey/silty, sandy, GRAVEL with some cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



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Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

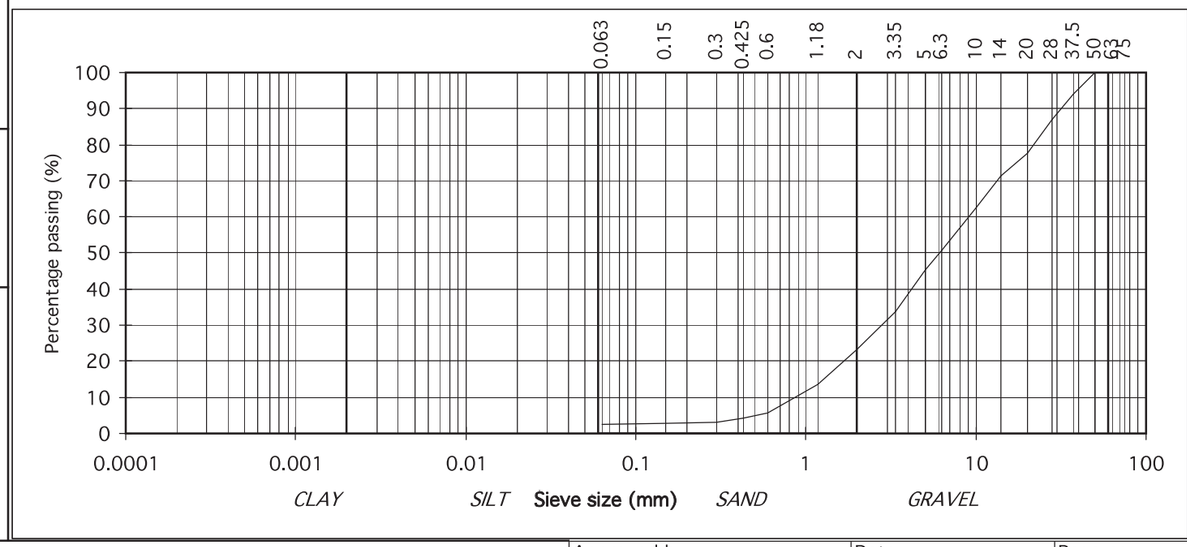
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	94	
28	87	
20	78	
14	71	
10	63	
6.3	51	
5	45	
3.35	34	
2	23	
1.18	14	SAND
0.6	6	
0.425	4	
0.3	3	
0.15	3	
0.063	3	SILT/CLAY

Contract No: 21319 Report No. R97006
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BHRC03
Sample No. AA96688 Lab. Sample No. A18/9364
Sample Type: B
Depth (m) 3.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 06/12/2018
Description: Black/brown slightly clayey/silty, very sandy, GRAVEL

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



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Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

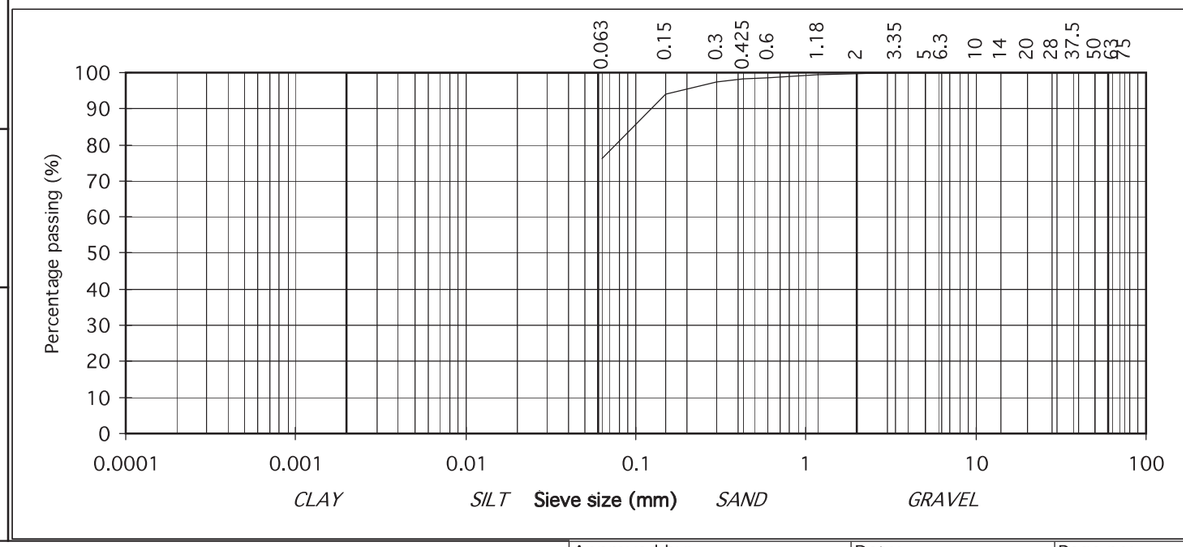
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	100	
10	100	
6.3	100	
5	100	
3.35	100	
2	100	
1.18	99	SAND
0.6	99	
0.425	98	
0.3	98	
0.15	94	
0.063	76	SILT/CLAY

Contract No: 21319 Report No. R96726
Contract: Priorsland , Carrickmines , Dublin
BH/TP : BHRC04
Sample No. AA96691 Lab. Sample No. A18/9366
Sample Type: B
Depth (m) 2.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Brown slightly sandy, SILT/CLAY

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

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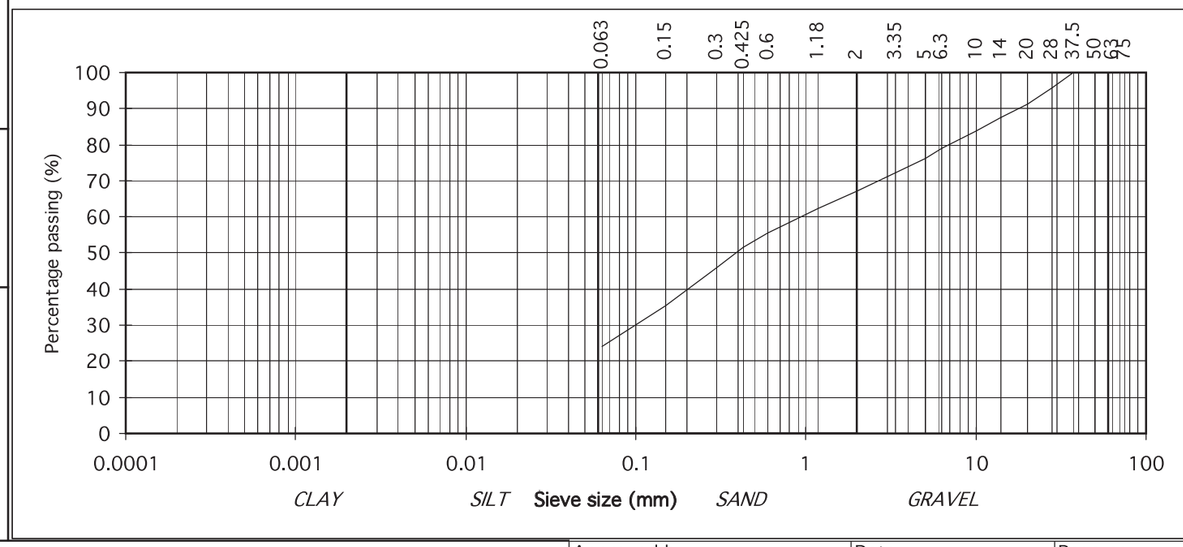
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	96	
20	91	
14	88	
10	84	
6.3	79	
5	76	
3.35	72	
2	67	
1.18	62	SAND
0.6	55	
0.425	52	
0.3	46	
0.15	35	
0.063	24	SILT/CLAY

Contract No: 21319 Report No. R96727
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP01
Sample No. AA85653 Lab. Sample No. A18/9367
Sample Type: B
Depth (m) 2.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Grey brown sandy, slightly gravelly, SILT

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

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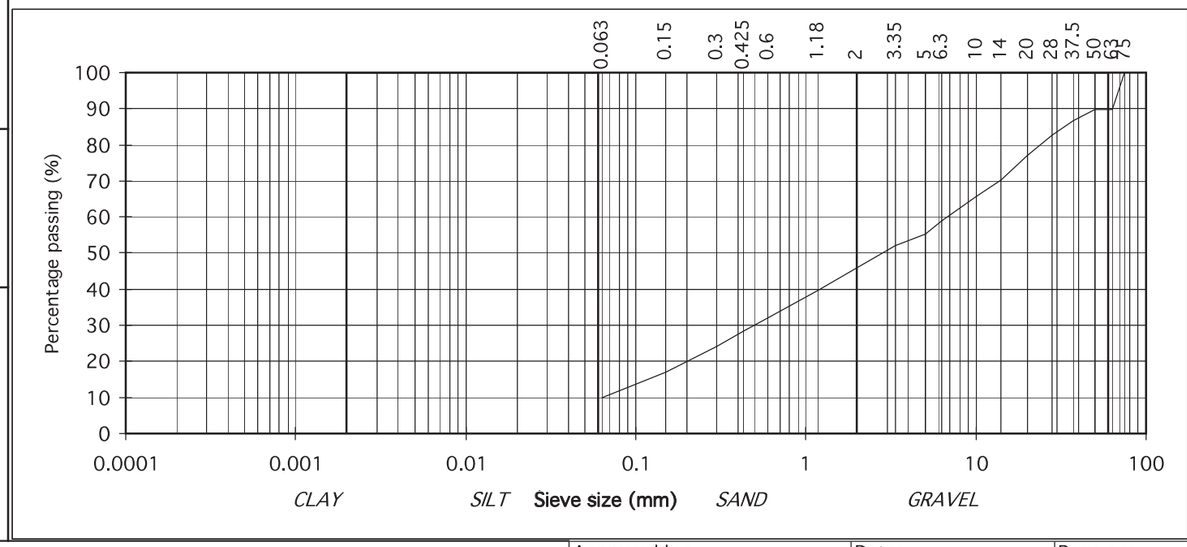
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	90	
50	90	GRAVEL
37.5	87	
28	83	
20	77	
14	70	
10	66	
6.3	59	
5	55	
3.35	52	
2	46	
1.18	40	SAND
0.6	32	
0.425	28	
0.3	24	
0.15	17	
0.063	10	SILT/CLAY

Contract No: 21319 Report No. R96549
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP02
Sample No. AA80657 Lab. Sample No. A18/9368
Sample Type: B
Depth (m) 1.70 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 16/11/2018 Date Testing started 30/11/2018
Description: Brown/grey clayey/silty, very sandy, GRAVEL with some cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

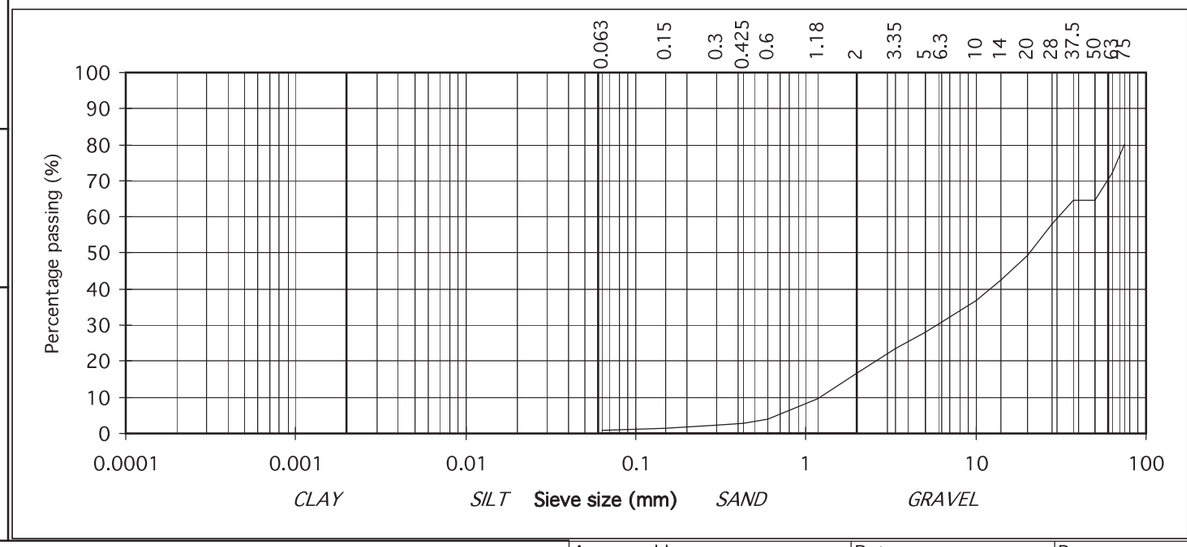
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	80	COBBLES
63	72	
50	64	GRAVEL
37.5	64	
28	58	
20	49	
14	43	
10	37	
6.3	31	
5	28	
3.35	23	
2	17	
1.18	10	SAND
0.6	4	
0.425	3	
0.3	2	
0.15	1	
0.063	1	SILT/CLAY

Contract No: 21319 Report No. R97000
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP03
Sample No. AA90659/60 Lab. Sample No. A18/9369
Sample Type: B
Depth (m) 0.90 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 12/12/2018
Description: Brown/grey slightly clayey/silty, sandy, GRAVEL with many cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

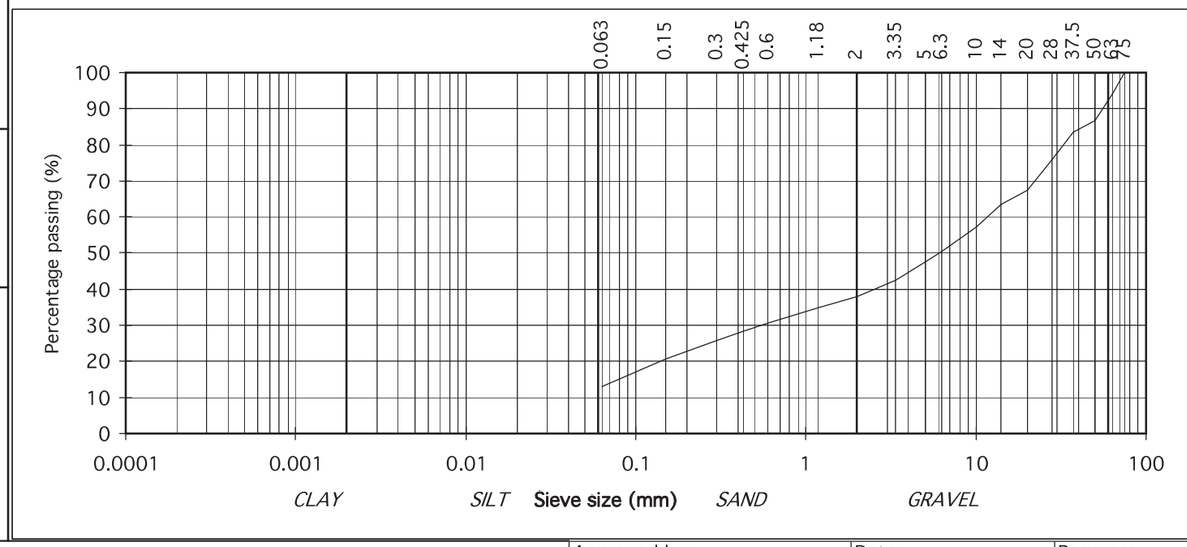
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1377

particle size	% passing	
75	100	COBBLES
63	94	
50	87	GRAVEL
37.5	84	
28	76	
20	67	
14	64	
10	57	
6.3	50	
5	48	
3.35	42	
2	38	
1.18	35	SAND
0.6	31	
0.425	28	
0.3	26	
0.15	21	
0.063	13	SILT/CLAY

Contract No: 21319 Report No. R97445
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP05
Sample No. AA80664 Lab. Sample No. A18/9370
Sample Type: B
Depth (m) 1.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Grey brown silty, very sandy, GRAVEL with some cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

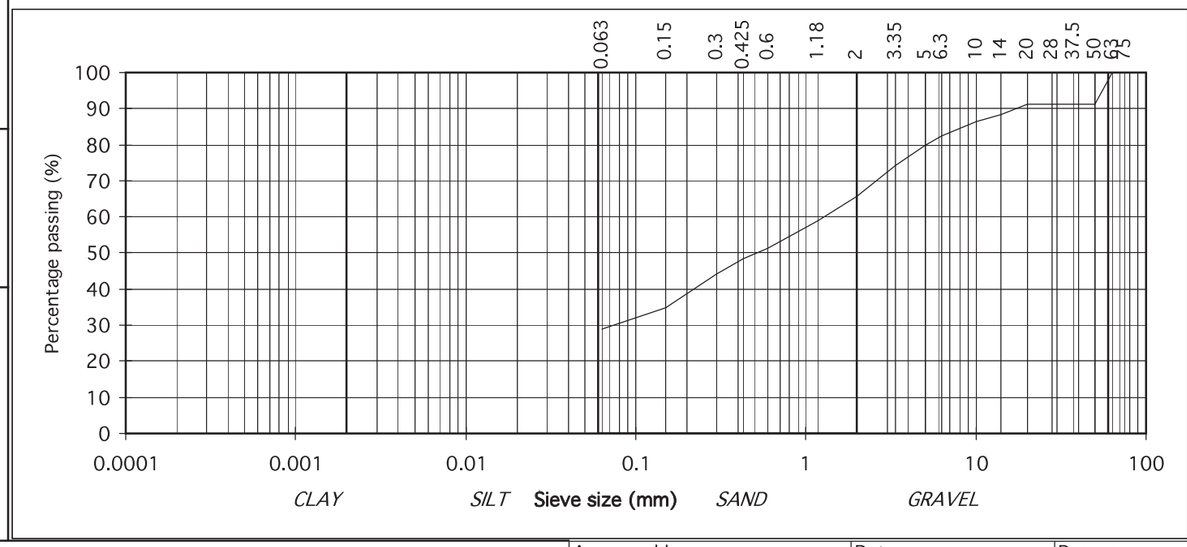
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1377

particle size	% passing	
75	100	COBBLES
63	100	
50	91	GRAVEL
37.5	91	
28	91	
20	91	
14	88	
10	86	
6.3	83	
5	80	
3.35	74	
2	66	
1.18	59	SAND
0.6	51	
0.425	48	
0.3	44	
0.15	35	
0.063	29	SILT/CLAY

Contract No: 21319 Report No. R96641
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP06
Sample No. AA80660 Lab. Sample No. A18/9371
Sample Type: B
Depth (m) 1.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 03/12/2018
Description: Light brown sandy, slightly gravelly, SILT/CLAY

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

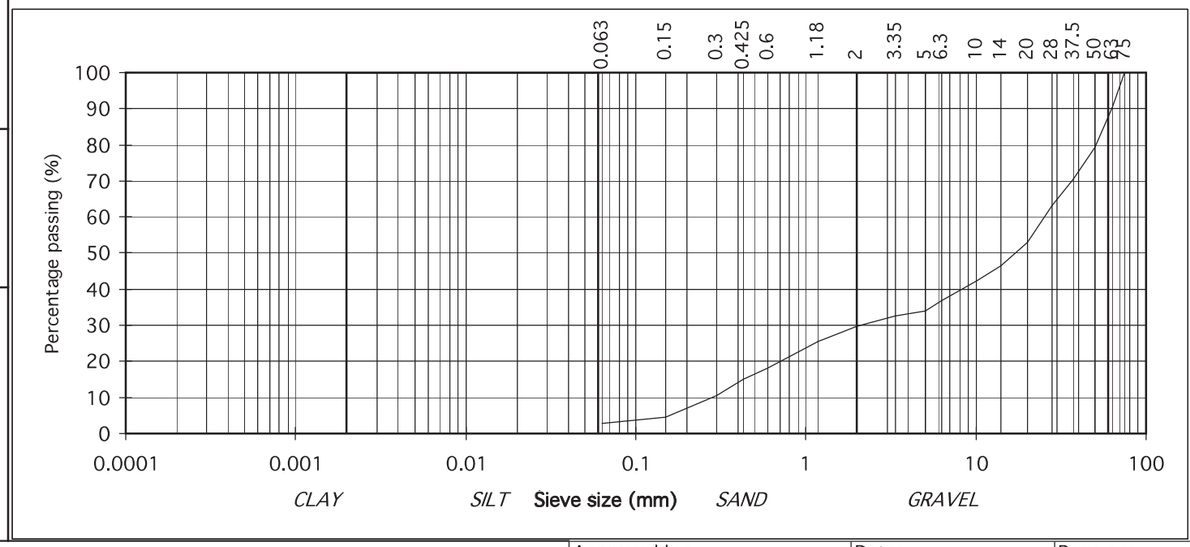
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1377

particle size	% passing	
75	100	COBBLES
63	90	
50	79	GRAVEL
37.5	70	
28	63	
20	53	
14	46	
10	42	
6.3	37	
5	34	
3.35	33	
2	30	
1.18	26	SAND
0.6	18	
0.425	15	
0.3	10	
0.15	4	
0.063	3	SILT/CLAY

Contract No: 21319 Report No. R97446
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP07
Sample No. AA80668 Lab. Sample No. A18/9372
Sample Type: B
Depth (m) 1.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Grey brown slightly clayey/silty, very sandy, GRAVEL with some cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

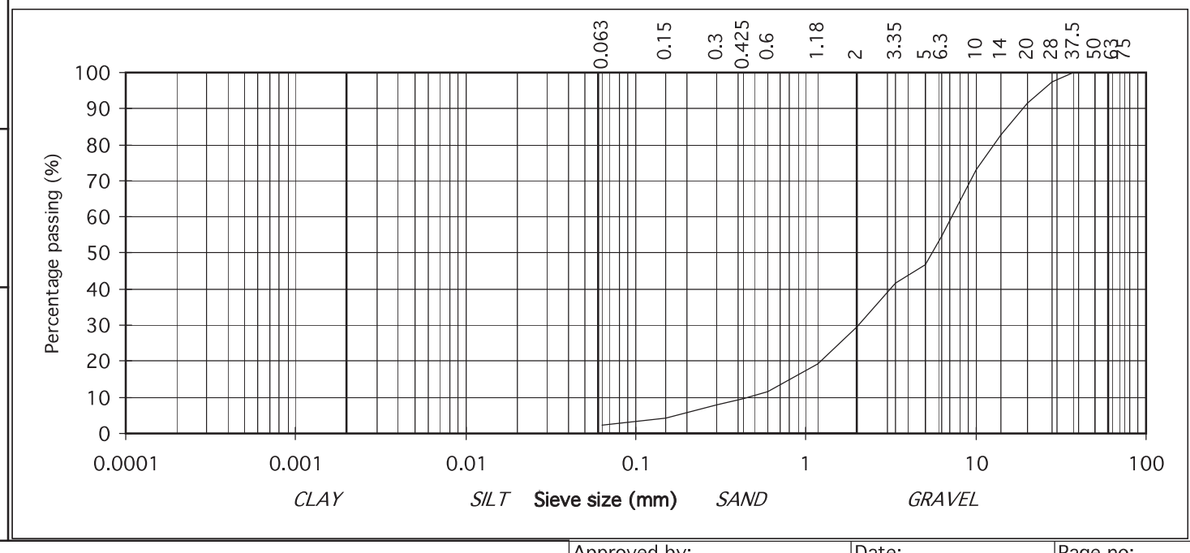
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1377

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	98	
20	92	
14	83	
10	73	
6.3	55	
5	47	
3.35	42	
2	30	
1.18	19	SAND
0.6	12	
0.425	10	
0.3	8	
0.15	4	
0.063	2	SILT/CLAY

Contract No: 21319 Report No. R97447
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP11
Sample No. AA80655 Lab. Sample No. A18/9373
Sample Type: B
Depth (m) 1.20 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Grey brown slightly clayey/silty, very sandy, GRAVEL

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

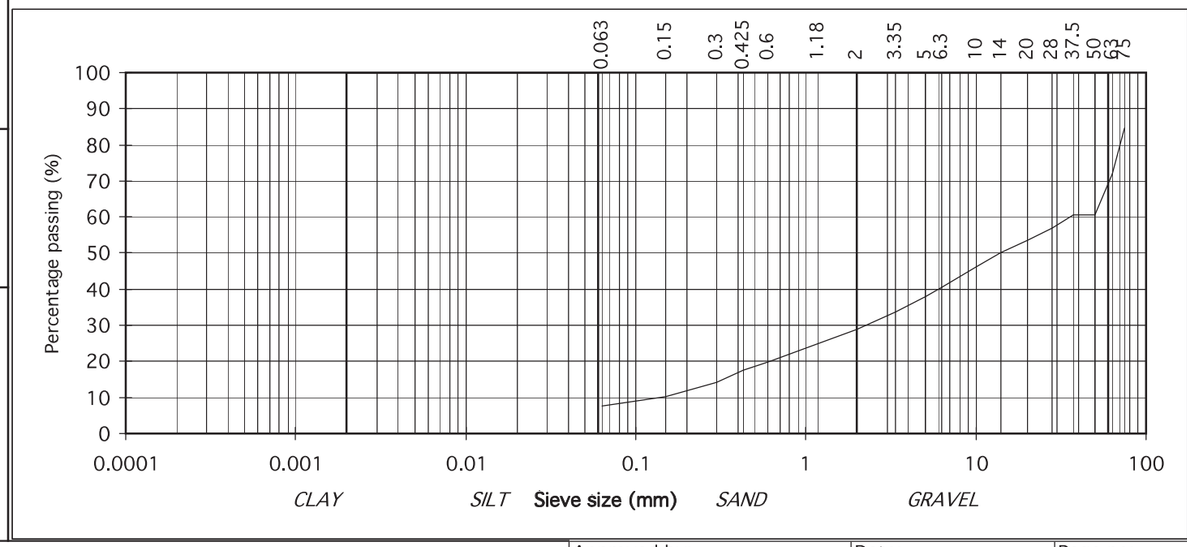
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	85	COBBLES
63	72	
50	61	GRAVEL
37.5	61	
28	57	
20	53	
14	50	
10	46	
6.3	40	
5	38	
3.35	34	
2	29	
1.18	25	SAND
0.6	20	
0.425	18	
0.3	14	
0.15	10	
0.063	8	SILT/CLAY

Contract No: 21319 Report No. R97001
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP20
Sample No. AA85674 Lab. Sample No. A18/9375
Sample Type: B
Depth (m) 1.00 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 12/12/2018
Description: Black clayey/silty, very sandy, GRAVEL with many cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

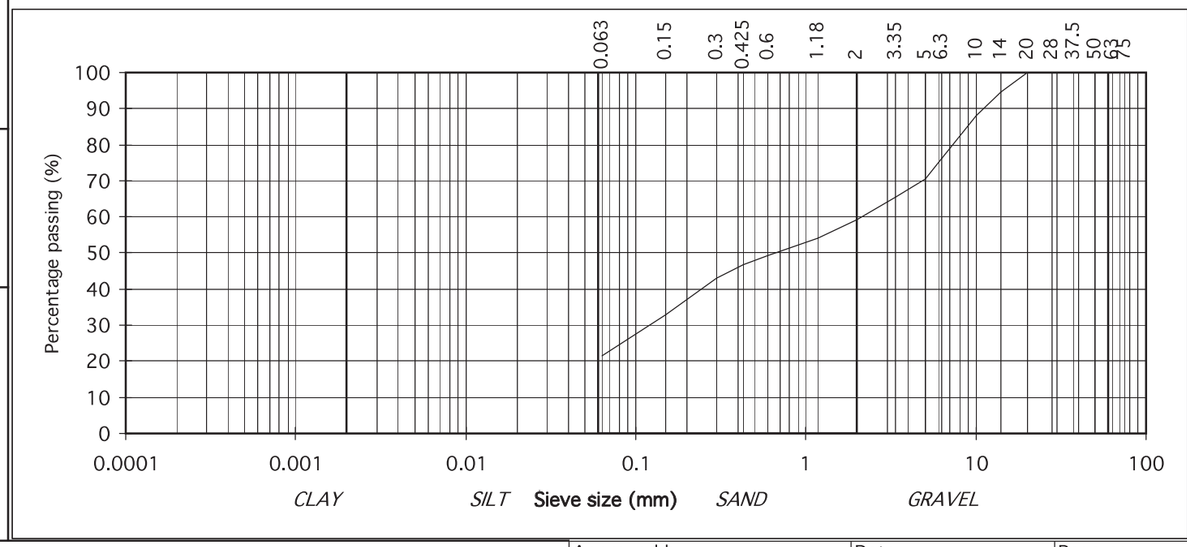
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	94	
10	88	
6.3	76	
5	71	
3.35	65	
2	59	
1.18	54	SAND
0.6	49	
0.425	47	
0.3	43	
0.15	33	
0.063	22	SILT/CLAY

Contract No: 21319 Report No. R96642
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP24
Sample No. AA80681 Lab. Sample No. A18/9378
Sample Type: B
Depth (m) 1.70 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 05/12/2018
Description: Mottled brown sandy, gravelly, SILT/CLAY

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

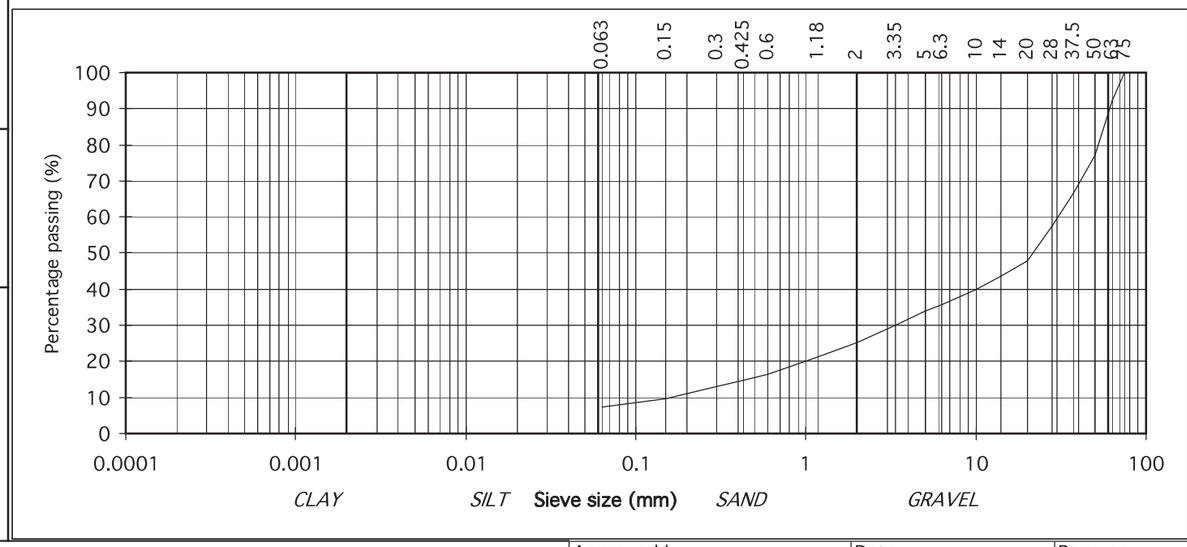
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	92	
50	77	GRAVEL
37.5	66	
28	58	
20	48	
14	44	
10	40	
6.3	36	
5	34	
3.35	30	
2	25	
1.18	21	SAND
0.6	16	
0.425	15	
0.3	13	
0.15	10	
0.063	7	SILT/CLAY

Contract No: 21319 Report No. R97002
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP29
Sample No. AA85662 Lab. Sample No. A18/9384
Sample Type: B
Depth (m) 1.40 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 06/12/2018
Description: Mottled brown silty, sandy, GRAVEL with some cobbles

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

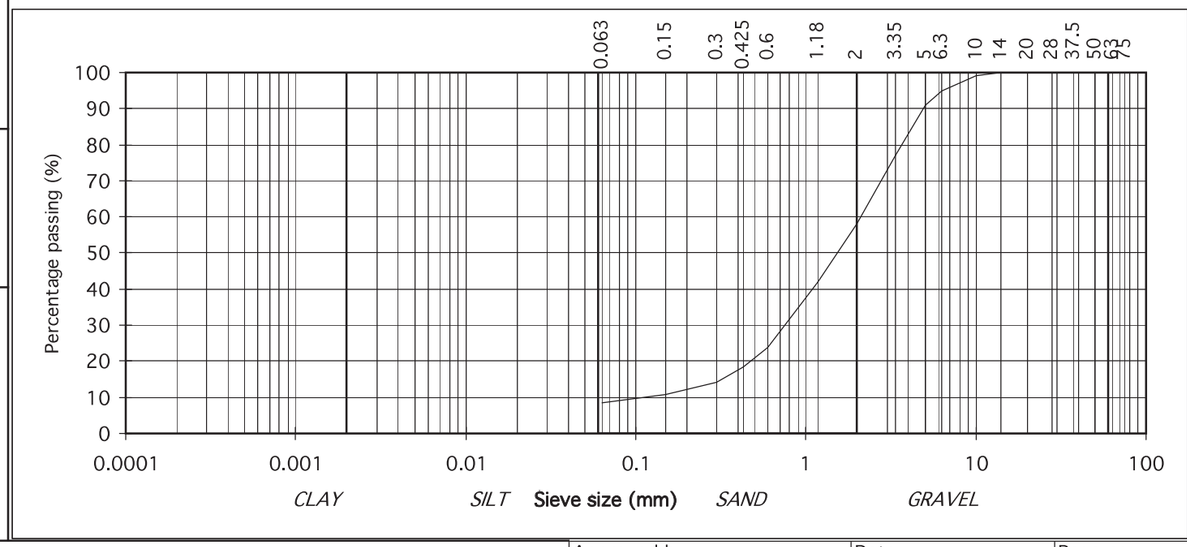
IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	100	
10	99	
6.3	95	
5	91	
3.35	77	
2	58	
1.18	42	SAND
0.6	24	
0.425	18	
0.3	14	
0.15	11	
0.063	9	SILT/CLAY

Contract No: 21319 Report No. R97003
Contract: Priorsland , Carrickmines , Dublin
BH/TP : TP31
Sample No. AA85684 Lab. Sample No. A18/9382
Sample Type: B
Depth (m) 1.40 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin
Date Received 30/11/2018 Date Testing started 12/12/2018
Description: Brown clayey/silty, very gravelly, SAND

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	02/01/19	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

Report No. R97004

Contract: Priorsland , Carrickmines , Dublin

Lab. Sample No. A18/9384

Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin

Date Testing started 12/12/2018

Description: Brown clayey/silty, sandy, GRAVEL with some cobbles

Contract No: 21319 Report No. R97004

Contract: Priorsland , Carrickmines , Dublin

BH/TP : TP34

Sample No. AA85686 Lab. Sample No. A18/9384

Sample Type: B

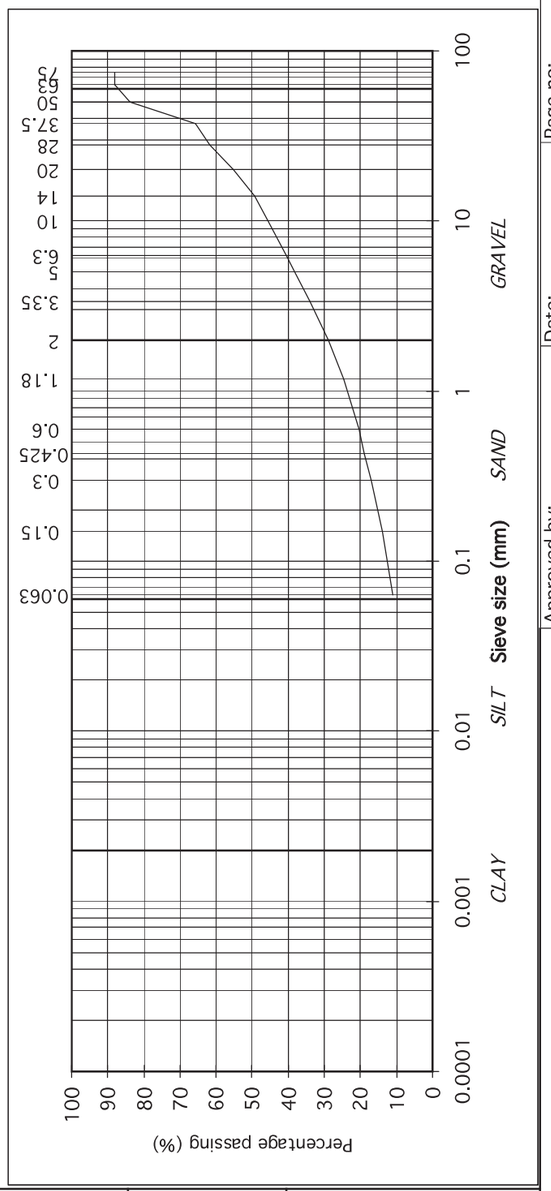
Depth (m) 1.50 Customer: Punch, Carnegie House, Library Road, Dun Laoghaire, Co Dublin

Date Received 30/11/2018 Date Testing started 12/12/2018

Description: Brown clayey/silty, sandy, GRAVEL with some cobbles

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377-Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



particle size	% passing	
75	88	COBBLES
63	88	
50	84	GRAVEL
37.5	66	
28	62	
20	55	
14	49	
10	46	
6.3	40	
5	38	
3.35	34	
2	29	
1.18	25	SAND
0.6	21	
0.425	19	
0.3	17	
0.15	14	SILT/CLAY
0.063	11	

Approved by: H Byrne Date: 02/01/19 Page no: 1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory

IGSL Ltd, M7 Business Park, Newhall, Naas, Co Kildare

IGSL Ltd.

Determination of Shear Strength by Direct Shear

Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract: Priorsland Carrickmines — Contract No. 21319

Location: TP3 @ 0.9m — Sample No. 80659

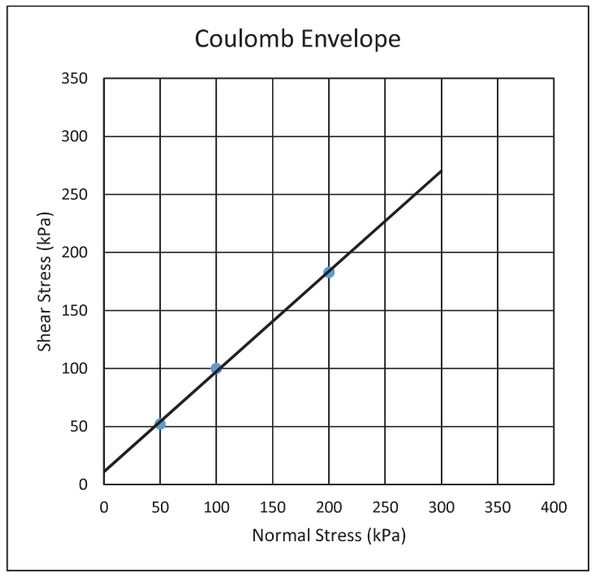
Report No. R97943 — Customer: Punch

Sample Received: — Testing started: 02/01/19

Method of Preparation: <2mm material compacted into box in 3 layers

Description: Brown slightly gravelly clayey SAND (Natural MC 19%)

	Specimen 1	2	3
Normal Stress (kPa)	50	100	200
Length/Width (mm)	60 x 60	60 x 60	60 x 60
Height (mm)	23	23	25
Initial Moisture Content (%)	26	26	26
Initial Bulk Density (Mg/m^3)	1.99	1.99	2.02
Initial Dry Density (Mg/m^3)	1.58	1.58	1.60
Particle Density (Mg/m^3) (Assumed)	2.65	2.65	2.65
Maximum Shear Stress (kPa)	52.225	99.95	182.854
Horizontal displacement at failure (mm)	4.985	5.129	5.622
Rate Horizontal displacement (mm/min)	0.05	0.05	0.05
Condition (Dry (D) / Submerged (S))	S	S	S



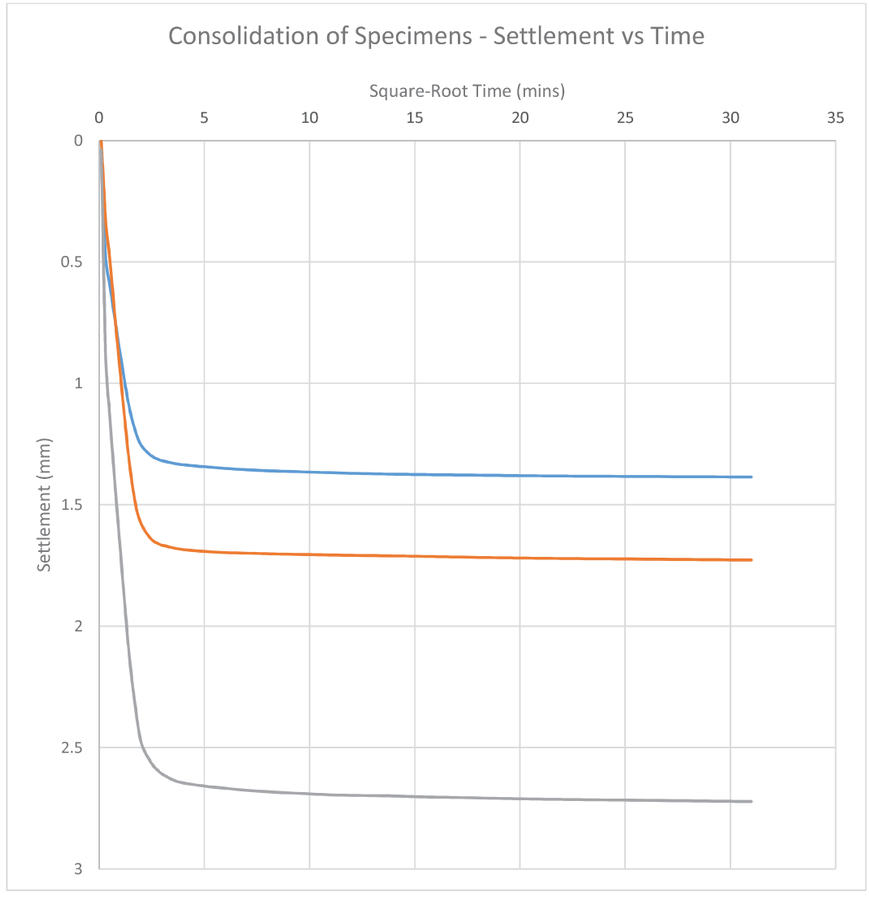
c' (kPa)	10
ϕ' (degrees)	41

Page 1 of 3

Determination of Shear Strength by Direct Shear

Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

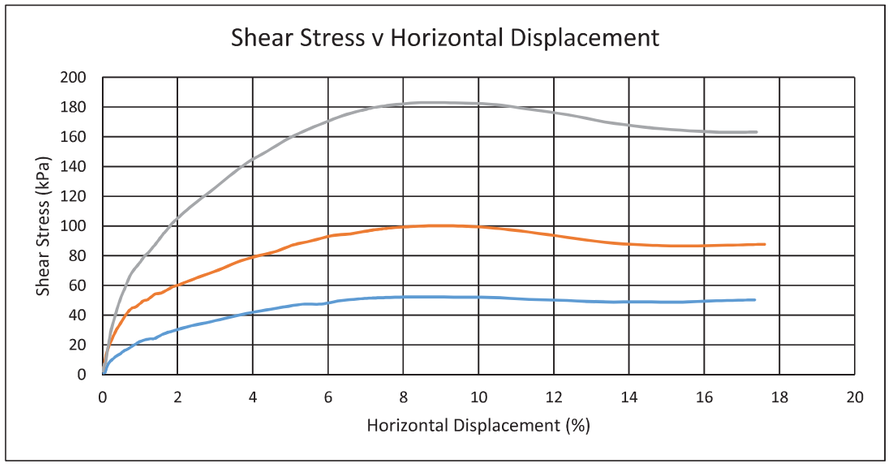
Contract: Priorsland Carrickmines
Contract No. 21319
Location: TP3 @ 0.9m
Sample No. 80659

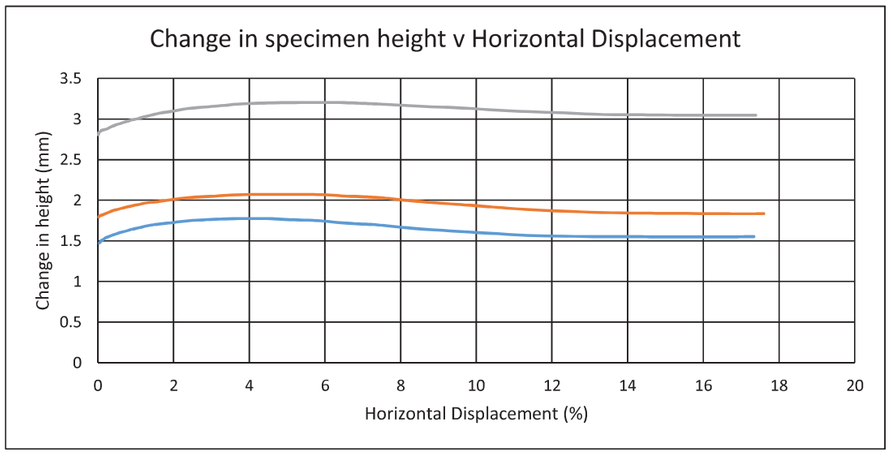


Determination of Shear Strength by Direct Shear

Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract: Priorsland Carrickmines
Contract No. 21319
Location: TP3 @ 0.9m
Sample No. 80659
Report No. R97943





Results relate to the specimen tested.
Approved signatories
☐ J Barrett (Quality Manager)
☐ H Byrne (Laboratory Manager)

Approved by	Date
	23/01/19

IGSL Ltd M7 Business Park Naas Co. Kildare TP3.shearbox.consolidated Permeability.Report Rev 0 05/04

Determination of Shear Strength by Direct Shear

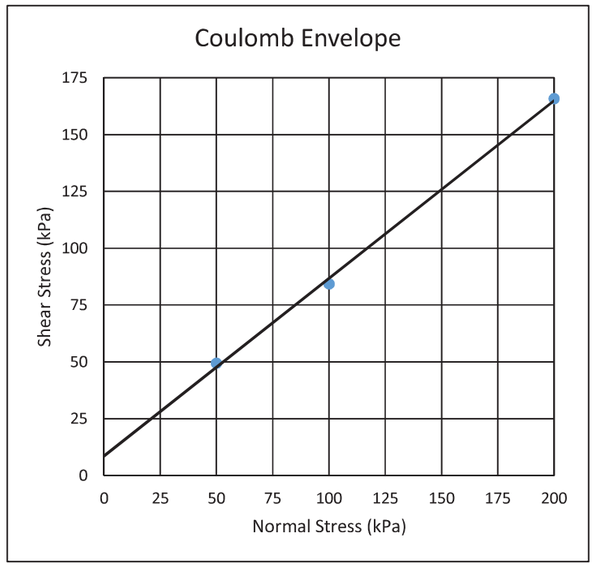
Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract:	Priorsland Carrickmines	Contract No.	21319
Location:	TP7 @ 1.0m	Sample No.	80668
Report No.	R97944	Customer:	Punch
Sample Received:		Testing started:	09/01/19

Method of Preparation: <2mm material compacted into box in 3 layers

Description: Brown slightly gravelly clayey SAND (Natural MC 19%)

	Specimen		
	1	2	3
Normal Stress (kPa)	50	100	200
Length/Width (mm)	60 x 60	60 x 60	60 x 60
Height (mm)	25	25	25
Initial Moisture Content (%)	28	28	28
Initial Bulk Density (Mg/m^3)	2.00	2.00	2.01
Initial Dry Density (Mg/m^3)	1.57	1.57	1.57
Particle Density (Mg/m^3) (Assumed)	2.65	2.65	2.65
Maximum Shear Stress (kPa)	49.417	84.216	165.776
Horizontal displacement at failure (mm)	7.525	8.034	6.771
Rate Horizontal displacement (mm/min)	0.05	0.05	0.05
Condition (Dry (D) / Submerged (S))	S	S	S

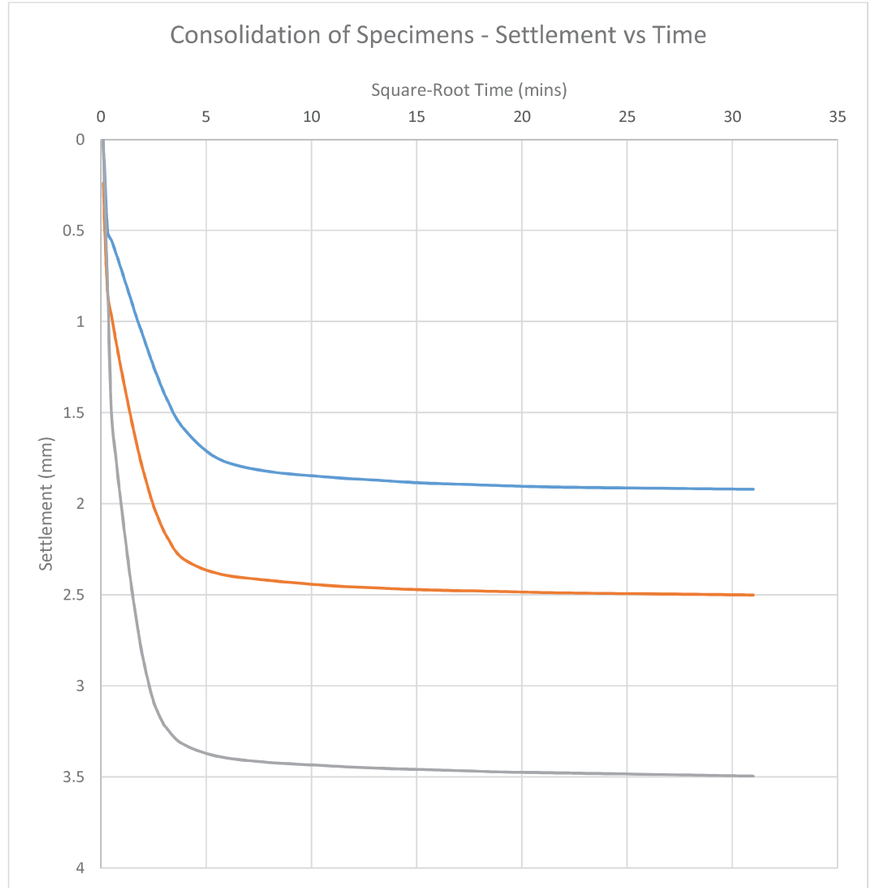


c' (kPa)	7
ϕ' (degrees)	38

Determination of Shear Strength by Direct Shear

Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract:	Priorsland Carrickmines	Contract No.	21319
Location:	TP7 @ 1.0m	Sample No.	80668

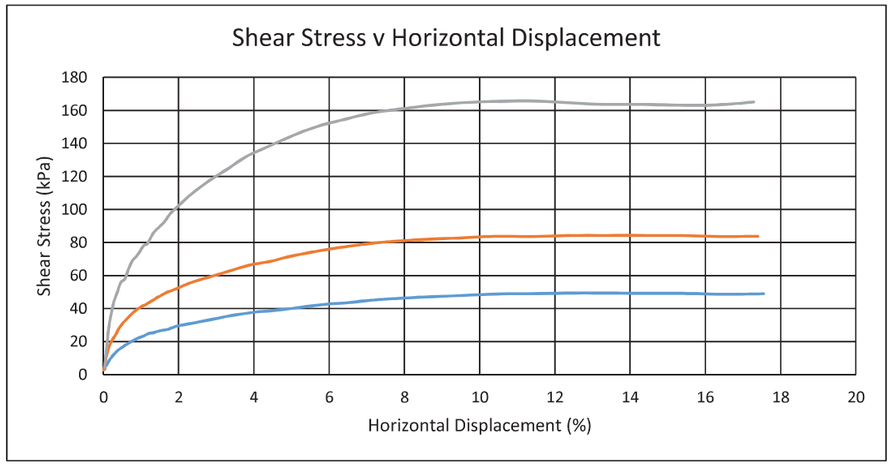


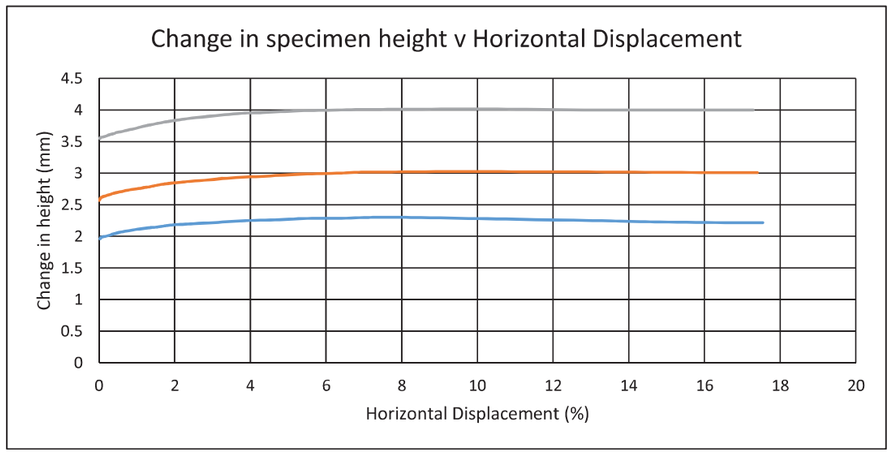
SL Ltd M7 Business Park Naas Co. Kildare TP7.shearbox.consolidated Permeability.Report Rev 0 05/04

Determination of Shear Strength by Direct Shear

Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract: Priorsland Carrickmines
Contract No. 21319
Location: TP7 @ 1.0m
Sample No. 80668
Report No. R97944





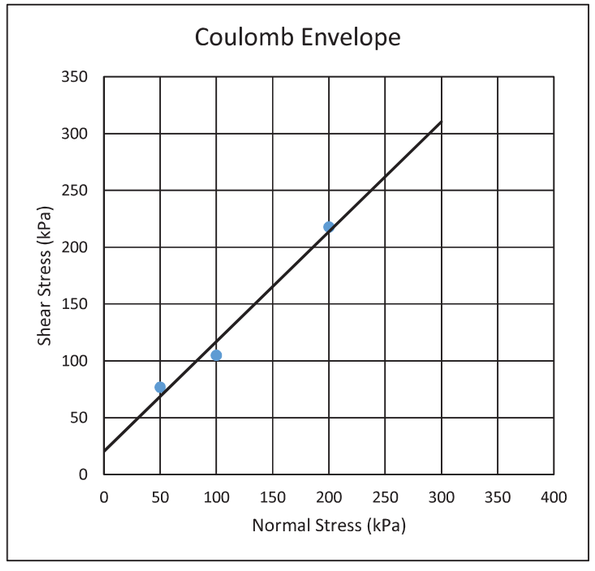
Results relate to the specimen tested.	Approved by	Date	
Approved signatories ☐ J Barrett (Quality Manager) ☐ H Byrne (Laboratory Manager)		23/01/19	Page 3 of 3

Determination of Shear Strength by Direct Shear

Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract: Priorsland Carrickmines
Contract No. 21319
Location: TP11 @ 1.2m
Sample No. 80655
Report No. R97026
Customer: Punch
Sample Received:
Testing started: 17/12/18
Method of Preparation: <2mm material tamped into box in 3 layers
Description: Brown silty clayey sandy GRAVEL (Natural MC 14%)

	Specimen 1	2	3
Normal Stress (kPa)	50	100	200
Length/Width (mm)	60 x 60	60 x 60	60 x 60
Height (mm)	26	23	25
Initial Moisture Content (%)	22	22	22
Initial Bulk Density (Mg/m^3)	1.96	1.96	1.96
Initial Dry Density (Mg/m^3)	1.61	1.61	1.61
Particle Density (Mg/m^3) (Assumed)	2.65	2.65	2.65
Maximum Shear Stress (kPa)	76.659	104.847	217.707
Horizontal displacement at failure (mm)	4.923	4.384	4.867
Rate Horizontal displacement (mm/min)	0.5	0.5	0.5
Condition (Dry (D) / Submerged (S))	S	S	S

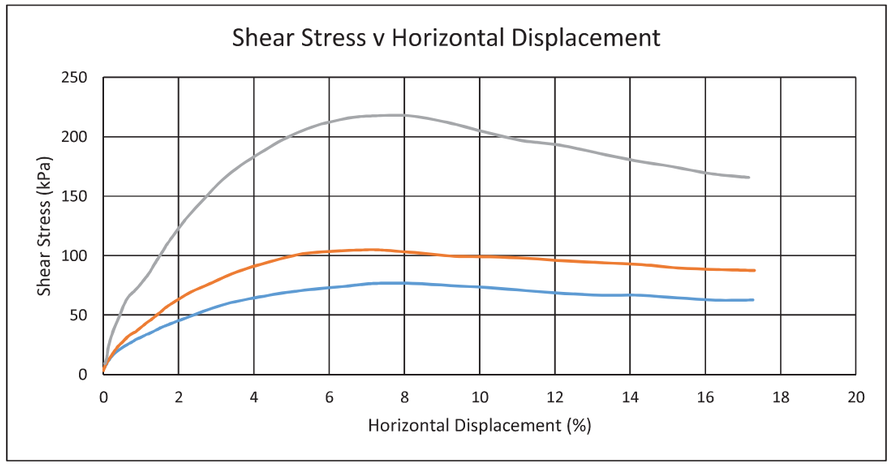


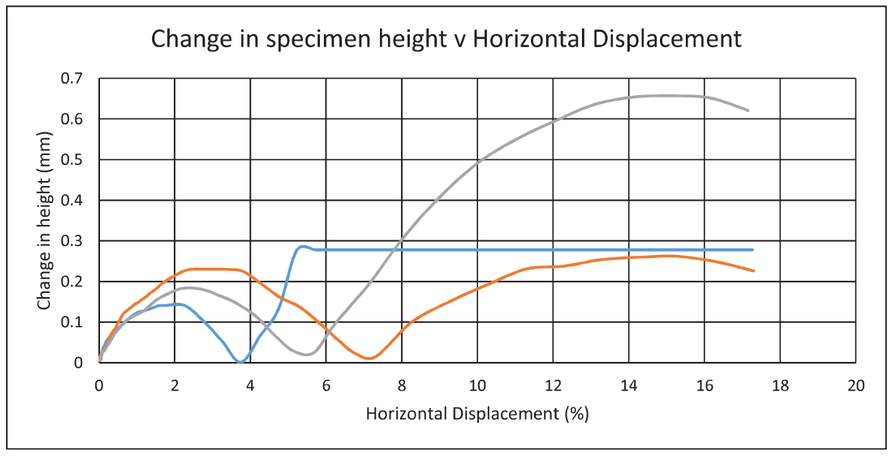
c' (kPa)	19
ϕ' (degrees)	44

Determination of Shear Strength by Direct Shear

Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract: Priorsland Carrickmines
Contract No. 21319
Location: TP11 @ 1.2m
Sample No. 80655
Report No. R97026





Results relate to the specimen tested.
Approved signatories
☐ J Barrett (Quality Manager)
☐ H Byrne (Laboratory Manager)

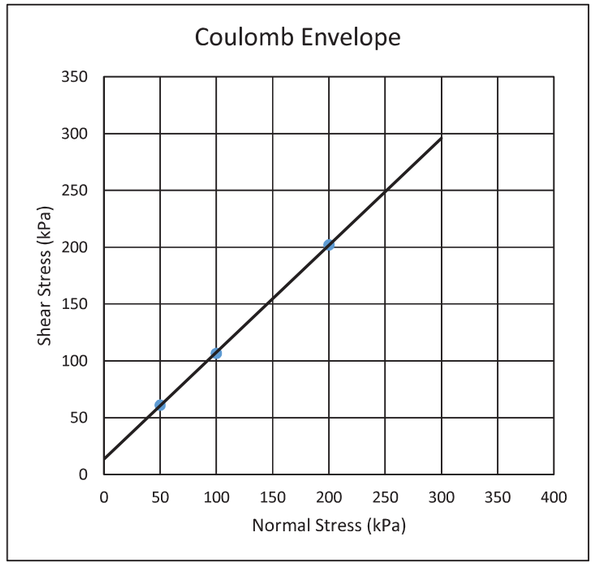
Approved by	Date
	20/12/18

Determination of Shear Strength by Direct Shear

Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract: Priorsland Carrickmines
Contract No. 21319
Location: TP16 @ 1.5m
Sample No. 80670
Report No. R97027
Customer: Punch
Sample Received:
Testing started: 18/12/18
Method of Preparation: <2mm material tamped into box in 3 layers
Description: Brown silty clayey sandy GRAVEL (Natural MC 15%)

	Specimen 1	2	3
Normal Stress (kPa)	50	100	200
Length/Width (mm)	60 x 60	60 x 60	60 x 60
Height (mm)	23	23	23
Initial Moisture Content (%)	23	23	23
Initial Bulk Density (Mg/m^3)	1.99	1.98	1.97
Initial Dry Density (Mg/m^3)	1.61	1.60	1.60
Particle Density (Mg/m^3) (Assumed)	2.65	2.65	2.65
Maximum Shear Stress (kPa)	61.074	106.637	202.055
Horizontal displacement at failure (mm)	4.923	4.384	4.867
Rate Horizontal displacement (mm/min)	0.5	0.5	0.5
Condition (Dry (D) / Submerged (S))	S	S	S



c' (kPa)	19
ϕ' (degrees)	44

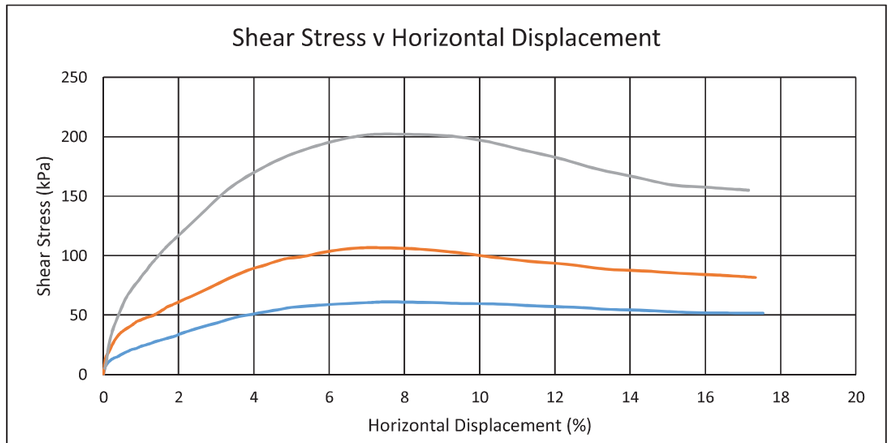
Determination of Shear Strength by Direct Shear

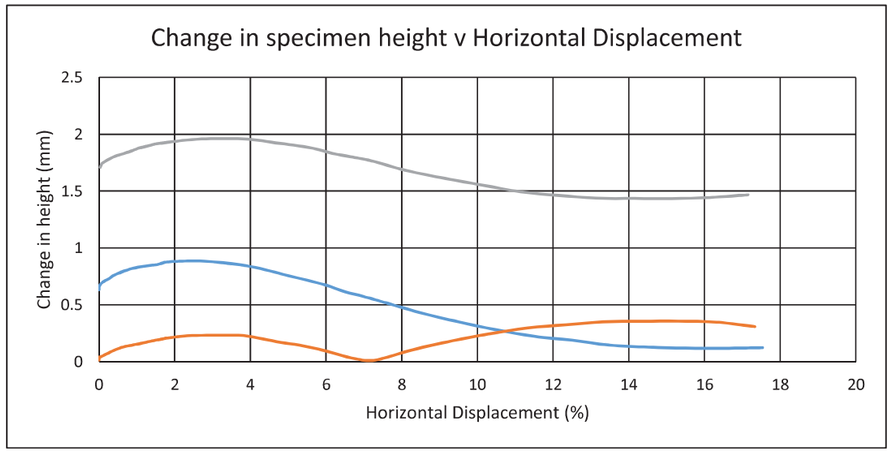
Small Shearbox Apparatus BS1377:Part 7:1990, Clause 4

Contract: Priorsland Carrickmines — Contract No. 21319

Location: TP16 @ 1.5m — Sample No. 80670

Report No. R97027





Results relate to the specimen tested.	Approved by	Date	
Approved signatories ☐ J Barrett (Quality Manager) ☐ H Byrne (Laboratory Manager)		20/12/18	Page 2 of 2

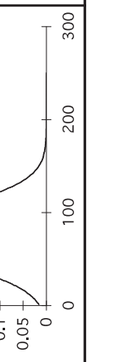
(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Priorsland, Carrickmines, Dublin 18 — Sample Type: Core

Contract no. 21319 — Date of test: 11/12/18

RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC01	6.1	78	20.0	1.222	3.29	4.02	80	d	//
	7.8	78	12.0	1.222	1.97	2.41	48	d	//
	8.8	78	4.0	1.222	0.66	0.80	16	d	//
	10.9	78	22.0	1.222	3.62	4.42	88	d	//
	11.7	78	15.0	1.222	2.47	3.01	60	d	//
	13.8	78	19.0	1.222	3.12	3.81	76	d	//
RC02	6.3	78	11.0	1.222	1.81	2.21	44	d	//
	7.6	78	18.0	1.222	2.96	3.61	72	d	//
	10.7	78	22.0	1.222	3.62	4.42	88	d	//
	13.4	78	20.0	1.222	3.29	4.02	80	d	//
RC03	7.2	78	28.0	1.222	4.60	5.62	112	d	//
	8.4	78	31.0	1.222	5.10	6.22	124	d	//
	9.9	78	8.0	1.222	1.31	1.61	32	d	//
	11.8	78	22.0	1.222	3.62	4.42	88	d	//
	12.3	78	21.0	1.222	3.45	4.22	84	d	//
	14.6	78	26.0	1.222	4.27	5.22	104	d	//
	14.8	78	11.0	1.222	1.81	2.21	44	d	//
RC04	5.1	78	6.0	1.222	0.99	1.20	24	d	//
	7.8	78	10.0	1.222	1.64	2.01	40	d	//
	9.2	78	18.0	1.222	2.96	3.61	72	d	//
	10.6	78	22.0	1.222	3.62	4.42	88	d	//
	10.8	78	19.0	1.222	3.12	3.81	76	d	//
	13.2	78	30.0	1.222	4.93	6.02	120	d	//
	13.4	78	28.0	1.222	4.60	5.62	112	d	//
	14.4	78	27.0	1.222	4.44	5.42	108	d	//

*UCS Normal Distribution Curve



Abbreviations

i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	25	25
Minimum	0.80	16
Average	3.77	75
Maximum	6.22	124
Standard Dev.	1.52	30
Upper 95% Confidence Limit	6.75	135.00
Lower 95% Confidence Limit	0.80	15.98

Comments:

*UCS taken as k x Point Load Is(50): k= 20

Appendix 7 Laboratory Test Results (Environmental)

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING 2183

Final Report

Report No.:	18-37578-1
Initial Date of Issue:	06-Dec-2018
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	21319 Priorsland Carrickmines Dublin

Quotation No.:		**Date Received:**	29-Nov-2018
Order No.:		**Date Instructed:**	29-Nov-2018
No. of Samples:	30		
Turnaround (Wkdays):	5	**Results Due:**	05-Dec-2018
Date Approved:	06-Dec-2018		

Approved By:

Details: Martin Dyer, Laboratory Manager

Chemtest
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Results - Leachate

Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL			Chemtest Job No.:		18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578
Quotation No.:			Chemtest Sample ID.:		733240	733242	733244	733246	733247	733249	733250	733251	733252	733253	733254	733256	733258
			Sample Location:		BH2	BH5	BH7	BH8	BH1A	BH3	BH4	BH6	BHRC2	BHRC3	BHRC4	TP2	TP9
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	1.00	0.50	0.50	1.00	0.50	1.00	1.00	1.00	1.00	1.00	0.60	0.70
Determinand	**Accred.**	**SOP**	**Units**	**LOD**													
Ammonium	U	1220	mg/l	0.050	0.22	0.11	0.22	0.076	0.15	0.11	0.077	0.17	0.11	0.19	0.17	0.58	0.16
Ammonium	N	1220	mg/kg	0.10	2.2	1.1	2.2	0.76	1.5	1.1	0.77	1.7	1.1	1.9	1.7	5.8	1.6
Boron (Dissolved)	U	1450	µg/l	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Boron (Dissolved)	U	1450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

Chemtest
The right chemistry to deliver results

Results - Leachate

Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL			Chemtest Job No.:		18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578
Quotation No.:			Chemtest Sample ID.:		733260	733261	733263	733265	733267	733268	733269
			Sample Location:		TP16	TP21	TP24	TP29	TP33	TP36	TP37
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.70	0.60	0.60	0.60	0.60	0.60	0.60
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
Ammonium	U	1220	mg/l	0.050	0.20	0.16	0.13	0.090	0.14	0.088	0.14
Ammonium	N	1220	mg/kg	0.10	2.0	1.6	1.3	0.90	1.4	0.88	1.4
Boron (Dissolved)	U	1450	µg/l	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Boron (Dissolved)	U	1450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL				Chemtest Job No.:	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578
Quotation No.:				Chemtest Sample ID.:	733240	733241	733242	733243	733244	733245	733246	733247	733248
				Sample Location:	BH2	BH3	BH5	BH5	BH7	BH7	BH8	BH1A	BH1A
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	1.00	1.00	2.00	0.50	2.00	0.50	1.00	2.00
				Asbestos Lab:	COVENTRY		COVENTRY		COVENTRY		COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-		-		-		-	-	
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	
Moisture	N	2030	%	0.020	5.3	18	13	7.6	31	9.5	23	11	11
pH	U	2010		N/A		[A] 8.1		[A] 8.6		[A] 8.7			[A] 8.6
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40		< 0.40		0.52		< 0.40	< 0.40	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		< 0.010		< 0.010		< 0.010			< 0.010
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 6.5		[A] < 1.0		[A] 25		[A] 1.8	[A] < 1.0	
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50		[A] < 0.50		[A] < 0.50		[A] < 0.50	[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 44		[A] 1.6		[A] 13		[A] 2.1	[A] 2.8	
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.028		[A] < 0.010		[A] 0.084		[A] < 0.010	[A] 0.011	
Arsenic	U	2450	mg/kg	1.0	14		33		11		23	34	
Barium	U	2450	mg/kg	10	36		36		55		61	34	
Cadmium	U	2450	mg/kg	0.10	0.85		0.84		1.5		0.58	1.1	
Chromium	U	2450	mg/kg	1.0	9.2		19		13		28	8.2	
Molybdenum	U	2450	mg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	< 2.0	
Antimony	N	2450	mg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	< 2.0	
Copper	U	2450	mg/kg	0.50	8.1		13		13		12	9.0	
Mercury	U	2450	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Nickel	U	2450	mg/kg	0.50	14		29		23		36	19	
Lead	U	2450	mg/kg	0.50	11		15		22		25	9.0	
Selenium	U	2450	mg/kg	0.20	0.24		0.28		1.1		0.95	0.31	
Zinc	U	2450	mg/kg	0.50	40		62		50		56	36	
Chromium (Trivalent)	N	2490	mg/kg	1.0	9.2		19		13		28	8.2	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	< 0.50	
Fraction of Organic Carbon	U	2625		0.0010	[A] 0.0077		[A] 0.0044		[A] 0.020		[A] 0.0052	[A] 0.0037	
Total Organic Carbon	U	2625	%	0.20	[A] 0.77		[A] 0.44		[A] 2.0		[A] 0.52	[A] 0.37	
Mineral Oil	N	2670	mg/kg	10	< 10		< 10		< 10		< 10	< 10	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0		[A] < 5.0		[A] < 5.0		[A] < 5.0	[A] < 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	

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Results - Soil

Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL				Chemtest Job No.:	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578
Quotation No.:				Chemtest Sample ID.:	733240	733241	733242	733243	733244	733245	733246	733247	733248
				Sample Location:	BH2	BH3	BH5	BH5	BH7	BH7	BH8	BH1A	BH1A
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	1.00	1.00	2.00	0.50	2.00	0.50	1.00	2.00
				Asbestos Lab:	COVENTRY		COVENTRY		COVENTRY		COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0		[A] < 5.0		[A] < 5.0		[A] < 5.0	[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10		[A] < 10		[A] < 10		[A] < 10	[A] < 10	
Benzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Toluene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0	
Naphthalene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Acenaphthene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Fluorene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Phenanthrene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Anthracene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Fluoranthene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Pyrene	U	2800	mg/kg	0.10	< 0.10		0.13		< 0.10		< 0.10	< 0.10	
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Chrysene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Coronene	N	2800	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0		< 2.0		< 2.0		< 2.0	< 2.0	
PCB 28	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 52	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 90+101	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 118	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 153	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 138	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 180	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	[A] < 0.10		[A] < 0.10		[A] < 0.10		[A] < 0.10	[A] < 0.10	
Total Phenols	U	2920	mg/kg	0.30	< 0.30		< 0.30		< 0.30		< 0.30	< 0.30	

Chemtest
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Results - Soil

Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL				**Chemtest Job No.:**	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578
Quotation No.:				**Chemtest Sample ID.:**	733249	733250	733251	733252	733253	733254	733255	733256	733257
				Sample Location:	BH3	BH4	BH6	BHRC2	BHRC3	BHRC4	TP1	TP2	TP5
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.00	1.00	1.00	1.00	1.00	1.40	0.60	1.00
				Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-	-	-	-		-	
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	
Moisture	N	2030	%	0.020	19	20	17	17	16	16	14	6.7	20
pH	U	2010		N/A							[A] 8.0		[A] 7.7
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40		< 0.40	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010						< 0.010	< 0.010		< 0.010
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 5.3	[A] 2.6	[A] 2.4	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] 1.8	
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50		[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 2.9	[A] 2.8	[A] 2.3	[A] 8.9	[A] 0.91	[A] 1.6		[A] < 0.50	
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.048	[A] 0.018	[A] 0.025	[A] 0.018	[A] < 0.010	[A] 0.038		[A] 0.025	
Arsenic	U	2450	mg/kg	1.0	29	14	46	14	15	18		14	
Barium	U	2450	mg/kg	10	91	81	110	32	36	77		42	
Cadmium	U	2450	mg/kg	0.10	1.9	1.0	2.1	0.99	0.48	1.7		1.2	
Chromium	U	2450	mg/kg	1.0	21	24	18	16	17	27		11	
Molybdenum	U	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		< 2.0	
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		< 2.0	
Copper	U	2450	mg/kg	0.50	9.8	16	16	14	12	13		6.9	
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Nickel	U	2450	mg/kg	0.50	25	34	39	28	26	28		13	
Lead	U	2450	mg/kg	0.50	21	20	19	19	19	25		12	
Selenium	U	2450	mg/kg	0.20	0.71	0.28	0.24	1.3	< 0.20	0.46		0.35	
Zinc	U	2450	mg/kg	0.50	50	48	48	46	44	56		32	
Chromium (Trivalent)	N	2490	mg/kg	1.0	21	24	18	16	17	27		11	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	
Fraction of Organic Carbon	U	2625		0.0010	[A] 0.0092	[A] 0.0071	[A] 0.0035	[A] 0.0057	[A] 0.0030	[A] 0.0096		[A] 0.0062	
Total Organic Carbon	U	2625	%	0.20	[A] 0.92	[A] 0.71	[A] 0.35	[A] 0.57	[A] 0.30	[A] 0.96		[A] 0.62	
Mineral Oil	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10		< 10	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0		[A] < 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	

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Results - Soil

Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL				**Chemtest Job No.:**	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578
Quotation No.:				**Chemtest Sample ID.:**	733249	733250	733251	733252	733253	733254	733255	733256	733257
				Sample Location:	BH3	BH4	BH6	BHRC2	BHRC3	BHRC4	TP1	TP2	TP5
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.00	1.00	1.00	1.00	1.00	1.40	0.60	1.00
				Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0		[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10		[A] < 10	
Benzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Toluene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0	
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		< 2.0	
PCB 28	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	
PCB 52	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	
PCB 90+101	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	
PCB 118	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	
PCB 153	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	
PCB 138	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	
PCB 180	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10		[A] < 0.10	
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30		< 0.30	

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Results - Soil

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Client: IGSL				Chemtest Job No.:	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578
Quotation No.:				Chemtest Sample ID.:	733258	733259	733260	733261	733262	733263	733264	733265	733266
				Sample Location:	TP9	TP13	TP16	TP21	TP22	TP24	TP24	TP29	TP29
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.70	0.60	0.70	0.60	1.00	0.60	1.00	0.60	1.40
				Asbestos Lab:	COVENTRY		COVENTRY	COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-		-	-		-		-	
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	
Moisture	N	2030	%	0.020	33	12	13	17	18	15	53	22	13
pH	U	2010		N/A		[A] 7.2			[A] 7.1		[A] 6.4		[A] 8.4
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40		< 0.40	< 0.40		< 0.40		< 0.40	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		< 0.010			< 0.010		0.77		< 0.010
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 1.9		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] 1.1	
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50		[A] < 0.50	[A] < 0.50		[A] < 0.50		[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 1.3		[A] < 0.50	[A] < 0.50		[A] 5.5		[A] < 0.50	
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.062		[A] 0.012	[A] < 0.010		[A] < 0.010		[A] 0.013	
Arsenic	U	2450	mg/kg	1.0	1.8		11	8.3		25		31	
Barium	U	2450	mg/kg	10	38		51	47		51		150	
Cadmium	U	2450	mg/kg	0.10	2.4		1.3	1.1		1.1		0.33	
Chromium	U	2450	mg/kg	1.0	14		19	18		15		22	
Molybdenum	U	2450	mg/kg	2.0	< 2.0		< 2.0	< 2.0		< 2.0		4.0	
Antimony	N	2450	mg/kg	2.0	< 2.0		< 2.0	< 2.0		< 2.0		< 2.0	
Copper	U	2450	mg/kg	0.50	9.2		11	12		11		4.9	
Mercury	U	2450	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Nickel	U	2450	mg/kg	0.50	11		27	28		23		24	
Lead	U	2450	mg/kg	0.50	13		18	14		15		16	
Selenium	U	2450	mg/kg	0.20	2.2		0.35	0.33		< 0.20		0.47	
Zinc	U	2450	mg/kg	0.50	25		42	40		33		36	
Chromium (Trivalent)	N	2490	mg/kg	1.0	14		19	18		15		22	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50	< 0.50		< 0.50		< 0.50	
Fraction of Organic Carbon	U	2625		0.0010	[A] 0.026		[A] 0.0039	[A] 0.0037		[A] 0.0023		[A] 0.0062	
Total Organic Carbon	U	2625	%	0.20	[A] 2.6		[A] 0.39	[A] 0.37		[A] 0.23		[A] 0.62	
Mineral Oil	N	2670	mg/kg	10	< 10		< 10	< 10		< 10		< 10	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0		[A] < 5.0	[A] < 5.0		[A] < 5.0		[A] < 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	

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Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL				Chemtest Job No.:	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578	18-37578
Quotation No.:				Chemtest Sample ID.:	733258	733259	733260	733261	733262	733263	733264	733265	733266
				Sample Location:	TP9	TP13	TP16	TP21	TP22	TP24	TP24	TP29	TP29
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.70	0.60	0.70	0.60	1.00	0.60	1.00	0.60	1.40
				Asbestos Lab:	COVENTRY		COVENTRY	COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0		[A] < 5.0	[A] < 5.0		[A] < 5.0		[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10		[A] < 10	[A] < 10		[A] < 10		[A] < 10	
Benzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Toluene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	
Naphthalene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Acenaphthene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Fluorene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Phenanthrene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Anthracene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Fluoranthene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Pyrene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Chrysene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Coronene	N	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10		< 0.10	
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0		< 2.0	< 2.0		< 2.0		< 2.0	
PCB 28	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	
PCB 52	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	
PCB 90+101	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	
PCB 118	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	
PCB 153	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	
PCB 138	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	
PCB 180	U	2815	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	[A] < 0.10		[A] < 0.10	[A] < 0.10		[A] < 0.10		[A] < 0.10	
Total Phenols	U	2920	mg/kg	0.30	< 0.30		< 0.30	< 0.30		< 0.30		< 0.30	

Results - Soil

Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL			Chemtest Job No.:		18-37578	18-37578	18-37578
Quotation No.:			Chemtest Sample ID.:		733267	733268	733269
			Sample Location:		TP33	TP36	TP37
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.60	0.60	0.60
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	14	12	12
pH	U	2010		N/A			
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 3.7	[A] < 1.0	[A] 1.7
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 2.1	[A] < 0.50	[A] 9.8
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.013	[A] < 0.010	[A] < 0.010
Arsenic	U	2450	mg/kg	1.0	3.0	7.1	24
Barium	U	2450	mg/kg	10	40	71	55
Cadmium	U	2450	mg/kg	0.10	0.12	1.2	1.1
Chromium	U	2450	mg/kg	1.0	16	20	20
Molybdenum	U	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	3.2
Copper	U	2450	mg/kg	0.50	3.2	13	19
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	7.5	29	39
Lead	U	2450	mg/kg	0.50	10	19	20
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	19	44	56
Chromium (Trivalent)	N	2490	mg/kg	1.0	16	20	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Fraction of Organic Carbon	U	2625		0.0010	[A] 0.0038	[A] 0.0027	[A] 0.0047
Total Organic Carbon	U	2625	%	0.20	[A] 0.38	[A] 0.27	[A] 0.47
Mineral Oil	N	2670	mg/kg	10	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 21319 Priorsland Carrickmines Dublin

Client: IGSL			Chemtest Job No.:		18-37578	18-37578	18-37578
Quotation No.:			Chemtest Sample ID.:		733267	733268	733269
			Sample Location:		TP33	TP36	TP37
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.60	0.60	0.60
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 52	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 90+101	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 118	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 153	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 138	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 180	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30

Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733240 **Sample Ref:** **Sample ID:** **Sample Location:** BH2 **Top Depth(m):** 1.00 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.77	3	5	6
Loss On Ignition	2610	U	%	1.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.047	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0020	< 0.050	0.5	2	25
Barium	1450	U	0.0036	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0014	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0015	< 0.050	0.5	10	30
Nickel	1450	U	0.0014	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0025	< 0.50	4	50	200
Chloride	1220	U	2.3	23	800	15000	25000
Fluoride	1220	U	0.18	1.8	10	150	500
Sulphate	1220	U	16	160	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	16	160	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	5.3

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.

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Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733242 **Sample Ref:** **Sample ID:** **Sample Location:** BH5 **Top Depth(m):** 1.00 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.44	3	5	6
Loss On Ignition	2610	U	%	1.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.22	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0013	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0011	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	3.7	37	800	15000	25000
Fluoride	1220	U	0.32	3.2	10	150	500
Sulphate	1220	U	2.8	28	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	13	130	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	13

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-37578						
Chemtest Sample ID:	733244						
Sample Ref:							
Sample ID:							
Sample Location:	BH7						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 2.0	3	5	6
Loss On Ignition	2610	U	%	4.9	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.018	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0067	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0023	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	2.8	28	800	15000	25000
Fluoride	1220	U	0.22	2.2	10	150	500
Sulphate	1220	U	21	210	1000	20000	50000
Total Dissolved Solids	1020	N	98	960	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.4	54	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	31

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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-37578						
Chemtest Sample ID:	733246						
Sample Ref:							
Sample ID:							
Sample Location:	BH8						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.52	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.022	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0039	< 0.050	0.5	2	25
Barium	1450	U	0.0039	< 0.50	20	100	300
Cadmium	1450	U	0.00013	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0020	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0068	0.068	0.4	10	40
Lead	1450	U	0.0049	0.049	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0011	0.011	0.1	0.5	7
Zinc	1450	U	0.0067	< 0.50	4	50	200
Chloride	1220	U	2.2	22	800	15000	25000
Fluoride	1220	U	0.20	2.0	10	150	500
Sulphate	1220	U	7.0	70	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	100	1000	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	23

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733247 **Sample Ref:** **Sample ID:** **Sample Location:** BH1A **Top Depth(m):** 1.00 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.37	3	5	6
Loss On Ignition	2610	U	%	1.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.040	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	< 0.0010	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0017	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.0	10	800	15000	25000
Fluoride	1220	U	0.20	2.0	10	150	500
Sulphate	1220	U	5.3	53	1000	20000	50000
Total Dissolved Solids	1020	N	26	260	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	60	600	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733249 **Sample Ref:** **Sample ID:** **Sample Location:** BH3 **Top Depth(m):** 0.50 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.92	3	5	6
Loss On Ignition	2610	U	%	3.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.031	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0018	< 0.050	0.5	2	25
Barium	1450	U	0.0013	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0012	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	4.1	41	1000	20000	50000
Total Dissolved Solids	1020	N	47	470	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	64	640	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	19

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733250 **Sample Ref:** **Sample ID:** **Sample Location:** BH4 **Top Depth(m):** 1.00 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.71	3	5	6
Loss On Ignition	2610	U	%	3.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.042	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0022	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.0	10	800	15000	25000
Fluoride	1220	U	0.33	3.3	10	150	500
Sulphate	1220	U	2.2	22	1000	20000	50000
Total Dissolved Solids	1020	N	38	380	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	16	160	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	20

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.

Chemtest
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Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733251 **Sample Ref:** **Sample ID:** **Sample Location:** BH6 **Top Depth(m):** 1.00 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.35	3	5	6
Loss On Ignition	2610	U	%	2.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.032	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0015	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0026	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.3	13	800	15000	25000
Fluoride	1220	U	0.39	3.9	10	150	500
Sulphate	1220	U	10	100	1000	20000	50000
Total Dissolved Solids	1020	N	85	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	88	880	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	17

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733252 **Sample Ref:** **Sample ID:** **Sample Location:** BHRC2 **Top Depth(m):** 1.00 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.57	3	5	6
Loss On Ignition	2610	U	%	1.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.040	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0036	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0022	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0015	0.015	0.06	0.7	5
Selenium	1450	U	0.0024	0.024	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.8	18	800	15000	25000
Fluoride	1220	U	0.24	2.4	10	150	500
Sulphate	1220	U	11	110	1000	20000	50000
Total Dissolved Solids	1020	N	85	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	59	590	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	17

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.

Chemtest
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Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733253 **Sample Ref:** **Sample ID:** **Sample Location:** BHRC3 **Top Depth(m):** 1.00 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.30	3	5	6
Loss On Ignition	2610	U	%	1.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.046	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0057	0.057	0.5	2	25
Barium	1450	U	0.0014	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0018	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0064	0.064	0.4	10	40
Lead	1450	U	0.0020	0.020	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0026	< 0.50	4	50	200
Chloride	1220	U	2.1	21	800	15000	25000
Fluoride	1220	U	0.30	3.0	10	150	500
Sulphate	1220	U	5.4	54	1000	20000	50000
Total Dissolved Solids	1020	N	29	290	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	59	590	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	16

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733254 **Sample Ref:** **Sample ID:** **Sample Location:** BHRC4 **Top Depth(m):** 1.00 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.96	3	5	6
Loss On Ignition	2610	U	%	3.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		6.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.051	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0026	< 0.050	0.5	2	25
Barium	1450	U	0.0026	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0014	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0026	< 0.050	0.4	10	40
Lead	1450	U	0.0013	0.013	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0023	< 0.50	4	50	200
Chloride	1220	U	1.2	12	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	9.4	94	1000	20000	50000
Total Dissolved Solids	1020	N	38	380	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	64	640	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	16

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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733256 **Sample Ref:** **Sample ID:** **Sample Location:** TP2 **Top Depth(m):** 0.60 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.62	3	5	6
Loss On Ignition	2610	U	%	2.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.036	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0036	< 0.050	0.5	2	25
Barium	1450	U	0.0041	< 0.50	20	100	300
Cadmium	1450	U	0.00013	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0024	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0025	< 0.050	0.4	10	40
Lead	1450	U	0.0014	0.014	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0034	< 0.50	4	50	200
Chloride	1220	U	1.1	11	800	15000	25000
Fluoride	1220	U	0.30	3.0	10	150	500
Sulphate	1220	U	1.8	18	1000	20000	50000
Total Dissolved Solids	1020	N	42	420	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	63	630	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.7

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-37578						
Chemtest Sample ID:	733258						
Sample Ref:							
Sample ID:							
Sample Location:	TP9						
Top Depth(m):	0.70						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 2.6	3	5	6
Loss On Ignition	2610	U	%	8.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.049	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0014	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0025	0.025	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	2.4	24	800	15000	25000
Fluoride	1220	U	0.15	1.5	10	150	500
Sulphate	1220	U	2.6	26	1000	20000	50000
Total Dissolved Solids	1020	N	41	400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	17	170	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	33

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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-37578						
Chemtest Sample ID:	733260						
Sample Ref:							
Sample ID:							
Sample Location:	TP16						
Top Depth(m):	0.70						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.39	3	5	6
Loss On Ignition	2610	U	%	2.2	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		6.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.039	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0017	< 0.050	0.5	2	25
Barium	1450	U	0.0019	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0012	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0025	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0027	< 0.50	4	50	200
Chloride	1220	U	1.4	14	800	15000	25000
Fluoride	1220	U	0.13	1.3	10	150	500
Sulphate	1220	U	4.2	42	1000	20000	50000
Total Dissolved Solids	1020	N	29	290	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	90	900	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	13

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-37578						
Chemtest Sample ID:	733261						
Sample Ref:							
Sample ID:							
Sample Location:	TP21						
Top Depth(m):	0.60						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.37	3	5	6
Loss On Ignition	2610	U	%	1.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.045	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0011	< 0.050	0.5	2	25
Barium	1450	U	0.0017	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0018	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0015	< 0.50	4	50	200
Chloride	1220	U	1.6	16	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	2.9	29	1000	20000	50000
Total Dissolved Solids	1020	N	44	440	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	69	690	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	17

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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-37578						
Chemtest Sample ID:	733263						
Sample Ref:							
Sample ID:							
Sample Location:	TP24						
Top Depth(m):	0.60						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.23	3	5	6
Loss On Ignition	2610	U	%	1.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.077	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0010	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.27	2.7	10	150	500
Sulphate	1220	U	1.3	13	1000	20000	50000
Total Dissolved Solids	1020	N	61	600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	14	140	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	15

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733265 **Sample Ref:** **Sample ID:** **Sample Location:** TP29 **Top Depth(m):** 0.60 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.62	3	5	6
Loss On Ignition	2610	U	%	5.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		6.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.059	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0018	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.52	5.2	10	150	500
Sulphate	1220	U	3.3	33	1000	20000	50000
Total Dissolved Solids	1020	N	72	710	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	89	890	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	22

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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

Chemtest Job No: 18-37578 **Chemtest Sample ID:** 733267 **Sample Ref:** **Sample ID:** **Sample Location:** TP33 **Top Depth(m):** 0.60 **Bottom Depth(m):** **Sampling Date:**					**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.38	3	5	6
Loss On Ignition	2610	U	%	1.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.047	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0012	< 0.050	0.5	2	25
Barium	1450	U	0.0061	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	0.0013	0.013	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.9	19	800	15000	25000
Fluoride	1220	U	0.18	1.8	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	46	450	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	19	190	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

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 - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-37578						
Chemtest Sample ID:	733268						
Sample Ref:							
Sample ID:							
Sample Location:	TP36						
Top Depth(m):	0.60						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.27	3	5	6
Loss On Ignition	2610	U	%	1.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.051	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0063	0.063	0.5	2	25
Barium	1450	U	0.0032	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0048	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0090	0.090	0.4	10	40
Lead	1450	U	0.0035	0.035	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.011	< 0.50	4	50	200
Chloride	1220	U	1.2	12	800	15000	25000
Fluoride	1220	U	0.43	4.3	10	150	500
Sulphate	1220	U	6.4	64	1000	20000	50000
Total Dissolved Solids	1020	N	31	310	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.8	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 21319 Priorsland Carrickmines Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-37578						
Chemtest Sample ID:	733269						
Sample Ref:							
Sample ID:							
Sample Location:	TP37						
Top Depth(m):	0.60						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.47	3	5	6
Loss On Ignition	2610	U	%	2.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.065	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0023	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0015	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.3	13	800	15000	25000
Fluoride	1220	U	0.40	4.0	10	150	500
Sulphate	1220	U	2.2	22	1000	20000	50000
Total Dissolved Solids	1020	N	47	470	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	16	160	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

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.

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:
733240			BH2		A	Amber Glass 250ml
733240			BH2		A	Amber Glass 60ml
733241			BH3		A	Amber Glass 250ml
733242			BH5		A	Amber Glass 250ml
733242			BH5		A	Amber Glass 60ml
733243			BH5		A	Amber Glass 250ml
733244			BH7		A	Amber Glass 250ml
733244			BH7		A	Amber Glass 60ml
733245			BH7		A	Amber Glass 250ml
733246			BH8		A	Amber Glass 250ml
733246			BH8		A	Amber Glass 60ml
733247			BH1A		A	Amber Glass 250ml
733247			BH1A		A	Amber Glass 60ml
733248			BH1A		A	Amber Glass 250ml
733249			BH3		A	Amber Glass 250ml
733249			BH3		A	Amber Glass 60ml
733250			BH4		A	Amber Glass 250ml
733250			BH4		A	Amber Glass 60ml
733251			BH6		A	Amber Glass 250ml
733251			BH6		A	Amber Glass 60ml
733252			BHRC2		A	Amber Glass 250ml
733252			BHRC2		A	Amber Glass 60ml

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:
733253			BHRC3		A	Amber Glass 250ml
733253			BHRC3		A	Amber Glass 60ml
733254			BHRC4		A	Amber Glass 250ml
733254			BHRC4		A	Amber Glass 60ml
733255			TP1		A	Amber Glass 250ml
733256			TP2		A	Amber Glass 250ml
733256			TP2		A	Amber Glass 60ml
733257			TP5		A	Amber Glass 250ml
733258			TP9		A	Amber Glass 250ml
733258			TP9		A	Amber Glass 60ml
733259			TP13		A	Amber Glass 250ml
733260			TP16		A	Amber Glass 250ml
733260			TP16		A	Amber Glass 60ml
733261			TP21		A	Amber Glass 250ml
733261			TP21		A	Amber Glass 60ml
733262			TP22		A	Amber Glass 250ml
733263			TP24		A	Amber Glass 250ml
733263			TP24		A	Amber Glass 60ml
733264			TP24		A	Amber Glass 250ml
733265			TP29		A	Amber Glass 250ml
733265			TP29		A	Amber Glass 60ml

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:
733266			TP29		A	Amber Glass 250ml
733267			TP33		A	Amber Glass 250ml
733267			TP33		A	Amber Glass 60ml
733268			TP36		A	Amber Glass 250ml
733268			TP36		A	Amber Glass 60ml
733269			TP37		A	Amber Glass 250ml
733269			TP37		A	Amber Glass 60ml

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.
1450	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.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
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.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
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.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
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
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

Test Methods

SOP	Title	Parameters included	Method summary
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.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	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-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching)	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"

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

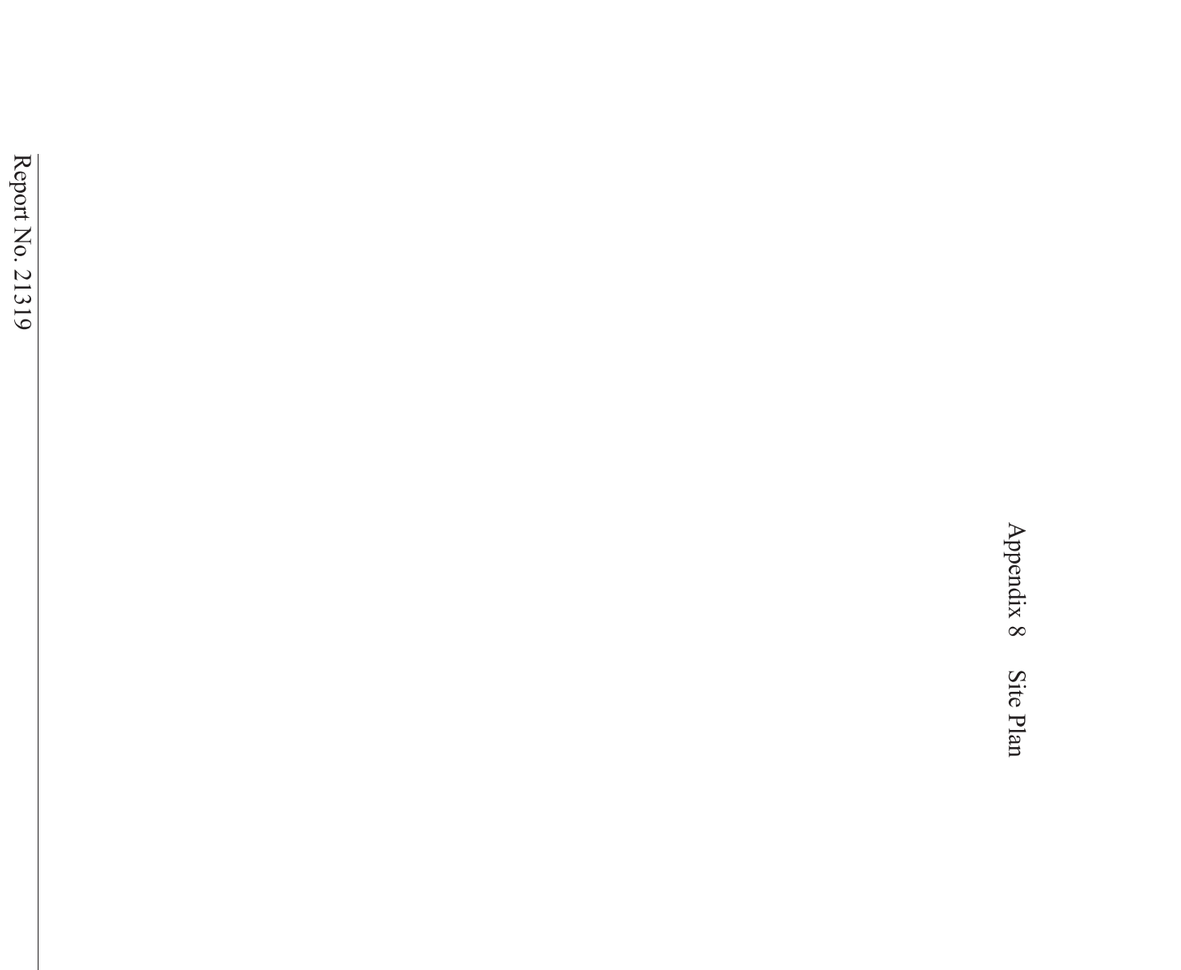
A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

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

Appendix 8 Site Plan



PROPOSED SITE INVESTIGATION

LEGEND

- Trial Pit Location
- Bore Hole Location — BH01
- Rotary Core Location — RC01
- Stand Pipe Location — SP01
- Soakaway Test — SC01
- Approx. Site Boundary

NOTES FOR SITE INVESTIGATION WORKS OPTION 2:

1. SITE AREA = APPROX. 8.3ha.
2. TOTAL NUMBER TEST POINTS PROPOSED:
   - 2.1. ROTARY CORES = 4no.
   - 2.2. BOREHOLES = 8no.
   - 2.3. TRIAL PITS = 32no.
   - 2.4. STANDPIPES = 3no.
   - 2.5. SOAKAWAY TESTS = 5no.
3. CONTRACTOR TO REFER TO PUNCH SITE INVESTIGATION SPECIFICATION FOR FURTHER INFORMATION ON WORK REQUIREMENTS, CONTRACTUAL REQUIREMENTS AND HEALTH AND SAFETY REQUIREMENTS.
4. SITE INVESTIGATION CONTRACTOR TO PROVIDE LONGSECTIONS FOR BOREHOLES FOR A-A, B-B, C-C, D-D, 1-1, 2-2 AND 3-3.

COLOUR DRAWING ☒

Date Drawn: SEP 2018
Drawn By: JB
Date Issued:
Issued By:

Rev.	Amendment	By	Date

Client:

Job: RESIDENTIAL DEVELOPMENT PRIORSLANDS CARRICKMINES
Title: PROPOSED REDUCED SITE INVESTIGATION LAYOUT

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Stage: INFORMATION
Scale @ A1: 1:1000
Technician Check: JB
Engineer Check: PC
Approved: PC
Drawing No: 182186-SK005
Rev: IF0

APPENDIX 8.1 TRAFFIC NOISE INWARD NOISE IMPACT ASSESSMENT

PRIORSLAND CHERRYWOOD SHD - ENVIRONMENTAL IMPACT ASSESSMENT REPORT

INTRODUCTION

Planning Permission is currently being sought for a residential development to be located in Priorsland, Dublin that is proposed to be constructed on greenfield lands adjacent to the M50 within the Cherrywood Strategic development zone (SDZ). The development will be located in a relatively high noise level environment due to the long boundary adjacency with the motorway and appropriate consideration must therefore be given to its inward noise impact.

The proposed development is composed of terraced housing units, high rise apartment blocks, village centre facilities and parklands. The SDZ also provides for a primary school on the northern portion of the lands, which is to be developed by the Department of education at a later date. The total area of the site is to be 8.59 hectares.

CLV Consulting Limited has been engaged to conduct an assessment of the likely inward traffic noise impact expected to be experienced by the development and to provide appropriate recommendations for reducing M50 road emissions to acceptable limits in both internal and external development locations.

The following document details the results of an ambient noise survey conducted on development lands, sets out appropriate criteria in respect of both internal and external noise level requirements, provides a detailed account of our assessment and lists the mitigation recommendations that were determined to be required in order to ensure the proposed development minimises potential significant noise impacts from the adjacent M50 motorway.

RECEIVING ENVIRONMENT

An environmental noise survey was conducted in order to quantify the existing noise environment on development lands adjacent to the M50. The survey was conducted in general accordance with ISO 1996-2: 2017: Acoustics - Description, measurement and assessment of environmental noise.

Specific details are set out in the following sections.

Measurement Location

Given that the M50 is the only noise source of any significance located in the vicinity of the residential area of the site, it was desired to conduct noise measurements as close to the motorway as possible with a direct line of sight to the road. Note that only a small portion of the site was accessible due logistical constraints (i.e. livestock in adjacent fields, culverts and fencing), however, the available area was in the vicinity of the residential dwelling facades and, given that the adjacent areas of the motorway are flat and uniform along the entire development boundary length, only one measurement location was required for assessment purposes.

The measurement location was therefore selected to be near the centre of the development's southwestern boundary with the road and roughly in line with the facades of both the nearest house and apartment block to the motorway. At this location, there was a direct line of sight with the road (note that some trees blocked some portions of the motorway visually but were both insignificant and negligible from a noise emissions standpoint).

See Figure A1.

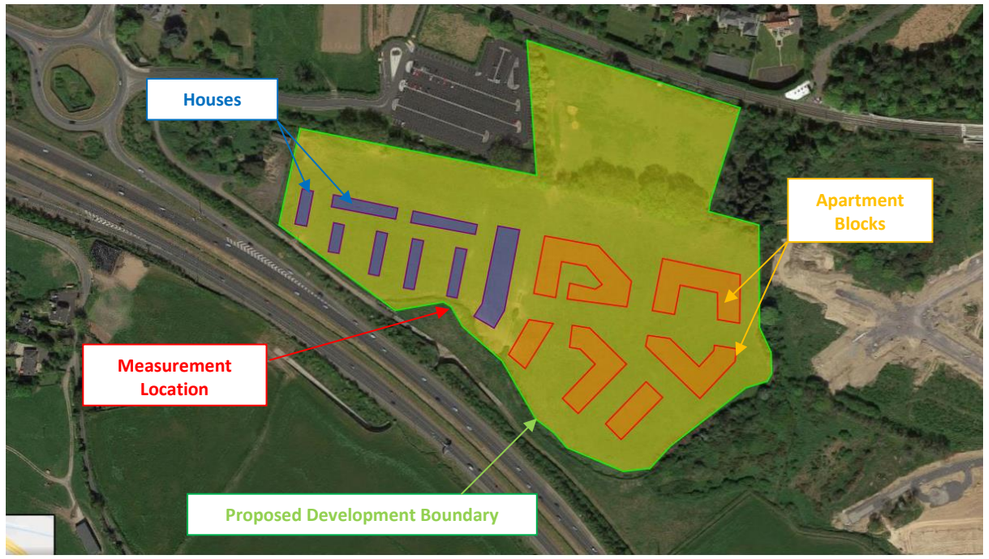

Figure A1 Site Layout Showing Approximate Position of Measurement Location

Survey Periods

Noise measurements were conducted over the course of three survey periods as follows:

- Morning Rush Hour 13:55 to 17:30hrs on 27 September 2018
- Evening Rush Hour 23:00 to 01:45hrs on 26 September 2018
- Night-time 23:00 to 01:45hrs on 26 / 27 September 2018

The morning and evening rush hour measurements were conducted over typical daytime rush hour periods during periods of high traffic volumes on the M50 in order to capture worst case noise levels.

The night-time period measurement period was selected to provide a description of the night time M50 noise during the earliest hours of the night time period.

The meteorological conditions over the course of each survey period are detailed in Table A1 below.

Survey Period	Wind		Temperature °C	Cloud Cover %	Relative Humidity %	Precipitation?
	Speed	Direction				
Morning Rush Hour	5 - 6 m/s	WNW	13	20	84	None.
Evening Rush Hour	4 - 5 m/s	SW	20	10	77	None.
Night Time	2 - 3 m/s	SSW	16	50	86	None.

Table A1 Meteorological Conditions During the Noise Surveys

Personnel & Instrumentation

Brian S. Johnson (CLV) conducted the noise level measurements during all survey periods. He is an internationally experienced acoustic consultant who has been working in the fields of architectural / building acoustics and noise control since 1994. He has been based in America, Europe, Asia and Australia and holds a Certificate of Competence in Environmental Noise Measurements from the Institute of Acoustics.

The measurements were conducted using an NTI Audio Type XL2 Sound Level Meter (Serial #A2A-10989-EO). It was fitted with a 90mm windshield and before and after the survey the measurement apparatus was check calibrated using a Casella Cel 120 Acoustic Calibrator (Serial #3921077). The microphone was positioned approximately 1.4m above the ground.

The calibration certificates for the sound level meter and calibrator are provided at the rear of this document.

Procedure

Measurements were conducted continuously during all three measurement periods. Sample periods for all measurements were 10 minutes in duration. The results were saved to the instrument memory for later analysis. All primary noise sources contributing to noise build-up were also noted.

Measurement Parameters

The statistical noise survey results are presented in terms of the following five parameters:

L_{Aeq} 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.

L_{Amax} is the instantaneous maximum sound level measured during the sample period.

L_{Amin} is the instantaneous minimum sound level measured during the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The “A” suffix denotes the fact that the sound levels have been “A-weighted” in order to account for the non-linear nature of human hearing.

All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

Measurement Results

The survey results for all three measurement periods are summarised in Table A2 below.

Time		Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
Morning Rush Hour	07:30 - 07:40hrs	69	74	65	71	67
	07:40 - 07:50hrs	71	77	66	73	69
	07:50 - 08:00hrs	71	75	66	72	69
	08:00 - 08:10hrs	70	81	66	72	69

	08:10 - 08:20hrs	70	75	64	72	68
	08:20 - 08:30hrs	67	72	63	69	66
	08:30 - 08:40hrs	67	72	61	68	65
	08:40 - 08:50hrs	66	71	62	68	64
	08:50 - 09:00hrs	68	73	62	70	65
	09:00 - 09:10hrs	68	74	60	70	64
	09:10 - 09:20hrs	64	68	56	65	61
	09:20 - 09:30hrs	64	69	60	65	62
	09:30 - 09:40hrs	65	71	59	67	63
Evening Rush Hour	16:00 - 16:10hrs	65	72	58	67	62
	16:10 - 16:20hrs	64	70	57	66	60
	16:20 - 16:30hrs	64	68	58	66	61
	16:30 - 16:40hrs	65	70	59	66	62
	16:40 - 16:50hrs	67	71	58	68	63
	16:50 - 17:00hrs	67	72	62	68	64
	17:00 - 17:10hrs	66	71	61	68	64
	17:10 - 17:20hrs	67	72	62	69	65
	17:20 - 17:30hrs	67	76	61	68	64
	17:30 - 17:40hrs	67	71	61	68	65
	17:40 - 17:50hrs	68	79	62	70	65
	17:50 - 18:00hrs	67	73	62	69	65
	18:00 - 18:10hrs	68	72	62	70	66
Night-time	23:00 - 23:10hrs	62	70	52	65	57
	23:10 - 23:20hrs	64	72	52	67	59
	23:20 - 23:30hrs	64	71	53	66	58
	23:30 - 23:40hrs	63	70	52	66	58
	23:40 - 23:50hrs	64	73	50	67	58
	23:50 - 00:00hrs	63	70	53	66	59
	00:00 - 00:10hrs	62	70	50	65	56

	00:10 - 00:20hrs	63	70	50	66	58
	00:20 - 00:30hrs	62	71	48	65	56
	00:30 - 00:40hrs	62	70	43	65	56
	00:40 - 00:50hrs	61	69	46	65	53
	00:50 - 01:00hrs	62	70	46	65	54
	01:00 - 01:10hrs	62	68	55	65	56

Table A2 Summary of Measured Noise Levels

During all measurement periods, the ambient noise levels in the vicinity of the development were completely dominated by local traffic noise along the M50. The only other noise source of any significance that was identified during the surveys was occasional aircraft flyover noise. However, it was not of a magnitude to have any significant contribution to the noise levels reported in Table A2.

The M50 noise emission measurement results can therefore be summarised as follows:

- Morning rush hour noise levels: 64 - 71dB L_{Aeq} and 65 - 72dB L_{A10}.
- Evening rush hour noise levels: 64 - 68dB L_{Aeq} and 66 - 70dB L_{A10}.
- Night time period noise levels: 61 - 64dB L_{Aeq} and 65 - 67dB L_{A10}.

DEVELOPMENT INTERNAL / EXTERNAL NOISE CRITERIA

External Noise Level Criteria

Guideline criteria for external noise levels in residential gardens / patios can be found in both the **BS 8233 Guidance On Sound Insulation And Noise Reduction For Buildings** and **ProPG: Planning & Noise (Professional Guidance on Planning & Noise For New Residential Developments)** guidance documents. Both of these documents state that ambient noise levels in external residential areas should ideally not be above 50 - 55dB L_{Aeq}.

Given the significantly high ambient noise environment in the vicinity of the development due to the M50, it is acknowledged from the outset of this assessment that these external noise level targets are not likely to be achieved due to the practical limitations of the M50 roadway noise level emissions and the impracticality involved in appropriately attenuating them (without the ability to provide a noise barrier or berm immediately beside the roadway)[1].

Although exceedances of this criteria is naturally not desirable, both the **BS 8233 G** and **ProPG: Planning & Noise** documents recognize that their stated guideline values are not achievable in all instances and that external noise levels in excess of this criteria would not be prohibitive provided additional considerations are made in relation to the development.

From **BS 8233**:

> *'It is recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'*

[1] Note that permission was sought in relation to provision of a noise barrier adjacent to the M50 in the vicinity of the development (which would be far and away the most effective method of traffic noise attenuation). However, these lands are owned by others and permission was refused.

'In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.'

From **ProPG**:

'These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces.'

'Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

- *A relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *A relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or*
- *A relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *A relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).'*

Given the above guidance, the following general approach was developed as the development's external noise level strategy in order to provide an acceptable external ambient noise environment:

- ✓ The 50 - 55dB L_{Aeq} external criteria will be designed for in all instances where it is practically possible to be achieved.
- ✓ Where this external criteria is not achievable, external noise levels will be attenuated as far as practicable.
- ✓ Relatively quiet, publicly accessible, external amenity spaces will be provided that are located within 5min walking distance of all residential spaces in the development.
- ✓ The façade design of all residential spaces will incorporate superior sound insulation glazing / façade elements to achieve a quiet internal acoustic environment that will comply with criteria applicable to low level residential bedroom environments.

Internal Noise Level Criteria

Appropriate guidance for internal noise levels within residential spaces is contained within **BS8233 (2014): Guidance on Sound Insulation and Noise Reduction for Buildings**. This British Standard sets out recommended noise limits for indoor ambient noise levels in residential dwellings / apartments as detailed in Table A3 below.

Activity	Room Type	Design Criterion $L_{Aeq,T}$ (dB)	
		Daytime (07:00 - 23:00hrs)	Night Time (23:00 - 07:00hrs)
Resting / Sleeping Conditions	Living Rooms	35dB $L_{Aeq,16hr}$	-
	Bedrooms	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

Table A3 BS8233 (2014) Recommended Indoor Ambient Noise Levels

The appropriate internal criteria are therefore 35dB L_{Aeq} for daytime periods and 30dB L_{Aeq} for night time periods.

In summary, the following internal noise level criteria would therefore apply to the proposed development:

- Daytime (07:00 to 23:00 hours) 35dB $L_{Aeq,16hr}$
- Night-time (23:00 to 07:00 hours) 30dB $L_{Aeq,8hr}$

EXTERNAL NOISE LEVEL ASSESSMENT

Dwellings

The development houses are located on the western third of the property and consist of forty-seven double and triple storey dwellings. The preferred design option based on the SDZ planning scheme zoning (and the maximising of the number of units with a southerly aspect to the rear) is for the dwellings located along the eastern and southern aspect of the area to be oriented in an east-west facing direction with all rear gardens having a direct view to the M50. The dwellings located along the northern aspect are oriented in a north-south facing direction with all of the rear gardens located on the south side. Almost all of these gardens will also have direct views to the M50.

Given that the predicted level of noise emissions at the various dwelling rear gardens will vary, a computer model was constructed (using CadnaA software) in order to predict the expected ambient noise levels at the various dwelling clusters subsequent to construction completion. Source noise levels for the M50 were calibrated based on both the highest and lowest noise spectrums measured during the daytime periods of the ambient noise survey. The resulting noise level ranges for each garden were then determined for each property.

Given that it was desired to determine the various noise level ranges, a labelled map was provided in lieu of contour mapping. This allowed both the various upper and lower limits of the predicted ranges over the daytime period to be compared with the 50 - 55dB L_{Aeq} criteria. Noise levels that exceeded the criteria are shown in red.

The noise level prediction map is provided in Figure A2 below.

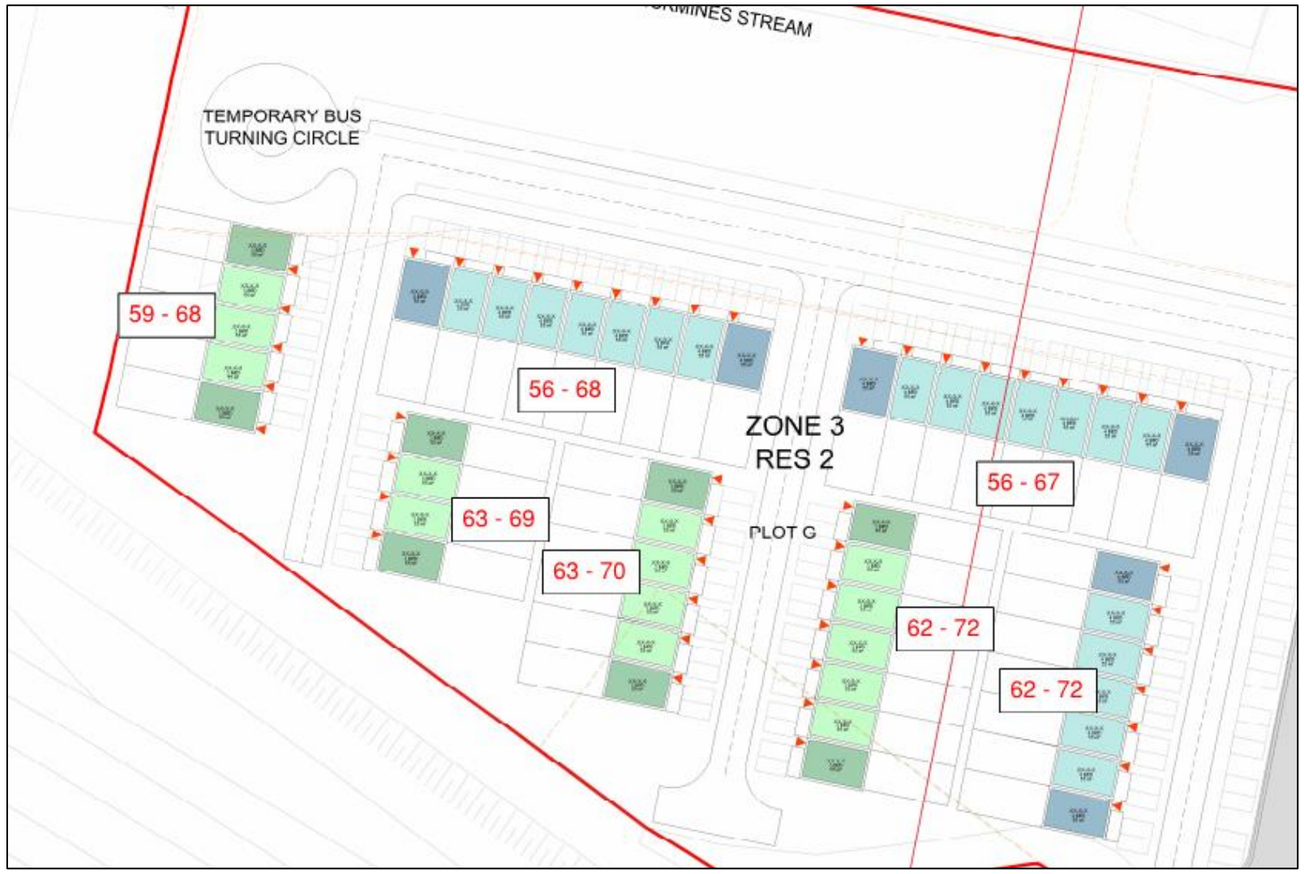

Figure A2 Predicted Ambient Noise Levels For Dwellings (No Attenuation Measures Provided)

As can be seen in Figure A2, all of the predicted ambient noise levels exceed the optimum external design criteria. As expected, this indicates that additional mitigation measures are required.

Given that the M50 is an existing roadway and that permission could not be secured to build on lands adjacent to it, the only practical method of attenuating external ambient noise levels due to M50 road emissions would be to provide sound barrier walls on development lands. A number of different locations were considered for their provision but the location and configuration that was determined to be both the most desirable and effective was as follows:

- A 3m high wall along the full extent of the development southern boundary (in the vicinity of the dwelling zone).

Note that this barrier wall would also provide an additional security benefit as a property boundary wall.

This configuration was modelled and the predicted results are shown in Figure A3 below. Noise levels that were within or below the optimum design criteria range are shown in blue and levels that exceeded the criteria are shown in red.

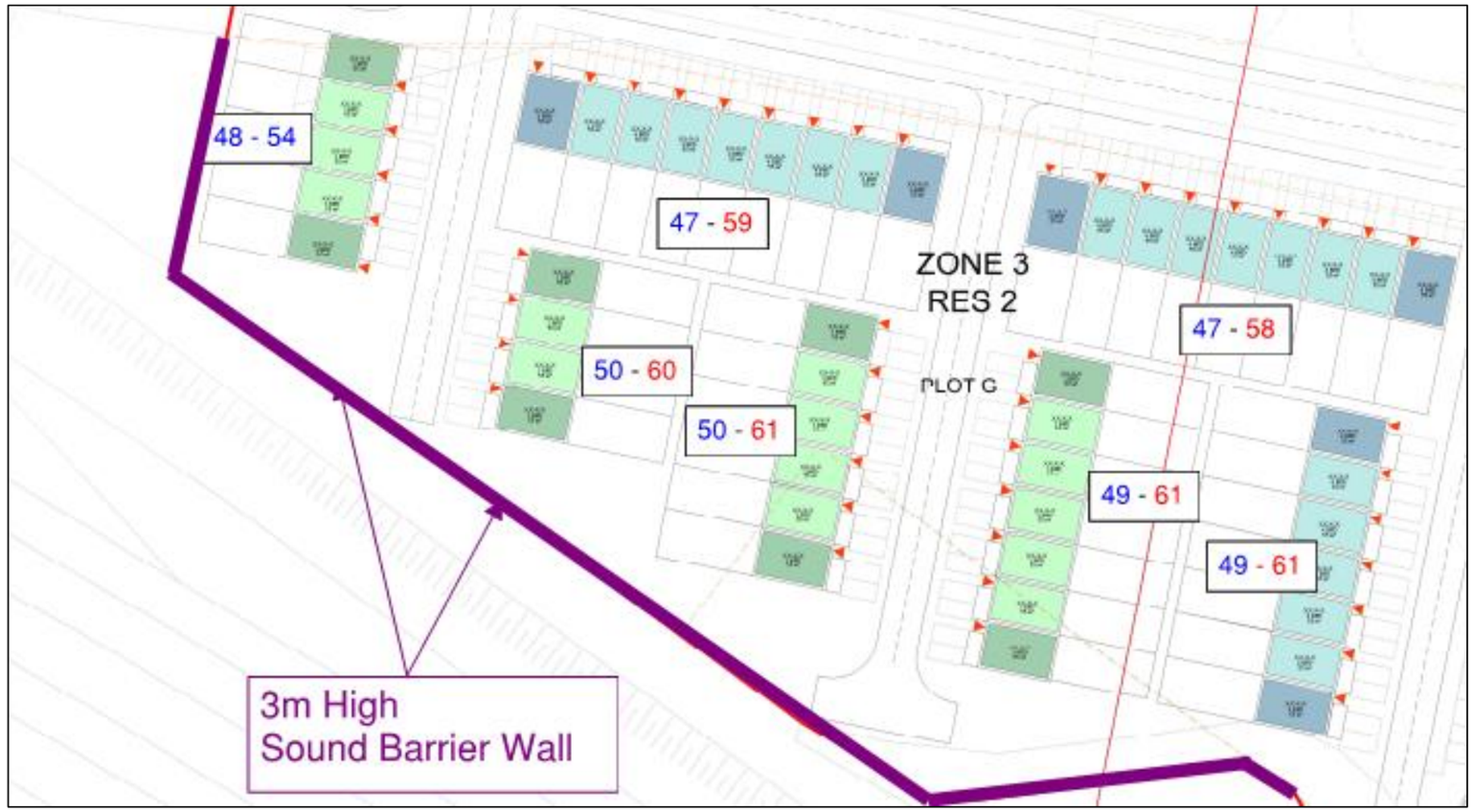

Figure A3 Predicted Ambient Noise Levels With 3m High Barrier Wall Provided Along Property Boundary

As can be seen in Figure A3, ambient noise levels across the development due to M50 noise emissions are significantly reduced with provision of the perimeter sound barrier wall. Although the upper levels in the predicted ranges would still exceed the upper criteria level of 55dB L_{Aeq} in the majority of rear gardens during portions of the daytime period, the exceedances would likely only occur during rush hour periods and would be considered to be both minimal and minimised as far as practicable (note: increases in height of the sound barrier walls would be impractical due to both difficulty and unsightliness as well as the limited additional decrease in noise reduction).

The adopted guidance goals for limiting ambient noise levels in dwelling rear gardens to 50 - 55dB L_{Aeq} where practical and minimised as far as possible where it isn't would therefore be considered to be achieved with provision of the 3m high boundary perimeter sound barrier wall.

In addition to limiting external noise levels in rear gardens, one of the other guidance goals is to provide a 'relatively quiet, protected, publicly accessible, external amenity space' such as a public park within a 5 minute walking distance. As part of the development, linear parklands will extend along the northern boundary immediately adjacent to the development's residential dwelling area and will extend into a dedicated park (Priorsland Park) that will be located at the northeast corner of the development.

See Figure A4 below.

Note that the façade design goal in respect of external ambient noise levels is discussed in Internal Noise Level Assessment section.

Figure A4 Public Parkland Areas Within A 5min Walk of Development Dwelling Area

The parkland areas near the dwelling zone will be located in areas of development lands that are farthest away from the M50 and which will also be well shielded from the motorway by the dwellings and other development buildings themselves. They should serve to provide a relatively quiet amenity area in very close proximity to the dwellings and would therefore adequately fulfil this adopted guidance goal as well.

Apartment Blocks

The apartments (high density housing which conform with the RES 2 and RES 3 densities of the SDZ planning scheme)) are located on the eastern half of the property and will locate in six multi-storey tower blocks. The apartment blocks are expected to be five storeys in height (typically) with a combination of surface, podium and underground level car parking facilities.

The architectural design strategy is for the blocks to be constructed in various geometrical shapes with four blocks forming central areas that have private open spaces opening directly onto central courtyard communal open spaces and two blocks being linear blocks with no courtyard spaces. Some of the courtyard blocks (Block E1/E2) will have central communal open areas with a direct view to the M50. The central areas of Blocks C & E will be elevated above ground level podium parking. The remaining blocks will be located at ground level or slightly above (i.e. ≈0.5m).

See Figure A5 below for an Apartment Block location layout.

Figure A5 High Density Apartment Block Layout

There are three primary areas in these apartment blocks that will potentially have concerns associated with the external ambient noise levels:

- ✓ the central podium communal open areas
- ✓ the ground level garden areas
- ✓ the external balcony areas.

These are considered separately as follows.

Central Podium Amenity Areas

As discussed above, the central communal open areas will be located on elevated, courtyard podium areas. Blocks D & F will not have central communal open spaces and A, B & C courtyard areas will not have a direct line of sight with the M50 but the Block E1 / E2 courtyard area will face directly towards it.

A computer model analysis was conducted similar to the one conducted for the dwellings with the apartment blocks modelled as currently designed. The results are shown in Figure A6 below.

Figure A6 Predicted Ambient Noise Levels For Apartment Block Amenity Areas (No Mitigation Measures Provided)

As can be seen in Figure A6, most of the predicted ambient noise levels in the central amenity areas will comply with the optimum 50 - 55dB L_{Aeq} external design criteria during daytime periods. The only exceedance would be in the Block E1 / E2 central amenity area during busier traffic periods of the day. However, these noise levels could be reduced slightly by increasing the 1.1m high sound barrier wall at the perimeter edge of the podium level to 1.5m. This configuration is modelled and the predicted results are shown in Figure A7 on the following page.

Figure A7 Predicted Ambient Noise Levels For Apartment Block Amenity Areas With 1.5m High Perimeter Wall

As shown in Figure A7, the ambient noise levels in Block E1/E2 are reduced with provision of the 1.5m high perimeter wall. Although the upper levels in the predicted range would still slightly exceed the upper criteria level of 55dB L_{Aeq} during the daytime peak rush hour period, the exceedance would again be considered to be both minimal and minimised as far as practicable (further increases in the height of the sound barrier wall would provide limited extra benefit in noise reduction).

The adopted guidance goals for limiting ambient noise levels in these amenity areas to 50 - 55dB L_{Aeq} where practical and minimising them as far as possible where it isn't would therefore be considered to be achieved by increasing the Block E1/E2 perimeter wall to 1.5m in height.

Ground Level Garden Areas

Private gardens will be provided for most ground or podium level apartment areas. However, Blocks A, B, C & E private gardens are located on podium levels which would be similar to the open amenity areas and are therefore addressed in the previous section. Additionally, Block F does not have any ground level private garden areas. The only private gardens that therefore need to be considered are those that are located on the southeast facade of Block D.

In order to ensure that noise levels in the Block D private garden areas are reduced as far as practicable, we would recommend the following design approach:

- ✓ Provision of a 3m high perimeter wall provided along the southern and eastern boundary of the development as shown in Figure 8 below. Note that this would be the preferred design approach as it would just extend the 3m high barrier wall being provided along the dwelling zone.
- ✓ Provision of landscaping measures such as trees and hedging along garden perimeters should also be considered for both psychological and sound masking benefits.

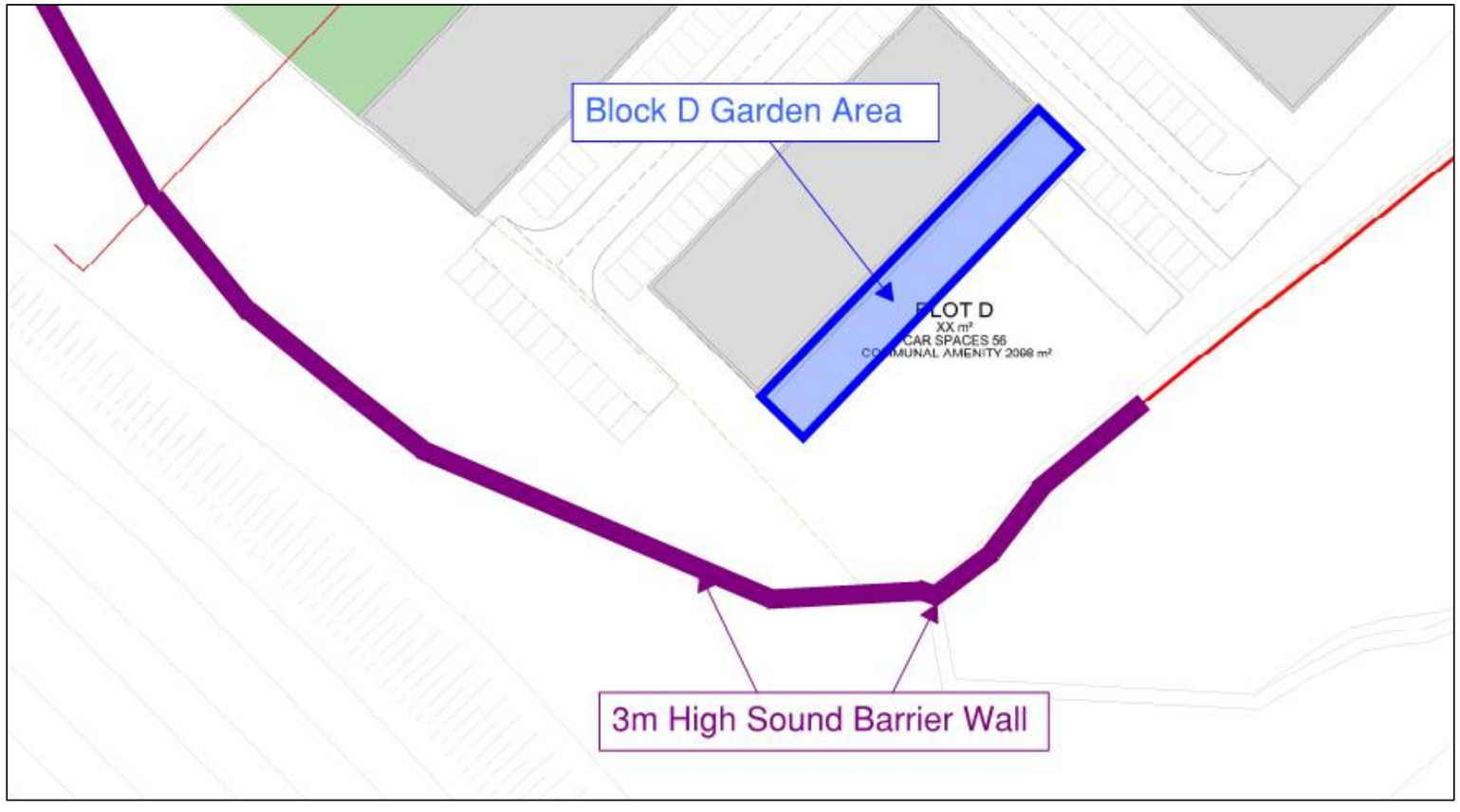

Figure A8 Apartment Block Garden Areas Where 2m High Perimeter Fencing Should Be Provided

Predicted noise levels in these garden areas with the perimeter fencing provided is predicted to be of the order of 50 - 58dB L_{Aeq}. Additional increases in perimeter fencing height would only provide minimal further benefit.

The adopted guidance goals for limiting ambient noise levels in these amenity areas to 50 - 55dB L_{Aeq} where practical and minimising them as far as possible where it isn't would therefore be considered to be achieved with provision of the 3m high sound barrier wall.

Apartment Balconies

It is expected that apartment balconies will be provided for most apartments in each of the six blocks. Balconies are a little different in nature to private gardens and amenity areas in that high noise levels are generally more tolerated (i.e. inner city balconies are typically left open and can overlook busy road routes whilst most gardens are located at the rear of properties and fenced in).

Two approaches could therefore be considered in respect of reducing ambient noise levels in balcony areas.

The first would be to take the viewpoint that apartment tenants would likely prefer an open air balcony space with moderate levels of ambient noise to a fully enclosed but quieter one. It could be considered in this instance that the attenuated central amenity areas and nearby parklands that are to be integrated into the development will provide multiple and sufficient quiet external area alternatives. If this approach is taken, we would recommend the following design considerations be implemented:

- ✓ Balconies in apartment blocks that have direct or oblique views to the M50 should be located within the façade perimeter envelope (i.e. do not provide balcony extensions) so that they are shielded from the M50. This will provide a significant noise reduction for these spaces. See Figure A9 below.
- ✓ Perimeter balcony walls should extend as high as possible so as to provide as much as screening as possible for balcony occupants in seated positions.

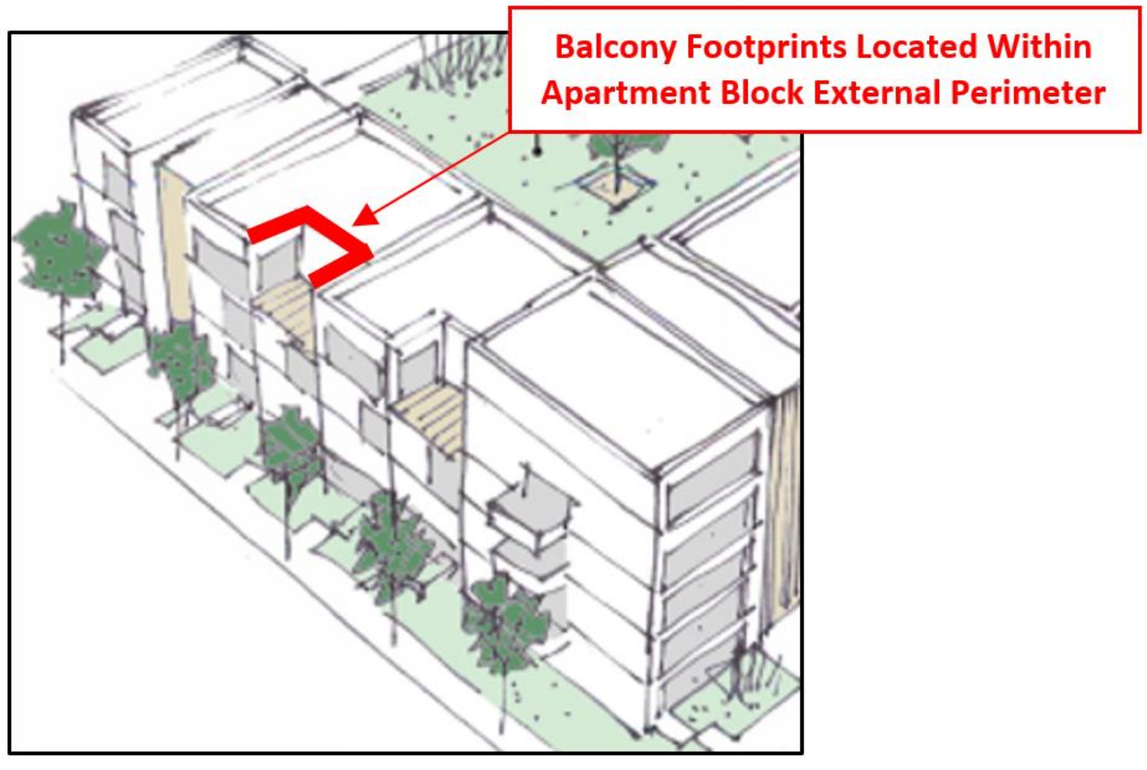

Figure A9 Apartment Balcony Preferred Design

The second approach would be to consider that a quieter, enclosed balcony is more desirable than an open, noisy one. In this instance, we would recommend the following considerations be implemented:

- ✓ If balconies are provided for apartments located on south facing Block C, D, E & F facades with direct views to the M50, they should be provided with double glazed enclosures (6mm - 12mm air space - 8mm glass) and not provided with openable glazed elements.
- ✓ Balconies in Blocks C, D, E & F with oblique views to the M50 can be enclosed with single glazing (minimum 6mm thick) and could incorporate openable glazed elements.
- ✓ All balconies in Blocks A & B and balconies in Blocks C, D, E & F with completely blocked views of the M50 would not need to be enclosed.

As discussed in the previous section, Priorsland Park will also be located at the northeast corner of the development which is less than a 5 minute walk from these apartment blocks and which would serve as an even quieter amenity area.

The façade design goal in respect of external ambient noise levels is discussed in in the Internal Noise Level Assessment section.

Development Boundary Landscaping

In addition to the mitigation recommendations discussed in the previous two sections, it is also highly recommended to provide an abundance of landscaping features (e.g. trees, hedges, etc) along the southern development boundary. Although these landscaping measures will only provide a very minimal degree of extra sound absorption / scattering / diffusion, it has been experimentally proven that shielding of roadways with landscaping features provide a significant psychological benefit and reduction in the subjective perception of traffic noise emissions.

Landscaping measures should therefore be provided as densely as possible along the southern boundary areas.

INTERNAL NOISE LEVEL ASSESSMENT

Dwellings

It was determined as part of our external noise level modelling prediction exercise that noise levels along the south facing first floor façades of dwellings facing onto the M50 will be as high as 72dB L_{Aeq} during daytime periods and as high as 64dB L_{Aeq} during the earliest portion of night time periods. Noise levels (perpendicularly incident) on the east / west facing first floor facades that are exposed to the road are predicted to be in the range of 66 - 69dB L_{Aeq} during daytime periods and 61dB L_{Aeq} during a worst case night time period. Noise levels incident on north facing first and second floor facades are predicted to be ≤50dB L_{Aeq} during all time periods.

Although the external wall constructions are not known at this stage, assuming a facade construction with a minimum performance specification of 50dB R_w (such as a minimum 200mm thick solid masonry or brick wall or a 2 x 100mm concrete block cavity masonry wall with battened composite boards as the internal finish) is provided, it would be sufficient to reduce external noise levels of this order to well below the design criteria.

Roof constructions will also need to be a minimum of 40dB R_w which can be easily achieved with a concrete tile roof and plasterboard ceilings construction.

Detailed consideration, however, will need to be given to the external glazing configurations, door constructions and ventilation.

Given the different ranges of external noise levels on the various facades of the dwellings, it was prudent to provide a different range of noise reductions specifications for the glazing elements on each façade. Based on the various noise level ranges, three recommended minimum glazing specifications were determined and are summarised in Table A4 below.

Glazing Spec Type	Octave Band Centre Frequency (Hz)						Typical Glazing Configuration
	125	250	500	1k	2k	4k	
A	22	24	30	38	35	30	6mm glass - 12mm air space - 8mm glass
B	25	28	36	41	42	40	10mm glass - 12mm air space - 6mm laminate glass
C	26	28	38	47	43	42	6mm glass - 12mm air space - 11 mm laminate glass

Table A4 Dwelling Glazing Sound Insulation Performance Requirements, SRI (dB)

Figures A10 & A11 detail the locations where the various glazing specifications should be applied for Apartment Block ground and first / second floor windows respectively.

: Glazing Specification A

: Glazing Specification B

: Glazing Specification C

Figure A10 Dwelling Ground Floor Glazing Sound Insulation Minimum Performance Requirements (SRI)

: Glazing Specification A

: Glazing Specification B

: Glazing Specification C

Figure A11 Dwelling First & Second Floor Glazing Sound Insulation Minimum Performance Requirements (SRI)

It should be noted that the performance values detailed in Table A4 are the basis of the assessment and that the configurations detailed are merely typical examples which can be expected to afford these performance values. Alternative products with an equivalent or better performance would also provide sufficient sound insulation; however, glazing thicknesses of individual panes should not be similar to each other for Glazing Specifications B or C.

For operable windows, the proposed framing design will need to be acoustically reviewed during the design stage and acoustic treatment may be required. At a minimum, operable windows would need to incorporate compressible gasket seals to the full perimeter of the frame and any sliding windows will need to be installed in a rebated frame and sealed so that no gaps exist around the perimeter when closed.

The other design element consideration is in relation to external doors located on the external façade. These entry doors should be selected based on the minimum glazing performance specifications as detailed in Table A5.

Glazing Specification	Minimum External Door Sound Insulation Performance (dB R_w)
A	30
B	35
C	35

Table A5 External Door Minimum Sound Insulation Performance Specifications

Acoustic test data should be obtained from the façade supplier to confirm that all primary window and external door constructions to be supplied performs to the required acoustic specification as detailed above. If acoustical performance data is not available for any of the specific systems then it must be provided in accordance with the following details:

- The performance requirements shall be obtained from laboratory measurements obtained in accordance with ISO 140-3: 1995 “Measurement of sound insulation in buildings and of building elements” and weighted in accordance with ISO 717-1: 1997 “Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation”.
- Laboratory measurements shall be obtained from an independent acoustic test laboratory accredited by a recognized approving body and shall be a fully representative part of the system including associated framing or support system and seals.
- Ratings and measurements obtained in accordance with other equivalent standards may also be permitted and should be submitted to the client representative for approval.
- The Trade Contractor shall provide Tender test certificates demonstrating compliance with the specified acoustic performance for the products offered. Failing this, the Trade Contractor shall allow in the Tender for the expense of such necessary testing as demonstrating compliance with the specification. The tests shall be carried out at an independent acoustic test laboratory approved by a recognized acoustic institution.

It is also important that the sound insulation performance of the trickle vents do not significantly compromise the integrity of the window performance. Provision should be made for provision of acoustic trickle vents in the various façades that achieves the minimum sound reduction values listed in Table A6 below.

Glazing Specification	Minimum Trickle Vent Sound Insulation Performance (dB $D_{n,e,w}$)
A	35
B	42
C	45

Table A6 Trickle Vent Minimum Sound Reduction Performance Specifications

Provided all of the above recommended design measures are properly provided, noise levels inside the development dwellings would comply with the project internal noise level design criteria and therefore provide a suitable internal acoustic environment throughout the development.

Apartment Blocks

It was determined as part of our external noise level modelling prediction exercise that worst case noise levels along the south facing facades of apartment blocks facing onto the M50 will be as high as 72dB L_{Aeq} during daytime periods and as high as 64dB L_{Aeq} during the earliest portion of night time periods. Noise levels (perpendicularly incident) on most east / west facing apartment block facades that are exposed to the road are predicted to be in a similar range due to high level reflections from adjoining buildings. Noise levels incident on north facing apartment block facades are predicted to be ≤ 50dB L_{Aeq} during all periods.

Similar to the dwelling assessment, assuming a façade construction with a minimum performance specification of 50dB R_w (such as a minimum 200mm thick solid masonry or brick wall or a 2 x 100mm concrete block cavity masonry wall with battened composite boards as the internal finish) is provided, it would be sufficient to reduce external noise levels of this order to well below the design criteria. However, detailed consideration will need to be given to the external glazing configurations, door constructions and ventilation.

For sake of simplicity, we have used the three recommended minimum glazing specifications that were developed as part of the dwelling internal noise level assessment (see Table A4).

Figure A12 details the locations where the various glazing specifications should be applied for the various apartment block windows. Note that glazing on some of the lower floors that overlook central amenity areas can likely be downrated given that they will be shielded by the barrier walls. However, specific glazing specifications for every single level is beyond the scope of this assessment and should be carried out as part of the architectural detailed design.

: Glazing Specification A

: Glazing Specification B

: Glazing Specification C

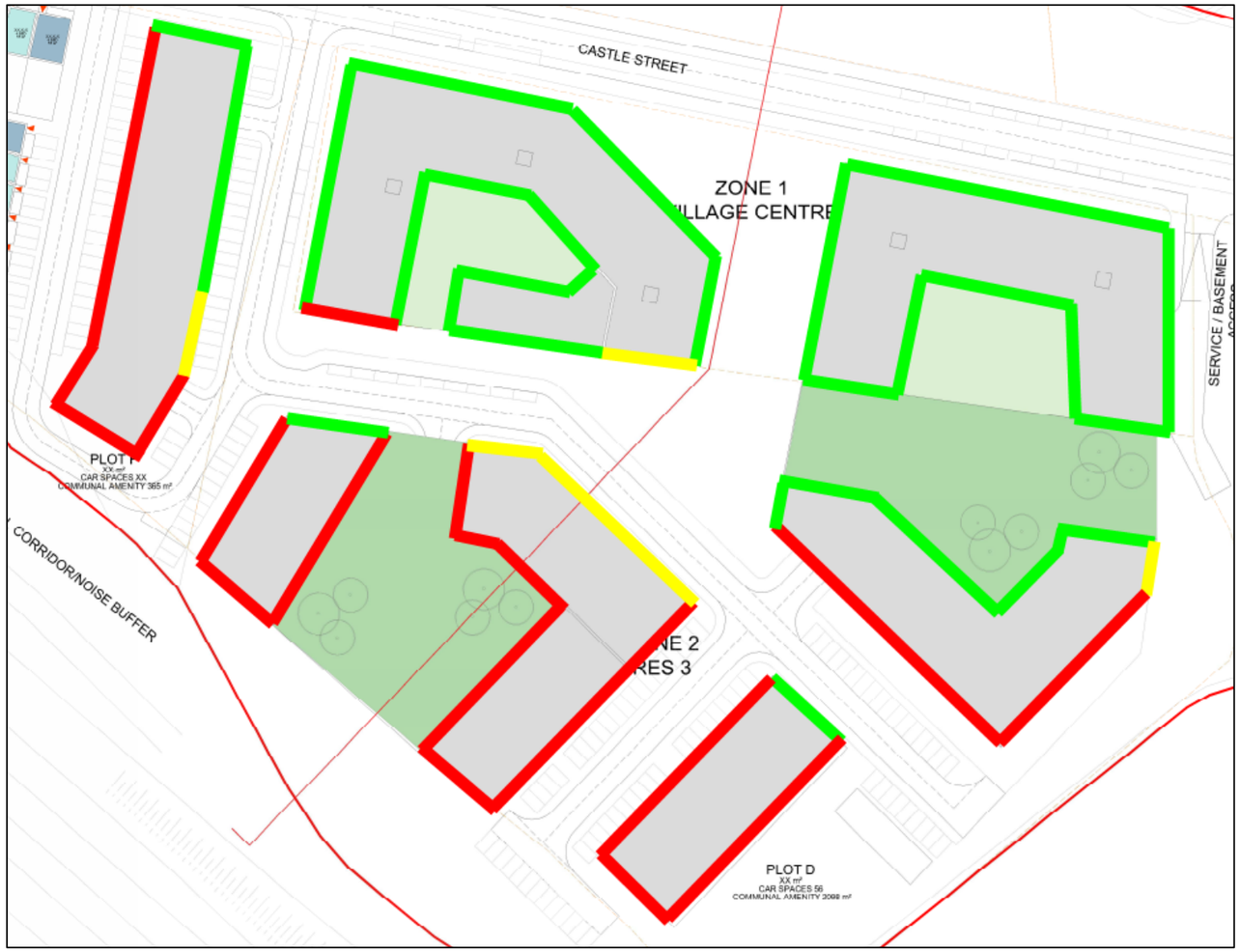

Figure A12 Apartment Block Glazing Sound Insulation Minimum Performance Requirements (SRI)

For operable windows, the proposed framing design will need to be acoustically reviewed during the design stage and acoustic treatment may be required. At a minimum, operable windows would need to incorporate compressible gasket seals to the full perimeter of the frame and any sliding windows will need to be installed in a rebated frame and sealed so that no gaps exist around the perimeter when closed.

Apartment block doors and acoustic trickle vents should be selected using the minimum performance specifications listed in Tables A5 & A6 respectively.

SUMMARY OF INWARD NOISE IMPACT

External Noise Level Impact Summary

Given the significantly high ambient noise environment in the vicinity of the proposed development due to the M50 motorway, a noise impact consideration approach consistent with the **BS 8233** and **ProPG** guidance documents was adopted in order to ensure an acceptable external ambient noise environment could be provided.

This approach is summarised as follows:

- ✓ The 50 - 55dB L_{Aeq} external criteria will be designed for in all instances where it is practically possible to be achieved.
- ✓ Where this external criteria is not achievable, external noise levels will be attenuated as far as practicable.
- ✓ Relatively quiet, publicly accessible, external amenity spaces will be provided that are located within 5min walking distance of all residential spaces in the development.
- ✓ The façade design of all residential spaces will incorporate superior sound insulation glazing / façade elements to achieve a quiet internal acoustic environment that will comply with criteria applicable to low level residential bedroom environments (considered as part of the Internal Noise Level Impact).

Given that both currently measured and predicted ambient noise levels (with the development as built) are in excess of these levels, a number of mitigation measures were developed. These are summarised as follows:

<u>Residential Dwellings</u>

- ➢ Provision of a 3.0m high barrier wall provided along the southern development boundary adjacent to the dwelling zone.
- ➢ Provision of public parkland area within a 5min walk of all development dwellings.

<u>Apartment Blocks</u>

- ➢ Provision of a 1.5m high perimeter wall provided along the Block E1/E2 central amenity area southern boundary.
- ➢ Provision of a 3.0m high barrier wall along the southern and eastern development boundary (effectively an extension of the residential zone barrier wall).
- ➢ Provision of landscaping measures such as trees and hedging along garden perimeters.
- ➢ Either design of balconies in all other areas for direct and oblique views to the M50 by locating them within the façade perimeter envelope and extending balcony perimeter walls as high possible or provision of glazed enclosures with no openable glazed elements.
- ➢ Provision of public parkland area within a 5min walk of all apartment blocks.

In addition to the above, landscaping measures (e.g. trees, hedges, etc) should be provided as densely as possible along the southern boundary areas.

Assuming the above developed mitigation measures are properly incorporated into the development design, the magnitude of the inward external noise impact would be considered both minimal and minimised as far as practicable.

Internal Noise Level Impact Summary

Appropriate guidance for internal noise levels within residential spaces was taken from **BS 8233 (2014): Guidance on Sound Insulation and Noise Reduction for Buildings** as follows:

- Daytime (07:00 to 23:00 hours) 35dB $L_{Aeq,16hr}$
- Night-time (23:00 to 07:00 hours) 30dB $L_{Aeq,8hr}$

Given the above requirements together with the expected external noise levels, the following mitigation measures were developed for both dwelling and apartment blocks:

- Provision of minimum 50dB R_w external walls.
- Provision of minimum 40dB R_w roof constructions (dwellings only).
- Provision of high performing glazing specifications
- Provision of acoustic external entry doors
- Provision of acoustic trickle vents

Assuming the above developed mitigation measures are properly incorporated into the development design, the **BS 8233** criteria should be achieved and the magnitude of the inward noise impact would be considered negligible.

SOUND LEVEL METER CALIBRATION CERTIFICATE

NSAI
National Metrology Laboratory

Certificate of Calibration

Issued to	CLV Consulting The NSC Campus Mahon Co. Cork
Attention of	Niall Vaughan

Certificate Number	180331
Item Calibrated	NTi Audio XL2-TA Sound Level Meter with NTi Audio MC230 Microphone
Serial Number	A2A-10989-E0 (SLM) and 9189 (Microphone)
Client ID Number	None
Order Number	PO12012018N3
Date Received	26 Jan 2018
NML Procedure Number	AP-NM-09
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 21 Dec 2018] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 17 Nov 2018] B&K 4134 Measuring Microphone, No. 0743 [Cal Due Date: 28 Apr 2019] B&K 4228 Pistonphone, No. 0740 [Cal Due Date: 21 Mar 2019] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 15 May 2018]

Calibrated by	David Fleming	Approved by	Paul Hetherington
Date of Calibration	09 Feb 2018	Date of Issue	09 Feb 2018

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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Glasnevin | Dublin 11 | Ireland T+ 353 1 808 2600 | F+353 1 808 2600 | NSAI.ie

ACOUSTIC CALIBRATOR CALIBRATION CERTIFICATE

NSAI
National Metrology Laboratory

Certificate of Calibration

Issued to	CLV Consulting The NSC Campus Mahon Co. Cork
Attention of	Niall Vaughan

Certificate Number	180332
Item Calibrated	Casella CEL-120/1 Acoustic Calibrator
Serial Number	3921077
Client ID Number	None
Order Number	PO12012018N3
Date Received	26 Jan 2018
NML Procedure Number	AP-NM-13
Method	The above calibrator was allowed to stabilize for a suitable period in laboratory conditions. It was then calibrated by measuring the sound pressure level generated in its measuring cavity (half-inch configuration). The calibrator's operating frequency was also measured.
Calibration Standards	Norsonic 1504A Calibration System incorporating: Agilent 34401A Multimeter, No. 0736 [Cal due date: 17 Nov 2018] B & K 4134 Measuring Microphone, No. 0743 [Cal due date: 28 Apr 2019] B & K 4228 Pistonphone, No. 0740 [Cal due date: 21 Mar 2019]

Calibrated by	David Fleming	Approved by	Paul Hetherington
Date of Calibration	07 Feb 2018	Date of Issue	07 Feb 2018

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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APPENDIX 12.1 OPERATIONAL WASTE MANAGEMENT PLAN

Operational Waste Management Plan

at

Priorsland

Carrickmines

Co. Dublin

March 2022

Prepared By:

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1.0 INTRODUCTION

This Operational Waste and Recycling Management Strategy (the 'Strategy ') has been prepared by Nevin Traynor BSc.Env, HDIP IT, Cert SHWW, IAH of Traynor Environmental Ltd on behalf of 1 Carrickmines Land Limited ('The Applicant') in support of the proposed Priorsland development (hereafter referred to as the 'Proposed Development') within the Dun Laoghaire – Rathdown County Council.

The principal aim of this Strategy is to demonstrate how the Proposed Development has taken into account sustainable methods for waste and recycling management during its operation. Furthermore, with regards to waste and recycling management within the Proposed Development, this Strategy has the following aims:

- To contribute towards achieving current and long-term government, Eastern Midlands Region (EMR) and Dun Laoghaire – Rathdown County Council targets for waste minimisation, recycling and re-use;
- To comply with all legal requirements for handling operational waste;
- To achieve high standards of waste management performance, through giving (and continuing to give) due consideration to the waste generated by the Proposed Development during its operation; and
- To provide the Proposed Development with a convenient, clean and efficient waste management strategy that enhances the operation of the Proposed Development and promotes recycling.

It is important to note that the Dun Laoghaire – Rathdown County Council is part of the Eastern Midlands Region. The Eastern Midlands Region comprises of Dublin City Council, Dun Laoghaire – Rathdown, Fingal, South Dublin, Kildare, Louth, Laois, Longford, Meath, Offaly, Westmeath and Wicklow County Council.

This Strategy provides a review of the requirements placed upon the Proposed Development under national legislation and implemented policy at all levels of government (i.e. national (Ireland), regional (EMR), district and (local (Dun Laoghaire Rathdown). Consideration has also been given to requirements included in local standards and guidance documents (i.e. DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018) in line with the Regional Waste Management Plan and British Standard Waste Management in Buildings, Code of Practice (BS 5906:2005) so as to comply with relevant objectives and targets.

The methodology used to identify and estimate volumes of waste generated during operation of the Proposed Development has been provided and is outlined in *Section 4: Methodology* of this Strategy. Following this, the approach taken towards waste management within the Proposed Development is discussed. This includes a breakdown of the waste management process, which details waste handling, storage area provision, and collection arrangements. All waste reduction measures are compliant with BS 5906:2005, Eastern Midlands Region (EMR) and Sustainable Urban Housing: Design Standards for New Apartments which are also discussed in this Strategy.

This Strategy has been written by Traynor Environmental Ltd, using information provided by Mola Architects (hereafter referred to as the 'Architects').

2.0 LEGISLATION/ PLANNING POLICY

A summary of national legislation and national, regional and local planning policy relevant to the Proposed Development is outlined in section 3.1 below. It should be noted that this summary identifies those elements of the policy or guidance applicable to waste management within the Proposed Development and does not provide a comprehensive summary of the identified legislation or policy.

2.1 National Legislation

The Government issued a policy statement in September 1998 titled as *'Changing Our Ways'* which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. A heavy emphasis was placed on reducing reliance on landfill and finding alternative methods for managing waste. Amongst other things, Changing Our Ways stated a target of at least 35% recycling of municipal (i.e. household, commercial and non-process industrial) waste.

A further policy document *'Preventing and Recycling Waste – Delivering Change'* was published in 2002. This document proposed a number of programmes to increase recycling of waste and allow diversion from landfill. The need for waste minimisation at source was considered a priority.

This view was also supported by a review of sustainable development policy in Ireland and achievements to date, which was conducted in 2002, entitled *'Making Irelands Development Sustainable – Review, Assessment and Future Action'*. This document also stressed the need to break the link between economic growth and waste generation, again through waste minimisation and reuse of discarded material

In order to establish the progress of the Government policy document *Changing Our Ways*, a review document was published in April 2004 entitled *'Taking Stock and Moving Forward'*. Covering the period 1998 – 2003, the aim of this document was to assess progress to date with regard to waste management in Ireland, to consider developments

since the policy framework and the local authority waste management plans were put in place, and to identify measures that could be undertaken to further support progress towards the objectives outlined in *Changing Our Ways*.
Taking *Stock and Moving Forward* noted a significant increase in the amount of waste being brought to local authority landfills. The report noted that one of the significant challenges in the coming years was the extension of the dry recyclable collection services. The most recent policy document was published in July 2012 titled *'A Resource Opportunity.* The policy document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions, including the following:

- A move away from landfill and replacement through prevention, reuse, recycling and recovery.
- A Brown Bin roll-out diverting 'organic waste' towards more productive uses.
- Introducing a new regulatory regime for the existing side-by-side competition model within the household waste collection market;
- New Service Standards to ensure that consumers receive higher customer service standards from their operator;
- Placing responsibility on householders to prove they use an authorised waste collection service.
- The establishment of a team of Waste Enforcement Officers for cases relating to serious criminal activity will be prioritised;
- Reducing red tape for industry to identify and reduce any unnecessary administrative burdens on the waste management industry;
- A review of the producer responsibility model will be initiated to assess and evaluate the operation of the model in Ireland;
- Significant reduction of Waste Management Planning Regions from ten to three.

While a *resource opportunity* covers the period to 2020, it is subject to a mid-term review in 2016 to ensure that the measures are set out properly and to provide an opportunity for additional measures to be adopted in the event of inadequate performance. Since 1998, the Environmental Protection Agency (EPA) has produced periodic *'National Waste (Database) Reports'* detailing among other things estimates for household and commercial (municipal) waste generation in Ireland and the level of recycling, recovery and disposal of these materials. The 2018 National Waste Statistics, which is the most recent study published, reported the following key statistics for 2016:

- 2,763 kilotons of municipal waste were managed in 2016 (6% increase compared to 2014).
- 74% of managed municipal waste was recovered (79% in 2014). Recovery includes treatment processes such as recycling, use as a fuel (incineration and co-incineration) and backfilling.
- 41% of managed municipal waste was recycled (41% in 2014). Recycling includes reprocessing of waste materials into products, composting and anaerobic digestion.
- 26% of managed municipal waste was landfilled in 2016.

2.2 Regional Level

The proposed development is located in the Local Authority area of Dun Laoghaire – Rathdown County Council
The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the area which was published in May 2015. This plan replaces the previous Dublin region plan due to changing National policy as set out in *A Resource Opportunity: Waste Management Policy in Ireland* and changes being enacted by the *Waste Framework Directive (2008/98/EC).*

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 introduced under the *Waste Management (Landfill Levy) (Amendment) Regulations 2015.* The Dun Laoghaire – Rathdown County Council *Plan 2016 – 2022* sets out a number of objectives and actions for the South Dublin area in line with the objectives of the regional waste management plan.

Waste objectives and actions with a particular relevance to this development are:
Objectives:

- ***IE5 Objective 1:*** *To support the implementation of the Eastern–Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies and policy actions.*
- ***IE5 Objective 2:*** *To support waste prevention through behavioural change activities to de-couple economic growth and resource use.*
- ***IE5 Objective 3:*** To encourage the transition from a waste management economy to a green circular economy to enhance employment and increase the vale recovery and recirculation of resources.
- ***IE5 Objective 4:*** To provide, promote and facilitate high quality sustainable waste recovery and disposal infrastructure / technology in keeping with the EU waste hierarchy and to adequately cater for a growing

residential population and business sector.

- ***IE5 Objective 5:*** To provide 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.
- ***IE5 Objective 6:*** To seek the provision of adequately sized public recycling facilities in association with new commercial developments and in tandem with significant change of use / extensions of existing commercial developments where appropriate.
- ***IE5 Objective 7:*** To develop a countrywide network of green waste centres in suitable locations to expand the collection system for compostable waste.
- ***IE5 Objective 8:*** *To secure appropriate provision for the sustainable management of waste within developments, including the provision of facilities for the storage, separation and collection of such waste.*

Actions:

- *Support and facilitate the separation of waste at source into organic and non-organic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used and recycled or composted and divert organic waste from landfill, in accordance with the National Strategy on Biodegradable Waste (2006).*
- *Implement the objectives of the National Waste Prevention Programme at a local level with businesses, schools, householders, community groups and within the Council's own activities.*
- *Promote an increase in the amount of waste re-used and recycled consistent with the Regional Waste Management Plan and Waste Hierarchy and facilitate recycling of waste through adequate provision of facilities and good design in new developments.*
- *Implement the South Dublin Litter Management Plan 2015 – 2019.*

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. Secondary legislation includes:
  - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended
  - Waste Management (Collection Permit) Regulations (S.I No. 820 of 2007) as amended
  - Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended
  - Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended
  - Waste Management (Packaging) Regulations 2014 (S.I. 282 of 2014) as amended
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015) as amended by S.I. No. 182 of 2019,reg 3
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014) as amended
  - European Union (Batteries and Accumulators) Regulations 2014(S.I. No. 283 of 2014) as amended
  - Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), as amended
  - European Union (Household Food Waste and Bio-waste) Regulation 2015 (S.I. No. 430 of2015)
  - Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended
  - Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended
  - European Communities (shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No.342/2011)
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
- 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.

2.4 Responsibilities of the Waste Producer.

The waste producer is responsible for waste from the time it is generated through until its legal disposal (including its method of disposal.) Waste contractors will be employed to physically transport waste to the final waste disposal / recovery site.

It is therefore imperative that the residents, commercial tenants and the proposed facilities management company undertake on-site management of waste in accordance with all legal requirements and employ suitably permitted/licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contactor handle, transport and reuse/recover/recycle/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* as amended or a waste or IED (Industrial Emissions Directive) 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.

2.5 Dun Laoghaire – Rathdown County Council Bye-Laws

Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste were brought into force by DLRCC in July 2009. The Bye-Laws place legal obligations on the waste producer in terms of the way waste is stored and managed on a site/premises. Dry recyclables must be segregated at source, and bio-waste (organic) must be segregated if a collection service is available. Waste must be presented in approved containers that are kept in a reasonable state and only presented for collection in approved areas and times by the Council.

2.6 Regional Waste Management Service Providers & Facilities

Various contractors offer waste collection services for the residential and commercial sector in the Dun Laoghaire – Rathdown County Council. Details of waste collection permits (granted, pending and withdrawn) for the region are available from the NWCPO.

As outlined in the new regional waste management plan, there is a decreasing number of landfills available in the region. Only three municipal solid waste landfills remain operational and are all operated by the private sector. There are a number of other licensed and permitted facilities in operation in the region including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

A copy of all CORs and waste permits issued by the Local Authorities are available from the NWCPO website and all waste/IED licenses issued are available from the EPA.

Thornton's Recycling is the Councils main recycling and disposal facility and it accepts a wide range of household waste types. The facility is located in Parkwest Business Park, Cherry Orchard, Dublin 24 which is 20km from the site. Thornton's Recycling provide a three-waste stream collection service. Thornton's collection service for the Cherrywood area is (twice a week for Residual Waste and Recycling Waste Streams and once a week for Organic Matter).

2.7 Policy Context

Development Plan Policy generally sets out guidelines for waste management which conform to the European Union and National Waste Management Hierarchy as follows:

- Waste Prevention
- Minimisation
- Re-use
- Waste Recycling
- Energy Recovery
- Disposal

This guidance is subject to economic and technical feasibility and environmental assessment. Council's Waste Management Strategy is firmly grounded in EU and National policy and can be summarised by the waste hierarchy of prevention, recycling, energy recovery and disposal.

3.0 DESCRIPTION OF THE PROJECT

3.1 Location, Size and Scale of the Development

- The development will comprise a mixed-use village centre and residential development of 443 no. units comprising 6 no. blocks (A-F) of apartments (up to 5 storeys with basement/undercroft parking) providing 402 no. apartments units (146 no. 1-beds; 218 no. 2-beds and 38 no. 3-beds), and 41 no. houses (19 no. 3-beds and 22 no. 4-beds). All apartments provided with private balconies/terraces. Provision of indoor residential facilities to serve apartment residents.
- The Village Centre and non-residential elements will comprise a supermarket, local retail/retail service units, non-retail commercial units, creche, gym, community space, and offices (High Intensity Employment) use.
- Provision of car/bicycle/motorcycle parking; ESB sub-stations; bin storages areas, and all associated plant areas.
- Provision of the first phase of Priorsland Park (on lands within the applicant's ownership) and other public and communal open spaces.
- Construction of Castle Street through the subject lands and two road bridges across the Carrickmines Stream, one to serve the future school site/ park, the second to provide pedestrian and cyclist access to the Carrickmines Luas station and future Transport Interchange to the north. Provision of an additional pedestrian bridge to the park. Provision of an acoustic barrier along the southern/western edge of the site.
- All associated site development works, landscaping, boundary treatments and services provision.

A more detailed description is outlined in Chapter 3.

Block	Number of Units			Total
	1- Bed	2-Bed	3-Bed	
A	30	42	-	72
B	34	37	-	71
C	29	35	7	71
D	11	21	13	45
E	19	54	12	85
F	23	29	6	58
Total	**146**	**218**	**38**	**402**

Table 1.0 Residential Development Unit Mix

Location	Land Use	Floor Space m²
Plot A & B	No. Retail	715m²
Plot A & B	Non-Retail	213m²
Plot A	Creche	513m²
Plot E	Community Facilities	252m²
Plot C & E	Residential facilities	551m²
Plot E	Gym	155m²

Table 2.0 Commercial Floor Space in m²

3.2 Typical Waste Categories

The predicted waste types that will be generated at the proposed development include the following:

- **Dry Mixed Recyclables (DMR)** – includes Newspaper / General paper Magazines, Cardboard Packaging, Drink (Aluminium) Cans, Washed Food (Steel/Tin) Cans, Washed Tetra Pak Milk & Juice Cartons, Plastic Bottles (Mineral/Milk/Juice/Shampoo/Detergents), Rigid Plastics. (Pots/Tubs/Trays*)
- **Mixed Non-Recyclables (MNR) / All General Waste** – Nappies, soiled food, packaging, old candles, plasters, vacuum cleaner contents, broken delph, contaminated plastics
- **Organic (food) Waste** – Leaves, weeds and mosses (not sprayed with weed killer), Dead plants and flowers, Grass and hedge cuttings (finger sized twigs), Bread, pasta and rice, Meat, fish, poultry bones, Out of date food (no plastic packaging), Tea Bags, Coffee grounds and paper filters**.** Fruit and vegetables (cooked and uncooked). Food soiled cardboard or paper (no coated paper) Eggs and dairy products (no plastic packaging) Paper napkin and paper towels
- **Glass**

In addition to the typical waste materials that will be generated on a daily basis, there will be some additional waste types generated in small quantities that will need to be managed separately including:

- Green/garden waste - may be generated from internal plants, gardens and external landscaping;
- Textiles
- Batteries
- Waste electrical and electronic equipment (WEEE)
- Chemicals (solvents, pesticides, paints, adhesives, resins, detergents, etc.)
- Fluorescent tubes and other mercury containing waste
- Furniture (and from time to time other bulky wastes)

Wastes should be segregated into the above waste types to ensure compliance with waste legislation and guidance while maximising the re-use, recycling and recovery of waste with diversion from landfill wherever possible.

3.3 European Waste Codes

In 1994, the *European Waste Catalogue* and *Hazardous Waste List* were published by the European Commission. In 2002, the EPA published a document titled the *European Waste Catalogue and Hazardous Waste List*, which was a condensed version of the original two documents and their subsequent amendments. This document has been replaced by the EPA '*Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous*' which became valid from the 1st June 2015. This waste classification system applies across the EU and is the basis for all national and international waste reporting, such as those associated with waste collection permits, COR's, permits and licences and EPA National Waste Database. Under the classification system, different types of wastes are fully defined by a code. The List of Waste (LoW) code (also referred to as European Waste Code or EWC) for typical waste materials expected to be generated during the operation of the proposed development are provided in the Table below.

Waste Material	LoW Code
Paper and Cardboard	20 01 01
Plastic	20 01 39
Metals	20 01 40
Mixed Municipal Waste	20 03 01
Glass	20 01 02
Biodegradable Kitchen Waste	20 01 08
Oils and Fats	20 01 25/26*
Biodegradable garden and park waste	20 02 01
Textiles	20 01 11
Batteries and accumulators*	20 01 33*-34
Printer Toner / Cartridges*	20 01 27* -28
Green Waste	20 02 01
Waste electrical and electronic equipment*	20 01 35*-36
Chemicals (solvents, pesticides, paints & adhesives, detergents etc) *	20 01 13 / 19 /27 / 28 / 29* 30
Fluorescent tubes and other mercury containing waste*	20 01 21*
Bulky wastes	20 03 07

Table 3.0 LoW Codes

3.4 Methodology

3.4.1 Residential Calculation Methodology

Waste arisings were calculated in accordance with BS 5906:2005 and included a provision of 5 litres (L) of food waste per residential unit per week. These guidelines determine the minimum capacity for waste storage space to be allocated and are as follows:

- 30 litres (L) per unit + 70L per bedroom (see Table 4.0 for further details).
- Split 50:50 between DMR and residual waste; and
- 5L per residential unit for food waste.

Number of Bedrooms	Weekly Waste Arisings per Unit (L)			
	DMR	Food Waste	MNR	Total
1 Bedroom	50	5	50	**105**
2 Bedroom	85	5	85	**175**
3 Bedroom	120	5	120	**245**

Table 4.0 Weekly Waste Arisings Methodology

3.4.2 Commercial Calculation Methodology

BS 5906:2005 provides a methodology for the calculation of waste arisings from communal areas. These calculation methodologies are outlined within Table 5.0 of this Strategy. A 50:50 split between DMR and residual waste has been assumed for the communal areas.

Land Use Class	Waste Storage Requirements	Waste Stream Ratios
Amenities Space	5L per m^2 NIA	50: 50 DMR: Residual
Retail	10L per m^2 Sales Floor Area (SFA)	DMR: Residual Waste 50: 50
Creche	10L per m^2 NIA	50: 50 DMR: Residual

Table 5.0 Communal Area Waste Arising Calculations (Weekly)

4.0 ESTIMATED WASTE ARISING

A waste generation spreadsheet was developed by Traynor environmental Ltd and has been used to predict waste types, weights and volumes arising from operations within the proposed development. The spreadsheet incorporates building area and use and combines these with other data including Irish EPA Statistics/Reports and similar European Countries waste generation rates. The estimated quantum/volume of waste that will be generated from the residential units has been determined based on the predicted occupancy of the units. The waste generation for the retail, commercial and childcare units is based on waste generation rates per m^2 floor area for the proposed area uses.

The estimated quantum/volume of waste that will be generated from the residential units has been determined based on the predicted occupancy of the units and is presented in table 4.0 below.

Waste Volume (l/week)							
Waste type	**Block A**	**Block B**	**Block C**	**Block D**	**Block E**	**Block F**	**Totals**
Organic Waste	360	355	355	225	425	290	**2010**
Mixed Dry Recyclables	5070	4845	5265	3895	6980	4335	**30390**
Glass	360	355	355	225	425	290	**2010**
Mixed Municipal Waste	5070	4845	5265	3895	6980	4335	**30390**
Total	**10860**	**10400**	**11240**	**8240**	**14810**	**9250**	**64800**

Table 4.0 Residential Waste Prediction (L/per week)

Non-Residential Floor Areas	Location	Area sq.m	Area (sq.) GIA	Area (sq.) (NIA)	DMR Recycling	Food Waste	MNR Residual	Glass	Total (L)
Retail	**Plot A & B**	715	657.8	550.55	2752.75	1376.38	2752.75	1376.38	5505.50
Non-Retail	**Plot A & B**	213	196.0	164.01	410.03	410.03	410.03	410.03	820.05
Community Facilities	**Plot E**	513	472.0	395.01	987.53	987.53	987.53	987.53	1975.05
Creche	**Plot A**	252	231.8	194.04	970.20	485.10	485.10	485.10	1455.30
Residential amenity	**Plot C & E**	155	142.6	119.35	298.38	298.38	596.75	298.38	895.13
Gym	**Plot E**	551	506.9	424.27	2121.35	2121.35	2121.35	2121.35	

Table 7.0 Non-Residential Waste Predictions (L/per week)

4.1 Waste Storage and Collection

This section provides information on how waste generated within the development will be stored and how the waste will be collected from the development. This has been prepared with due consideration of the proposed site layout as well as best practice standards, local and national waste management requirements including those of Dun Laoghaire Rathdown County Council. In particular, consideration has been given to the following documents:

- BS 5906:2005 Waste Management in Buildings – Code of Practice;
- EMR Waste Management Plan 2015 – 2021;
- Dún Laoghaire Rathdown County Council, *Presentation and Storage of Waste Byelaws* (2009);
- DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018).

4.2 Residential Waste and Recycling Management and Storage Strategy

The residential waste and recycling management and storage strategy can be broken into six main plots (A-F). Plot G which is residential houses will have three bins per house which will be separate to the waste storage areas discussed above in Section 3.0.

Block	Number of Bins Required for a Weekly Collection		
	MNR	**Organic**	**DMR**
A	6 x 1100L	12 x 240L	6 x 1100L
B	6 x 1100L	12 x 240L	6 x 1100L
C	6 x 1100L	12 x 240L	6 x 1100L
D	4 x 1100L	8 x 240L	4 x 1100L
E	8 x 1100L	16 x 240L	8 x 1100L
F	5 x 1100L	10 x 240L	5 x 1100L
Total	**35 x 1100L**	**70 x 240L**	**35 x 1100L**

Table 6.0 Storage Requirements

4.2.1 Waste Storage Residential Units

Provision is made for the segregation and storage of domestic waste within each unit. Each unit is provided with bins in the kitchen area to enable the separation of waste into different waste streams – 1.) glass, 2.)food, 3.)DMR (Dry Mixed Recycling) and 4.) general waste (MNR). Sample images of bin types in each unit below.

All Apartment Blocks

Residential Developments will ensure access for all (including people with disabilities) in a brightly lit, safe & well sighted area, spacious enough for easy manoeuvrability, good ventilation and ready access if required for the control of potential vermin. Sufficient access and egress will be provided to enable receptables to be moved easily from the storage area to an appropriate collection point within the curtilage of the development. Each apartment will include individual waste storage bins which shall be sized to allow their easy manual handling to be brought to the central waste storage area (WSA). It is anticipated that DMR, MNR, organic waste and glass will be collected on a weekly basis.

4.3 Commercial Waste and Recycling Management and Storage Strategy

Commercial occupiers will be allocated space within the curtilage of each unit for the appropriate management of waste as part of the internal fit-out in. For those elements which are currently Outline, it is proposed that some areas of combined waste storage will be provided and the number of bins required could be reduced. However, for the purpose of this Strategy, and to allow for a reasonable worst case, the number of bins per building core has been calculated. Details of storage requirements for combined bin stores will be confirmed at the detailed design stage.

The current plans indicate the Proposed Development has the capacity to store and separate the required number of bins for the residential and commercial elements of the Proposed Development in-line with the guidance.

Waste Area	MNR	Organic	DMR
A	9 x 1100 L	20 X 240 L	9 X 1100 L
B	6 X 1100 L	12 X 240 L	6 X 1100 L
C	6 X 1100 L	12 X 240 L	6 X 1100 L
D	4 X 1100 L	8 X 240 L	4 X 1100 L
E	9 X 1100 L	18 X 240 L	9 X 1100 L
F	5 X 1100 L	10 X 240 L	5 X 1100 L
Total Plot (A -F)	**39 X 1100 L**	**80 X 240 L**	**39 X 1100 L**

Table 7.0 Total Waste Storage Requirements (Commercial + Residential)

4.4 Waste Storage (Plot A)

4.4.1 Retail / Non-Retail / Commercial

Retail/Non-Retail/Commercial tenants will be required to segregate their waste into the following waste categories within their own units:

- DMR
- MNR
- Organics
- Glass

Bins will be strategically located throughout the retail units. It is proposed that each retail unit will have separate waste storage for each unit (1 x MDR, 1 x DMR and 1 x Organic). As required, the tenants will segregate DMR, MNR and organic waste within their own unit. Glass waste should be brought to the nearest bottle bank or civic amenity centre. If there is a café/restaurant tenant, organic waste from kitchen areas should be collected in bins as close to food preparation as possible.

There is a high intensity employment (HIE) unit proposed in plot A which will employee approximately 50 people. The WSA for Block A/B will service this area.

All bin/containers should will be clearly labelled, and colour coded to avoid cross contamination of the different waste streams. Signage should be posted on or above the bins to show which wastes can be put in each bin.
Suppliers for the retail/non-retail/commercial units should be requested by the tenants to make deliveries in reusable containers, minimize packaging or to remove any packaging after delivery where possible, to reduce waste generated by the development. Waste materials such as batteries, WEEE and printer toner/cartridges may be generated within

the units, but it is anticipated that they will be generated infrequently (if they do arise). Temporary storage areas may be identified within the units for these items pending collection by an authorised waste contractor.

5.4.2 Creche – Childcare Facility

Staff will be required to segregate their waste into the following waste categories within their own unit:

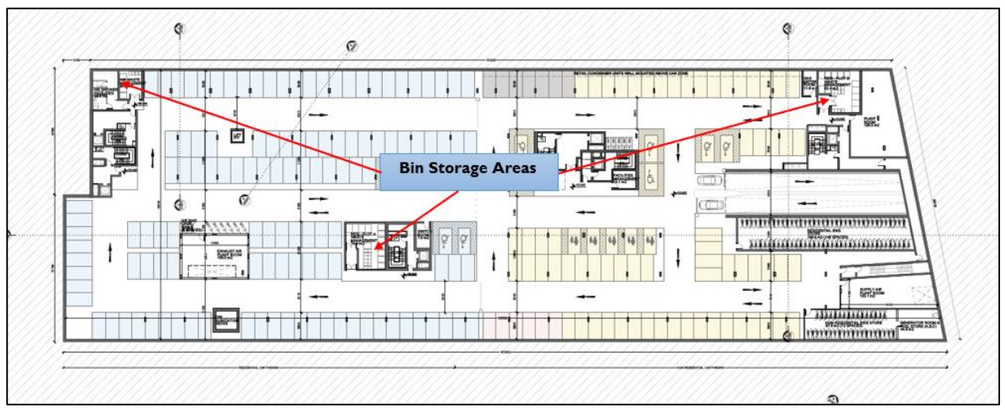
- DMR;
- MNR; and
- Organic waste;

As required, the staff will need to bring segregated DMR, MNR and organic waste to the dedicated WSA. Each bin/container in the WSA will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which waste types can be placed in each bin. Access to the WSA will be restricted to authorised childcare facility staff, facilities management and waste contractors by means of a key or electronic fob access. Waste materials such as batteries, WEEE and printer toner/cartridges may be generated within the retail units, but it is anticipated that they will be generated infrequently (if they do arise). Temporary storage areas may be identified within the unit for these items pending collection by an authorised waste contractor.

4.4.3 Residential Units Plot A.

The proposed WSA locations are illustrated in Figure 1.0 below. There are two locations underground for the use of residents in plot A. Each WSA is titled "Bin Store". It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSA in plot A. Glass waste should be brought to the nearest bottle bank or civic amenity centre by residents.

Figure 1.0 WSA in Plot A (Residential Use)



4.5 Waste Storage (Block B)

4.5.1 Retail / Supermarket

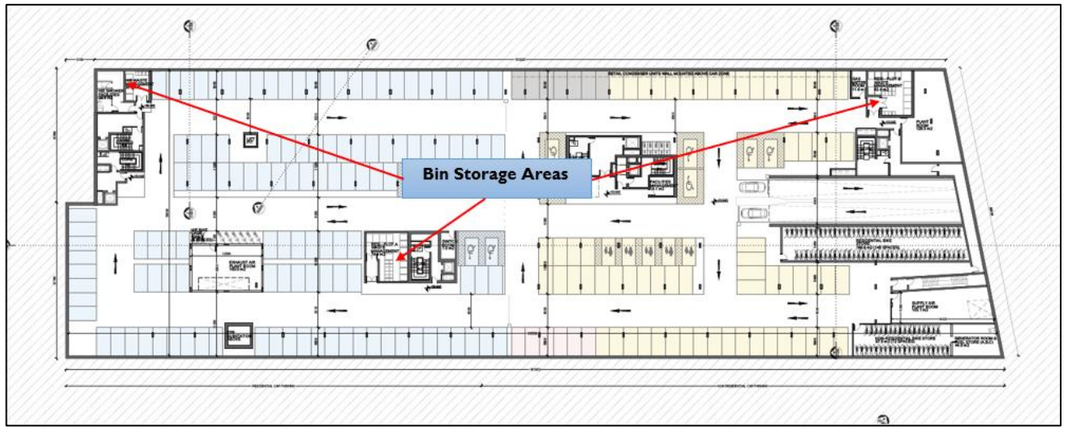
Bins will be strategically located within the unit as required by the occupiers to facilitate segregation and temporary storage of waste. The main types generated within the unit are anticipated to be DMR, MNR and organic waste. All bin/containers will be clearly labelled, and colour coded to avoid cross contamination of the different waste streams. Signage should be posted on or above the bins to show which wastes can be put in each bin. Glass waste should be brought to the nearest bottle bank or civic amenity centre. However, a contract with the Waste Collection company could facilitate in the supply of glass bins.

Waste materials such as batteries, WEEE and printer toner/cartridges may be generated within the units, but it is anticipated that they will be generated infrequently (if they do arise). Temporary storage areas may be identified within the units for these items pending collection by an authorised waste contractor. The supermarket located in Plot B will have designated bins for the premises with a compactor. It is proposed that the supermarket will use 1 / 2 commercially available compactors for DMR and MNR waste streams. The use of compactors will significantly reduce the volume of waste and as such the number of bins stored for the supermarket. There will be organic bins provided in plot B for the supermarket.

4.5.2 Residential Units (Plot B).

The proposed WSA locations are illustrated in Figure 2.0 below. Each WSA is titled "Bin Store". It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSAs in Plot B. Glass waste should be brought to the nearest bottle bank or civic amenity centre by residents.

Figure 2.0 WSA in Plot B

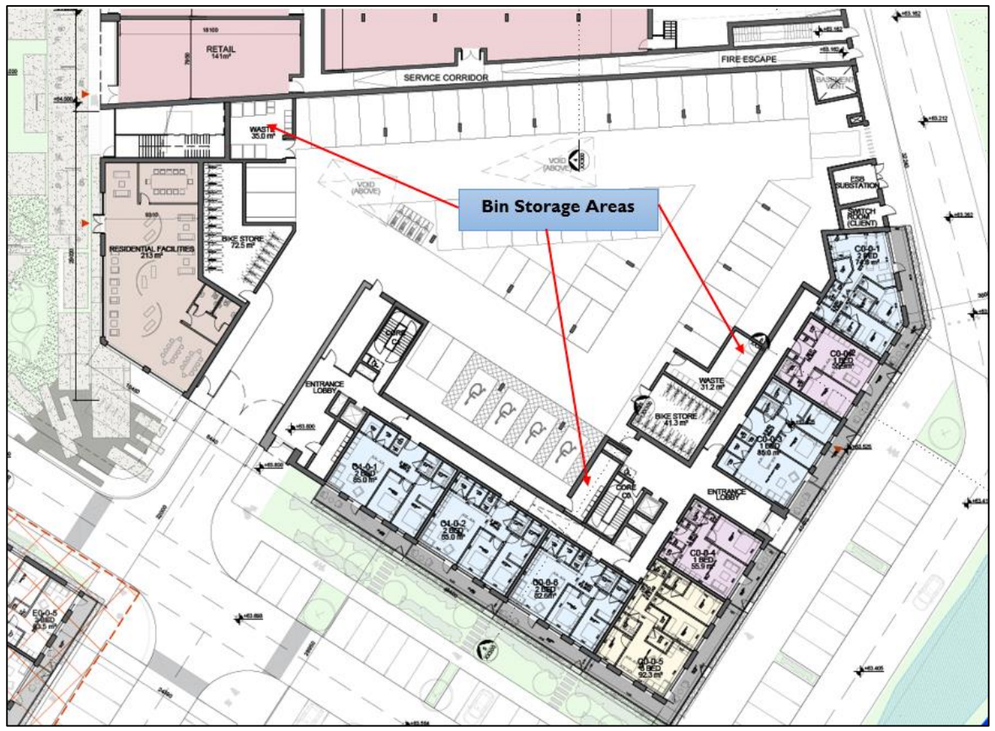


4.6 Waste Storage (Block C)

4.6.1 Residential / Apartment

The proposed WSA locations are illustrated in Figure 3.0 below. Each WSA is titled "Bin Store". It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSAs in Plot C. All bin/containers will be clearly labelled, and colour coded to avoid cross contamination of the different waste streams. Signage should be posted on or above the bins to show which wastes can be put in each bin. Glass waste should be brought to the nearest bottle bank or civic amenity centre.

Figure 3.0 WSA in Plot C (Residential Use)



4.7 Waste Storage (Block D)

The proposed WSA locations are illustrated in Figure 4.0 below. Each WSA is titled "Bin Store". It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSAs in Plot D. All bin/containers will be clearly labelled, and colour coded to avoid cross contamination of the different waste streams. Signage should be posted on or above the bins to show which wastes can be put in each bin. Glass waste should be brought to the nearest bottle bank or civic amenity centre by the residents.

Figure 4.0 WSA in Plot D (Residential Use)

4.8 Waste Storage (Block E)

4.8.1 Commercial / Community / Gym

Bins will be strategically located within the units as required by the occupiers to facilitate segregation and temporary storage of waste. The main types generated within the unit are anticipated to be DMR, MNR and organic waste. As required, the tenants will need to bring segregated DMR, MNR and organic waste to the dedicated WSA in Plot E.

All bin/containers will be clearly labelled, and colour coded to avoid cross contamination of the different waste streams. Signage should be posted on or above the bins to show which wastes can be put in each bin. Suppliers for the retail/non-retail/commercial units should be requested by the tenants to make deliveries in reusable containers, minimize packaging or to remove any packaging after delivery where possible, to reduce waste generated by the development. Glass waste should be brought to the nearest bottle bank or civic amenity centre by the residents.

4.8.2 Residential Units

The proposed WSA locations are illustrated in Figure 5.0. Each WSA is titled "Bin Store". It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSAs in Plot E. Glass waste should be brought to the nearest bottle bank or civic amenity centre.

Figure 5.0 WSA in Plot E

4.9 Waste Storage (Block F)

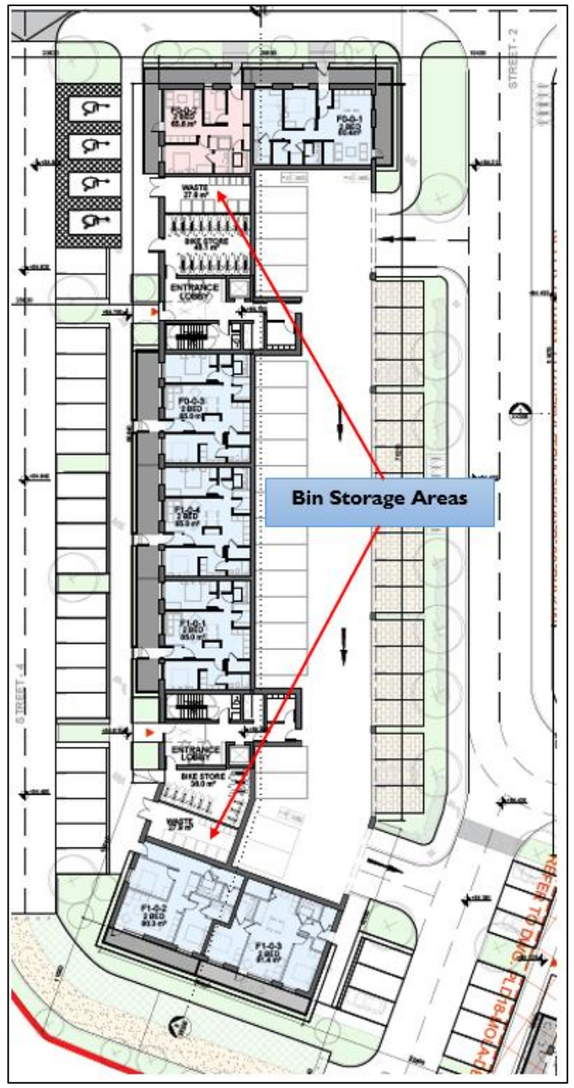
4.9.1 Commercial / Communal Area

Bins will be strategically located within the units as required by the occupiers to facilitate segregation and temporary storage of waste. The main types generated within the unit are anticipated to be DMR, MNR and organic waste. As required, the tenants will need to bring segregated DMR, MNR and organic waste to the dedicated WSA. All bin/containers should be clearly labelled, and colour coded to avoid cross contamination of the different waste streams. Signage should be posted on or above the bins to show which wastes can be put in each bin. Suppliers for the retail/non-retail/commercial units should be requested by the tenants to make deliveries in reusable containers, minimize packaging or to remove any packaging after delivery where possible, to reduce waste generated by the development.

4.9.2 Residential / Apartments

The proposed WSA locations are illustrated in Figure 6.0. Each WSA is titled "Bin Store". It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSAs in Plot F Glass waste should be brought to the nearest bottle bank or civic amenity centre.

Figure 6.0 WSA in Plot E (Residential Use)



4.10 Waste Storage Area Requirements

Waste storage receptacles required will vary in size, design and colour depending on the appointed waste contractor. All waste receptacles used will comply with the IS EN 840 2012 standard for performance requirements of mobile waste containers

The WSAs should meet the following requirements:

- Be fitted with a non-slip floor surface;
- Provide ventilation to reduce the potential for generation of odours (unless external) with a recommended 6-10 air changes per hour for a mechanical system;
- Provide suitable lighting – a minimum Lux rating of 220 is recommended;
- Be easily accessible for people with limited mobility;
- Be restricted to access by tenants, facilities management and waste contractors only;
- Be supplied with hot or cold water for washing of bins;
- Be fitted with suitable power supply for a power washer, if required;
- Have a sloped floor to a central foul drain for bin wash water run-off;
- Have appropriate signage placed above and on bins indicating correct use; and
- Have measures for potential control of vermin, if required.

The facilities management company, residents and retail/commercial and childcare facility tenants will be required to maintain the bins and their WSAs in good condition.
All residents and tenants should be made aware of the waste segregation requirements and waste storage arrangements.

4.11 Waste Collection

There are numerous private contractors that provide waste collection services in the Cherrywood area. who hold a valid waste collection permit for the specific waste types collected. All waste collected must be transported to registered/permitted/licensed facilities only.

All waste requiring collection by the appointed waste contractor will be collected from the WSAs by nominated waste contractors or facilities management depending on the agreement and will be brought to the temporary waste marshalling/collection areas. The empty bins will be promptly returned to the appropriate WSAs.

Bins will be temporarily stored prior to collection in designated areas. All waste receptacles presented for collection will be clearly identified as required by waste legislation and the requirements of the Dun Laoghaire Rathdown Waste Bye-Laws. Also, waste will be presented for collection in a manner that will not endanger health, create a risk to traffic, harm the environment or create a nuisance through odours or litter.

4.12 Additional Waste Materials

In addition to the typical waste materials that are generated on a daily basis, there will be some additional waste types generated from time to time that will need to be managed separately. A non-exhaustive list is presented below.

- **Printer Cartridges/Toners**

Waste printer cartridge/toners generated by residents can usually be returned to the supplier free of charge or can be brought to a civic amenity centre.

- **Light bulbs** generated by residents should be taken to the nearest civic amenity centre for appropriate storage and recovery/disposal.
- **Textiles**

Where possible, waste textiles should be recycled or donated to a charity organisation for reuse.

- **Green waste**

Green waste generated from landscaping of external areas will be removed by external landscape contractors. Green waste generated from internal plants/flowers can be placed in the organic waste bins in the WSAs.

- **Waste Cooking Oil**

If the residents generated waste cooking oil, this can be brought to a civic amenity centre.

- **Furniture (and other bulky wastes)**

Furniture and other bulky waste items may occasionally be generated. The collection of bulky waste will be arranged as required by the tenants. If residents wish to dispose of furniture, this can be brought a civic amenity centre.

- **Abandoned Bicycles**

Abandoned bicycles should be donated to charity, where possible, if they arise or sent for scrap.

- **Batteries**

In accordance with these regulations' consumers are able to bring their waste batteries to their local civic amenity centre or can return them free of charge to retailers which supply the equivalent type of battery, regardless of whether or not the batteries were purchased at the retail outlet and regardless of whether or not the person depositing the waste battery purchases any product or products from the retail outlet.

- **Waste Electrical and Electronic Equipment (WEEE)**

The *WEEE Directive 2002/96/EC* and associated Waste Management (WEEE) Regulations have been enacted to ensure a high level of recycling of electronic and electrical equipment. In accordance with the regulations, consumers can bring their waste electrical and electronic equipment to their local recycling centre.

- **Glass**

It is the responsibility of the residents to bring their glass waste to a civic amenity centre for recycling.

5.0 SUMMARY AND CONCLUSIONS

The Proposed Development will be sustainable with high standards of waste management performance. As such, due consideration has been given to waste generated by the Proposed Development during its operation. Waste management within the Proposed Development has the following aims:

- To contribute towards achieving current and long-term government, Dun Laoghaire Rathdown County Council and EMR targets for waste minimisation, recycling and reuse;
- To allow that all legal requirements for the handling and management of waste during the operation of the Proposed Development are complied with; and
- To provide tenants with convenient, clean and efficient waste management systems that enhance the operation of the buildings and promote high levels of recycling.

Separate storage will be provided for commercial MDR, food waste and residual waste within the curtilage of each unit. Residential units and the HIE will be serviced by communal WSAs. The private residential units will be serviced by a 3-bin wheelie bin service. All waste arisings will be stored in bins proportionate to the volume of waste produced. Furthermore, the commercial waste management element of this Strategy has been developed to allow for a degree of flexibility to address any alterations in future waste arisings as a result of commercial land use changes or Environmental Management Systems (EMSs).

In summary, this OWMP presents a waste strategy that complies with all legal requirements, waste policies and best practice guidelines and demonstrates that the required storage areas have been incorporated into the design of the development. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the *EMR Waste Management Plan.*

APPENDIX 12.2 CONSTRUCTION & DEMOLITION WASTE MANAGEMENT PLAN

Construction & Demolition Waste Management Plan

at

Priorsland

Carrickmines

Co. Dublin

March 2022

Prepared By:

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1.0 Introduction

Traynor Environmental Ltd has prepared this Construction & Demolition Waste Management Plan (C&DWMP) on behalf of I Carrickmines Land Limited. The proposed development will comprise of a mixed-use Village Centre and residential development. non-residential elements will comprise a supermarket, local retail/retail service units, non-retail commercial units, creche, gym, community space, and offices (High Intensity Employment) use. Provision of car/bicycle/motorcycle parking; ESB sub-stations; bin storages areas, and all associated plant areas. The project will also provide landscaping, services, roads, amenities and parking. It should be noted that the outline elements of the strategy will be updated post planning as the design evolves.

The purpose of this plan is to provide information necessary to ensure that the management of construction and demolition (C&D) waste at the site is undertaken in accordance with current legal and industry standards including the Waste Management Acts 1996 - 2011 and associated Regulations, Protection of the Environment Act 2003 as amended, Litter Pollution Act 1997 and the Eastern-Midlands Region Waste Management Plan 2015 – 2021. 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 CDWMP includes information on the legal and policy framework for construction waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and sets out specific measures for management of different waste streams.

1.1 Construction & Demolition Waste Management in Ireland

European Level

The project will follow the "EU Construction and Demolition Waste Management Protocol 2016". A construction and Demolition (C&D) waste is the largest waste stream in the EU – it represents about third of all waste produced. This Protocol fits within the construction 2020 strategy, as well as the communication on resource efficiency opportunities.

The overall aim of this protocol is to increase confidence in the C&D waste management process and the trust in the quality of C&D recycled materials. This will be achieved by:

- Improved waste identification, source separation and collection.
- Improved waste logistics.
- Improved waste processing.
- Quality management.
- Appropriate policy and framework conditions.

The policy document A Waste Action Plan for a Circular Economy Ireland's National Waste Policy 2020-2025 was published on the 4th of September 2020. The 'Waste Action Plan for a Circular Economy' goes beyond the management of waste and addresses how we look at resources more broadly, capturing and maximising the value of materials that may in the past have been discarded. A key objective of this Action Plan is therefore to shift the focus away back up the product life cycle, to remove or design out harmful waste, to extend the life of the products and goods used and prevent waste arising in the first place – consistent with the concept of a zero-waste future. The document sets out several actions in relation to C&D waste and commits to undertake a review of specific producer responsibility requirements for C&D projects over a certain threshold.

Other guidelines followed in the preparation of this report include 'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers' published by FÁS and the Construction Industry Federation in 2002. 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.

National Level

The Irish Government issued a policy statement in September 1998 known as 'Changing Our Ways', 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' concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

The strategy for the management of waste from the construction and demolition phase is in line with the requirements of the Draft Best Practice Guidelines for the Preparation of resource management plans for construction & demolition projects published in April 2021. These draft guidelines will supersede the Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects published in 2006. The guidance document Construction and Demolition Waste Management: A handbook for Contractors and Site Managers was also consulted in the preparation of this assessment. There are currently no Irish guidelines on the assessment of operational waste generation and guidance is taken from industry guidelines, plans and reports, British Standards and other relevant studies and reports including BS 5906:2005 Waste Management in Buildings – Code of Practice, the Eastern-Midland Region Waste Management Plan 2015 – 2021, the EPA National Waste Database Reports 1998 – 2012 and the EPA National Waste Statistics Web Resource.

The guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion. 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.
- Waste disposal/recycling of construction wastes at the site.
- Provision of training for waste manager 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, Dublin City Council etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a C&D Waste Management Plan for developments. This development requires a C&D WMP under the following criterion:

- New residential development of 10 houses or more; and
- Demolition/renovation/refurbishment projects generating in excess of 100m3 in volume, of waste.

Other guidelines followed in the preparation of this report include 'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers' published by FÁS and the Construction Industry Federation in 2002.

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.

Regional Level

The proposed development is located in the Local Authority area of Dublin City Council. The Eastern-Midlands Region Waste Management Plan 2015 – 2021 is the regional waste management plan for the Dublin City Council area published in May 2015. This Plan replaces the previous Waste Management Plan due to changing National policy as set out in A Resource Opportunity: Waste Management Policy in Ireland and changes being enacted by the Waste Framework Directive (WFD) (2008/98/EC). The Regional Plan sets out the strategic targets for waste management in the region but does not set a specific target for C&D waste. However, the Waste Framework Directive sets Member States a target of "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

The Dún Laoghaire-Rathdown *County Development Plan 2016 – 2022* sets out a number of policies for the Dún Laoghaire-Rathdown County area, in line with the objectives of the regional waste management plan. Waste objectives with a particular relevance to the proposed development are:

Waste Management Objectives:

- **Policy EI12: Waste Management Strategy* -** It is Council policy to conform to the European Union and National Waste Management Hierarchy as follows: Waste prevention, Minimisation, Re-use, Waste recycling, Energy recovery and Disposal subject to economic and technical feasibility and Environmental Assessment.
- **Policy EI13: Waste Plans -** It is Council policy to publish plans for the collection, treatment, handling and disposal of waste in accordance with the provisions of the Waste Management Acts 1996 (as amended) and Protection of the Environment Act 2003 (as amended).
- **Policy EI14: Private Waste Companies -** It is Council policy to ensure that all waste that is disposed of by private waste companies is done so in compliance with the requirements of the Environmental Protection Agency and the Waste Management Legislation and in accordance with the Planning Code.

- **Policy EI15: Waste Prevention and Reduction** - It is Council policy to promote the prevention and reduction of waste and to co-operate with industry and other agencies in viable schemes to achieve this.
- **Policy EI16: Waste Re-use and Recycling** - It is Council policy to promote the increased re-use and re-cycling of materials from all waste streams. The Council will co-operate with other agencies in viable schemes for the extraction of useful materials from refuse for re-use or re-cycling.
- **Policy EI17: Refuse Disposal** - It is Council policy to dispose of refuse by means of sanitary landfill or other suitable methods as deemed appropriate.
- **Policy EI18: Hazardous Waste** - It is Council policy to co-operate with other agencies, to plan, organise, authorise and supervise the disposal of hazardous waste.

1.2 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. Secondary legislation includes:
  - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended
  - Waste Management (Collection Permit) Regulations (S.I No. 820 of 2007) as amended
  - Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended
  - Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended
  - Waste Management (Packaging) Regulations 2014 (S.I. 282 of 2014) as amended
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
  - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended
  - Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), as amended
  - European Union (Household Food Waste and Bio-waste) Regulation 2015 (S.I. No. 430 of 2015)
  - Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended
  - Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended
  - European Communities (shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No.342/2011
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
- Environmental Protection Agency 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.

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 client 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 Facility Permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a waste or IED 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.

2.0 Description of the Project

2.1 Location, Size and Scale of the Development

The development will comprise a mixed-use Village Centre and residential development as follows:

- The development will comprise a mixed-use village centre and residential development of 443 no. units comprising 6 no. blocks of apartments (up to 5 storeys with basement/undercroft parking) providing 402 no. apartments units (146 no. 1-beds; 218 no. 2-beds and 38 no. 3-beds), and 41 no. houses (19 no. 3-beds and 22 no. 4-beds). All apartments provided with private balconies/terraces. Provision of indoor residential facilities to serve apartment residents.
- The Village Centre and non-residential elements will comprise a supermarket, local retail/retail service units, non-retail commercial units, creche, gym, community space, and offices (High Intensity Employment) use.
- Provision of car/bicycle/motorcycle parking; ESB sub-stations; bin storages areas, and all associated plant areas.
- Provision of the first phase of Priorsland Park (on lands within the applicant's ownership) and other public and communal open spaces.
- Construction of Castle Street through the subject lands and two road bridges across the Carrickmines Stream, one to serve the future school site/ park, the second to provide pedestrian and cyclist access to the Carrickmines Luas station and future Transport Interchange to the north. Provision of additional pedestrian bridge to the park.
- All associated site development works, landscaping, boundary treatments and services provision.

2.2 Objective

The objectives of the CDWMP are as follows:

- Promote an integrated approach to waste management throughout the project construction & demolition stage and to set out appropriate responsibilities.
- Promote sustainable waste management in line with waste management hierarchy.
- Provide an outline for the management of wastes arising from construction works for the project in accordance with the relevant Irish and EU waste management legislation; and
- Provide a framework for the designers and the Principal Contractor to appropriately manage waste generated during the course of the project. Both the designers and the Principal Contractor will be responsible for implementing the findings and specific measures of the CDWMP in their "Site Waste Management Plan" (SWMP).

The CDWMP outlines methods to achieve waste prevention, maximum recycling and recovery of waste and provides methods for the management of the various anticipated waste streams. The plan also provides guidance on collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g., contamination of soil or water resources). The CDWMP describes the applicable legal and policy framework for C&D waste management in Ireland (both nationally and regionally).

It is currently envisaged that the proposed development will be completed in three total phases. The Main Contractor will be required to prepare a detailed construction programme as part of their tender proposal.

Construction Phase	Description
Phase 1	• Construction of the western bridge crossing over Carrickmines Stream, i.e. the established flood containment zone, including establishment of the temporary pedestrian and cyclist access routeto the Carrickmines Luas Stop in the north-west of the site. • Construction of Castle Street within the private site extents, i.e. no crossing of the Ticknick Stream, and completion of associated service routes and ancillary works. This will also include abus turning head at the western end of Castle Street to facilitate bus operations subject to development of adjacent lands to the northwest and the permanent vehicular connection to the Transport Interchange. • Establishment of easement associated with the Irish Water trunk watermain. • Topsoil removal through development lands – refer to Item 17 below for constraints regarding phased translocation of the eastern hedgerow. • Site regrading throughout development extents to establish flood containment zone. • The hedgerow along the eastern site boundary will be protected and retained throughout the Works. • Consideration can be given to the delivery of the Phase 2 basement car park and associated bulkexcavations as a means of reducing the nett fill associated with the development. Constructionof the basement structure to transfer slab level is an option that will ultimately be influenced by consideration of costs and the financing programme.

	▪ Construction of flood relief culverts to the north and south of Carrickmines Stream. • Construction of the eastern bridge crossing over the established flood containment zone,including establishment of access routes to the park lands in the north east of the site. • Installation of drainage/SuDS elements along southern boundary with ultimate discharge to theTicknick Stream. • Completion of internal road network to service Phase 1a development, i.e. Plots F and G,including associated private realm SuDS measures. • Construction of residential units for Plots F and G. • Installation of perimeter fencing and noise attenuation measures along southern site boundaryas required. • Delivery of landscaping and parks/recreation elements throughout the Phase 1 extents.
Phase 2	• Completion of internal road network to service Phase 2 development, i.e. Plots A, B and C, including associated private realm SuDS measures. This includes the delivery of the service access yard at the basement car park entrance. • Construction of residential and non-residential units for Plots A, B and C. • Delivery of landscaping and parks/recreation elements throughout the Phase 2 extents.
Phase 3	• Completion of internal road network to service Phase 2 development, i.e. Plots D and E, includingassociated private realm SuDS measures. • Construction of residential units for Plots D and E. • Delivery of landscaping and parks/recreation elements throughout the Phase 3 extents. • Subject to completion by third party landowner, construction of Castle Street from the as-built extents at junction with Barringtons Road up to the Ticknick Stream crossing point as per the extant permission DZ20A/0399. • As per the extant permission DZ20A/0399, construction of bridge over Ticknick Stream – providing the operational/permanent access arrangement to the subject lands at Priorsland. • Subject to completion by third party landowner, construction of associated services along Castle Street from relevant tie-in locations within adjacent landowners' lands (to be progressed in tandem with Items 21 and 22 above). This is in accordance with the planning conditions associated with the extant permission DZ20A/0399. • Subject to completion by third party landowner, establishment of the vehicular connection at western bridge crossing over Carrickmines Stream.

Table 2.1 Phases of the Development.

2.3 Details of the Non-Hazardous Wastes to be produced

There will be topsoil and subsoil excavated to facilitate construction of the new building's foundations, excavation of the basement, installation of services and site levelling. The project engineers, Punch Consulting Engineers, have estimated that the total volume of material to be excavated will be c. 15,000m^3. It is expected a fill quantity of 47,000m^3 will be required.

The spoil generated from the basement construction must be disposed at an appropriate licensed land fill site. Reuse/recycling/recovery/disposal of this 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). The volume of waste requiring recovery/disposal will dictate whether a Certificate of Registration (COR), permit or license is required by the receiving facility.

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 oversupply 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. These wastes will be segregated by the main contractor, and stored appropriately for removal by a licenced waste contractor.

2.4 Potentially Hazardous Wastes to be Produced

2.4.1 Contaminated Soil

In the event that 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'* 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*, which establishes the criteria for the acceptance of waste at landfills.

2.4.2 Fuel/Oils

In order to provide fuel to the relevant items of plant on site, a certified double skinned metal fuel tank with integrated pump, delivery hose, meter, filter and locking mechanism will be situated in a secure area on the construction site. It will be situated within a bund. This tank will be certified for lifting when full.
Sand piles and emergency clean up spill kits will be readily available in the event of a fuel spill. A hazardous bin will also be available to contain any spent sand or soak pads.
New metal gerry cans with proper pouring nozzles will be used to move fuel around the site for the purposes of refuelling items of small plant on site.

Drip trays will be used under items of small plant at all times. Any waste oils etc. contained in the drip trays or the bunded area will be emptied into a waste oil drum, which will be stored within the bund.

Metal gerry cans and any other items of fuel containers will be stored in certified metal bunded cabinets. Any gas bottles will be stored in a caged area at a secure location on the site. All will be properly secured at point of work.
Provided that these requirements are adhered to, it is not expected that there will be any fuel/oil wastage at the site.

2.4.3 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 fluorescent tubes and other mercury containing waste may be generated during C&D activities. These wastes (if encountered) will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

2.5.4 Main C&D Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction and demolition activities at a typical site are shown in Table 3.1. The selected waste streams are suggested under *"Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – Appendix 3"*. 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.

Waste Material	LoW Code
Concrete	17 01 01
bricks	17 01 02
Tiles and ceramics	17 01 03
Wood	17 02 01-03
Glass	17 02 02
Plastic	17 02 03
Bituminous mixtures, coal tar and tarred products	17 03 02
Copper, Bronze, Brass	17 04 01
Aluminium	17 04 02
Lead	17 04 03
zinc	17 04 04
Iron & steel	17 04 05
tin	17 04 06
Mixed metals	17 04 07
Soil and Stones	17 05 04
Gypsum-based construction material	17 08 02
Mixed C&D waste	17 09 04

Table 2.2 Typical waste types generated and EWCs (individual waste types may contain hazardous substances.

3.5 Works Description

3.5.1 Hoarding, Site Set-up and Formation of Site Access/Egress

The site area will be enclosed with hoarding details of which are to be agreed with DLRCC. Hoarding panels will be maintained and kept clean for the duration of the works. This will involve erecting hoarding around the proposed site perimeter in line with the finished development extents.

The available site footprint will enable the Contractor to set up the site compound within the site boundary.

The Contractor will be responsible for the security of the site. The Contractor will be required to:

- Operate a Site Induction Process for all site staff;
- Ensure all site staff shall have current 'Safe Pass' cards and appropriate PPE;
- Install adequate site hoarding to the site boundary;
- Maintain site security at all times;
- Install access security in the form of turn-styles and gates for staff;
- Separate public pedestrian access from construction vehicular traffic;

3.5.2 Site Clearance and Demolition

The location is a greenfield site and will require minimal site clearance past topsoil removal and some light tree removal.

It is noted that the proposed development consists of the excavation and construction of a single level of basement, the subsequent construction of multiple storeys of residential apartments and the associated site landscaping and ancillary development. It also includes the construction of single-familyhomes and overall site in-fill to raise the site as a whole south of the Carrickmines Stream flood zone.

3.5.3 Construction Sequence of Development

The construction of the proposed Plots A and B mixed-use development will consist of excavation and installation of the basement car park and construction of RC framed structures on ground floor transfer slabs. The construction of the proposed Plots C, E, and F will consist of construction of RC framed structures on an associated transfer slab over undercroft parking. Plot D will consist of an RC framed structure over a typical pad foundation. Plot G will consist of typical blockwork houses on a pad foundation.

The construction methodology and programme of these activities will be dictated by the Contractor.

3.5.3.1 Site Grading

The basement area will involve the excavation of approximately 15,000m^3 of material. However, in orderto raise the site out of flood zones A and B, the site as a whole will need to be raised a little more thana meter, on average. This will involve the infill of approximately 47,000m^3 of material. A geotechnical report undertaken by IGSL on 22/01/2019 shows that the predominant soils in the area are brown silt/clay. The basement formation level is at c-1.50mOD, so it is not envisaged that rock will be encountered during excavation.

The Contractor must prepare a Construction and Demolition Waste Management Plan in accordance with the "Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects" (Department of Environment, Heritage and Local Government, 2006) and ensure that all material is disposed of at an appropriately licensed land fill site. The Contractor must also outline detailed proposals within the Construction Management Plan to accommodate construction traffic.

3.5.3.2 Basement Construction

In the case of Plots A and B, the construction of the basement will involve the excavation of the basement footprint and immediate surrounds to enable construction of an RC foundation slab with thickenings coinciding with column locations. The basement perimeter wall will consist of RC construction (likely a pre-cast component). The spoil generated from the basement construction must be disposed at an appropriate licensed land fill site. The concrete operations associated with the basement structure will require concrete deliveries to site.

The geotechnical report by IGSL indicates a relatively high groundwater table, as high as 1.2 below ground level in some borings. This may be problematic for the basement car park below Plots A and B. To prevent any potential risk of groundwater intrusion into the lower structure the basement car park will be constructed as a water tight box, the proposed grade for the basement is Grade 1, as per BS 8102:1990. The proposed structural integrity of the basement and its ability to prevent groundwater intrusion into the site is deemed sufficient to mitigate the potential risk to acceptable limits. The concrete works will involve concrete deliveries to site and adequate wash-down and wheel wash facilities must be provided for the concrete wagons.

3.5.3.3 Construction Sequence of Superstructure

The construction of the various superstructures will involve complex sequencing of activities and various construction methodologies could be adopted to deliver the Contract. The nature of the buildings in Plots A-F, the column grids and economic factors, among other issues, would suggest that the buildings will

be constructed utilising reinforced concrete frames. The houses in Plot G will be constructed of traditional concrete blocks, with a façade as shown in the architect's details.

As noted the construction methodology and therefore the programme of the construction activities will be dictated by the Contractor.

Building Structure Plots A and B:

- Construction of the foundation basement slab and permanent basement perimeter wall structures;
- Construction of rising elements to Level 0 and construction of Level 0 floor slab and transfer structures;
- Similar sequence of construction of rising elements and floor slabs

Building Structure Plot C – Plot F:

- Construction of the ground floor foundation slab
- Construction of rising elements to Level 1 and construction of Level 1 floor slab;
- Similar sequence of construction of rising elements and floor slabs

Building Structure Plot G:

- Construction of the ground floor foundation slab
- Construction of concrete block masonry to Level 1 and construction of level 1 floor slab

Envelope / Cladding Plot A – Plot F:

- Commencement of envelope works to Level 1 when structure has progressed to approximately Level 2/3;
- Advancing of Cladding two levels behind the structure.

Envelope / Cladding Plot G:

- The structural blockwork will also act as the envelope for the structure, and cladding will follow completion of the blockwork.

Mechanical & Electrical Fit-Out:

- First fix will commence from ground floor level upwards;
- This will be followed by the second fix and final connections.

Fit-Out:

- Initial installation of stud work when cladding completed and floor is weather tight;
- Installation of equipment and associated connection to services;
- Completion of finishes.

Commissioning:

- The final commissioning period will commence during fit-out.

The above represents a high level indicative construction sequence only. The actual sequence will be dictated by the Contractor. The Contractor will issue a detailed construction programme outlining the various stages prior to commencement of works.

It is envisaged that multiple tower cranes will be temporarily erected to accommodate the apartment block construction works for the distribution of building

3.6 Working Hours

The proposed hours of work on site will be 08:00 hrs to 19:00 hrs Monday to Friday and 08:00 hrs to 14:00 hrs Saturday unless otherwise specified by planning conditions. Certain tasks may need to be undertaken outside of these hours. All outside of hours work will first be agreed in writing with the Local Authority.

3.7 Traffic Management

The management of construction traffic on the public and private road networks in and around the Cherrywood SDZ is a critical part of the overall project and must be actively managed by the Contractor. The Contractor must submit a Construction Traffic Management Plan to the Local Authority for approval.

The Main Contractor will be responsible for all site access and works activity and must ensure the continued operation of the Cherrywood SDZ road network and the surrounding local road network as a result of its construction traffic.

The proposed construction access route to the Priorsland site will be via the western route utilising the available legal right of way (via the M50 Southbound Roundabout). This access route will consist of a stop/go

system giving primacy to incoming construction related traffic in order to minimise impacts on the local road network. The management of construction traffic on the public road network around the development will be a critical part of the overall project and must be actively managed by the Contractor. Scheduling and coordination of site traffic in advance of arrival/departure will be needed to ensure that disruption to public traffic is mitigated.

This access track will also be utilised for construction activities associated with construction of the western Carrickmines Stream bridge crossing which will establish the proposed interim pedestrian and cyclist access to the Transport Interchange. Refer to Figures 2a and 2b for site photographs.

Once the Castle Street extension becomes viable, and is completed in its entirety, that Level 2 route would become the standard, on-going access route for the Priorsland development. Access to the Priorsland development will therefore eventually utilise the Level 2 Road access route as required under the permanent SDZ requirement. This also applies to the residential/operational traffic associated with the proposed development.

4.0 Waste Management

4.1 Demolition Waste Generation

The proposed development site is a green field site, therefore no demolition works at the site will be required.

4.2 Construction Waste Generation

The location is a greenfield site and will require minimal site clearance past topsoil removal and some light tree removal. It is noted that the proposed development consists of the excavation and construction of a single level of basement, the subsequent construction of multiple storeys of residential apartments and the associated site landscaping and ancillary development. It also includes the construction of single-family homes and overall site in-fill to raise the site as a whole south of the Carrickmines Stream flood zone. Table 4.1 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports, the GMIT15* and research reports.

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

Table 4.1 Waste materials generated on a typical Irish construction site

Table 4.2 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 large-scale development waste generation rate per m^2, using the waste breakdown rates shown in Table 4.1.

Construction Waste Material	Quantity	Actions
Metal	558.6 t	20% to be reused on site and 80% to be recycled
Glass	11.76 t	50% of any waste concrete to be recycled and 50% to be properly disposed of
Paper & Cardboard	0.88 t	100% of any waste masonry to be recycled
Plastic	0.88 t	100% of any waste timber to be recycled
Wood	168 t	100% of any waste packaging to be recycled
Mixed Waste	8.82 t	Not envisaged at this stage of the project*
Mineral (concrete, bricks, gypsum)	1293.6 t	Any other waste materials will be recycled where possible or disposed of appropriately
Soil/Stones	221.7 t	
Residues	676.2 t	
Total Arisings	**2,940 t**	

Table 4.2 Estimated on and off-site reuse, recycle and disposal rates for construction waste

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.

Notwithstanding the information in Table 4.2, the quantity of excavated material generated has been estimated to be c.15,000 m^3, as the site will require excavation for site levelling, building foundations and the installation of services. Any suitable excavated material will be temporarily stockpiled for reuse as fill, where possible.
However, in order to raise the site out of flood zones A and B, the site as a whole will need to be raised a little more than a meter, on average. This will involve the infill of approximately 47,000m3 of material. A geotechnical report undertaken by IGSL on 22/01/2019 shows that the predominant soils in the area are brown silt/clay. The basement formation level is at c-1.50mOD, so it is not envisaged that rock will be encountered during excavation.

4.3 Proposed Waste Management Options

Waste materials generated will be segregated on site, where it is practical. Where the on-site segregation of certain wastes 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 Dún Laoghaire-Rathdown region that provide this service.
On site controls will include:

- Regular shaped skips, will be used for the duration of the demolition/ construction works. All skips will be situated in the waste segregation area on site.
- Labelled skips will be available for each of the following waste types: wood, metal, brick/ rubble, canteen waste, plasterboard, paper and cardboard, other general waste and special bins for any hazardous wastes as required.
- Throughout the demolition/ construction zone, covered labelled wheelie bins will be placed at designated waste depots. These bins will be taken and used by the operatives/ sub-contractors and returned to the depots after use.
- The waste segregation area banksman will co-ordinate the movement of skips to and from the demolition/ construction zone. The banksman will also co-ordinate the scheduling of the approved waste collector to transport waste to the relevant permitted/ licensed waste facility.

All waste arising will be handled by an approved waste contractor holding a current waste collection permit. All waste arising requiring disposal off-site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

Some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (Ref. Article 30 (1) (b) of the Waste Collection Permit Regulations 2007 as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste offsite in their work vehicles (which are not design for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s) detailing the waste arising throughout the C&D phases, 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 such as batteries, paints, oils, chemicals etc, if such wastes arise.

The management of the main waste streams is outlined as follows:
<u>Topsoil and Subsoil</u>
The Waste Management 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 bulk excavation phase.

It is anticipated that no excavated material will be taken off site, with the exception of the basement spoil. If for some reason this material is removed off-site 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.

If the material is deemed to be a waste, then removal and reuse/recycling/ recovery/disposal of the material will be carried out in accordance with the *Waste Management Acts 1996 – 2011* as amended. The volume of waste removed will dictate whether a COR, permit or licence is required by the receiving facility. 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).

Spoil/Imported Fill Management

Spoil and imported fill material will be distributed within the lands made available (LMA) to the extent practical. This requires proper placement of the spoil and fill material within the LMA using techniques to avoid or minimize environmental disturbance, such as vegetation impacts. If the spoil material cannot be completely distributed within the LMA, spoil disposal sites will be required.

Objectives:

- To ensure that all spoil shall be controlled to protect environment
- To ensure proper disposal of all spoil in the spoil disposal site in construction stage.

Management Measures:

- Identify an area to dispose of the spoil within the lands made available where possible
- Designate an area for temporary stockpiling if required, temporary stockpiles to be covered with 1.5mm thick polyethylene membrane
- All topsoil to be stored in stockpiles of 1m sloped to ensure no water can pond, they shall be kept weed free and planted with sterile Italian Ryegrass if they are to be in place for over 12 months
- Send samples of the material away for classification in the LoW.
- If no area can be identified for the disposal of spoil on site, material to be disposed of in accordance with waste management legislation.

Infill material will be imported to the site. This material will be either quarried product from quarries that have planning permission; greenfield/inert soil imported under a Waste Permit issued by the local authority; or materials that have been approved as by-products by the EPA in accordance with the EPA's criteria for determining a material is a by-product, per the provisions of article 27(1) of the European Communities (Waste Directive) Regulations, 2011. The required material should not be imported under an article 27 until the EPA and local authority have accepted the notification.

Bedrock

The basement formation level is at c-1.50mOD, so it is not envisaged that rock will be encountered during excavation.

Silt & Sludge

During the construction phase, silt and petrochemical interception will 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 and demolition works are expected to be clean, inert material and will be recycled, where possible.

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 into mixed ferrous, aluminium cladding, high grade stainless steel, low grade stainless steel etc., 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 demolition and construction phases 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. Some glass may not be suitable for recycling and this will be placed with the MNR waste.

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

C&D 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 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.

Disposal of Water, Wastewater and Sewage

All site facilities during construction will be located entirely within the site. The facilities will include canteen, toilet block and drying room for all staff/workers. These facilities will be connected to the Local Authority sewage system with local authority approval.

Water Disposal

Throughout the works, all surface water (water from excavations etc.) will be pumped to a holding tank on site. From here the water will be pumped to a series of settlement tanks. These tanks will act as primary and secondary settlement. The settlement tanks will be of sufficient number and size to allow the necessary retention time for solids to settle. The discharge water from the final tank will be routed to the existing combined water system with approval from the local authority. Visual checks of the pumping and settlement system will be carried out on a routine basis.

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 construction and removal of any construction waste offsite, details of the proposed destination of each waste stream will be provided to DLRCOCO by the project team.

4.4 Waste Minimisation

The following waste minimisation measures will be implemented during the course of the construction works:

- Facilitate recycling and appropriate disposal by on site segregation of all waste materials generated during construction into appropriate categories, including:
    - Top-soil, subsoil, gravel hard-core
    - Concrete, bricks, tile, ceramics, plasterboard
    - Asphalt, tar, and tar products
    - Metals

  - Dry Recyclables e.g., cardboard, plastic, timber
- All waste assessed by the Waste Manager as 'not suitable for reuse' will be stored in skips or other suitable receptacles in a designated area of the site, to prevent cross contamination between waste streams.
- Wherever possible, leftover materials (e.g., timber off cuts)
- Uncontaminated excavated material (top-soil, sub soil, etc.) will be segregated, stockpiled, and re-used on site in preference to importation of clean fill, where possible; and
- Where possible, the Waste Manager will ensure that all waste leaving site will be recycled or recovered.
- Identification of potential for reuse of Inert wastes

4.5 Waste Compound

The waste compound will include but is not limited to the following:

- Details of the provision of a dedicated and secure compound, containing bins and skips into which all waste generated by construction site activities will be placed.
- Responsibility for provision of signage and verbal instruction to ensure proper housekeeping and segregation of construction waste materials.
- Responsibility for identification of Permitted Waste Contractors who shall be employed to collect and dispose of waste arising from the construction works.

4.5.1 Waste Handling /Segregation and Storage

Wastes generated during works will be segregated and temporarily stored on site (pending collection or for re-use on site) in accordance with a pre-determined segregation and storage strategy (to be developed by the Principal Contractor as part of their SWMP).

The following minimum segregation and storage strategy requirements will be required:

- Waste streams will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on site drawings.
- Waste storage, fuel storage and stockpiling and movement are to be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable).
- Roles and responsibilities of those managing the segregation and storage areas will be identified.
- The waste storage area will contain suitably sized containers for each waste stream and will be agreed with the waste contractors in advance of the commencement of the project.
- All segregation and waste storage areas will be inspected regularly by the appointed Waste Manager.
- Waste will be stored on site, including metals, asphalt, and soil stockpiles, in such a manner as to:
  - Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures).
  - Maximise waste segregation to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling, and recovery; and
  - Prevent hazards to site workers and the general public during construction phase (largely noise, vibration, and dust).

4.6 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.

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996 – 2011*. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project waste manager 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/IED Licence for that site will be provided to the nominated project waste manager. 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.

5.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is provided below.

The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

5.1 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 capping material for landfill sites, or for the reinstatement of quarries etc. This material is often taken free of charge or a reduced fee for such purposes, reducing final waste disposal costs**.**

5.2 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.

5.3 Disposal

Landfill charges in the Leinster region are currently at around €120 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 C&D waste usually costs less than municipal waste. Specific C&D 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.

6.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the project waste manager to ensure commitment, operational efficiency and accountability during the C&D phases of the project.

6.1 Waste Manager Training and Responsibilities

The nominated waste manager 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 waste manager 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 waste manager 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 waste manager 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 C&D WMP.

6.2 Roles and Responsibilities

All parties involved in the Project will have responsibility for waste management. Responsibility will vary at different stages of the project lifecycle. Key responsibilities are set out in Table 6.1.

Some responsibility assignments indicated in Table 6.1 may change, depending on the agreed project contractual arrangements and project design requirements. The appointed Principal Contractor will be responsible for refining and implementing the findings of the outline CDWMP within their own over-arching Site Waste Management Plan (SWMP).

Responsible Party	Responsibility	Project Stage
Client	Appointment of competent Principal Contractor and Design Team Responsibility of waste management from 'cradle to grave', including documentation of same.	Project initiation and subsequent tendering phases All project stages
Principal Contractor	Construction & Demolition Waste Management Plan implementation Refinement and implementation of the outline CDWMP within their own over-arching Site Waste Management Plan (SWMP) Appoint competent and authorised waste management contractor(s) Appoint trained, competent Waste Manager	Project Implementation Project Implementation Project tendering phase Construction phase
Waste Manager	SWMP implementation Ensure that is the objectives of both the CDWMP and the contractors SWMP are put in place. Waste characterisation. Selection of techniques and design to minimise waste and to maximise recovery and recycling of waste during the project. Maintenance of Waste Documentation for 3 years. Completion of Final Waste Management Report Educate colleagues, site staff, external contractors, and suppliers about alternatives to conventional construction waste disposal	Project Implementation Construction stage Construction stage Project Design Phase and during project implementation Post-construction stage Construction stage
Design Team	Identification of Key Waste Streams Design to minimise waste generation in lifecycle of completed construction. Design of Soil Excavation Plan Adequately provide for waste management in tender documents and declare all relevant information & data.	Project Design Phase Project Design Phase Project Design Phase Project Procurement Phase
Subcontractors	Comply with CDWMP and Contractors SWMP, where relevant	Project Implementation

6.3 Site Crew Training

Training of site crew 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 C&D WMP 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

7.0 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 construction waste arising's on site. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times.

The waste manager or delegate will record the following;

1) Waste taken for reuse off-site;
2) Waste taken for recycling;
3) Waste taken for recovery;
4) Waste taken for disposal; and
5) Reclaimed waste materials brought on-site for reuse.

For each movement of waste off-site, a signed docket will be obtained by the Waste Manager from the contractor, detailing the weight and type of the material and the source and destination of the material. This will be carried out for each material type. This system will also be linked with the delivery records. In this way, the percentage of C&D waste generated for each material can be determined.

The system will allow the comparison of these figures with the targets established for the recovery, reuse and recycling of C&D waste presented earlier and to highlight the successes or failures against these targets

7.1 Noise, Dust and Vibration

The Main Contractor will be required to monitor noise, dust and vibration as will be outlined in the planning conditions. The Contractor will establish baselines for noise, dust and vibration in advance of works commencing onsite. As part of their detailed construction management plan, the Contractor will be required to clearly indicate how they plan on monitoring noise, dust and vibration throughout the course of the project

8.0 OUTLINE WASTE AUDIT PROCEDURE

8.1 Responsibility for Waste Audit

The appointed waste manager will be responsible for conducting a waste audit at the site during the C&D phase of the development.

8.2 Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported off-site will be undertaken mid-way through the project. If waste movements are not accounted for, the reasons for this will 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.

Waste management costs will also be reviewed. Upon completion of the C & D 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.

9.0 CONSULTATION WITH RELEVANT BODIES

9.1 Local Authority

Once construction contractors have been appointed and prior to removal of any C&D waste materials offsite, details of the proposed destination of each waste stream will be provided to DLRCOCO.

DLRCOCO will also be consulted, as required, throughout the excavation and construction phases 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.

9.2 Waste Permitting, Licences & Documentation

Under the Waste Management (Collection Permit) Regulations 2007, as amended, a collection permit to transport waste, which is issued by the National Waste Collection Permit Office (NWCPO), must be held by each waste collection contractor.

Waste may only be treated or disposed of at facilities that are licensed or permitted to carry out that specific activity (e.g., chemical treatment, landfill, incineration, etc.) for a specific waste type.

Operators of such facilities cannot receive any waste, unless they are 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 licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste permitted to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

Records of all waste movements and associated documentation will be held at the site. Records management and maintenance will be the responsibility of the Principal Contractor.

APPENDICES: CHAPTER 13 – CULTURAL HERITAGE

IAC ARCHAEOLOGY

- APPENDIX 13.1 GEOPHYSICAL SURVEY REPORT
- APPENDIX 13.2 ARCHAEOLOGICAL TESTING REPORT
- APPENDIX 13.3 BUILT HERITAGE ASSESSMENT OF CARRICKMINES STREAM AND MILL SITE
- APPENDIX 13.4 SMR/RMP SITES WITHIN THE SURROUNDING AREA
- APPENDIX 13.5 STRAY FINDS WITHIN THE SURROUNDING AREA
- APPENDIX 13.6 RPS/NIAH SITES WITHIN THE SURROUNDING AREA
- APPENDIX 13.7 HERITAGE LEGISLATION PROTECTING THE ARCHAEOLOGICAL RESOURCE
- APPENDIX 13.8 HERITAGE LEGISLATION PROTECTING THE ARCHITECTURAL RESOURCE
- APPENDIX 13.9 IMPACT ASSESSMENT AND THE CULTURAL HERITAGE RESOURCE
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APPENDIX 13.1 GEOPHYSICAL SURVEY REPORT

Geophysical Survey Report

Lands At Brenanstown & Carrickmines Great, South County Dublin

Detection License
18R0197

Client
IAC Ltd.

On behalf of
Lioncor Developments Ltd.

Date
October 2018

Project
TAG1800IE31

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TARGET REPORT 1800IE31
LANDS AT BRENANSTOWN & CARRICKMINES GREAT, SOUTH COUNTY DUBLIN

PROJECT BACKGROUND

Geophysical survey was undertaken at a proposed development site located in Brenanstown & Carrickmines Great townlands in South County Dublin. The survey examined 2 adjacent fields situated between Carrickmines LUAS Park & Ride (N) and the M50 Motorway (S), c.0.7km E pf the Park Shopping Centre and R842 serving Kiltiernan. Survey extended over 6.84 hectares of land, investigating 2 areas (M1-M2) bound to the S by a minor access road.

This survey forms part of a pre-planning archaeological assessment being undertaken prior to proposed development at the site, and it was commissioned by IAC Ltd. on behalf of Lioncor Developments Ltd. The survey objectives were to identify the location, form and character of buried archaeological remains, where present within the site boundary, and to advise further archaeological works prior to proposed development at the site.

Coordinates	722301 723924 (ITM central coordinate)
Townlands	Brenanstown & Carrickmines Great
County	South County Dublin
Landuse	Pasture (poorly maintained to the N and W)
Landscape, soils geology	Flat to undulating lowland occupied by fine loamy drift of the Clonroche (1100a) association, with alluvial soils (5RIV) to NW and SE (Irish National Soils Map, 1:250,000k, V1b, 2014). Bedrock comprises of pale grey fine to coarse-grained granite of Type 2e equigranular, Northern and Upper Liffey Valley Plutons (Geological Survey Ireland Spatial Resources, Public Data Viewer Series).
Archaeology	The area of archaeological potential associated with enclosure and mill site DU026-080001/002 traverses the eastern portion of the proposed development. No surface visible traces of DU026-080001/002 remain. Numerous RMPs in the vicinity of the site, and discoveries from recent excavations connected with neighbouring developments, demonstrate that the site is located within a region rich in evidence of human settlement ranging from the early prehistoric through to the late medieval period. Details of enclosure and mill site DU026-080001/002 and further RMPs within a 0.6km radius of the site are provided below:

SMR No.	Class	Townland	ITM East	ITM North
DU026-080001	Enclosure	Brenanstown	722443	723952
DU026-080002	Water mill -unclassified	Brenanstown	722443	723952
DU026-005001-5	Castle, bawn, fortifications, mill,	Carrickmines Great	721719	724068
DU026-145,146	Rock art	Carrickmines Great	721719	724068
DU026-007	Portal tomb	Brenanstown	722828	724187
DU026-006	Enclosure	Laughanstown	722733	723791
DU026-150	Fulacht fia	Carrickmines Great	722574	723298
DU026-135	Fulacht fia	Carrickmines Great	722225	723690
DU026-080	Mill & enclosure	Brenanstown, Carrickmines Great	722443	723952
DU026-005001-5	Castle, bawn, fortifications, mill,	Carrickmines Great	721719	724068
DU026-145,146	Rock art	Carrickmines Great	721719	724068
DU026-007	Portal tomb	Brenanstown	722828	724187

Fieldwork	18th & 19th September 2018	**Detection license**	18R0197
Report issue	3rd October 2018	**Client**	IAC Ltd. on behalf of Lioncor Developments Ltd.
Author	John Nicholls MSc	**Technique**	Magnetic gradiometry

1 SURVEY METHODOLOGY

1.1 Survey coverage and data collection

1.1.1 High resolution magnetic gradiometer survey was undertaken within the site boundary, investigating a total 6.84 hectares of available land, examining 2 adjacent fields, completing 2 areas of survey (M1-M2). The survey employed an advanced multichannel fluxgate gradiometer system combined with cm precision GPS. Magnetic gradiometer and GPS data were recorded simultaneously at rates of 75Hz and 1Hz respectively, conducting parallel instrument traverses 2.8m in width across the site, providing a spatial resolution of c.80 magnetic gradiometer measurements per square metre.

1.2 Survey instrumentation

1.2.1 Details of the instrumentation employed for this geophysical survey are provided below:

Technique	Sensor spacing	Sample rate	Instrumentation	Instrument sensitivity/precision	No. of measurements recorded
Magnetic (fluxgate) gradiometry	0.35m	75Hz	Bartington 1000L fluxgate gradiometers & DL601	0.1nT (1000mm baseline)	755,102
GPS	3.15m	1Hz	Trimble R10 GPS operating in VRS mode	<0.1m (vertical & horizontal)	10,835

1.3 Data processing

1.3.1 Survey data were processed using in-house, open-source and commercial software. Following GPS and magnetic gradiometer measurements on site survey data were processed as follows:

Process	Description
1	Zero median correction to balance data from entire sensor array
2	Gridding of corrected data via nearest neighbour interpolation or kriging
3	Greyscale generation at optimum range & export to tiff-format (.tiff & .wld)

1.3.2 To ensure the integrity of the processed data, and maintain close correlation with the original raw on-site measurements, no additional smoothing, low or high pass filters were applied proceeding steps 1-3.

2 GENERAL CONSIDERATIONS & COMPLICATING FACTORS

2.1 Access & ground conditions

2.1.1 The proposed development extends across 2 adjacent fields covering a total 9ha of land separated by a stream. At the time of fieldwork the northern field comprised very poorly maintained pasture land covered in high vegetation with an abundance of modern debris at the surface. These poor surface conditions complicated fieldwork in M1, and significantly compromised data quality. Poor ground conditions were also noted in M2 to the NE and NW.

2.2 Modern interference

2.2.1 High voltage overhead power cables traverse M2 NW of survey centre on NE-SW alignment, with further disturbance along the northern and eastern limits of M2 caused by buried services.

2.2.2 Numerous small-scale ferrous responses are also evident throughout the results from M1-M2. Ferrous responses are a common occurrence in magnetic survey data, and in most cases represent modern metal debris contained within the topsoil.

2.2.3 Broad areas of ferrous response are also apparent in the results, notably at the northern, eastern and western perimeter of M1, and to the NE and SW in M2. These mostly correspond to surface visible manholes and debris sited along the northern perimeter of M2. However, the potential that the zones of ferrous disturbance to the NE in M2 represent remains associated with water mill DU026-008002 should not be dismissed.

2.2.4 An extensive network of land drains, which is visible as a herringbone pattern of narrow interconnecting linear anomalies, extends across the eastern portion of M2.

2.2.5 The remains of 3 former boundaries are also indicated by the results from survey in M2.

3 MAGNETIC GRADIOMETRY RESULTS

3.1 M1

3.1.1 Stongly magnetic positive/negative linear responses A and B to the E-SE in M1 may be of potential interest, possibly representing remains associated with DU026-080001/002. However, no definitive concentrations of response indicative of a water mill site or enclosure type anomalies are evident in this location. A possible natural soil/geological explanation for responses A-B should be considered.

3.1.2 A further sub-rectangular pattern of weak linear trends (C) is evident E of survey centre in M1, to the W of responses A-B. The potential archaeological significance of these trends should not be ignored. However, interpretation remains uncertain as these anomalies are at the limits of instrument detection, and a possible natural soil/geological explanation or former landuse origin may be expected.

3.1.3 No further responses of note are indicated by the results from survey in M1.

3.2 M2

3.2.1 The results from survey in M2 highlight the location a ring ditch (D) in the western portion of survey. This measures c.13m in diameter. Linear responses and discrete positives of expected archaeological significance have been recorded c.25m to the W (E) and immediately S (F) of ring ditch D. A possible posthole structure is also indicated by a discrete circular arrangement of poorly defined responses (G) located c.26m NE of C. Combined responses D-G may represent part of a larger concentration of settlement remains extending beyond the western/south-western limits of the site.

3.2.2 Archaeological interpretation of broad positives H shortly NE of G is uncertain, and a natural soil/geological origin should be considered. A potential pit location (I) has also been recorded in proximity to the south-western edge of survey.

3.2.3 E-NE of survey centre in M2 several responses of possible interest are evident, including a group of potential pit locations (J), increased response K, and faint linear anomaly L. Interpretation of J-L is tentative. The potential that these responses may represent remains associated with DU026-080001/002, should not be dismissed. However, given the poor nature of the ground surface and the recent installation of an extensive network of land drains in this location, the exact origin of J-L remains unclear. Similar patterns of response are evident elsewhere in M2 to the E (M) and SE of survey centre (N).

3.2.4 No further responses of note are indicated by the results from survey in M2.

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4 CONCLUSION

4.1 No responses confirming the exact location of enclosure and watermill remains DU026-080001/002 are evident in the results from survey in M1-M2. Anomalies located in proximity to the zone of archaeological potential associated with DU026-080001/002 have, however, been recorded. These include strongly magnetic linear anomalies, discrete positives and weak trends, although the exact origin of these responses remains unclear, particularly in view of adjacent disturbance from modern buried services, land drains and ferrous debris. A natural soil/geological, recent landuse, or modern ferrous origin for these responses should not be dismissed.

4.2 To the W/NW in M2 the results from survey confirm the location of 1 ring ditch, and further linear/pit remains including a possible posthole structure.

4.3 The results also display remnants of past cultivation, former land divisions, and an extensive network of land drains.

4.4 Interpretation of the results from both M1-M2 has been complicated by modern interference deriving from high voltage overhead power cables, buried services and modern ferrous debris.

*** This conclusion must be read in conjunction with the detailed discussion of the results included in the main section of this report.**

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LIST OF FIGURES

APPENDIX

APPENDIX 1: TECHNICAL INFORMATION

INSTRUMENTATION

GPR/Ground Penetrating Radar: GPR systems comprise a configuration/data acquisition unit, a transmitting/receiving antenna (250-500mhz), and a cart with an odometer or integrated GPS. The technique is used for identifying remains of buried foundations, structures and cavities. GPR systems transmit a continuous electromagnetic wave of energy into the ground and record reflections of that energy as it interacts with the stratigraphy and structures below the surface. Data is acquired along parallel transects, 0.5m or 1m apart, and recorded as a function of the elapsed time for the energy wave to travel from transmitter to reflector and back to the surface. The strength of reflections recorded from GPR survey is proportional to the conductive and dielectric properties of the buried objects with which the transmitted energy is incident.

Gradiometry/Magnetometry (6 sensor gradiometer system combined with GPS): Gradiometry is the most widely applied technique in archaeological prospection, and is regularly used on sites 1-100ha in size to locate and characterize buried remains of enclosure ditches, pits, hearths, furnaces and kilns. These remains often produce magnetic contrasts above localized soil/geological variation due to enhancement from burning activity and organic enrichment of the soil during archaeological settlement. Mapping of these contrasts is undertaken using an array of either caesium or fluxgate magnetometer sensors for measurement of the earth's total field or variations in its vertical component. Target uses a 6 sensor gradiometer system combined with cm precision GPS to measure magnetic anomalies from buried archaeological remains in detail, collecting data along parallel lines 0.5m or 0.75m apart, at 10-12cm intervals along each line.

Electrical Resistivity: Electrical resistivity is generally used to map locations of buried structures, including foundation remains, walls, burial cairns, and existing earthworks. Using an array of electrodes mounted on a portable frame a small electrical current is passed through the ground at regular intervals via *current* emitting probes. Variations in resistance to the flow of this electrical current as it passes through the ground are measured by *potential* probes. Single or parallel twin arrays use 1 or 2 pairs of current and potential probes fixed to a mobile frame, with 1 remote *current* and 1 *potential* probe maintained stationary 20m from the survey limit. Resistivity surveys are normally conducted at 0.5m x 1m or 1m x 1m intervals.

EMI/Electromagnetic Induction (EMI sled system combined with GPS): EMI is suitable for detection of buried remains including foundations, enclosures, ditches, pits, and kilns. The technique measures variations in both the electrical conductivity and magnetic susceptibility of the soil. EMI systems comprises of 1 transmitting and 2-4 receiving coils, providing 2-8 data sets from below surface. The transmitting coil generates a time varying primary magnetic field which propagates above and below ground, generating alternating (eddy) currents within the soil and the objects it contains. These create a secondary magnetic field proportional to the rate of change of the magnetic field, which is measured by receiving coils 0.5m and 1m from the transmitting coil. Target's EMI sled system is used to survey in vertical or horizontal modes along 0.5m, 0.75m or 1m spaced lines at 10-12cm intervals along each line.

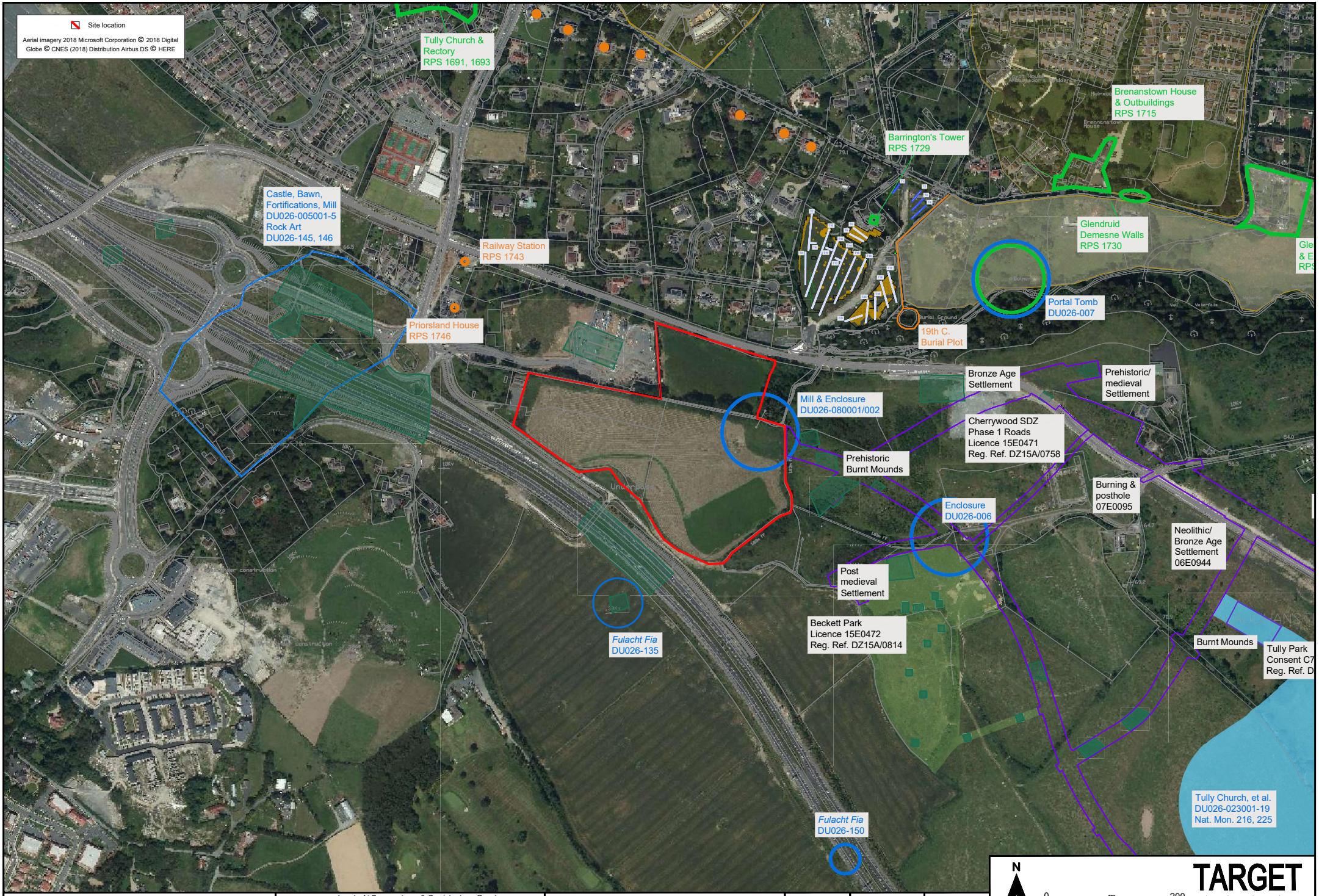
DISPLAY

Greyscale: The greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at very fine increments, allowing the full range of values to be displayed within a given data set. This display method also enables the identification of discrete responses barely above localized soil/geological variations.

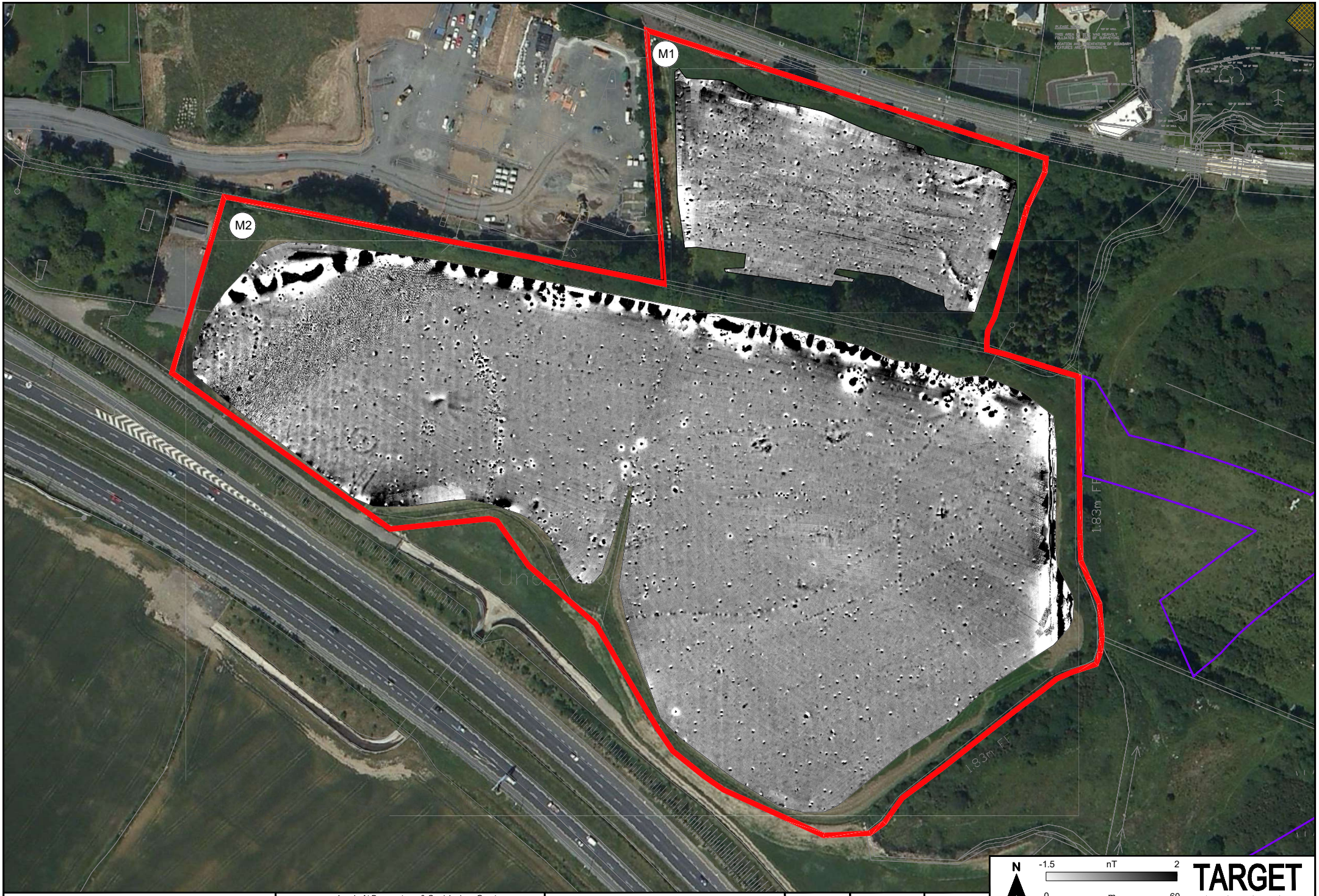
Colour Plot: Colour plots comprising RGB values linearly interpolated between a user-specified range of values can provide further insight into the varying anomalies within a given data set. Colour plots are particularly useful for EMI data where presentation of results within a confined range of values is not always feasible with other formats.

XY Trace: XY Trace displays provide a near-perspective representation of responses recorded along each instrument traverse. The format is used mainly for locating responses from modern ferrous, but can assist in identifying magnetically strong anomalies relating to hearth, kiln and furnace remains. Ferrous anomalies can also be identified via a search of the attribute table in a GIS extracting readings beyond a specified range (e.g. where z<= -15 and where z>=15), and then combining this layer with other display formats for interpretation.

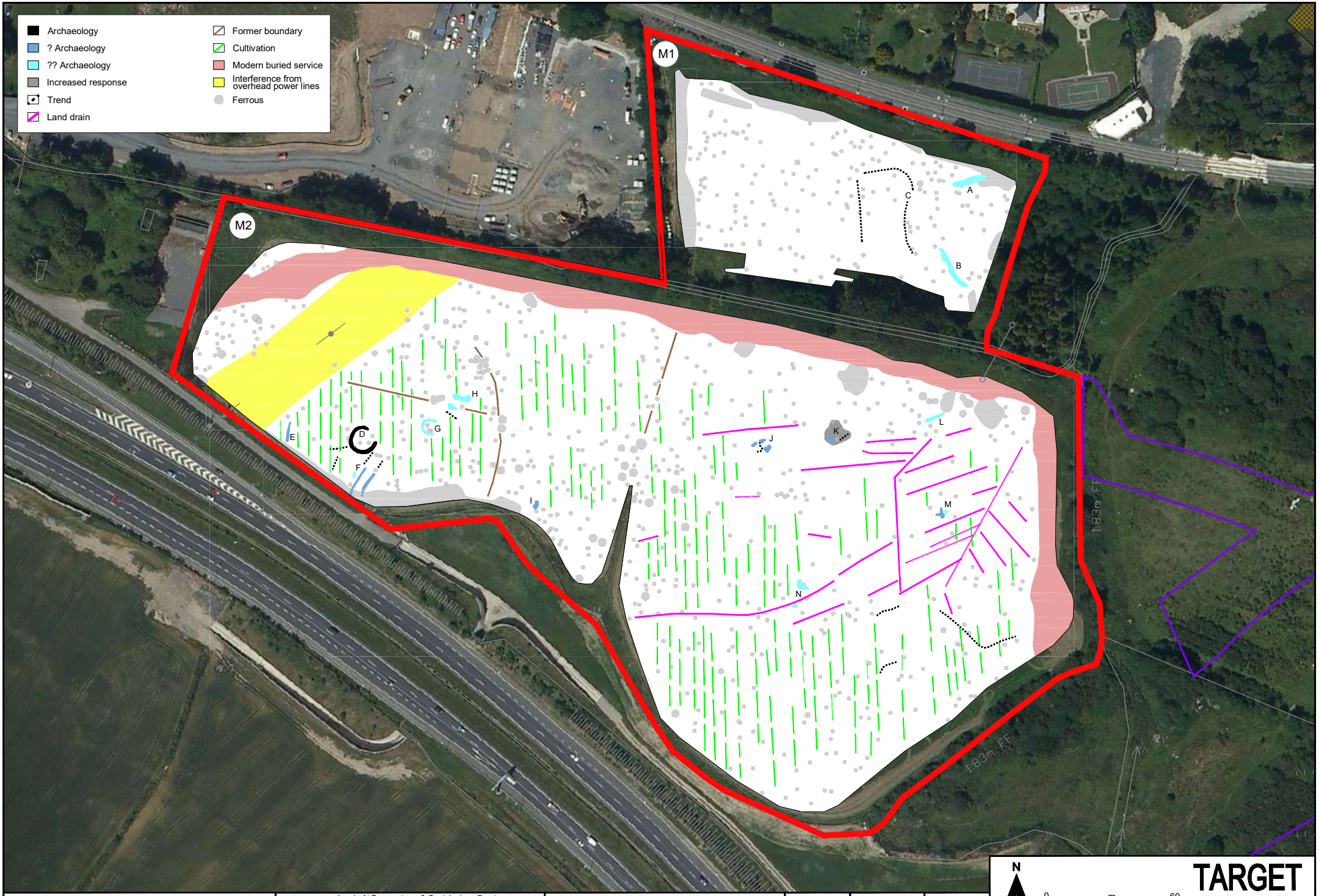
Time-slice: Radargrams collected from grid based survey or parallel transects can be compiled as a 3D volume, then re-sampled to produce a series of 2D plans at incremental depth/time offsets. A series of Time-slice displays at 25-50cm offsets permits analysis of the pattern and depth of reflections within a given GPR survey area.



Drawing	Site location diagram, survey locations M1-M2	**Project**	Lands At Brenanstown & Carrickmines Great, South County Dublin	**Client**	IAC Ltd. on behalf of Lioncor Developments Ltd.	**Fig.** 1	**Scale** 1:5000 @ A3	**TAG.** 1800IE31



Drawing	Greyscales M1-M2	**Project**	Lands At Brenanstown & Carrickmines Great, South County Dublin	**Client**	IAC Ltd. on behalf of Lioncor Developments Ltd.	**Fig.** 2	**Scale** 1:1500 @ A3	**TAG.** 1800IE31



Drawing	Interpretations M1-M2	**Project**	Lands At Brenanstown & Carrickmines Great, South County Dublin	**Client**	IAC Ltd. on behalf of Lioncor Developments Ltd.	**Fig.** 3	**Scale** 1:1500 @ A3	**TAG.** 1800IE31

TARGET archaeological geophysics

APPENDIX 13.2 ARCHAEOLOGICAL TESTING REPORT

IAC Archaeology

ARCHAEOLOGICAL ASSESSMENT
AT
PRIORSLAND,
BRENANSTOWN & CARRICKMINES GREAT,
DUBLIN 18

LICENCE NUMBER: 18E0650

ON BEHALF OF: LIONCOR DEVELOPMENTS LTD

I.T.M.: 722285, 723930

LICENCEE: LIZA KAVANAGH
AUTHOR: LIZA KAVANAGH & MAEVE TOBIN

DATE: JANUARY 2019

IAC PROJECT REF.: J3349

IRISH ARCHAEOLOGICAL CONSULTANCY LTD
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ABSTRACT

Irish Archaeological Consultancy Ltd has prepared this report on behalf of Lioncor Developments Ltd, to study the impact, if any, on the archaeological and historical resource of proposed residential development, which is located at Priorsland, Dublin 18 (OS Sheet 26, ITM 722285, 723930). The report was undertaken by Liza Kavanagh and Maeve Tobin of IAC Ltd under licence 18E0650 and follows on from a geophysical survey which was carried out in September 2018 by John Nicholls (Licence 18R0197). Archaeological testing was carried out over the course of five days from 8th November 2018. The results of both investigations, and the conclusions summarised below, will inform an impact assessment and mitigation strategy for a future planning application.

Recorded Monuments

The trenches targeted the zone of notification for recorded monument DU026-080 (mill and enclosure), geophysical anomalies and open green space to fully investigate the archaeological potential of the site. The Carrickmines Stream crosses the site on a west–east alignment and is fed by the Ticknick Stream which forms the eastern boundary of site. The geophysical survey and testing did not reveal any evidence for structural remains or an enclosure within the zone of notification for DU026-080. This area had been heavily disturbed by modern land drains and services, as indicated by the geophysical survey. It is possible that land improvement during the late 19th century may have removed any remaining trace of a former mill building; however it is also possible that the location of the mill was misidentified, and the actual location could be situated further to the northeast beyond the application site boundary.

No groundworks should be carried out within the zone of notification for DU026-080 without prior consultation with an archaeologist. It is recommended that all ground disturbances associated with the proposed development within this area, including site investigations and topsoil stripping, be monitored by a suitably qualified archaeologist under licence to, and in consultation with the National Monuments Service (NMS). If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation *in-situ* or by record. Any further mitigation will require approval from the NMS.

Newly Identified Archaeology

Testing revealed seven previously unrecorded areas of archaeological significance, which have been designated as Archaeological Areas 1–7. These comprise a probable Bronze Age penannular ditch enclosing at least four cremation pit burials and two pits (AA1), two single pits (AA2 and AA3) and four areas containing disturbed spreads of burnt mound material (AA4–7). On the discovery of human remains and ceramic in AA1 the National Museum of Ireland (NMI) and NMS advised emergency excavation of the features exposed in Trench 37 under a reactivation of licence 18E0650. This was carried out during week commencing 26th November 2018. There is high potential that further burial pits survive outside the extent of the investigated test trench within the enclosure ditch. Ground works associated with the proposed development, such as topsoil stripping and excavation, would have a significant adverse impact on the archaeological features or deposits in AA1–7 and associated remains.

No ground works, such as site investigations, should be undertaken within the vicinity of AA1–7 without prior consultation with an archaeologist. While it is acknowledged that preservation *in-situ* of newly discovered archaeological sites is the preferred policy of the development plan where possible, the location of the archaeology in AA1–7 is situated within the footprint of numerous proposed buildings and the access road. Development densities and layout of the infrastructure has been prescribed in the development plan for Cherrywood and as such there will be a direct negative impact on the recently identified archaeology. It is therefore recommended that the archaeological features in AA1–7, and any associated remains, be preserved by record (i.e. excavation) in advance of construction. Excavation should be carried out by a licence eligible archaeologist in consultation with the NMS.

Unidentified Archaeology

This investigation has confirmed the accuracy of the geophysical survey and as such we now have a good understanding of the site. There is potential however for previously unrecorded archaeology to survive beneath the current ground surface, outside of the investigated trenches in areas that were not accessible for survey (i.e. beneath overhead wires and along hedgerows). Small ephemeral features, such as the pits in AA2 and AA3, do not have a geophysical signature. Furthermore there is a low possibility that truncated remains of the former mill may be preserved in areas not suitable for geophysical survey or testing.

Ground works associated with the proposed development, such as topsoil stripping and excavation, would have an adverse impact on any previously unrecorded archaeological features or deposits that have the potential to survive. As such it is recommended that all ground works be subject to archaeological monitoring. This work should be carried out under licence to, and in consultation with the NMS. Further mitigation, such as preservation *in-situ* or excavation, may be required dependant on the findings of this investigation.

Priorsland,
Brenanstown and Carrickmines Great, Dublin 18
Archaeological Assessment
Licence Number: 18E0650

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1 INTRODUCTION

1.1 GENERAL

The following report details the results of a programme of archaeological testing undertaken at a site in Priorsland located within the townlands of Brenanstown and Carrickmines Great in Dublin 18 (Figure 1, ITM 722285, 723930). This assessment has been carried out to ascertain the potential impact of the proposed development on the archaeological resource that may exist within the proposed development area. The assessment (licence 18E0650) was undertaken by Liza Kavanagh of Irish Archaeological Consultancy Ltd (IAC), on behalf of Lioncor Developments Ltd.

Test trenching was carried out under strict archaeological supervision over the course of five days from 8th November 2018 using a 13 tonne 360 degree tracked excavator fitted with a flat, toothless bucket. A total of 41 trenches were mechanically investigated across the test area which measured 1,810 linear metres. Testing follows on from a geophysical survey undertaken by John Nicholls in September 2018 (Nicholls 2018, licence 18R0197) and the results of both investigations will inform an impact assessment report to be submitted with a future planning application.

The trenches targeted the zone of notification for recorded monument DU026-080 (mill and enclosure), geophysical anomalies and open green space to fully investigate the archaeological potential of the site. No evidence for mill buildings or enclosure was identified that may be associated with DU026-080. Seven areas containing previously unidentified archaeological features and artefacts were identified during testing. The most significant of these comprises a probable Bronze Age penannular ditch enclosing at least four cremation pit burials with urns and two burial pits (AA1). On the discovery of human remains and ceramic in AA1 the National Museum of Ireland (NMI) and National Monuments Service (NMS) advised emergency excavation of the features exposed in Trench 37 under a reactivation of licence 18E0650. An updated method statement was prepared in consultation with a conservator (Susannah Kelly) and osteoarchaeologist (Maeve Tobin), and the excavation was carried out by Liza Kavanagh during week commencing 26th November 2018. The results of this excavation will be reported separately.

1.2 THE DEVELOPMENT

It is proposed to submit a planning application for a residential development at Priorsland, in the townlands of Brenanstown and Carrickmines Great in Dublin 18. The site currently comprises two fields of pasture bound to the north by the Luas line, to the south by the M50, to the northwest by the Luas Park&Ride facility and to the east by the lands under development within the Cherrywood Strategic Development Zone (SDZ). It is traversed by the Carrickmines Stream on a west–east axis and the Ticknick Stream forms the eastern boundary.

The Cherrywood Planning Scheme (2014) zones the application site for residential, village centre, education, infrastructure, and park development. The site will be accessed by Castle Street which was recently constructed up to the eastern boundary

of the application site. The SDZ Planning Scheme (2014) has prescribed the location, quantum and mix of development including the physical infrastructure to be constructed within the plot (see Map 6.3 contained in the planning scheme).

Detailed design is not currently available however high level plans indicate a mix of residential and commercial development in the southern field with a future school and park in the northern field (Figure 2). In the southern field rows of terraced townhouses are proposed in the west with higher density apartment blocks and commercial buildings (village centre) in the east. Castle Street will be extended along the length of the site, to the south of the stream and at least two access points are required to cross the watercourse, although exact locations are not currently known. Flood prevention works will also be required along the route of the watercourse.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 SITE SPECIFIC DESCRIPTION & BACKGROUND

The site is situated in the townlands of Carrickmines Great and Brenanstown, bisected by the Carrickmines Stream which forms the townland boundary (Figure 1, Plates 1–4). The M50 borders the site to the south and the Luas line passes to the immediate north. The Luas Park & Ride facility is situated to the immediate northwest with Priorsland House to the west of this. The site currently comprises two fields of level pasture, used by the Carrickmines Equestrian Centre (Figure 1, Plates 1–3). The zone of notification for a recorded mill and enclosure (DU026-080001) is located within the eastern half of site.

Prehistoric Period

Extensive evidence for Bronze Age burial and settlement activity has also been recorded from the wider area around Carrickmines Great, Jamestown, Laughanstown, Cherrywood, Glebe, and Kilgobbin (Seaver 2013; McQuade 2013; and ÓDrisceoil 2013). The nearest evidence for settlement comprises the early and late Bronze Age hut structures excavated c. 50m to the south within the footprint of the M50 (ÓDrisceoil 2013). A large quantity of flints were recovered associated with these sites. Several *fulachtaí fia*, have been identified c. 200m south at Carrickmines Great (DU026-135) and 300m east at Brenanstown (Whitty, McIlreavy and Kavanagh 2018, licence 15E0471) which date to this period. The burnt mounds excavated at AA1 and AA6 lie to the immediate east of the stream, bordering the current field, and these sites have been dated to early and middle Bronze Age (Whitty, McIlreavy and Kavanagh 2018; 2σ 2466–2142 BC, UBA 38739; 2σ 1887–1691 BC, UBA 38746).

Megalithic rock art, cup-marked granite boulders (DU026-145 and DU026-144) were identified during groundworks associated with the M50 in Carrickmines Great and Laughanstown respectively. These stones are to be relocated to Cabinteely Park for public accessibility. A portal tomb (DU026-007) is present on the north side of the Carrickmines Stream 420m to the east-northeast; and a Wedge Tomb DU026-024 is recorded 1.3km south in Laughanstown.

Evidence for burial at this time is wide spread with a substantial Bronze Age cemetery excavated at Laughanstown 1.6km south (Seaver 2013). An early Bronze Age cremation burial accompanied by an urn, a copper alloy pin and some burnt flint was also excavated c. 1.7km to the southeast in the same townland (McQuade 2005). A ring barrow (DU026-133), cremation burial and the remains of a roundhouse were also excavated further away at Cherrywood (O'Neill 1998).

A Bronze Age cist burial (DU026-015) discovered in 1926 during quarrying in Jamestown c. 2km west. Excavation in advance of a golf course revealed further Bronze Age features in the adjacent field (Kyle 2012; Licence Ref.: 11E0085) and the NMI Topographical Files note stray finds of human bone and pottery sherds in the Jamestown area (NMI 1957:126–9, 1929: 1290). Further northwest evidence for an extensive prehistoric landscape have been identified in Kilgobbin including an urn

burial (DU026-123). The presence of a mixture of finds from different periods in some of these features is significant in that it is representative of an intensive, multi-phased, prehistoric environment (Hagen 2013). These excavations included a Beaker enclosure, a Beaker hut site, Beaker pits, a Bronze Age burial complex with associated stakeholes comprising two cremation burials and middle–late Bronze Age pottery.

There is a growing corpus of evidence for Iron Age activity in the wider vicinity of the application site. Settlement features have been recorded during excavations at Carrickmines Great, Jamestown, Laughanstown, and Kilgobbin. Iron Age hut sites were excavated at Kilgobbin (Hagen 2013) and at Carrickmines Great (ÓDrisceoil 2013; ÓDrisceoil and Devine 2012). The early Iron Age habitation site at Carrickmines Great, to the immediate south of the application area, appeared to be a small undefended farmstead represented by a post-built circular house associated with iron-smelting furnace, charcoal-production features and cultivation of cereals (*ibid*.). At this time the surrounding landscape has been characterised as woodland with oak, alder, hazel, ash and apple trees in the vicinity. A late Iron Age cremation burial pit was also recorded in the northern limit of the Carrickmines Great excavation area c. 50m north of the 'farmstead' discussed above (ibid.). Further evidence for Irons Age burial was identified as a cremation deposit within a ringditch excavated at Jamestown (Kyle 2012). A copper-alloy ring retrieved from this ringditch has been interpreted as a finger ring, a chain link, or part of a composite bracelet or necklace (*ibid*.).

Medieval and Post-medieval Period

The complex of medieval settlement features at Carrickmines (DU026-005001-4) is situated c. 210m to the northwest. Carrickmines lay at the junction of two medieval roads, leading north to Dublin and east to Laughanstown/ coast (Clinton and Shiels 2013, 137). Excavations c. 100m northwest of the application site in advance of the M50 revealed three conjoined enclosures representing occupation from the late 12th century into the modern period (ibid.). It is likely, based on historical and archaeological records, that a small manor (including a stone-lined cereal-drying kiln) containing arable and pastoral land was present at Carrickmines from the mid-late 12th century (Bolton 2016, 112). In the following decades a horizontal watermill, workshop containing three furnaces or kilns, and an additional structure were built. In the early 13th century the excavators have identified a moated enclosure surrounding the manor, representing the first evidence for fortification at Carrickmines. A significant number of artefacts (c. 90,000) were recovered during excavation at Carrickmines, including a vast number of locally produced ceramics and metalwork (Clinton and Shiels 2013, 138)

The zone of notification for a recorded mill and enclosure (DU026-080001) is located within the eastern half of site (Figure 1) based on field work for the Ordnance Survey in 1837. A building, quern stone and possible enclosures were recorded in a sketch map in the approximate location of the proposed development area (Figure 3). These were recorded on the first edition 6-inch OS map as the site of an ancient mill (Figure 4); now recorded as DU026-080. By the turn of the 20th century the stream had formerly canalised and the fields subject to reorganisation. No evidence for the

location of the former mill is shown on the 1909 25-inch OS map (Figure 4). Earlier mapping in the mid-17th century (Figure 3) suggests the site of a water mill further to the northeast. The exact location of the mill is a bit vague. Field inspection did not identify any no evidence for former mill buildings (Plates 2–4).

The rerouted Carrickmines Stream survives today as a deep channel with stone faced banks, lined on either side with mature trees. A narrow avenue of trees is present on the northern side of the stream on a raised level bank. The stream was inspected in September 2018 by an archaeologist during field inspection (Plate 4). While no obvious cut stone or quern stones were noted it is possible that the wall facing reused debris from former structural remains associated with a mill building.

2.2 PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

A geophysical survey was undertaken within the application site (M1–M2) in September 2018 (Nicholls 2018, licence 18R0197, Figure 5). No responses confirming the exact location of enclosure and watermill remains DU026-080001/002 are evident in the results from survey in M1-M2. Anomalies located in proximity to the zone of archaeological potential associated with DU026-080001/002 have, however, been recorded. These include strongly magnetic linear anomalies (Anomaly A-B), discrete positives and weak trends (Anomalies C, J-N), although the exact origin of these responses remains unclear, particularly in view of adjacent disturbance from modern buried services, land drains and ferrous debris. A natural soil/geological, recent land-use, or modern ferrous origin for these responses should not be dismissed.

To the west-northwest in M2 the results from survey confirm the location of one ringditch (Anomaly D), and further linear/pit remains (Anomaly E-I) including a possible posthole structure. The results also display remnants of past cultivation (green lines), former land divisions (brown lines), and an extensive network of land drains (pink lines). Interpretation of the results from both M1-M2 has been complicated by modern interference deriving from high voltage overhead power cables, buried services and modern ferrous debris.

3 ARCHAEOLOGICAL TESTING

3.1 GENERAL

Test trenching took place between the 8th and 14th of November 2018, using a 13 tonne 360 degree tracked excavator equipped with a flat, toothless bucket under strict archaeological supervision. A total of 41 trenches were excavated within the area of proposed development. The layout of test trenches was designed to investigate the archaeological potential of the zone of notification for the recorded monuments DU026-080001–2 and geophysical anomalies A-N; with further trenches scattered in the open areas (Figures 5 and 6). Any investigated deposits were preserved by record. This was by means of written, drawn and photographic records.

The test trenches were excavated to determine, as far as reasonably possible, the location, extent, date, character, condition, significance and quality of any surviving archaeological remains threatened by the proposed development. Test trenching was also carried out to clarify the nature and extent of existing disturbance and intrusions and to assess the degree of archaeological survival in order to formulate further mitigation strategies. These are designed to reduce or offset the impact of the proposed development scheme.

3.2 TESTING RESULTS

A total of 41 trenches were excavated across the site measuring 1,810 linear metres (Figure 6, Plates 4–14). Trenches 2 and 13 were partially extended from that proposed in the method statement to investigate the extent of archaeology. The trenches were excavated across two flat fields of pasture currently grazed by the Carrickmines Equestrian Centre horses. Testing was carried out in wet conditions and water pooling was evident in the northeast quadrant of the southern field within the zone of notification of DU026-080001-2. The results of each trench are detailed in Appendix 1 with a full description of each archaeological context included in Appendix 2.

The topsoil generally consists of a mid to dark grey silty clay with occasional inclusions of field stone. In the northeast of the southern field the topsoil is quite thin (0.2m), overlying a mid-grey sandy clay, associated with past flood events. In the southwest the topsoil is quite deep, extending to c. 0.7m in places. The subsoil varies across site but is most commonly a yellow beige sandy clay with frequent stone inclusions. A light blue grey marl subsoil is noted adjacent in the vicinity of the former Carrickmines Stream. Banding of yellow sand and dark grey sand with decayed stone was noted in the southwest quadrant.

Testing confirmed that the development area has been extensively disturbed and truncated by modern drainage features. There was hardly one trench that didn't indicate some form of land improvement, such as shallow clay filled drains, stone culverts, stone filled drains or drains containing ceramic pipe (Plates 15–19). The drainage features along the southern and western perimeter of site are largely shallow, gently sloping linear concave cuts filled with a variation of grey silty clay. The

north and east of the field is criss-crossed by narrow stone-filled drains containing orange/red clay pipes. The northern field is frequently traversed with large stone culverts, many of which are still in operation. A possible former field boundary shown on the geophysical survey is noted in T32 and T33, appearing as a shallow concave cut filled with grey silty clay.

A number of other non-archaeological features were also noted, including such as the root burning in T34 and the large dump of stone in T36 (Plates 20 and 21) which correspond to geophysical anomalies.

3.2.1 Recorded Monument DU026-080 (mill and enclosure)

The zone of notification for this record was targeted by 11 test trenches (T8–10, T11–T16 and T22. These trenches largely reflected a sterile environment truncated by substantial number of land drains. Archaeological features (C15.1 and C13.1) were identified in two of these trenches but these appear to represent prehistoric burnt mound activity and not related to recorded milling activity. These findings are also reflected in the geophysical survey which does not identify any distinct structural remains or archaeology. The archaeological features are described in AA5 and AA6 below.

3.2.2 Archaeological Features

Testing revealed seven previously unrecorded areas of archaeological significance, which have been designated as Archaeological Areas 1–7 (AA1-7). These comprise a probable Bronze Age penannular ditch enclosing at least four cremation pit burials and two pits (AA1), two single pits (AA2 and AA3) and four areas containing disturbed spreads of burnt mound material (AA4–7). The latter features have been heavily truncated by modern drainage and in AA6 and AA7 scant remains of the presumed original archaeology.

Archaeological Area 1

T37 (Figure 6 and 7, Plates 22–26) was excavated in the southwest quadrant of the proposed development area, targeting the geophysical anomaly ('D') indicating a C-shaped enclosure/ penannular ditch. The trench revealed the southwest section of the ditch (C37.1) enclosing six pits (C37.2–7), four of which contain urns (C37.2, C37.3, C37.4, and C37.5) and two of these display exposed cremated human remains. The ditch measures 1.5m wide and 0.6m deep. At the northern end of the ditch a possible terminus for the ditch (C37.9) was identified in the western edge of the trench. If this is the case then the enclosure has a potential diameter c. 9m. Extending for at least 5m from the northeast side of the ditch is a deposit (C37.8) of mid brown silty clay with occasional decayed stone inclusions. This deposit appears to have been cut by some of the pits and partially overlies pits C37.5 and C37.7.

The features were temporarily covered and protected pending excavation. The urn burials in T37 were covered with thin individual sheets of ply and then covered with a layer of polythene or terram. This methodology aims to prevent damage of the vessels and human remains from compaction or accidental damage in the interim period. The open trench was fenced off and made secure. Emergency excavation of all

features exposed within T37 was carried out in late November 2018 however the remains of the monument extend beyond this trench and there is high potential that further burial pits exist within the enclosure. The four burial pits with urns were block lifted by a conservator, Susannah Kelly, and will be excavated in laboratory conditions.

Archaeological Area 2

In the eastern limit of T31 the remains of a single sub-oval pit C31.1 was noted (Figures 6 and 8, Plate 27). It extends beyond the southern limit of the trench but the visible dimensions are 0.7m by 0.4m. It is filled with charcoal rich silty clay. This feature does not have a geophysical signature. The function of the pit is not known, but it may represent a charcoal clamp or some such activity.

Archaeological Area 3

In the northern third of T29 the remains of a single large sub-circular pit, C29.1, was recorded (Figures 6 and 8, Plate 28). It measures 1.4m by 1.2m and is filled with small angular stone and light grey sandy clay. This feature does not have a geophysical signature. The function of the pit is not known.

Archaeological Area 4

In the southern limit of T25 the heavily truncated remains of a burnt mound spread was recorded (Figures 6 and 8, Plates 29 and 30). The deposit is truncated by land drains and a stone culvert. It is described in two parts; the northern section is 4.7m long and is partially overlain by a deposit of beige brown clay and marl. The southern section is 1.5m long and is located 6.2m to the south. This feature corresponds with geophysical anomaly N. This end of the trench immediately filled with water upon excavation and the ground was very wet in the vicinity.

Archaeological Area 5

A cluster of three features were identified in trenches T15, T18, T19, T20, and T21 within an area measuring c. 80m by 40m (Figures 6 and 9). These comprise the remains of two truncated burnt mound spreads and a pit.

C18.1 is the remains of a burnt mound spread measuring c. 8m by 8.2m and 0.3m deep cut by a modern drainage feature C20.2 (Plate 31). The consistency is dark black and grey silty clay with frequent burnt stone inclusions and decayed granite in the form of mica fragments. The area to the immediate north of this burnt mound flooded with ground water quickly after excavation of the trench. This feature corresponds with geophysical anomaly K.

To the west-southwest of this is the remains of a second burnt mound spread C20.1 (Plate 32). It measures c. 11m by 11.4m and 0.2m deep. The consistency is a dark grey black silty clay with frequent burnt stone inclusions and decayed granite. This spread is truncated on its north side by a northeast–southwest drainage feature C20.2, and by a narrow drain in the southeast. This feature corresponds with geophysical anomaly J.

To the north-northeast of burnt mound C18.1 is the remains of a small (0.7m by 0.7m) sub-circular pit C15.1 (Plate 33). It is filled with dark grey black silty clay and frequent burnt stone inclusions and is bisected by a modern narrow drain containing a clay pipe (Plate 29). This feature does not have a geophysical signature. The function of the pit is not known.

Archaeological Area 6

Within the zone of notification for DU026-080 the remains of a heavily truncated burnt mound spread was identified in the eastern end of T13 (Figures 6 and 8, Plate 34). The burnt mound spread (C13.1) comprises black to dark grey silty clay with frequent burnt stone and mica inclusions. It measures 2.4m by 0.8m and 0.05m deep. It is cut by both a northeast–southwest narrow drainage pipe and by a northwest–southeast drainage pipe. This feature does not have a geophysical signature.

Archaeological Area 7

The only feature of archaeological significance noted in the smaller field to the north, is the remains of a heavily truncated burnt mound spread, identified in the southern limit of T2 (Figures 6 and 8, Plate 35). This deposit consists of a thin (0.06m) spread of black to dark grey silty clay with frequent decayed and burnt stone inclusions overlain by a grey marl and sandy deposit. It appears that the burnt mound spread was dragged and disturbed by land drainage activities leaving only a seam of the deposit along the edge of the marl deposit. T2 was extended to the south by 5.5m to expose the full extent of this feature; which is 6m north–south and 0.5m east–west. This feature does not have a geophysical signature.

4 CONCLUSIONS

Archaeological testing was carried out at Priorsland, Dublin 18 in the townlands of Brenanstown and Carrickmines Great (ITM 722285, 723930) in November 2018. The testing followed on from a geophysical survey (Nicholls 2018, licence 18R0197) and the results of both investigations will inform an impact assessment and mitigation strategy to be incorporated with a future planning application.

The trenches targeted the zone of notification for recorded monument DU026-080 (mill and enclosure), geophysical anomalies and open green space to fully investigate the archaeological potential of the site.

The Carrickmines Stream crosses the site on a west–east alignment and connects with the Ticknick Stream which forms the eastern boundary of site. The geophysical survey did not reveal any distinct evidence for structural remains or an enclosure associated with record DU026-080 however there were several anomalous areas that may have indicated the ephemeral remains. A total of 11 trenches investigated zone of notification for DU026-080. Testing revealed that this area had been heavily disturbed by modern land drains and services, as indicated by the geophysical survey. It is possible that land improvement during the late 19th century may have removed any remaining trace of a former mill building; however it is also possible that the location of the mill was misidentified in the 1830s, and the actual location could be situated further to the northeast beyond the application site boundary. There is a low possibility that truncated remains for the former mill may be preserved in areas not suitable for geophysical survey or testing.

Testing revealed seven previously unrecorded areas of archaeological significance, which have been designated as Archaeological Areas 1–7. These comprise a probable Bronze Age penannular ditch enclosing at least four cremation pit burials and two pits (AA1), two single pits (AA2 and AA3) and four areas containing disturbed spreads of burnt mound material (AA4–7).

The archaeology identified in AA1 is significant in both its type and form. The presence and density of the urn burials within such an enclosure is indicative of its local importance. As discussed above previous excavations to the south in Laughanstown, c. 1.3–1.5km south, identified cremation burials associated with pots and urns, and one particular example was accompanied by a pin and burnt lithics. It is a testament to both the affluence and longevity of the Bronze Age community in this area that this landscape contains so many high status burials. Megalithic monuments are also known in the area at Glebe and Laughanstown, and further west at Kiltiernan.

Consultation with the NMI and NMS on the discovery of human remains in AA1 advised emergency excavation of the features exposed in Trench 37 under a reactivation of licence 18E0650. An updated method statement was prepared in consultation with a conservator (Susannah Kelly) and osteoarchaeologist (Maeve Tobin), and the excavation was carried out during week commencing 26th November

2018. Four of the burials containing ceramics were block lifted by a conservator and will be excavated in laboratory conditions. The burial monument extends beyond this trench as indicated by the geophysical signature and as such there is high potential for further burials to exist outside of the investigated area within AA1. This area should be viewed as having a high level of archaeological sensitivity.

The remainder of the archaeological areas (AA2–7) largely represent prehistoric burnt mound activity, similar to those recorded in the adjacent fields to the east and south within the footprints of Castle Street and the M50 respectively. These features are considered to have local significance.

This investigation has confirmed the accuracy of the geophysical survey and as such we now have a good understanding of the site. With the exception of the features noted above all other geophysical anomalies including A-C and E-I corresponded to drainage features or variations on the natural subsoil. There is potential however for previously unrecorded archaeology to survive beneath the current ground surface, outside of the investigated trenches in areas that were not accessible for survey (i.e. beneath overhead wires and along hedgerows). Small ephemeral features, such as the pits in AA2 and AA3, do not have a geophysical signature.

5 IMPACT ASSESSMENT AND MITIGATION STRATEGY

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological resources potentially affected. Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping; disturbance by vehicles working in unsuitable conditions; and burial of sites, limiting access for future archaeological investigation.

5.1 IMPACT ASSESSMENT

- The zone of notification for mill and enclosure DU026-080 has been investigated through geophysical survey and targeted by 11 test trenches. This area had been heavily disturbed by modern land drains and services. It is possible that land improvement during the late 19th century may have removed any remaining trace of a former mill building; however it is also possible that the location of the mill was misidentified, and the actual location could be situated further to the northeast beyond the application site boundary. There is a low possibility that truncated remains of the former mill may be preserved in areas not suitable for geophysical survey or testing to the northeast.

- Testing revealed seven previously unrecorded areas of archaeological significance, which have been designated as Archaeological Areas 1–7. These comprise a probable Bronze Age penannular ditch enclosing at least six cremation pit burials (AA1), two single pits (AA2 and AA3) and four areas containing disturbed spreads of burnt mound material (AA4–7). Emergency excavation of the features exposed in Trench 37 (within the core of AA1) was carried out in late November 2018 as advised by the NMI and NMS; however the burial monument extends beyond this trench as indicated by the geophysical signature and there is high potential that further burials exist outside of the investigated test trench.

  The archaeology in AA1–7 lie within the footprint of proposed buildings and the access road. Development densities and layout of the infrastructure has been prescribed in the development plan for Cherrywood. Ground works associated with the proposed development, such as topsoil stripping and excavation, would have a significant adverse impact on the archaeological features or deposits in AA1–7 and associated remains.

- This investigation has confirmed the accuracy of the geophysical survey and as such we now have a good understanding of the site. There is potential however for previously unrecorded archaeology to survive beneath the current ground surface, outside of the investigated trenches in areas that were not accessible for survey (i.e. beneath overhead wires and along hedgerows). Small ephemeral features, such as the pits in AA2 and AA3, do not have a geophysical signature.

  Ground works associated with the proposed development, such as topsoil stripping and excavation, would have an adverse impact on any previously unrecorded archaeological features or deposits that have the potential to survive.

5.2 MITIGATION

We recommend the following actions in mitigation of the impacts above.

- No groundworks should be carried out within the zone of notification for DU026-080 without prior consultation with an archaeologist. It is recommended that all ground disturbances associated with the proposed development within this area, including site investigations and topsoil stripping, be monitored by a suitably qualified archaeologist under licence to, and in consultation with the NMS. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation *in-situ* or by record. Any further mitigation will require approval from the NMS.

- While it is acknowledged that preservation *in-situ* of newly discovered archaeological sites is the preferred policy of the development plan where possible the locations of AA1-7 are situated within the footprint of numerous proposed buildings and access road. As such it is recommended that the archaeology in AA1–7, and any associated features, be preserved by record (i.e. excavation) in advance of construction. Excavation should be carried out by a licence eligible archaeologist in consultation with the NMS.

  No ground works, such as site investigations, should be undertaken within the vicinity of AA1–7 without prior consultation with an archaeologist.

- It is recommended that all ground disturbances associated with the proposed development, including site investigations and topsoil stripping, be monitored by a suitably qualified archaeologist under licence to, and in consultation with the NMS. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation *in-situ* or by record. Any further mitigation will require approval from the NMS.

It is the developer's responsibility to ensure full provision is made available for the resolution of any archaeological remains, both on site and during the post excavation process, should that be deemed the appropriate manner in which to proceed.

Please note that all recommendations are subject to approval by the National Monument Section of the Heritage and Planning Division, Department of Culture, Heritage and the Gaeltacht.

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www.googleearth.com – Aerial photographs of the proposed development area.

APPENDICES

APPENDIX 1 TRENCH RESULTS

TRENCH	LENGTH (m)	WIDTH (m)	DEPTH (m)	ORIENTATION	DETAILS
1	60	2	0.3	NNE–SSW	No archaeology found. Two stone culverts on average 1.2m wide and 0.37m deep with water still flowing through them in the north end of trench. Two shallow clay filled drains, 0.6m wide and 0.2m deep. Height of bedrock in centre of trench. South end of trench marked by drop in slope and a change in subsoil from sandy clay to grey marl which filled with water, possibly marking previously flow of river.
2	60	2	0.32	NNE–SSW	**Archaeological Area 7. C2.1** Remains of a burnt mound spread truncated by modern drainage (Plate 31). Two shallow clay filled drains, 0.7m wide, 0.08m deep. Four stone culverts average 0.4-1.2m wide and 0.15-0.55m deep.
3	60	2	0.33	NNE–SSW	No archaeology found. Five stone culverts average 0.4-1.2m wide and 0.15-0.55m deep. Two shallow clay filled drains, 0.7m wide, 0.08m deep.
4	30	2	0.4	Northeast-southwest	No archaeology found. Targeted geophysical anomaly C. This appeared to correspond with a stone culvert crossing the SW end of the trench in a north-south direction, 0.9m wide, were it joined an east–west stone culvert 0.7m wide.
5	60	2	0.36	West-east	No archaeology found. Targeted geophysical anomaly C which appeared to correspond with the junction of two stone culverts, one north–south, 1.2m wide and one northwest–southeast 0.6m wide. Four other stone culverts are known in this trench also.
6	30	2	0.3	West-east	No archaeology found. Two shallow clay filled drainage features, 0.6-1.4m wide and 0.1m deep.
7	20	2	0.3	Northwest-southeast	No archaeology found. Targeted geophysical anomaly A which appeared to be represented by a height of bedrock. A stone culvert is noted in the southwest end of trench.
8	20	2	0.3	Northeast-southwest	No archaeology found. Targeted geophysical anomaly B. No features are known within this trench. A change in subsoil is noted in the southwest end of the trench from sandy clay to marl.
9	10	2	0.27	Northeast-southwest	No archaeology found. No features are known within this trench but the southwest end of the trench flooded quickly after excavation.
10	10	2	0.38	West-east	No archaeology found. A single shallow clay filled drain, 0.55m wide and 0.11m deep crossed the trench in an east-southeast–west-northwest direction.

TRENCH	LENGTH (m)	WIDTH (m)	DEPTH (m)	ORIENTATION	DETAILS
11	40	2	0.4	WNW-ESE	No archaeology found. Targeted ZON DU026-080 but no features were identified to relate to this. Two dumps of stone, clay and plastic noted here. A drain, containing a plastic pipe, 0.5m wide noted also.
12	10	2	0.6	Northwest-southeast	No archaeology found. Targeted ZON DU026-080 but no features were identified to relate to this. and linear geophysical anomaly L. A stone culvert is noted to cross the trench as this point of L. This trench flooded quickly as it was dug.
13	50	2	0.43	Northeast-southwest	**Archaeological Area 6. C13.1** shallow spread of burnt mound material truncated heavily truncated by modern drainage (Plate 30). Targeted ZON DU026-080 but no features were identified to relate to this. No features are noted to correspond to this.
14	20	2	0.45	Northeast-southwest	No archaeology found. Targeted ZON DU026-080 but no features were identified to relate to this. Two stone filled drains cross the trench. Pockets of peat are also noted in this trench.
15	20	2	0.4	NNE-SSW	**Archaeological Area 5. C15.1** remains of a pit with burnt stone inclusions, cut by modern drain with plastic pipe (Plate 29). Targeted ZON DU026-080 but no features were identified to relate to this.
16	60	2	0.28	North-south	No archaeology found. Targeted ZON DU026-080 but no features were identified to relate to this. North end of the trench is marked by a change in subsoil from sandy clay to marl. This area flooded quickly. A plastic drain pipe crosses the centre of the trench.
17	15	2	0.48	Northeast-southwest	No archaeology found. Targeted ZON DU026-080 but no features were identified to relate to this and short oblong geophysical anomaly M which appeared to correspond with the intersection of two modern drains.
18	15	2	0.3	Northeast-southwest	**Archaeological Area 5**. Targeted large sub-circular geophysical anomaly K, this corresponded with burnt mound spread **C18.1**, cut by a modern drain (Plate 28).
19	10	2	0.25	Northwest-southeast	**Archaeological Area 5.** Targeted large sub-circular geophysical anomaly K, this corresponded with burnt mound spread **C18.1** (Plate 28), cut by a modern drain **C20.2**. A stone filled drain crosses the southeast of the trench.
20	15	2	0.28	NNE-SSW	**Archaeological Area 5.** Targeted small irregular geophysical anomaly J, this corresponds with burnt mound spread **C20.1 (**Plate 27). This is cut by a modern drain **C20.2.** A deposit of grey marl overlies the spread at its north end. A modern clay pipe crosses the north end of the trench beyond the edge of the spread.
21	15	2	0.3	West-east	**Archaeological Area 5.** Targeted small irregular

TRENCH	LENGTH (m)	WIDTH (m)	DEPTH (m)	ORIENTATION	DETAILS
					geophysical anomaly J, this corresponds with burnt mound spread **C20.1** (Plate 27).
22	100	2	0.43	WNW-ESE	No archaeology found. Targeted ZON DU026-080 but no features were found to correspond to this. A stone filled drain crossed the site at its east end. A dump of concrete blocks is noted at the west end of the trench. A variation in subsoil from sandy clay to grey marl with water pooling is noted mid-way in the trench.
23	100	2	0.35	North-south	No archaeology found.
24	50	2	0.25	Northwest-southeast	No archaeology found.
25	60	2	0.28	NNE-SSW	**Archaeological Area 4.** Targeted L-shaped geophysical anomaly N which corresponds to **C25.1** burnt mound spread bisected by a modern drain (Plate 25 and 26).
26	50	2	0.29	North-south	No archaeology found. Modern stone filled drain in north end of trench. Borehole noted in south end of trench.
27	60	2	0.3	Northeast-southwest	No archaeology found.
28	100	2	0.33	Northwest-southeast	No archaeology found. Large stone culvert, east–west orientated bounded on one side by peat.
29	100	2	0.37	Northwest-southeast	**Archaeological Area 3. C29.1** sub-circular pit with stony fill (Plate 24). Shallow linear filled with dark brown sandy gravel crosses the trench at its northwest end.
30	100	2	0.52	WNW-ESE	No archaeology found. Silt filled hollows common in the trench.
31	100	2	0.6	West-east	**Archaeological Area 2. C31.1** sub-circular pit with charcoal rich fill (Plate 23). Dump of stone with red brick and animal bone inclusions noted mid-way in trench, 1.2m wide and 0.2m+ deep. Shallow clay filled drainage feature, 0.9 wide and 0.13m deep crosses the trench in a northeast–southwest direction.
32	60	2	0.42	WNW-ESE	No archaeology found. Shallow clay filled drain, 1.4m wide and 0.32m deep, also noted in T33, corresponding with former boundary trend noted in the geophysical report.
33	60	2	0.62	WNW-ESE	No archaeology found. Shallow clay filled drain, 1.4m wide and 0.32m deep, also noted in T32, corresponding with former boundary trend noted in the geophysical report.
34	10	2	0.65	Northwest-southeast	No archaeology found. Targeted small oblong geophysical anomaly I which corresponds with an area of root burning with decayed stone inclusions, consisting of beige silty clay with charcoal pieces.
35	15	2	0.7m	Northeast-southwest	No archaeology found. Targeted linear geophysical anomaly H which is noted as a variation subsoil

TRENCH	LENGTH (m)	WIDTH (m)	DEPTH (m)	ORIENTATION	DETAILS
					from sandy clay to decayed stone and beige sand. A shallow depression of dark grey brown clay 1m long and 0.6m wide and 0.07m deep is noted in the south end of the trench, not archaeological in nature.
36	15	2	0.7	Northwest-southeast	No archaeology found. Targeted C-shaped geophysical anomaly G which corresponds to a large circular dump of stone and grey sand, red brick and animal bone 3.2m long and at least 1.4m wide.
37	20	2	0.45	Northeast-southwest	**Archaeological Area 1.** Targeted C-shaped geophysical anomaly D which corresponds to C-shaped ring ditch **C37.1**. The return of this ditch is possibly represented at the northeast of the trench at **C37.9.** Six burials, four containing urns (**C37.2, C37.3, C37.4, C37.5, C37.6 and C37.7**) are located within the arc of the C-shaped enclosure. A shallow spread partially overlay at least two of these burials, **C37.8.** Plates 18-22.
38	30	2	0.7	West-east	No archaeology found.
39	50	2	0.52	Northwest-southeast	No archaeology found. Targeted linear geophysical anomalies E and F. Anomaly E corresponds to a variation in subsoil between sandy clay and decayed stone and grey sand. Anomaly F corresponds to a shallow drainage feature, 0.7m wide and 0.15m deep.
40	30	2	0.54	Northeast-southwest	No archaeology found. Stone filled drain, 0.6m wide and 0.14m deep, corresponding with former boundary geophysical trend.
41	30	2	0.52	Northeast-southwest	No archaeology found.

APPENDIX 2 CONTEXT DESCRIPTION

CONTEXT NO.	TRENCH NO.	DESCRIPTION
1	All	Topsoil described as mid to dark grey brown silty clay with occasional stone inclusions.
2	All	Subsoil described as mostly yellow beige sandy clay with variations in the wetter areas of site to grey marl and in the southeast of the site to banding of dark grey sand and decayed stone.
C2.1	T2	Heavily truncated remains of a burnt mound spread. All that survives is the edge of the feature 0.2m wide, cut away and dragged into a land clearance feature composed of a deposit of light grey marl mixed with occasional black to dark grey sand and decayed stone, sloping gently to the southwest. The remaining spread is 0.06m deep fading out after 0.6m.
C13.1	T13	Heavily truncated shallow remains of burnt mound spread. All that survives if the spread is a patchy deposit, 0.05m deep, at maximum cut by at least two modern drains containing pipes. It extends for 2.4m east–west and .8m north–south.
C15.1	T15	Sub-circular pit, 0.7m in diameter, filled with a deposit of burnt stone and dark grey black sandy clay, cut through its centre by a modern drainage pipe, 0.15m wide.
C18.1	T18, T19	A burnt mound spread extends through the centre of T18 into the northwest end of T19. It is described as a back to dark grey sandy clay with frequent inclusions of burnt stone and decayed granite in particular. It measures c. 8m by 8.2m and 0.3m deep. It is cut on its northwest edge by drain C20.2.
C20.1	T20, T21	A burnt mound spread extends through the centre of T20 and T21 for a distance of c. 11m by 11.3m, with a depth of 0.2m. It consists of a dark grey to black sandy clay with frequent inclusions of decayed stone and burnt angular stone. It is cut on its north side by a drain C20.2 and partially overlain in the same area by a deposit (1.8m long, 0.2m deep) of likely upcast material, light grey, mottled yellow marl in consistency.
C20.2	T18, T20	Drainage feature, consisting of a northeast–southwest linear with gentle break of slope at top, steeply sloping sides and flat to slightly concave base, filled with beige grey silty clay fill with large stones noted at the base, 0.9m wide and 0.2m deep.
C25.1	T25	A burnt mound spread, bisected by modern stone culvert. It consisted of black charcoal rich silty clay with frequent burnt stone and mica fragments. The northern section is 4.7m long and 0.28m deep, and is partially overlaid by a deposit of mid grey brown sandy clay, extending to the east. An area 6.2m long was disturbed by the stone culvert and associated drainage activities, leaving a small (1.5m long) deposit, 0.1m deep, of burnt mound spread, abutting the south side of the culvert and heading beyond the trench to the west.
C29.1	T29	Sub-circular pit with sharp break of slope at top, steeply sloping sides filled with a mid to light grey sandy clay a frequent angular stone almost appearing almost packed together in the fill. It measures 1.4m long by 1.2m wide and 0.3m deep.
C31.1	T31	Sub-oval pit, with sharp break of slope at top, steeply sloping sides, filled with a dark grey to black charcoal rich silty clay, 0.75m long, at

		least 0.4m wide and 0.1m deep.
C37.1	T37	C-shaped enclosure ditch. This ditch shown on the geophysical survey as a penannular ditch has a gradual break of slope at top, steeply sloping sides, gradual break of slope at base and flat base (Plate 3). A hand excavated slot trench indicates that the ditch measures c. 1.5m in width and c. 0.6m in depth. It is filled with a moderate to firm compaction of mid grey brown silty clay with occasional stone inclusions.
C37.2	T37	Cremation burial pit containing the remains of an urn. The pot measures c. 0.34m by 0.34m. The blackened rim (10mm depth) of the pot is visible along the southwest circumference of pit, which is filled with dark grey brown silty clay.
C37.3	T37	Cremation burial pit containing the remains of an urn. The pot measures c. 0.22m by 0.22m. The pot has a red exterior and blackened interior (12mm depth) and is filled by a loosely compacted of dark grey brown silty clay.
C37.4	T37	Cremation burial pit containing the remains of an urn. The pot measures c. 0.27m by 0.27m.It has a red exterior, and blackened interior (18mm thickness) filled by dark grey brown silty clay and fragmented cremated human remains, in poor condition.
C37.5	T37	Cremation burial pit containing the remains of an urn. The pot measures c. 0.28m by 0.28m. The edge of the pot is partially exposed as a blackened pot noted on southwest circumference. Fill of dark grey brown silty cay with visible cremated human remains.
C37.6	T37	Black charcoal rich silty clay in sub-circular pit measuring c. 0.5m by 0.2m+. It contains rare flecks of white burnt bone inclusions.
C37.7	T37	Sub-circular pit measuring c. 0.4m by 0.35m. It is filled by a mid-brown grey deposit with frequent fragmented burnt bone remains inclusions.
C37.8	T37	Deposit of mid brown, mottled silty clay with decayed stone inclusions, measuring c. 5m by 2.1m+.
C37.9	T37	Linear feature extending beyond the northwest edge of trench, with gradually sloping sides and concave base, filled with grey brown silty clay with occasional charcoal flecks. Within the trench it measures 1.3m long and 0.44m wide, with a depth of 0.2m.

APPENDIX 3 RMP SITES WITHIN THE SURROUNDING AREA

SMR NO.:	DU026-080001-2
RMP STATUS:	Yes
TOWNLAND:	Brenanstown and Carrickmines Great
PARISH:	Tully
BARONY:	Rathdown
I.T.M.:	722425, 723970
CLASSIFICATION:	Enclosure (001) and mill (002)
DIST. TO SITE:	Within eastern half of site
DESCRIPTION:	**001 -** The OS Letters (1837) include sketches of the Brennanstown/Carrickmines Great area that show a series of enclosures to the S of site of an 'ancient mill'. This was located on a stream E of Carrickmines that runs into Glendruid Glen. There is no visible trace of these enclosures. **002 -** The 1836 OS 6-inch map shows the 'site of ancient mill' along a stream E of Carrickmines that runs into Glendruid Glen. It is marked on the Down Survey (1655-6) map and the Civil survey (1654-6) states that there was a corn mill and tuck mill here (Simington 1945). The OS Letters include sketches of this area which show the foundations of a rectangular building and a feature marked 'Old Quern' (O'Flanagan 1927, 16). Paddy Healy has pinpointed the site as being within the wooded area of the Druid's Glen(Pers. comm. Rob Goodbody).
REFERENCE:	www.archaeology.ie

SMR NO.:	DU026-135
RMP STATUS:	Yes
TOWNLAND:	Carrickmines Great
PARISH:	Tully
BARONY:	Rathdown
I.T.M.:	722224, 723723
CLASSIFICATION:	*Fulacht Fia*
DIST. TO SITE:	c. 100m to the south
DESCRIPTION:	The site was identified in 1998 during topsoil-stripping during the construction of a gas pipeline as a 7.5m (N-S) by 6m spread of burnt stone and charcoal in a loose, silty clay matrix. It had been truncated by a field drain running north-south through the middle of it. A pit was identified below the eastern portion of the site. It measured 0.95m (SE/NW) by 0.7m and was up to 0.42m deep. The pit was full of a deposit of burnt material that could not be distinguished from the burnt stone spread. A flake of struck flint was recovered (O Neill 2000, 37-9, O'Neill 1999).
REFERENCE:	www.archaeology.ie

SMR NO.:	DU026-005001-4, DU026-146
RMP STATUS:	Yes
TOWNLAND:	Carrickmines Great
PARISH:	Tully
BARONY:	Rathdown
I.T.M.:	721771, 724098
CLASSIFICATION:	Castle (005001), bawn (005002), fortifications (005003), mill (005004), ringwork

	(005005), Rock Art (-146)
DIST. TO SITE:	c. 210m to the northwest
DESCRIPTION:	**005001 –** The fragmentary remains of Carrickmines Castle have been incorporated into farm outbuildings. This is located in low-lying terrain off the Golden Ball-Carrickmines Road. The castle fragment comprises a section of wall (H 4m) built of randomly coursed blocks of granite. It contains a square-headed window under a round segmental arch at ground level. The documentary evidence indicates a castle in existence of Carrickmines from the 14th-century (Ball 1901, 195-203). This castle was apparently levelled following a battle in the 1641 rebellion. The fields SW of the castle are uneven with rock outcrop and a series of irregular ditches marked on the 1937 OS 6 inch map and interpreted as outer defences (pers. comm. Mr. Paddy Healy). These ditches create a number of raised sub-rectangular platforms (L c. 50m, Wth 30m). Monitoring of trial trenches adjacent to the castle in 1996 exposed a stone built drain of post -medieval date (Connolly 1997, 16-17). Excavations have since revealed a double fosse/double bank along the NW flank of the site. To the SE of the inner castle area is a stone-revetted fosse interpreted as part of the southern curtain wall. This enclosed an area of angular form and was connected to an earlier enclosure by a causeway. Two linear fosses identified c 60m to the S of the castle may represent some form of outer defence line. These contained Saintonge pottery which was made in the Saintonge region of France in the 13th and 14th centuries. Remains of a two-phase building were also exposed N of the castle area. Considerable quantities of late 13th/early 14th century pottery have been retrieved. Finds include an iron axehead, spindle whorls, leather shoes, rotary querns, iron keys, nails buckles and sundry implements. A cobbled surface a millpond, kiln and wells were also found on the site (Clinton 2002, 72, 2003, 85-7, 2004, 131). **005002 -** This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. Excavations at Carrickmines castle have revealed a double fosse/double bank along the NW flank of the site. To the SE of the inner castle area is a stone-revetted fosse interpreted as part of the southern curtain wall. This enclosed an area of angular form and was connected to an earlier enclosure by a causeway. Two linear fosses identified c 60m to the S of the castle may represent some form of outer defence line. These contained Saintonge pottery which was made in the Saintonge region of France in the 13th and 14th centuries (Clinton 2002, 72; 2003, 85-7; 2004, 131). **005003 -** This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. The fields SW of Carrickmines castle are uneven with rock outcrop and a series of irregular ditches marked on the 1937 OS 6 inch map and interpreted as outer defences (pers. comm. Mr. Paddy Healy). These ditches create a number of raised sub-rectangular platforms (L c. 50m, Wth 30m). Monitoring of trial trenches adjacent to the castle in 1996 exposed a stone built drain of post -medieval date (Connolly 1997, 16-17). **005004 -** This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. A millrace runs from the site identified on the OS 1st edition map as 'site of an ancient mill' to the N of Carrickmines castle. **005005 -** This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. Excavations at Carrickmines castle in 2001 uncovered evidence for an earthen bank/fosse-defended enclosure which has been interpreted as an irregularly shaped ringwork castle (Clinton 2001, 87). **146 -** This is one of three small boulders containing cup-marks which were discovered during archaeological investigations on the route of the South-Eastern Motorway (Clinton 2002, 87; 2004, 131).
REFERENCE:	www.archaeology.ie

SMR NO.:	DU026-007

RMP STATUS:	Yes
TOWNLAND:	Brenanstown
PARISH:	Tully
BARONY:	Rathdown
I.T.M.:	722866, 724186
CLASSIFICATION:	Portal tomb
DIST. TO SITE:	420m to the east-northeast
DESCRIPTION:	This very impressive portal tomb is located on the valley floor of a steep-sided glen close to a stream. A massive wedge-shaped granite roofstone (L 5.1m; Wth 4.5m; D 1.75m) covers a chamber (int. dims. L 3.1m; Wth 1.42m) and antechamber facing west. It rests on the two front portal stones (H 2.6m and 2m respectively) and three sidestones. A doorstone separates the main chamber from the antechamber. There are some granite boulders at the rear of the tomb wall which may have been part of an additional chamber (Borlase 1897, 2, 390-92; Ó Nualláin 1983, 96; Turner 1983, 5). There are two deep depressions on the upper surface of the roofstone, with ducts leading to the corner of the stone.
REFERENCE:	www.archaeology.ie

SMR NO.:	DU026-006
RMP STATUS:	Yes
TOWNLAND:	Brenanstown
PARISH:	Tully
BARONY:	Rathdown
I.T.M.:	722739, 723805
CLASSIFICATION:	Enclosure
DIST. TO SITE:	250m to the southeast
DESCRIPTION:	This site was located a farmyard in a field of pasture on a hillslope N of Tully cross. Recent road development adjacent to the site. Furze and bracken densely cover an area which is marked on the 1st edition (1843) map as an enclosure. There is a semi-circular raised area to the E of this site (13m E-W, 15m N-S. H 1.10m). This may have been caused by the building of a concrete block wall which cuts into it. Recently subject to testing and monitoring – no archaeology present.
REFERENCE:	www.archaeology.ie

SMR NO.:	DU026-150
RMP STATUS:	Yes
TOWNLAND:	Carrickmines Great
PARISH:	Tully
BARONY:	Rathdown
I.T.M.:	722560, 723305
CLASSIFICATION:	*Fulacht Fia*
DIST. TO SITE:	470m to the south
DESCRIPTION:	A burnt mound was identified during topsoil-stripping for the South-Eastern Motorway (M50). An area of decayed and burnt stone (L9m, Wth 20m) was revealed which covered two possible troughs. A sherd of Early Bronze Age pottery was found in the fill (O'Reilly 2004, 134).
REFERENCE:	www.archaeology.ie

APPENDIX 3 STRAY FINDS WITHIN THE SURROUNDING AREA

Information on artefact finds from the study area in County Dublin has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

A significant quantity of artefactual material (c. 90,000 artefacts) was recovered during the archaeological excavations at Carrickmines and has been accessioned to the National Museum of Ireland and is held in their repository in Swords, Co. Dublin. These includes pottery (c. 20,000 sherds), coins, weapons and ammunition, human skeletal remains, metal, glass, wood, leather and clay artefacts,

TOWNLAND, PARISH & BARONY	NMI NO.	FIND	FIND PLACE	DESCRIPTION
Laughanstown Tully, Rathdown	1975:247	Medieval pottery	Vicinity of Tully Church	Base wall sherds, medieval pottery. Fairly coarse, hard, micaceous and quarzitic ware.
	1981:10	Medieval pottery	Vicinity of Tully Church	Body sherd of glazed vessel. Orange fabric with abraded pale green external glaze.
	1999:132	Medieval pottery	Vicinity of Tully Church	Five sherds of medieval pottery, consisting of 3 sherds of unglazed Leinster Cooking Ware and two sherds of glazed ware.
	1989:18	Bronze strap end, Various post-1790 items	Field walking over site of the military camp	Strap end of copper alloy. Possible 10th century with decoration. Finds recovered during. The finds have all be categorised as AD 1790 or later. Uniform buttons including military, livery, dress and railway examples. Some brass pieces from muskets and bugles. Bronze and copper military badges including both Irish and English regimental crests. Lead musket and pistol shot varying from 10–17mm. A variety of coins dating from 1792 onwards. A toy lead horse and bronze cannon. A bronze rosary crucifix.
Glenamuck North, Tully, Rathdown	1974:89	Bronze Palstave	Found in a field 18" deep.	Bronze Palstave cast in a bi-valve mould. It is heavily patinated and extremely pitted all over. L 13.5cm, W butt 2.8cm. cutting edge 5.8cm

APPENDIX 4 LEGISLATION PROTECTING THE ARCHAEOLOGICAL RESOURCE

PROTECTION OF CULTURAL HERITAGE

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the *European Convention on the Protection of the Archaeological Heritage* (Valletta Convention), ratified by Ireland in 1997.

THE ARCHAEOLOGICAL RESOURCE

The *National Monuments Act 1930 to 2014* and relevant provisions of the *National Cultural Institutions Act 1997* are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

OWNERSHIP AND GUARDIANSHIP OF NATIONAL MONUMENTS

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

REGISTER OF HISTORIC MONUMENTS

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

PRESERVATION ORDERS AND TEMPORARY PRESERVATION ORDERS

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site

illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

RECORD OF MONUMENTS AND PLACES

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for Culture, Heritage and the Gaeltacht) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition they are liable for costs for the repair of the damage caused.

In addition to this, under the *European Communities (Environmental Impact Assessment) Regulations 1989,* Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

THE PLANNING AND DEVELOPMENT ACT 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable

development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

DLR COUNTY DEVELOPMENT PLAN 2016–2022

Policy AH1: Protection of Archaeological Heritage

It is Council policy to protect archaeological sites, National Monuments (and their settings), which have been identified in the Record of Monuments and Places (RMP) and, where feasible, appropriate and applicable to promote access to and signposting of such sites and monuments.

Policy AH2: Protection of Archaeological Material *in Situ*

It is Council policy to seek the preservation *in situ* (or where this is not possible or appropriate, as a minimum, preservation by record) of all archaeological monuments included in the Record of Monuments and Places, and of previously unknown sites, features and objects of archaeological interest that become revealed through development activity. In respect of decision making on development proposals affecting sites listed in the Record of Monuments and Places, the Council will have regard to the advice and/ or recommendations of the Department of Arts, Heritage and the Gaeltacht (DoAHG).

CARRICKMINES CASTLE CONSERVATION PLAN 2017

The Carrickmines Conservation Plan 2015-2025 was formally adopted by Dun Laoghaire-Rathdown County Council on the 13th February 2017 to provide a framework for the conservation and management of the site of Carrickmines Castle. The vision for the management of the Carrickmines Castle Site is that Dún Laoghaire-Rathdown County Council will raise awareness of the history of Carrickmines Castle, conserve the upstanding remains, provide supervised access to the site to members of the public where possible and facilitate reasonable access to the site for academic research.

Policy 1: Preserve the surviving archaeological structures.
Policy 2: It is the policy of this Conservation Plan to raise awareness of the history of Carrickmines Castle.
Policy 3: The site will be maintained in such a manner to protect biodiversity while allowing safe reasonable access and safeguarding the archaeology of the site.
Policy 4: It is the policy of this Conservation Plan to provide intellectual and physical access where possible to the site of Carrickmines Castle.
Policy 5: To permanently store archaeological material not accessioned to the National Museum of Ireland below-ground at the Carrickmines site.
Policy 6: It is the policy of this Conservation Plan to manage and maintain the shells of the remaining the farmhouse and outbuildings in a manner consistent with the Department of Arts, Heritage and the Gaelteacht Architectural Heritage Protection Guidelines for Planning Authorities (2011).
Policy 7: Dún Laoghaire-Rathdown County Council to implement the Conservation Plan in consultation with relevant stakeholders.

APPENDIX 5 IMPACT ASSESSMENT & THE CULTURAL HERITAGE RESOURCE

POTENTIAL IMPACTS ON ARCHAEOLOGICAL AND HISTORICAL REMAINS

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2003: 31). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.

- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.

- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.

- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.

- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.

- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.

- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

PREDICTED IMPACTS

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;

- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;

- Assessment of the levels of noise, visual and hydrological impacts, either in general or site specific terms, as may be provided by other specialists.

APPENDIX 6 MITIGATION MEASURES & THE CULTURAL HERITAGE RESOURCE

POTENTIAL MITIGATION STRATEGIES FOR CULTURAL HERITAGE REMAINS

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

DEFINITION OF MITIGATION STRATEGIES

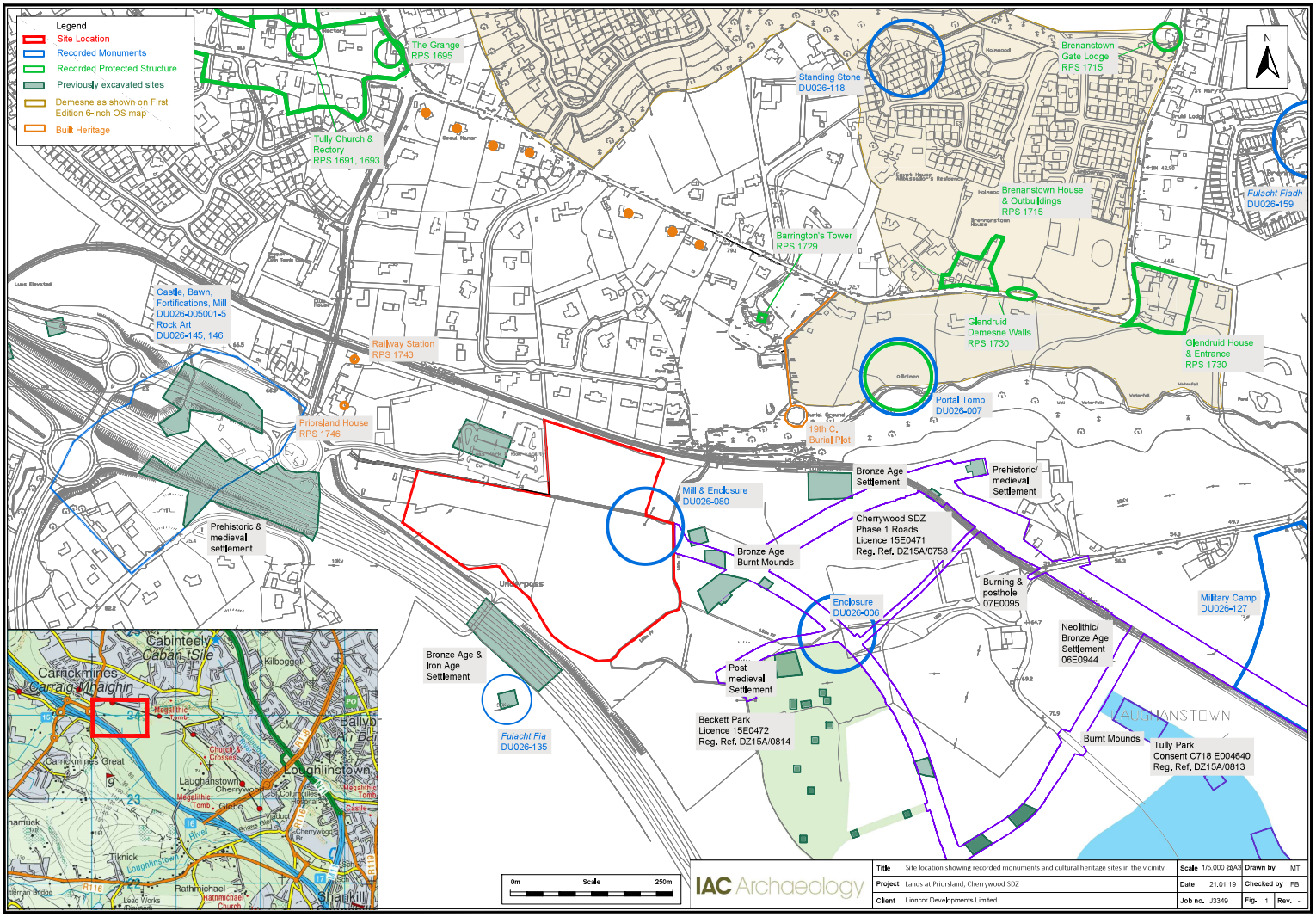
ARCHAEOLOGICAL RESOURCE

The ideal mitigation for all archaeological sites is preservation *in situ*. This is not always a practical solution, however. Therefore a series of recommendations are offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

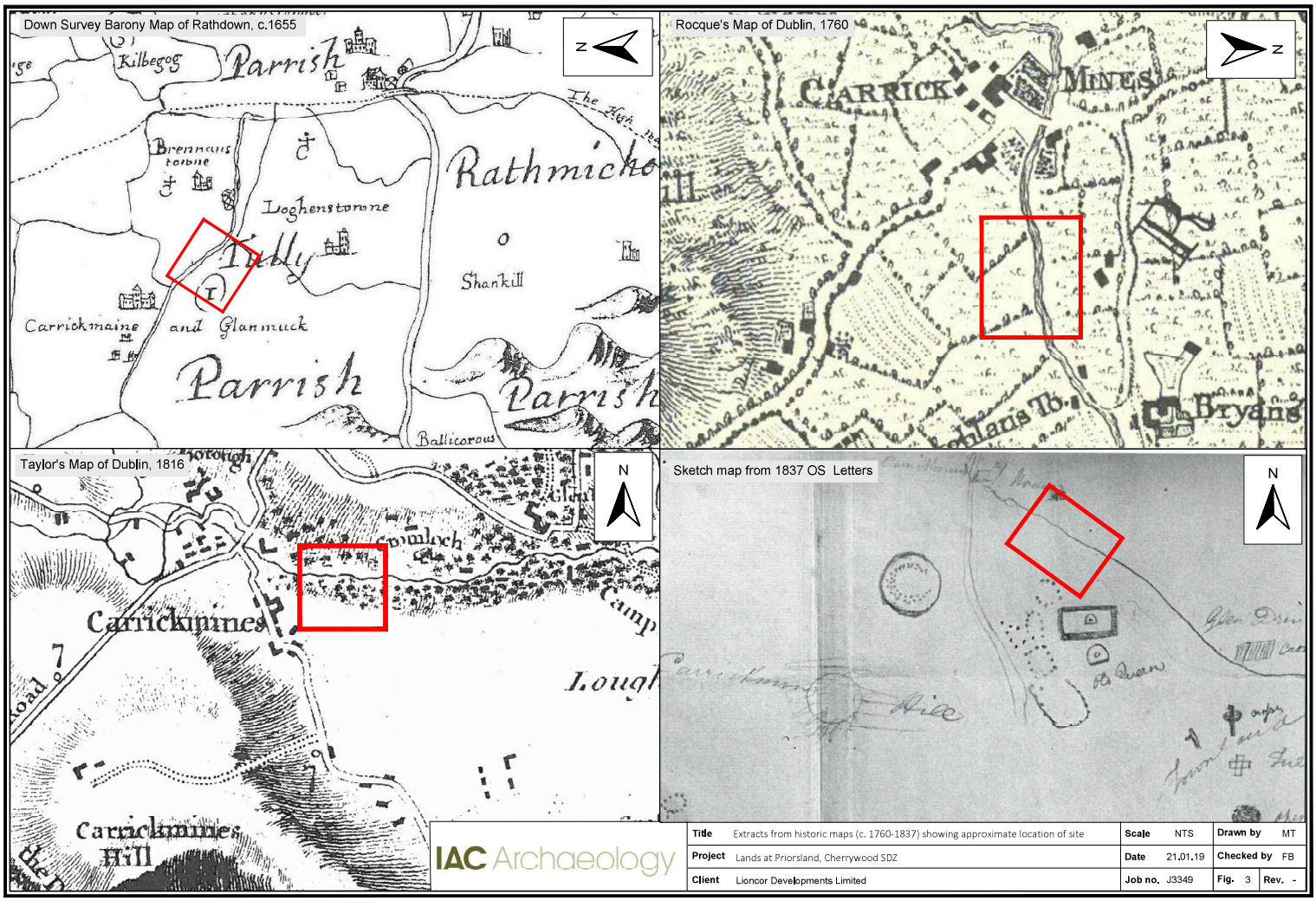
Full Archaeological Excavation involves the scientific removal and recording of all archaeological features, deposits and objects to the level of geological strata or the base level of any given development. Full archaeological excavation is recommended where initial investigation has uncovered evidence of archaeologically significant material or structures and where avoidance of the site is not possible. (CIfA 2014b)

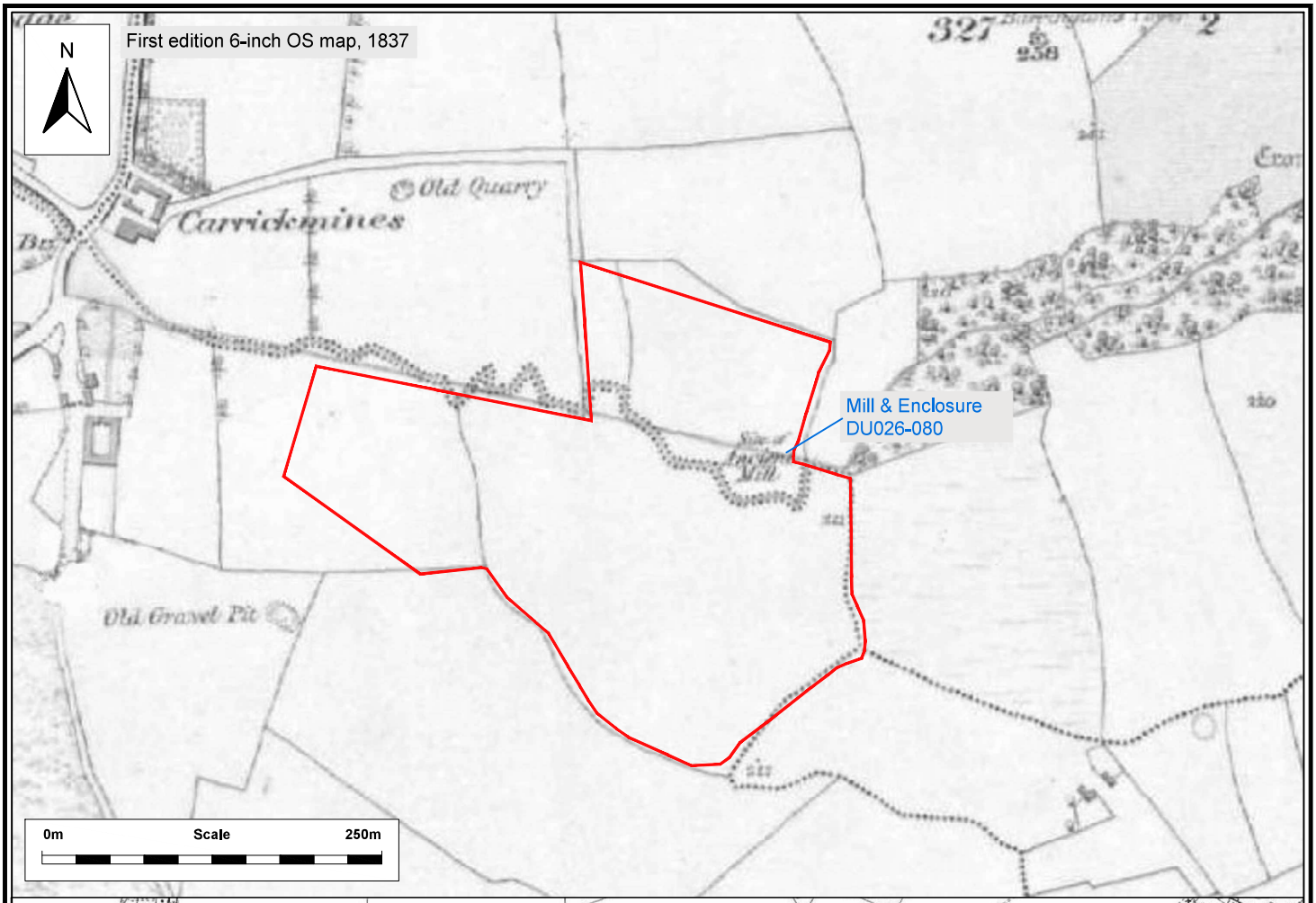
Archaeological Test Trenching can be defined as 'a limited programme... of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land or underwater. If such archaeological remains are present test trenching defines their character and extent and relative quality.' (CIfA 2014a)

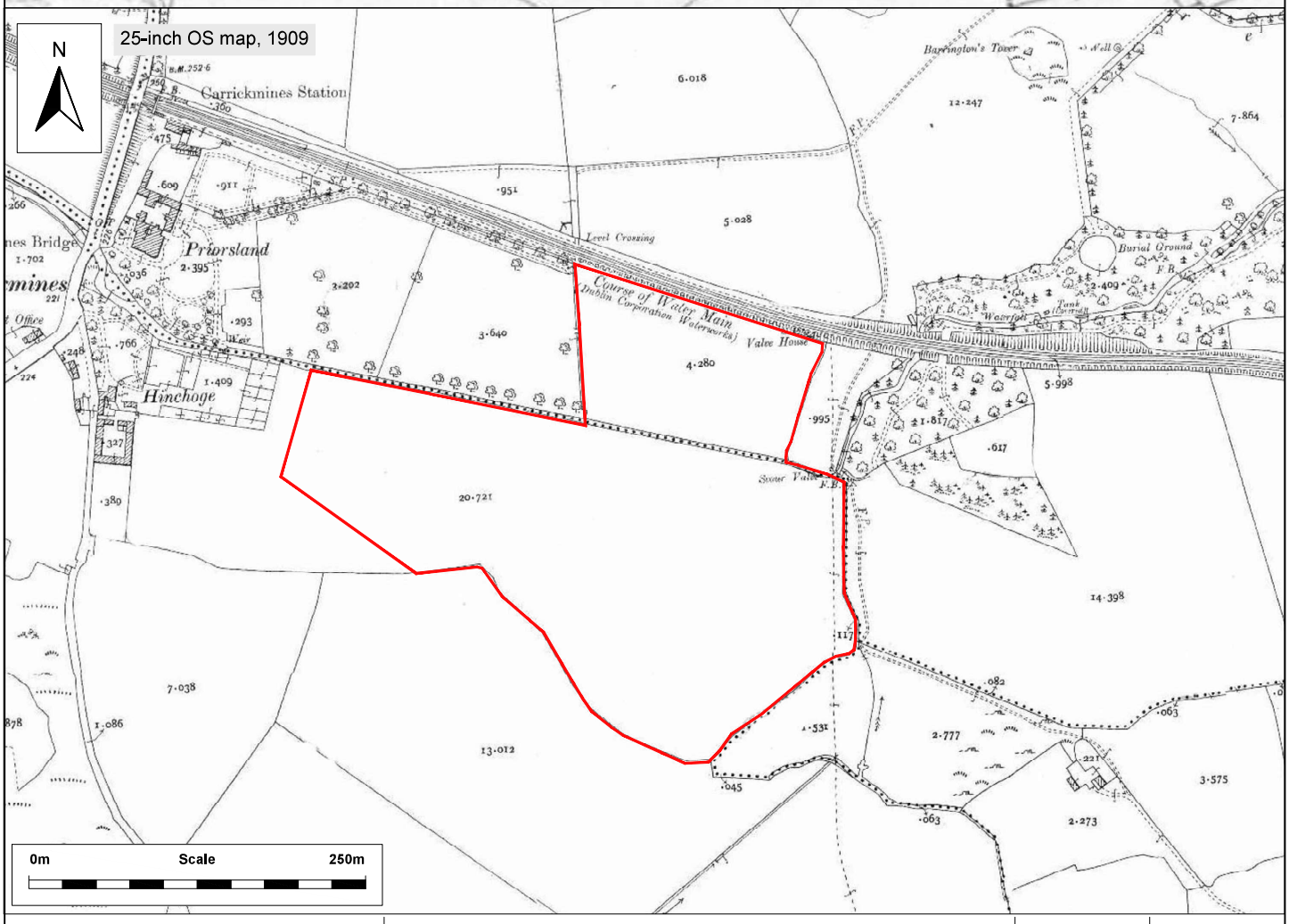
Archaeological Monitoring can be defined as a 'formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons within a specified area or site on land or underwater, where there is possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.' (CIfA 2014c)


Legend
Site Location
Recorded Monuments
Recorded Protected Structure
Previously excavated sites
Demesne as shown on First Edition 6-inch OS map
Built Heritage
N
The Grange RPS 1695
Tully Church & Rectory RPS 1691, 1693
Standing Stone DU026-118
Brenanstown Gate Lodge RPS 1715
Brenanstown House & Outbuildings RPS 1715
Fulacht Fiadh DU026-159
Barrington's Tower RPS 1729
Castle, Bawn, Fortifications, Mill DU026-005001-5 Rock Art DU026-145, 146
Railway Station RPS 1743
Glendruid Demesne Walls RPS 1730
Glendruid House & Entrance RPS 1730
Portal Tomb DU026-007
Priorsland House RPS 1746
19th C. Burial Plot
Bronze Age Settlement
Prehistoric/ medieval Settlement
Mill & Enclosure DU026-080
Cherrywood SDZ Phase 1 Roads Licence 15E0471 Reg. Ref. DZ15A/0758
Prehistoric & medieval settlement
Bronze Age Burnt Mounds
Burning & posthole 07E0095
Enclosure DU026-006
Military Camp DU026-127
Neolithic/ Bronze Age Settlement 06E0944
Bronze Age & Iron Age Settlement
Post medieval Settlement
Beckett Park Licence 15E0472 Reg. Ref. DZ15A/0814
Fulacht Fia DU026-135
Burnt Mounds
Tully Park Consent C718 E004640 Reg. Ref. DZ15A/0813
Cabinteely
Carrickmines
Loughlinstown
Laughanstown
Tiknick
Rathmichael
Shankill
0m
Scale
250m
IAC Archaeology
Title Site location showing recorded monuments and cultural heritage sites in the vicinity
Project Lands at Priorsland, Cherrywood SDZ
Client Lioncor Developments Limited
Scale 1/5,000 @A3
Date 21.01.19
Job no. J3349
Fig. 1
Drawn by MT
Checked by FB
Rev. -

IAC Archaeology	**Title** Plan of proposed development (draft for illustrative purposes)	**Scale** NTS	**Drawn by** MT		
	Project Lands at Priorsland, Cherrywood SDZ	**Date** 21.01.19	**Checked by** FB		
	Client Lioncor Developments Limited	**Job no.** J3349	**Fig.** 2	**Rev.** -	

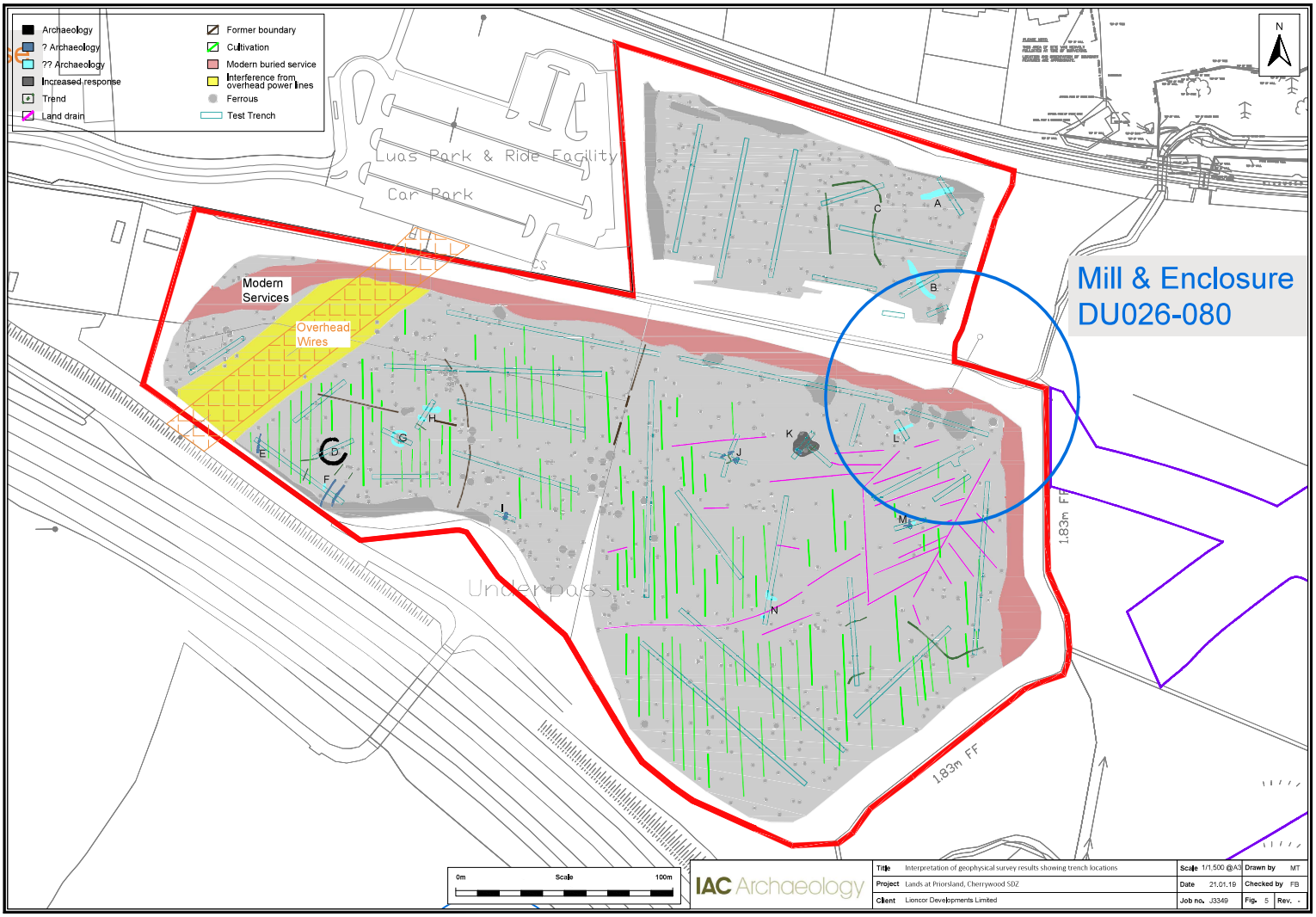

Down Survey Barony Map of Rathdown, c.1655
Kilbegog
Parrish
Brennans torne
Loghenstowne
Tully
Rathmicho
Shankill
Carrickmaine
and Glanmuck
Parrish
Parrish
Ballicorous
Rocque's Map of Dublin, 1760
CARRICK
MINES
Bryans
Taylor's Map of Dublin, 1816
Carrickmines
Carrickmines Hill
Sketch map from 1837 OS Letters
N
N
IAC Archaeology
Title Extracts from historic maps (c. 1760-1837) showing approximate location of site
Project Lands at Priorsland, Cherrywood SDZ
Client Lioncor Developments Limited
Scale NTS
Date 21.01.19
Job no. J3349
Drawn by MT
Checked by FB
Fig. 3
Rev. -

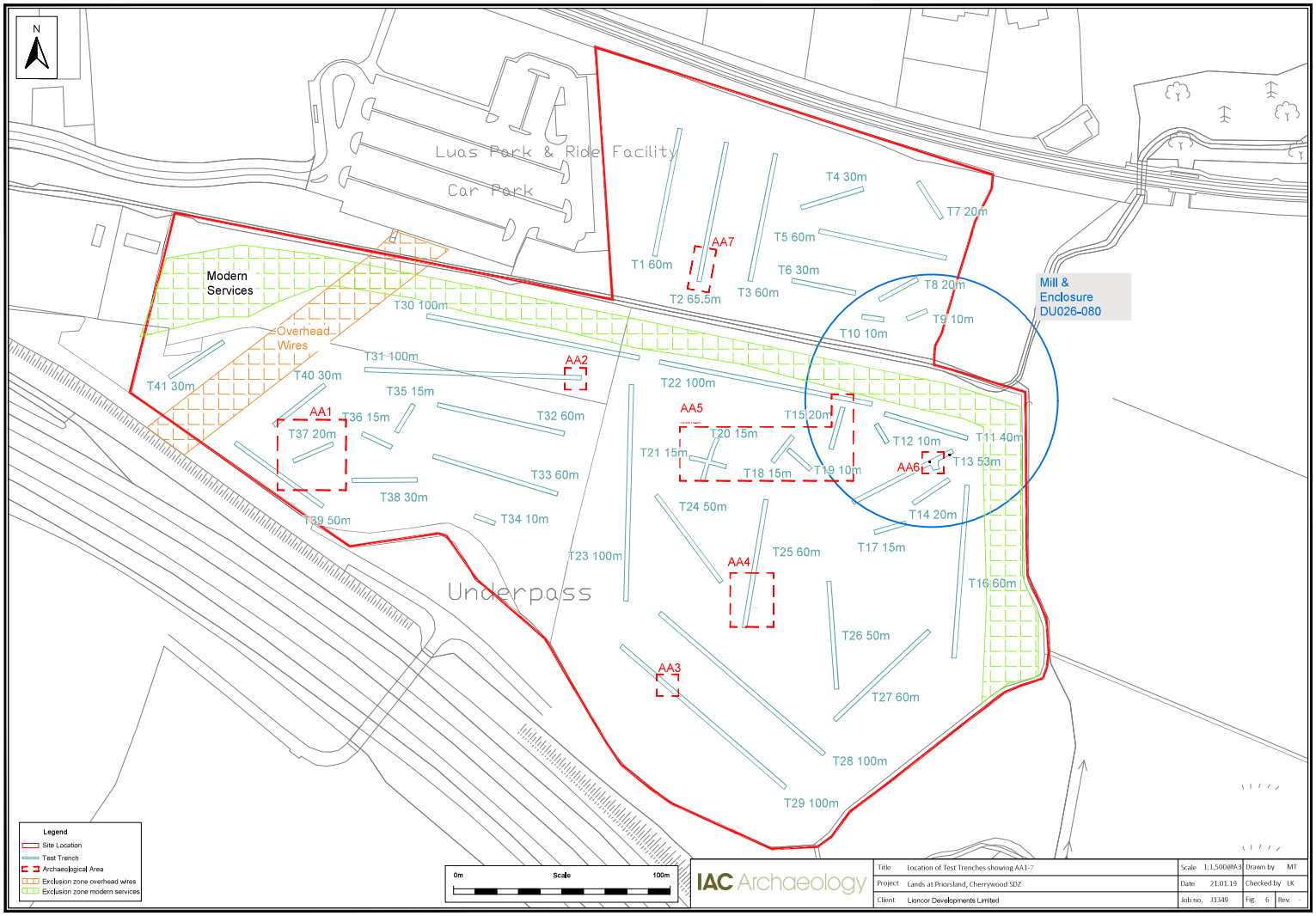


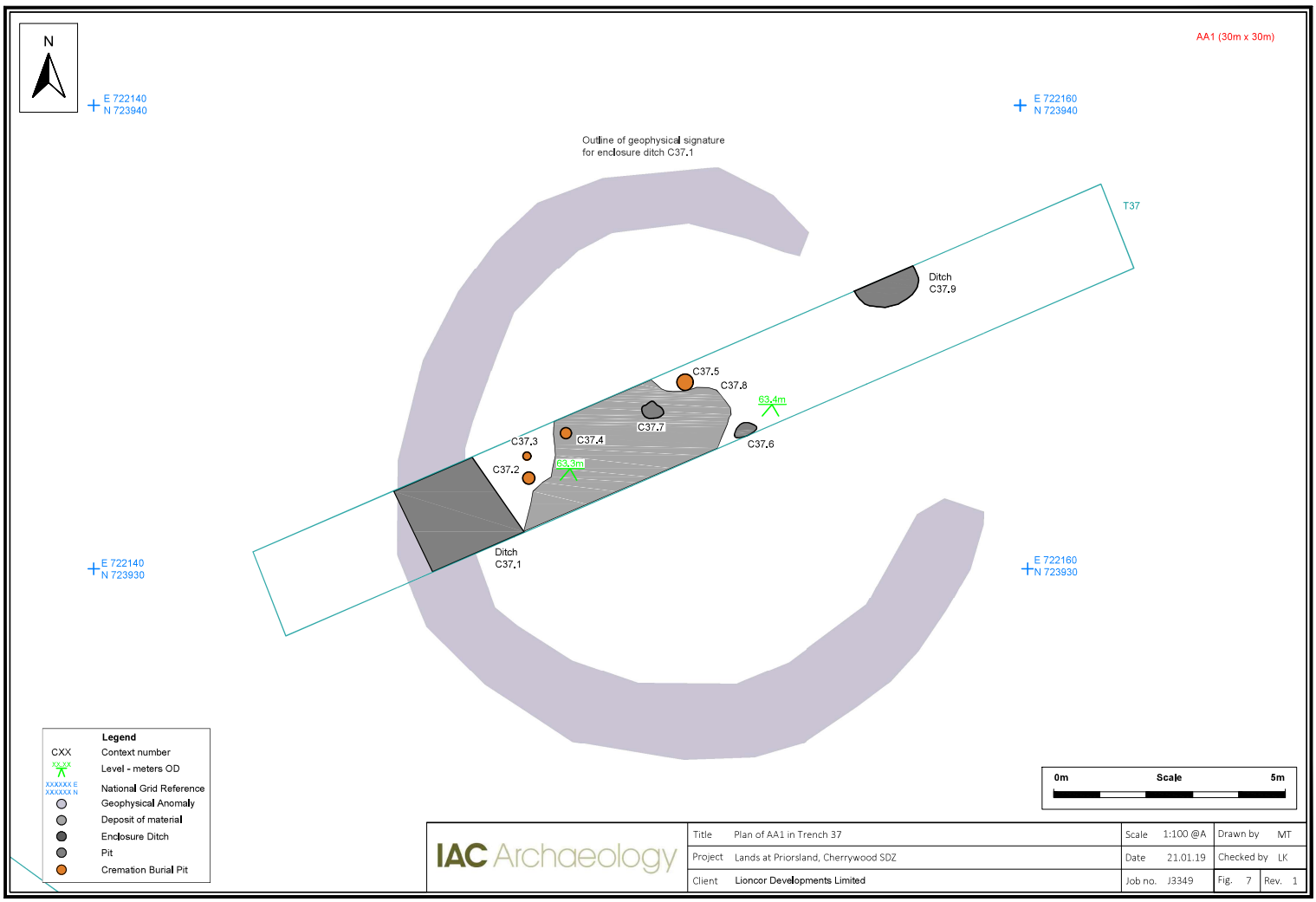


IAC Archaeology

Title	Extracts from historic OS maps (1837 and 1909) showing site location	**Scale**	1:5,000 @A4	**Drawn by**	MT
Project	Lands at Priorsland, Cherrywood SDZ	**Date**	21.01.19	**Checked by**	RL
Client	Lioncor Developments Limited	**Job no.**	J3349	**Fig.** 4	**Rev.** -

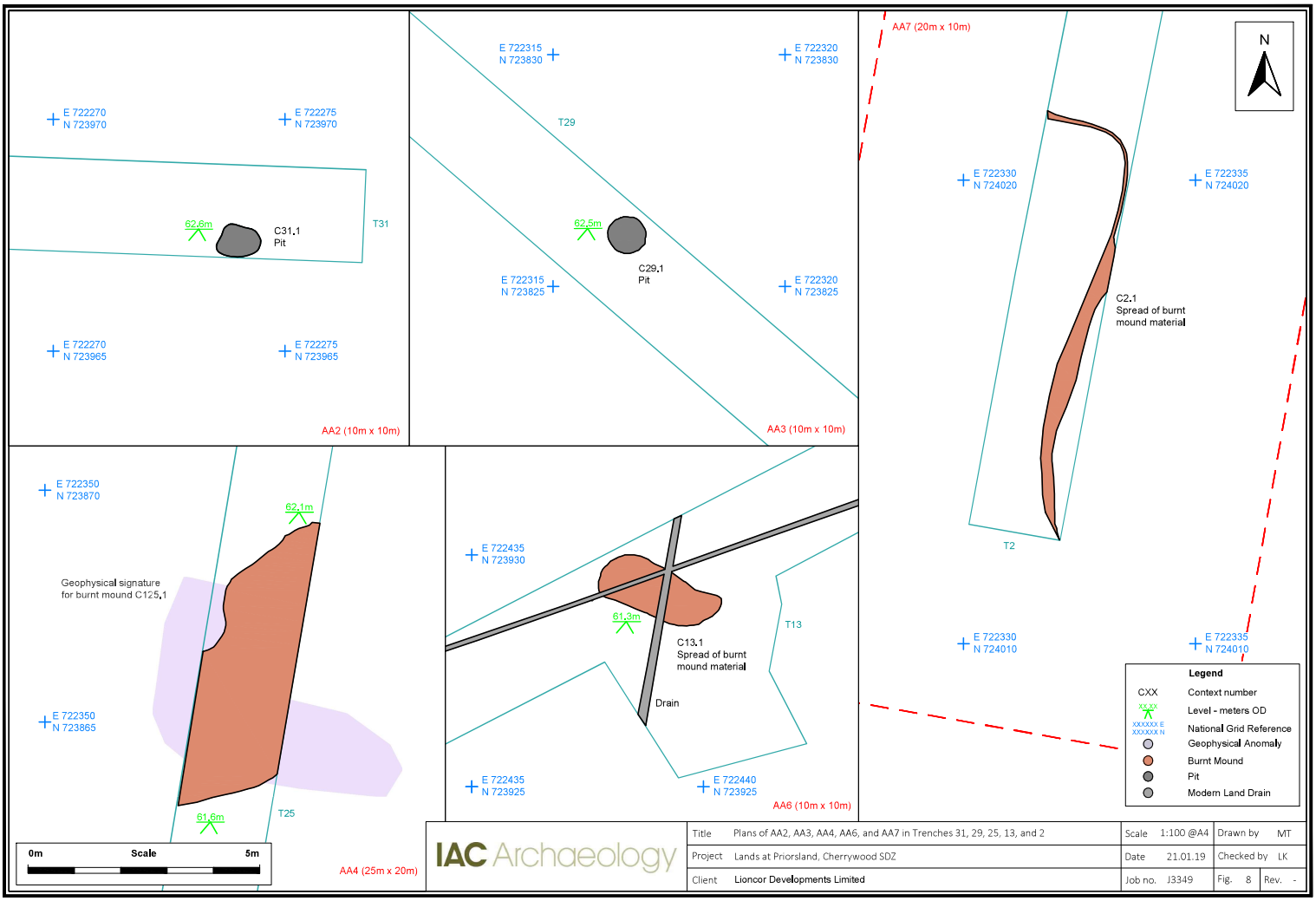

Archaeology
? Archaeology
?? Archaeology
Increased response
Trend
Land drain
Former boundary
Cultivation
Modern buried service
Interference from overhead power lines
Ferrous
Test Trench
Luas Park & Ride Facility
Car Park
Modern Services
Overhead Wires
Underpass
Mill & Enclosure
DU026-080
1.83m FF
1.83m FF
A
B
C
D
E
F
G
H
I
J
K
L
M
N
N
0m
Scale
100m
IAC Archaeology
Title Interpretation of geophysical survey results showing trench locations
Project Lands at Priorsland, Cherrywood SDZ
Client Lioncor Developments Limited
Scale 1/1,500 @A3
Date 21.01.19
Job no. J3349
Fig. 5
Rev. -
Drawn by MT
Checked by FB


N
Luas Park & Ride Facility
Car Park
Modern Services
Overhead Wires
Underpass
Mill & Enclosure DU026-080
T1 60m
T2 65.5m
T3 60m
T4 30m
T5 60m
T6 30m
T7 20m
T8 20m
T9 10m
T10 10m
T11 40m
T12 10m
T13 53m
T14 20m
T15 20m
T16 60m
T17 15m
T18 15m
T19 10m
T20 15m
T21 15m
T22 100m
T23 100m
T24 50m
T25 60m
T26 50m
T27 60m
T28 100m
T29 100m
T30 100m
T31 100m
T32 60m
T33 60m
T34 10m
T35 15m
T36 15m
T37 20m
T38 30m
T39 50m
T40 30m
T41 30m
AA1
AA2
AA3
AA4
AA5
AA6
AA7
Legend
Site Location
Test Trench
Archaeological Area
Exclusion zone overhead wires
Exclusion zone modern services
0m
Scale
100m
IAC Archaeology
Title Location of Test Trenches showing AA1-7
Project Lands at Priorsland, Cherrywood SDZ
Client Lioncor Developments Limited
Scale 1:1,500@A3
Date 21.01.19
Job no. J3349
Drawn by MT
Checked by LK
Fig. 6
Rev.



IAC Archaeology

Title	Plan of AA1 in Trench 37	Scale 1:100 @A	Drawn by MT
Project	Lands at Priorsland, Cherrywood SDZ	Date 21.01.19	Checked by LK
Client	Lioncor Developments Limited	Job no. J3349	Fig. 7 Rev. 1


E 722270
N 723970
E 722275
N 723970
62.6m
C31.1
Pit
T31
E 722270
N 723965
E 722275
N 723965
AA2 (10m x 10m)
E 722315
N 723830
E 722320
N 723830
T29
62.5m
C29.1
Pit
E 722315
N 723825
E 722320
N 723825
AA3 (10m x 10m)
AA7 (20m x 10m)
N
E 722330
N 724020
E 722335
N 724020
C2.1
Spread of burnt
mound material
T2
E 722330
N 724010
E 722335
N 724010
Legend
CXX
Context number
XX.XX
Level - meters OD
XXXXXX E
XXXXXX N
National Grid Reference
Geophysical Anomaly
Burnt Mound
Pit
Modern Land Drain
E 722350
N 723870
62.1m
Geophysical signature
for burnt mound C125.1
E 722350
N 723865
61.6m
T25
0m
Scale
5m
AA4 (25m x 20m)
E 722435
N 723930
61.3m
T13
C13.1
Spread of burnt
mound material
Drain
E 722435
N 723925
E 722440
N 723925
AA6 (10m x 10m)
IAC Archaeology
Title Plans of AA2, AA3, AA4, AA6, and AA7 in Trenches 31, 29, 25, 13, and 2
Scale 1:100 @A4
Drawn by MT
Project Lands at Priorsland, Cherrywood SDZ
Date 21.01.19
Checked by LK
Client Lioncor Developments Limited
Job no. J3349
Fig. 8
Rev. -

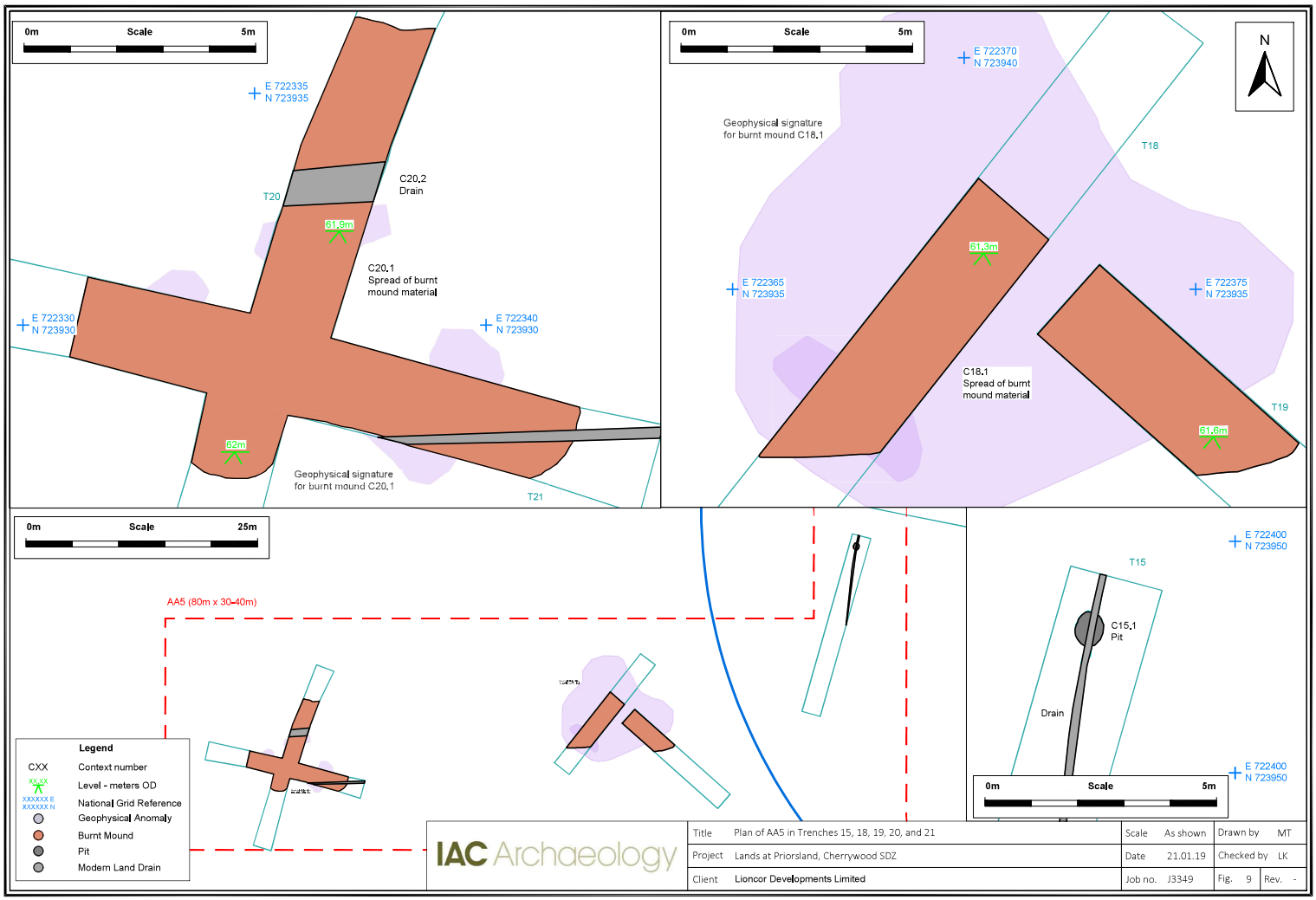

0m Scale 5m
E 722335
N 723935
C20.2
Drain
T20
61.9m
C20.1
Spread of burnt
mound material
E 722330
N 723930
E 722340
N 723930
62m
Geophysical signature
for burnt mound C20.1
T21
0m Scale 5m
E 722370
N 723940
N
Geophysical signature
for burnt mound C18.1
T18
61.3m
E 722365
N 723935
E 722375
N 723935
C18.1
Spread of burnt
mound material
T19
61.6m
0m Scale 25m
AA5 (80m x 30-40m)
E 722400
N 723950
T15
C15.1
Pit
Drain
E 722400
N 723950
0m Scale 5m
Legend
CXX Context number
XX.XX Level - meters OD
XXXXXX E
XXXXXX N
National Grid Reference
Geophysical Anomaly
Burnt Mound
Pit
Modern Land Drain
IAC Archaeology
Title Plan of AA5 in Trenches 15, 18, 19, 20, and 21
Scale As shown
Drawn by MT
Project Lands at Priorsland, Cherrywood SDZ
Date 21.01.19
Checked by LK
Client Lioncor Developments Limited
Job no. J3349
Fig. 9
Rev. -

Plate 1 Southern field, facing northeast

Plate 2 Site of DU026-080, facing northwest

Plate 3 Northern field showing site of DU026-080, facing east

Plate 4 Carrickmines Stream, facing east

Plate 5 T1, facing south

Plate 6 T8, facing southwest

Plate 7 T15, facing south

Plate 8 T22, facing west

Plate 9 T26, facing north-northwest

Plate 10 T30, facing east

Plate 11 T34, facing esat-southeast

Plate 12 T36, facing west-northwest

Plate 13 T39, facing southeast

Plate 14 T41, facing southwest

Plate 15 Stone drain in T3, facing west-northwest

Plate 16 Stone culvert in T5, facing southwest

Plate 17 Stone-filled drain in T26, facing south-southeast

Plate 18 Clay-filled drain in T31, facing southwest

Plate 19 Drainage feature in T39 facing south

Plate 20 Root burning with decayed stone in T34, facing east-southeast

Plate 21 Modern stone deposit in T36, facing southwest

Plate 22 T37, AA1, facing north

Plate 23 AA1: C37.1 Penannular ditch, facing northwest

Plate 24 AA1: C37.2, C37.3 and C37.4 pit burials, facing southwest

Plate 25 AA1: C37.5, C37.6 and C37.7 pit burials, facing southeast

Plate 26 AA1: C37.9, possible ditch terminus, facing northwest

Plate 27 AA2: C31.1 Pit facing south

Plate 28 AA3: C29.1 Pit, facing southeast

Plate 29 AA4: C25.1 Burnt mound spread, facing south

Plate 30 AA4; C25.1 Burnt mound spread truncated by drain, facing west

Plate 31 AA5: C18.1 Burnt mound spread, facing southwest

Plate 32 AA5: C20.1 Burnt mound spread, facing southeast

Plate 33 AA5: C15.1 Pit

Plate 34 AA6: C13.1 Truncated burnt mound spread, facing southeast

Plate 35 AA7: C2.1 Truncated burnt mound spread, facing north

PRIORSLAND CHERRYWOOD SHD - ENVIRONMENTAL IMPACT ASSESSMENT REPORT

APPENDIX 13.3 BUILT HERITAGE ASSESSMENT OF CARRICKMINES STREAM AND MILL SITE

PRIORSLAND CHERRYWOOD SHD - ENVIRONMENTAL IMPACT ASSESSMENT REPORT

INTRODUCTION

This report has been compiled by Rob Goodbody in order to examine a stream at Carrickmines Great in the light of a potential mill site marked "Site of mill" on the first-edition Ordnance Survey map of 1843. The steam follows a straight course for a distance and this form could represent a possible millrace. The river channel is stone-lined in places. The examination of the river and its environs and archive research have been carried out in order to investigate the reasons for the form of the river and to establish whether or not it was associated with a mill. It is proposed to develop the adjacent lands for housing and a school. As part of this development it will be necessary to cross the river channel with two bridges and hence it is necessary to explore the historical background and the nature of the river on site.

METHODOLOGY

The project was carried out in two phases – the site inspection and the desktop research.

The visit to the site involved examination of as much of the river and its banks as is possible. Significant parts of the river are overgrown with brambles, making the river inaccessible and the banks not visible. Stonework on the banks was examined to determine its nature and photographs were taken to illustrate the river and its banks.

The archival research centred on Ordnance Survey maps and the associated records of the Ordnance Survey that are now lodged in the National Archives. Examination of the first-edition Ordnance Survey map of 1843 indicated that there was an apparent anomaly in the way in which the river was depicted, and knowledge of the area and experience suggested that the anomaly could be explained with reference to the documents on which the map was based.

A search in the National Archives did not reveal the original surveyor's notebook in which the measurements of the river were recorded. A map on which changes to the map were recorded could also not be found. The evidence was then discovered in the Ordnance Survey Fair Plan for the Carrickmines Area.

RESULTS OF DESKTOP STUDY

The earliest documentary evidence for mills in the vicinity of Carrickmines is to be found in the twin surveys carried out in the 1650s – the Down Survey, which mapped the area and the Civil Survey, which listed the various land holdings. Neither is exhaustive in its content, as the primary focus was on land held by those who had been involved in the rebellion of 1641. However, the area under consideration in this report is adequately covered.

The river that is the subject of this report formed the townland boundary between the lands of Carrickmines and Brenanstown. In the early 19th century, the townland of Carrickmines was subdivided into two, named Carrickmines Little and Carrickmines Great and the area under consideration here is within the latter.

The Civil Survey listed the lands of "*Carrickmayne*" as having the walls of a castle, an orchard and a garden plot. There was no mention of a mill, strongly suggesting that there wasn't a mill, as mills had a value and would have been noted. The buildings listed at "*Breynanstowne*" were a castle, a garden plot a tuck mill and a corn mill.

The Down Survey maps were produced on three levels – county, barony and parish. The map of County Dublin shows no mill on the river in the vicinity of Carrickmines or Brenanstown, probably due to the small scale of the map.

The Down Survey map of the Dublin half-barony of Rathdown shows a mill at Brenanstown and this is indicated by an arrow on Figure 1 below. The map is not clear, but it is possible that there are two mills marked and it was frequently the case, even into the 19th century, that a tuck mill and a corn mill would be in the same building. It is notable that the boundary between Carrickmines and Brenanstown shown on this map is marked by the river and that the mill is on the part of the river downstream from the Carrickmines boundary.

The parish map, shown in Figure 2, produced as part of the Down Survey shows a similar layout. In this case south is at the top of the map. The large area in the centre of the map is Carrickmines and Glenamuck, stretching from the top of the map extract almost to the bottom and divided at the narrow point by the river. To the left of this is the townland of Brenanstown. For a short distance the river runs along the townland boundary – seen in this map beneath the second R of "Parrish". The mill building is further to the left, away from the parish boundary, and marked by a red arrow. The presence of just one mill on this map, apparently in conflict with the Civil Survey's listing of two mills, supports the supposition that the tuck mill and the corn mill were in the same building.

John Rocque's map of County Dublin was published in 1760 and is orientated with west at the top. In the detail reproduced in Figure 3, the river is seen flowing down through Carrickmines and Brenanstown (marked "Bryanstown". No mill is labelled on the map, though there are buildings close to the river that could have been mills. All of these are too far from Carrickmines to have been on the part of the river discussed here.

John Taylor's map of the environs of Dublin, published in 1816, does not label any mill on this river. There is a building shown on the map, however, that is adjacent to the river, deep in the valley and this could be a mill. This building is arrowed in Figure 4. As with the Rocque map, this building is too far east to be in the part of the river that forms the townland boundary with Carrickmines.

William Duncan's map of County Dublin, published in 1821 and included here in Figure 5, shows the river and its valley clearly and this is easily compared with the Ordnance Survey maps that appeared twenty years later. The river is seen crossing an open plain, with no buildings in the vicinity. It turns northwards and enters a deep valley, though no buildings are shown until further down the valley.

The first Ordnance Survey map of this area to be published was Dublin six-inch sheet 26, published in 1843. The detail of this map in Figure 6 shows the townland boundary marked in red. This follows what appears to be the course of a river; townland boundaries are depicted on these maps as a dotted line and in this instance, there is a pair of lines, which was frequently the symbol used when the boundary ran along a river. However, there is another pair of lines that cuts across the townland boundary in a straight line and usually a pair of lines such as this depicts a river or other watercourse such as a ditch or millstream. On the northern side of the townland boundary, in between the straight pair of lines and the dotted townland boundary the map marks "Site of Ancient Mill". It would be easy to interpret the townland boundary as being the river, while the straight line marks a millrace. However, the straight line runs back upstream as far as Carrickmines and intersects the river at multiple points. A millrace would not intersect a river unless it was carried on an elevated channel.

In June 1837, Eugene O'Curry of the Ordnance Survey visited the area, recording that he "traversed Carrickmines, Loughanstown, Tullow, Glen Druid, etc" and he sent on the result of his researches to Thomas Larcom, head of the Ordnance Survey. The resulting sketch map is reproduced as Figure 7. The sketch is difficult to interpret, mainly because of its being little more than a series of notes jotted down without any apparent attempt at drawing to scale. For instance, the actual distance between the "Glen Druid Cromleac" and Carrickmines House is 750m, while the distance between the "Cromleac" and the hillfort "On Rathmichael Hill" is 2.8km. However, the river running past Carrickmines House and the Glen Druid portal tomb is marked clearly, and no features are marked on the map in the vicinity of the river on the sketch map.

An "Old Quern" is marked on the map, with a rectangle beside it, but without explanation. These are not shown in the vicinity of the river and are located on the map midway between the river and a road, which appears to be Golf Road, Carrickmines. Should O'Curry have found the quern in or near the river it is hard to see how he would not have drawn it close to the river on his sketch.

Some clarity is brought to the investigation by the above map, which is a detail of the Ordnance Survey's fair plan of the parish of Tullow. The fair plans are manuscript maps produced to a six-inch scale and intended as a first draft of the final published map. The surveys carried out by the Ordnance Survey staff towards the preparation of the Dublin six-inch series were carried out in 1836-37 and finalised at this stage. However, as one of the purposes of these maps was to represent administrative boundaries accurately and clearly, the publication of the maps was held up pending the implementation of new boundaries, both of Dublin city and of the county. The Dublin six-inch maps were finally published in 1843 and, most significantly, they were brought up to date prior to publication. They cannot, therefore, be described as 1837 maps, as the information, while based on an initial draft in 1837, represents the later date.

The fair plan for the parish of Tully was drawn in February 1837. This map shows the townland boundary running along either side of the river, which meanders over a distance of 500m eastwards of Carrickmines village. Notably, there is no sign of the pair of straight lines that were shown on the 1843 map (Figure 8). There is also no indication of the site of a mill. Also notable on this map is the word "Ruin" marked in the valley downstream to the east of the part of the river at present under consideration. A very small rectangle, picked out in red, appears to the right of the word "Ruin", close to the river. A line is shown running from a bend in the river and past the side of this ruin and this may depict a mill race, while the building is a ruined mill. The word "Ruin" does not appear on the published version of the map.

Another survey carried out by the Ordnance Survey staff collected names that were to be inserted on the maps. These were recorded in the Ordnance Survey name books. The names for Tully parish appear in two name books, both compiled in December 1836. In neither book is there any mention of a mill or a site of a mill.

Later Ordnance Survey maps (Figure 9) show the river as a straight channel, turning sharply northwards before it enters the deep valley. No mention appears on the map of a site of a mill, though the Ordnance Survey usually carried through sites such as that from one edition to the next.

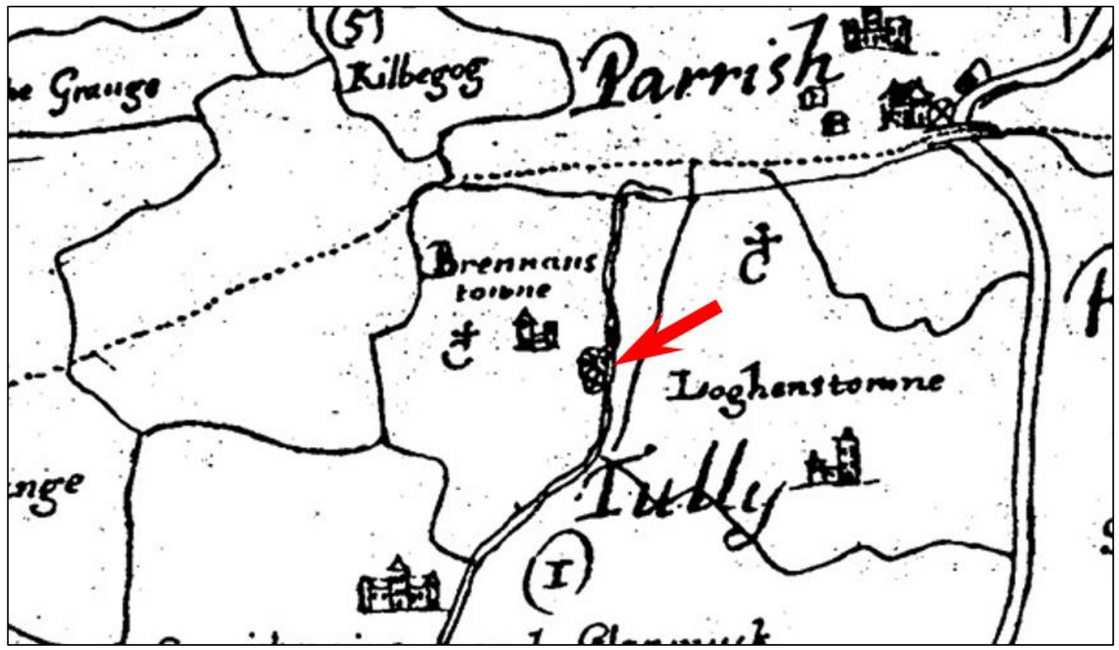


Figure 1: Detail of Down Survey barony map

Figure 2: Detail of Down Survey parish map

Figure 3: Detail of Rocque's map of County Dublin

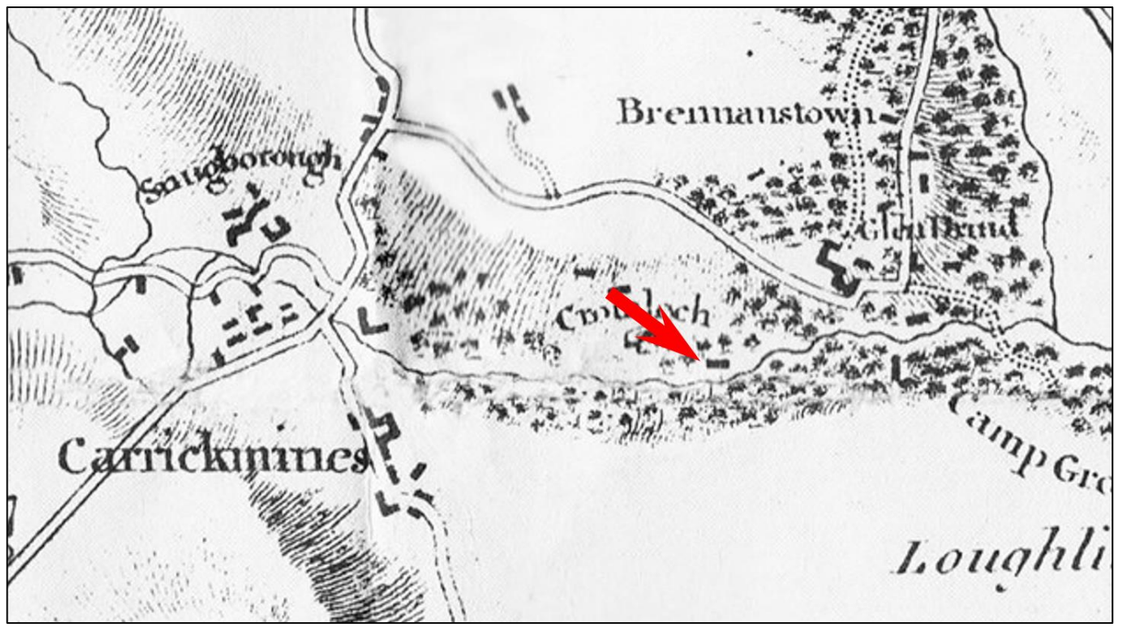


Figure 4: Detail of Taylor's map of the environs of Dublin, 1816

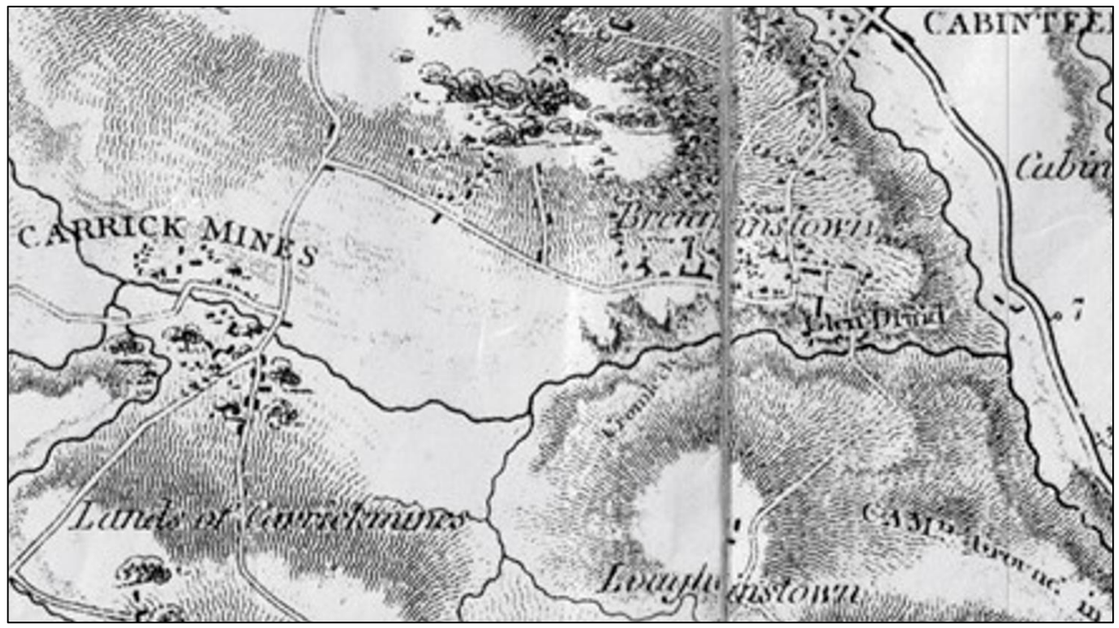


Figure 5: Detail of Duncan's map of County Dublin, 1821

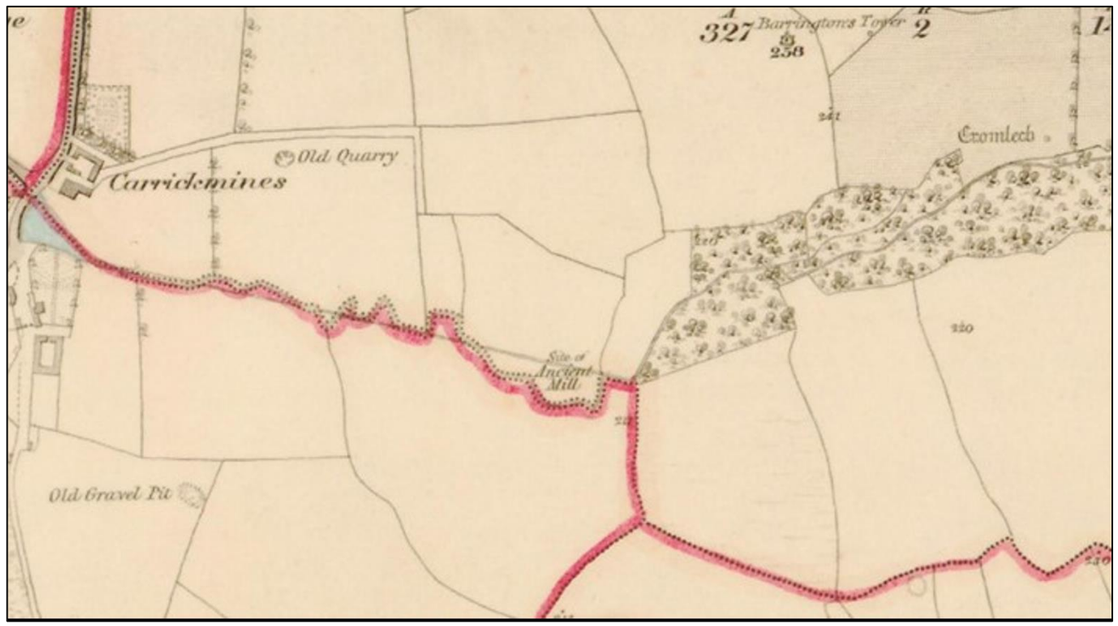


Figure 6: Detail of Ordnance Survey six-inch map of 1843

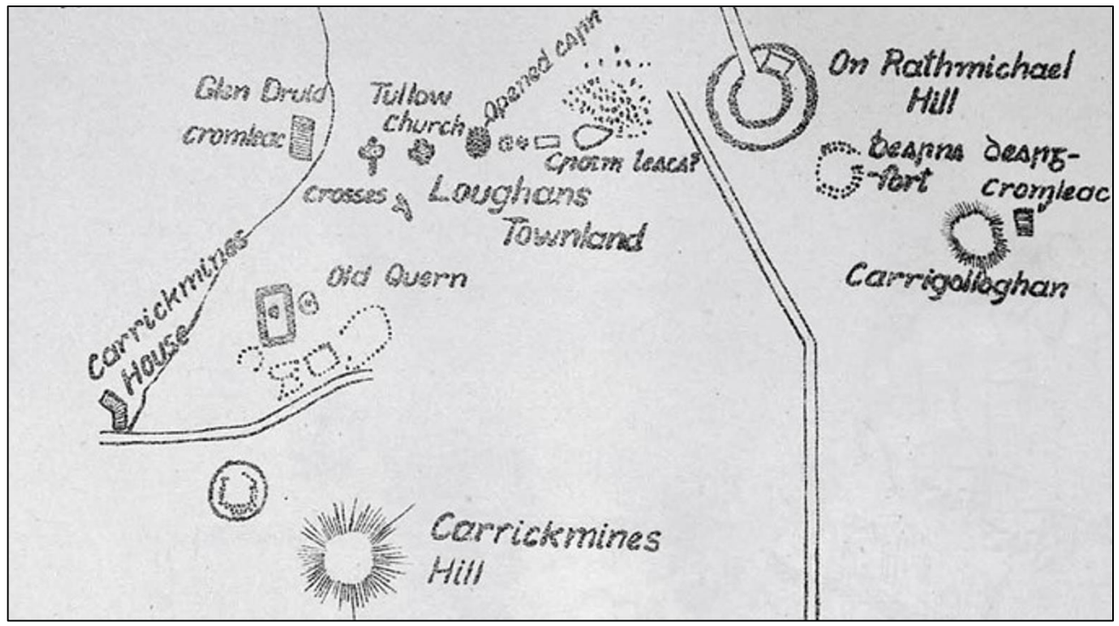


Figure 7: Detail of sketch map from Ordnance Survey letters

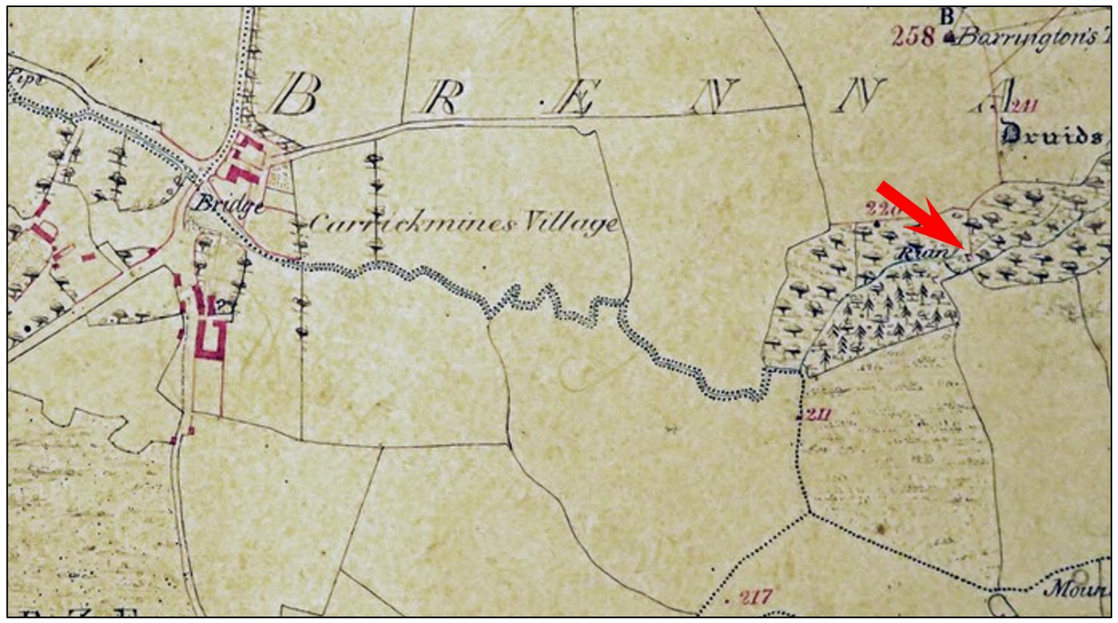


Figure 8: Detail of Ordnance Survey fair plan, 1836

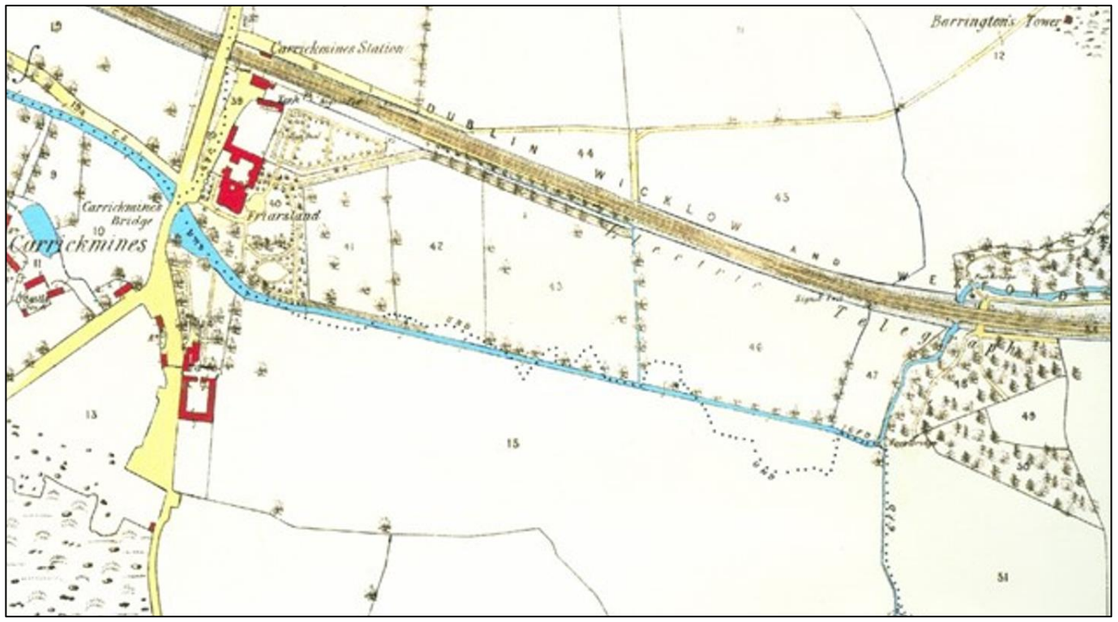


Figure 9: Detail of Ordnance Survey map of 1864

CONCLUSIONS OF DESKTOP RESEARCH

Two issues need to be clarified – the interpretation of the way in which the water courses are depicted on the published Ordnance Survey map of 1843 and a determination of the identity of the mill site marked on that map.

The first issue is clearly resolved by reference to the 1837 fair plan reproduced in Figure 7 above. This clearly shows that the river meandered over the relatively flat land and that there was no straight water course. The 1864 Ordnance Survey map shows a straight water course and no meander. It is clear that the river has been straightened and that this work was under way in the early 1840s when the Ordnance Survey staff were updating the maps for publication. The straight-line water course marked on the 1843 edition was not a millrace.

The second issue is less clear. What is missing is the basis for the Ordnance Survey's label noting the site of the ancient mill. Earlier evidence for mills on this river places them further downstream and this makes sense, as the relatively flat land that caused the extensive meandering of the river would not make a good location for a mill, where the millrace needs to run almost level for a distance in order to achieve a fall back into the river. Clearly this will not occur where the fall on the river is so small that meandering takes place. Conversely, where the river enters the Druid's Glen, which is the wooded area downstream, there is a greater fall and achieving the necessary head of water to drive the millwheel is more likely. The only evidence in the Ordnance Survey's background surveys showing evidence for a mill that has come to light to date is Eugene O'Curry's sketch map, though, as seen above, this does not indicate that the quern stone was anywhere near the river.

It may be relevant to add that the late archaeologist, Patrick Healy, found a quern stone in the bed of the river in the Druid's Glen in a location close to where the "Ruin" is marked on the Ordnance Survey fair plan. While this is not evidence that there was no mill on the site marked on the 1843 map, it is strongly suggestive that the ruin marked on the fair plan may have been a mill.

RESULTS OF FIELD INSPECTION

The river runs in a relatively straight course, though despite the depth of the channel it managed to deviate from this course to some extent, introducing some slight bends and widening the channel in places. In general, the river channel is c. 1.2m deep and the river varies from about 1.5m to 2m in width. The depth of the water varies with the rainfall, and on the day of survey the depth was in the region of 250 to 300mm. Photo 1 shows how the river has introduced slight bends and increases in width in various places along its course.

It was intended to undertake a metal detection survey of the stream bed under a reactivation of licence 18R0249 by Liza Kavanagh of IAC however the visibility was too poor due to high levels of sediment in the water.

Along much of the course of the river the banks are heavily overgrown with brambles and ivy, preventing examination of the banks (Photo 2). Where the banks are visible, they are generally faced with stone, though in many places the stonework has collapsed. Where the stone survives *in-situ* the banks are almost vertical (Photo 3). The stones are for the most part of granite and are angular, indicating that they have either been quarried or they have been split from larger field stones. They are generally irregular and variable in size. A very small number of stones were seen during the survey that appear to have been reused, as they appear to be cut into shape. The stone at the water line, to the left of the ranging rod in the above photograph seems to be of granite and has a straight arris separating two flat surfaces. As this is not normally found naturally in granite stones it is possible that this has been salvaged from an earlier building. Whether this is the case can only be determined by removing the stone for examination.

In one place seen during the survey the stone lining extended to the top of the embankment (Photo 4), while for the most part the surviving stonework rises only about half way up. No trace of any mortar was seen, either as the cement to bind the stone lining together or as residual mortar remaining on stone reused from an earlier structure.

In many places there was little or no stone on the embankment and where there were significant areas of bare bank there were usually significant quantities of stone in the river channel (Photo 5). The collapse of stonework would be a significant agency in the introduction of curves into the channel and places where the channel is wider, as the stone would divert the water flow, often into a bank that is no longer protected by its stone facing.

At one point a bridge has been provided over the river to allow for the passage of people and horses between one field and another. Close to this bridge, downstream, there is a stone in the river bed that has a very rectilinear form (Photo 6). This stone was not lifted to examine it more closely. Another similar object was lifted and found to be a concrete block. This one may be granite, however and, if so, it has been reused as granite does not form this shape naturally.

On the northern side of the river there is a low embankment (Photo 7). It is probable that this is the spoil that was dug out of the trench in about 1840 when the river channel was straightened.

At the eastern end of the straight run of the channel the river bends sharply towards the north. At this bend a steel beam crosses the river (Photo 8 and 9). This is the remnant of a footbridge that is marked as such on the 1907 Ordnance Survey map. This bridge was crossed by the present author in the mid-1980s and was in poor condition at that time.

Photo 1: River channel

Photo 2: River channel with stone lining

Photo 3: Detail of stone lining

Photo 4: Stone lining on embankment

Photo 5: Collapsed stone in river channel

Photo 6: Squared stone in river channel

Photo 7: Bank on northern side of river

Photo 8: Remnant of bridge at bend in river

Photo 9: Bend in river showing junction with Ticknick Stream, seen from upstream

CONCLUSIONS OF FIELD INSPECTION

As was seen in the desktop research section above, the straight river channel dates from around 1840, when the meandering channel was replaced by a deep, straight channel, presumably to assist the drainage of the floodplain adjacent to the river. The stonework on the river banks would date from that time. The stone lining is not in the form of walls but is merely a stone facing onto the banks to protect them from erosion. It appears that the stone was never mortared, as no trace of mortar was identified during the survey.

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APPENDIX 13.4 SMR/RMP SITES WITHIN THE SURROUNDING AREA

RMP NO.	STATUS	LOCATION	CLASSIFICATION	DESCRIPTION	ITM	DISTANCE FROM SITE
DU026-080001-2	RMP	Brenanstown and Carrickmines Great	Enclosure (-001), Mill (-002)	001 - The OS Letters (1837) include sketches of the Brennanstown/Carrickmines Great area that show a series of enclosures to the S of site of an 'ancient mill'. This was located on a stream E of Carrickmines that runs into Glendruid Glen. There is no visible trace of these enclosures. 002 - The 1836 OS 6-inch map shows the 'site of ancient mill' along a stream E of Carrickmines that runs into Glendruid Glen. It is marked on the Down Survey (1655-6) map and the Civil survey (1654-6) states that there was a corn mill and tuck mill here (Simington 1945). The OS Letters include sketches of this area which show the foundations of a rectangular building and a feature marked 'Old Quern' (O'Flanagan 1927, 16). Paddy Healy has pinpointed the site as being within the wooded area of the Druid's Glen (Pers. comm. Rob Goodbody).	722430, 723960	Within proposed development area
DU026-135	SMR	Carrickmines Great	*Fulacht Fia*	The site was identified in 1998 during topsoil-stripping during the construction of a gas pipeline as a 7.5m (N-S) by 6m spread of burnt stone and charcoal in a loose, silty clay matrix. It had been truncated by a field drain running north-south through the middle of it. A pit was identified below the eastern portion of the site. It measured 0.95m (SE/NW) by 0.7m and was up to 0.42m deep. The pit was full of a deposit of burnt material that could not be distinguished from the burnt stone spread. A flake of struck flint was recovered (O Neill 2000, 37-9, O'Neill 1999).	722220, 723720	100m southwest
DU026-005001-4, DU026-146	Nat. Mon., RMP	Carrickmines Great	Castle (-001), bawn (-002), fortifications (-003), mill (-004), ringwork (-005), Rock Art (DU026-146)	005001 – The fragmentary remains of Carrickmines Castle have been incorporated into farm outbuildings. This is located in low-lying terrain off the Golden Ball-Carrickmines Road. The castle fragment comprises a section of wall (H 4m) built of randomly coursed blocks of granite. It contains a square-headed window under a round segmental arch at ground level. The documentary evidence indicates a castle in existence of Carrickmines from the 14th-century (Ball 1901, 195-203). This castle was apparently levelled following a battle in the 1641 rebellion. The fields SW of the castle are uneven with rock outcrop and a series of irregular ditches marked on the 1937 OS 6 inch map and interpreted as outer defences (pers. comm. Mr. Paddy Healy). These ditches create a number of raised sub-rectangular platforms (L c. 50m, Wth 30m). Monitoring of trial trenches adjacent to the castle in 1996 exposed a stone built drain of post -medieval date (Connolly 1997, 16-17). Excavations have since revealed a double fosse/double bank along the NW flank of the site. To the SE of the inner castle area is a stone-revetted fosse interpreted as part of the southern curtain wall. This enclosed an area of angular form and was connected to an earlier enclosure by a causeway. Two linear fosses identified c 60m to the S of the castle may represent some form of outer defence line. These contained Saintonge pottery which was made in the Saintonge region of France in the 13th and 14th centuries. Remains of a two-phase building were also exposed N of the castle area. Considerable quantities of late 13th/early 14th century pottery have been retrieved. Finds include an iron axehead, spindle whorls, leather shoes, rotary querns, iron keys, nails buckles and sundry implements. A cobbled surface a millpond, kiln and wells were also found on the site (Clinton 2002, 72, 2003, 85-7, 2004, 131). 005002 - This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. Excavations at Carrickmines castle have revealed a double fosse/double bank along the NW flank of the site. To the SE of the inner castle area is a stone-revetted fosse interpreted as part of the southern curtain wall. This enclosed an area of angular form and was connected to an earlier enclosure by a causeway. Two linear fosses identified c 60m to the S of the castle may represent some form of outer defence line. These contained Saintonge pottery which was made in the Saintonge region of France in the 13th and 14th centuries (Clinton 2002, 72; 2003, 85-7; 2004, 131). 005003 - This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. The fields SW of Carrickmines castle are uneven with rock outcrop and a series of irregular ditches marked on the 1937 OS 6 inch map and interpreted as outer defences (pers. comm. Mr. Paddy Healy). These ditches create a number of raised sub-rectangular platforms (L c. 50m, Wth 30m). Monitoring of trial trenches adjacent to the castle in 1996 exposed a stone built drain of post -medieval date (Connolly 1997, 16-17). 005004 - This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. A millrace runs from the site identified on the OS 1st edition map as 'site of an ancient mill' to the N of Carrickmines castle. 005005 - This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. Excavations at Carrickmines castle in 2001 uncovered evidence for an earthen bank/fosse-defended enclosure which has been interpreted as an irregularly shaped ringwork castle (Clinton 2001, 87). 146 - This is one of three small boulders containing cup-marks which were discovered during archaeological investigations on the route of the South-Eastern Motorway (Clinton 2002, 87; 2004, 131).	721780, 724090	c. 210m to the west-northwest
DU026-007	Nat. Mon., RMP, RPS	Brenanstown	Portal Tomb	This very impressive portal tomb is located on the valley floor of a steep-sided glen close to a stream. A massive wedge-shaped granite roofstone (L 5.1m; Wth 4.5m; D 1.75m) covers a chamber (int. dims. L 3.1m; Wth 1.42m) and antechamber facing west. It rests on the two front portal stones (H 2.6m and 2m respectively) and three sidestones. A doorstone separates the main chamber from the antechamber. There are some granite boulders at the rear of the tomb wall which may have been part of an additional chamber (Borlase 1897, 2, 390-92; Ó Nualláin 1983, 96; Turner 1983, 5). There are two deep depressions on the upper surface of the roofstone, with ducts leading to the corner of the stone.	722865, 724185	420m northeast
DU026-006	RMP	Laughanstown	Enclosure	This site was located a farmyard in a field of pasture on a hillslope N of Tully cross. Recent road development adjacent to the site. Furze and bracken densely cover an area which is marked on the 1st edition (1843) map as an enclosure. There is a semi-circular raised area to the E of this site (13m E-W, 15m N-S. H 1.10m). This may have been caused by the building of a concrete block wall which cuts into it. Recently subject to testing and monitoring as part of the Cherrywood Phase 1 Roads corridor (Castle Street) however no archaeology was present (15E0471).	722738, 723800	250m east
DU026-150	SMR	Carrickmines Great	*Fulacht Fia*	A burnt mound was identified during topsoil-stripping for the South-Eastern Motorway (M50). An area of decayed and burnt stone (L9m, Wth 20m) was revealed which covered two possible troughs. A sherd of Early Bronze Age pottery was found in the fill (O'Reilly 2004, 134).	722560, 723305	500m south

APPENDIX 13.5 STRAY FINDS WITHIN THE SURROUNDING AREA

Information on artefact finds from the study area in County Dublin has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

A significant quantity of artefactual material (c. 90,000 artefacts) was recovered during the archaeological excavations at Carrickmines and has been accessioned to the National Museum of Ireland and is held in their repository in Swords, Co. Dublin. These includes pottery (c. 20,000 sherds), coins, weapons and ammunition, human skeletal remains, metal, glass, wood, leather and clay artefacts,

TOWNLAND & PARISH	NMI NO.	FIND	FIND PLACE	DESCRIPTION
Laughanstown, Tully	1975:247	Medieval pottery	Vicinity of Tully Church	Base wall sherds, medieval pottery. Fairly coarse, hard, micaceous and quarzitic ware.
	1981:10	Medieval pottery	Vicinity of Tully Church	Body sherd of glazed vessel. Orange fabric with abraded pale green external glaze.
	1999:132	Medieval pottery	Vicinity of Tully Church	Five sherds of medieval pottery, consisting of 3 sherds of unglazed Leinster Cooking Ware and two sherds of glazed ware.
	1989:18	Bronze strap end, Various post-1790 items	Field walking over site of the military camp	Strap end of copper alloy. Possible 10th century with decoration. Finds recovered during. The finds have all be categorised as AD 1790 or later. Uniform buttons including military, livery, dress and railway examples. Some brass pieces from muskets and bugles. Bronze and copper military badges including both Irish and English regimental crests. Lead musket and pistol shot varying from 10–17mm. A variety of coins dating from 1792 onwards. A toy lead horse and bronze cannon. A bronze rosary crucifix.
Cabinteely, Kill	2011:262–263	Axes	St. Brigid's school	Two copper alloy flat axes.
	R2454.1–3	Cremation burial	In a cist	Cremated human remains found in a chamber covered with a stone, flint flake and iron disc.
	2543:wk058	Cup		Ceramic cup.
Loughlinstown, Killiney	n/a	Large assemblage of various finds	Early medieval cemetery.	A large quantity of finds found in association with a large cemetery excavated near Cabinteely. (See RMP file DU026-119).
	1967:137	Flint Blade	Laneway	Pointed flint artefact, roughly triangular in plan.
	1957:350	Part of cemetery – stone cists	Garden	In 1957 a stone cist burial was disturbed in a garden. Museum staff investigated and retrieved human bones. The bones were identified as those of an adult male. In 1938 three human skulls were found while digging drains for a nearby house.
Glenamuck North, Tully	1974:89	Bronze Palstave	Found in a field 18" deep.	Bronze Palstave cast in a bi-valve mould. It is heavily patinated and extremely pitted all over. L 13.5cm, W butt 2.8cm. cutting edge 5.8cm

APPENDIX 13.6 RPS/NIAH SITES WITHIN THE SURROUNDING AREA

RPS REF.:	NIAH REF.	STATUTORY PROTECTION	LOCATION	CLASSIFICATION	DESCRIPTION	RATING	ITM	DISTANCE FROM SITE
1746	60260234	RPS	Glenamuck Road, Carrickmines	Priorsland House, Out-Offices and Gates	Detached three-bay two-storey house, extant 1884, on a cruciform plan centred on single-bay single-storey flat-roofed projecting porch to ground floor; three-bay (three-bay deep) two-storey lower block (west) with two-bay two-storey rear (west) elevation. Occupied, 1911. A house representing an integral component of the 19th-century domestic built heritage of area with the architectural value of the composition, one refronting an earlier house occupied by Reverend Lyndon Henry Bolton (d. 1869; Lewis 1837 II, 656), suggested by such attributes as the deliberate alignment maximising on scenic vistas overlooking landscaped grounds 'which enjoy a backdrop of semi-rural parkland'; the symmetrical frontage centred on a Classically-detailed porch; the diminishing in scale of the openings on each floor producing a graduated visual impression; and the monolithic timber work embellishing the roofline (Shaffrey 2010, n.p.). Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior where contemporary joinery including 'a fine staircase built in an anachronistic mid eighteenth-century style'; restrained chimneypieces; and decorative plasterwork enrichments, all highlight the artistic potential of the composition (ibid.). Furthermore, adjacent outbuildings (extant 1837); and a wedge-shaped walled garden (extant 1909), all continue to contribute positively to the group and setting values of a self-contained estate having historic connections with George Sutherland '[of] Priorsland Carrickmines County Dublin'; Dr. Thomas Wrigley Grimshaw MD CB (1839-1900), 'Registrar General of Ireland late of Priorsland Carrickmines County Dublin'; Alexander Porter (1876-1946) and the Honourable Frances Maud Porter (née Gibson) (1880-1957); Alfred Dover Delap (1871-1943); and Thomas Vincent Murphy (1902-88) 'of Priorsland Carrickmines'.	Regional	721965, 724140	142m northwest
1967	60260233	-	Glenamuck Road, Carrickmines	Water tower	Freestanding single-bay single-stage water tower, extant 1909, on a square plan. Decommissioned, 1958. Now disused. Limewashed walls supporting embossed cast-iron water tank on red brick header bond "cornice". Set in unkempt grounds shared with Carrickmines Railway Station.	Regional	722025, 724210	177m northwest
1743	60260232	RPS	Glenamuck Road, Carrickmines	Station House - Former Carrickmines Railway Station	Detached three-bay two-storey railway station, opened 1854, on a rectangular plan; four-bay two-storey platform (north) elevation. Occupied, 1911. Closed, 1958. Restored, 2009. Now disused. Hipped slate roof with lichen-spotted clay ridge tiles, rendered chimney stacks on rendered chamfered bases having concrete capping supporting terracotta pots, and cast-iron rainwater goods on timber eaves boards on slightly overhanging exposed timber rafters retaining cast-iron downpipes. Rendered, ruled and lined walls on rendered plinth with rusticated cut-granite quoins to corners. A railway station erected to a design attributed to William Dargan (1799-1867) identified as an important component of the mid 19th-century domestic built heritage of south County Dublin on account of the connections with the development of the Dublin and South Eastern Railway (DSER) line opened (1854) by the Dublin and Wicklow Railway (DWR) Company with the architectural value of the composition, one recalling the contemporary Stillorgan Railway Station, suggested by such attributes as the compact rectilinear plan form centred on a pedimented doorcase; the dramatic diminishing in scale of the openings on each floor producing a graduated visual impression; and the slightly oversailing roofline.	Regional	721985, 724225	198m northwest
2066	60260219	-	Brenanstown	Mausoleum, family burial ground	Private burial ground, opened 1847, including: Part subterranean single-bay single-storey barrel-roofed single-cell vault on a rectangular plan. Sod-covered segmental barrel roof. Roughcast wall between roughcast splayed abutment walls with cut-granite coping. Pair of trefoil-headed panels centred on square-headed door opening with cast-iron door. Set in unkempt grounds with piers to perimeter supporting flat iron gate. A vault erected (1847) by Edward Barrington JP (1796-1877) of Fassaroe House, County Wicklow. NOTE: In addition to 8 of his 19 children produced by two marriages, including identically-named sons Richard Manliffe Barrington (1829-47) and Richard Manliffe Barrington (1849-1915), the vault contains the reinterred remains of his father John Barrington (1764-1824); brother John Barrington (1800-36); and sister Selina Barrington (1805-36), all of whom died of Typhus and were originally buried in nearby Tully Graveyard [SMR DU026-023002-].	Regional	722668, 724130	200m northeast
-	60260228	-	Castle View, Carrickmines	Water pump	Freestanding cast-iron "lion mask" water hydrant, extant 1937. Now disused. Road fronted.	Regional	721905, 724165	44m northwest
1729	60260220	RPS	Brenanstown Road, Brenanstown	Barrington's Tower, House.	Attached single-bay three-stage folly, built 1810, on a square plan originally detached. Extended, 1956, producing present composition to accommodate alternative use. Now disused. Set in overgrown grounds with rusticated rendered piers to perimeter having stringcourses below capping supporting wrought iron double gates. A "faux" Irish tower house folly erected by John Barrington (1764-1824) of nearby Glendruid (see 60260215) representing an integral component of the early nineteenth-century built heritage of south County Dublin with the architectural value of the composition, one described (1838) as 'a lofty pleasure turret erected near [the site of] a castle' (D'Alton 1838, 836), confirmed by such attributes as the compact square plan form; the battered silhouette; and the crow stepped parapets embellishing the roofline. NOTE: An adjoining "fan-shaped" neo-Georgian house not only repurposed the folly, but also timber work reclaimed from Platin Hall (1700; demolished 1954-5), County Meath.	Regional	722617, 724277	260m northeast

RPS REF.:	NIAH REF.	STATUTORY PROTECTION	LOCATION	CLASSIFICATION	DESCRIPTION	RATING	ITM	DISTANCE FROM SITE
-	60260221	-	Brenanstown Road, Brenanstown	Water pump	Freestanding cast-iron "lion mask" water hydrant, extant 1937. Now disused. Road fronted. Supplied by Glenfield and Kennedy (established 1852) of Kilmarnock representing an interesting example of mass-produced cast-iron work making a pleasing, if largely inconspicuous visual statement in sylvan street scene.	Regional	722731, 724320	370m northeast
-	60260231	-	Glenamuck Road, Carrickmines	Tullybeg House	Detached three-bay two-storey flat-roofed house, extant 1937, on a square plan; two-bay two-storey side elevations. Sold, 2013. Flat roof behind parapet with concealed rainwater goods.	Regional	722030, 724440	390m north
2050	60260225	-	Brenanstown Road, Brenanstown	Coolgreen House	Detached three-bay two-storey house, built 1900; occupied 1901, on a U-shaped plan with single-bay two-storey gabled advanced (east) or single-bay two-storey projecting (west) end bays centred on single-bay single-storey lean-to projecting porch. A house representing an integral component of the domestic built heritage of south County Dublin with the architectural value of the composition, one attributed to Richard Francis Caulfield Orpen (1863-1938) owing to similarities with his own house at nearby Coologe (see 60260211), suggested by such attributes as the compact plan form; the diminishing in scale of the multipartite openings on each floor producing a graduated visual impression; and the high pitched roofline. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior, thus upholding the character or integrity of a house having historic connections.	Regional	722262, 724530	407m north
DU026-007	-	Nat. Mon., RMP, RPS	Brenanstown	Portal Tomb	Portal Tomb located on the valley floor of glen close to Carrickmines Stream (see Appendix 5.11.4).	National	722865, 724185	420m northeast
2020	60260230	-	Glenamuck Road, Carrickmines	Hillside House	Detached four-bay single-storey house with dormer attic, extant 1909, on an L-shaped plan with two-bay single-storey double gabled projecting end bay. A house erected to a design by Richard Francis Caulfield Orpen (1863-1938) of South Frederick Street, Dublin (DIA), representing an integral component of the early 20th-century domestic built heritage of south County Dublin with the architectural value of the composition, one showing the development of the so-called "Royal Exchange Estate" as 'a picturesque garden city [with] houses of the new type…designed by architects and well-designed too', suggested by such attributes as the angular plan form; the diminishing in scale of the multipartite openings on each floor producing a graduated visual impression; and the high pitched roofline. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior where contemporary joinery; chimneypieces; and sleek plasterwork refinements, all highlight the artistic potential of a house having historic connections	Regional	722070, 724530	477m north
-	60260227	-	Glenamuck Road, Carrickmines	Ingleside House	Detached three-bay two-storey house with dormer attic, extant 1909, on an L-shaped plan with single-bay two-storey gabled projecting end bay; two-bay (south) or single-bay (north) two-storey side elevations. A house representing an integral component of the early 20th-century domestic built heritage of south County Dublin with the architectural value of the composition, one showing the development of the so-called "Royal Exchange Estate" as 'a picturesque garden city [with] houses of the new type…designed by architects and well designed too', suggested by such attributes as the compact plan form centred on a pillared porch; the silver-grey "opus incertum" stone work offset by red brick dressings producing a mild two-tone palette; the diminishing in scale of the openings on each floor producing a graduated visual impression with the principal "apartments" defined by polygonal bay windows; and the high pitched roofline.	Regional	722100, 724590	500m north

APPENDIX 13.7 HERITAGE LEGISLATION PROTECTING THE ARCHAEOLOGICAL RESOURCE

PROTECTION OF CULTURAL HERITAGE

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention), ratified by Ireland in 1997.

THE ARCHAEOLOGICAL RESOURCE

The National Monuments Act 1930 to 2004 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as ‘a monument or the remains of a monument the preservation

of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

OWNERSHIP AND GUARDIANSHIP OF NATIONAL MONUMENTS

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

REGISTER OF HISTORIC MONUMENTS

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

PRESERVATION ORDERS AND TEMPORARY PRESERVATION ORDERS

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

RECORD OF MONUMENTS AND PLACES

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for Housing, Local Government and Heritage) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in the case of urgent necessity and with the consent of the Minister, commence the work until two months after the giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the European Communities (Environmental Impact Assessment) Regulations 1989, Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

THE PLANNING AND DEVELOPMENT ACT 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

DLR COUNTY DEVELOPMENT PLAN 2016-2022

Policy AH1: Protection of Archaeological Heritage

Policy AH2: Protection of Archaeological Material in Situ

Policy AR1: Record of Protected Structures

Policy AR4: National Inventory of Architectural Heritage (NIAH)

Policy AR5: Buildings of Heritage Interest

Policy AR8: Nineteenth and Twentieth Century Buildings, Estates and Features

Policy AR9: Protection of Historic Street Furniture

Policy AR11: Industrial Heritage

Policy AR12: Architectural Conservation Areas

CHERRYWOOD SDZ PLANNING SCHEME 2014

Archaeological Objectives: H1–H6

Recorded Monuments & Places Specific Objectives: H7–12

SEA ENVIRONMENTAL REPORT FOR CHERRYWOOD PLANNING SCHEME, 2012

Archaeological Objectives: SEO CH1, CH2

CARRICKMINES CASTLE CONSERVATION PLAN 2017

The Carrickmines Conservation Plan 2015-2025 was formally adopted by Dun Laoghaire-Rathdown County Council on the 13th February 2017 to provide a framework for the conservation and management of the site of Carrickmines Castle. The vision for the management of the Carrickmines Castle Site is that Dún Laoghaire-Rathdown County Council will raise awareness of the history of Carrickmines Castle, conserve the upstanding remains, provide supervised access to the site to members of the public where possible and facilitate reasonable access to the site for academic research.

APPENDIX 13.8 HERITAGE LEGISLATION PROTECTING THE ARCHITECTURAL RESOURCE

DRAFT DLR COUNTY DEVELOPMENT PLAN 2016–2022

Policy AR1: Record of Protected Structures

Policy AR2: Protected Structures Applications and Documentation

Policy AR3: Protected Structures and Building Regulations

Policy AR4: National Inventory of Architectural Heritage (NIAH)

Policy AR5: Buildings of Heritage Interest

CHERRYWOOD SDZ PLANNING SCHEME 2014

General Objectives for works to Protected Structures and to the lands associated with them:

Specific Objectives: H13–H27

Lehaunstown House – Specific Objectives: H53–H5

Specific Objectives for the Outbuildings: H56–57

Specific Objectives (Lands to the southwest): H58–H59

Bride's Glen Viaduct Specific Objectives: H60–H63

Historical Interest Specific Objective: H64

APPENDIX 13.9 IMPACT ASSESSMENT AND THE CULTURAL HERITAGE RESOURCE

POTENTIAL IMPACTS ON ARCHAEOLOGICAL AND CULTURAL HERITAGE REMAINS

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2003: 31). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.
- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.
- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.
- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.
- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.
- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.
- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

PREDICTED IMPACTS

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;
- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.

APPENDIX 13.10: MITIGATION MEASURES AND THE CULTURAL HERITAGE RESOURCE

POTENTIAL MITIGATION STRATEGIES FOR CULTURAL HERITAGE REMAINS

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative effects.
The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved in situ.

DEFINITION OF MITIGATION STRATEGIES

ARCHAEOLOGICAL RESOURCE

The ideal mitigation for all archaeological sites is preservation *in-situ*. This is not always a practical solution, however. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation in situ are not possible.

Full Archaeological Excavation can be defined as 'a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design' (CIfA 2014b).

Archaeological Test Trenching can be defined as 'a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate' (CIfA 2014a).

Archaeological Monitoring can be defined as 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIfA 2014c).

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

ARCHITECTURAL RESOURCE

The architectural resource is generally subject to a greater degree of change than archaeological sites, as structures may survive for many years but their usage may change continually. This can be reflected in the fabric of the building, with the addition and removal of doors, windows and extensions. Due to their often more visible presence within the landscape than archaeological sites, the removal of such structures can sometimes leave a discernable 'gap' with the cultural identity of a population. However, a number of mitigation measures are available to ensure a record is made of any structure that is deemed to be of special interest, which may be removed or altered as part of a proposed development.

Conservation Assessment consists of a detailed study of the history of a building and can include the surveying of elevations to define the exact condition of the structure. These assessments are carried out by Conservation Architects and would commonly be carried out in association with proposed alterations or renovations on a Recorded Structure.

Building Survey may involve making an accurate record of elevations (internal and external), internal floor plans and external sections. This is carried out using a EDM (Electronic Distance Measurer) and GPS technology to create scaled drawings that provide a full record of the appearance of a building at the time of the survey.

Historic Building Assessment is generally specific to one building, which may have historic significance, but is not a Protected Structure or listed within the NIAH. A full historical background for the structure is researched and the site is visited to assess the standing remains and make a record of any architectural features of special interest. These assessments can also be carried out in conjunction with a building survey.

Written and Photographic record provides a basic record of features such as stone walls, which may have a small amount of cultural heritage importance and are recorded for prosperity. Dimensions of the feature are recorded with a written description and photographs as well as some cartographic reference, which may help to date a feature.