Strategic Housing Development (SHD) at Park West, Dublin 12

Greenseed Limited (Applicant)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

December 2021

BMA PLANNING

Strategic Housing Development (SHD) at Park West, Dublin 12

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Environmental Impact Assessment Report (EIAR) Submitted to An Bord Pleanála with a Planning Application for Strategic Housing Development (SHD)

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NON-TECHNICAL SUMMARY

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of the applicant, Greenseed Limited, in association with the submission of a planning application to An Bord Pleanala, for a Strategic Housing Development at Park West, Dublin 12.

POLICY CONTEXT

The current application has been prepared in the context of a range of national, regional and local planning policy sources. These are reviewed and commented on in detail in the *Statement of Consistency & Material Contravention Statement*, prepared by BMA Planning and submitted with this application. The main sources are summarised below.

The *Dublin City Development Plan 2016 – 2022* (DCDP) is the current statutory development plan for the area.

A key aspect of the DCDP Core strategy is that future development is prioritised within the inner city, key district centres and Strategic Development and Regeneration Areas (SDRA's).

Park West is designated as *SDRA 4 – Park West Cherry Orchard* and these areas are zoned Z14 where it is the objective *'To seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and "Z6" would be the predominant uses.' (Section 14.8.13).*

Development Standards included in Chapter 16 of DCDP have been considered and the development has incorporated these principles and standards insofar as they are relevant to the proposals.

The *Park West – Cherry Orchard Local Area 2019* (hereafter 'the LAP') was adopted at a Dublin City Council meeting on 7th October 2019 and came into effect in November 2019.

The proposed development is a Material Contravention of the DCDP and the LAP in relation to building heights. Reference Section 16.7.2 of the DCDP and Site Brief 6: Park West Avenue/ Road Site of the LAP respectively. The proposed development is also a Material Contravention of the DCDP in relation to unit mix (Ref. Section 16.10.1 Residential Quality Standards – Apartments: Mix of Residential Units of the DCDP). The case for increased building heights is supported by the *Urban Development and Building Heights Guidelines for Planning Authorities* (2018) and specifically SPPR3(A). Regarding unit mix, the scheme complies with the Sustainable Urban Housing: Design Standards for New Apartment Guidelines for Planning Authorities (Revised 2020) which allows flexibility in relation to Unit Mix (Specific Planning Policy Requirement 1).

The following national and regional policy documents are also relevant to this project: -

- *Project Ireland 2040 - The National Planning Framework (NPF)*
- *Housing for All – A New Housing Plan for Ireland (2021)*
- *Regional Spatial and Economic Strategy (RSES) 2019-2031 for the Eastern and Midland Region*

The project will deliver a high-density scheme of modern and adaptable new homes, within an existing urban area, in close proximity to existing public transport and local service provision. This is in accordance with the principles and vision of the above national and regional plans.

In terms of Section 28 Ministerial Guidelines, the proposed development is designed to comply with these Government Guidelines and, in particular, is consistent with two important Guidelines that have issued on foot of the NPF, namely the 'Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities (revised 2020)' and 'Urban Development and Building Heights Guidelines for Planning Authorities (2018)'.

In summary, therefore, the proposed development is set against a very favourable policy background which supports the development of the Park West lands for high density residential and mixed use development as proposed.

DESCRIPTION OF PROJECT AND ALTERNATIVES

Park West is situated c.8km west of Dublin City Centre, directly east of the M50, south of Ballyfermot and Cherry Orchard residential neighbourhoods and north of the John F Kennedy and Naas Road industrial areas. The Park West neighbourhood is bound by the Dublin to Cork mainline railway to the north, the Grand Canal to the south, the M50 to the west and the Killeen Road to the east.

The application site (c.9.4ha) is located within Park West, Dublin 12 and east of Park West Avenue and north of Park West Road. The Dublin to Cork mainline railway defines the northern boundary with Park West Business Park to the east. The northern and eastern boundaries of the site, to the rail line and Park West Business Park respectively, are defined by palisade fencing. An existing berm defines the southern and western boundaries of the site. The site is largely undeveloped with the exception of the Aspect Hotel, comprising an 8-storey hotel building and ancillary surface carpark accessed from Park West Avenue.

The proposed development involves a 10-year permission for 7no. predominantly residential blocks (Blocks A to G) accommodating a total of 750no. apartments. The apartment unit mix comprises 321no. (43%) 1 bed units, 384no. (51%) 2 bed units and 45no. (6%) 3 bed units.

Resident services and amenities are also proposed to serve the future residents and total 487sq.m gross floor area within Blocks B and D. Non-residential uses will comprise 1no. retail unit of 156sq.m within Block A and a creche of 410sq.m, community space of 48sq.m and café/ bar of 91sq.m all within Block G.

13,460sq.m (14%) of public open space is provided and comprises a linear park orientated west to east and functioning as a link to the established residential areas to the west of Park West Avenue and a public plaza/ square including Multi-Use Games Area (MUGA) located centrally within the site. Communal open spaces totalling 6,175sq.m are provided at podium level within each of the proposed Blocks A to F, a roof garden within Block G and include passive open spaces that are visually and functionally accessible to the future residents of the development.

Vehicular access to serve the proposed development will be provided via access roads off Park West Road and Park West Avenue. Tie in works are required to Park West Avenue and Park West Road to provide for suitable junctions and pedestrian crossings at the proposed access points.

The development will also include parking for vehicles and bicycles, landscaping and all associated site and development works.

This EIAR contains a description of the construction process as it is known at this pre-consent stage and ahead of detailed design development and the details are based on the *Outline Construction Management Plan (OCMP)* [CS Consulting] prepared and submitted with the planning application documentation.

In the event of a grant of permission, the appointed contractor(s) will update the OCMP to comply with and implement the requirements and mitigation and monitoring measures set out in this EIAR and any conditions imposed as part of the granted planning approval. This Contractor's Construction and Environmental Management Plan (CEMP) will be submitted to the Planning Authority prior to commencement.

The construction of the project is planned to take between five to seven years to complete as detailed in the ***Phasing Management and Delivery Report*** [Greenseed Limited] submitted with the application. The current indicative phasing suggests that the project will be split into four phases following completion of initial mobilisation, site clearance and site development works.

The proposed site excavation will result in a surplus of "cut" material which will be exported off site for reuse or disposed to suitably licensed landfill facilities.

The construction compound for the infrastructure works will be entirely within the site boundary, although in some instances located outside the phase being constructed. On-site facilities will include a site office and staff welfare facilities (e.g. toilets, drying room, canteen, etc.). It is envisaged that one or more tower cranes will be temporarily erected to accommodate the construction works. Hoists and teleporters may also be used within the site and around its perimeter as required during the project. Vehicle parking for construction personnel will be accommodated within the development site. To the extent possible, personnel will also be encouraged to use public transport, and information on local transportation will be published on site.

The number of workers on the site will vary throughout the construction programme. During the site clearance and excavation, it is likely that no more than 50 workers will be present on site at any one time. However, during peak construction this could rise to 200-300 workers depending on the number of buildings under construction simultaneously.

Typical working hours (Monday to Friday: 07:00 to 19:00; Saturdays: 08:00 to 14:00 and Sundays and Bank Holidays: Works not permitted) are envisaged but with scope for some construction operations to be undertaken outside the prescribed times where this is necessary or unavoidable. This can be agreed with the Planning Authority.

Piling will be required for the substructure of the apartment blocks. The concrete operations associated with the foundation will require concrete deliveries to site which will be managed by the contractor and subject to the CEMP.

There are a number of options for the superstructure design and these will not be decided until detail design and tender stage but the methods of construction will be typical of what would be expected for a development of this nature.

For the apartment blocks, the most likely options would be Reinforced Concrete (RC) Column and Flat Slab, RC/Masonry Cross Wall and Precast Slab, Precast Concrete Twin Wall and Precast Slab or a combination of.

On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

As the project is supported by the DCDP and LAP, no other alternative locations were considered. The consideration of "alternatives" was however an integral part of the design process through numerous iterations of the site layout, the design of the buildings in their external manifestation. The iterative design process also involved alternative internal layouts of the buildings based on input from technical experts relating to topics such as mechanical and electrical engineering, structural engineering, fire and daylight/ sunlight. On this basis, it is considered that all reasonable alternatives to the project are considered and no alternatives have been overlooked which would significantly reduce or further minimise environmental effects.

POPULATION AND HUMAN HEALTH

During construction, the main likely significant effects are a positive impact on employment with c.200-300 direct jobs created and indirect employment generated in the local economy as a result of the multiplier effect.

During construction, the proposed development will cause loss of amenity, disruption and inconvenience to local residents and the nearest receptors. However, this impact will be temporary in nature and mitigated insofar as practicable through the Contractor's CEMP. The CEMP will implement the requirements and mitigation and monitoring measures set out in this EIAR and any conditions attached to a grant of planning. A Community Liaison Officer (CLO) will be appointed and will inform the public of site operations and be available to local residents / members of the public with concerns / complaints.

The effects caused by air quality, noise and vibration and transport are addressed in Chapters 8, 9 and 11 of this EIAR.

Subject to adherence to best practice construction health and safety procedures, no significant adverse effects on human health are anticipated during the construction of this development.

Overall, during the operational phase, the impact of the development on the wider population are considered to be significant and positive and the main impacts are :-

- an increase in population, a long term positive moderate effect which will accelerate the rate of population increase in the Cherry Orchard C Electoral Division in accordance with local regional and national policy;
- a permanent positive significant change in the landscape from undeveloped urban fringe to residential community;
- positive long term impact on employment and the local economy through the creation of jobs and associated multiplier effect;
- the commercial and community facilities in the proposed development will likely have a positive moderate impact on facilities in the area for existing and future populations;

In the operational stage, measures to address health and safety considerations, including risks of fire, flooding and universal access have been addressed as part of design mitigation and will be subject to the relevant regulations to ensure no significant adverse impacts on human health.

Impacts of the proposed development in terms of daylight/ sunlight, overshadowing and wind effects have also been examined in detail in tandem with the scheme design and no significant impacts are anticipated.

No significant impacts are expected on human health as a result of the risk or vulnerability to major accidents or disasters.

BIODIVERSITY

The Biodiversity chapter of the EIAR was prepared by Altemar Ltd. It assesses the biodiversity value of the proposed development area and the potential impacts of the development on the ecology of the surrounding area and within the potential zone of influence (ZOI). The proposed development is not within a designated site. There are no Natura 2000 sites within 5km, and there are three National conservation sites (Grand Canal pNHA, Liffey Valley pNHA, and Royal Canal pNHA) within five km of the proposed development site. There are no Ramsar sites within 5km of the proposed development site. There is no direct hydrological connection to designated conservation sites. Out of an abundance of caution, it is considered that there is an indirect hydrological pathway to designated conservation sites within Dublin Bay via the proposed foul and surface water drainage strategy. Foul wastewater drainage will be directed to an existing public foul network, which ultimately outfalls to Ringsend WwTP for treatment. Any silt or pollutants will be treated along this network. Surface water drainage will be directed to an existing public surface water network which outfalls to the Camac River, which in turn outfalls to the marine environment at Dublin Bay. No specific mitigation is required to protect designated sites. The project must comply with Water Pollution legislation to ensure that there are no contaminated discharges from the site including contaminated surface runoff and dust enter the existing surface water drainage network. However, these measures are not necessary for the protection of designated sites including Natura 2000 sites.

No species of conservation importance were noted on site, based on NPWS and NBDC records as fine resolution. The proposed development site is primarily Recolonising Bare Ground (ED3). Bramble scrub is located around the north and western perimeter of the site. The south western portion of the site has an area of unmanaged grassland. No habitats of conservation significance were noted within the site. No terrestrial species (flora and fauna) of conservation importance were noted on site. However, of note is a single stand of Japanese knotweed (*Reynoutria japonica*) was noted on site (Plate 1). This stand has become well established. This invasive species is listed on the third Schedule of regulation 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011. An Invasive species management plan accompanies the submission. No plant species that are rare or are of conservation value were noted during the field assessment on in biodiversity records. The common frog (*Rana temporaria*) was not observed on site. However, there are small pond features on site that could be of importance of frogs during the breeding season. No badgers or badger activity was noted on site. No protected terrestrial mammals of conservation importance were noted on site or in the immediate vicinity of the site. A bat survey was carried out. There are no bat roosts or potential bat roosts on site. A single soprano pipistrelle (*Pipistrellus pygmaeus*) was noted briefly foraging on site. Mitigation measures are outlined to protect local biodiversity during construction. During operation no specific operational mitigation measures are required beyond those outlined elsewhere in the EIAR.

With the successful implementation of outlined mitigation measures and elsewhere in the EIAR, to limit biodiversity, surface water and dust impacts, including ecological supervision, no significant impacts are foreseen from the construction or operation of the proposed project. Residual impacts of the proposed project will be localised to the immediate vicinity of the proposed works.

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on biodiversity and designated conservation sites through the application the standard construction and operational phase controls as outlined above. In particular, mitigation measures to ensure compliance with Water Pollution Acts will satisfactorily address the potential impacts on downstream biodiversity. No significant adverse impacts on biodiversity or designated sites are likely from the proposed works following the mitigation described above.

LAND AND SOILS

The assessment of Land & Soils is contained within Chapter 6 of the EIAR report. CS Consulting analysed and prepared this chapter to take cognisance of the existing, during construction and proposed effects the development would have on the geology of the environment.

Existing Environment

The existing site is mainly greenfield with over 80% of the site area covered in grass. There is an existing hotel, vehicular access and a car park within the site boundary.

Geology

Made Ground comprising reworked sandy gravelly clay fill mantles the site and in places. Construction and Demolition (C&D) waste is present within the fill material. While mostly confined to the upper metre the Made Ground appears to deepen within the eastern portion of the site to depths of up to 1.7 m BGL. Within the southern portion of the site infiltration test pits terminated within Made Ground at a depth of 1.5 m BGL thereby implying that the fill could be deeper.

The underlying natural soils comprise predominately stiff (high strength) grey/brown sandy gravelly clay. This material strengthens with depth, becoming very stiff (very high strength) within the upper 2 metres (deepening to 3.5 metres at the eastern end of the proposed structural development).

The upper grey/brown and lower dark grey/brown and black gravelly clays represent glacial till, which is often referred to as the "Dublin Boulder Clay". The difference in coloration and consistency between the upper grey/brown and lower very stiff dark brown/grey deposits are usually attributed to weathering of the upper till.

The underlying limestone bedrock is in a medium strong to strong condition and this has been proven to a maximum depth of 11.3 m BGL.

Hydrogeology/Groundwater

Groundwater ingress was not observed within the boreholes or trial pits. However, water strikes occurred during rotary drilling and were observed at a shallowest depth of 2.6 m BGL during the drilling period. Subsequent groundwater monitoring of standpipes has shown standing groundwater level in the range 2.2 to 3.5 m BGL.

The results of groundwater monitoring therefore indicates that excavations below c.2.0m BGL could intercept the groundwater table. While water ingress through the glacial clays would be expected to be slow any open excavations will ultimately fill with water as the groundwater table re-establishes to its true level.

It is also noted that granular (sand/gravel) lenses are not uncommon within glacial till and if intercepted the rate of water ingress through such lenses would be significantly higher. The rate of water ingress could also increase where the upper highly fractured bedrock is intercepted.

Soil Classification

11 number samples of excavated soil material were supplied to O’Callaghan Moran by IGSL from various locations across the site.

All results of samples can be found in the Waste Classification Report appended to this report, below is a short summary of the conclusions/results of the report:

- Asbestos was not detected in any of the samples.
- All samples are classified as non-hazardous.
- All samples meet the inert landfill WAC.

Impact Assessment

The potential impacts during the construction and demolition phases are: -

Demolition

- air quality issues pertaining to demolition on site structures,
- noise issues due to demolition of structures on site,
- subsidence issues regarding adjacent landowners, due to excavation works,
- increased in temporary local traffic volumes due to removal of demolition & excavated site,
- reduction in regional landfill capacity due to acceptance of classified waste material.

Construction

- The presence of contaminants in the underlying strata and the exposure of site workers to contaminated ground through direct contact, inhalation of dust and vapours or oral intake.
- Excavated and stripped soil can be disturbed and eroded by site vehicles during the construction. Rainfall and wind can also impact on non-vegetated/uncovered areas within the excavation or where soil is stockpiled.
- Noise and vibration will be generated through the construction phase particularly during pilling and excavation work. Given that some rock excavation is required it is anticipated that rock breaking techniques will be used. Noise and vibration impacts are considered in detail in Chapter 9 - Noise and Vibration.
- The removal of soil from the ground could, without the adoption of appropriate control measures, lead to some ground movement in the immediate surrounds of the excavation with an associated risk of settlement and damage to buildings in the immediate area. Details of mitigation methods are outlined in the next section.
- The presence of contaminants in the groundwater and the exposure of site workers to existing contaminated groundwater.
- The potential impact of dewatering and temporarily reducing the ground water level on surrounding structures.
- The potential for groundwater from the demolition and construction phase of the project to contribute to contamination of the local groundwater.
- The mobilisation and migration of soluble contaminants in groundwater.

Operation

During the operational phase of the new development on the subject site it is envisaged that there will be little to no potential impact on the geology of the area or on groundwater.

Run-off from hardstanding areas will pass through a closed drainage system, which will incorporate silt traps and oil/petrol interceptors, to mitigate the possibility of potentially contaminated surface water from contaminating the soil and bedrock geology. This drainage system will then discharge into the Local Authority operated sewer system. It is not predicted that there will be any adverse effects on the soils and geology during the operational phase of the development.

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Cumulative Impacts

Cumulative impacts on the proposed development can be considered in two areas:

- Impact due to the construction on adjoining underground structures and due to the potential to block groundwater flow patterns,

- The requirement for excavated soils deemed to be disposed on in licenced landfill facilities, thereby reducing the capacity in the landfills to accept future material.

The "Do Nothing Impact" assesses the environmental impact of not redeveloping the proposed development site in respect of the existing impacts to land and soils, at the proposed site. Under the "Do Nothing Scenario" there would be no change in the current land use of the site and therefore the soil and bedrock geology environments would remain in their current state. There is no predicted long-term impact on the soil, geology and hydrogeology environments associated with the operation phase of the proposed development.

Mitigation

Mitigation measures for the demolition phase will be as outlined in the Outline Construction Management Plan, submitted as part of this application by CS Consulting. The main impacts are associated with the Construction Phase of the proposed development these mitigation measures can be summarised as follows:

- The excavated material will be monitored and assessed to determine the most suitable disposal outlet. Material will be categorised according to the Landfill Directive and will be sent to appropriately licensed facilities for treatment/disposal. Where applicable, material on site will be segregated and divided into material re-use, material re-cycling and waste material streams in accordance with current guidelines and best practice.
- Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted through the excavation period. The provision of vehicle wheel wash facilities at site exits and implementation of a road sweeping programme will reduce effect on surrounding road network.
- Inherent in any redevelopment is the potential for groundwater from the demolition and construction phase of the project to contribute to contamination of the local groundwater. By developing a detailed construction methodology and strict adherence to this policy by vigilant site management, these potential risks can be mitigated to acceptable levels.
- During the demolition and excavating phase of the works monitoring will be ongoing for noise, vibration, settlement, gas & water levels as well as ground contamination as described in the section below on Monitoring.

Following construction there will be no long-term significant impacts with respect to soils and geology of the site.

Residual Impact Assessment

The assessment concluded that the residual impacts would be minor in nature & would not cause off site issues pertaining to the sites geological setting.

Monitoring

It is recommended that the following are monitored in relation to the soil and geological environments during the demolition and construction stage:

- Any additional testing and monitoring of soil and made ground that will be excavated for any potentially contaminated material to ensure adequate classification and disposal.
- Monitoring of the retaining wall using for example, inclinometers and monitoring of water movements either seepages or through control points.
- Monitoring of neighbouring structures immediate to the development site for the effects of any vibration, movement and settlement arising from the excavation works based on condition surveys carried out by the contractor prior to the works.
- Monitoring of interrelated impacts such as noise and vibration levels, dust emissions etc. are dealt with in their other chapters in this EIAR.
- Testing and monitoring of water and gas during excavation works.
- Monitoring of water movements either seepages or through control points.

WATER

This section of the EIAR has been prepared by CS Consulting and describes the existing water aspects on the proposed development site.

Existing Environment

Potable Water Infrastructure

Record drawings reviewed from Irish Water indicate the following services in the area:

- Two number 450mm watermains and a 150mm watermain on Park West Avenue, west of the proposed development.
- A 250mm watermain on Park West Road, south of the proposed development.

Stormwater Infrastructure

Record drawings reviewed indicate the following services in the area:

- A 300mm diameter surface water sewer which changes to a 600mm and onto a 750mm diameter on Park West Road. This surface water sewer discharges in easterly direction and connects to the 750mm diameter surface water sewer on Heaney Avenue.

Foul Drainage Infrastructure

Record drawings reviewed from Irish Water indicate the following services in the area:

- An existing 225mm foul sewer on Park West Road, south of the subject site location, which discharges in easterly direction and connects to the 300mm diameter foul sewer on Heaney Avenue.

Flood Risk

The site of the proposed development is in Flood Zone C, based on Dublin City Councils Strategic Flood Risk Assessment from the current Development Plan. The primary risk of flooding to the site is by Pluvial flooding.

Impact Assessment

The proposed development was assessed to look at the redevelopment of the site and the impact this would have on the potable water, storm water drainage and foul water infrastructure to service the proposed development.

Potable Water

The proposed schemes requirement have been assessed by Irish Water who have deemed the requirements can be adequately services by the local infrastructure.

Stormwater

The proposed development will adhere to the requirements of Dublin City Council's sustainable urban drainage systems. This will allow the storm water generated on site to be released in a controlled manner even during extreme storm water events while also using infiltration techniques to improve the overall storm water quality.

Foul water

The proposed schemes requirement shave been assessed by Irish Water who have deemed the requirements can be adequately services by the local infrastructure.

Flood risk

A site specific flood risk assessment for the site has been carried out and the sites current, low risk designation will be maintained following the development of the site.

Mitigation

The proposed development shall include a range of mitigation measures to ensure that the scheme will have a minor impact on the local water services. The scheme will ensure low water usage sanitary appliance, sustainable drainage techniques to mitigate against any adverse effects of the scheme's re-development.

Residual Impact Assessment

The proposed scheme will draw on the existing potable water and wastewater services in the environs. This has been assessed and validated by Irish Water. As the subject lands was previously developed and the site is zoned for the volume of development applied for the residual assessment of the impact of water services is deemed to be minor.

Monitoring

The potable & foul infrastructure will be vested to Irish Water post completion. The public elements for the stormwater drainage system will be taken in charge by Dublin City Council for up-keep and routine maintenance when required.

AIR AND CLIMATE

Byrne Environmental Consulting Ltd have assessed the potential air quality and climatic impacts that the Park West Strategic Housing Development may have on the receiving environment during the construction and operational phases of the project. The assessment includes a comprehensive description of the existing air quality in the vicinity of the subject site, a description and assessment of how construction activities and the operation of the development may impact existing air quality and climate, the mitigation measures that will be implemented to control and minimise the impact that the development may have on local ambient air quality and finally to demonstrate how the development shall be constructed and operated in an environmentally sustainable manner.

In terms of the existing baseline air quality environment, site specific baseline data and published data available from similar environments indicates that levels of nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2) particulate matter less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and benzene are well below the National and European Union (EU) ambient air quality standards.

The construction phase of the development has the potential to generate short term fugitive dust emissions and diesel engine exhaust emissions associated with construction vehicles and plant however these emissions will be controlled by appropriate mitigation techniques and through the implementation of a construction phase air quality management and monitoring plan throughout the duration of the construction phase. The predicted construction phase residual impacts with mitigation on air quality will be slight, local and short-term. The predicted construction phase residual impacts with mitigation on climate will be imperceptible local and short-term.

The operational phase of the development will see the functioning of modern, well insulated thermally efficient buildings in which energy efficiency shall be achieved by implementing sustainable features into the development's buildings and infrastructure design. The design of the residential units will ensure their operation will have a minimum impact on the receiving climate and that their design will withstand future potential extreme weather events associated with climate change.

The predicted impacts of domestic heating and traffic generated air pollutants associated with the development will not exceed the ambient air quality standards and the impact of the development on ambient air quality and climate been determined to be imperceptible, neutral and long-term.

NOISE AND VIBRATION

Byrne Environmental Consulting Ltd have assessed the potential noise and vibrational impacts that the proposed Park West Strategic Housing Development may have on the receiving environment during the construction and operational phases of the proposed development. The assessment includes a comprehensive description of the existing ambient baseline noise climate in the vicinity of the subject site, a description of how construction activities may impact the existing ambient noise climate, the mitigation measures that shall be implemented to control and minimise the impact that the development may have on the receiving environment and the mitigation by design measures that are intended to ensure that the inward noise impact from the external environment is controlled within the residential units of the development.

Ambient noise levels in the vicinity of the site shall temporarily increase during the construction phase, however noise levels shall be controlled, minimised and managed through the implementation of best practice construction noise and vibration mitigation measures. The operational phase of the development will not have an adverse or unacceptable outward noise impact on the receiving environment including existing noise sensitive receptors located in the vicinity of the site.

The assessment has also assessed the inward noise impact of the surrounding environment including external transportation noise on the proposed development in order to ensure that suitable internal noise levels can be achieved across the site within the residential dwellings.

The impact assessment has concluded that the construction phase noise impacts with mitigation will be negative, slight to moderate and short-term at existing local residential receptors and the operational phase noise impact will be neutral, imperceptible and long-term at local residential receptors. It is predicted that the inward noise impact with mitigation will be neutral, not-significant and long-term.

MATERIAL ASSETS: BUILT SERVICES

This section of the EIAR has been prepared by CS Consulting and EDC Consulting Engineers and describes the existing site services aspects on the proposed development site.

To develop the subject lands existing services will be required to be relocated on site without the loss of service. This has been factored into the proposed design and phasing of the scheme.

The proposed development was assessed to look at the development of the site and the impact this would have on all aspect of public utilities including the potable water, foul water electricity gas and telecommunication infrastructure to service the proposed development.

The proposed potable water and foul water requirements have been assessed by Irish Water who have deemed the requirements can be adequately services by the local infrastructure.

Based on information received from ESB Networks, the site is serviced by an existing HV cable located along Park West Avenue and Park West Road. As part of the enabling works package at Parkwest it is proposed to divert the existing 38kV lines to the North of the site underground. The design team has commenced discussions with the ESB and will continue these post a grant of planning permission.

Based on information received from Gas Networks Ireland (GNI), there is an existing medium pressure gas pipe along Park West Avenue. The only gas requirement for the site will be for the restaurant. An initial load assessment has been carried out and no capacity issues have been identified.

Based on information received from Eir, the site is well serviced along Park West Avenue and Park West Road. An initial assessment has been carried out and no capacity issues have been identified.

The proposed development includes a range of mitigation measures to ensure that the scheme will have a minor impact on the local foul & potable services. The scheme will ensure low water usage sanitary appliance & sperate drainage runs for the foul and storm water systems to mitigate against any adverse effects of the schemes operation.

The potable & foul infrastructure will be vested to Irish Water post completion. Irish Water will therefore take over the operational and maintenance aspects of the proposed developments potable water and foul infrastructure.

All electricity, gas and telecommunications excavations will be fully reinstated to the requirements of ESB, Gas Networks Ireland (GNI) and the relevant telecommunications providers respectively.

MATERIAL ASSETS: TRANSPORTATION

The assessment of Traffic and Transport has been prepared by CS Consulting and is contained within Chapter 11 of the EIAR report.

Impacts Assessed

This chapter of the EIAR assesses and evaluates the likely impact of the proposed development on the surrounding road network, with a particular focus on the operation of nearby existing road junctions. Both the development's construction stage and its operational stage are considered, and proposed mitigation measures are identified.

Relevant Receptors

In the context of this chapter, environmental receptors susceptible to being affected by the proposed development comprise elements of the surrounding road network (adjacent streets and their junctions).

Traffic Impact Assessment Methodology

The methodology employed for assessing the development's impact on nearby road junctions comprises the following:

- A traffic survey to establish baseline vehicle traffic movements.
- The application of growth factors to scale these flows up to future year levels.
- Calculation of the development's vehicle trip generation during peak hours, using a database of past traffic surveys.
- Distribution of these vehicle trips across the local road network in accordance with existing traffic patterns.
- Computer modelling of nearby existing and proposed junctions to determine their operational performance under existing and future traffic conditions.

Baseline Scenario

Assessment of the two existing road junctions closest to the development site (the Aspect Hotel access, and the roundabout junction of Park West Avenue and Park West Road) shows that these junctions both currently operate efficiently and within their design limits.

Future Do-Nothing Scenario

The Do-Nothing scenario relates to the design year 2040 (15 years after completion of the subject development). This allows for general increases in background vehicle traffic over this period. Vehicle traffic generated by the subject development itself is not included.
Under these conditions, assessment shows that the existing Aspect Hotel access junction will continue to operate effectively. As a result of background traffic growth, however, the existing roundabout junction of Park West Avenue and Park West Road will experience traffic flows higher than designed for and, unless upgraded in the interim, will cease to function effectively by the year 2040.

Predicted Impacts – Construction Stage
During its construction stage, the proposed development is predicted to result in a short-term slight adverse impact on the operation of junctions on the surrounding road network. This impact will be confined to the duration of construction activity on site and will therefore be entirely reversible. The maximum potential peak hour vehicular trip generation of the site during construction is lower than that during its operational stage.

There is also potential during the construction stage for construction-related activity to impact upon the surrounding road network in other ways, for instance through surrounding roads being temporarily obstructed by stopped/parked construction vehicles or by delivery/loading operations, or being fouled by dirt/debris originating from the construction site. In the absence of mitigation measures, these impacts would be adverse in nature, short-term in duration, and significant. The construction stage mitigation measures described in this chapter are however intended to prevent and minimise these impacts, and these measures will be strictly adhered to.

Predicted Impacts – Operational Stage
In its operational stage, the subject development shall generate regular vehicular trips on the surrounding road network, increasing traffic flows at nearby existing junctions. The existing Aspect Hotel access junction on Park West Avenue (which shall serve as the proposed development's western access) is also to be reconfigured as a signal-controlled junction under the development proposals. An assessment of nearby junctions was conducted under the predicted traffic conditions for the design year 2040 (15 years after completion of the subject development), including traffic generated by the subject development, and this was compared to the Do-Nothing scenario previously described. This analysis showed that the traffic flows generated by the subject development will produce increases in vehicle queues and delays at nearby junctions but will not be the cause of any junction exceeding its efficient operating limits.

During its operational stage, the subject development is therefore predicted to result overall in a long-term moderate adverse impact on the operation of junctions on the surrounding road network. This impact should be considered reversible to a degree, as any future measures that reduce local vehicular traffic volumes (e.g. improvements in public transport or cycling infrastructure, junction redesign, or changes in general traffic flow restrictions) have the potential to improve local traffic flows generally, as well as to reduce vehicle trips to/from the subject development.

Mitigation Measures - Construction Stage
The lead contractor appointed for the construction of the development will be required to prepare a site-specific Construction and Environmental Management Plan (CEMP), which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network. A Designated Community Liaison Officer (DCLO) will be nominated for the subject development, who will work with DCLOs on other active sites to coordinate construction activities. The DCLO will also act as a point of contact for local residents, Dublin City Council, An Garda Síochána.

The final site-specific CEMP will include a plan for the scheduling and management of construction traffic, so as to:

- avoid heavy construction traffic travelling via unsuitable roads and junctions;

- avoid construction traffic parking, queueing, or loading/unloading the public road;
- schedule most construction traffic outside peak hour times; and
- keep the public roads around the site clean.

Construction personnel will be encouraged to make use of the available high-quality public transport links to the area and/or to commute by bicycle, to minimise private car trips to and from the site. To avoid problems of parking overspill on surrounding streets, however, limited essential staff parking shall be provided within the site. In parallel with this, parking restrictions and management measures on surrounding streets will be reviewed and implemented as necessary in agreement with local residents and Dublin City Council.

Mitigation Measures - Operational Stage

The development shall incorporate several design and management elements intended to mitigate the impact of the development on the surrounding road network during its operational stage. These include:

- a reduced car parking provision, which shall discourage higher vehicle ownership rates and excessive vehicular trips to the development (by residents and visitors);
- a high provision of secure bicycle parking, which shall serve to encourage bicycle journeys by both development occupants and visitors; and
- an internal car-share club providing 14no. shared cars for the sole use of the development's residents, which shall support a reduced level of car ownership and help to discourage unnecessary car journeys.

A Residential Travel Plan Coordinator shall be appointed for the proposed development, with the remit to implement and oversee an ongoing Residential Travel Plan (RTP). This shall assist development occupants and visitors in making the most of sustainable transport opportunities and in avoiding single-occupant car journeys to and from the development site where possible.

Cumulative Operational Impacts

In the evaluation of traffic impact, the future year junction performance assessments conducted in respect of the proposed development typically also include other traffic flows to be generated by relevant nearby committed development, such that the predicted impacts also represent the potential cumulative impacts. In this case, however, no relevant nearby committed developments have been identified.

Monitoring and Reinstatement

The lead contractor appointed for the construction of the development will be required to prepare a site-specific CEMP, which shall outline measures for monitoring the impact of construction traffic on the operation and condition of the surrounding street network, including remedial actions to be taken in the event of construction traffic causing damage to road infrastructure.

The lead contractor will also be required to monitor the travel habits of construction personnel and to tailor supports for public and shared transport use accordingly. Surrounding streets will be monitored to ensure that no nuisance parking associated with construction activity takes place.

Post-development monitoring of the surrounding street network's performance is not required or proposed in this case. Within the scope of the Residential Travel Plan (RTP) to be implemented for the development, however, the Residential Travel Plan Coordinator shall be responsible for monitoring the travel habits of development occupants and visitors. The Residential Travel Plan Coordinator shall gather data on travel patterns, for instance by conducting periodic travel surveys of development occupants.

MATERIAL ASSETS: RESOURCE AND WASTE MANAGEMENT

Byrne Environmental Consulting Ltd have assessed the potential impact that construction phase and operational phase wastes associated with the proposed Park West Strategic Housing Development Strategic Housing Development may have on the receiving environment and on local and regional waste management infrastructure.

The assessment includes a comprehensive description of the nature and quantities of wastes that shall be generated during the construction and operational phases of the development and a description of how wastes generated shall be managed in accordance with Dublin City Council Development Plan 2016-2022 Waste Management Policies and Objectives.

The Site Specific Construction and Operational Waste Management Plans have been designed to ensure that the construction and operational phases of the proposed development will be managed to reduce the generation of unsegregated wastes, to maximise the potential for recycling, recovery and re-use and to demonstrate how the development will operate in a sustainable manner in terms of waste management and how the development will contribute to the achievement of the regions compliance with the waste reduction targets specified in the Eastern-Midlands Region Waste Management Plan 2015-2021.

The residual impact associated with the construction phase with mitigation will generate a small quantity of unrecyclable and non-reusable construction wastes which will result in a neutral, not significant and short-term impact.

The residual impact associated with the operational phase with mitigation, will generate a small quantity of unrecyclable and non-reusable domestic and commercial waste which will result in a neutral, not significant and long-term impact.

CULTURAL HERITAGE

IAC Archaeology has prepared this chapter to study the impact, if any, on the archaeological and cultural heritage resource of a proposed development at Park West, Dublin 12. The assessment was carried out by Faith Bailey of IAC Archaeology.

The proposed residential development is located at Park West, Dublin 12. The site is bordered to the north by The Great Southern and Western Railway line; to the west by Park West Avenue and Park West Business Park; to the south by Park West Road and Park West Industrial Park to the east. The site is currently occupied by a hotel car park as well as disturbed greenfield and demolished access roads. There are no recorded monuments located within the development area. The closest consists of a burial ground (DU017-083), c. 128m to the west.

Analysis of the aerial photographic record available for the area has shown from 2000 to 2005 the site was subjected to a large amount of disturbance with dumping, ground disturbances and access roads running through the site. A field inspection has been carried out, which confirms the site has been subject to extensive disturbance. No previously unrecorded sites or areas of archaeological or cultural heritage potential were noted. Given the high level of disturbance within the site, the overall archaeological potential is considered to be very low.

Due to the highly disturbed nature of the proposed development area, it is likely that any archaeological remains that may have been present have since been removed. As such no negative impacts upon the archaeological or cultural heritage resource are predicted as a result of the development going ahead.

No impacts are predicted upon the archaeological or cultural heritage resource as a result of the operation of the proposed development.

No archaeological or cultural heritage mitigation for the construction or operation phase it required, as no impacts are predicted.

LANDSCAPE

The Landscape chapter assesses the potential effects of the proposed development on the townscape character and views/visual amenity of the receiving environment. It should be read in conjunction with the verified photomontages contained in Appendix 14A of the EIAR. The Landscape chapter was prepared by David Bolt BA(hons) CMLI of Model Works Ltd.

Located to the northwest of Park West, the c.9.4 ha. site is comprised chiefly of an area of undeveloped grassland. It is a partially realised urban new-build development at the western edge of Dublin City, bound by the M50 to the west and Dublin to Cork mainline railway to the north. The site is partly brownfield land of strategic scale with frontage to the two main streets and has a c. 320m frontage to Park West Avenue to the southwest, and a c. 200m frontage to Park West Road to the south. These are the two main thoroughfares serving Park West. The site is also conveniently located near to the Park West and Cherry Orchard rail station, situated to the north west, which is served by the mainline railway. The Aspect Hotel and associated car park is located to the central west boundary of the site. Much of the site appears to have previously been utilised for temporary construction-associated works, and there is an existing hard standing to the south east corner.

The townscape of Park West evolved rapidly following the construction of the M50 in the 1990s, which established a new, clearly defined edge to Dublin's urban area. Extensive industrial and low density residential development initially took place within greenfield sites in the area, until the first phase of the Park West established the infrastructure of a new urban core. This was to be a mixed use, high density development of distinctly urban character and appreciably high design and material quality. It employed urban design principles such as the use of strong building lines, active frontage and building height to define streets and generate place-identity and clear legibility. The land uses were clustered into residential, retail/leisure, commercial industrial use zones with public open space integrated throughout. The adjacent development consists of mainly blocks of 5 storey residential above 2 retail storeys or 5-8 floors of commercial use, and there is also the landmark hotel of 8 storeys on Park West Avenue, located centrally within Site 6. While the completed elements of masterplan are of high quality, the development was left incomplete due to macro-economic factors and commercial constraints of the late 2000's recession. In its current use and condition the site, as well as other vacant development parcels in adjacent areas, detract from the townscape character, quality and visual amenity in the area.

Stage 1 development will contribute significantly towards rectifying the gap in masterplan, although the townscape will remain incomplete until the subject site is fully developed.

Townscape Effects

The sensitivity of the townscape can be classified 'low' (definition: *Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such townscapes are generally unrecognised in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement*).

The classification of townscape sensitivity takes account of the existing condition of the receiving environment, but also a) the trends of change in the area, b) the development policy applying to the affected area, c) the susceptibility of the affected character areas to the proposed development typology and d) any features that are defined by (or implied have) landscape or aesthetic importance. The latter may include, for example, statutory or other designations such as or listed buildings of cultural or historic value, features that are noted in popular, traditional culture or vernacular.

Potentially susceptible receptors of townscape effects in the receiving environment include the residential neighbourhoods of Cherry Orchard Estate, the Cedar Brook Apartments complex, the Park West Academy, Concert and Crescent Buildings residential apartments, Plaza West residential apartments and public open spaces adjacent to the scheme. Due to its employment status, the Park West Business Park would not normally be considered a sensitive receptor by the GLVIA definition, but the public open spaces surrounding the buildings contain several public artworks of distinction and therefore attract tourist/leisure interest and therefore should be considered so.

The magnitude of townscape change which would result from the proposed development can be classified 'high' (definition: *Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape*).

The high magnitude classification arises not from the proposal being uncharacteristic in the context (it is a development of urban character in a designated development area), but rather from the potential for the development to change certain key elements and characteristics of the receiving environment. These changes include:

- The introduction of buildings of urban character and scale to the streetscapes of Park West Avenue and Park West Road, resulting in town centre-type enclosure of the streets and strengthening/ reinforcing the urban structure. This would make a significant positive contribution to townscape legibility (by appreciably defining Park West Avenue as the main street, and reinforcing the junction with Park West Road as the 'centre').
- The expansion of the Park West neighbourhood across the site, with the new high density residential development complementing the existing Plaza Park West, Aspect Hotel, Crescent, Concert and Park West Business Park buildings to collectively form a distinct urban core of scale (in terms of spatial extent, built form, population, etc.) and diversity. The development would make a significant contribution to the realisation of the objectives of Park West's designation as *Strategic Development and Regeneration Area 4* as set out within Section 14.8.13 of the DCDP Core Strategy. The LAP references stages 1, 2 and 3 of the application site as Site 6.
- The enhancement of Park West Avenue and Park West Road streetscapes along the frontage of the site, most notably by the provision of a pedestrian facilities and links on the site-side of the streets, between Park West and Cherry Orchard Station, Plaza Park West, and the Crescent buildings and Park West Business Park, and by the introduction of a large number of street trees in green verges.
- The extension of the public realm, the pedestrian and cycle circulation network and the green infrastructure network across the site, significantly improving the permeability and navigability of Park West. The most notable elements of the proposal in this regard are the 'Linear Park' (which is aligned to function as an extension of the public open space fronting the Crescent Building) and the vehicular/pedestrian access connecting the proposed development to Plaza Park West and Park West Road.
- The provision of a new Central Park and play area at the east end of Linear Park, functioning as a community hub in the public realm and green infrastructure network.
- A significant increase in the number and variety of shrubs and trees on the site and along Park West Avenue, by the generous planting proposed in the development, in the new Central Park

and the linear open space, on the internal streets and in the courtyards. This would have significant positive effects on the site's biodiversity, landscape and visual amenity value.

- Introduction of SuDS and bio-retention features within the landscape design, including extensive areas of permeable surfacing and run-off attenuation structures, with benefits for sustainability and mitigation of climate change.

In summary, the significance of the townscape effects is predicted to be 'moderate' (definition: *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends*) and the effects would be positive.

Visual Effects

To assess the proposed development's potential visual effects 17no. viewpoints were selected for detailed assessment informed by verified photomontages. The viewpoints were selected to address all the key elements and character areas around the site, and to show the proposal from a range of angles and distances. The most significant findings of the visual effects assessment are as follows:

- Views from within and adjacent to the site (Viewpoints 6, 7, 8, 9, 10, 11, 12, 13, 14, 15) would be significantly improved. In all of these views the development would introduce buildings of high design and material quality to the townscape, generating urban-type street enclosure along Park West Road and a conceptual urban gateway between the Block A landmark tower and the Concert Building near Park West and Cherry Orchard Station. The proposed scheme will expand the critical mass of contemporary urban development within Park West, moving completion of the Park West vision forward and remedying the decade-long hiatus in progress. The streetscapes would also be improved by the introduction of green verges and a large number of street trees.
- Views from the approaches to Park West generally (Viewpoints , 2, 3, 4, 5) would also be improved. In these views the development would complement the existing Park West buildings, forming a more substantial and diverse urban core, thereby improving townscape legibility and sense of place.
- The visual effects on Park West Avenue (the public realm) would be of moderate to very significance positive (considering the context and development policy for the site). Due to its considered massing/ height the visible part of Block A landmark tower would be intentionally prominent and would be a high quality addition to the townscape, acting as a gateway to Park West from the north and beacon from the surrounding hinterland.
- The composition and character of views from the nearest Cherry Orchard Estate houses to the site would be changed by the broad north-facing frontage of Blocks A to F, of contemporary urban character to the site c.55m to the rear of the houses. However, given the site's zoning and the associated policy driving its development and the mitigation measures employed, including a) the stepping down of massing/ height towards the houses, and b) the views would be restricted to upper floors due to the existing security wall adjacent to the Dublin-Cork mainline railway and c) the aesthetics of the scheme far out way the unappealing view across vacant waste land and the prospect of associated anti-social behaviour that it attracts. Hence, the potential negative effects have been minimised.

CONCLUSION

The EIAR has considered the likely, significant, adverse effects of the proposed project on the receiving environment, including cumulative impacts and having regard to assessments under other European Directives.

Mitigation measures (see Chapter 15) are included, to avoid and / or reduce impacts on the environment where considered necessary. This includes mitigation measures incorporated into the design of the proposed development.

The EIAR concludes that there are no material or significant environmental issues arising from the project which would prohibit the competent authority from issuing consent for the development.

1. INTRODUCTION

1.1 PURPOSE OF REPORT

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of Greenseed Limited (hereafter Greenseed / The Applicant) in association with the submission of a planning application to An Bord Pleanala, for a 10-year permission for a proposed Strategic Housing Development (SHD) at Park West, Dublin 12.

The EIA process, including the preparation of this EIAR, and the examination of the information presented by the Local Authority, will inform the decision-making process. The purpose of this EIAR is to assist and inform the Competent Authority in undertaking an environmental assessment of this project.

Therefore, the objectives of this EIAR are summarised as follows:-

- To identify the significant environmental impacts of the project during the construction and operational phases having regard to the characteristics of the receiving environment.
- To evaluate the magnitude and significance of impacts and to propose appropriate measures to mitigate potential adverse impacts.
- To identify, where appropriate, monitoring measures to be implemented during the construction and operational phases.

The nature and extent of the development proposed, i.e. the project being assessed in this EIAR, is outlined in Chapter 3. This is prepared with reference to the plans and particulars submitted with the planning application.

Details of the project will be available online through the EIA Portal[1] and on the website of Competent Authority. A copy of the application, including this EIAR, will also be available on the project specific website for this SHD development – www.parkwestshd.ie

1.2 STATUTORY REQUIREMENTS

The EIA Directive, Council Directive 85/337/EEC of 27 June 1985 *on the assessment of the effects of certain public and private projects on the environment*, is designed to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to development consent being given.

Council Directive 85/337/EEC has been amended by Council Directives 97/11/EC, 2003/35/EC and 2009/31/EC. These amendments were codified in Directive 2011/92/EU. In 2014, the Directive was further amended by Directive 2014/52/EU.

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[1] The EIA Portal is accessible via the Department of Housing, Planning and Local Government website at https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal

1.2.1 Directive 2014/52/EU (Amendment of Directive 2011/92/EU)

Directive 2014/52/EU amending Directive 2011/92/EU *on the assessment of the effects of certain public and private projects on the environment* was adopted on 16 April 2014.

The definition of the EIA process is redefined under Article 2(g) as follows:-

> *"Environmental impact assessment" means a process consisting of:*
>
> *(i) The preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*
>
> *(ii) The carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;*
>
> *(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;*
>
> *(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and*
>
> *(v) The integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."*

The content of an EIAR is included in Article 5(1) and expanded upon in Annex IV (See Box 1.1):-

> *"Article 5*
>
> *1. Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least:*
>
> *(a) a description of the project comprising information on the site, design, size and other relevant features of the project;*
>
> *(b) a description of the likely significant effects of the project on the environment;*
>
> *(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
>
> *(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
>
> *(e) a non-technical summary of the information referred to in points (a) to (d); and*
>
> *(f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

BOX 1.1 ANNEX IV: DIRECTIVE 2011/92/EU AS AMENDED BY DIRECTIVE 2014/52/EU

INFORMATION REFERRED TO IN ARTICLE 5(1)
(INFORMATION FOR THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT)

1. *A Description of the project, including in particular:*
   (a) a description of the location of the project;
   (b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;
   (c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;
   (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.
2. *A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.*
3. *A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.*
4. *A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.*
5. *A description of the likely significant effects of the project on the environment resulting from, inter alia:*
   (a) the construction and existence of the project, including, where relevant, demolition works;
   (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;
   (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;
   (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);
   (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;
   (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;
   (g) the technologies and the substances used.
   The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative,

> *transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.*
>
> 6. *A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.*
> 7. *A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.*
> 8. *A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.*
> 9. *A non-technical summary of the information provided under points 1 to 8.*
> 10. *A reference list detailing the sources used for the descriptions and assessments included in the report.*

1.2.2 National EIA Legislation

The EIA Directive was first transposed into Irish law by the *European Communities (Environmental Impact Assessment) Regulations*, 1989 (S.I. No. 349 of 1989) which amended the *Local Government (Planning and Development) Act*, 1963 (and other legislation) to provide for environmental impact assessment. These Regulations, together with the *Local Government (Planning and Development) Regulations*, 1990 (S.I. No. 25 of 1990), which made more detailed provision in relation to planning consents, came into effect on 1 February 1990.

The 2014 EIA Directive has principally been transposed into national planning law by the *European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018* (S.I. No. 296 of 2018).

EIA provisions in relation to planning permissions are contained in the Part X of the *Planning and Development Act, 2000*, As Amended and Part 10 and Schedules 5, 6, 7 and 7A of the *Planning and Development Regulations*, 2001, As Amended.

1.2.3 National Guidance

The Department of Housing, Planning and Local Government (DHPLG) issued *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*, in August 2018. The footnote below contains a glossary of terms from these Guidelines and used in this EIAR[2].

The Environmental Protection Agency (EPA) prepared revised (draft) guidance to respond to the 2014 EIA Directive. The current Draft *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2017) and Draft *Advice Notes for Preparing Environmental Impact Statements* (2015), have been referenced in the preparation of this EIAR.

1.3 THE NEED FOR AN EIAR – SCREENING

Schedule 5 of the Planning and Development Regulations 2001, As Amended, specifies a variety of projects which require an EIAR. Part 2 (10) relates to 'Infrastructure Projects' and states as follows:-

> *10.Infrastructure projects*
> *(a) Industrial estate development, where the area would exceed 15 hectares.*
> *(b) (i) Construction of more than 500 dwelling units.*
> *(ii) Construction of car-parks providing more than 400 spaces, other than a car-park provided as part of, and incidental to the primary purpose of, a development.*
> *(iii) Construction of shopping centres with a gross floor space exceeding 10,000 square metres*
> *(iv) Urban development which would involve an area greater than 2 hectares in the case of a Business District, 10 hectares in the case of other parts of a built-up area, and 20 hectares elsewhere. (In this paragraph "business district" means a district within a city or town in which the predominant land use is retail or commercial use.)"*

The development proposed is above the relevant threshold for Part 10(b)(i) and therefore an EIAR is required for this project.

1.4 SCOPING OF EIAR

'Scoping' is a process to determine what information should be contained in an EIAR. It will also decide what methods should be used to gather and assess that information.

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[2] **Competent Authority** - The authority designated as responsible for performing the duties arising from the Directive. In this guidance competent authorities are planning authorities and An Bord Pleanála.
Development consent - The decision of the competent authority or authorities which entitles the developer to commence the project.
EIA - The process of carrying out environmental impact assessment as required by the EIA Directive.
EIA Report (EIAR) - The report prepared by the developer in accordance with the requirements of article 5 of the EIA Directive and submitted to the competent authority, together with the application documentation, for development consent.
Reasoned Conclusion - The statement made by the Competent Authority on the significant effects of the project on the environment, based on an examination of the EIA report and, where appropriate, the results of its own supplementary examination.

1.4.1 Statutory Instruments and Guidance

In the first instance, the scope of the EIAR has been determined with regard to the Statutory Instruments and Regulations relating to EIA and related guidance from the European Union, the Government and the EPA. These include the following:-

EU Directives / Legislation

- The EU Directives on Environmental Impact Assessment (85/337/EEC as amended by 97/11/EC, 2003/35/EC, 2009/31/EC, codified in 2011/92/EU and amended by 2014/52/EU)
- The Planning and Development Act, 2000 (as amended)
- The Planning and Development Regulations, 2001 (as amended)

EIA and related Guidance

- EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*
- EPA (2003) *Advice Notes on Current Practice in the preparation of Environmental Impact Statements*
- DEHLG (2003) *Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development.*
- EPA (2015) *Advice Notes for preparing Environmental Impact Statements* (Draft)
- EPA (2017) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (Draft)
- European Commission (2017) *Environmental Impact Assessment of Projects - Guidance on Scoping*
- European Commission (2017) *Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report*
- DHPCLG (2018) *Circular* PL05/2018 – *Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) and Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.*
- DHPCLG (2018) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.*
- NRA. 2009. *Guidelines for Assessment of Ecological Impacts of National Road Schemes.* National Roads Authority.

The scope of the study is also informed by the extent to which other assessments have addressed some types of effects adequately and appropriately. This includes other sources of relevance to the proper planning and sustainable development of the site. Chapter 2.0 contains an overview of the main planning policy sources relevant to the project.

1.4.2 Environmental Factors

The 2017 EPA Draft Guidelines recommend that the scoping process use 'likely' and 'significant' as the principal determining criteria for what should be assessed in the EIAR. Any issues which do not pass the test are omitted or 'scoped out' from further assessment.

A description of the likely significant effects of the project on the environmental factors listed in Article 3(1) of the 2014 Directive is included in this EIAR under the following headings:-

• Population and Human Health	Chapter 4

• Biodiversity	Chapter 5
• Land and Soils	Chapter 6
• Water	Chapter 7
• Air and Climate	Chapter 8
• Noise and Vibration	Chapter 9
• Material Assets: Built Services	Chapter 10
• Material Assets: Transportation	Chapter 11
• Material Assets: Resource and Waste Management	Chapter 12
• Cultural Heritage	Chapter 13
• Landscape	Chapter 14

The scope of this EIAR focuses on the effects at project level and does not re-assess the alternatives or effects on the environment already considered at the higher strategic level. This is in accordance with Section 3.3.5 of the 2017 EPA Draft *Guidelines*:- "*The extent to which higher level considerations have already been assessed and so do not need to be assessed again should inform and be referred to in the EIA scoping process."*

1.4.3 Consultation

A formal scoping opinion was not sought from An Bord Pleanala (ABP) in relation to this EIAR. However, the Stage 2 Pre-application Consultation with ABP noted that the final application would be accompanied by an EIAR. Issues raised in the context of the ABP Consultation have been taken on board in the compilation of this EIAR.

The application was also prepared following consultation with Dublin City Council Planning Department and the other departments responsible for roads, water services, parks and housing. This consultation took place at Stage 1 of the SHD process and continued between Stages 2 and 3.

Scoping of individual chapters was undertaken as appropriate by the experts assigned to the topic. Where this involved scoping the assessment with the Local Authority, Irish Water, utility providers and other prescribed bodies /consultees, details are provided in the relevant Chapter.

1.4.4 Related Projects/ Cumulative Impacts

The scoping of the assessment also considers other projects or activities (permitted or planned) that are not included in the project but which may result in cumulative impacts – i.e. '*The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects*'. (EPA, 2017 – Table 3.3).

By considering these projects, the EIAR allows the Competent Authority to form an overall understanding of the likely effects that will arise, including direct, indirect / secondary or cumulative impacts, if the current project proceeds. Related Projects and other projects whose implementation may coincide with the project are considered in Chapter 3.

Plans and programmes relevant to the project are listed in Chapter 2. These plans have been subjected to a higher tier of environmental assessment through the Strategic Environmental Assessment (SEA) process and in line with Section 3.3.5 of the EPA Guidance (see above), the higher level considerations do not need to be assessed again. This EIAR however, has due regard to the policies and objectives in the relevant plans and programmes.

1.5 RISK OF MAJOR ACCIDENTS AND/ OR DISASTERS

In accordance with Article 3(2) and Annex IV of the 2014 EIA Directive, the vulnerability of the project to risks of major accidents and/or disasters is considered, and the implications for likely significant effects on the environment if it did occur.

Article 3(2) of the 2014 EIA Directive states that an EIAR shall consider:-

> *'The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned'.*

An EIAR should also contain the following information prescribed in 5(d) of Annex IV of the 2014 EIA Directive:-

> *5. "A description of the likely significant effects of the project on the environment resulting from, inter alia:*
> *….*
> *(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);"*

The 2018 *Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment* sets out two key considerations to address this:-

- *"The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment;*
- *The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g. flooding) and man-made disasters (e.g. technological disasters)."*

(Source: Page 31, Section 4.29)

During the construction phase the risk of accidents and/ or disasters arise from the potential for construction accidents are addressed under Health and Safety Regulations and other codes. Insofar as they are relevant to the planning and EIA process, mitigation measures that will prevent and/ or mitigate the significant effects are identified.

During the operational phase the risk of fire related accidents is similarly addressed through the Building Regulations (Fire Safety) and is therefore addressed through primary mitigation in the design process. Residual risks of fire and road traffic accidents will be managed by emergency services as per their standard procedures.

The risk of flooding and vulnerability of the project is addressed in the Site Specific Flood Risk Assessment (SSFRA) submitted with the planning application documentation. Adherence to best practice and "proper planning and sustainable development" principles means these risks are reduced to an acceptable level whereby the risk is unlikely and unexpected as a result and further assessments within the EIA process are not necessary.

Otherwise, in terms of the project, no other major accidents or disasters are considered to give rise to effects that are 'likely' and 'significant'.

1.6 STRUCTURE/ METHODOLOGY

1.6.1 Structure of EIAR

The overall structuring and scope of this EIAR has regard to the information requirements of the EC Directives, Irish Statutory Regulations and established best practice.

The EIAR has been written and illustrated with figures in a manner which, insofar as possible, is intended to be understandable to the public generally.

In accordance with the statutory regulations, a Non-Technical Summary has been prepared and included in this EIAR.

Chapters 1-3 of the EIAR provides the context for the EIA assessment including details of the planning policy context, alternatives considered, a description of the site, the development (i.e. the project) and the construction methodology.

This is followed by each of the assessment chapters. The structure used in this EIAR is a Grouped Format structure which examines each environmental topic in a separate chapter.

Chapter 15.0 summarises the significant effects, including cumulative effects (both the addition of many minor or significant effects and the effects of other projects), and addresses the interactions between impacts on different factors. It also contains a list of the mitigation and monitoring measures from each Chapter.

In accordance with Section 3.8.4 of the *Draft Guidelines on Information to be Contained in Environmental Impact Assessment Reports* (August 2017), a compendium of the mitigation and monitoring measures to be adopted during the construction and operational phases of the project, detailed within each chapter, are included in Chapter 15.0.

The Appendices contain background and technical details relating to the project and are referred to in the relevant Chapters (numbered with the relevant Chapter number and followed by A, B, C etc.).

Appendix 14A contains the Landscape and Visual Assessment – Verified Views - and is presented as a separate A3 volume.

1.6.2 Methodology

A systematic approach is employed using standard descriptive methods, replicable prediction techniques and standardised impact descriptions to provide an appropriate evaluation of each environmental topic under consideration.

An outline of the methodology employed to examine each environmental topic is provided below:

- Introduction: Provides an overview of the specialist area and identifies the specialist who prepared the assessment.
- Study Methodology: This subsection outlines the method by which the relevant impact assessment has been conducted within that chapter.
- The Existing Receiving Environment (Baseline Situation): In describing the receiving

environment, the context, character, significance and sensitivity of the baseline receiving environment into which the project will fit is assessed.
- Impacts and Mitigation: This section provides a description of the impacts that may arise during the construction and operational phases of the project. Appropriate mitigation measures are included where required. A description of any Residual Impacts post implementation of the mitigation measures is given where they occur.
- The impacts will consider both “Do-Nothing” (where the development does not proceed and the environment would not change as a result) and worst case is undertaken.

Where necessary and appropriate the following are also considered:-

- Monitoring: This involves a description of monitoring in a post-development phase, if required. This section addresses the effects that require monitoring, along with the methods and the agencies that are responsible for such monitoring. The level of monitoring proposed is proportionate to the nature, location and size of the project and the significance of its effects.
- Reinstatement: While not applicable to every aspect of the environment considered within the EIAR, certain measures need to be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.
- Interactions: Where applicable, the assessment refers to impact interactions, including potential indirect, secondary and cumulative impacts.

1.6.3 Forecasting Methods

The individual forecasting methods used to assess the various effects of the project on the environment are outlined in the relevant Chapters of this EIAR in the ‘Methodology’ section.

1.6.4 Difficulties Encountered

Some details of the project and the construction methodology / programme are matters which may be subject to change depending on the contractor(s) appointed and other considerations which are not finalised at this stage, and which cannot be finalised until a grant of planning permission for the project has been issued. These are matters which can be addressed prior to commencement of development in consultation with the planning authority and other relevant stakeholders.

Apart from progamme delays, Covid-19 restrictions did not impose particular difficulties in terms of surveys and much of the early survey work was undertaken prior to the Covid-19 restrictions being in place and those that were not could be undertaken within the restrictions.

No other significant difficulties were encountered in the preparation of the EIAR. Any limitations or technical difficulties associated with assessment of an environmental topic are detailed in the relevant chapter.

1.6.5 Reference List

The list of The EU Directives, Legislation and guidance documents in Section 1.4.1 references the sources of the descriptions and assessments included in the EIAR.

At the end of each assessment chapter, a reference list of additional sources relied on in that

Chapter, specific to that assessment, is provided.

1.6.6 List of Abbreviations

The following abbreviations are used in this EIAR:-

AA	Appropriate Assessment
CA	Competent Authority
EIA	Environmental Impact Assessment
EIA Directive	Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
NTS	Non-Technical Summary
SEA	Strategic Environmental Assessment

Other abbreviations which are specific to a description / an environmental topic are clarified in the relevant chapters.

1.7 TERMINOLOGY

The descriptions used to describe the effects on the environment in this EIAR are listed below. These descriptions are taken from the Draft *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2017) Table 3.3:-

Quality of Effects It is important to inform the non-specialist reader whether an effect is positive, negative or neutral	*Positive Effects* A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities). *Neutral Effects* No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. *Negative/adverse Effects* A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance). *Positive Effects* A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by

removing nuisances or improving amenities).

Describing the Significance of Effects

‘’Significance’ is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see *Determining Significance* below.).

Imperceptible

An effect capable of measurement but without significant consequences.

Not significant

An effect which causes noticeable changes in the character of the environment but without significant consequences.

Slight Effects

An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate Effects

An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.

Significant Effects

An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

Very Significant

An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.

Profound Effects

An effect which obliterates sensitive characteristics

Describing the Extent and Context of Effects

Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.

Extent

Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.

Context

Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

Describing the Probability of Effects

Descriptions of effects should establish how likely it is that the predicted effects will occur – so that the CA can take a view of the

Likely Effects

The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly balance of risk over advantage when making a decision.

implemented.

Unlikely Effects
The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Describing the Duration and Frequency of Effects
'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.

Momentary Effects
Effects lasting from seconds to minutes

Brief Effects
Effects lasting less than a day

Temporary Effects
Effects lasting less than a year

Short-term Effects
Effects lasting one to seven years.

Medium-term Effects
Effects lasting seven to fifteen years.

Long-term Effects
Effects lasting fifteen to sixty years.

Permanent Effects
Effects lasting over sixty years

Reversible Effects
Effects that can be undone, for example through remediation or restoration

Frequency of Effects
Describe how often the effect will occur. ((once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually))

Describing the Types of Effects

Indirect Effects (or. Secondary Effects)
Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.

Cumulative Effects
The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.

'Do-Nothing Effects'

The environment as it would be in the future should the subject project not be carried out.

`Worst case' Effects
The effects arising from a project in the case where mitigation measures substantially fail.

Indeterminable Effects
When the full consequences of a change in the environment cannot be described.

Irreversible Effects
When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

Residual Effects
The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

Synergistic Effects
Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

1.8 PROJECT TEAM / CONTRIBUTORS

This EIAR has been prepared on behalf of the developer by a team of qualified experts, as required by the EIA Directive. The contributors involved in the preparation of this EIAR are identified in Table 1.1.

Table 1.1 : EIA Team

Chapter	Company	Expert Contributor
Non- Technical Summary	Input from Contributors of each of the assessment chapters listed below.	All
1 Introduction	BMA Planning, Planning and Development Consultants, Taney Hall, Eglington Terrace, Dundrum, Dublin 14.	John Murphy BA MRUP MIPI. John is a Senior Planner with BMA Planning and has over 17 years' experience in planning and development projects including experience of directing and contributing to the preparation of environmental impact assessments for a variety of projects.
2 Planning Policy Context	BMA Planning, Planning and Development Consultants,	John Murphy BA MRUP MIPI

	Taney Hall, Eglington Terrace, Dundrum, Dublin 14.	
3 Description of Project and Alternatives	BMA Planning, Planning and Development Consultants, Taney Hall, Eglington Terrace, Dundrum, Dublin 14. Cronin & Sutton Consulting, 1st Floor, 19-22 Dame Street, Dublin 2	John Murphy BA MRUP MIPI Niall Barrett BEng (Hons), CEng, Nat Dip Eng Cert, Cert Health and Safety, Cert PSDP, Cert RSA, MIEI. Niall is a Director and Chartered Engineer specialising in Civil, Traffic and Transportation Engineering and has over 15 years' experience in this field. He has worked on numerous projects including experience of directing and contributing to the preparation of environmental impact assessments for a variety of projects
4 Population and Human Health	BMA Planning, Planning and Development Consultants, Taney Hall, Eglington Terrace, Dundrum, Dublin 14.	John Murphy BA MRUP MIPI
5 Biodiversity / Species and Habitats	Altimar, Templecarrig Upper, Greystones, Co. Wicklow.	Bryan Deegan MCIEEM, Msc. Environmental Science, Bsc (Hons) in Applied Marine Biology, National Dip in Applied Aquatic Science, National Cert. in Science (Aquaculture).
6 Land and Soils	Cronin & Sutton Consulting, 1st Floor, 19-22 Dame Street, Dublin	Gary Lindsay of CS Consulting. Gary is a Chartered Engineer with Engineers Ireland and has been practicing as a consulting engineer for over seventeen years. Gary holds a Bachelor's Degree in Civil Engineering from University College Dublin.
7 Water	Cronin & Sutton Consulting, 1st Floor, 19-22 Dame Street, Dublin	Gary Lindsay of CS Consulting.
8 Air and Climate	Byrne Environmental Consulting Ltd., Red Bog Skryne Road Dunshaughlin Co. Meath	Ian Byrne MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics. Ian has over 24 years' experience as an acoustic consultant and has particular speciality in the monitoring assessment and

		management of the impacts on noise and vibration on human health and on the receiving environment. Ian has prepared numerous air quality and climate impact assessments for large residential, commercial and industrial developments for private and public clients.
9 Noise and Vibration	Byrne Environmental Consulting Ltd., Red Bog Skryne Road Dunshaughlin Co. Meath	Ian Byrne MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics.
10 Material Assets: Built Services	Cronin & Sutton Consulting, 1st Floor, 19-22 Dame Street, Dublin EDC Consulting Engineers 4 Grand Canal Wharf South Dock Road Dublin 4	Gary Lindsay of CS Consulting. Gary is a Chartered Engineer with Engineers Ireland and has been practicing as a consulting engineer for over seventeen years. Gary holds a Bachelor's Degree in Civil Engineering from University College Dublin. Adam Hynes, Chartered Engineer. Adam is a Senior Building Services Engineer with EDC engineering and has over 7 years' experience in the building services industry. During this time he has worked across a wide variety of sectors and projects from planning to completion stage.
11 Material Assets: Transportation	Cronin & Sutton Consulting, 1st Floor, 19-22 Dame Street, Dublin	Niall Barrett BEng (Hons), CEng, Nat Dip Eng Cert, Cert Health & Safety, Cert PSDP, Cert RSA, MIEI
12 Material Assets: Resource and Waste Management	Byrne Environmental Consulting Ltd., Red Bog Skryne Road Dunshaughlin Co. Meath	Ian Byrne MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics.
13 Cultural Heritage	IAC Archaeology Unit G1, Network Enterprise Park, Kilcoole, Co. Wicklow	Faith Bailey BA (Hons), MA, MCIfA, MIAI is an Associate Director and Senior Archaeologist and Cultural Heritage Consultant with IAC Archaeology. She holds an MA in Cultural Landscape Management (archaeology and built heritage) and a BA in single honours archaeology from the University of Wales, Lampeter. She is a licence eligible archaeologist and has over 18 years' experience working in the commercial archaeological and

		cultural heritage sector. Faith has significant experience in the preparation of Briefs of Evidence and taking the stand as the expert witness at Oral Hearings.
14 The Landscape	Model Works, The Old Courtyard, Newtownpark Ave, Glebe, Blackrock, Co. Dublin	David Bolt of Model Works Ltd. David has a degree in Landscape Architecture, is a member of the Landscape Institute (UK) and has over 35 years' experience in urban/landscape design and development and environmental planning, and acts as a landscape expert witness.
15 Significant Effects, Interactions and Other Impacts	BMA Planning, Planning and Development Consultants, Taney Hall, Eglington Terrace, Dundrum, Dublin 14.	John Murphy BA MRUP MIPI

2. PLANNING POLICY CONTEXT

2.1 INTRODUCTION

The current application has been prepared in the context of a range of national, regional and local planning policy sources. These are reviewed and commented on in detail in the *Statement of Consistency & Material Contravention Statement*, prepared by BMA Planning and submitted with this application. It is not proposed to repeat these provisions in this document. The following is a summary of the most relevant plans to the current application.

2.2 DEVELOPMENT PLAN

The *Dublin City Development Plan 2016 – 2022* (the “Development Plan” or “DCDP”) is the current statutory development plan for the area.

The following outlines the most relevant provisions of the Development Plan in the context of the project.

2.2.1 Vision and Core Strategy (Chapter 2)

A key aspect of the DCDP Core strategy is that future expansion, whether housing or mixed uses occur on a phased basis and in tandem with high-quality rail-based public transport. The settlement strategy prioritises this expansion spatially within the intercity, key district centres and Strategic Development and Regeneration Areas (SDRA’s).

18 areas are designated as *SDRA’s* in the Development Plan. Each of which are capable of delivering a significant quantum of residential and employment development.

The application site is designated as *SDRA 4 – Park West/ Cherry Orchard*, with a capacity of c.2,200 – 3,000 units (LAP, Section 4.6.4).

2.2.2 Quality Housing (Chapter 5)

The Council has identified the need to create sustainable communities in a number of key inner suburban areas and Park West is named specifically as one of these areas.

Policy QH8, relates to sustainable residential development and it states that it is a policy of Dublin City Council:

> *‘QH8 To promote the sustainable development of vacant or under-utilised infill sites and to favourably consider higher density proposals which respect the design of the surrounding development and the character of the area.’*

2.2.3 Built Heritage and Culture (Chapter 11)

There are no protected structures on site.

2.2.4 Land Use Zoning (Chapter 14)

The lands are zoned *Z14 Strategic Development and Regeneration Areas (SDRA's)* where it is the objective: -

> '*To seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and "Z6" would be the predominant uses.'*
> *(Section 14.8.13 of Dublin City Development Plan 2016-2022)*

All uses proposed are permissible uses under this zoning objective.

2.2.5 Strategic Development and Regeneration Areas (Chapter 15)

The application site is identified as an SDRA site in the DCDP - SDRA 4 – *Park West/ Cherry Orchard*. The overall SDRA4 lands, includes 9no. development sites located north and south of the Dublin – Kildare Mainline Railway with the capacity to accommodate a mix of retail, commercial and community uses.

The key principles which apply to SDRA 4 are set out in Chapter 15 and Fig.23 (below).

In accordance with the DCDP, a Local Area Plan was prepared for Park West/ Cherry Orchard in 2019. The LAP is discussed below within Section 2.3.

2.2.6 Development Management (Chapter 16)

All Development Standards included in Chapter 16 have been considered and the development has incorporated these principles and standards insofar as they are relevant to the proposals.

2.3 PARK WEST – CHERRY ORCHARD LOCAL AREA PLAN 2019

The Park West – Cherry Orchard LAP is contained in a single volume with six sections and is supported by environmental reports including a Strategic Environmental Assessment Report, Strategic Flood Risk Assessment and Appropriate Assessment.

Section 5 of the LAP includes a site brief for each of the 9no. identified key development sites. The current application site is located within Site 6.

A series of map and text-based development objectives are identified for Site 6 in relation to the following: -

- Land Use
- Density
- Building Heights
- School Site
- Social Infrastructure
- Linkages
- Streets and Urban Edges
- Level Changes
- Retail/ commercial Units

- Pedestrian and Cycle Movement
- ESB Powerlines
- Archaeology
- Landscaping
- Recycling Bank.

The proposed development is a Material Contravention of the DCDP and the LAP in relation to building heights. Reference Section 16.7.2 of the DCDP and Site Brief 6: Park West Avenue/ Road Site of the LAP respectively. The proposed development is also a Material Contravention of the DCDP in relation to unit mix (Ref. Section 16.10.1 Residential Quality Standards – Apartments: Mix of Residential Units of the DCDP).

The case for increased building heights is supported by the *Urban Development and Building Heights Guidelines for Planning Authorities* (2018) and specifically SPPR3(A). Regarding unit mix, the scheme complies with the *Sustainable Urban Housing: Design Standards for New Apartment Guidelines for Planning Authorities* (Revised 2020) which allows flexibility in relation to Unit Mix (SPPR1).

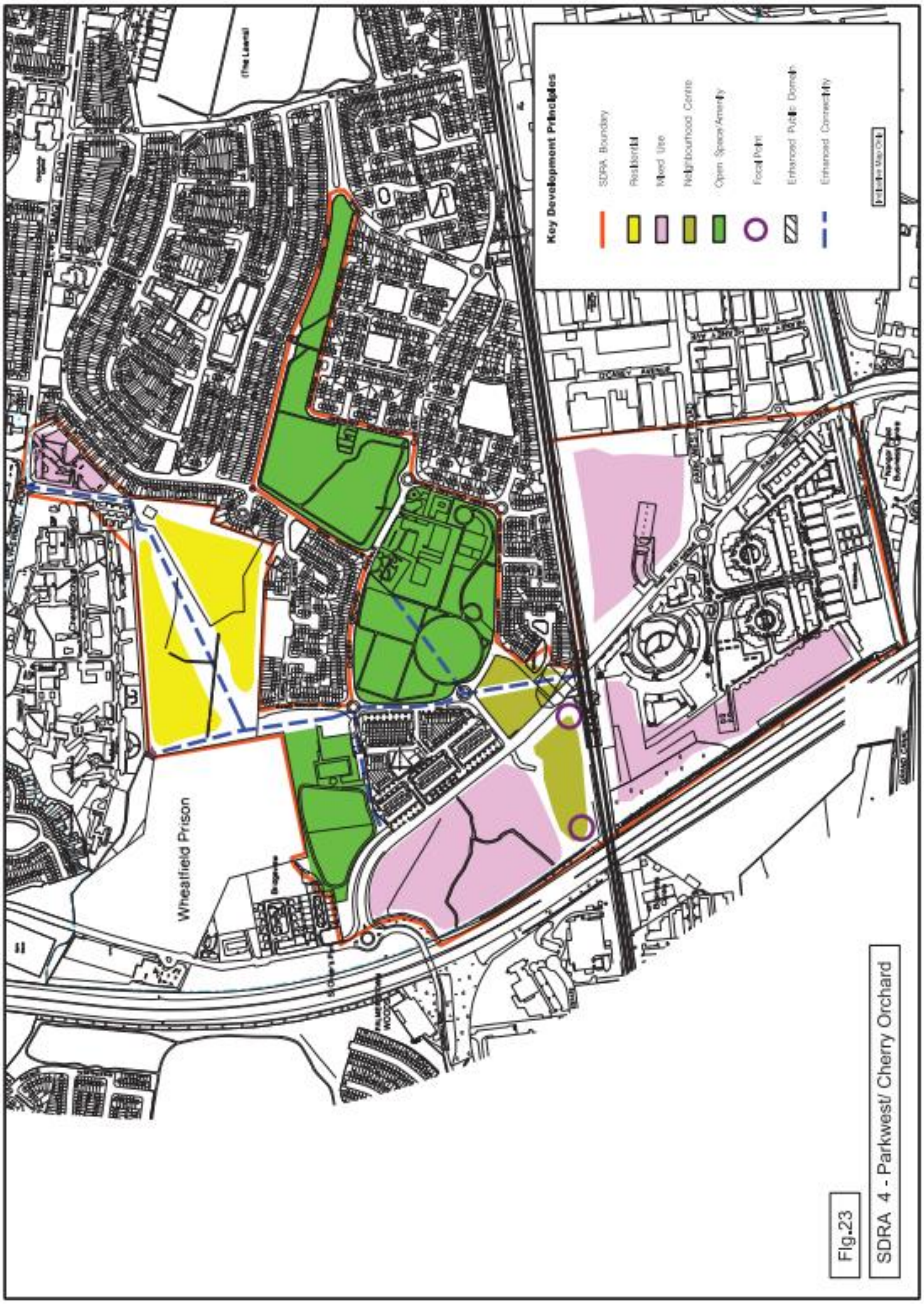

Figure 2.1 SDRA 4 Key Development Principles (Source DCDP)

2.4 NATIONAL AND REGIONAL POLICY

The following national and regional policy documents are relevant to this project: -

- *Project Ireland 2040 - The National Planning Framework*
- *Housing for All – A New Housing Plan for Ireland (2021)*
- *Regional Spatial and Economic Strategy (RSES) 2019-2031 for the Eastern and Midland Region*

2.4.1 Project Ireland 2040 – National Planning Framework

The National Planning Framework (NPF) is the Government's high-level strategic plan for shaping the future growth and development of the Country out to the year 2020.

A key element of the NPF's strategy is compact growth with the key features being: -

- *Targeting a greater proportion (40%) of future housing development to be within and close to the existing 'footprint' of built-up areas.*
- *Making better use of under-utilised land and buildings, including 'infill', 'brownfield' and publicly owned sites and vacant and under-occupied buildings, with higher housing and jobs densities, better serviced by existing facilities and public transport.*
- *Supporting both urban regeneration and rural rejuvenation through a €3 Billion Regeneration and Development Fund and the establishment of a National Regeneration and Development Agency.*

(Page 22)

In accordance with the National Policy Objectives of the NPF, the current application will deliver a high-density development of modern and adaptable new homes within an existing urban area in close proximity to existing public transport and local service provision.

One of the key future growth enablers for Dublin in Page 37 of the NPF include "*Identifying a number of ambitious large- scale regeneration areas for the provision of new housing and employment throughout the city and metropolitan area and the measures required to facilitate them as integrated, sustainable development projects".* The project will provide new housing and employment in the city centre and will also act as a catalyst for future development and regeneration of the area.

2.4.2 HOUSING FOR ALL – A NEW HOUSING PLAN FOR IRELAND (2021)

This document sets out the Government's new housing plan for Ireland with the overall aim stated as allowing everyone in the stated to have access to a home to purchase or rennet at an affordable price, built to a high standard and in the right place, offering a high quality of life.

To meet this objective, Housing for All provides four pathways to achieving four overarching objectives: -

- Supporting Homeownership and Increasing Affordability;
- Eradicating Homelessness, Increasing Social Housing Delivery and Supporting

Social Inclusion;
- Increasing New Housing Supply; and
- Addressing Vacancy and Efficient Use of Existing Stock.

Each of the pathways contains a comprehensive suite of actions to achieve these housing policy objectives.

2.4.3 Regional Spatial and Economic Strategy 2019-2031

The *Eastern and Midlands Regional Assembly Regional Spatial and Economic Strategy, 2019-2031* (RSES) is a strategic plan which provides a multifaceted approach to regional development.

The Strategy is based upon the 3 key Principles and 16 Regional Strategic Outcomes.

The *Dublin Metropolitan Area Strategic Plan* (MASP) is a land use and transportation strategy contained within the RSES. Consolidation of Dublin City and its suburbs is part of the vision of the MASP.

The project will deliver a high-density scheme of modern and adaptable new homes, within an existing urban area, in close proximity to existing public transport and local service provision. This is in accordance with the principles and vision of the Metropolitan Area Strategic Plan (MASP).

2.5 SECTION 28 MINISTERIAL GUIDELINES

2.5.1 Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009) and Associated Urban Design Manual Best Practice Guidelines (2009)

The key principles for new residential developments in urban areas are contained in these Guidelines and translated into practice in the accompanying design manual. They generally relate to a plan led / sequential approach to development, densities and location, sustainable neighbourhoods and better design / urban design.

These are incorporated at a local level in the relevant development plan, local area plan or SDZ planning scheme and at project stage, to be considered in the preparation and assessment of planning applications.

2.5.2 Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities (revised 2020)

These Guidelines, hereafter referred to as the ‘Apartment Guidelines’ contain qualitative and quantitative measures for the design of apartments and related facilities including storage areas, open spaces and communal facilities.

Specific Planning Policy Requirements (SPPRs) included in the Guidelines take precedence over policies and objectives of development plans, local area plans or SDZ planning schemes.

2.5.3 Quality Housing for Sustainable Communities (2007)

The aim of these Guidelines is to identify principles and criteria that are important in the design of housing and to highlight specific design features, requirements and standards that have been found, from experience, to be particularly relevant. Guidance within this document is arranged under five headings :- Site Selection; Design Brief, Procurement and Cost Control; Urban Design Objectives in the Provision of Housing; Scheme Layout and Design; and Dwelling Design.

2.5.4 Urban Development and Building Heights Guidelines for Planning Authorities (2018)

The national planning policy guidance on building heights is set out in these Guidelines, building on the policies in the National Planning Framework (NPF).

The Building Height Guidelines support, in principle, heights of **6 storeys** at street level with scope to consider greater building heights within city centre areas including within the canal ring in Dublin.

2.5.5 The Planning System and Flood Risk Assessment - Guidelines for Planning Authorities (2009)

These Guidelines introduce comprehensive mechanisms for the incorporation of flood risk identification and management into the planning process.

A Site-Specific Flood Risk Assessment (SSFRA) has been prepared in accordance with these Guidelines and is enclosed with the application.

3. DESCRIPTION OF PROJECT AND ALTERNATIVES

3.1 INTRODUCTION

This Chapter provides a description of the project site in the context of its receiving environment and a description of the project and the main alternatives considered in so far as relevant from an environmental impact perspective.

The project description should be read in conjunction with the plans and particulars submitted with the planning application including the Planning Application Report, design statements and other technical studies. To avoid unnecessary repetition, it is not proposed to repeat the contents of these reports.

3.2 SITE AND SURROUNDINGS

3.2.1 The Site

Park West is located c.8km west of Dublin City Centre, directly east of the M50, south of Ballyfermot and Cherry Orchard residential neighbourhoods and north of the John F Kennedy and Naas Road industrial areas.

The Park West neighbourhood is bound by the Dublin to Cork mainline railway to the north, the Grand Canal to the south, the M50 to the west and the Killeen Road to the east. Access through the lands is provided by Park West Road which traverses the site from east to west from the Killeen Road and Park West Avenue. Park West Avenue moves from south to north through the lands connecting the New Nangor Road to the south to Palmerstown Way/ Cloverhill Road to the north.

Park West is generally made up of Park West Industrial Estate, Park West Business Park and Park West residential neighbourhood. Park West Industrial Estate comprises the eastern half of the Park West complex and comprises a large number of industrial and warehouse type premises with associated parking. Park West Business Park generally comprises 3 to 5 storey office blocks within a parkland setting located within the south western corner of the wider Park West complex. The Park West residential neighbourhood is located primarily within the north western corner of the lands and centred around blocks known as the Academy Building and the Crescent building.

There are pockets of undeveloped lands within Park West located along the boundary with the M50 and at the south western corner adjoining the Grand Canal. The subject site also comprises an undeveloped area of land located centrally within the Park West complex.

Figure 3.1 illustrates the location and extent of the current application site on an aerial photograph.

The application site (c.9.4ha) is located within Park West, Dublin 12 and east of Park West Avenue and north of Park West Road. The Dublin to Cork mainline railway defines the northern boundary with Park West Business Park to the east. The northern and eastern boundaries of the site, to the rail line and Park West Business Park respectively, are defined by palisade fencing. An existing berm defines the southern and western boundaries of the site.

The site is largely undeveloped with the exception of the Aspect Hotel, comprising an 8-storey hotel building and ancillary surface carpark accessed from Park West Avenue.

The remaining undeveloped lands are generally flat and meet Park West Road at grade to the south while Park West Avenue rises from south to north as it bounds the site to the west. An existing berm defines the southern and western boundaries of the site. The northern and eastern boundaries of the site, to the rail line and Park West Business Park respectively, are defined by palisade fencing.

Photographs 1 to 4 illustrate the principal features of the site.

3.2.2 Planning History

The site (previously referred to as Sector 3, Park West) has a history of planning applications summarised as follows: -

- Reg. Ref. 4884/04: Permission granted for 4 to 7 storey hotel building accommodating 200 bedrooms.
- Reg. Ref. 6300/05: Permission granted for amendments to Reg. Ref. 4884/04 and a mixed-use commercial, residential, retail and cultural development comprising 176,335sq.m of development including 958no. residential apartments, office accommodation, cultural/ civic library uses and a revised hotel.
- Reg. Ref. 2930/06: Permission granted for revised hotel development and associated temporary surface car.
- Reg. Ref. 3436/18: Permission granted for extension to the existing hotel development consisting of an additional 78no. bedrooms and revised temporary car parking layout.

Figure 3.1: Location and Extent of Current Application Site
(Source: Bing Maps)

Photo 1: View of the Southern Boundary of the Site with Park West Road

Photo 2: View of the Western Boundary of the Site with Park West Avenue & Aspect Hotel

Photo 3: View of Northern Boundary of the Site with Dublin to Cork Mainline Railway

Photo 4: View of the Interior of the Site from the Western Boundary

3.3 THE PROJECT

The proposed development (70,649 sqm gross floor area - GFA) will consist of:

- 750no. residential units (Blocks A to G) comprising a mix of one, two and three bed apartments and all associated ancillary accommodation (69,989sqm GFA)

- Non-residential uses 705sqm GFA) including a retail unit, a creche community space, café/ bar.

The gross floorspace of non-residential uses as a percentage of the overall gross floorspace is 1%.

The following is a summary of the key statistics.

KEY STATISTICS

- ***No of Units:*** 750
- ***Unit Mix:*** 321no. 1 beds (43%),
  384no. 2 beds (51%),
  45no. 3 beds. (6%)
- ***Total GFA:*** 70,694sqm
- ***Residential (Gross):*** 69,989sqm
- ***Housing Density:*** 137 units / ha (based on net site of 5.5ha)
- ***Non-residential (GFA):*** 705sqm
- ***Non-Residential %:*** 1%
- ***Plot Ratio:*** 1: 1.29 (based on site of 5.5ha)
- ***Site Coverage:*** 23%
- ***Building Height:*** 2 to 15 storeys
- ***Car Parking Spaces:*** 552 (477no. residential/ 0.64 per unit)
- ***Bicycle Parking Spaces:*** 1676 (2.2 per unit)

3.3.1 Project Description

Figure 3.2 illustrates the proposed layout plan.

The proposed development is described below on a block-by-block basis.

- Block A (11,563sq.m GFA): - A 2 to 15 storey with 109no. residential units and 1no. retail/ commercial unit of 156sq.m.

- Block B (4,180sq.m GFA): - A 2 to 8 storey block with 44no. residential units and resident services and amenities of 84sq.m.

- Block C (8,865sq.m GFA): - A 2 to 8 storey block with 100no. residential units.

- Block D (16,403sq.m GFA): - A 2 to 8 storey block with 179no. residential units in. Residential services and amenities of 403sq.m are proposed at ground, first and second floor levels.

- Block E (15,995sq.m GFA): - A 2 to 8 storey block with 179no. residential units.

- Block F (9,629sq.m): - A 2 to 8 storey block with 99no. residential units.

- Block G (4,059sq.m): - A 1 to 8 storey block with 40no. apartments, a creche of 410sq.m with associated external play area, a café/ bar unit of 91sq.m and a community space of 48sq.m.

- Public Open Space: - c.1.3ha (14%) of public open space is provided and comprises a linear park orientated west to east and functioning as a link to the established residential areas to the west of Park West Avenue and a public plaza/ square including Multi-Use Games Area (MUGA) located centrally within the site.

- Communal Amenity Space: - Communal amenity spaces totalling 6,175sq.m are provided at podium level within each of the proposed Blocks A to F and at roof levels within Block G and include passive open spaces that are visually and functionally accessible to the future residents of the development.

- Private Open Spaces: - Will be in the form of balconies for the apartments and duplexes and terraces for ground floor units.

Vehicular access to serve the proposed development will be provided via access roads off Park West Road and Park West Avenue. Tie-in works are required to Park West Avenue and Park West Road to provide for suitable junctions and pedestrian crossings at the proposed access points.

In addition to pedestrian and cycle access at the above two locations there will be a pedestrian and cycle access at the north western corner of the site adjoining Park West Avenue and providing access to the proposed west to east street along the northern boundary of the site. This access to Park West Avenue will facilitate safe and efficient access for pedestrians and cyclists to Park West and Park West - Cherry Orchard Train Station located directly to the north west across Park West Avenue.

Car parking is provided at ground floor/ under croft level beneath Blocks A, B, C, D, E and F and at street level. A total of 552no. car parking spaces are proposed including 477no. residential car parking spaces at ratio of 0.64 per residential unit. 5no. car parking spaces will serve the proposed non-residential uses.

99no. existing car parking relating to the existing Aspect Hotel are located within the current application site. The Aspect Hotel is a pre-existing building located centrally within the site. Permission was granted for an extension to this hotel in February 2019 (Reg. Reg. 3436/18). Condition 3 attached to Reg. Ref. 3436/18 addresses a legacy issue relating to the Aspect Hotel car park which is located on the site of the proposed Block G. The current application provides for the demolition of the hotel surface car park to facilitate the development of Block G. It is proposed that the permitted car parking (totalling 70no. spaces) to serve the hotel will be relocated beneath Blocks A-B-C (36no. spaces) and at street level to the south of the existing Aspect Hotel (34no. spaces). The existing car park is proposed to be demolished and the site of the permitted hotel extension landscaped pending the development of the hotel extension.

A total of 1,676 cycle parking spaces are proposed. The cycle parking is provided at ground floor/ under croft level beneath Blocks A to F to serve the proposed residential units and integrated into the public realm at street level for visitors.

The residual lands within Site 6, identified as development Stages 2 and 3, are sites for future development and will be seeded/ grassed and fenced until such time as development proposals for those sites are advanced. The Stage 2 lands include a site for a proposed school as identified within the LAP and to be brought forward by the Department of Education and Skills.

Permission is also sought for associated hard and soft landscaping, boundary treatments and all associated site and development works.

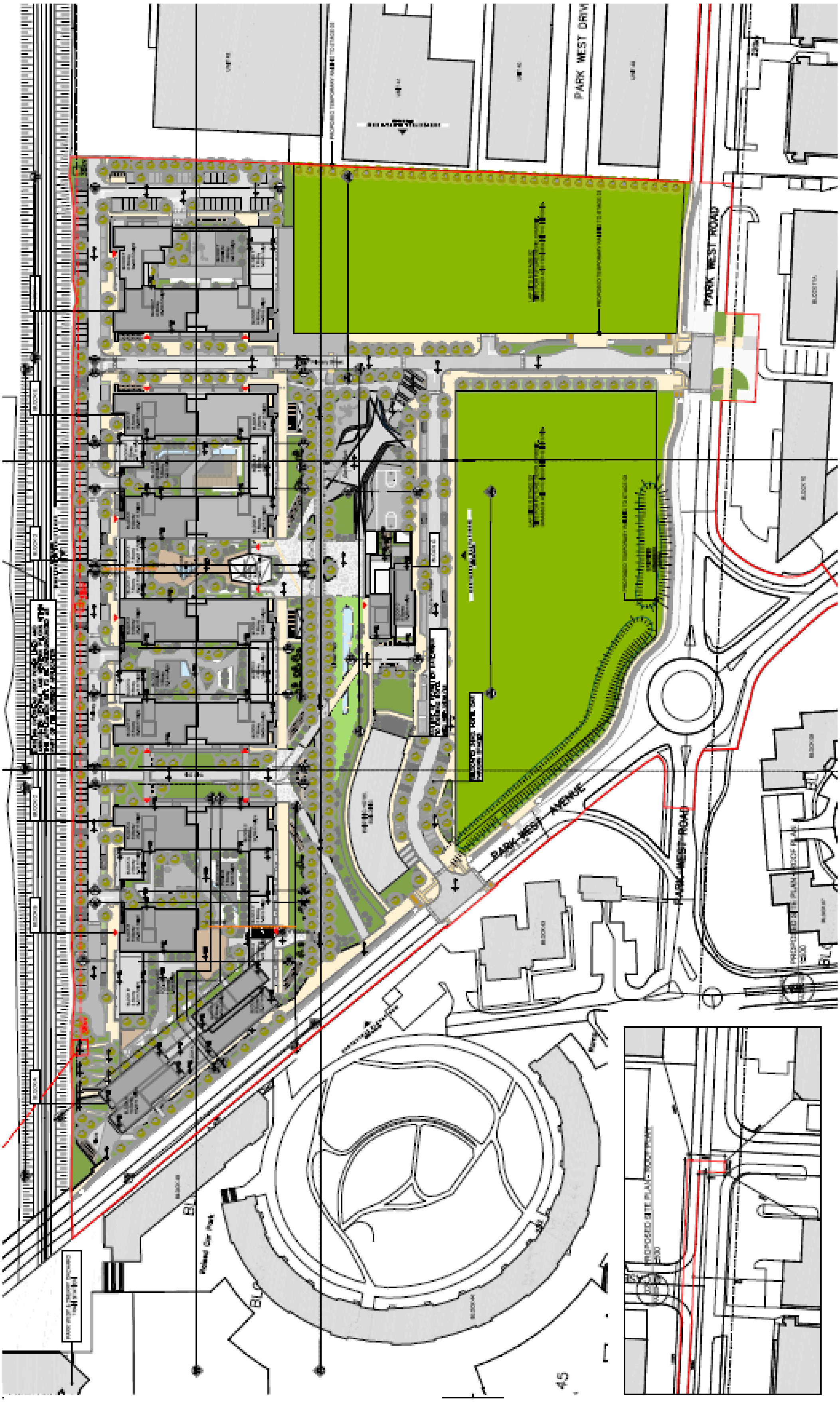

Figure 3.2: Proposed Layout Plan

3.4 CONSTRUCTION ACTIVITIES

3.4.1 Introduction

This section contains a description of the construction process as it is known at this pre-consent stage and ahead of detailed design development. An ***Outline Construction Management Plan*** [CS Consulting] has also been prepared and is submitted with the planning application documentation.

The description has considered the outermost or “not to exceed” parameters where full details of the construction process is not known or available at this stage. It is considered that the description of the construction phase activities provides a sufficient level of detail for planning permission / EIA purposes.

Certain assumptions are made in the OCMP based on the information available at this time and, for the avoidance of doubt, it is not proposed or intended that the applicant / contractor(s) are bound by these proposals which may change depending on the timing and circumstances pertaining at the time of construction.

The OCMP contains further detail on the construction programme and construction related activities outlined below. It also addresses issues relating to volumes of materials, traffic and environmental controls, health and safety etc.

On receipt of a grant of permission, the appointed contractor(s) will update the OCMP to comply with and implement the requirements and mitigation and monitoring measures set out in this EIAR and any conditions imposed as part of the granted planning approval. The Contractor’s Construction and Environmental Management Plan (CEMP) can be submitted to the Planning Authority prior to commencement.

3.4.2 Construction Phasing

The construction of the project is planned to take between 6 to 7 years to complete. The current indicative phasing suggests that the project will be split into 4 phases with the accompanying infrastructure and green spaces being handed over with each phase, as it is constructed (see **Figure 3.3** below).

The phasing of the proposed development is detailed in the ***Phasing Management and Delivery Plan*** [Greenseed Limited] submitted with the planning application documents. In summary, it is proposed that the north-south access road from Park West Road, the west to west link from Park West Avenue, the central public open space and Blocks A, B and C will be constructed in Phase 1 of the development. Blocks D and E will be constructed in Phase 2. Phase 3 will comprise the construction of Block F. The final phase of development will comprise the relocation of the hotel car park and the construction of Block G.

The phasing summarised above is indicative, and the final phasing, and associated Construction Traffic Management Plans will be appointed by the appointed Contractor, and submitted to Dublin City Council for approval, prior to commencement.

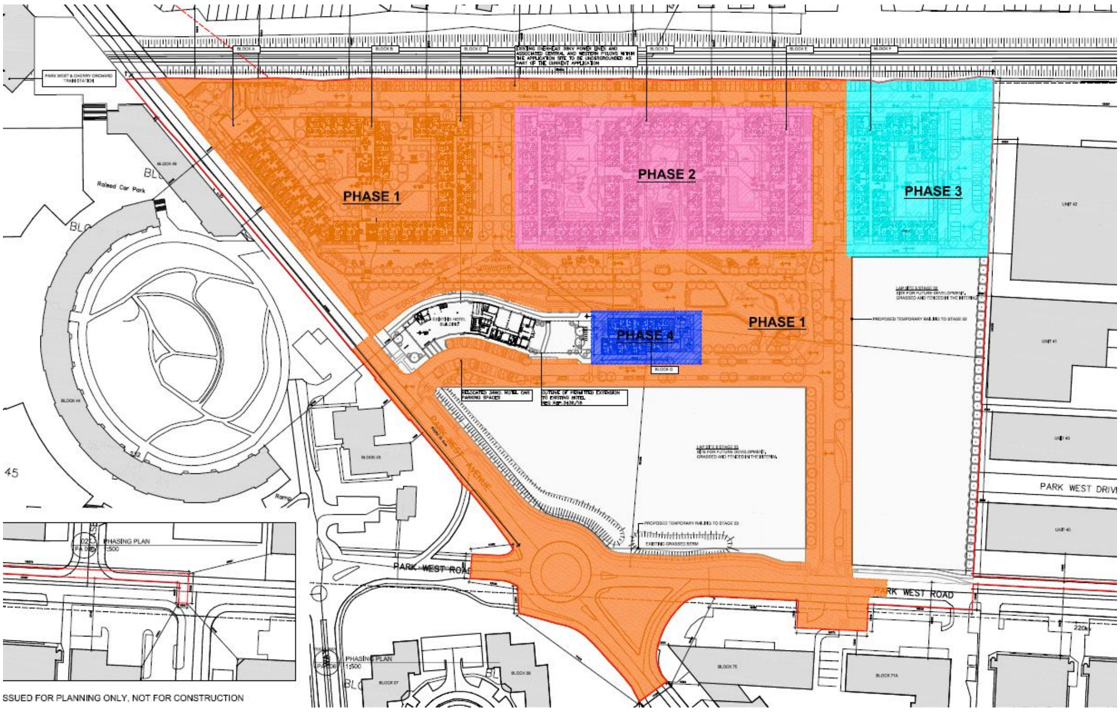

Figure 3.3: Indicative Construction Phasing

(Source: Phasing Management and Delivery Plan)

3.4.3 Site Clearance

The following is a high-level method statement for the site preparation and clearance phase of the development.

- Establish a site set-up and welfare facilities.
- Carry out an invasive species survey using a qualified and approved surveyor.
- Carry out a detailed services survey of the site to identify all buried services. determine what services are live, redundant and potentially serve neighbouring properties. To be performed before any ground break up is performed on site.
- Carry out any necessary services diversions and decommissioning works.

Breaking ground will only take place following a full survey. Any materials identified as being hazardous will be removed and disposed of in strict accordance with the applicable legislation. All services will be disconnected and removed.

All materials will either be fully separated on site and disposed of to the applicable landfills / processing facility or failing that material will be sent to a processing facility for separation. Relevant certification and documentation confirming the final separation and most environmentally friendly disposal will be available.

3.4.4 Excavation

The proposed site levels are determined by a combination of factors such as tie-ins with existing roads, existing topography, TGD Part M compliant access to ground floor levels etc. The profiling of the site to accommodate the proposed site levels, and the absence of any raised landscaping features, will result in a surplus of "cut" material which will be exported off site to suitably licensed landfill facilities (c. 31,209m^3).

The Contractor must prepare a Construction 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.

3.4.5 Site Management and Accommodation

The construction compound for the infrastructure works will be entirely within the site boundary, although in some instances located outside the phase being constructed.

The facilities to be provided and maintained by the contractor will include:

- construction plant;
- hoisting equipment and cranes;
- scaffolding, platforms, access ladders, barriers, handrails;
- barricades and hoardings;
- temporary driveways, road crossovers and construction zone;
- 24/7 emergency vehicle access to site during working hours;
- on-site hardstand areas for vehicle loading and unloading;

- storage sheds and compounds;
- rubbish sorting areas;
- site amenities with all required equipment and facilities;
- construction worker accommodation;
- first aid facilities;
- site administration accommodation.

Plant and equipment used during the entire works are:

- articulated and rigid trucks;
- Pilling-rigs, bulldozers, excavators, backhoes, with ancillary equipment (rock hammers or saws);
- Tower cranes/mobile cranes;
- concrete delivery trucks;
- concrete pumps;
- man, and material hoists;
- scissor, boom and fork lifts.

The number of workers on the site will vary throughout the construction programme and so it is difficult to put a precise estimate on the numbers of workers employed on the site. During the site clearance and excavation, it is likely that no more than 50 workers will be present on site at any one time. However, during peak construction this could rise to 200-300 workers depending on the number of buildings under construction at any one time.

On-site facilities will include a site office and staff welfare facilities (e.g. toilets, drying room, canteen, etc.).

Vehicle parking for construction personnel will be accommodated within the development site. To the extent possible, personnel will also be encouraged to use public transport, and information on local transportation will be published on site.

Harmful material will be stored on site for use in connection with the construction works only. These materials will be stored in controlled manner. Where on site facilities are used, there will be a bunded filling area using double bunded steel tank at a minimum.

On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

3.4.6 Vehicular Access to Site

The site will be serviced from the existing vehicular access at Park West Road. The layout and operation of the access will be determined by the Contractor in their Construction Traffic Management Plan (CTMP) and will vary depend on the phase of construction. Fulltime Traffic Management Operatives will be located at the vehicle access points during the construction works.

3.4.7 Site Working Hours

Subject to the agreement of the Planning Authority, the following site operation hours are proposed:

Monday to Friday: 07:00 to 19:00
Saturdays: 08:00 to 14:00
Sundays and Bank Holidays: Works not permitted

It may be necessary for some construction operations to be undertaken outside these times, for example: service diversions and connections; concrete finishing and fit-out works; etc. There may also be occasions where it is necessary to make certain deliveries outside these times, for example, where large loads are limited to road usage outside peak times.

3.4.8 Erection and operation of cranes

It is envisaged that one or more tower cranes will be temporarily erected to accommodate the construction works for the distribution of reinforcing steel, concrete skips, concrete formwork element and general building materials. No loads will be lifted over the public domain or adjacent properties.

The Contractor will need to obtain all necessary licences from the Local Authority. A “mast climber” may be installed at some local areas to facilitate façade features. The mast climber is essentially a climbing platform that allows the user to safely access any level without the requirement for a full scaffold tower.

Hoists and teleporters may also be used within the site and around its perimeter as required during the project, to facilitate material and waste movements into and out of the site.

3.4.9 Substructure and Superstructure

There are a number of options for the superstructure design and these will not be decided until detail design and tender stage.

For the apartment blocks, the most likely options would be reinforced concrete (RC) column and flat slab, RC/masonry cross wall and precast slab, precast concrete twin wall and precast slab or a combination of.

The following outlines a general construction sequence for the development:

Foundations:
The site is relatively flat and therefore no exceptional foundation solutions are required. It is likely that piling will be required for the substructure of the apartment blocks. The concrete operations associated with the foundation will require concrete deliveries to site.

Building Structure:

- Construction of the foundations/substructure.
- Construction of rising elements to 1st floor and 1st floor slabs.
- Similar sequence of construction of rising elements and floor slabs.
- Note allowance for service construction concurrently or before superstructure.

Envelope / Cladding:

- Envelope works will follow in a sequential manner.

Mechanical and Electrical fit-out:

- First fix will commence at each level behind structure.
- This will be followed by the second fix and the final connections.

Fit-out:

- Initial installation of any stud work when cladding is complete 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 is an indicative construction sequence. The final sequence will be dictated by the Contractor.

3.4.10 Environmental Management

The contractor will establish guidelines and controls for all activities that may impact on the surrounding environment for the duration of the works and, in particular, will ensure that the mitigation and monitoring measures contained in this EIAR are implemented.

A Construction and Environmental Management Plan (CEMP) will be prepared by the Contractor and will address, inter alia, commitments made in relation to noise, air quality/ dust suppression, management of waste, traffic management, storm water management and invasive species.

3.5 RELATED PROJECTS / OTHER PROJECTS

There are no projects (off-site or secondary) occurring as a direct result of the project.

The cumulative effects of the project with the other projects listed below, if any, are considered in the relevant Chapters of this EIAR and summarised in Chapter 15.

- Reg. Ref. 3436/18: - Permission granted for a 7-storey extension of 3,704sq.m to the existing Aspect hotel.

- Reg. Refs. 3798/18, 3941/20, 3403/21: - Permission granted for the conversion, extension and change of use of existing Blocks 70 and 72 at Park West Plaza (directly south of the current apliction site) from commercial office over ground floor retail/restaurant uses to provide for a residential development with a total of 84 no. apartments over retail/restaurant use and associated amendments in 2020 and 2021.

- Reg. Refs. SD18A/0068, SD20A/0309: - Permission granted for information and communications technology facility buildings and associated development at Crag Avenue, Clondalkin Industrial Estate, Dublin 22 (west of the M50).

3.6 ALTERNATIVES EXAMINED

The consideration of "Alternatives" is requirement of the EIA process. By outlining alternatives considered, it is possible to reduce or minimise environmental impacts and ensure that better solutions are not overlooked.

3.6.1 Alternative Locations

The EPA Guidelines (2002 and 2017 Draft Guidelines) recognises that it is not always necessary or appropriate to consider alternative options for projects which have been previously determined in a higher plan.

> *"Hierarchy*
> *EIA is only concerned with projects. Many projects, especially in the area of public infrastructure, arise on account of plans, strategies and policies which have previously been decided upon. It is important to acknowledge that* ***in some instances neither the applicant nor the competent authority can be realistically expected to examine options which have already been previously determined by a higher authority*** *(such as a national plan or regional programme for infrastructure or a spatial plan)."*

(Source: EPA *Guidelines on the information to be contained in Environmental Impact Statements,* Section 2.4.3 Alternatives, page 12)

The location of the project has been determined by the designation of the area as a Strategic Development Regeneration Area (SDRA) which supports the development of a new residential community in Park West. As the development of this site for the land uses proposed has been identified at a local / national scale in the CDP / LAP / Planning Scheme, no alternative sites were considered in this EIAR.

3.6.2 Alternative Layout / Designs

Alternative designs for the different parts of the site were considered and developed by the architects during the design process, with input from the overall project team. This involved a constantly evolving design whereby different solutions were constantly tested to establish the optimum design solution.

Insofar as effects on the environment are concerned, these issues were taken into consideration in arriving at the chosen scheme and, in that sense, the proposed development embodies these considerations.

The main alternatives considered in terms of layout, and the main reasons for the option chosen, included:-

- Basements were minimised due to the excessive cost of basement construction and the layout options considered also involved providing parking at grade. Various permutations were considered in relation to the ratio of residential parking provided.

- The height strategy has evolved throughout the design phase and was informed by the

Landscape and Visual Assessment and the Daylight / Sunlight Assessments which informed a decision on the capacity of the site and the impact of the proposed development on the immediate vicinity of the site and on views from the wider district.

- A number of design alternatives were examined to address the design and layout of the street along the northern boundary of the site including consideration of the level change between Park West Avenue and the site. The chosen design provides own door dual aspect duplex units with access from the north elevation and activity to the street. In addition, a detail landscape proposal provides for a pedestrian and cycle access from Park West Avenue and suitable boundary treatments to the railway line.

- Various alternative locations within the Central Open Space were considered for the MUGA and the chosen location was deemed optimal in terms of its central location accessible to the future residents of the development and established residents in Park West.

- Communal open spaces at podium level were chosen based on their location but also taking into account micro-climatic conditions based on advice from the relevant experts.

- Various alternative locations were considered for the relocation of the existing Aspect Hotel Car Park. A combination of surface car parking and below podium car parking was chosen to ensure convenience of access for hotel patrons while minimising car parking at street level.

- Daylight/ sunlight analysis was undertaken as an iterative process during the course of the design of the apartment blocks and alternative layouts were examined.

A synopsis of the environmental effects of the main alternative scenarios which have been dismissed in favour of the proposed development is summarised as follows with reference to the topics in the EIA Directive.

Table 3.1 Synopsis of Comparison of the Environmental Effects of Alternatives Considered

Population and Human Health	• The layout of the scheme was amended following consultations with DCC to provide a north/ south link street between Blocks a-B-C and D-E which has a positive impact on the proposed Railway Avenue and for the future residents of the scheme in terms of permeability through the development. • The proposed scheme was revised between Stages 2 and 3 to integrate the car parking associated with the existing Aspect Hotel into the design and layout of the proposed east – west street and Block A-B-C. The scheme as now proposed will provide an enhanced urban setting for future residents and visitors to the development. • The southern elevation of Block A-B-C was modified between Stages 2 and 3 to reduce the building height at this location and provide for sufficient levels of sunlight to the proposed podium level communal amenity space which is a positive microclimate outcome for this block. • Layout options for the ramp access between the proposed Railway Avenue and Park West Avenue were discounted in favour of the current proposal which provides enhanced access between the proposed development and Park West/ Cherry Orchard Rail Station.
Biodiversity	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as biodiversity is concerned
Land and Soils	• None of the alternative layouts or designs had significantly difference effects to the proposed development insofar as Land and Soils are concerned.
Water	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as impacts on groundwater or surface water are concerned
Air and Climate	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as Air and Climate are concerned
Noise and Vibration	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as Noise and Vibration are concerned
Material Assets: Built Services	• None of the alternative layouts or designs had significantly different effects to the proposed development insofar as Material Assets: Built Services are concerned
Material Assets: Transportation	• The layout options considered included alternatives for greater parking provision at street level and within basements. These alternatives were not favoured due to their effects on the road network and variance with the current policy objectives for promotion of public transport, pedestrian and cycle modes.
Material Assets: Resource and Waste Management	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as Resource and Waste Management is concerned

Cultural Heritage	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as Cultural Heritage is concerned.
Landscape	• A number of alternative proposals for the design and materials and finishes to tower element on Block A were considered but were deemed to have a greater impact on the wider area in terms of visual impacts.

3.6.3 Alternative Processes

This is an urban residential development and therefore the consideration of alternative processes relates to the methods of construction to be used in the development. The alternatives have been considered and the Outline Construction Management Plan (OCMP) details the construction processes likely to be employed and which have been assumed for the purposes of this EIAR.

3.6.4 Conclusion on Assessment of Alternatives

On the basis of the foregoing, it is considered that all reasonable alternatives to the project are considered and no alternatives have been overlooked which would significantly reduce or further minimise environmental effects.

Having considered all alternatives, the final design chosen by the developer, i.e. the project as now submitted for consideration, is deemed to be the most suitable project for the site.

4. POPULATION AND HUMAN HEALTH

4.1 INTRODUCTION

This chapter was prepared by John Murphy BA MRUP MIPI of BMA Planning and addresses impacts on 'Population and Human Health' as required under the 2014 EIA Directive. Refer to Table 1.1 for details on relevant qualifications and experience.

Impacts on population include impacts on the social and economic environment arising from the development such as impacts on population change, demographic trends, employment and economic activity, implications for land use patterns and, impacts on social and community infrastructure.

According to European Commission's *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report* (2017), human health would relate to matters such as release of toxic substances, health risks arising from major hazards, changes in disease vectors, changes in living conditions, effects on vulnerable groups and exposure to traffic noise or air pollutants. These could impact on workers on the project or the local population.

The Environmental Protection Agency (EPA) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* - Draft (2017) acknowledge that *"..the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc."* (EPA, 2017, Section 3, page 29).

In this regard, potential impacts of this project on population and human health are also addressed in the following Chapters of this EIAR: -

- Air Quality and Climate (Chapter 8)
- Noise and Vibration (Chapter 9)
- Material Assets: Transportation (Chapter 11)
- Landscape (Chapter 14)

4.2 ASSESSMENT METHODOLOGY

4.2.1 Site Visit

A site visit was undertaken on 8th June 2020 as part of this assessment and a further site visit was undertaken on 20th August 2021. The application site and surroundings were visited to examine the receiving environment insofar as people and communities are concerned and, in particular, to identify the people most likely to be affected by the project.

4.2.2 Desktop Assessment

The study area was identified and the nearest sensitive receptors were identified.

The presentation of the receiving environment is based on site visits and a desk-based study. The study area profile is based on official Census data by the Central Statistics Office (CSO) (www.cso.ie). Ordnance Survey maps and aerial photography were examined and the policy sources referred to in Chapter 3 were also consulted.

Existing social and community infrastructure in the vicinity is identified and the nearest sensitive receptors (individual or grouped) are listed to assist in the identification of people and communities who would be most affected by the project.

Based on this baseline presentation of the receiving environment, the likely significant adverse impacts on population and human health were considered and are presented under the following headings: -

- Land Use
- Population
- Employment and Economic Activity
- Human Health

Mitigation and Monitoring Measures are proposed in respect of the above topics where appropriate.

The impact assessment section of this chapter follows the terminology (where applicable) used in the EPA Guidelines as set out in Chapter 1 of this EIAR. While perceptions of project can be somewhat subjective, it is considered that the impacts presented are broadly representative of the impacts on the population within the study area.

4.2.3 Consultation

The proposed project has been the subject of a process of consultation with Dublin City Council and An Bord Pleanala as set out in the Strategic Housing Development legislation. The issues and opinions expressed in the consultations were taken and included in the design process.

4.3 RECEIVING ENVIRONMENT

4.3.1 Study Area Profile

The principal study area has been determined as the project site (i.e. all areas within the planning application boundary for the project).

A wider study area is examined in the context of the baseline environment, and with regard to the potential for significant effects on population and human health.

The site is located within the Cherry Orchard C Electoral Division (ED). The project study area for the purposes of this assessment is therefore considered to be the Cherry Orchard C Electoral Division (ED). The baseline environment of the study area is set against the Dublin City Administrative area to provide a context within trends which can be examined.

Figure 4.1 identifies the site in the context of these Electoral Areas.

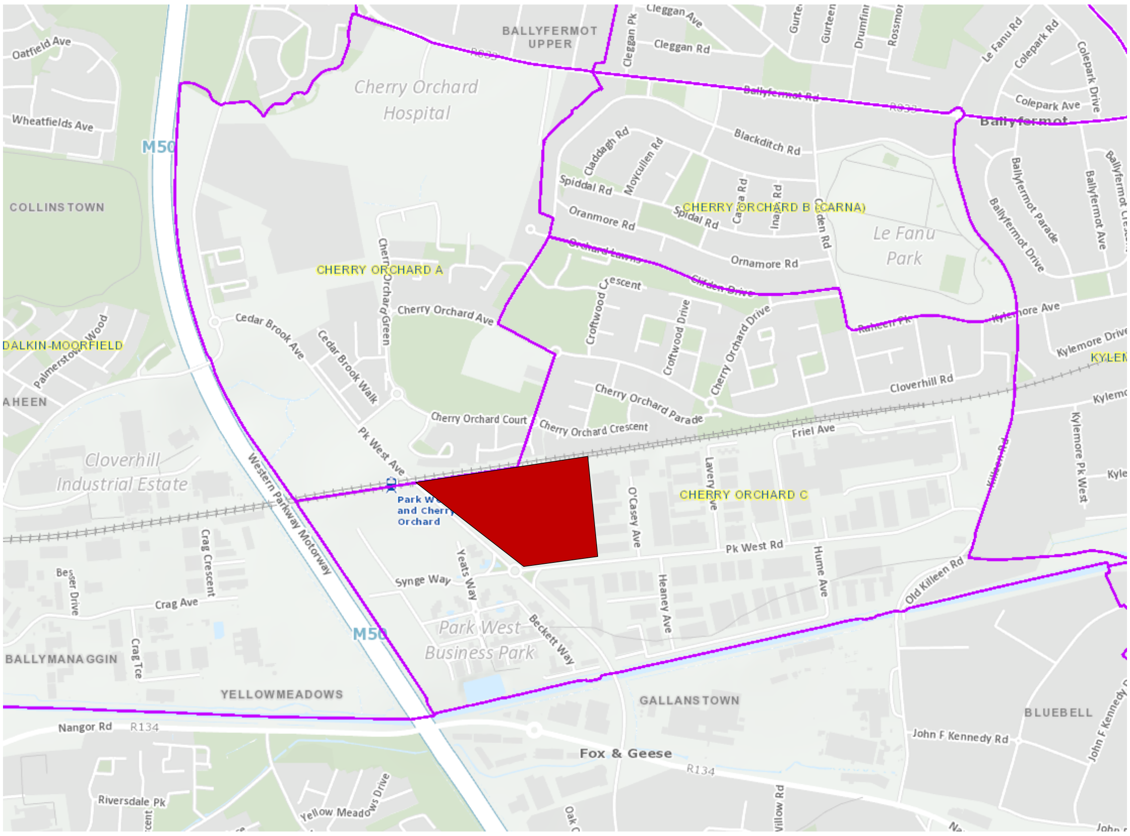

Figure 4.1 Application Site within Cherry Orchard C ED

4.3.2 Population

In 2016, the population of the Dublin City Administrative area was recorded as being 554,554 persons. This represents a population increase of 5.1% in the last inter-censal period from 2011 to 2016.

The 2016 Census results indicate that the total population of the Cherry Orchard ED was 4,545 in 2016. This represents a 0.13% decrease in population between 2011 and 2016. Since 2006, the population has increased by 18%. This population increase reflects the completion and occupation of the existing residential communities to the west of the current application site and Park West Avenue.

The population trends suggest that Park West is an area that is has stabilised in terms of population growth with low levels of growth to a slight reduction in population relative to wider County administrative area which continues to experience population growth.

Table 4.1: Population Profile (Source: Pobal Maps, 2020).				
ED Name	ED ID	Total Population 2006	Total Population 2011	Total Population 2016
Cherry Orchard C	2097	3855	4551	4545
Dublin City		506233	527612	554554

4.3.3 Demographic Profile

Within the ED, a further breakdown is available into Small Area (SA) divisions. These allow further refinement of the study area to focus on lands to the immediate context for the subject site. The SA divisions included in the study area are located south of the rail line and include the Park West apartment developments (SA ID codes 268040004, 268040003/01), Park West Business Park, Park West Industrial estate and the subject lands (SA ID code 268040005).

- There are 1,485 households within the ED, with approximately one third in the SA divisions. The households in the SA divisions are concentrated along the eastern edge of the M50 and include the apartment developments at this location. North of the railway line, the housing type is predominantly terraced two storey dwelling houses including the housing estates of Cherry Orchard Crescent and Cherry Orchard Parade.

- Within the Cherry Orchard C ED, 29% of the population is between the ages of 25 – 40. This is consistent with 31% for Dublin City. The figure is significantly higher in the SA divisions at 50%.

- The 0-19 age cohort for the ED is 30%. It is lower in the SA divisions at 22%, which is consistent with 24% for Dublin City. At the other end of the age pyramid, 6.5% of the ED population is 65 and over. It is lower in the SA divisions at 3%. The rate for Dublin City is 14%.

- There is a significant difference between the unemployment rates and deprivation indices for the SA divisions north and south of the rail line with the rate of unemployment (male) at 46% and *disadvantaged* to *very disadvantaged* noted for Cherry Orchard Crescent and Cherry Orchard Parade north of the rail line. The rate of unemployment (male) for the southern SA's, including the Park West apartments, is c. 7%. Two of the SA divisions are classified as *affluent* areas, with the SA adjoining the M50 *marginally above average.*

4.3.4 Land Use and Receptors

The EPA Advice Notes (2015) identify receptors as neighbouring landowners, local communities and other parties which are likely to be directly affected by the project.

The site is currently undeveloped except for the existing Aspect Hotel which is located centrally on the western boundary of the site. (Refer to the description of the site and its context in Chapter 3).

The sensitive population receptors in the area are the communities and properties identified below, and geographically presented on Figure 4.2:-

Residential	R1	Residential estates north of the railway line including Barnville Park, Cherry Orchard Court, Cherry Orchard Grove, Cherry Orchard Crescent, Cherry Orchard Park, Cherry Orchard Parade, Cherry Orchard Way and Cherry Orchard Avenue.
	R2	Park West Apartments to the west
Industrial / Employment	R3	Park West Industrial Park - Industrial uses to the east
	R4	Park West Business Park - Mixed use buildings to the south.
Other	R5	Aspect Hotel
	R6	St Ultan's Primary School and Childcare Centre and Cherry Orchard Community Centre
	R7	Cherry Orchard Park including playground and Orchard Celtic Football Club

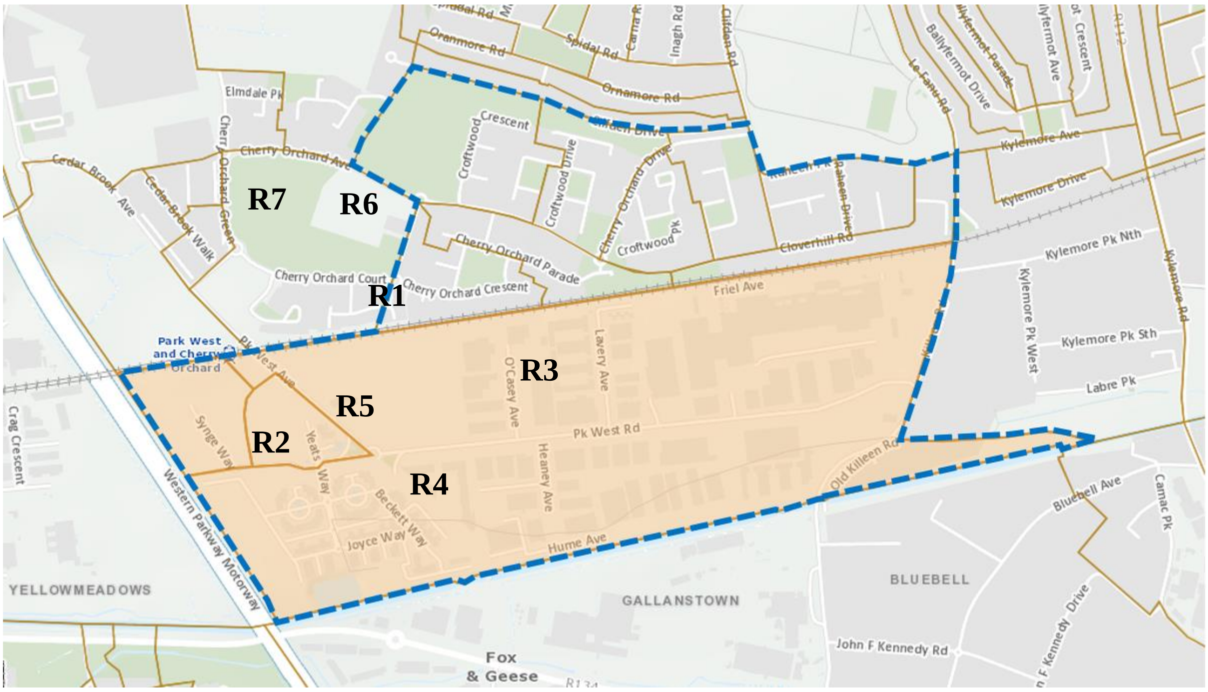

Figure 4.2 Study Area in the context of the site (outlined red), the Cherry Orchard C Electoral Area is outlined in blue, with the Small Areas highlighted orange.

4.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The project is described in Chapter 3. The following elements are relevant to the assessment of effects in this Chapter.

The characteristics of the development are typical of any new residential development in an existing urban context.

The development will involve the construction of 750no. new residential units comprising apartments. This will convert the lands to residential use and transform the receiving residential environment into a modern residential space.

There is also an element of non-residential development proposed including a mix of retail, café/ bar, creche, and community uses.

There is a large public open space proposed as part of the development with a MUGA space. The ancillary infrastructure associated with the development comprises of roads, cycle and pedestrian connections.

4.5 CONSTRUCTION IMPACTS

The main likely significant effects of the project are as follows: -

4.5.1 Land Use

The site will be hoarded off and inaccessible to the public. Construction activities will be generally confined to the site. Some level of construction activity is likely over a period of up to 6 - 7 years. Movements by the general public (vehicular, cycle or pedestrian) through the site will be affected during the construction phase resulting in a moderate short term negative impact. Access to existing residential, commercial and industrial properties in Park West will be maintained and so no major disruption to these properties is expected.

4.5.2 Population Change and Demographic Trends

Some increase in population may arise during the construction period related to construction workers seeking accommodation. However, the impacts in relation to population at the construction phase will be short term in nature and not significant.

4.5.3 Economy

The construction phase of the project will provide for the employment of a substantial number of construction workers over the construction programme. This will be a significant positive short-term impact in terms of employment and further indirect multiplier effects to the wider economy.

4.5.4 Human Health

The construction phase of the project will cause a certain amount of loss of amenity, disruption, nuisance and inconvenience to the local community, particularly the residents who are located closest to the project including receptors at R1, R2, R4 and R5. Potential effects on human health arising during the construction phase of the project relate generally to quality of life including air quality, climate, noise, water and hydrology, resource and waste management, potential disruption of services and the risk of major accidents/disasters. While the assessment of effects relating to each of these environmental factors are dealt with separately elsewhere in this EIAR (Refer to Chapters 7-10), this section provides a summary as to how these effects have the potential to give rise to human health effects.

- Traffic - The level of construction generated traffic is not expected to be significant. As outlined in Chapter 10, Materials Assets: Transportation, proposed access routes will keep trucks to an established HGV route, minimising their impact on residential areas. The potential disturbance is likely to result in a slight negative short term impact on the local population.

- Water - As outlined in Chapter 7, Water, the construction phase of the project has the potential to alter the water quality and hydrological regime temporarily in the study area. Any effect on water quality has the potential to give rise to human health effects. Leaks from the waste may contaminate soils and water streams, and produce air pollution through contamination, creating health hazards. Subject to adherence to best practice construction measures, such impacts are not considered to be likely or significant in this instance.

- Air Quality - As outlined in Chapter 8, Air Quality, the construction phase of the project has the potential to give rise to dust emissions from construction traffic, building demolition, excavation works, piling etc. Poor air quality has the potential to affect human health by increasing the risk of asthma and other respiratory diseases. There is therefore potential for short term air quality effects during construction to affect human health. Best practice mitigation measures for construction activities are proposed to ensure adverse air quality impacts are minimised. The likely impact will be negative, short-term and imperceptible. Monitoring of air quality shall be carried out for the duration of the construction phase in accordance with the Chapter 8 recommendations.

- Noise - The most common effects of excessive noise on people include annoyance, sleep disruption, health problems to vulnerable persons and general quality of life problems. As outlined in Chapter 9, Noise and Vibration, the assessment has determined that, during the construction phase, noise and vibration emissions will be temporary and transient. The receptors affected will vary depending on the phase of development and the works being undertaken within close proximity. With the mitigation measures in place, and by complying with all relevant guidance, the overall impact will be short-term and slight. Monitoring of noise shall be carried out for the duration of the construction phase in accordance with the Chapter 9 recommendations

- Waste – Waste generated during the construction phase of the project will be segregated at source and disposed of appropriately. No potential effects on human health are therefore likely if waste is managed correctly. Measure to address vermin and pest control shall be included in the Contractors CEMP.

- Accidents – The construction of any project of this nature has potential to give rise to unplanned events or accidents, including fire, which impact on health and safety of human beings if such activities are not managed appropriately. Subject to adherence to best practice construction measures, such impacts are not considered to be likely or significant in this instance. A 'worst-case' scenario resulting from the construction of the development would be an accident leading to serious injury or death to a worker. However, the mitigation measures outlined should ensure that this should not occur.

- Other - The population will be also be affected by impacts associated with traffic disruption, utility and services disruptions and visual impacts. These effects are considered in the relevant chapters of this EIAR (namely Chapters 10 – Materials Assets: Built Services, 11 – Materials Assets: Transportation and 14 – Landscape) and mitigation measures proposed to reduce the significance.

- Aviation **–** Cranes operating during the construction phase will not be of sufficient height to impact directly on aviation, however, lighting has the potential to impact on aviation if not properly installed and site the developer should notify and consult with the Irish Aviation Authority as a precaution prior to cranes being erected on the site.

The level of disturbance and impacts to human health are predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently and properly managed having regard to neighbouring activities. These negative impacts will be, cumulatively, significant but short term. Measures to address such human health considerations will be mitigated through the implementation of a Contractor's Construction and Environmental Management Plan (CEMP) and will be subject to Regulations and the relevant Health and Safety codes – see Mitigation Measure PPH-C1 below.

4.5.5 Mitigation – Construction Phase

PPH-C1	**Construction and Environmental Management Plan (CEMP)-** In order to mitigate potential temporary community disturbance during construction, a Construction Management Plan (OCMP) has been prepared and is included with the application. If the project is approved and implemented, the appointed contractor will incorporate the environmental commitments contained in this EIAR and prepare a Construction and Environment Management Plan (CEMP) for the agreement of the Planning Authority prior to development commencing on site.
PPH-C2	**Liaison Officer** - The contractor(s) will appoint a liaison officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the Contractor(s) CEMP prepared prior to construction commencing.
PPH-C3	**Working Hours -** Typically, construction working hours will be limited to 7.00 – 19.00 Monday to Friday and 8.00 to 14.00 on Saturday. It is anticipated that there will be times, due to exceptional circumstances, that construction work will be necessary outside these standard hours i.e. large concrete pours. Deviations from these standard times will be agreed in advance with the Planning Authority.
PPH-C4	Prior to the erection of cranes on the site the developer shall notify and consult with the Irish Aviation Authority.

4.5.6 Monitoring

No monitoring measures are proposed with respect to population and human health.

4.6 OPERATIONAL IMPACTS

The main areas of impact are as follows: -

4.6.1 Land Use

The project will deliver a new residential community with supporting land uses which will change the character of the existing landscape. This project may also act as a catalyst for further development / investment in the area and there is likely to be a positive impact on existing property and land values in the area. This change is consistent with planning policy and is a long-term positive effect.

4.6.2 Population

The residential population of the proposed housing units will be in the order of c.1,800 people. The impact on the population is considered to be a long term significant positive effect insofar as it reflects the emerging trend in the wider area. New residential units will contribute to the delivery of a critical mass of population which will support a wide range of additional local businesses, services, transport infrastructure and employment opportunities.

4.6.3 Economy

The project will have a slight to moderate positive impact on the local economy through the direct employment in the retail and community units and indirectly in relation to support services to the new residential population. The increased population will also have an indirect positive impact on the local economy through its spending power.

4.6.4 Amenity and Human Health

For the future residents, the living environment was carefully considered in the design process to ensure a high quality scheme was designed in accordance with the relevant codes and guidance. The scheme meets all quantitative standards and the qualitative aspects of the scheme are demonstrated in the Housing Quality Assessment and other supporting documents submitted with the planning application such as the Daylight Sunlight and Shadow Assessment Report and Wind Micro-Climate Assessment. The iterative design process has included introduction of design mitigation measures to improve the quality of residential units. The overall impact is considered to be neutral/ positive.

The main impacts on human health, associated with air quality, noise, traffic and transportation and landscape, are considered elsewhere in this EIAR (Chapters 8 - Air and Climate, 9 - Noise and Vibration, 11 - Materials Assets: Transportation and 14 – The Landscape including mitigation measures). This section provides a summary as to how these effects have the potential to give rise to human health effects:-

- Traffic - As outlined in Chapter 10, Materials Assets: Transportation, the level of traffic generated by the proposed development will not be significant. The impact will be neutral and slight or imperceptible.

- Noise - As outlined in Chapter 9, Noise and Vibration, operational noise levels will be managed to achieve the relevant noise limit values. The impacts, therefore, on human health will be neutral for the life of the development.
- Air Quality - As outlined in Chapter 8, the operational phase of the project will not generate air emissions that would have an adverse impact on local ambient air quality or local human health.

- Water - As outlined in Chapter 7, Water, the proposed development will connect to existing public water infrastructure in the area and will not give rise to any significant impacts on ground water.

- Landscape - As outlined in Chapter 14, The Landscape, the proposed landscaping and open space proposals have a potential positive impact on health in the new population. The impact of the insertion of the proposed development into the existing urban setting of the development is also addressed with reference to key views from the wider area. When taken in the context of current planning policies, the proposed impact is considered to be neutral / positive.

- Waste – No likely significant impacts on human health are predicted for the operational phase of the project. As outlined in Chapter 12, Material Assets: Resource and Waste Management, the residents and non-residential users will be provided with suitable waste management facilities to safely dispose of their recycling and waste materials.

- Accidents – The risk of accidents / unplanned events is addressed through the Building Regulations (Fire Safety) and is therefore addressed through primary mitigation in the design process. Residual risks of fire and road traffic accidents will be managed by emergency services as per their standard procedures.

- Aviation - The highest building on the site is 15 storeys. Under the Standardised European rules of the Air (SERA), it is not permissible to fly over built up areas at a height of less than 1000ft (approx. 304 metres). The proposed development does not impact on the standardised approaches\departures to Dublin airport, Casement aerodrome or Westin Airport. The proposed development does not impact on any of the Dublin hospitals where a helipad is used. Therefore, there are no long-term impacts on aviation as a result of the development.

Subject to implementation of the mitigation measures, the cumulative negative impacts of the development during the operational phase are typical of any urban development and are considered to be slight to moderate long term. The effects are in keeping with those expected for urban area as promoted in the Dublin City Development Plan and the other planning sources described in Chapter 2.

4.6.5 Mitigation

Mitigation measures relating to those factors under which population and human health effects might occur have been addressed elsewhere in this EIAR, under the relevant environmental factors. Other than the mitigation measures outlined these Chapters, no further mitigation measures have been proposed with respect to population and human health for the operational phase.

4.6.6 Monitoring

No monitoring measures are proposed with respect to population and human health.

4.7 RESIDUAL EFFECTS

Following the implementation of the mitigation measures outlined above, and elsewhere in this EIAR relating to human health, no significant negative residual effects are identified in respect of the project.

4.8 'DO-NOTHING' SCENARIO

In the event that the project does not proceed, the site would remain as it is currently in a brownfield state and an opportunity would be missed to consolidate and rejuvenate this inner suburban location in accordance with national, regional and local planning policy guidance.

4.9 WORST CASE SCENARIO

In the worst case scenario the site would remain undeveloped and in an under utilised state or the development would commence but not be completed.

4.10 INTERACTIONS

Population and Human Health interactions are primarily linked to the environmental factors listed below. These interactions, and the impacts being considered, are identified in the relevant Chapters.

- Air Quality and Climate (Chapter 8)
- Noise and Vibration (Chapter 9)
- Material Assets: Transportation (Chapter 11)
- Landscape (Chapter 14)

References

- Census (2016) www.cso.ie (Date Accessed on 14th February 2020)
- Department of Defence, Irish Defence Forces and The Government of Ireland (2020) '*Defence Forces Built Infrastructure Programme 2020 – 2025'*
- Dublin City Council (2016) *Dublin City Development Plan 2016-2022*
- European Commission (2017) *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report*
- Pobal (2020) https://maps.pobal.ie/ (Date Accessed on 14th February 2020)
- IAIP (Integrated Aeronautical Information Package), dated 22nd April 2021

5 BIODIVERSITY

5.1 INTRODUCTION

This section of the Environmental Impact Assessment Report (EIAR) was carried out by Altemar Ltd. It assesses the biodiversity value of the proposed development area and the potential impacts of the development on the ecology of the surrounding area and within the potential zone of influence (ZOI). Standard construction and operational phase control measures, in addition to monitoring measures are proposed to minimise potential impacts and to improve the biodiversity potential of the proposed development site. However, it is important to note that none of the measures proposed are necessary for the protection of Natura 2000 sites or their conservation objectives. These are standard measures to comply with legislation and in particular Water Pollution Acts.

Under the EIA Directive as well as best practice methodology from the EPA, the analysis of impacts to biodiversity is an essential component of the EIA process, and so is a required chapter in any EIAR.

Under Article 6(3) of the Habitats Directive an 'appropriate assessment' of projects must be carried out to determine if significant effects are likely to arise to the integrity of Natura 2000 sites. An Appropriate Assessment Screening Report has been prepared as a separate stand-alone report with this planning application. This concluded that the likelihood of significant effects can be excluded.

5.1.1 Background to Altemar

Altemar Ltd. is an established environmental consultancy that is based in Greystones, Co. Wicklow that has been in operating in Ireland since 2001. Bryan Deegan MCIEEM is the Managing Director of Altemar Ltd. and holds a M.Sc. Environmental Science, BSc (Hons.) in Applied Marine Biology and a National Diploma in Applied Aquatic Science. He has over 26 years' experience as an environmental consultant in Ireland and was the ecologist for all aspects of this project. Previous projects where Altemar were the lead project ecologists include the Lidl Ireland GmbH regional distribution centres in Newbridge and Mullingar, 18 airside projects for daa at Dublin Airport and 7 fibre optic cable landfalls in Ireland including the New York to Killala cable project in 2015.

5.2 ASSESSMENT METHODOLOGY

This chapter has been prepared having regard to the following guidelines;

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018)
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (EPA, 2017)

A pre-survey biodiversity data search was carried out. This included examining records and data from the National Parks and Wildlife Service (NPWS), National Biological Data Centre (NBDC) and the Environmental Protection Agency (EPA), in addition to aerial, 6 inch maps and satellite imagery. A habitat survey of the site was undertaken within the appropriate seasonal timeframe for terrestrial fieldwork. Field surveys were carried out as outlined in Table 5.1. All surveys were carried out in the appropriate seasons.

5.2.1 Site Visit

Table 5.1 – Field Surveys

Area	Surveyors	Survey Dates
Terrestrial Ecology	Bryan Deegan (MCIEEM) of Altemar	10th September 2021
Badger / Mammal Survey	Bryan Deegan (MCIEEM) of Altemar	5th December 2021
Bat Fauna	Bryan Deegan (MCIEEM) of Altemar	10th September 2021

Desk studies were carried out to obtain relevant existing biodiversity information within the ZOI. The assessment also extends beyond the immediate development area to include those species and habitats that are likely to be impacted upon by the proposed residential development. As outlined in the Engineering Services Report prepared by CS Consulting Group, it is proposed to attenuate surface water on-site before being discharged to an existing public surface water network located on Park West Road. This network outfalls to the River Camac, which in turn discharges to the marine environment at Dublin Bay. Foul wastewater will be directed to an existing public foul sewer located on Heaney Avenue, which in turn discharges to Ringsend WwTP for treatment. As such, out of an abundance of caution, it is considered that there is an indirect hydrological pathway to designated conservation sites located within Dublin Bay via the proposed foul and surface water drainage strategy.

Details of the proposed development are seen in Chapter 3 of this EIAR. The proposed layout, drainage strategy and landscape design were reviewed to inform this assessment. Further, Chapter 3, Description of Project and Alternatives, Chapter 6, Land and Soils, Chapter 7 Water, and Chapter 12 Material Assets: Resource and Waste Management of this submission were reviewed.

5.2.2 Proximity to designated conservation sites and habitats or species of conservation interest

The designated conservation sites within 15km of the proposed combined development site were examined for potential impact. Sites beyond 15km have no direct or indirect pathways or are across the marine environment where significant dilution, mixing and settlement would occur and given the scale of the proposed development, impacts on sites beyond 15km would be at negligible levels. This assessment included sites of international importance; Natura 2000 sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA)) and Ramsar sites and sites of National importance ((Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA). Up to date GIS data (2021 NPWS data shapefiles) were acquired and plotted against 1, 5, 10 and 15km buffers from the proposed development site. A data search of rare and threatened species within 10km of the proposed site (GIS shapefile) was provided by NPWS. Additional information on rare and threatened species was researched through the National Biodiversity Data Centre maps

5.2.3 Terrestrial and Avian Ecology

A pre-survey data search was carried out. This included a literature review to identify and collate relevant published information and ecological studies previously conducted and comprised of information from the following sources; the National Parks and Wildlife Service, NPWS Rare and Protected Species Database, National Biodiversity Data Centre, EPA WMS watercourses data, in addition to aerial, 6 inch, satellite imagery. Following the desktop study, walk-over assessments of the site were carried out on the 10th September 2021. Surveys were carried out by means of a thorough search within the potential ZOI. The presence of mammals is indicated principally by their signs, such as resting areas, feeding signs or droppings - though direct observations are also occasionally made.

Habitat mapping was carried out according to Fossitt (2000) using AcrGIS 10.5 and displayed on Bing satellite imagery or street mapping based on the 10th September 2021 site visit. Any rare or protected species or habitats were noted. As part of the fieldwork an invasive species assessment was carried out. Birds noted on site were classed based on the Birds of Conservation Concern in Ireland classification of red, amber and green, which is based on an assessment of the conservation status of all regularly occurring birds on the island of Ireland.

5.2.4 Bat Fauna

A bat detector and emergent survey that covered the entire application site was carried out on the 10th September 2021. There are no bat roosts on site and no trees of bat roosting potential.

5.2.5 Rating of Effects

The terminology for rating impacts is derived from the EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (2017).

5.2.6 Difficulties Encountered

No difficulties were encountered in relation to the preparation of the Biodiversity report. The bat survey was undertaken within the active bat period (April to September) and a detector survey was possible. The mammal survey was carried out inside the optimal period for survey in December 2021. Full coverage of the site was possible and no limiting factors are foreseen in relation to the survey dates.

5.3 RECEIVING ENVIRONMENT

5.3.1 Zone of Influence

The potential zone of influence (ZOI) was set at a radius of 2km from the proposed Project. It should be noted that where there was a potential for the ZOI to be influenced by drainage connections, natural biodiversity corridors e.g. rivers or woodland these were also take into account and the assessment was extended. As outlined in the Engineering Services Report prepared by CS Consulting Group, it is proposed to attenuate surface water on-site before being discharged to an existing public surface water network located on Park West Road. This network outfalls to the River Camac, which in turn discharges to the marine environment at Dublin Bay. Foul wastewater will be directed to an existing public foul sewer located on Heaney Avenue, which in turn discharges to Ringsend WwTP for treatment. As such, out of an abundance of caution, it is considered that there is an indirect hydrological pathway to designated conservation sites located within Dublin Bay (namely, South Dublin Bay SAC & pNHA, South Dublin Bay and River Tolka Estuary SPA, Sandymount Strand/Tolka Estuary Ramsar site, North Dublin Bay SAC & pNHA, North Bull Island SPA & Ramsar site) via the proposed foul and surface water drainage strategy. The potential ZOI extends beyond the site, with the potential for downstream impacts to extend beyond the proposed development area to the marine environment via the surface water/foul water network. The application site outline is shown in figure 5-1.

5.3.2 Designated Sites

As can be seen from Figures 5.2 (SAC's within 15km), 5.3 (SPA's within 15km), 5.4 (NHA and pNHA within 15km), 5.5 (Watercourses proximate to the site.), there are no Natura 2000 sites within 5km, and three National conservation sites (Grand Canal pNHA, Liffey Valley pNHA, and Royal Canal pNHA) within five km of the proposed development site. There are no Ramsar site within 5km of the proposed development site. The distance and details of the conservation sites within 15km of the proposed development are seen in Table 5.2a and Table 5.2b. Figures 5.6 – 5.11 demonstrate waterbodies proximate to the subject site and designated conservation sites with the potential for a hydrological pathway.

Table 5.1a – Natura 2000 sites within 15km (and outside 15km with potential for a pathway) of the proposed development

Natura 2000 Sites	Distance	Direct Hydrological / Biodiversity Connection
Special Areas of Conservation (SAC)		
Glenasmole Valley SAC	8 km	**No**
Rye Water Valley/Carton SAC	8.1 km	**No**
South Dublin Bay SAC	10.3 km	**No**
Wicklow Mountains SAC	10.4 km	**No**
North Dublin Bay SAC	12.7 km	**No**
Special Protection Areas (SPA)		
South Dublin Bay and River Tolka Estuary SPA	9.7 km	**No**
Wicklow Mountains SPA	11.3 km	**No**
North Bull Island	12.8 km	**No**

Table 5.2b – National designated sites and Ramsar sites within 15km (and outside 15km with potential for a pathway) of the proposed development

Designation	Conservation Sites	Distance	Direct Hydrological / Biodiversity Connection
pNHA	Grand Canal	0.2 km	**No**
pNHA	Liffey Valley	2.1 km	**No**
pNHA	Royal Canal	4.9 km	**No**
pNHA	Dodder Valley	5.3 km	**No**
pNHA	Lugmore Glen	7 km	**No**
pNHA	Glenasmole Valley	8 km	**No**
pNHA	Rye Water Valley/Carton	8.1 km	**No**
pNHA	Slade of Saggart and Crooksling Glen	8.9 km	**No**
pNHA	North Dublin Bay	9.4 km	**No**
pNHA	South Dublin Bay	10.3 km	**No**
pNHA	Santry Demesne	10.6 km	**No**
pNHA	Fitzsimon's Wood	11.2 km	**No**
pNHA	Booterstown Marsh	11.3 km	**No**
pNHA	Dolphins, Dublin Docks	11.4 km	**No**

pNHA	Kilteel Wood	14.6 km	**No**
Ramsar	Sandymount Strand/Tolka Estuary	10.3 km	**No**
Ramsar	North Bull Island	12.9 km	**No**

Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

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Figure 5.1 – Proposed Development Site Outline (red)

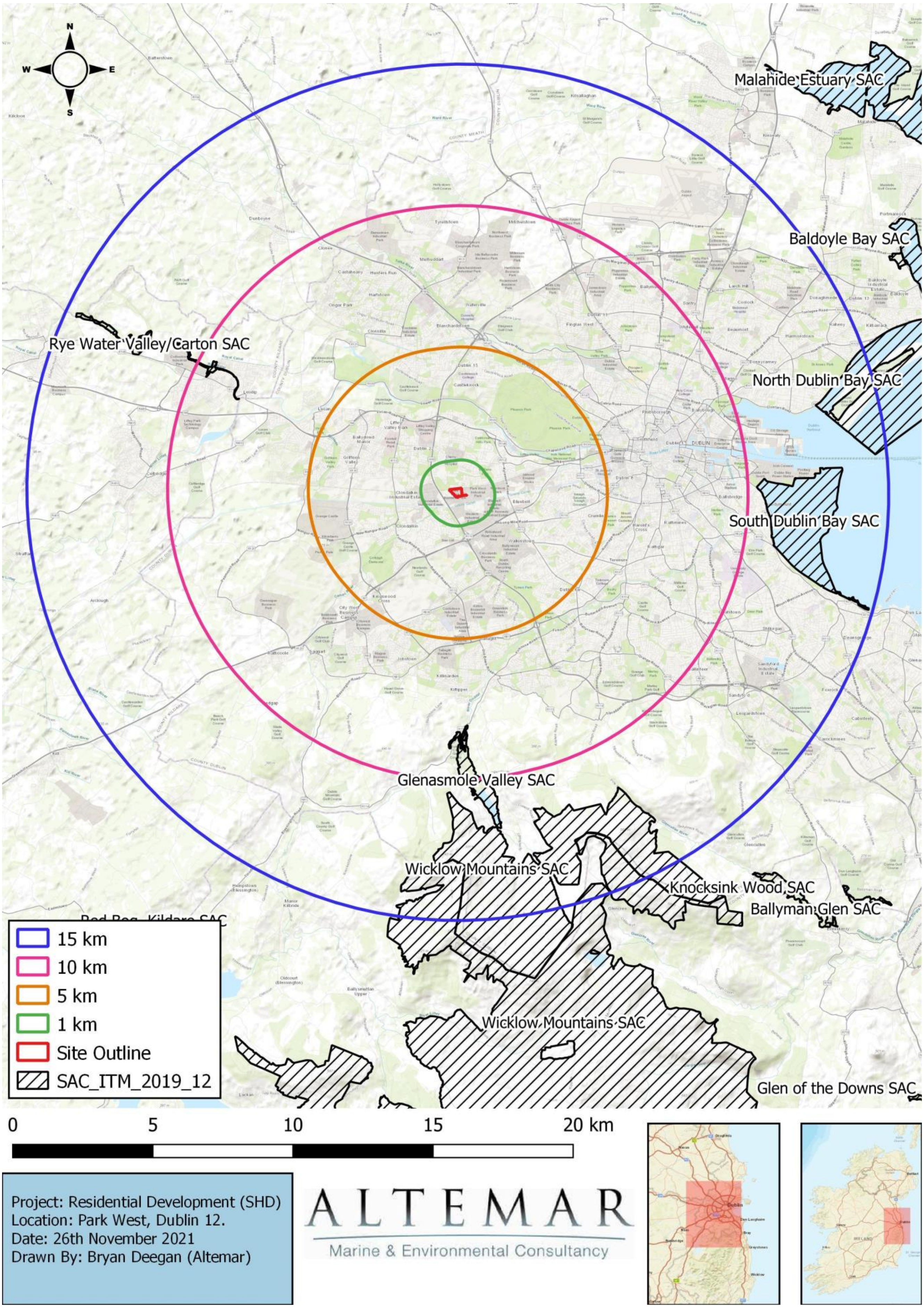


Figure 5.2 – Special Areas of Conservation within 15km of the proposed development site

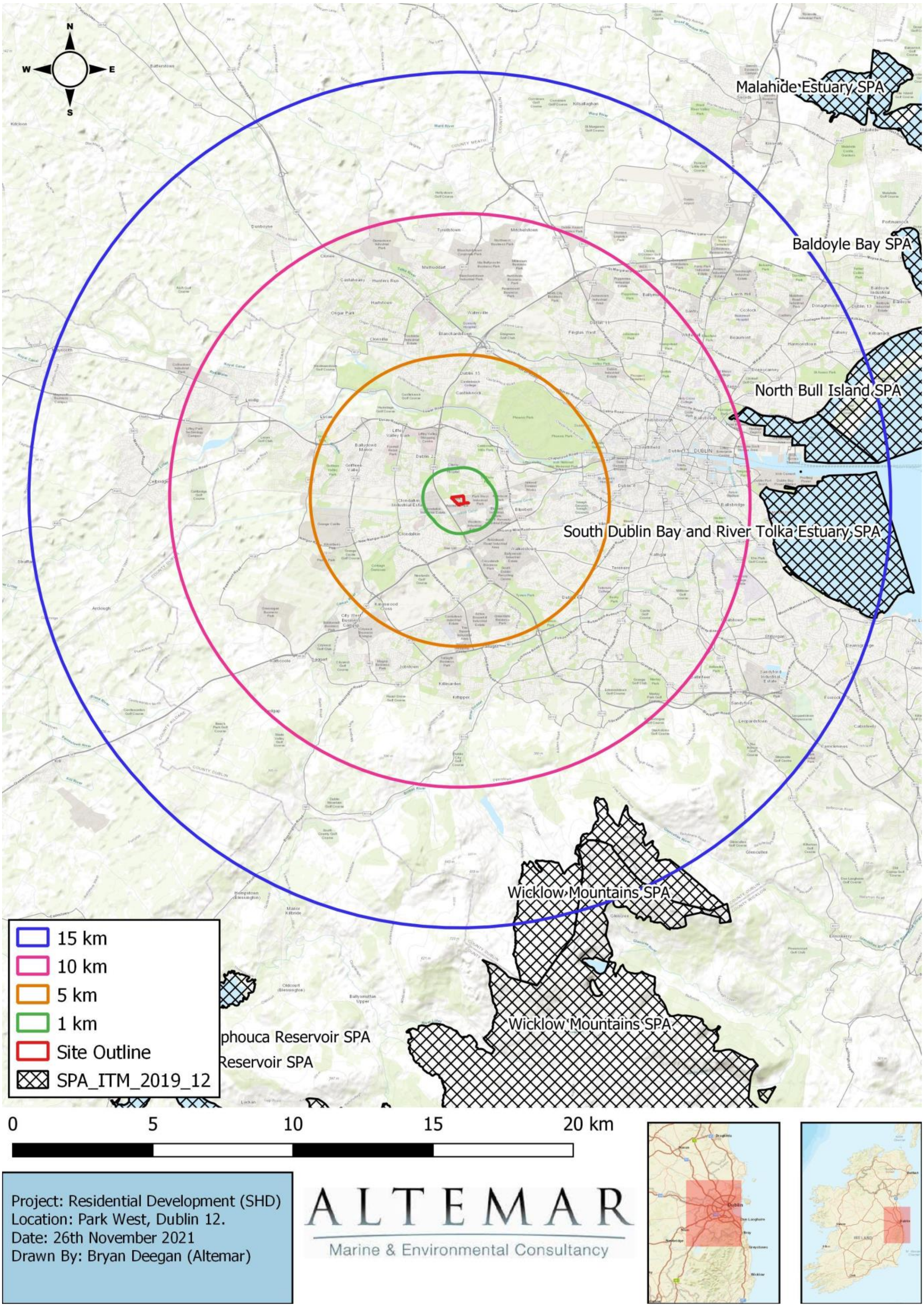
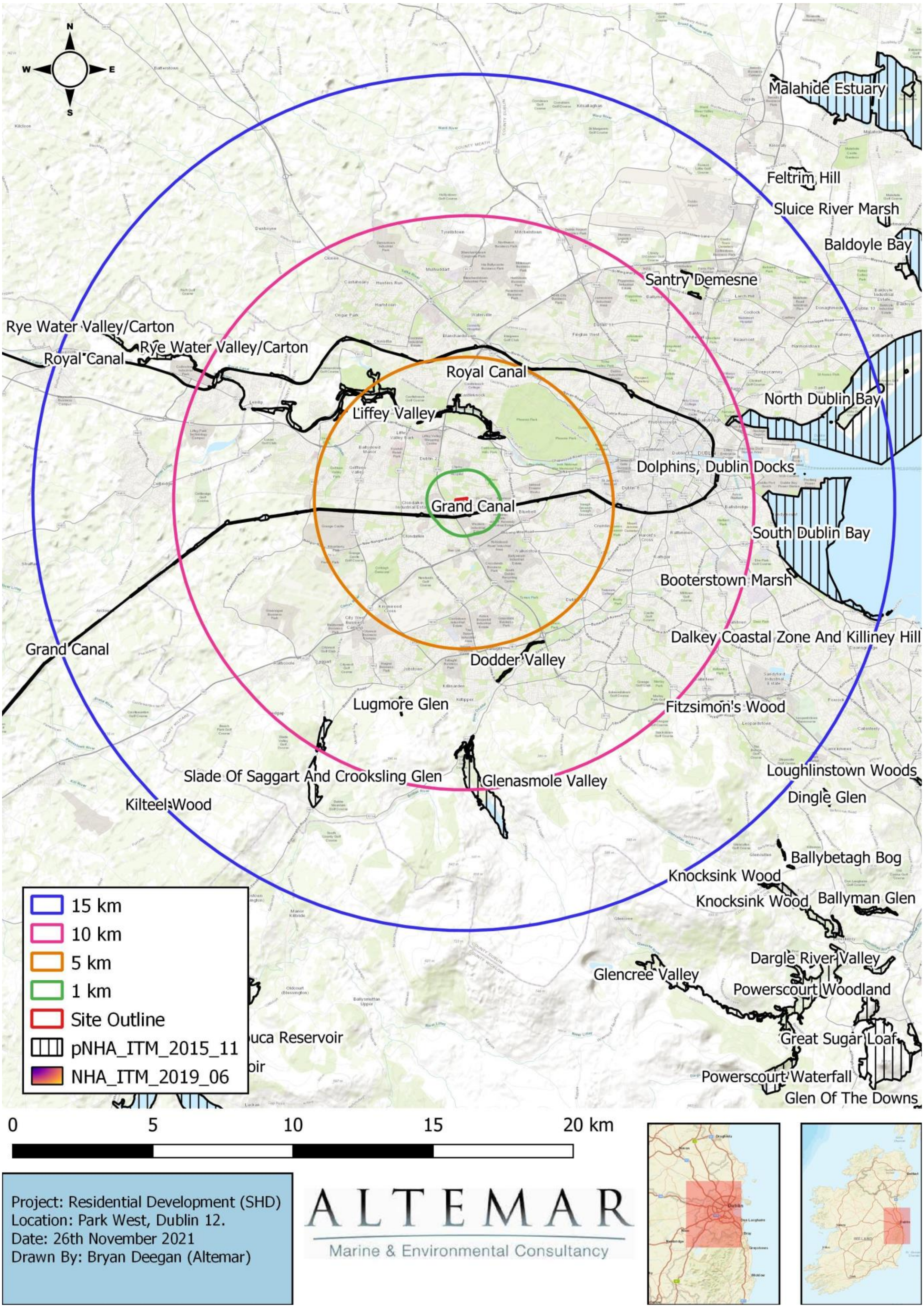


Figure 5.3 – Special Protection Areas within 15km of the proposed development site



Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

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Figure 5.4 – NHAs and pNHAs within 15km of the proposed development site

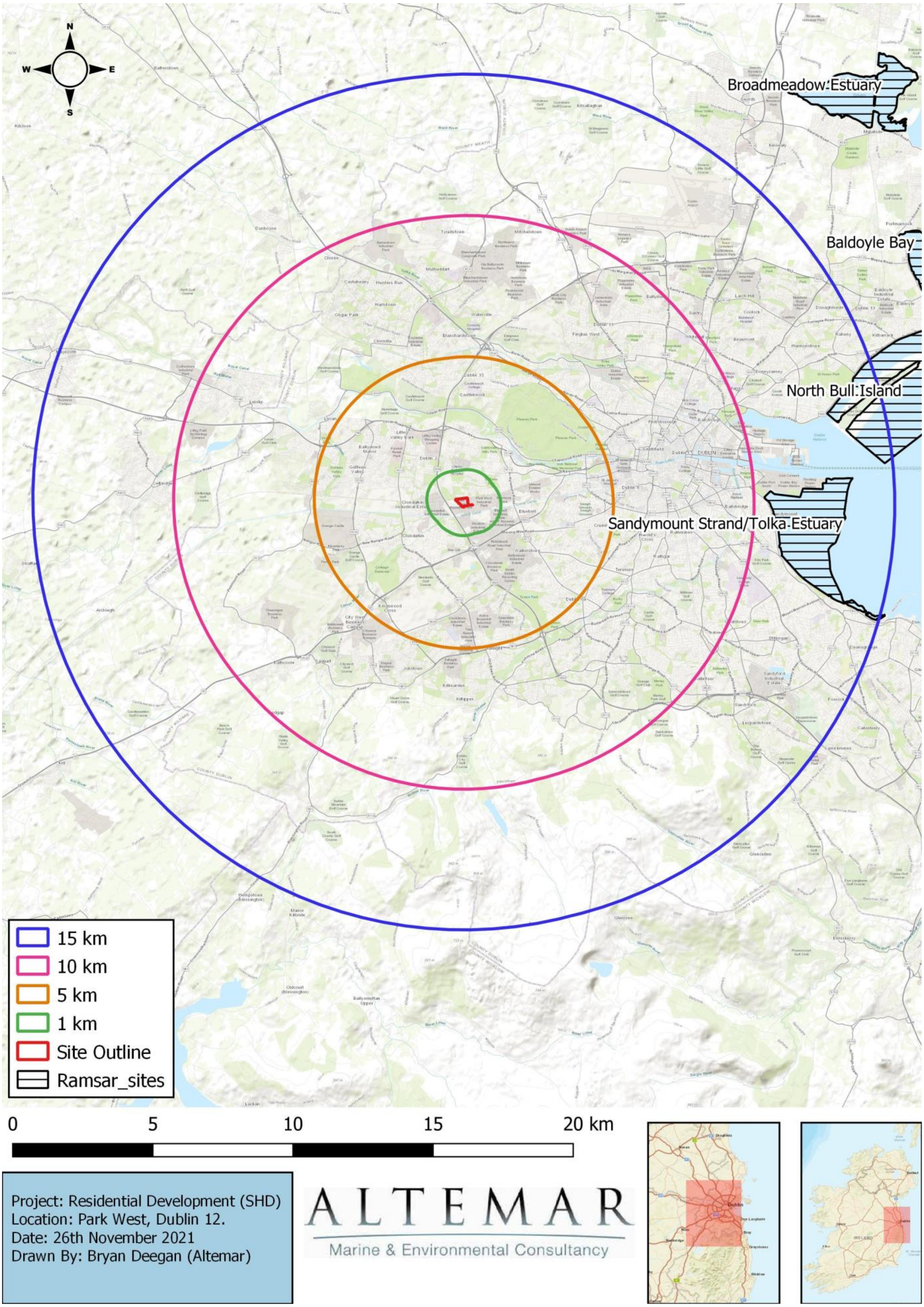
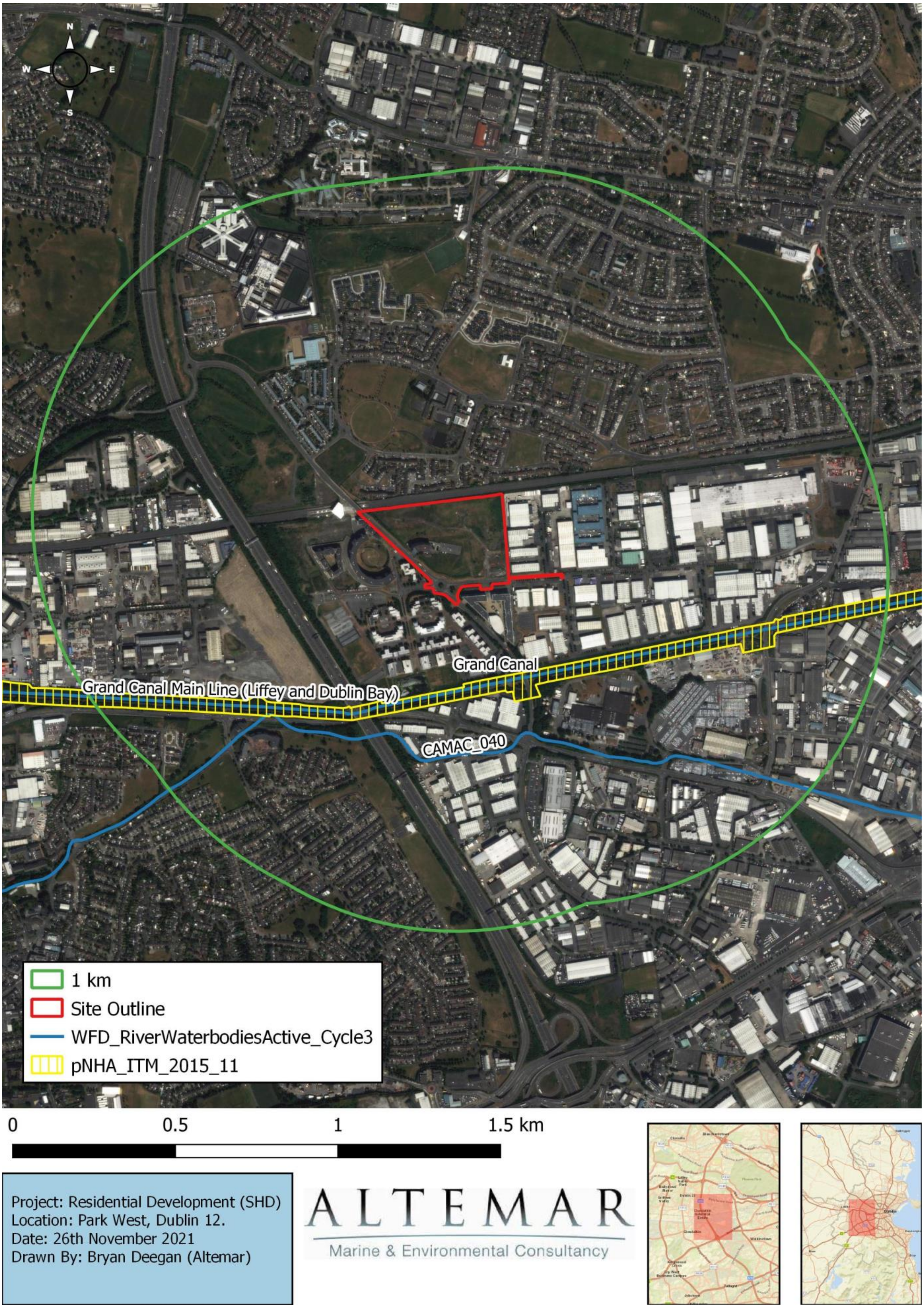


Figure 5.5 – Ramsar sites within 15km of the proposed development site

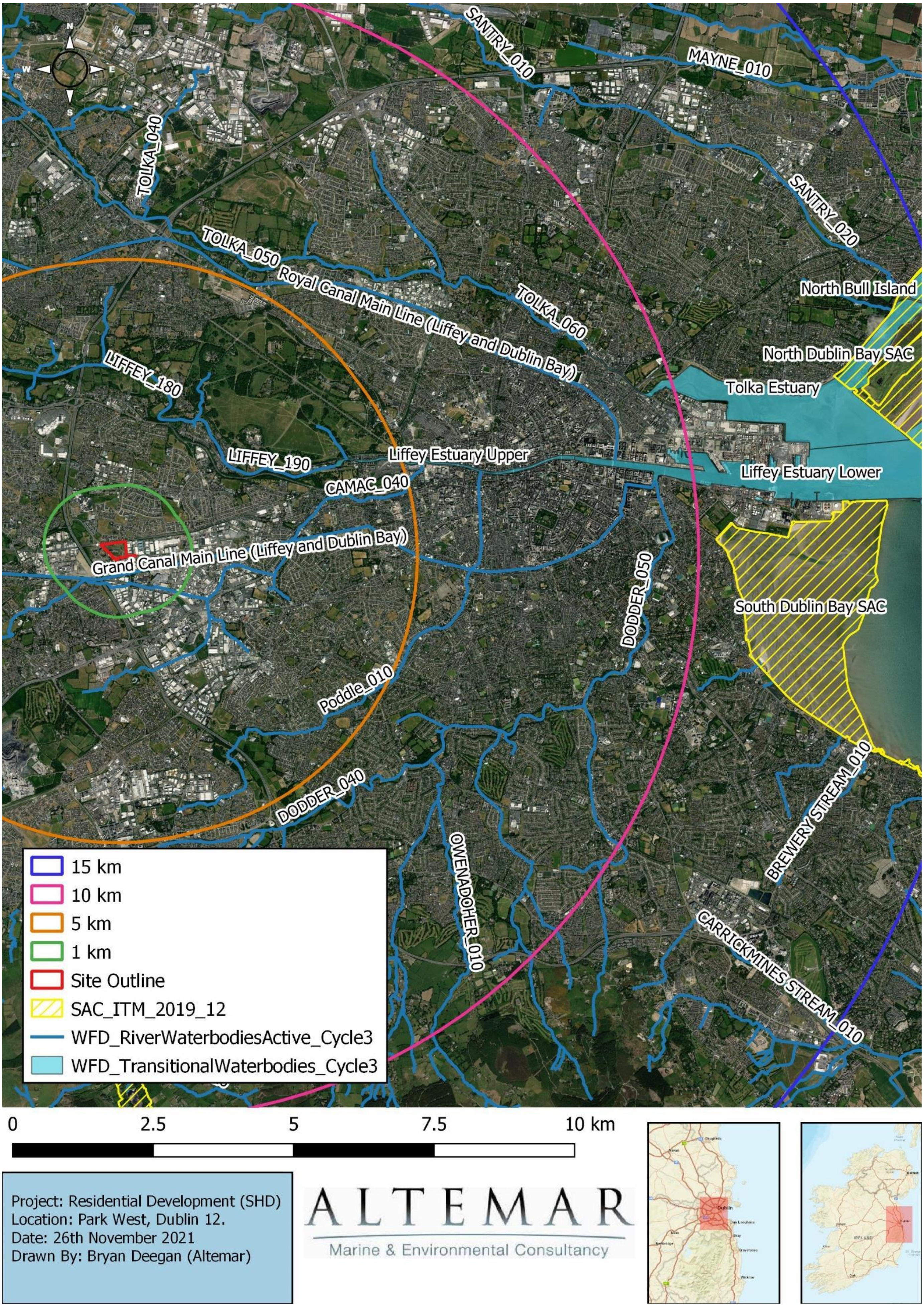
Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

Figure 5.6 – Waterbodies within 1km of the proposed development site



Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

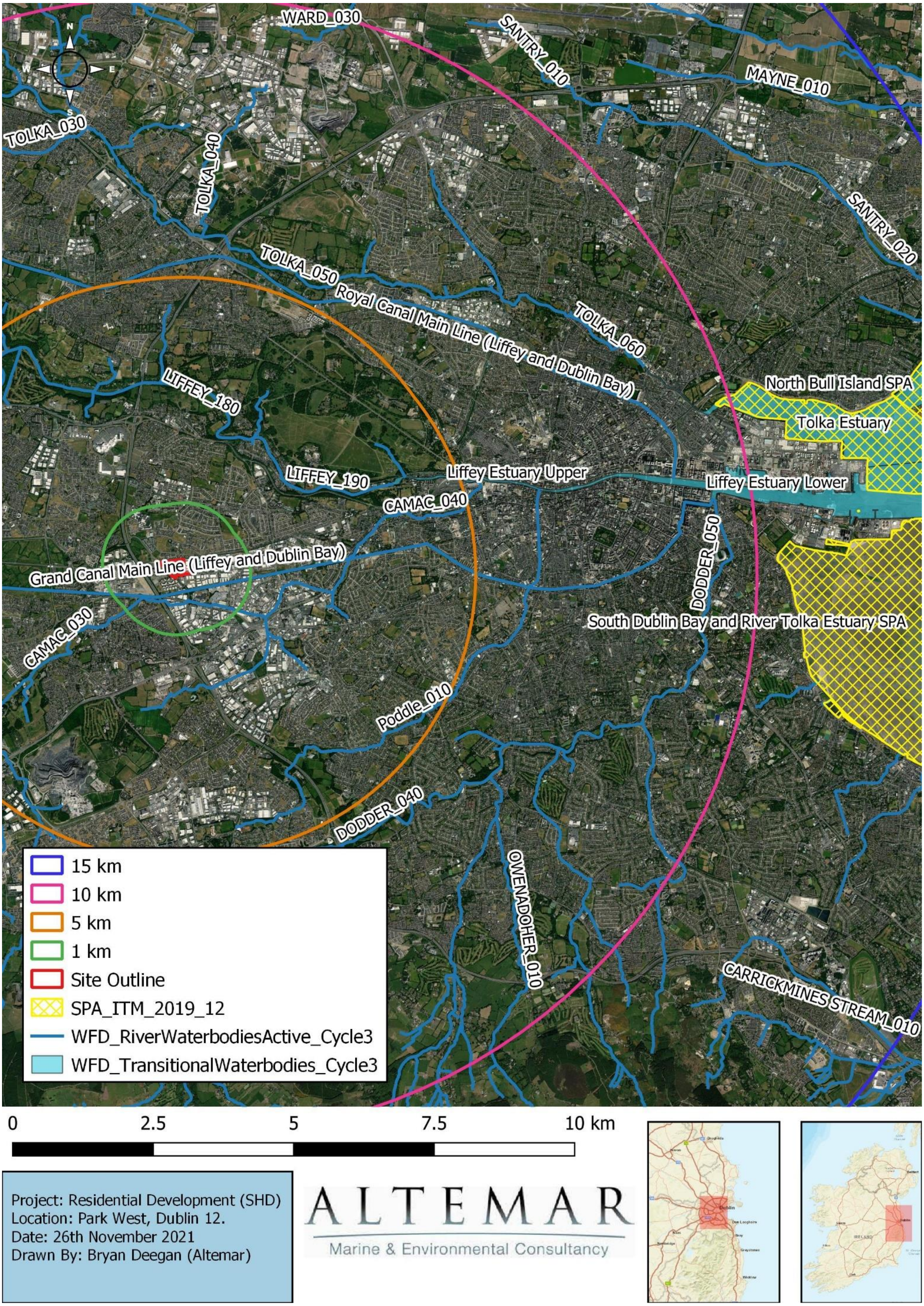
Figure 5.7 – Waterbodies and pNHAs within 1km of the proposed development site



Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

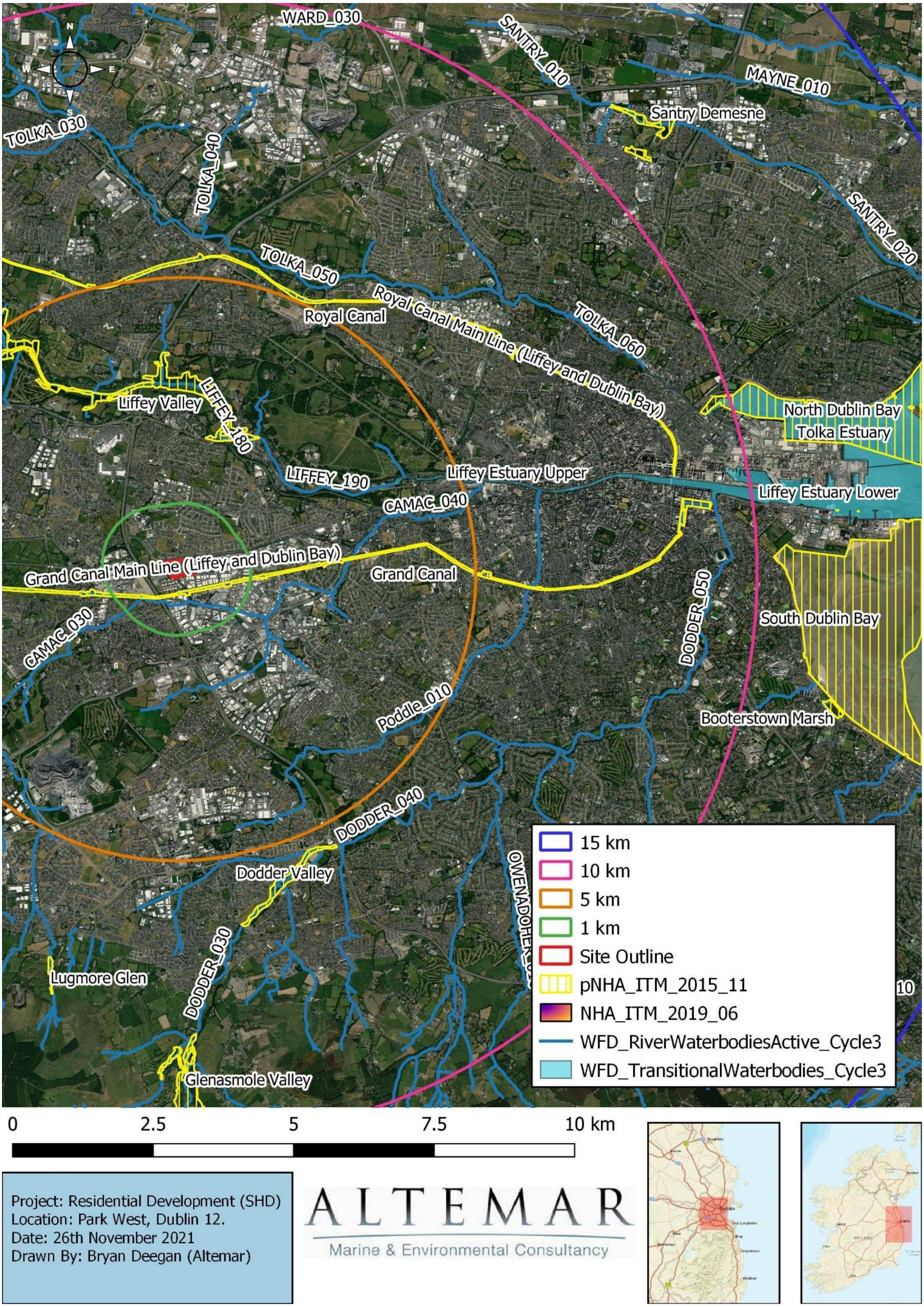
ALTEMAR
Marine & Environmental Consultancy

Figure 5.8 – Waterbodies and SACs within 15km of the proposed development site



Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

Figure 5.9 – Waterbodies and SACs within 15km of the proposed development site



Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

Figure 5.10 – Waterbodies and pNHAs within 15km of the proposed development site

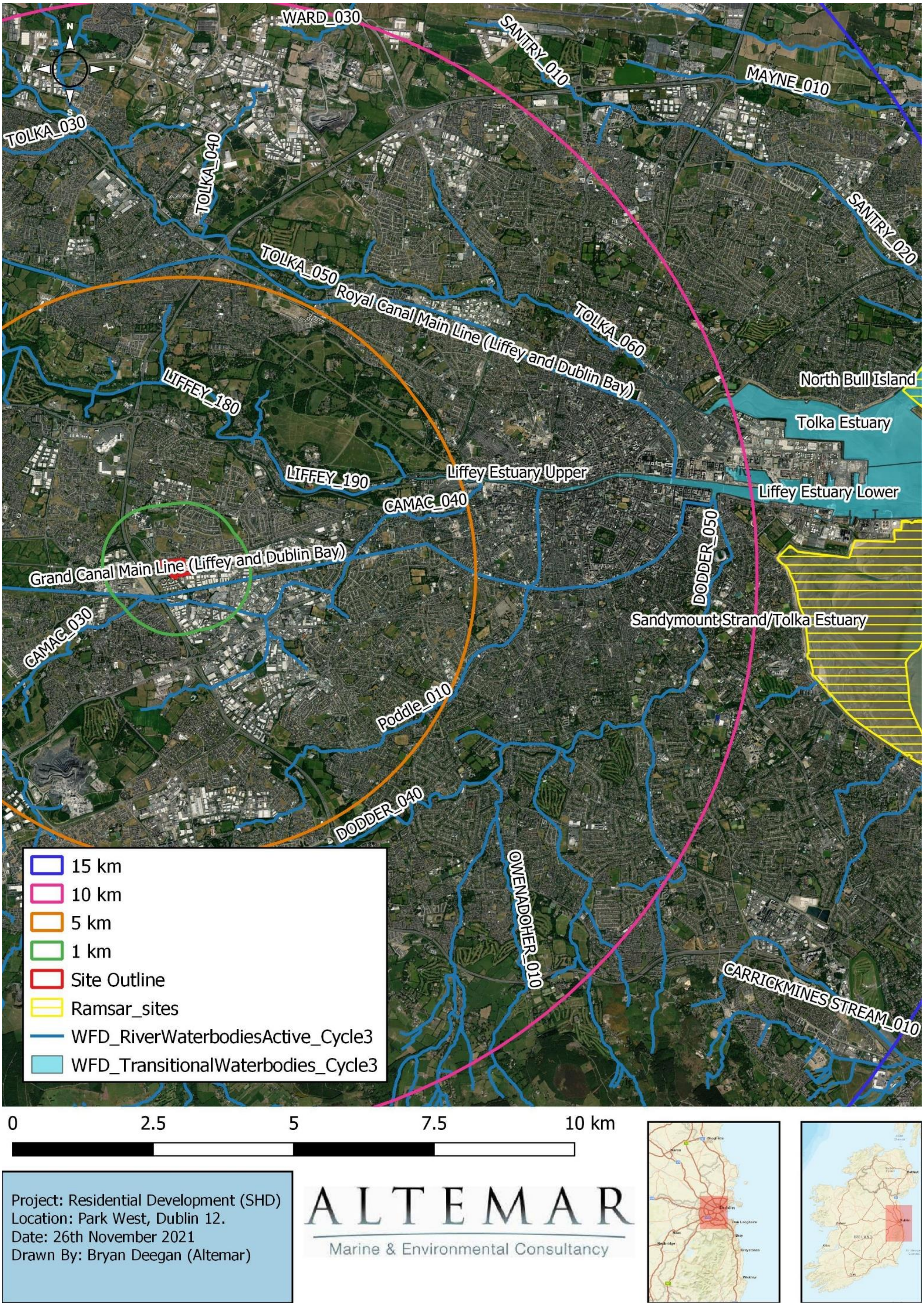


Figure 5.11 – Waterbodies and Ramsar sites within 15km of the proposed development site

5.3.3 Species Data

It should be noted that no species of conservation importance were noted on site, based on NPWS and NBDC records as fine resolution. Species recorded within a 2km^2 grid are demonstrated in Table 5.3 (O03W).

Table 5.3 – National Biodiversity Data Centre Records within the 2km^2 grid (O03W)

Black-headed Gull (Larus ridibundus); Brent Goose (Branta bernicla); Common Kestrel (Falco tinnunculus); Common Kingfisher (Alcedo atthis); Common Starling (Sturnus vulgaris); Common Wood Pigeon (Columba palumbus); House Sparrow (Passer domesticus); Mallard (Anas platyrhynchos); Tufted Duck (Aythya fuligula); Butterfly-bush (Buddleja davidii); Canadian Waterweed (Elodea canadensis); Japanese Knotweed (Fallopia japonica); Japanese Rose (Rosa rugosa); Nuttall's Waterweed (Elodea nuttallii); Harlequin Ladybird (Harmonia axyridis); Large Red Tailed Bumble Bee (Bombus (Melanobombus) lapidarius); Red-eared Terrapin (Trachemys scripta); Daubenton's Bat (Myotis daubentonii); Eastern Grey Squirrel (Sciurus carolinensis); European Otter (Lutra lutra); European Rabbit (Oryctolagus cuniculus); Lesser Noctule (Nyctalus leisleri); Pipistrelle (Pipistrellus pipistrellus sensu lato); Soprano Pipistrelle (Pipistrellus pygmaeus)

Table 5.4 – Species found by NPWS proximate to the subject site

Opposite-leaved Pondweed (Groenlandia densa); Freshwater Crayfish (Austropotamobius pallipes); Common Frog (Rana temporaria); Hairy Violet (Viola hirta); Otter (Lutra lutra); Green Figwort (Scrophularia umbrosa); Hairy St. John's-wort (Hypericum hirsutum); Blue Fleabane (Erigeron acer); Yellow Archangel (Lamiastrum galeobdolon subsp. montanum); Badger (Meles meles); Smooth Newt (Lissotriton vulgaris); Brook Lamprey (Lampetra planeri); West European Hedgehog (Erinaceus europaeus)

Habitat Data

Habitats within the proposed site were classified according to Fossitt (2000) (Figure 5.12) based on the 10th September 2021 site visit and the species noted within each habitat are described.

Figure 5.12 –Fossitt (2000) Habitat map of the proposed development site

Plate 1. Recolonising bare Ground (Single stand of Japanese Knotweed (Top left) (small pond bottom right))

ED3 Recolonising Bare Ground

As can be seen from Figure 5.12 the vast majority of the proposed development site consists of an area of Recolonising Bare Ground. Based upon an examination of historic satellite imagery (Google Earth Pro) the site has been an area of significant disturbance which included stockpiling of soil and rubble (primarily on the eastern portion of the site) since 2003 until approximately 2017 when activity on site appears to have ceased. The western portion of the site consists of rubble and spoil heaps that have become recolonised while the western portion of the site is primarily recolonising bare ground that has previously been cleared.

This site is being recolonised by opportunistic species such as butterfly-bush (*Buddleja spp.*`), red valerian (*Centranthus ruber*), bramble (*Rubus fruticosus agg.*), rape (*Brassica napus*), clover (*Trifolium spp.*), thistles (*Cirsium arvense & C. vulgare*), self-heal (*Prunella vulgaris*), docks (*Rumex spp.*), gorse (*Ulex sp.*), ragworts (*Senecio spp.*), nettle (*Urtica dioica*), colt's foot (*Tussilago farfara*), hoary willowherb (*Epilobium parviflorum*), wild teasel (*Dipsacus fullonum*), lesser trefoil (*Trifolium dubium*), snowberry (*Symphoricarpos albus*), oxeye daisy (*Leucanthemum vulgare*), rushes (*Juncus sp.*), rosebay willowherb (*Chamaenerion angustifolium*), primrose (*Primula vulgaris*) and roses (*Rosa spp.*). Trees such as elder (*Sambucus nigra*), alder (*Alnus glutinosa*), willow (*Salix. Sp.*) and sycamore (*Acer pseudoplatanus*) were also noted in site. A single stand of Japanese knotweed (*Reynoutria japonica*) was noted on site (Plate 1). This stand has become well established. This invasive species is listed on the third Schedule of regulation 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011.

Plate 2. GS2-Dry meadows and grassy verges/WS1-Scrub

GS2-Dry meadows and grassy verges

On the south western portion of the site a section of Dry Meadows and Grassy Verges is located. This area appears not to have suffered from the same disturbance seen on other parts of the site. Species include plantains (*Plantago spp*.), thistles (*Cirsium arvense, C. vulgare*), bramble (*Rubus fruticosus agg*.), docks (*Rumex spp*.), clovers (*Trifolium spp*.), ragworts (Senecio spp.), Common Vetch (Vicia sativa ssp. Segetalis), Primrose (Primula vulgaris), wild carrot (Daucus carota), cow parsley (Anthriscus sylvestris), daisy (Bellis perennis), Common Knapweed (Centaurea nigra) and gorse (Ulex sp.)

Plate 3. Scrub

WS1-Scrub

A thin line of scrub is located on the northern, western and north eastern boundary of the site. It appears to be the commencement of a bramble dominated scrub encroachment due to a lack of maintenance on site. Species include bramble (*Rubus fruticosus agg*.), rosebay willowherb (*Chamaenerion angustifolium*), ragworts (Senecio spp.), nettle (*Urtica dioica*), thistles (*Cirsium arvense, C. vulgare*), hedge bindweed (*Calystegia sepium*), elder (*Sambucus nigra*), willow (*Salix. Sp*.) and sycamore (*Acer pseudoplatanus*).

Flora

The plant species encountered at the various locations on site are detailed above. Records of rare and threatened species from NBDC and NPWS were examined. No plant species that are rare or are of conservation value were noted during the field assessment on in biodiversity records. Japanese knotweed (*Reynoutria japonica*) was noted on site (Plate 1). This stand has become well established. This invasive species is listed on the third Schedule of regulation 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011. No other invasive plant species that could hinder removal of soil from the site during groundworks, such as, giant rhubarb, Himalayan balsam or giant hogweed were noted on site.

Fauna

Amphibians/Reptiles

The common frog (*Rana temporaria*) was not observed on site. The common lizard (*Zootoca vivipara*) or smooth newt (*Lissotriton vulgaris*) were not recorded on site. There are small pond features on site that could be of importance of frogs during the breeding season.

Terrestrial Mammals

Badgers have been noted within the 10km^2 grid by the NPWS. No badgers or badger activity was noted on site. No protected terrestrial mammals of conservation importance were noted on site or in the immediate vicinity of the site. Rabbits (Oryctolagus cuniculus) and a fox (*Vulpes vulpes*) activity were noted on site.

Bats

A bat survey was carried out and is seen in Appendix 5A. There are no bat roosts or potential bat roosts on site. A single soprano pipistrelle (*Pipistrellus pygmaeus*) was noted briefly foraging on site.

Birds

The following bird species were noted on site:

Table 5.5: Bird Species noted in the vicinity of the proposed development.

Common Name	***Scientific Name***
Wren	*Troglodytes troglodytes*
Jackdaw	*Corvus monedula*
Robin	*Erithacus rubecula*
Blue tit	*Parus caeruleus*
Great tit	*Parus major*
Goldfinch	*Carduelis carduelis*
Hooded Crow	*Corvus cornix*
Magpie	*Pica Pica*
Starling	*Sturnus vulgaris (Amber Status) (on electricity pyln)*

Overall Evaluation of the Context, Character, Significance and Sensitivity of the Proposed Development Site

As seen in Figure 5.12, the proposed development site is primarily Recolonising Bare Ground (ED3). The eastern portion of the site is dominated by rubble and low spoil heaps. Bramble scrub is located around the north and western perimeter of the site. The south western portion of the site has an area of unmanaged grassland. No habitats of conservation significance were noted within the site No other habitats of conservation significance were noted within the site outline. No terrestrial species (flora and fauna) of conservation importance were noted on site. However, of note is a single stand of Japanese knotweed (*Reynoutria japonica*) was noted on site (Plate 1). This stand has become well established. This invasive species is listed on the third Schedule of regulation 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011. In addition a single soprano pipistrelle (*Pipistrellus pygmaeus*) was noted briefly foraging on site.

5.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3.

5.4 ANALYSIS OF THE POTENTIAL IMPACTS

This section of the EIAR examines the potential causes of impact that could result in likely significant effects to the species and habitats that occur within the ZOI of the combined site. These impacts could arise during either the construction or operational phases of the proposed development. The following terms are derived from EPA EIAR Guidance and are used in the assessment to describe the predicted and potential residual impacts on the ecology by the construction and operation of the proposed development.

Table 5.6 Impact description terminology

Magnitude of impact and typical descriptions.

Magnitude of impact (change)		Typical description
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Negligible	Adverse	Very minor loss or alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

Criteria for Establishing Receptor Sensitivity/Importance

Importance	Ecological Valuation
International	Sites, habitats or species protected under international legislation e.g. Habitats and Species Directive. These include, amongst others: SACs, SPAs, Ramsar sites, Biosphere Reserves, including sites proposed for designation, plus undesignated sites that support populations of internationally important species.
National	Sites, habitats or species protected under national legislation e.g. Wildlife Act 1976 and amendments. Sites include designated and proposed NHAs, Statutory Nature Reserves, National Parks, plus areas supporting resident or regularly occurring populations of species of national importance (e.g. 1% national population) protected under the Wildlife Acts, and rare (Red Data List) species.
Regional	Sites, habitats or species which may have regional importance, but which are not protected under legislation (although Local Plans may specifically identify them) e.g. viable areas or populations of Regional Biodiversity Action Plan habitats or species.
Local/County	Areas supporting resident or regularly occurring populations of protected and red data listed-species of county importance (e.g. 1% of county population), Areas containing Annex I habitats not of international/national importance, County important populations of species or habitats identified in county plans, Areas of special amenity or subject to tree protection constraints.
Local	Areas supporting resident or regularly occurring populations of protected and red data listed-species of local importance (e.g. 1% of local population), Undesignated sites or features which enhance or enrich the local area, sites containing viable area or populations of local Biodiversity Plan habitats or species, local Red Data List species etc.
Site	Very low importance and rarity. Ecological feature of no significant value beyond the site boundary

Quality of Potential Impacts on Biodiversity

	Impact Description
Negative /Adverse Impact	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Neutral Impact	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Positive Impact	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).

Significance of Impacts

Significance of Impact	Description of Potential Impact
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable2 changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An impact which obliterates sensitive characteristics.

Duration of Impact

Duration of Impact	Description
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to fifteen years.
Long-term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Extent of Effects	Description
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.

Prior to the implementation of mitigation measures, the proposed development has the potential to impact on biodiversity during both the construction and operational phases of the project. The proposed development will involve the removal of the existing terrestrial habitats on site, re-profiling, excavations and the construction of roads, footpaths, and associated services including landscaping works and foul, surface water, and water supply services.

5.5.1 Construction Impacts

The construction of the proposed development would potentially impact on the existing ecology of the site and the surrounding area. These potential construction impacts would include impacts that may arise during the site clearance, re-profiling of the site and the building phases of the proposed development. Potential construction impacts on habitats and species within the subject site are outlined in Table 5.7a and Table 5.7b. Construction phase measures are required on site particularly as significant reprofiling of the site is proposed which will remove all existing terrestrial habitats and can lead to silt laden and contaminated runoff.

Designated Conservation Sites

There is no direct hydrological connection to designated conservation sites. Out of an abundance of caution, it is considered that there is an indirect hydrological pathway to designated conservation sites within Dublin Bay via the proposed foul and surface water drainage strategy. Namely, South Dublin Bay SAC & pNHA, South Dublin Bay and River Tolka Estuary SPA, Sandymount Strand/Tolka Estuary Ramsar site, North Dublin Bay SAC & pNHA, North Bull Island SPA & Ramsar site.

Foul wastewater drainage will be directed to an existing public foul network, which ultimately outfalls to Ringsend WwTP for treatment. Any silt or pollutants will be treated along this network. Surface water drainage will be directed to an existing public surface water network which outfalls to the Camac River, which in turn outfalls to the marine environment at Dublin Bay.

In the absence of mitigation measures, given the minimum distance to a designated conservation site along this network (9.4km to North Dublin Bay pNHA), any silt or pollutants will settle, be dispersed, or diluted along this network and will not impact on designated conservation sites. In the absence of mitigation, runoff during site works, re-profiling, and the construction of project elements would not be expected to impact on designated conservation sites within Dublin Bay. Localised control measures are required to ensure that dust and contaminated surface water does not enter the surface water drainage system. However, the measures were not necessary for the protection of Natura 2000 sites, which are located more than 10km from the proposed development site. These measures would be in place whether or not there is an indirect pathway to designated sites and are to comply with Water Pollution Acts. In the absence of any control measures dilution settlement and mixing would occur in the public surface was network and the River Camac and would be at negligible levels once the water enters the estuarine environment in Dublin Bay.

The Appropriate Assessment Screening Report that accompanies this planning application concludes that '*No Natura 2000 sites are within the zone of influence of this development. There is no direct hydrological pathway to Natura 2000 sites. Having taken into consideration the effluent discharge from the proposed development works, the distance between the proposed development site to designated conservation sites, lack of direct hydrological pathway or biodiversity corridor link to conservation sites and the dilution effect and treatment of effluent and surface runoff, it is concluded that this development that would not give rise to any significant effects to designated sites.*'

5.5.2 Operational Impacts

Once constructed, all onsite drainage will be connected to separate foul and surface water systems. Surface water runoff will comply with SUDS and discharge to the Camac River. All foul water drainage will be treated at Ringsend WwTP. It would be expected that the ecological impacts in the long term would be minor adverse as the majority of the site will be built land. Potential operational impacts on habitats and species are outlined in Table 5.8a and Table 5.8b.

Designated Conservation sites
During operation, in the absence of mitigation, no significant impacts on designated sites are likely.

5.5.3 Indirect Impacts

Appropriate measures should be taken to prevent the movement of silt laden surface water run-off, dust, and pollutants into adjacent habitats. Mitigation measures need to be in place to protect local biodiversity. These measures including silt fencing, a wheelwash and road sweeping to ensure that silt, dust, and pollutants do not enter the drainage network from construction activities, particularly during enabling works. These measures are outlined in section 5.8.

Table 5.7a. Construction Impacts on habitats.

Habitat	Fossitt	Habitats Directive	Rating	Construction Impact	Impact Significance
Recolonising Bare Ground	ED3		E	Construction will result in the complete removal of this habitat. The removal of Japanese Knotweed would be seen as a positive impact.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Dry meadows and grassy verges/Scrub	GS2/WS1		D	Construction will result in the complete removal of this habitat.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Scrub	WS1		D	Construction will result in the complete removal of this habitat.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Built Land	BL3		E	Construction will result in the partial removal of this habitat.	Low Adverse/Site/Negative/Not Significant/short term
Amenity Grassland	GA2		E	Construction will result in the partial removal of this habitat.	Low Adverse/Site/Negative/Not Significant/short term
Aquatic	FW		C	No watercourses are on site but could be susceptible to impact through drainage networks. Mitigation is required.	Low Adverse/Local/Negative/Not Significant/ short term

Table 5.7b. Construction Impacts on species

Species	Rating	Construction Impact	Impact Significance
Mammal-Bats	A	As bats are not roosting on site, no specific mitigation measures are required and a derogation licence is also not required for the demolition or felling of trees. Light spill during construction has the potential to impact on foraging. Mitigation is required in relation to lighting during construction.	Low Adverse/Site/Negative/Not Significant/Long term/short term
Mammals-Terrestrial	A-D	No terrestrial mammals of conservation importance were noted on site. No badger activity or setts were noted. Mitigation is required in relation to a pre-construction survey for terrestrial mammals.	Neutral/Not significant/long term/likely
Birds	A-D	Site clearance could potentially impact on bird nesting	Low Adverse/Site/Negative/Not Significant/short term/likely
Amphibians-Frogs	B	No evidence of frog activity was not noted on site. There are several small ponds on site. Mitigation is required in relation to a pre construction survey .	Low Adverse/Local/Negative/Not Significant/short term
Terrestrial Flora	A-D	The majority of existing flora will be removed. The area consists of Recolonising Bare Ground, Dry meadows and grassy verges, Scrub and built land. No species of conservation importance were noted on site.	Neutral/Not significant/long term/likely

Table 5.8a. Operational Impacts

Habitat	Fossitt	Habitats Directive	Rating	Construction Impact	Impact Significance
Recolonising Bare Ground	ED3		E	Construction will result in the complete removal of this habitat.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Dry meadows and grassy verges	GS2		D	Construction will result in the complete removal of this habitat.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Scrub	WS1		D	Construction will result in the complete removal of this habitat.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Amenity Grassland	GA2		E	Construction will result in the partial removal of this habitat. Additional landscaping will res	Low Adverse/Site/Negative/Not Significant/short term
Aquatic	FW		C	No watercourses are on site but could be susceptible to impact through drainage networks. Standard construction compliance is required in relation to surface water.	Low Adverse/Local/Negative/Not Significant/ short term

Table 5.8b. Operational Impacts on species

Species	Rating	Construction Impact	Impact Significance
Mammal-Bats	A	As bats are not roosting on site, no specific mitigation measures are required and a derogation licence is also not required. Light spill during operation has the potential to impact on foraging. Foraging was not considered to be significant on site and no mitigation is required.	Low Adverse/Site/Negative/Not Significant/long term
Mammals-Terrestrial	A-D	No terrestrial mammals of conservation importance were noted on site. No badger activity or setts were noted.	Neutral/Not significant/long term/likely
Birds	A-D	It is likely that the proposed development will increase human and vehicular. The site is within a suburban area. No significant effects are foreseen from the operation of the proposed development.	Low Adverse/Site/Negative/Not Significant/long term
Amphibians-Frogs	B	No evidence of frog activity was noted on site.	Neutral/Not significant/long term/likely
Terrestrial Flora	A-D	The majority of existing flora will be removed. It would be expected that the biodiversity value would improve once landscaping elements have been completed.	Neutral/Not significant/long term/likely

5.5 MITIGATION MEASURES & MONITORING

Construction and operational controls will be incorporated into the proposed development project to minimise the potential negative impacts on the ecology within the Zone of Influence (ZoI). These measures are outlined in detail in Table 5.9.

Designated Conservation sites within 15km
No specific mitigation is required to protect designated sites. The project must comply with Water Pollution legislation to ensure that there are no contaminated discharges from the site including contaminated surface runoff and dust enter the existing surface water drainage network. However, these measures are not necessary for the protection of designated sites including Natura 2000 sites.

Development Construction
All mitigation measures outlined in Table 5.9 will be carried out in consultation with and to the satisfaction of the project ecologist. All works on site will have sufficient mitigation measures to prevent silt and dust from runoff during works (Table 5.9). This will include measures outlined in the Hydrology and Air & Climate Chapters of the EIAR. A project ecologist will be appointed to oversee works on site including the implementation of mitigation measures in relation to biodiversity.

Table 5.9. Mitigation measures.

Construction Phase

B-C1	Mitigation Measures outlined in Section 7.6 (Hydrology Chapter) will be followed to prevent surface water impacts and downstream impacts on biodiversity.
B-C2	Mitigation Measures outlined in Section 8.4 (Air & Climate Chapter) will be followed to prevent impacts on biodiversity from air quality impacts including dust.
B-C3	Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent.
B-C4	An Invasive Species Management Plan has been prepared (Appendix 5B). Prior to enabling works commencing on site the stand of Japanese knotweed (and soil within 7m buffer) will be removed off site under licence.
B-C5	Pre-Construction surveys will be carried out for mammals and amphibians on site prior to works commencing on site. Should terrestrial faunal species of conservation be present on site appropriate licencing will be acquired from NPWS prior to the commencement of works within the vicinity of the fauna present.
B-C6	Lighting during construction works will face inwardly to the site and will not create excessive spill from the site. Lighting will be carried out in discussion with the project ecologist.
B-C7	A project ecologist will be appointed to oversee enabling and construction works.

Operational Phase
No specific operational mitigation measures are required beyond those outlined in section 7.6 of this EIAR.

5.6 ADVERSE EFFECTS LIKELY TO OCCUR FROM THE PROJECT (POST MITIGATION)

It should be noted that the early implementation of ecological supervision on site at initial mobilisation and enabling works is seen as an important element to the project, particularly in relation to the implementation of surface water runoff mitigation.

With the successful implementation of outlined mitigation measures and elsewhere in the EIAR, to limit biodiversity, surface water and dust impacts, including ecological supervision, no significant impacts are foreseen from the construction or operation of the proposed project. Residual impacts of the proposed project will be localised to the immediate vicinity of the proposed works.

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on biodiversity and designated conservation sites through application of the standard construction and operational phase controls as outlined above. In particular, mitigation measures to ensure compliance with Water Pollution Acts will satisfactorily address the potential impacts on downstream biodiversity. No significant adverse impacts on biodiversity or designated sites are likely from the proposed works following the mitigation described above.

5.7 CUMULATIVE IMPACTS ARISING FROM OTHER DEVELOPMENTS

Based on a review of the projects listed within Section 3.5 of this EIAR, there are no committed developments in proximity to the subject site which are likely to give rise to cumulative impacts with it. Given this, it is considered that in combination effects with other existing and proposed developments in proximity to the application area would be unlikely, neutral, not significant and localised. No significant cumulative effects are foreseen on biodiversity from cumulative impacts.

5.8 RESIDUAL EFFECTS

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on the sensitive receptors. The overall impact on biodiversity is a not significant low adverse short term impact on the ecology of the area and locality overall. This is primarily as a result of the loss of terrestrial habitats on site, supported by the creation of additional biodiversity features and complexity, standard construction and operational controls and a sensitive landscaping strategy.

5.9 'DO-NOTHING' SCENAIRO

In the absence of the proposed development, it would be expected that biodiversity would increase on site as a lack of maintenance of the site would lead to scrub encroachment and increase in nesting and foraging habitat.

5.10 WORST CASE SCENAIRO

Following construction, fire or building collapse would be seen as the main potential worst case scenario risk to biodiversity, conservation sites and human health, with localised and potential airborne and potential for impact. Having regard to the scale of the development, a significant fire would release airborne and waterborne pollutants due to the combustion of normally inert industrial materials and appliances. Water used in a significant fire could contain toxic materials that would enter the surface water drainage network. The final surface water manhole is a hydrobrake manhole with an activating flow control device. In addition petrochemical interception will be on site.

Worst Case Scenario Impacts: Unlikely, Negative, Slight*, localised*, Temporary. Standard mitigation required and will be in place.

5.11 INTERACTIONS

The biodiversity elements of this EIAR have involved consultation with a wide section of the Project Team particularly in relation to the Construction Management, design, lighting, drainage and landscape elements of the proposed development. There are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to the biodiversity chapter. The biodiversity chapter of the EIAR involves interactions with Chapter 6 - Lands & Soils, Chapter 7 – Water, Chapter 8 – Air Quality & Climate, Chapter 9 – Noise & Vibration, Chapter 10 – Material Assets: Built Services, Chapter 11 – Material Assets: Transportation, Chapter 12 – Material Assets: Resource and Waste Management, Chapter 14 - Landscape. It is considered that there is the potential for slight, temporary negative short term impacts on biodiversity due to dust (air), emissions to water and construction traffic associated with the Construction Phase of the proposed Project. These impacts are addressed in more detail in the other chapters of the EIAR. There is also potential for the Operational Phase of the proposed development to impact on biodiversity via surface water runoff. However, post mitigation these impacts are not deemed to be significant.

5.12 MONITORING

B-M1	A project ecologist will oversee works on site.

5.13 REINSTATEMENT

No reinstatement works are required for ecological features.

5.14 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered during the preparation of the biodiversity chapter.

REFERENCES

- Environmental Protection Agency (August 2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA, Wexford
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- Practice (in the preparation on Environmental Impact Statements). EPA, Wexford
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6. LAND AND SOILS

6.1 INTRODUCTION

This section of the EIAR has been prepared by Cronin and Sutton Consulting and describes the existing Land & Soils aspects on the proposed development site. An assessment is made of the likely impact arising during the demolition, construction and operational phases of the development on these elements.

This chapter was prepared by Gary Lindsay of CS Consulting. Gary is a Chartered Engineer with Engineers Ireland and has been practicing as a consulting engineer for over seventeen years. Gary holds a Bachelor's Degree in Civil Engineering from University College Dublin.

6.2 ASSESSMENT METHODOLOGY

This chapter has been set out with reference to the specific criteria set out in the Environmental Protection Agency guidelines:

- Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2002 & 2017 'Draft'),
- Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA 2015),
- EIA Directive 2014/EU/52, Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003),
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, (Dept Housing 2018).

The draft guidelines have also been reviewed and have formed the basis for the development of this chapter.

Other reference documents used in the preparation of this assessment include the following:

- National Roads Authority (NRA) Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- Ground Investigation Report October 2021 Prepared by Irish Geotechnical Services Ltd (IGSL).

The existing site is mainly greenfield with over 80% of the site area covered in grass. An assessment of the soils and bedrock geology underlying the study area was undertaken in the form of site investigation works by IGSL and an assessment of the existing groundwater underlying the study area was undertaken in the form of a study using information available from Ground Investigation report by IGSL. The corresponding Ground Investigation Report by IGSL for Cronin and Sutton Consulting Engineers, October 2020 is attached in **Appendix 6A**.

A separate Waste Characterisation Assessment of soil samples from across the site was also carried out by O'Callaghan Moran and Associates (OCM), November 2021 and is included in **Appendix 6B.**

6.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full description of the project is provided in the statutory notices and in Chapter 3 of the EIAR.

6.4 RECEIVING ENVIRONMENT

6.4.1 Geology

From the IGSL Site Investigation Report the site wide geology can be summarised as follows: Made Ground comprising reworked sandy gravelly clay fill mantles the site and in places Construction and Demolition (C&D) waste is present within the fill material. While mostly confined to the upper metre the Made Ground appears to deepen within the eastern portion of the site to depths of up to 1.7 m BGL. Within the southern portion of the site infiltration test pits terminated within Made Ground at a depth of 1.5 m BGL thereby implying that the fill could be deeper.

The underlying natural soils comprise predominately stiff (high strength) grey/brown sandy gravelly CLAY. This material strengthens with depth, becoming very stiff (very high strength) within the upper 2 metres (deepening to 3.5 metres at the eastern end of the proposed structural development).

The upper grey/brown and lower dark grey/brown and black gravelly clays represent glacial till, which is often referred to as the "Dublin Boulder Clay". The difference in coloration and consistency between the upper grey/brown and lower very stiff dark brown/grey deposits are usually attributed to weathering of the upper till.

Rotary drilling below the refusal depths of the boreholes produced returns of very high strength gravelly clay (glacial till) overlying bedrock at depths in the range (49.5 to 51.6 mOD) across much of the site dipping to 6.3 m BGL.

The underlying limestone bedrock is in a medium strong to strong condition and this has been proven to a maximum depth of 11.3 m BGL.

6.4.2 Hydrogeology/ Groundwater

From the IGSL Site Investigation Report the site wide hydrogeology/groundwater regime can be summarised as follows: -

Groundwater ingress was not observed within the boreholes or trial pits. However, water strikes occurred during rotary drilling and were observed at a shallowest depth of 2.6 m BGL during the drilling period.

Subsequent groundwater monitoring of standpipes has shown standing groundwater level in the range 2.2 to 3.5 m BGL.

The results of groundwater monitoring therefore indicates that excavations below c. 2.0m BGL could intercept the groundwater table. While water ingress through the glacial clays would be expected to be slow, any open excavations will ultimately fill with water as the groundwater table re-establishes to its true level.

It is also noted that granular (sand/gravel) lenses are not uncommon within glacial till and if intercepted the rate of water ingress through such lenses would be significantly higher. The rate of water ingress could also increase where the upper highly fractured bedrock is intercepted.

However, no basements to the scheme are proposed and the potential to intercept groundwater for this scheme is therefore highly unlikely.

6.4.3 Soil Classification

From the OCM Waste Classification Report the soil can be summarised as follows: -

11 number samples of excavated soil material were supplied to OCM by IGSL from various locations across the site.

The samples were tested for, metals (arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, total organic carbon (TOC), BTEX (benzene, toluene, ethylbenzene and xylene) aliphatic and aromatic hydrocarbons, polychlorinated biphenyls (PCB), mineral oil, polyaromatic hydrocarbons (PAH) and asbestos. Leachate generated from the samples was tested for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, chloride, fluoride, soluble sulphate, phenols, dissolved organic carbon (DOC), total dissolved solids (TDS).

All results of samples can be found in the Waste Classification Report appended to this report. Below is a short summary of the conclusions/results of the report:

- Asbestos was not detected in any of the samples.
- All samples are classified as non-hazardous
- All samples meet the inert landfill WAC.

6.5 POTENTIAL IMPACTS

6.5.1 Potential Impact on Soils, Subsoils and Bedrock

Demolition

The potential impact pertaining to the proposed development with regard to land & soil involves the removal of the existing car park structure and services on site & the excavation of disposal of material to allow the development to be constructed and the disposal of these materials. The potential impacts potentially are;

- air quality issues pertaining to demolition on site structures,
- noise issues due to demolition of structures on site,
- subsidence issues regarding adjacent landowners, due to excavation works,
- increased in temporary local traffic volumes due to removal of demolition & excavated site,
- reduction in regional landfill capacity due to acceptance of classified waste material.

Construction

The principal risks associated with the Construction Phase are:

- The presence of contaminants in the underlying strata and the exposure of site workers to contaminated ground through direct contact, inhalation of dust and vapours or oral intake.
- Excavated and stripped soil can be disturbed and eroded by site vehicles during the construction. Rainfall and wind can also impact on non-vegetated/uncovered areas within the excavation or where soil is stockpiled.
- Noise and vibration will be generated through the construction phase particularly during pilling and excavation work. Given that some rock excavation is required it is anticipated that rock breaking techniques will be used. Noise and vibration impacts are considered in detail in Chapter 9 - Noise and Vibration.
- The removal of soil from the ground could, without the adoption of appropriate control measures, lead to some ground movement in the immediate surrounds of the excavation with an associated risk of settlement and damage to buildings in the immediate area. Details of mitigation methods are outlined in the next section.
- The presence of contaminants in the groundwater and the exposure of site workers to existing contaminated groundwater.
- The potential impact of dewatering and temporarily reducing the ground water level on surrounding structures.
- The recommendations from Outline Construction Management Plan which are noted below:
    i. *In order to reduce the potential for any movement over and above that expected, the following methods of safe practice should be considered prior to and during construction:*
    ii. *Good workmanship will be required to ensure that secant piled wall installation induced settlements are kept to a minimum. It will be essential to ensure that the made ground and the glacial sands are not allowed to collapse prior to casting of the concrete;*
    iii. *Allowance should be made for groundwater presence during the construction of the piles, and the work should stop immediately to reassess the situation if any significant inflows are encountered;*
    iv. *Careful consideration will need to be given to an effective and safe method of dewatering during excavation should groundwater ingress below the secant piled wall exceed that which can be managed using traditional open excavation pumping techniques;*
    v. *The first stage of excavation should be minimised, and the first (stiff) support should be installed as early as possible in the construction sequence;*
    vi. *Where temporary props are required, they should be designed to provide adequate restraint to limit lateral ground movements. Walings should be tied in, so they do not rely on friction or adhesion between the prop end and waling to be held in place;*
    vii. *It should also be ensured that basement slab is cast as early as possible and tight to the piled retaining wall;*
    viii. *Ground/basement slabs should be given sufficient time to cure and gain strength prior to removal of the temporary propping;*
    ix. *The construction of the wall and its permanent support systems should not be delayed;*

    x. *Over-excavation should be avoided;*
    xi. *Monitoring both above and below ground should be carried out to ensure that the expected displacements are not exceeded. Limits of lateral and vertical displacement should be set beyond which the method of construction should be re assessed.*

- The potential for groundwater from the demolition and construction phase of the project to contribute to contamination of the local groundwater.
- The mobilisation and migration of soluble contaminants in groundwater.

Operation
During the operational phase of the new development on the subject site it is envisaged that there will be little to no potential impact on the geology of the area or on groundwater.

Run-off from hardstanding areas will pass through a closed drainage system, which will incorporate silt traps and oil/petrol interceptors, to mitigate the possibility of potentially contaminated surface water from contaminating the soil and bedrock geology. This drainage system will then discharge into the Local Authority operated sewer system. It is not predicted that there will be any adverse effects on the soils and geology during the operational phase of the development.

Run-off from hardstanding areas will pass through a closed drainage system, which will incorporate silt traps and oil/petrol interceptors, to mitigate the possibility of potentially contaminated surface water from contaminating the soil and bedrock geology. This drainage system will then discharge into the Local Authority operated system. It is not predicted that there will be any adverse effects on the groundwater during the operational phase of the development.

6.5.2 Cumulative Impacts

Cumulative impacts on the proposed development can be considered in two areas:

- Impact due to the construction on adjoining underground structures and due to the potential to block groundwater flow patterns,
- The requirement for excavated soils deemed to be disposed of in licenced landfill facilities, thereby reducing the capacity in the landfills to accept future material.

6.5.3 Do Nothing Impact

The “Do Nothing Impact” assesses the environmental impact of not redeveloping the proposed development site in respect of the existing impacts to land and soils, at the proposed site.

Under the “Do Nothing Scenario” there would be no change in the current land use of the site and therefore the soil and bedrock geology environments would remain in their current state.

6.6 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

Potential issues noted above during the construction phase can be mitigated by following the measures noted below.

6.6.1 Construction Phase

The main impacts are associated with the Construction Phase of the proposed development. Following construction there will be no long-term significant impacts with respect to soils and geology of the site.

Mitigation measures relating to impacts outlined in the previous section are outlined below:

LS-C1	Mitigation measures for the demolition phase shall be implemented as outlined in the *Outline Construction Management Plan*, submitted as part of this application by CS Consulting.
LS-C2	The excavated material will be monitored and assessed to determine the most suitable disposal outlet. Material will be categorised according to the Landfill Directive and will be sent to appropriately licensed facilities for treatment/disposal. Where applicable, material on site will be segregated and divided into material re-use, material re-cycling and waste material streams in accordance with current guidelines and best practice.
LS-C3	Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted through the excavation period. The provision of vehicle wheel wash facilities at site exits and implementation of a road sweeping programme will reduce effect on surrounding road network.
LS-C4	Inherent in any redevelopment is the potential for groundwater from the demolition and construction phase of the project to contribute to contamination of the local groundwater. By developing a detailed construction methodology and strict adherence to this policy by vigilant site management, these potential risks can be mitigated to acceptable levels.
LS-C5	During the demolition and excavating phase of the works monitoring will be ongoing for noise, vibration, settlement, gas & water levels as well as ground contamination as described in the section below on Monitoring.

Moderate negative impacts during the construction phase will be short term only in duration. Implementation of the above measures will mitigate any significant long-term adverse impact.

6.7 PREDICTED IMPACTS

6.7.1 Construction

Demolition
The demolition material generated on site to enable the proposed development to be constructed, will be segregated and assessed to establish the viability of material to be reused or recycled. The nature of the development will inevitably mean that waste material generated on site will not be suitable for re-use of recycling and therefore will be required to be removed from site and disposed of in accordance with current legislation. The waste material taken from site deemed to be inert or non-hazardous, will be committed to a regional landfill.

Construction
The proposed development will result in a large volume of excavated material including existing made ground, soil and potentially rock being removed off site for disposal. From initial site investigations and WAC analysis excavated material can be disposed of in invert land fill facility. However, some material encountered during construction works on site may contain contaminants and therefore these works will need to be monitored and tested during the works and be exported to an approved licensed waste facility.

It is not envisaged that the groundwater will be encountered during excavation works, however the disposal of groundwater shall be in accordance with the licensed requirements of Dublin City Council and will be on a short-term basis. The licencing agreement with the Council, may call for, subject to analysis of the groundwater, the groundwater water to pass through filtration system to remove sediment from the water and an oil separator prior to discharge to a designated sewer and at a controlled rate. The predicated impacts of same would be classed as moderate.

6.7.2 Operation

There is no predicted long-term impact on the soil, geology and hydrogeology environments associated with the operation phase of the proposed development.

6.8 MONITORING

It is recommended that the following are monitored in relation to the soil and geological environments during the demolition and construction stage:

LS-M1	Any additional testing and monitoring of soil and made ground that will be excavated for any potentially contaminated material to ensure adequate classification and disposal.
LS-M2	Monitoring of the retaining wall using for example, inclinometers and monitoring of water movements either seepages or through control points.
LS-M3	Monitoring of neighbouring structures immediate to the development site for the effects of any vibration, movement and settlement arising from the excavation works based on condition surveys carried out by the Contractor prior to the works.
LS-M4	Monitoring of interrelated impacts such as noise and vibration levels, dust emissions etc. are dealt with in their other chapters in this EIAR.
LS-M5	Testing and monitoring of water and gas during excavation works.
LS-M6	Monitoring of water movements either seepages or through control points.

6.9 REINSTATEMENT

Any temporary construction compounds will be removed from the site following the end of the construction phase. Reinstatement at completion of the works will involve removal of all deleterious materials that may have been deposited during construction works and restoring any areas within the public realm/pedestrian corridor with an appropriate and acceptable hard-wearing layer.

6.10 INTERACTIONS

The impacts described previously in this Chapter also relate to and interact with other chapters within the EIAR specifically; Population and Human Health, Water, Biodiversity, Noise and Vibration, Air Quality & Climate and Material Assets. These impacts are described in more detail in the various corresponding chapters however some general points are described below:

- There is a potential for dust from the limited demolition work and excavations or stockpiles to impact on air quality/human beings.

- Noise and vibration will be generated through the Construction Phase particularly during the pilling and excavation works.

- Construction workers will be exposed to any contaminants present in the underlying strata through direct contact and inhalation of dust and vapours.

In assessing the impact on lands and soils we have also considered and had regard to a number of the separate standalone reports included with this planning application, particularly the Construction and Demolition Waste Management Plan and Outline Construction Management Plan.

6.11 DIFFICULTIES ENCOUNTERED IN COMPILING

The soil and geology profiles described are extracted from available site investigation information and waste classification assessments carried out by independent 3rd parties which uses testing and observation of a sample within boreholes, trial pits etc to give an overall representation of the site. The assumptions made regarding the site are based on this available information only and cannot account for localised areas which differ however unlikely.

However, the mitigation measures proposed during demolition and construction stage will ensure that if any additional contamination is identified it will be addressed to ensure no adverse impacts on the environment. This will include monitoring & testing of materials to be removed from site following segregation of waste materials. Waste materials will be assessed in accordance relevant waste classification and waste disposal legislation.

7. WATER

7.1 INTRODUCTION

This section of the EIAR has been prepared by Cronin and Sutton Consulting and describes the existing water, wastewater and flooding zoning aspects on the proposed development site. An assessment is made of the likely impact arising during the demolition, construction and operational phases of the development on these elements.

This chapter was prepared by Gary Lindsay of CS Consulting. Gary is a Chartered Engineer with Engineers Ireland and has been practicing as a consulting engineer for over seventeen years. Gary holds a Bachelor's Degree in Civil Engineering from University College Dublin.

7.2 ASSESSMENT METHODOLOGY

This chapter has been set out with reference to the specific criteria set out in the Environmental Protection Agency guidelines:

- Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2002),
- Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA 2015),
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, (Dept Housing 2018).

The draft guidelines have also been reviewed and have formed the basis for the development of this chapter.

Other reference documents used in the preparation of this assessment include the following:

- National Roads Authority (NRA) Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA).

A desktop study was carried out on the local and regional surface water and drainage network. Information was obtained from documents including the following sources:

- EPA online Water Quality Database and Envision Map Viewer (www.epa.ie)
- Dublin City Council Water and Drainage Department record drawings and discussions with Drainage Division Engineers;
- Flood Risk Assessment Report completed by Cronin and Sutton Consulting which accompanies this Planning Application.
- All available information concerning the development including development plans.

The following legislation was referred to in compiling this chapter:

- Water Framework Directive 2000/60/EC:

The EU Water Framework Directive (WFD) 2000/60/EC came into force on 22nd December 2000, and enacted into Irish legislation through S.I. No. 722 of 2003 European Communities (Water Policy) Regulations 2003. This legislation and regulation is a significant piece of legislation for water policy, as it provides a co-ordinated approach across Europe for all water policies, establishing a management structure for future water policy. A few key objectives of the Directive are to:

- Protect all waters, including rivers, lakes, groundwater, transitional and coastal waters.
- Achieve "good status" in all waters by 2015, and maintaining "high status" where the status already exists.
- Have water management based on River Basin Districts (RBD).

The strategies and objectives of the Water Framework Directive in Ireland have been influenced by a range of National and European Union legislation and regulation including:

- European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988),
- Local Government (Water Pollution) Acts 1977 – 1990,
- Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998).

In turn the implementation of the Water Framework Directive and its associated policies has necessitated the introduction of new regulations in Ireland including, the European Communities Environmental Objectives (Surface Waters) Regulations 2009, which are discussed further in the following section.

European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No.272 of 2009):

These regulations have been devised as a more complete and stringent set of surface water quality regulations which covers the requirements of the Water Framework Directive and the Dangerous Substances Directive. These regulations came into effect on 30th July 2009 and have been adopted by the Government. These new regulations supersede previous water quality regulations (both EU and national). This project must still be cognisant of previous regulations as they form the basis for a wide range of impact assessment and monitoring methodologies. It is envisaged that a detailed construction management plan which will include the management or disposal of surface water runoff will be prepared in advance of construction commencing on site. The construction management plan will be cognisant of these new regulations and apply them throughout the construction phase.

European Communities Priority Substances Directive 2008:

These regulations have been devised to assign a chemical status assessment for water bodies. Directive 2008/105/EC provides environmental quality standards in the field of water policy.

- European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988)

The Salmonid Regulations set water quality standards for salmonid waters, with identification of salmonid waters, water quality standards, and frequencies of sampling and methods of analysis and inspection.

- Local Government (Water Pollution) Acts 1977 – 1990:

The Act is the main legislation for the prevention and control of water pollution, including the general prohibition of polluting matter to waters. While this act has largely been superseded by the 2009 Regulations, current impact assessment and monitoring methodologies must still be cognisant of this legislation.

- Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998):

As part of the Water Pollution Acts, these regulations require water quality be maintained or improved, with reference to the biological quality river rating system (Q Rating) as assigned by the Environmental Protection Agency between 1995 to 1997. While this act has also largely been superseded by the 2009 Regulations, current impact assessment and monitoring methodologies must still be cognisant of this legislation.

An assessment of the existing water quality was also carried out in the form of a desktop study examining water quality data from the EPA from surveys predominately conducted by the EPA and local authorities. Various quality classes are used to establish and monitor the condition of rivers and streams in Ireland. Quality classes relate to the potential beneficial use of a water body, and can be effected by the quality of water discharged to surface water during construction and operation of a development.

Background Information on the local drainage network and water supply was obtained from documents from local authorities.

A *Site Specific Flood Risk Assessment* Report compiled by Cronin & Sutton Consulting was undertaken for the proposed development and is included as part of the planning application. The potential sources of flooding considered were:

- Tidal/Coastal flooding;
- Fluvial flooding (from adjacent surface water bodies)
- Pluvial (direct rainfall)
- Groundwater flooding
- Potential for offsite flooding due to infrastructure failure.

7.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

7.4 RECEIVING ENVIRONMENT

This sub section addresses the implications for the proposed development on the existing environment and looks at the possible affects the proposed development may have during the construction & operational phase.

7.4.1 Potable Water Infrastructure

Record drawings reviewed from Irish Water indicate the following services in the area:

- Two number of 450mm watermains and a 150mm watermain on Park West Avenue, west of the proposed development.
- A 250mm watermain on Park West Road, south of the proposed development.

The existing 450mm asbestos cement public main enters the subject site and is capped north of the existing hotel. Prior to commencement of works, this 450mm public main will be surveyed by means of non-destructive tests, to identify the location of the main. The 450mm asbestos cement public main will be broken out and removed from the site, to allow the construction of the new development. The public main will be capped at the site entrance, subject to agreement with Irish Water.

All the noted existing water infrastructure is in the public control of Irish Water. As required a Pre-Connection Enquiry was lodged with Irish Water to allow an assessment of the local & regional infrastructure to accommodate the proposed development. Irish Water reverted to this enquiry confirming feasibility to connect without upgrades and noted that a formal connection agreement will be required to be entered into the services to be made available, refer to the Engineering Services Report for a copy of same. As required a Pre-Connection Enquiry was lodged with Irish Water indicating their requirements before a for connection agreement, refer to the Engineering Services Report for a copy of same.

7.4.2 Surface Water Drainage Infrastructure

Drainage record drawings indicate the following:

- A 300mm diameter surface water sewer which changes to a 600mm and onto a 750mm diameter on Park West Road. This surface water sewer discharges in easterly direction and connects to the 750mm diameter surface water sewer on Heaney Avenue.

7.4.3 Foul Water Drainage Infrastructure

Irish Water drainage records indicate:

- An existing 225mm foul sewer on Park West Road, south of the subject site location, which discharges in easterly direction and connects to the 300mm diameter foul sewer on Heaney Avenue.

This existing sewerage network in the vicinity of the site eventually discharges into the municipal wastewater treatment at Ringsend.

As required a Pre-Connection Enquiry was lodged with Irish Water to allow an assessment of the local & regional infrastructure to accommodate the proposed development. Irish Water reverted to this enquiry confirming feasibility to connect without upgrades and noted that a formal connection agreement will be required to be entered into the services to be made available, refer to the Engineering Services Report for a copy of same. As required a Pre-Connection Enquiry was lodged with Irish Water indicating their requirements before a for connection agreement, refer to the Engineering Services Report for a copy of same.

7.4.4 Flood Risk

The site of the proposed development is in **Flood Zone C**, based on Dublin City Council's Strategic Flood Risk Assessment from the current Development Plan. The primary risk of flooding to the site is by Pluvial flooding.

7.5 POTENTIAL IMPACTS

7.5.1 Construction Phase

This sub section addresses the implications for the proposed development on the existing environment and looks at the possible affects the proposed development may have during the construction & operational phase. The principle risks associated with the Construction Phase are:

Water Supply
The Contractor will require a separate water supply connection for the duration of the works. This is standard practice across the majority of new construction sites.

Surface Water
Surface water run-off will occur from hardstanding and roof structures during the construction period. Surface water run-off from construction activities has the potential to be contaminated.

- Suspended solids arising from ground disturbance and excavation.
- Hydrocarbons from accidental spillage from construction plant and storage.
- Concrete/cementitious products: arising from construction materials.
- Water removed from surface excavations as a result of rainfall or groundwater seepage.
- Vehicle wheel wash water.
- Runoff from exposed work areas and excavated material storage areas.
- Leakage of temporary foul water services; and
- Solid (municipal) wastes being disposed or blown into watercourses or drainage systems.

During excavation works, groundwater within the shallow perched aquifer and the sand and gravel aquifer will be dewatered to facilitate the construction of the basement. The removal of impacted groundwater will likely have a permanent positive effect on receiving surface waters.

Foul Water
The Contractor's operations will result in the generation of effluent and sanitary waste from facilities provided for the construction staff on site.

Flood Risk
Surface water run-off has the potential to flood excavations during the construction period. Ground water encountered during excavations has the potential to flood basement construction. Construction works, excavations etc. have the potential to contaminate surface and ground waters.

7.5.2 Operational Phase

The principal risks associated with the Operation Phase are:

Water Supply

The proposed development is to consist of 750 units and based on Irish Water guidelines, the water demand will be:

- ⇒ 405 l/day per apartment (based on 2.7 persons per unit x 150l/person/day);
- ⇒ 405 l/day x 750 units = 303,750l/day = 303.75 m3/day;
- ⇒ 3.51 l/sec Average water demand;
- ⇒ 17.58 l/sec Peak water demand (5 times average water demand).

For the retail unit, creche and bar/café a demand of 6,000 l/day has been assumed, which will be approximately

- ⇒ 0.07 l/sec Average water demand;
- ⇒ 0.35 l/sec Peak water demand (5 times average water demand).

The proposed watermain infrastructure and routing plan is shown on CS Drawings included with this submission.

A Pre-Connection Enquiry has been submitted to Irish Water based on the water demand for an initial proposed number units. See the Engineering Services Report which accompanies this submission for details of same.

Surface Water

The completed stormwater system will remain under the control of a management company and will not be offered to be taken in charge by the Local Authority. As such operational and maintenance requirements will be addressed by the company's maintenance contractor. Issues which my interfere with the stormwater network pertain to blockages and the lack of appropriate jetting and cleaning of gullies, drains and main sewers are required.

Due to the proposed stormwater system which will be implemented at the site there is considered to be minimal risk of the site impacting the water quality of the downstream network during the operational stage.

Proposed Attenuation Arrangements

The **first** aspect is to reduce any post development run-off to pre-development discharge rates. The development is to retain storm water volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1 in 100 year storm event increased by 20% for predicted climate change factors.

To ensure an accurate calculation of the required attenuation for the site Met Eireann was contacted to provide:

a) The SAAR (Standard Annual Average Rainfall) for the area: 727mm/year.
b) The sliding duration table for the site indicating the 1:100 year rainwater intensities to be used.
c) Soil type value obtained from the Flood Studies Report (for the subject lands this has been established as soil type 4).

These parameters allow the Q-Bar, greenfield runoff rate, to be calculated. The Q-Bar value for the site is 2.0 l/sec/Ha. As the storm water will connect into a public surface water sewer and the site area being more than 1Ha, 2.0l/s/Ha is used as the restriction value. Therefore, the allowable discharge rate off site for any given storm even will be limited to 10.8l/sec.

The proposed development is to retain storm water volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1 in 100 year storm event increased by 20% for predicted climate change factors. The attenuation volume requirement of 2165m^3 for the 1 in 100 year storm event. See CS Consulting's Engineering Services Report.

Proposed Sustainable Urban Drainage System, SuDS

The second aspect is the policy of the Local Authority is to include Sustainable Urban Drainage Systems, SuDS, for all new applications. The aim is to provide an effective system to mitigate the adverse effects of storm water runoff on the environments, through enhanced quality systems and on local infrastructure to aid in preventing downstream flooding. The features proposed shall reduce run-off volumes, pollution concentrations and enhance groundwater recharge and biodiversity.

The proposed SuDS features shall consist of:

a) Green-roof – this allows the roof areas of the proposed apartments to use a Sedum type covering to absorb the first 'flush' from rainfall events. Typically, 5-10mm of rain can be retained on the sedum surface. As more intense rain is experienced the green roof can overflow from the roof through down pipes and into the schemes main drainage runs.

b) Rainwater Harvesting/Water-'butts' – when the rain water from the green roofs and from the roofs of the housing units is drained to ground floor it will be directed into rainwater storage units, commonly referred to as water butts. The retained rainwater can then be stored and re-used for local landscaping and maintenance purposes. It would not be envisioned that the captured rainwater would be reused in the apartment units for public health reasons.

c) Permeable Paving – this system allows rainwater to be directed into carparking bays whereby the rainwater can filter through gaps in the paving blocks and percolate into the subsoil. The area which can be drained is subject to the infiltration characteristics of the subsoil, which is established following ground investigation testing on site in accordance with BRE 365.

d) Infiltration Systems (Land Drains) – it is also proposed to use infiltration systems like lands drains to allow the percolation of rainwater locally, again subject to the infiltration rates of the subsoil, which has to be established. The land drains will be fitted with an overflow system to allow excess storm water to be directed into the main drainage runs.

e) Main Attenuation Tank – As noted above, extreme storm events will require a dedicated system to contain the storm water flows generated during a 1-in-100 year storm, increased by 20%. It is proposed to use a proprietary underground storage tank for this purpose. The tank will be placed under open spaces, not roads so the open space above can be enjoyed while not preventing the schemes ability to retain the storm water.

f) Low Water Usage Appliances – It is also worth highlighting that low water usage appliances will also be utilised to aid in the reduction of water usage on the development.

g) Oil Separator – Prior to final disposal of storm water from the main drainage network into the public system the stormwater will pass through an oil separator to remove any hydrocarbons which may have entered the network from car parking areas.

The combination of the above noted elements will allow the proposed development to adhere to the principles of sustainable drainage practices while enhancing overall storm water quality. Interception Storage shall be provided via the use of the green roofs on the apartment buildings and by the use of local drainage into landscaped areas & tree pits where applicable. This will allow both interception & treatment volumes from the proposed development to be provided for.

Foul Water

The proposed development is to consist of 750 and based on Irish Water guidelines, the foul effluent generated will be:

- ⇒ 446l/day per apartment (based on 2.7 persons per apartment x 150l/person/day, + a 10% increase factor).
- ⇒ 446 l/day/apt x 750 units = 334,500 l/day = 334.5 m3/day;
- ⇒ 3.87 l/sec Average flow (1 DWF);
- ⇒ 23.23 l/sec Peak Flow (6 DWF).

For the retail unit, creche and bar/café a flow of 6,000 l/day has been assumed, which will be approximately

- ⇒ 0.07 l/sec Average water demand;
- ⇒ 0.42 l/sec Peak water demand (6 times average water demand).

The drainage network for the development will be in accordance with Part H of the Building Regulations and to the requirements and specifications of Irish Water.

All foul effluent generated from the proposed development shall be collected in separate foul pipes and flow under gravity, to the existing 300mm diameter sewer on Park West Road. The proposed drainage infrastructure and routing plan is shown on CS Drawings **PWT-CSC-XX-XX-DR-C-0012/0013** included with this submission. A Pre-Connection Enquiry has been submitted to Irish Water based on the water demand for an initial proposed units. See the Engineering Services Report which accompanies this submission for details of same.

Flood Risk

The proposed development will not adversely affect the subject sites Flood Zone designation or alter same for the local environs. The scheme has been reviewed in accordance with the requirements of both the Local Authorities Site specific flood risk assessment requirements and the requirements of the Department of the Environment & Planning. The proposed scheme will not increase the potential for localized or off-site flooding. For a detailed breakdown of the flood risk assessment for the scheme refer to the Site Specific Flood Risk Assessment prepared by CS Consulting for this scheme and submitted with this application.

7.6 MITIGATION MEASURES

7.6.1 Construction Phase

The main potential impacts are associated with the Construction Phase of the proposed development. Mitigation measures relating to impacts outlined in the previous section are outlined below:

W-C1	Prior to construction the Contractor will be required to develop a Construction and Environmental Management Plan which will incorporate mitigation measures such as containment procedures, audit and review schedules and an Emergency Response Plan in the event of spills, flooding or other incidents that may contribute to pollution to water during construction.
W-C2	All batching and mixing activities will be located in areas away from watercourses and drains.
W-C3	Protection measures will be put in place to ensure that all materials used during the construction phase are appropriately handled, stored and disposed of in accordance with recognized standards and manufacturer's guidance.
W-C4	Surface water drainage around the batching plant will be controlled and washout from mixing plant will be carried out in a designated, contained impermeable area.
W-C5	Spills of concrete, cement, grout or similar materials will not be hosed into drains.
W-C6	Rainwater that accumulates on site will be discharged to the DCC sewer system.
W-C7	The Contractor will comply with the following guidance documents: i) CIRIA – Guideline Document C532 Control of Water Pollution from Construction Sites (CIRIA, 2001) ii) CIRIA – Guideline Document C624 Development and Flood Risk - guidance for the construction industry (CIRIA, 2004).
W-C8	Dewatering and surface water discharges on the site, during construction and prior to completion will be controlled. All necessary facilities will be incorporated such as settlement ponds/tanks, oil/grit interceptors with shut down valves, bunded oil storage tanks adjacent to a petrol interceptor for storage of any recovered oil. A monitoring programme including sampling for water quality before discharge to the Council sewer during construction will be carried out to ensure that only clean surface water is discharged to the receiving systems.

W-C9	The Contractor will make all necessary arrangements for a temporary water supply in agreement with Irish Water and or Dublin City Council, in addition temporary pumping of ground water to facilitate the proposed basement construction will be licensed by Dublin City Council and the water levels monitored.

7.6.2 Operational Phase

W-O1	Incidental surface run-off from underground basement car parks, compactor units and waste / service yard areas will be discharged into the foul drainage system. Grit / petrol / oil separators will be provided in all of the above areas to improve the quality of water discharging.
W-O2	The provision of flow control with storm-water attenuation will ensure the rate of discharge of surface water is limited to greenfield run-off rates of 2 litres/second/hectare with a total allowable surface water discharge of 10.8 litres/second in line with the recommendations of the Greater Dublin Regional Code of Practice for Drainage Works and the Greater Dublin Strategic Drainage Study.
W-O3	SuDS proposals will improve the quality and reduce the quantity of surface water discharging into the receiving system.
W-O4	Removal of the surface water from the existing combined sewers will reduce the hydraulic loading on the existing sewerage network and Waste Water Treatment Plant (WWTP) at Ringsend.

Moderate negative impacts during the construction phase will be short term only in duration. Implementation of the above measures will mitigate any significant long-term adverse impact.

7.7 PREDICTED IMPACTS

7.7.1 Construction Impacts

- Prior to construction the Contractor will be required to develop a Construction & Environmental Management Plan (CEMP) which will incorporate mitigation measures such as containment procedures, audit and review schedules and an Emergency Response Plan in the event of spills, flooding or other incidents that may contribute to pollution to water during construction.

- All batching and mixing activities will be located in areas away from watercourses and drains.

- Protection measures will be put in place to ensure that all materials used during the construction phase are appropriately handled, stored and disposed of in accordance with recognized standards and manufacturer's guidance.

- Surface water drainage around the batching plant will be controlled and washout from mixing plant will be carried out in a designated, contained impermeable area.

- Spills of concrete, cement, grout or similar materials will not be hosed into drains.

- Rainwater that accumulates on site will be discharged to the DCC sewer system.

- The Contractor will comply with the following guidance documents:
- CIRIA – Guideline Document C532 Control of Water Pollution from Construction Sites (CIRIA, 2001)
- CIRIA – Guideline Document C624 Development and Flood Risk - guidance for the construction industry (CIRIA, 2004).

- Dewatering and surface water discharges on the site, during construction and prior to completion will be controlled. All necessary facilities will be incorporated such as settlement ponds/tanks, oil/grit interceptors with shut down valves, bunded oil storage tanks adjacent to a petrol interceptor for storage of any recovered oil. A monitoring programme including sampling for water quality before discharge to the Council sewer during construction will be carried out to ensure that only clean surface water is discharged to the receiving systems.

- The Contractor will make all necessary arrangements for a temporary water supply in agreement with Irish Water and or Dublin City Council, in addition temporary pumping of ground water to facilitate the proposed basement construction will be licensed by Dublin City Council and the water levels monitored as outline sin the basement impact assessment.

7.7.2 Operational Phase

Surface Water

The provision of petrol/ oil interceptors and grease trays where required will ensure improved quality of surface water run-off from the development to the existing system. The provision of flow control with storm attenuation will ensure a reduced quantity of surface water discharging to the existing surface water sewerage system, therefore reducing the impact on the receiving system.

In addition, it is likely that the long term impact of the proposed development will be positive due to the removal of impacted made ground which can be a source of contamination.

Foul Water

No significant impact is expected to occur to the sewerage systems as a result of the proposed development. Any increase in discharge will be compensated by a reduction in the expected surface water runoff into the combined sewers from the redevelopment. The proposed layout and loading were vetted by Irish Water who deemed the local network, subject to up-grades could accept the increased volumes. Any required up-grades off site will be undertaken by Irish Water and their designated contractors. As noted in Irish Waters Pre-Connection Enquiry response contributions towards up-grades deemed required by Irish Water will form part of the connection agreement should planning permission be secured.

Water Supply

The development will result in additional demands on the public water network however the installation of low flow devices will minimise the impact of the development on the existing water supply network. The proposed layout and loading were vetted by Irish Water who deemed the local network, subject to up-grades could provide the increased volumes. As with all new development of the nature proposed, water saving devices and water metres to Irish Water requirements are proposed to be installed in the development.

7.8 ‘DO NOTHING’ SCENARIO

The “Do Nothing Impact” assesses the environmental impact of not redeveloping the proposed development site in respect of the existing impacts to water, hydrology and existing drainage and water supply systems at the proposed site.

Under the “Do Nothing Scenario” there would be no change in the current site and therefore the hydrology environment and the drainage systems and water supply would remain as is. However, as the proposed development will provide separate foul & storm water systems and the storm water system will have a fixed discharge rate for all storm water events. This will allow a reduced flow from the site during extreme storm events, thereby increasing the hydraulic capacity in the public drainage network.

7.9 WORST CASE SCENARIO

7.9.1 Construction Phase

A ‘worst case scenario’ during the construction phase of the proposed scheme would entail a loss of potable & drainage services to the surrounding community for a short period of time.

7.9.2 Operational Phase

From an operational standpoint post development, the worst-case scenario would be that capacity in the water supply and drainage services is curtailed and future development limited as the proposed scheme has reduced spare capacity in the local & regional infrastructure.

7.10 MONITORING AND REINSTATEMENT

7.10.1 Construction Phase

All on site monitor works connected to the proposed project will be under the prepared (and approved by Dublin City Council) construction plans. These plans will clearly outline the safety measures required to ensure that the proposed development is constructed in accordance with current best practice & legislative requirements.

7.10.2 Operational Phase

When the proposed development is complete, elements of the scheme will be under the maintenance control of different entities.

- Foul drainage & potable water infrastructure will be vested to Irish Water,
- Public Roads/Landscaping/elements of the housing units will be taken in charge by Dublin City Council,
- All remaining elements will be under the control of a private management company.

The various bodies noted above will take responsibility for the maintenance and operation of the facilities when complete.

7.11 DIFFICULTIES IN COMPILING INFORMATION

No difficulties were encountered while compiling this Chapter.

REFERENCES

In addition to the sources noted above the documents listed below were also consulted.

- Dublin City Development Plan 2016–2022;
- Dublin City Strategic Flood Risk Assessment, 2016 – 2022;
- Regional Code of Practice For development works, Version 6;
- Irish Waters Code of Practice for Water Infrastructure;
- Irish Waters Code of Practice for Wastewater Infrastructure;
- Greater Dublin Strategic Drainage Study;
- Office of Public Works Flood Maps;
- Department of the Environment Flooding Guidelines;
- Geological Survey of Ireland Maps;
- Local Authority/Irish Water Drainage Records.

8. AIR AND CLIMATE

8.1 INTRODUCTION

Byrne Environmental Consulting Ltd have assessed the potential air quality and climatic impacts that the project may have on the receiving environment during the construction and operational phases of the project.

The assessment includes a comprehensive description of the existing air quality in the vicinity of the subject site; a description and assessment of how construction activities and the operation of the development may impact existing air quality; the mitigation measures that will be implemented to control and minimise the impact that the development may have on local ambient air quality and reduce the impact on the local micro climate; and, finally, a description as to how the development will be constructed and operated in an environmentally sustainable manner.

8.2 METHODOLOGY

The general assessment methodology of the potential impact of the project on air quality and climate has been conducted in accordance with following legislation and guidance.

8.2.1 Legislation and Guidance

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018)
- Guidelines on information to be contained in Environmental Impact Assessment Reports (EPA, Draft 2017).
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Revised Guidelines on the Information to be Contained in Environmental Impact Statements (EPA 2015).
- Planning and Development Regulations 2001, as amended, in particular by the European Union (Planning & Development) (Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018).
- Environmental Impact Assessment of Projects – Guidance on the preparation of the EIAR, European Commission, 2017.
- Climate Action and Low Carbon Development Act 2015

8.2.2 Construction Impact Assessment Criteria

The Institute of Air Quality Management – Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014) classifies demolition and construction sites according to the risk of impacts and to identify mitigation measures appropriate to the risk.

The main air quality impacts that may arise are:
- Dust Deposition resulting in the soiling of surfaces
- Visible dust plumes, which are evidence of dust emissions
- Elevated PM10 concentrations as a result of dust generating activities on site
- Increase in airborne particles and NO2 from diesel fuelled site vehicles and plant

The risk assessment considers the following site activities and their associated potential impacts:

- Demolition activities
- Earthworks
- Construction works
- Trackout (vehicle movements)

The risk assessment considers the following dust related impacts:

- Annoyance due to dust soiling
- The risk to health from exposure to PM10
- Harm to Ecological receptors.

The magnitude of the potential dust emission requires the scale of the works to be classified as Small, Medium or Large.

8.2.3 Operational Impact Assessment Criteria

Once operational, the proposed residential development at Park West may impact on local air quality as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Air quality standards and guidelines are available from a number of sources. The guidelines and standards referenced in this report include those from Ireland and the European Union.

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit values as defined in Table 8-1.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011), which implement European Commission Directive 2008/50/EC which has set limit values for the pollutants SO2, NO2, PM10, benzene and CO. Council Directive 2008/50/EC replaces the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions are also made for the inclusion of new ambient limit values relating to PM2.5. The European 2008/50/EC Clean Air for Europe (CAFÉ) Directive is the current air quality directive for Europe which supersedes the European Directives 1999/30/EC and 2000/69/EC. The Directive is implemented by the Air Quality Standards Regulations 2011 which replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

In order to assess a wider range of air pollutants in the development area it is necessary to review current air quality monitoring data from published sources such as the most recent EPA's 2019 Annual report entitled Air Quality in Ireland. This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site in the Dublin Conurbation it is characterised as a Zone A area as defined by the EPA.

EU legislation on air quality requires that Member States divide their territory into zones for the assessment and management of air quality. The zones in place in Ireland in 2019 are as follows:

- Zone A is the Dublin conurbation,
- Zone B is the Cork conurbation
- Zone C comprising 23 large towns in Ireland with a population >15,000.
- Zone D is the remaining area of Ireland.

The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. Upper and lower assessment thresholds are prescribed in the legislation for each pollutant. The number of monitoring locations required is dependent on population size and whether ambient air quality concentrations exceed the upper assessment threshold, are between the upper and lower assessment thresholds, or are below the lower assessment threshold.

Table 8.1 Air Quality Standards

Pollutant	**Regulation**	**Limit Criteria**	**Tolerance**	**Limit Value**
Nitrogen Dioxide	2008/50/EC	Hourly limit for the protection of human health – not to be exceeded more than 18 times/year Annual limit for the protection of human health Annual limit for the protection of vegetation	40% until 2003 reducing linearly to 0% by 2010 40% until 2003 reducing linearly to 0% by 2010 None	200 µg/m3 40 µg/m3 400 µg/m3 NO & NO2
Lead	2008/50/EC	Annual limit for the protection of human health	100%	0.5 µg/m3
Sulphur Dioxide	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 24 times/year Daily limit for protection of human health – not to be exceeded more than 3 times/year Annual and Winter limit for the protection of ecosystems	150 µg/m3 None None	350 µg/m3 125 µg/m3 20 µg/m3
Particulate Matter PM10	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times/year	50% 20%	50 µg/m3 40 µg/m3

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
		Annual limit for the protection of human health		
Particulate Matter PM2.5 Stage 1	2008/50/EC	Annual limit for the protection of human health	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m3
Particulate Matter PM2.5 Stage 2	2008/50/EC	Annual limit for the protection of human health	None	20 µg/m3
Benzene	2008/50/EC	Annual limit for the protection of human health	20% until 2006. Decreasing linearly to 0% by 2010	5 µg/m3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m3
Dust Deposition	German TA Luft Air Quality Standard Note 1	30 Day Average	None	350 mg/m2/day

8.2.4 Climate Assessment Methodology

Climate has implications for many aspects of the environment from soils to biodiversity and land use practices. The proposed development may impact on both the macro-climate and micro-climate. The macro-climate is the climate of a large geographic area such as Ireland. The micro-climate refers to the climate in the immediate area.

With respect to microclimate, green areas are considered to be sensitive to development. Development of any green area is generally associated with a reduction in the abundance of vegetation including trees and a reduction in the amount of open, undeveloped space. The removal of vegetation or the development of man-made structures in these areas can intensify the temperature gradient.

To assess the impacts of converting vegetative surfaces to hard-standing with residential buildings and its significance, the amount of vegetative surfaces associated with the proposed development that will be converted to residential buildings and hard-standing has been considered.

The impact of the proposed scheme upon the macro-climate is assessed through the consideration of the change in CO2 emissions that will occur due to the changes in traffic flow that occur in response to the proposed scheme.

The Conference of the Parties to the Convention (COP23) occurred in November 2017 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The “Paris Agreement”, agreed by 200 nations, has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress has also been made on elevating adaption onto the same level as action to cut and curb emissions. The EU, on the 23/24th of October 2014, agreed the "2030 Climate and Energy Policy Framework" (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD) (2014), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2007a; 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO2, VOCs and NH3 but failed to comply with the ceiling for NOX (EEA, 2012). Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016.The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO2, NOX, NMVOC, NH3, PM2.5 and CH4. In relation to Ireland, 2020-29 emission targets are for SO2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH3 (1% reduction) and for PM2.5 (18% reduction). In relation to 2030, Ireland's emission targets are for SO2 (85% below 2005 levels), for NOX (69% reduction), for VOCs (32% reduction), for NH3 (5% reduction) and for PM2.5 (41% reduction).

The following guidelines and EU Directives relating to Climate Change aspects of EIA reports have been applied to this assessment in order to determine the potential impacts that the proposed development may have on climate change.

- 2017 EPA Guidelines on information to be contained in Environmental Impact Assessment Reports
- European Union (Planning & Development) (Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018)
- European EIA Directive 2014/52/EU
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.

8.2.5 Difficulties Encountered

No difficulties were encountered during the preparation of this chapter of the EIAR.

8.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

Existing ambient air quality in the vicinity of the site has been characterised with information obtained from site specific baseline air quality surveys for Nitrogen Dioxide and Sulphur Dioxide and by reviewing the EPA's 2019 Annual Report "Air Quality in Ireland". This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site, it is characterised as a Zone A area within the Dublin Conurbation as defined by the EPA.

8.3.1 Description of Existing Climate

EU2020 Strategy - EU's Effort Sharing Decision (ESD), 406/2009/EC1 address Ireland's GHG emissions, of which one of the biggest contributors is transport.

Long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP). Implementation of these are classed as a "With Additional Measures scenario" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario.

EPA - Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 10 Mt CO2eq under the "With Existing Measures" scenario and 9 Mt CO2eq under the "With Additional Measures" scenario (EPA, 2019c). There may be further up dates for 2020.

The nearest synoptic meteorological station to the subject site is at Dublin Airport which is located approximately 10km north of the proposed development site and as such, long-term measurements of wind speed/direction and air temperature for this location are representative of prevailing conditions experienced at the subject site. Recent meteorological data sets for Dublin Airport were obtained from Met Éireann for the purposes of this assessment study.

Rainfall
Precipitation data from the Dublin Airport meteorological station for the period 2011-2020 indicates a mean annual total of about 762 mm. This is within the expected range for most of the eastern half of the Ireland which has between 750 mm and 1000 mm of rainfall in the year.

Temperature
The annual mean temperature at Dublin Airport (2011-2020) is 9.5ºC with a mean maximum of 15.3ºC and a mean minimum of 4.0ºC. Given the relatively close proximity of this meteorological station to the proposed development site, similar conditions would be observed. Table 8.2 sets out meteorological data for Dublin Airport from 2011-2020.

Wind
Wind is of key importance for both the generation and dispersal of air pollutants. Meteorological data for Dublin Airport indicates that the prevailing wind direction, in the Dublin area, is from the West and Southwest and blows Northeast across the proposed development. The mean annual wind speed in the Dublin area between 2011 - 2020 is 5.7 m/s.

Table 8.2 Meteorological Data for Dublin Airport 2011-2020

Year	Period	Rainfall (mm)	Maximum mean Temperature (^{0}C)	Minimum mean Temperature (^{0}C)	Mean Temperature (^{0}C)
2011	Annual Mean	672	16.7	3.1	9.4
2012	Annual Mean	850	15.3	5.4	9.3
2013	Annual Mean	764	14.0	3.6	9.9
2014	Annual Mean	870	15.8	5.4	10.6
2015	Annual Mean	766	14.0	4.0	9.0
2016	Annual Mean	725	15.7	4.4	10.1
2017	Annual Mean	661	15.0	5.3	9.9
2018	Annual Mean	709	14.8	4.8	9.7
2019	Annual Mean	886	15.9	5.1	9.6
2020	Annual Mean	749	15.7	5.0	9.6
Mean		767	15.3	4.0	9.5

8.3.2 Description of existing air quality

Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality “Air Quality in Ireland 2019” (Published September 2020) details the range and scope of monitoring undertaken throughout Ireland. The Dublin Conurbation is categorised as Zone A.

The most recent 2019 EPA air quality data sets include a number of Zone A monitoring locations which would be comparable to the expected air quality at the subject site. The various Zone A air quality monitoring stations within Dublin provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

The Air Quality Standards Regulations 2011 specify a limit value of 40 µg/m3, for the protection of human health, over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Nitrogen Dioxide
Long term NO_2 monitoring was carried out at ten Zone A locations in 2019. The NO_2 annual mean in 2019 for these sites ranged from 15 - 43 µg/m3 compared against the annual average limit of 40 µg/m^3.

The monitoring of NO_2 during 2019 at St John Road in Dublin reported an exceedance (43ug/m^3) of the EU Air Quality Annual Limit of 40ug/m^3. The EPA 2019 Reports states that heavy road traffic along St John Road was the cause of the elevated concentrations of NO2.

Sulphur Dioxide
The Air Quality Standards Regulations 2011 specify a daily limit value of 125 µg/m^3 for the protection of human health. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term SO2 monitoring was carried out at four Zone A locations in 2019. The daily SO_2 daily means in 2019 for these sites ranged from 0.8 – 2.5 µg/m3. Therefore, 5-year long term averages were below the daily limit of 125 µg/m3.

The annual mean SO_2 concentrations in Ireland have being declining since 2003. This trend is reflective in the shift in fuel choice across Ireland in both residential heating and the energy production sector.

Carbon Monoxide
The Air Quality Standards Regulations 2011 specify an 8-hour limit value (on a rolling basis) for the protection of human health of 10,000 μg/m^3. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term CO monitoring was carried out at one Zone A location in 2019. The 8-hour CO concentrations was 0.2 – 0.3mg/m^3 which is below the 8-hour limit value (on a rolling basis) of 10 mg/m3.

Particulate Matter PM10
The Air Quality Standards Regulations 2011 specify a PM10 limit value of 40 μg/m^3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term PM10 monitoring was carried out at thirteen Zone A locations in 2019. The PM10 annual mean in 2019 for these sites ranged from 11 - 19μg/m^3. Therefore, long term averages were below the annual average limit of 40 μg/m^3.

Particulate Matter PM2.5
The Air Quality Standards Regulations 2011 specify a PM2.5 limit value of 25 μg/m^3 over a calendar year.

Long term PM2.5 monitoring was carried out at ten Zone A locations in 2019. The PM2.5 average in 2019 for these sites ranged from 8 - 11μg/m^3. Therefore, long term averages were below the target value 25 μg/m3.

Table 8.3 Summary of the 2019 Air Quality data obtained from Zone A area

Pollutant	**Regulation**	**Limit type**	**Limit value**	**EPA monitoring data 2019**
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 μg/m^3	15 – 43* μg/m^3
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health (not to be exceeded more than 3 times per year)	125 μg/m^3	0.8 – 2.5 μg/m^3
Carbon monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health (Zone C)	10,000 μg/m^3	300 μg/m^3
Particulate matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 μg/m^3	11 – 19 μg/m^3
Particulate matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 μg/m^3	8 - 11 μg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 μg/m^3	< 0.21μg/m^3

8.3.3 Baseline air quality monitoring

A site-specific short-term monitoring study was conducted at the site for Nitrogen Dioxide (NO_2) and Sulphur Dioxide (SO_2) and Benzene during August 2021. NO_2 and SO_2 and Benzene were measured at the western site boundary (A1) opposite Park West Avenue using a passive diffusion tube over a two-week period.

The monitoring locations were chosen in order to obtain short-term sample concentrations for the identified parameters from the principal sources of local pollution i.e. vehicle exhaust emissions and building heating fossil fuel emissions.

The survey was indicative only and results obtained cannot be used to demonstrate compliance with short-term or annual limit values detailed in Table 8.1 above. The survey does, however, aid in identifying the influence of sources in the vicinity of the proposed development site. The results from the baseline air quality surveys are presented in Table 8.4 The concentrations of SO_2, NO_2 and BTEX measured during the short-term measurement survey were below their respective annual limit values and comparable with levels reported by the EPA.

Table 8.4 Results of site specific air quality monitoring at the development site

Pollutant	Location A1 Western Site Boundary	Assessment criteria
Sulphur dioxide	<1.56 ug/m^3	125 µg/m^3 (as annual average)
Nitrogen dioxide	11.54 ug/m^3	40 µg/m^3 (as annual average)
Benzene	1.78 ug/m^3	5 ug/m^3 (as annual average)

Review of EPA modelled NO2, PM10 and PM2.5 along M50 Motorway

The EPA's unified GIS Framework provides traffic emission data based on traffic volumes and the proximity of receptors to the source.

The EPA data detailed in Table 8.5 indicates that air quality at the Park West site are below the Air Quality Standards for NO^2, PM10 and PM2.5.

Table 8.5 EPA GIS Traffic emissions data for Park West

Pollutant	Limit type	Limit value	EPA GIS data
Nitrogen dioxide	Annual limit for protection of human health	40 µg/m^3	<28 µg/m^3
Particulate matter (as PM_{10})	Annual limit for protection of human health	40 µg/m^3	<12 µg/m^3
Particulate matter (as $PM_{2.5}$)	Annual limit for protection of human health	25 µg/m^3	7-8 µg/m^3

8.3.4 Significance

Based on published 2019 EPA air quality data for the Zone A (Dublin) area in which the subject site is located together with site specific monitoring data and a review of the EPA's GIS Framework modelling data, it may be concluded that the existing baseline air quality at the subject site may be characterised as being good with no exceedances of the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) limit values of individual pollutants. There is therefore currently sufficient atmospheric budget to accommodate the development without adversely impacting existing ambient air quality. The quality of existing air quality at the subject site must be maintained and improved where possible as a result of the proposed development to ensure that local human health and the ecological environment is not adversely affected.

8.3.5 Sensitivity

The subject site shall be developed by ground clearance and site preparation works and the subsequent construction of the apartment buildings, a creche, other small scale commercial uses and open landscaped areas. The principal local receptors that may be impacted by the development are existing residential areas to the north (Cherry Orchard Court) and to the west (The Crescent) of the site.

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following detail is relevant to the assessment in this Chapter.

The construction phase of the development has the potential to generate short term fugitive dust emissions and engine exhaust emissions associated with construction vehicles and plant. However, these emissions will be controlled by appropriate mitigation techniques and through the implementation of a construction phase air quality management and monitoring plan throughout the duration of the construction phase. The predicted construction phase residual impacts on air quality and climate will be negative, not-significant and short-term.

The construction phase will involve the removal of green space and trees from its current greenfield status to facilitate the development of a residential development. The development will include the planting of trees appropriate to the local area.

The operational phase of the development will see the functioning of modern, well insulated thermally efficient buildings in which energy efficiency shall be achieved by implementing sustainable features into the development's buildings and infrastructure design. The proposed development has been designed to minimise the impact on climate where possible in line with the most recent development guidelines (Nearly Zero Energy Building (NZEB) Part L of the Building Regulations, 1997 to 2020) and in reference to measures within the National Mitigation Plan. The design of the residential units will ensure their operation will have a minimum impact on the receiving climate and that their design will withstand future potential extreme weather events associated with climate change.

The predicted impacts of domestic heating and traffic generated air pollutants associated with the development will not exceed the ambient air quality standards and the impact of the development on ambient air quality and climate been determined to be imperceptible and long-term.

The inclusion of climate friendly design and the promotion of more sustainable modes of transport such as public transport, cycling and walking will benefit climate in the long term.

8.4.1 Potential Impacts of the proposed development

Various elements of the construction phase of the proposed development have the potential to impact on the receiving environment, local ambient air quality and on human health. The likely potential impacts associated with the construction of the proposed scheme prior to mitigation are described in this section. The mitigation and monitoring measures are described and the residual impacts with the development in place and the mitigation measures incorporated are detailed in Section 8.5.

The Institute of Air Quality Management – Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014) classifies demolition and construction sites according to the risk of impacts and to identify mitigation measures appropriate to the risk. The main air quality impacts that may arise are:

- Dust Deposition resulting in the soiling of surfaces
- Visible dust plumes, which are evidence of dust emissions
- Elevated PM10 concentrations as a result of dust generating activities on site
- Increase in airborne particles and NO2 from diesel fuelled site vehicles and plant

The risk assessment considers the following site activities and their associated potential impacts:

- Demolition activities
- Earthworks
- Construction works
- Trackout (vehicle movements)

The risk assessment considers the following dust related impacts:

- Annoyance due to dust soiling
- The risk to health from exposure to PM10
- Harm to Ecological receptors.

The magnitude of the potential dust emission requires the scale of the works to be classified as Small, Medium or Large which are defined as follows:

Earthworks

Large	Site Area >10,000m2 Potentially dusty soil prone to suspension (eg clays)>10 earth moving vehicles operating simultaneously
Medium	Site Area 2500m2 – 10,000m2moderately dusty soil (eg silts)5- 10 earth moving vehicles operating simultaneously
Small	Site Area <2500m2Large grain size (eg sands)<5 earth moving vehicles operating simultaneously

Large Volume >1000m2

Table 8.6 Risk of Dust Impacts during Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Low Risk

Construction Works

Large	Total Building Volume >100,000m3
Medium	Total Building Volume 25,000m3 - 100,000m3
Small	Total Building Volume <25,000m3
Building Volume	Medium Volume 24,000 - 100,000m2

Table 8.7 Risk of Dust Impacts Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Low Risk

Trackout

Large	>50 HGV outward movements per day of potentially dusty clays on unsealed road >100m
Medium	10 - 50 HGV outward movements per day of potentially dusty clays on unsealed road 50 - 100m
Small	<10 HGV outward movements per day of potentially dusty clays on unsealed road >50m
Large Volume	<50 HGV/day

Table 8.8 Risk of Dust Impacts Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Low Risk

The dust risk assessment for soiling, health and ecology completed for each of the four aspects of dust emissions has been determined from the characteristics of the development as detailed above. Table 8.9 presents the dust risk for each aspect.

Table 8.9 Dust Risk Assessment to Define Site-Specific Mitigation Measures

Sensitivity of Area High	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Soiling	Low Risk	High Risk	High Risk	High Risk
Human Health	Low Risk	High Risk	High Risk	High Risk
Ecology	Low Risk	Medium Risk	Medium Risk	Medium Risk

In order to reduce the risk that generated dusts and particulate matter as PM10 may have on the receiving environment, an appropriately high degree of mitigation measures will be required for the duration of the construction phase.

The German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m2*day) averaged over a one month period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Health & Local Government (DOEHLG, 2004) apply the Bergerhoff limit value of 350 mg/(m2*day) to the site boundary of quarries. This limit value can also be implemented with regard to potential dust impacts from construction of the proposed development.

In relation to construction related traffic, air quality significance criteria are assessed on the basis of compliance with the appropriate standards air limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

8.4.2 Construction Phase Ecological Impacts

For routes that pass within 2 km of a designated area of conservation (either Irish or European designation) the TII requires consultation with an Ecologist (2011). However, the TII guidance (2011) states that in practice the potential for impact to an ecological site is highest within 200 m of the proposed scheme and when significant changes in AADT (>5%) occur.

Transport Infrastructure Ireland's Guidelines for Assessment of Ecological Impacts of National Road Schemes (2009) and Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition shall be conducted:

- A European designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

There are no designated areas of conservation within 200m of the development site therefor an assessment of the impact of the proposed development on NOx concentrations and nitrogen deposition is not required.

8.4.3 Potential Operational Phase Impacts

8.4.3.1 Air Quality Impacts

The operational phase of the proposed development has the potential to have a neutral impact on local air quality as a result of the sustainable requirements for new buildings.

Traffic movements associated with the development have been evaluated and assessed as part of the Transport Assessment prepared by Cronin & Sutton Consulting.

The results of the NO_2 impact have been determined using the UK DEFRA methodology and a Road NO_2 value of 1.91ug/m3 has been determined giving a Total NO_2 value of 9.61 ug/m3. These values are below the Air Quality Standards Regulations 2011 40ug/m3 limit value for the protection of human health and the 30ug/m3 for the protection of vegetation. The impact will be long-term, localised, neutral and imperceptible.

8.4.3.2 Climate Impacts

The overall site area of the development lands is c. 9.4 hectares will include open space, and landscaped areas. The overall development includes the construction of buildings and roadways which may have the potential effect of marginally raising localised air temperatures, especially in summer.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change and vehicle exhaust emissions may have a potential to impact the macro-climate.
Climate change has the potential to alter weather patterns and increase the frequency of rainfall. The subject site is located within flood Zone C which details the probability of flooding occurring at less than 0.1% and there is no history of flooding on site. Adequate attenuation and drainage have been provided for to account for increased rainfall in future years associated with Climate Change as part of the design of this development. Therefore, the impact will be long-term, localised, neutral and imperceptible.

8.5 MITIGATION MEASURES

8.5.1 Construction Phase

AC-C1	Water dampening on exposed surfaces Screening of building during demolition to contain dust. Cleaning of local roads. Vehicle/Plant engines shall be turned off when not in use. Vehicle/Plant engines shall be maintained to ensure efficient operation. Mains power shall be utilised for Site Offices instead of generators.
AC-C2	A programme of dust deposition monitoring shall be initiated prior to the commencement of demolition works. A complaints management procedure shall be developed prior to the commencement of works.

8.5.2 Operational Phase

AC-01	Energy Efficiency – All residential units shall be designed and constructed in accordance with The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.
AC-02	U-values for floor and roof will exceed the building regulation backstops
AC-03	Mechanical extract ventilation with heat recovery via heat pump
AC-04	Provision of e-Vehicle charging points for residents
AC-05	Shrub planting with rain garden
AC-06	Bio-Retention Planting

AC-07	Green Roofs
AC-08	10% of parking spaces shall have electric charging points
AC-09	Installation of Photovoltaic Panels on building roofs

8.6 RESIDUAL IMPACTS

8.6.1 Construction Phase - Air Quality and Climate

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, human health and climate. However, the potential construction phase impacts shall be mitigated and monitored to ensure there is no adverse impact on ambient air quality for the duration of all construction phase works. It is predicted that the construction phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or on local human health or on the local micro-climate or the wider macro-climate.

Table 8.10 summarises the identified likely residual effects of the proposed development during the construction phase post application of mitigation measures.

Table 8.10 Summary of Construction Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction Phase Air Quality	Negative	Slight	Local	Likely	Short-Term	Residual
Construction Phase Climate	Negative	Imperceptible	Local	Likely	Short-Term	Residual

8.6.2 Operational Phase - Air Quality

The sustainable features that are incorporated into the design of all residential units will ensure that the operational phase of the development will not have an adverse impact on human health, local air quality or on local or global climate patterns. The residential units will be designed to ensure that they can withstand the potential changes in climate which may generate more extreme and prolonged meteorological events in the future.

It is predicted that fossil fuel combustion gas emissions including Carbon Dioxide, Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide and hydrocarbon particulate emissions will be slight and will not have an adverse significant impact on the existing ambient air quality in the vicinity of the proposed development site.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change, however, vehicle exhaust emissions generated from vehicles associated with the development will have a negligible impact on the macro-climate given modern technological developments in cleaner and more efficient vehicle engines. Current trends suggest that vehicle manufacturers are ceasing the manufacture of large diesel engines for private cars and instead adopting hybrid engine and all electric technologies which will contribute to the reduction of engine exhaust emissions including particulate matter, Nitrogen Oxides, Sulphur Dioxide, Carbon Dioxide and Carbon Monoxide.

To further reduce the climatic impact of the operational phase of the development, electric vehicle charging points shall be installed in dedicated parking spaces and cycle parking shall be provided to facilitate residents who own electric vehicles and to encourage other residents to purchase electric vehicles.

The development has been designed to provide thermally efficient buildings which will reduce the consumption of fossil fuels within each individual dwelling. This will reduce the impact the operational phase of the development will have on the micro and macro climate. In particular, there will be no “traditional” passive air vents in the apartments which are both thermally and acoustically inefficient.

Exhaust Air Heat Pump systems shall be incorporated into the design of all units. These efficient energy reducing systems together with thermally rated window sets will reduce the potential future impacts that the external climate will have in terms of wind and changing temperatures on the internal environment within the residential units. These design features will ensure the units are thermally efficient thus reducing the use of fossil fuels leading to a reduction of the impact on the micro and macro climate.

The thermal efficiency of the buildings will ensure that the development will be sustainable and will be protected against the impacts of future climate change which may include storm events and prolonged colder periods during the winter season. These factors will contribute to reducing the impact the operational development has on the local and global climate which will ultimately contribute in a positive manner in reducing the impact on local and further afield human health.

Table 8.11 Summary of Operational Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Phase Air Quality	Neutral	Imperceptible	Local	Likely	Long-Term	Residual
Operational Phase Climate	Neutral	Imperceptible	Local	Likely	Long-Term	Residual

8.7 CUMULATIVE IMPACTS

The cumulative air quality impact of the proposed Park West development, together with other existing developments and existing and future local transport infrastructure is assessed with regard to having established the baseline air quality and then predicting the impact that the proposed development will have on the baseline air quality. Together the combined impact can be assessed to determine if there is sufficient “atmospheric budget” to facilitate the proposed development.

8.7.1 Do Nothing Impact

Should the subject development not proceed, it is likely that another residential development may be applied for in the future as the subject site is zoned for residential development. Should the site remain undeveloped it will continue to have no impact on local air quality or on the local climate.

8.7.2 Risk To Human Health

It has been predicted that there will be a negligible impact on local air quality as a result of traffic movements associated with the proposed development. National and European Air Quality Standard limit criteria designed for the protection of human health will not be exceeded. The operational phase impact associated with traffic movements will be long-term, localised, neutral and imperceptible.

8.8 MONITORING

8.8.1 Construction Phase

AC-M1	A programme of dust deposition monitoring shall be initiated prior to the commencement of construction works. A complaints management procedure shall be developed prior to the commencement of construction works.

8.8.2 Operational Phase

Monitoring is not required for the Operational Phase of the development.

8.9 INTERACTIONS

The principal interactions between Air Quality and Climate, Human Beings, Biodiversity and Traffic have been addressed in this chapter.

REFERENCES

- Air Quality Regulations 2011, SI 180 of 2011
- European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018).
- Environmental Impact Assessment of Projects – Guidance on the preparation of the EIAR, European Commission, 2017.
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- Environmental Protection Agency, 2017 Draft Guidelines on information to be contained in Environmental Impact Assessment Reports.
- Environmental Protection Agency, 2002, 2015. Guidelines on the Information to be Contained in Environmental Impact Statements
- Environmental Protection Agency, 2020. Air Quality in Ireland 2019 – Key Indicators of Ambient Air Quality
- The Institute of Air Quality Management – Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)
- European Union Directive (2008/50/EC).
- German Federal Government Technical Instructions on Air Quality Control - TA Luft 2002
- German Standard Method for determination of dust deposition rate, VDI 2129.
- Greater London Authority – The Control of dust emissions from construction and demolition – Best Practice Guidelines, Nov 2006.

- Transport Infrastructure Ireland (TII) 2011 Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes Revision 1.
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings
- EPA 2019 Air Quality in Ireland

9 NOISE AND VIBRATION

9.1 INTRODUCTION

This section of the EIAR has been prepared by Byrne Environmental Consulting Ltd to identify and assess the potential noise and vibrational impacts associated with the proposed Strategic Housing Development at Park West, Dublin 12 during both the Construction and Operational Phases of the development.

This section includes a comprehensive description of the receiving ambient noise climate in the vicinity of the subject site; a description of how the construction and operational phases may impact the existing ambient noise climate, the mitigation measures that shall be implemented to control and minimise the impact that the development may have on ambient noise levels and the proposed acoustic design features required to minimise the impact of external noise sources on the residential units.

The mitigation measures designed for the development demonstrate how the development will be constructed and operated in an environmentally sustainable manner in order to ensure its minimal impact on the receiving noise climate and to provide adequate sound insulation in residential units from external sound sources and adjoining residential properties.

9.2 STUDY METHODOLOGY

The general assessment methodology of the potential noise and vibrational impacts that the proposed development will have on the receiving environment has been prepared in accordance with and with reference to:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2017 Draft)
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Advice Notes for Preparing Environmental Impact Statements (EPA, 2015, Draft)
- Development Management Guidelines (DoEHLG, 2007).
- Planning and Development Regulations 2001, as amended by European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018.
- IOA/ANC ProPG:Planning & Noise-New Residential Development, May 2017

9.2.1 Noise Assessment Methodology

Baseline Environment

The existing ambient noise climate in the vicinity of the site has been characterised with information obtained from site specific baseline noise surveys conducted in the vicinity of the closest noise sensitive receptors to the subject site. Baseline noise surveys were conducted in accordance with ISO 1996-1: 2017: Acoustics – Description, measurement and assessment of environmental noise and with regard to the EPA’s 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

The EPA' Round 3 2017 Strategic Noise Mapping of Road and Rail was reviewed to establish the specific impact that transportation related noise sources have on the Park West site.

9.2.2 Inward Noise Impact Assessment Methodology

The impact of the proposed development has been determined through prediction of future noise levels associated with the scheme using established calculation techniques.

Construction noise and vibration impacts have been assessed in accordance with Transport Infrastructure Irelands (TII) guidance document Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014). Indicative construction noise calculations have been undertaken using the methodology set out in BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise 2009+A1 2014.

Impacts associated with road traffic movements on the development when operational have been assessed with regard to the NRA's Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014). UK Department of Transport (Welsh Office) - Calculation of Road Traffic Noise [CRTN] and the Highways Agency Design Manual for Roads and Bridges Part 7 HD 213/11 – Revision 1 Noise and Vibration.

The operational phase of the development has been assessed with regard the Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound. Acoustic design of apartments refers to the 2018 Ministerial Guidelines "Sustainable Urban Housing – Design Standards for New Apartments. Paragraph 1.18 of the document refers specifically to the Building Regulations Technical Guidance Documents and states that the construction of the apartment building shall comply with all relevant requirements.

The inward noise impact that the external environment has been assessed with regard to Professional Guidance on Planning & Noise (ProPG), (IoA/ANC, 2017).

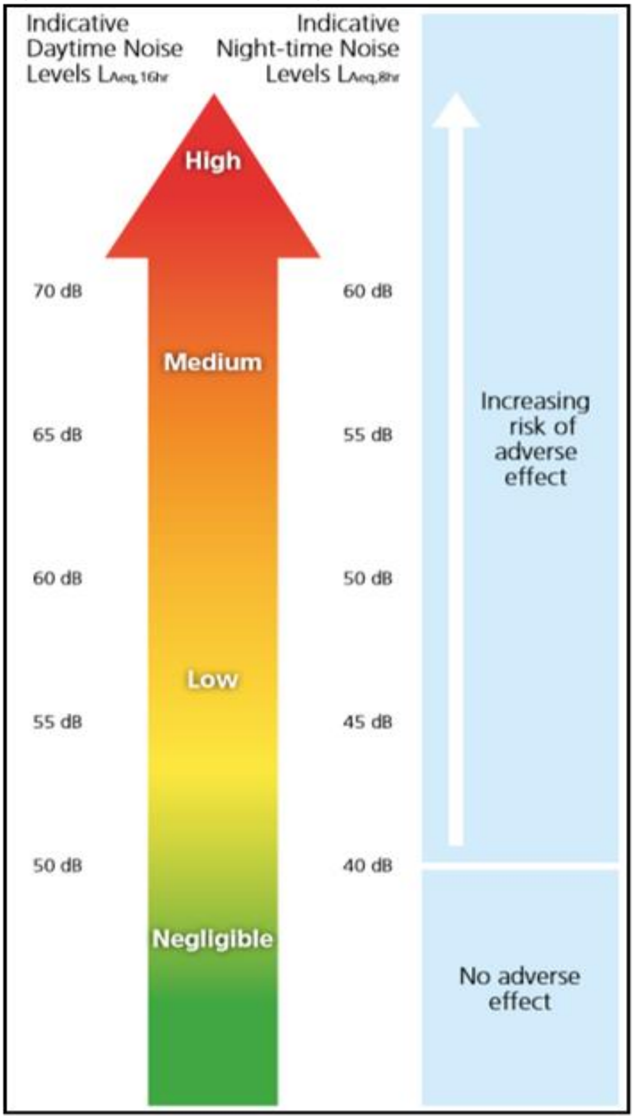
The Professional Guidance on Planning & Noise (ProPG) document May 2017 was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH) has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
Element 1 - Good Acoustic Design Process;
Element 2 - Noise Level Guidelines;
Element 3 - External Amenity Area Noise Assessment
Element 4 - Other Relevant Issues

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 9.1 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

Figure 9.1 ProPG Stage 1 Initial Risk Assessment



A site should not be considered a negligible risk if more than 10dB(A) LAFmax events exceed 60 dB during the night period and the site should be considered a high risk if the LAFmax events exceed 80 dB more than 20 times a night.

With regard to the ProPG risk assessment conducted based on the baseline noise assessment, the development site may be classified as having a low risk in terms of the existing low-noise climate at the site, that is, there are no adverse pre-existing noise sources in proximity to the development site which may impact the residential units once developed and occupied by residents.

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 9.1 and are based on annual average data levels.

Table 9.1 ProPG Internal Noise Levels

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$ 45 dB L_{AFmax}

9.3.3 Construction Impact Assessment Criteria

9.3.3.1 Construction Noise

This section describes the methodologies used to assess the outward noise impact that the construction and operational phases of the proposed development may have on the receiving environment including local receptors.

The construction noise limits which are presented in Table 9.2 are specified in British Standard BS 5228 – 1:2009+A1 2014 Code of practice for noise and vibration control on open sites: Part 1 Noise and are based on the noise measured at the external façade of a receptor.

BS5228 states that noise sensitive receptors (houses) are designated a category based on existing ambient noise levels. Each category is then assigned with a noise limit value.

Category A	Threshold values when ambient noise levels are less than these values.
Category B	Threshold values when ambient noise levels are the same as the Category A values.
Category C	Threshold values when ambient noise levels are higher than the Category A values.

Table 9.2 Threshold of Potential Significant Effect at Dwelling

Category and Threshold Value Period LAeq dB(A)	Category A	Category B	Category C
Night 23:00 – 07:00	45	50	55
Evening 19:00 - 23:00 & Weekends	55	60	65
Day 07:00 – 19:00 & Sat 07:00 – 13:00	65	70	75

9.3.3.2 Construction Vibration

Construction related vibrational impacts have been assessed in accordance with BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Ground borne Vibration and BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014.

Table 9.3 details the limits above which cosmetic damage could occur for transient vibration. Minor damage is possible at vibration magnitudes which are greater than twice those shown in Table 9.3 and major damage to a building structure would only generally occur at values greater than four times the tabulated values. These values only relate to transient vibration. If there is a continuous vibration, the guide values shown in Table 9.3 shall be reduced by up to 50%.

Table 9.3 Transient vibration guide values for cosmetic damage

Type of building	PPV (mm/s) in frequency range of predominant pulse	
	4-15Hz	15Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50mm/s at 4Hz and above.	50mm/s at 4Hz and above.
Unreinforced or light framed structures. Residential or light commercial buildings.	15mm/s at 4Hz increasing to 20mm/s at 15Hz.	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above.

Table 9.4 Guidance on the effect of construction vibration levels on humans

Vibration Level (PPV)	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30mm/s	Vibration might be just perceptible in residential environments.
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

9.3.4 Operational Impact Assessment Criteria

A change in traffic noise of less than 2dBA is generally not noticeable to the human ear whilst a change of 3dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 5 dBA would however be noticeable and, depending on the final noise level, there may be a slight or moderate noise impact. Changes in noise level in excess of 6dBA would be clearly noticeable, and depending on the final noise level, the impact may be moderate or significant. However, a significant change in traffic volumes or traffic category i.e. increase in the use of a road by HGVs, would be required to result in such increases.

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB LA10,18h is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB LA10,18h is equivalent to a 100% increase or a 50% decrease in traffic flow.

Traffic noise levels in excess of 60dBA (Lden) are considered to be potentially intrusive. LDEN is the day-evening-night composite noise indicator for assessing overall noise annoyance. For new roads projects the National Roads Authority design goal is to mitigate when predicted levels exceed 60dB Lden. However, for existing roads the Dublin Agglomeration, within the Noise Action Plan, have set a level of 70dB (Lday) and 55dB (Lnight) above which mitigation measures should be considered.

Relative impact assessment criteria associated with road traffic noise is set out in Table 9.5 below.

Table 9.5 Likely impact associated with change in traffic noise level.

Change in sound level (L_{10})	Subjective reaction	Impact
<3	Inaudible	Imperceptible
3-5	Perceptible	Slight
6-10	Up to a doubling of loudness	Moderate
11-15	Over a doubling of loudness	Significant
>15		Profound

9.3.5 Vibration Assessment Methodology

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

Construction impacts have been assessed in accordance with BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration and BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014.

Operational impacts have been assessed in accordance with the Transport Infrastructure Ireland, TII Guidelines for the Treatment of Noise & Vibration in National Road Schemes, 2014.

9.3.6 Construction Impact Assessment Methodology

The predicted construction noise levels that will be experienced at the nearest receptors as a result of construction activities have been calculated using the activity LAeq method outlined in BS 5228 1:2009+A1 2014 – Code of Practice for noise and vibration control on construction and open sites – Part 1 Noise.

9.3.7 Operational Impact Assessment Methodology

Impacts associated with road traffic movements associated with the operational development have been assessed with regard to the UK Department of Transport (Welsh Office) - Calculation of Road Traffic Noise [CRTN] and the Highways Agency Design Manual for Roads and Bridges Part 7 HD 213/11 – Revision 1 Noise and Vibration.

9.3.8 Difficulties Encountered

No difficulties were encountered during the preparation of this Chapter of the EIAR.

9.4 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The site is located in an area which includes, retail, commercial and residential development and with a high volume of road traffic along the local road network and on the M50 Motorway further west of the site throughout the day. Ambient noise levels reflect the nature of the existing noise climate which is typical of a busy urban environment.

9.4.1 Baseline environmental noise survey

Baseline noise measurement surveys were conducted at off-site residential receptors N1 & N2 and at site boundary locations N3 – N5 and as shown in Figure 9.2 between 7th – 9th September 2021 when CV19 restrictions were lifted, schools were back in term and normal traffic movements were occurring on local transport infrastructure.

9.4.2 Noise Measurement locations

Figure 9.2 Baseline Noise (N1-N5) and Vibration (V1) Monitoring Locations

9.4.3 Baseline noise measurement results

The following tables detail the results of the baseline noise surveys.

Table 9.6 Location N1 Cherry Orchard

Period 07.09.21 N1	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 09:30 – 12:30hrs 3-hr period	62	65	57	93
Nightime period 23:00 – 00:00hrs 1-hr period	56	60	53	91

The noise climate at N1 is dominated by train movements. Road traffic is audible from Park West Avenue.

Recorded vibration levels were negligible <0.100mm/sec PPV during the survey period at Location N1.

Table 9.7 Location N1 Crescent Apartment Building

Period 07.09.21 N2	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 13:05 – 16:05hrs 3-hr period	64	68	60	80
Nightime period 00:30 – 00:30hrs 1-hr period	60	63	57	82

The noise climate at N2 is dominated by road traffic on Park West Avenue

Table 9.8 Location N3 Northern site boundary

Period 09.09.21 N3	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,16hr}$	$L_{Aeq, 8\text{-}hour}$	L_{A90}	L_{AMax}
Daytime period 24-hr period	67	61	60	80

The noise climate at N3 is dominated by train movements and road traffic noise on Park West Avenue

Table 9.9 Location N4 Eastern site boundary

Period 08.09.21 N4	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 13:50 – 16:450rs 3-hr period	59	65	61	82
Nightime period 23:30 – 00:30hrs 1-hr period	52	49	53	79

The noise climate at N4 is influenced by activities and vehicle movements in the adjacent Industrial Estate.

Table 9.10 Location N5 Western Site Boundary

Period 08.09.21 N4	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,16hr}$	$L_{Aeq, 8\text{-}hour}$	L_{A90}	L_{AMax}
Daytime period 24-hr period	65	60	59	78

The noise climate at N5 is dominated by road traffic on Park West Avenue

9.4.4 Significance

It may be concluded that the impact of road traffic noise along the western site boundary and rail noise along the northern site boundary result in a ProPG Risk assessment category of Medium in the daytime and high in the nightime periods which means that the site is likely to be acceptable from a noise perspective provided that good acoustic design process is followed.

9.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following detail is relevant to the assessment in this Chapter.

The short-term outward noise impact during the construction phase must be managed and controlled to acceptable levels. There are a number of existing noise sensitive receptors located in proximity to the development site boundaries. It is fundamental that the proposed development or any aspect of the proposed development must not adversely impact the existing noise levels experienced at these receptors during both the short-term construction phase and the long-term operational phase.

9.6 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

9.6.1 Construction Impacts

The predicted construction noise levels that will be experienced at the nearest receptors as a result of demolition and construction activities have been calculated using the activity LAeq method outlined in BS 5228 1:2009+A1 2014 – Code of Practice for noise and vibration control on construction and open sites – Part 1 Noise.

Tables 9.11 to 9.13 detail the typical plant items to be used during the construction phases with the associated source reference from BS 5228: 2009+A1 2014.

Table 9.11 Predicted construction noise associated with Site Excavation works

Plant Item	BS 5228 Reference	Construction Noise Level L_{Aeq} dB
Tracked Excavator 1	C.4 Ref 76	79
Tracked Excavator 2	C.2 Ref 29	79
Articulated dump truck	C.2 Ref 33	81
Dozer	C.2 Ref 11	79
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ at N1 @ 50m	60	
$L_{Aeq,1hr}$ at N2 @ 40m	63	

Table 9.12 Predicted construction noise predictions associated with Piling works

Plant Item	BS 5228 Reference	Construction Noise Level LAeq dB
Rotary Piling	C.3 Ref 14	83
Concrete Pump	DC.3 Ref 25	78
Tracked Excavator	C.2 Ref 29	79
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ at N1 @ 50m	63	
$L_{Aeq,1hr}$ at N2 @ 40m	66	

Table 9.13 Predicted construction noise predictions associated with building construction works

Plant Item	BS 5228 Reference	Construction Noise Level LAeq dB
Generator (enclosed)	C.4 Ref 76	61
Dumper truck	c.4 Ref 4	76
Tracked Excavator	C.2 Ref 29	79
Lorry	C.2 Ref 34	80
Telescopic handler	C.4 Ref 54	79
Cement mixer truck pumping concrete	C.4 Ref.25	82
Tower Crane	C.4 Ref.48	76

Plant Item	BS 5228 Reference	Construction Noise Level LAeq dB
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ at N1 @ 50m	61	
$L_{Aeq,1hr}$ at N2 @ 40m	63	

The results of the assessment conclude that provided all mitigation measures including site hoarding are implemented, the BS5228 guidance construction day time noise limit of 75dB LAeq, 11hr can be complied with at the closest off-site residential receptors to the north and west of the site during site enabling, excavation, piling and general construction works.

Construction Traffic Noise

The maximum volume of construction traffic will be associated with the bulk excavation which will include up to 70 HGV movements per day on the haul routes to and from the site along public roads, the resulting average predicted traffic noise level at the closest receptors is calculated as follows:

The predicted noise levels at any receptor located within 5m of the haul route road has been calculated using a standard international acoustical formula as described below.

LAeq, T = SEL + 10log10(N) - 10log10(T) + 20log10(r1/r2) dB
where

LAeq, T	is the equivalent continuous sound level over time period (T) (3600 sec);
SEL	is the A weighted Sound Exposure Level of the noise event (77dB);
N	is the number of events over the time period T (70);
r1	is the distance at which SEL is assessed (5m)
r2	is the closest distance to the receptor from the road (10m)

The calculations are based on a 10-hour working day a maximum, a Sound Exposure Level of 77dBA for the trucks and the minimum distance between the local road passing by each of the nearest noise sensitive receptors to the public road (10m). No attenuation, above geometric spreading, has been considered within these calculations may be considered the worst case scenario.

The maximum predicted LAeq, period values as a result of the HGV traffic movements at the nearest noise sensitive receptors located along the haul route roads is predicted to be 54dBA, LAeq, period.

It is predicted that the predicted short-term increase in HGV movements associated with the construction phase of the development will not have an adverse impact on the existing noise climate of the wider area or on local receptors.

Construction Generated Vibration

The most significant potential sources of ground borne vibrations that may be generated during the construction phase of the development will be generated if tunnelling works below the Irish Rail track at the northern site boundary occur. A works-specific vibration monitoring plan will be developed in conjunction with Irish Rail should these works occur in the future.

It is predicted that vibration levels associated with construction activities at the closest receptors to the site will not exceed 7.5mm/sec PPV.

Human response to groundbourne vibrations will be perceptible at levels between 0.14 to 1.0 mm/sec PPV.

9.6.2 Operational Phase

The operational phase of the development will not adversely impact the existing noise climate at local receptors.

The assessment of the UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB LA10,18h is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB LA10,18h is equivalent to a 100% increase or a 50% decrease in traffic flow.

The increase in traffic associated with the development will not increase baseline traffic levels by more than 22%, thus the associated noise impact will be less than 3dB(A) which will be imperceptible.

9.6.3 Vibration

There will be no operational phase vibrational impacts.

9.6.4 'Do Nothing' Scenario

If the development does not proceed, the subject site will have no impact on the receiving noise climate of the area.

9.7 CUMULATIVE IMPACTS

There are no cumulative noise or vibration impacts predicted for either the construction or operational phases of the development.

9.8 MITIGATION MEASURES

9.8.1 Construction Phase

NV-C1	During the construction phases, the appointed Contractor will implement best practice noise mitigation and control methods and manage the works to comply with noise limits outlined in BS 5228-1:2009+A1 2014. Part 1 – Noise
NV-C2	Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
NV-C3	Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
NV-C4	A comprehensive programme of continuous live noise monitoring shall be conducted at the site boundaries in proximity to noise sensitive receptors for the duration of the demolition and construction phases
NV-0C	Erection of good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level;

NV-C6	Erection of barriers as necessary around items such as generators or high duty compressors; and situate high noise plant as far away from sensitive properties as permitted by site constraints.
NV-C7	Screening of high noise activities such as pneumatic breaking and crushing
NV-C8	During the demolition and construction phases, the appointed Contractor will implement best practice vibration mitigation and control methods outlined in BS 5228-1:2009+A1 2014. Part 2 – Vibration

9.8.2 Operational Phase Noise Mitigation

NV-01	Acoustically rated window sets with a minimum Sound Reduction performance of 37Rw shall be installed along building facades facing towards the rail line to the north, Park West Avenue to the west and the Industrial Estate to the east.
NV-02	No passive wall vents shall be installed in the building facades facing towards the rail line to the north, Park West Avenue to the west and the Industrial Estate to the east.
NV-03	The effectiveness of the acoustic windows shall be tested in situ to verify that the ProPG internal noise limit criteria are not exceeded. Testing shall be conducted at the earliest instance on test rooms.

9.7.3 'Worst-case' scenario

A worst-case scenario would arise if the noise and vibration mitigation measures are not implemented during the construction phase of the development. This would result in the generation of uncontrolled noise and vibration from the site which would result in an unacceptable impact on local receptors and the receiving environment

9.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

9.9.1 Construction phase predicted noise and vibration impacts

Predicted Noise Impact

The impact of the construction phase will result in an increase in daytime noise levels at the closest receptors to the site. With mitigation measures in place, it is predicted that the guideline construction noise limit of 75dB(A) LAeq, 11-hour can be complied with.

Predicted Vibration Impact

Site activities, in particular ground clearance and piling works will generate perceptible vibration at the closest residential receptors located west of the site. It is predicted that vibration levels associated with construction activities at the closest receptors to the site will not exceed 15 mm/sec PPV. Human response to groundbourne vibrations will be perceptible at levels between 0.14 to 1.0 mm/sec PPV.

Table 9.14 below summarises the identified likely impacts of the proposed development during the construction phase post application of mitigation measures.

Table 9.14 Summary of Construction Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction Phase Noise	Negative	Moderate to significant	Local	Likely	Temporary to Short-Term	Residual
Construction Phase Vibration	Negative	Not Significant	Local	Likely	Short-Term	Residual

9.9.2 Operational Phase

9.9.2.1 Predicted External Noise Impact

Predicted Noise Impact
The operational phase of the development will not adversely impact the existing noise climate at local existing receptors.

Predicted Vibration Impact
The operational phase of the development will not generate ground borne vibration levels.

Table 9.15 below summarises the identified likely significant effects of the proposed development during the operational phase post application of mitigation measures.

Table 9.15 Summary of Operational Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Phase Noise	Neutral	Not Significant	Local	Likely	Long-Term	Residual.

9.9.2.2 Predicted Inward Noise Impact

The measured noise levels are within the ProPG Medium Risk Assessment Category during the daytime period and within the Medium Risk Category during the nightime period as detailed in Table 9.11.

9.9.2.3 Risks to Human Health

Construction phase noise and vibration emissions will be temporary and transient and will be managed so as to minimise impact to population and human health by complying with all relevant guidance, as such the impact will be short-term and have a slight impact overall.

Operational phase noise will also be managed to achieve relevant noise limit values and is predicted to meet all such requirements. No operational phase vibration impacts are predicted. Therefore, the operational phase noise impacts will be neutral for the life of the development.

9.10 MONITORING

9.10.1 Construction Phase

NV-M1	A comprehensive programme of continuous live noise and vibration monitoring shall be conducted at receptors and structures in proximity to the site boundaries for the duration of the construction phase

9.10.2 Operational Phase

The monitoring of noise or vibration will not be required for the proposed residential development.

9.11 INTERACTIONS

The principal interactions between Noise & Vibration impacts and Human Beings have been addressed in this report which describes in detail the mitigation measures that shall be implemented to ensure that human health and residential amenity are not adversely impacted by any aspect of the construction or operational phases of the development.

REFERENCES

- Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP).
- Design Manual for Roads and Bridges – Volume 11 Section 3.
- Professional Guidance on Planning and Noise (ProPG), (IoA, 2017).
- British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise and Part 2: Vibration.
- British Standard BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- British Standard BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.
- British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound
- Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988.
- ISO 1996-2: 2017: Acoustics – Description, measurement and assessment of environmental noise.
- ISO 9613 (1996): Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.
- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002).
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003).
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017).
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).

10 MATERIAL ASSETS: BUILT SERVICES

10.1 INTRODUCTION

This section of the EIAR has been prepared by CS Consulting and describes the existing material assets for the drainage and potable water aspects on the proposed development site. An assessment is made of the likely impact arising during the demolition, construction and operational phases of the development on these elements. This chapter also considers the potential impacts with regards to the following proposed built services: Electricity, Gas, and Telecommunications.

This chapter was prepared by Gary Lindsay of CS Consulting. Gary is a Chartered Engineer with Engineers Ireland and has been practicing as a consulting engineer for over seventeen years. Gary holds a Bachelor's Degree in Civil Engineering from University College Dublin.

Input was also provided in relation to proposed built mechanical and electrical services environment by Adam Hynes, Chartered Engineer of EDC Mechanical, Electrical and Sustainable Consulting Engineers.

10.2 METHODOLOGY

10.2.1 Water Services

This chapter has been set out with reference to the specific criteria set out in the Environmental Protection Agency guidelines:

- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002)
- Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA 2015)
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, (Dept Housing 2018).

The draft guidelines have also been reviewed and have formed the basis for the development of this chapter.

Other reference documents used in the preparation of this assessment include the following:

- National Roads Authority (NRA) Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA).

A desktop study was carried out on the local and regional surface water and drainage network. Information was obtained from documents including the following sources:

- EPA online Water Quality Database and Envision Map Viewer (www.epa.ie)
- Dublin City Council Water and Drainage Department record drawings and discussions with Drainage Division Engineers;

- Flood Risk Assessment Report completed by Cronin and Sutton Consulting which accompanies this Planning Application.
- All available information concerning the development including development plans.

The following legislation was referred to in compiling this chapter:

- Water Framework Directive 2000/60/EC:

The EU Water Framework Directive (WFD) 2000/60/EC came into force on 22nd December 2000, and enacted into Irish legislation through S.I. No. 722 of 2003 European Communities (Water Policy) Regulations 2003. This legislation and regulation is a significant piece of legislation for water policy, as it provides a co-ordinated approach across Europe for all water policies, establishing a management structure for future water policy. A few key objectives of the Directive are to:

- Protect all waters, including rivers, lakes, groundwater, transitional and coastal waters.
- Achieve "good status" in all waters by 2015, and maintaining "high status" where the status already exists.
- Have water management based on River Basin Districts (RBD).

The strategies and objectives of the Water Framework Directive in Ireland have been influenced by a range of National and European Union legislation and regulation including:

- European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988),
- Local Government (Water Pollution) Acts 1977 – 1990,
- Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998).

In turn the implementation of the Water Framework Directive and its associated policies has necessitated the introduction of new regulations in Ireland including, the European Communities Environmental Objectives (Surface Waters) Regulations 2009, which are discussed further in the following section.

<u>European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No.272 of 2009):</u>

These regulations have been devised as a more complete and stringent set of surface water quality regulations which covers the requirements of the Water Framework Directive and the Dangerous Substances Directive. These regulations came into effect on 30th July 2009 and have been adopted by the Government. These new regulations supersede previous water quality regulations (both EU and national). This project must still be cognisant of previous regulations as they form the basis for a wide range of impact assessment and monitoring methodologies. It is envisaged that a detailed construction management plan which will include the management or disposal of surface water runoff will be prepared in advance of construction commencing on site. The construction management plan will be cognisant of these new regulations and apply them throughout the construction phase.

<u>European Communities Priority Substances Directive 2008:</u>

These regulations have been devised to assign a chemical status assessment for water bodies. Directive 2008/105/EC provides environmental quality standards in the field of water policy.

- European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988)

The Salmonid Regulations set water quality standards for salmonid waters, with identification of salmonid waters, water quality standards, and frequencies of sampling and methods of analysis and inspection.

- Local Government (Water Pollution) Acts 1977 – 1990:

The Act is the main legislation for the prevention and control of water pollution, including the general prohibition of polluting matter to waters. While this act has largely been superseded by the 2009 Regulations, current impact assessment and monitoring methodologies must still be cognisant of this legislation.

- Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998):

As part of the Water Pollution Acts, these regulations require water quality be maintained or improved, with reference to the biological quality river rating system (Q Rating) as assigned by the Environmental Protection Agency between 1995 to 1997. While this act has also largely been superseded by the 2009 Regulations, current impact assessment and monitoring methodologies must still be cognisant of this legislation.

An assessment of the existing water quality was also carried out in the form of a desktop study examining water quality data from the EPA from surveys predominately conducted by the EPA and local authorities. Various quality classes are used to establish and monitor the condition of rivers and streams in Ireland. Quality classes relate to the potential beneficial use of a water body, and can be effected by the quality of water discharged to surface water during construction and operation of a development.

Background Information on the local drainage network and water supply was obtained from documents from local authorities.

10.2.2 Public Utilities

As part of a desktop study of the existing services infrastructure, serving the development site, the following data was sourced online, for information:

- Electricity Supply Networks (ESB Networks);
- Gas Supply (Gas Networks Ireland);
- Telecommunications (Éir).

Information provided by the above providers was reviewed, in order to gain an appreciation of how the development site is currently served and determine its adequacy in terms of the proposed overall mixed-use development.

The assessment of potential impacts on the built services for the proposed development were assessed through a desktop study of the information provided in consultation with the relevant utility providers, listed above.

10.2.3 Consultation

Discussions were held between Irish Water and Dublin City Council as well as the ESB and telecommunications providers, along with the other members of the design team.

10.3 RECEIVING ENVIRONMENT

10.3.1 Foul Water

Review of Irish Water drainage records indicates that there is:

An existing 225mm foul sewer on Park West Road, south of the subject site location, which discharges in easterly direction and connects to the 300mm diameter foul sewer on Heaney Avenue.

All foul effluent in the region is directed via public drainage infrastructure to Ringsend Regional Waste Water Treatment Plant for processing before final discharge to Dublin Bay.

10.3.2 Potable Water

Review of Dublin City Council's watermain records indicates that there are:

- Two number of 450mm watermains and a 150mm watermain on Park West Avenue, west of the proposed development.
- A 250mm watermain on Park West Road, south of the proposed development.

10.3.3 Electricity

Based on information received from ESB Networks, the site is serviced by an existing HV cable located along Park West Avenue and Park West Road. Initial discussions with ESB Networks have taken place with regards to the servicing of the site, the intention will be to develop a network of substations throughout the site to serve the various blocks fed from the HV infrastructure in Park West Avenue / Park West Road. Based on an initial load assessment and meetings with the ESB there is no concern regarding power availability of supply going forward.

Diversions Required

As part of the enabling works package at Park West it is proposed to divert the existing 38kV lines to the North of the site underground.

The design team has developed two options with the ESB and various stakeholders to get the overhead lines undergrounded.

Option 1 (Preferred Option) – All cabling to drop to below ground at the pylon to the Northeast of the site. Cabling will continue underground West to the site perimeter where it will continue North through the ducts in the bridge on Park West Avenue.

Option 2 – All cabling to drop to below ground at the Northeast of the site. Cabling will continue West to the site perimeter where it will continue North in duct underneath the railway. A borehole will have to be drilled underneath the railway tracks for the ducting.

10.3.4 Bord Gais

Based on information received from Gas Networks Ireland (GNI), there is an existing medium pressure gas pipe along Park West Avenue. The only gas requirement for the site will be for the restaurant. An initial load assessment has been carried out and no capacity issues have been identified.

10.3.5 Telecommunications

Based on information received from Eir, the site is well serviced along Park West Avenue & Park West Road. An initial assessment has been carried out and no capacity issues have been identified.

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

10.4.1 Foul Drainage

The proposed development will require a new separate drainage network to collect and convey the effluent generated by the proposed development. The drainage network for the proposed development has been designed in accordance with:

- The Regional Code of Practice Drainage Works,
- The Greater Dublin Strategic Drainage Study,
- Irish Water Code of Practice for Wastewater Infrastructure.

The drainage network for the development will be in accordance with Part H of the Building Regulations and to the requirements and specifications set out in the Irish Water Code of Practice for Wastewater.

Proposed Effluent Generation

The proposed development is to consist of 750 and based on Irish Water guidelines, the foul effluent generated will be:

- 446l/day per apartment (based on 2.7 persons per apartment x 150l/person/day, + a 10% increase factor).
- 446 l/day/apt x 750 units = 334,500 l/day = 334.5 m3/day;
- 3.87 l/sec Average flow (1 DWF);
- 23.23 l/sec Peak Flow (6 DWF).

For the retail unit, creche and bar/café a flow of 6,000 l/day has been assumed, which will be approximately

- 0.07 l/sec Average water demand;
- 0.42 l/sec Peak water demand (6 times average water demand).

Proposed Foul Drainage Arrangements

All foul effluent generated from the proposed development shall be collected in separate foul pipes and flow under gravity, to the existing 300mm diameter sewer on Park West Road. The proposed drainage infrastructure and routing plan is shown on CS Drawings **PWT-CSC-XX-XX-DR-C-0012/0013** included with this submission.

Irish Water Confirmation of Feasibility

As required a Pre-Connection Enquiry was lodged with Irish Water to allow an assessment of the local & regional infrastructure to accommodate the proposed development. Irish Water reverted to this enquiry confirming feasibility to connect without upgrades and noted that a formal connection agreement will be required to be entered into the services to be made available, refer to the Engineering Services Report for a copy of same. As required a Pre-

Connection Enquiry was lodged with Irish Water indicating their requirements before a for connection agreement, refer to the Engineering Services Report for a copy of same.

10.4.2 Water Supply

Proposed Potable Water System

The proposed development is to consist of 750 units and based on Irish Water guidelines, the water demand will be:

- 405 l/day per apartment (based on 2.7 persons per unit x 150l/person/day);
- 405 l/day x 750 units = 303,750l/day = 303.75 m3/day;
- 3.51 l/sec Average water demand;
- 17.58 l/sec Peak water demand (5 times average water demand).

For the retail unit, creche and bar/café a demand of 6,000 l/day has been assumed, which will be approximately

- 0.07 l/sec Average water demand;
- 0.35 l/sec Peak water demand (5 times average water demand).

Proposed Watermain Arrangements

The proposed water supply connection to the new development will be from a sluiced connection to the existing 250mm public main adjacent to the site on Park West Road with a cross-connection to the existing 450mm public main on Park West Avenue, as directed by Irish Water. The proposed development will be serviced by a new 250mm ring main. Refer to CS Consulting drawings **PWT-CSC-XX-XX-DR-C-0014/0015** for a copy of the proposed watermain layout.

Irish Water Confirmation of Feasibility

As required a Pre-Connection Enquiry was lodged with Irish Water to allow an assessment of the local & regional infrastructure to accommodate the proposed development. Irish Water reverted to this enquiry confirming feasibility to connect without upgrades and noted that a formal connection agreement will be required to be entered into the services to be made available, refer to the Engineering Services Report for a copy of same. As required a Pre-Connection Enquiry was lodged with Irish Water indicating their requirements before a for connection agreement, refer to the Engineering Services Report for a copy of same.

10.4.3 ESB

The proposed development is to consist of 750 units and based on ESB guidelines, the electricity demand will be:

- 750 Apartments: 2kVA per apartment (2kVA x 750 units = 1.5Mva)
- Retail Unit: 100kVA
- Bar / Café: 50kVA

Proposed ESB Arrangements

The proposed ESB connection to the site will be taken from the HV cable located in Parkwest Avenue. A network of substations fed from the HV cable in Parkwest Avenue will be provided to serve the electrical requirements of the site.

ESB Confirmation of Feasibility

An initial meeting has been held with the ESB with respect to the site and there are no capacity issues with respect to the load required.

10.4.4 Bord Gais

The proposed development will require gas to the restaurant only.

Proposed Bord Gais Arrangements

The proposed Gas connection to the restaurant will be taken from the medium pressure gas line in Park West Avenue.

Confirmation of Feasibility

An initial assessment of the gas load for the restaurant has been carried out and there are no capacity issues with respect to the load required.

10.4.5 Telecommunications

The proposed development will require a telecoms connection for the following,

- 750 Apartments
- Retail Unit
- Bar / Café

Proposed Telecommunications Arrangements

The proposed telecoms connection to the site will be taken from the existing telecoms infrastructure Parkwest Avenue.

Confirmation of Feasibility

An initial assessment of the telecoms requirements for the site has been carried out and there are no capacity issues with respect to the site requirements.

10.5 POTENTIAL IMPACTS OF THE PROPSOED DEVELOPMENT

10.5.1 Construction Phase

Foul Water
The contractors operations will result in the generation of effluent and sanitary waste from facilities provided for the work force on site. This is expected to have a slight negative impact on the existing foul drainage network in the short term for the duration of construction work.

Potable Water
The contractors will require a separate water supply connection for the works. The impact on the water supply network is likely to be slight negative, and short term for the duration of the construction works.

Electricity

The following are the likely impacts of the proposed scheme during the construction stage:

- The striking of an underground electricity cable during construction operations could potentially result in serious injury or death of site staff.
- Power will be required for the construction activities, for temporary lighting and temporary signals required during construction works with power coming from the existing sub-station.
- The power demands during the construction phase on the existing electricity network are considered to be slight, negative and of short-term impact.
- Due to a cable strike outside of the proposed site, the potential to disrupt electricity services inside the development site is a possibility causing moderate effects to the construction programme. This is a possible indirect effect.

Gas

The following are the likely impacts of the proposed scheme during the construction stage:

- The striking of an underground gas main during construction operations could potentially result in serious injury or death of site staff due to a potential explosion.
- Excavation works causing damage and leaks to gas mains with a resultant negative impact on the climate and human health.
- The potential impact from the construction phase of the proposed development on the local gas supply network is likely to be low. The new gas main diversion will be fully installed and tested before any removal of the live network takes place.

Telecommunications

The following are the likely impacts of the proposed scheme during the construction stage:

- The striking of an underground/overhead telecommunications lines during construction operations could potentially result in serious downtime of the network in the development site leading to communication difficulties for the Construction Teams.
- The construction phase is likely to give rise to the requirement to divert existing fixed telecom lines. If not undertaken in accordance with best practise procedure, this has the potential to impact on local telecoms connectivity.
- The potential impact from the construction phase of the proposed development on the local telecoms network is likely to be imperceptible, short-term and low.

10.5.2 Operational Phase

Foul Water

The proposed wastewater network has been designed to cater for the full quantum of the development required for the development. Irish Waters Pre-connection enquiry has been received, indicating that the development can be accommodated.

Potable Water

The proposed potable network has been designed to cater for the full quantum of the development required for the development. Irish Waters Pre-connection enquiry has been received, indicating that the development can be accommodated.

Electricity

The proposed development will require electricity supplies during the operational phase of the scheme and these will be provided by the installation of new sub-stations within the development.

The indirect impact will allow ESB Networks to provide additional resilience in their network through the provision of new Sub-Stations (Assuming agreement with ESB Networks) which in turn should impact positively on the wider area's electrical infrastructure.

A 'worst-case' scenario resulting from the operation of the development would be a breakage on the cable feeding the Sub-Stations possibly caused by a third party leading to downtime of power supplies in the local network.

With the proposed installation of new sub-stations this should allow ESB Networks to cater for any secondary projects that may arise within the vicinity.

The cumulative impact from the operational phase of the development on the electricity supply network is likely to be long term, positive and moderate.

Gas

The proposed development will require gas supplies during the operational phase of the scheme and these will be provided by the installation of new connection to the restaurant – Proposed Utility Drawing – Gas. As the new services will be located underground this will result in a permanent but imperceptible effect. The buildings will be NZEB compliant and with the increased thermal performance of the buildings, the potential impact from the operational phase on the gas supply network is likely to be long term, neutral and low.

The additional demand on the gas network is not deemed to have any material impact on the surrounding area as there is sufficient capacity in the gas network system to manage the additional demand created by the development.

The cumulative impact from the operational phase of the development on the gas supply network is likely to be long term and low.

Telecommunications

The proposed development will require telecommunication connections during the operational phase of the scheme and given the number of telecommunication providers with infrastructure available within the Parkwest area this will provide the building users with a greater choice of service and will result in a positive effect for the users. As the new services will be located underground this will result in a permanent but imperceptible effect. Please refer to the Proposed Utility Drawing – Eir.

The additional demand on the telecoms network is not deemed to have any material impact on the surrounding area as there is sufficient capacity in the telecoms network system to manage the additional demand created by the development. The likely impact from the operational phase on the telecoms network is likely to be long term and low.

The 'worst case scenario' would be an outage created by a third party on the telecoms supply to the development causing loss of service.

The cumulative impact from the operational phase on the telecoms network is likely to be long term and low.

10.6 'DO NOTHING SCENARIO'

Under a 'do nothing' scenario, there would be no change in the sites current use and the existing status would remain and the impact would be neutral. In the scenario where the proposed development does not proceed as planned, the existing land-use and material assets in the study area would remain as currently identified in the desktop study, site visit and site-specific investigations.

10.7 MITIGATION MEASURES

10.7.1 Construction Mitigation Measures

MA:BS-C1	Foul Effluent generated on site from the contractors sanitary facilities will be discharged to a holding tank and removed off site by a licenced removal contractor in accordance with Dublin City Council requirements. Temporary discharge utilising the existing, or permitted sewerage network will be in agreement with Dublin City Council & Irish Water. All necessary health and safety measures will be undertaken to ensure the safety and welfare of construction personnel, the public and road users during construction of the foul infrastructure.
MA:BS-C2	Water Supply The contractor will make all necessary arrangements for a temporary water supply in agreement with Irish Water & Dublin City Council. A water meter will be installed to monitor water consumption on the site and to enable early detection of any potential leaks.
MA:BS- C3	Electricity The locations of the electricity network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the electricity network in close proximity to the works area. This will ensure that the underground electricity network will not be damaged during the construction phase All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB Networks and will be in compliance with any requirements or guidelines they may have have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines Where new services are required, the Contractor will apply to ESB Networks for a connection permit where appropriate and will adhere to their requirements

MA:BS-C4	Gas The locations of the gas network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with Gas Networks Ireland (GNI) Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the gas network in close proximity to the works area. This will ensure that the underground gas network will not be damaged during the construction phase All works in the vicinity of GNI infrastructure will be carried out in ongoing consultation with GNI and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live gas mains. Where new services are required, the Contractor will apply to GNI for a connection permit where appropriate and will adhere to their requirements
MA:BS-C5	Telecommunications The locations of the telecommunications network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant telecommunication provider Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the telecommunications network in close proximity to the works area. This will ensure that the underground telecommunications network will not be damaged during the construction phase All works in the vicinity of the telecommunications providers infrastructure will be carried out in ongoing consultation with the relevant provider and will be in compliance with any requirements or guidelines they may have Where new services are required, the Contractor will apply to the relevant provider for a connection permit where appropriate and will adhere to their requirements It is considered that any likely impacts to overhead cables in the vicinity will be mitigated by applying standard construction practices.

10.7.2 Operational Mitigation Measures

MA:BS-O1	Foul The proposed foul network when completed will be vested to Irish Water whom will have responsibility for the on-going maintenance and operation of the service. Private drainage areas, such as the various apartment blocks, will be maintained by the units maintenance company. Any issues going forward will there for be addressed and mitigation against.
MA:BS-O2	Water Supply

	The proposed potable water network when completed will be vested to Irish Water whom will have responsibility for the on-going maintenance and operation of the service. Private drainage areas, such as the various apartment blocks, will be maintained by the units maintenance company. Any issues going forward will there for be addressed and mitigation against.
MA:BS-O3	Electricity The power demands during the operational phase on the existing electricity network are considered to be imperceptible due to the energy efficient design including LED lighting, high performance heating equipment
MA:BS-O4	Gas The gas demands during the operational phase on the existing gas network are considered to be low due to the NZEB energy efficient design, thermal performance of the buildings and the use of renewable technology to reduce the heating demand. The design and construction of the required electrical services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.
MA:BS-O5	Telecommunications The telecommunications demand during the operational phase on the existing telecommunications network are considered to be imperceptible due to the resilience built into the networks by the relevant providers The design and construction of the required Telecommunication services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

10.8 RESIDUAL IMPACTS

Subject to implementation of the mitigation measures above there will be no residual adverse impacts to the material assets/ built services infrastructure as a result of the proposed development

10.9 MONITORING AND REINSTATEMENT

10.9.1 Monitoring

Ongoing monitoring of the water quality during construction is proposed as per MA:BS-C1 above. It is not foreseen that any monitoring will be required on completion of the proposed development.

10.9.2 Reinstatement

Any proposed works for the foul and watermain networks which are to take place outside of the subject lands will be carried out by Irish Water agents. Therefore, all reinstatement works will be in accordance, supervised and signed off by Irish Water or agents acting on their behalf.

All electricity, gas and telecommunications excavations will be fully reinstated to the requirements of ESB, Gas Networks Ireland (GNI) and the relevant telecommunications providers respectively.

REFERENCES

In addition to the sources noted in above the documents listed below were also consulted.

- Dublin City Development Plan 2016–2022;
- Dublin City Strategic Flood Risk Assessment, 2016 – 2022;
- Regional Code of Practice For development works, Version 6;
- Irish Waters Code of Practice for Water Infrastructure;
- Irish Waters Code of Practice for Wastewater Infrastructure;
- Greater Dublin Strategic Drainage Study;
- Geological Survey of Ireland Maps;
- Local Authority/Irish Water Drainage Records.
- ESB Construction Standards for MV Sub-Station Buildings.
- ESB electrical services handbook for housing schemes.
- GNI – Guidelines for Designers and Builders Domestic Sites
- https://www.esbnetworks.ie/staying-safe/contractor-safety/digging-and-excavation-work
- https://www.gasnetworks.ie/corporate/freedom-of-information/make-a-request/
- https://cbyd.emaps.eircom.ie/Eircom-CBYD/

11 MATERIAL ASSETS: TRANSPORTATION

11.1 INTRODUCTION

This chapter of the EIAR assesses any likely or significant impacts associated with traffic and transportation issues arising from the proposed development, in respect of both the operational and construction stages. Relevant mitigation measures are also presented in this chapter.

This assessment is based principally on the outcome of the Traffic and Transport Assessment (TTA) prepared by Niall Barrett of CS Consulting and submitted separately in support of this planning application. For full details of the assessment methodology and other transport-related aspects of the proposed development, particularly those that have no bearing on environmental impact, please refer to the TTA report.

11.2 ASSESSMENT METHODOLOGY

The methodology adopted for the assessment of traffic impact is summarised as follows:

1. A desktop study of the area surrounding the development site was conducted, examining the nature of the surrounding existing transport infrastructure, the existing public transport services nearby, and proposed future improvements to public transport services and transport infrastructure.

2. A vehicular traffic count survey was undertaken at 7no. sites on the surrounding road network, to establish background traffic flows and existing peak hour periods.

3. A development trip generation assessment was carried out using data extracted from the Trip Rate Information Computer System (TRICS) database of traffic surveys, to determine the potential vehicular trips to and from the proposed development site during peak hours.

4. An appropriate distribution was assigned to vehicular trips generated by the subject development, based upon the existing traffic characteristics of the surrounding road network.

5. A spreadsheet model was created containing baseline year do-nothing traffic flow data. These data were used to develop a computer model (using industry-standard TRANSYT software) comprising the existing roundabout junction of Park West Avenue and Park West Road, as well as the existing access junction to the Aspect Hotel on Park West Avenue. The performance of these modelled junctions was then assessed for the baseline year 2021.

6. The TRANSYT model was expanded to include the proposed development's new access junction on Park West Road. Future year traffic forecasts were derived from TII growth factors and development trip generation figures. The performance of the 3no. junctions within the expanded TRANSYT model was then assessed for the development's proposed year of opening (2025), 5 years after opening (2030), and 15 years after opening (2040; the Design Year assessment).

7. Car, bicycle, and motorcycle parking provisions within the proposed development have been assessed with reference to the parking standards set out in the Local Authority development plan and to those given in the 2020 *Design Standards for New Apartments*

11.2.1 Traffic Survey and Background Peak Hour Identification

Full turning movement classified traffic counts were carried out by Nationwide Data Collection (NDC), on behalf of CS Consulting, over a 12-hour period (07:00–19:00) on Wednesday the 13th of February 2019. This traffic survey predates the Government's introduction of travel restrictions related to the COVID-19 public health emergency, the first of which came into force on the 12th of March 2020, and is therefore not considered to have been affected by these measures. Continuing changes in travel habits and varying working patterns have however precluded conducting a more recent traffic survey, as data obtained through such a survey may not be representative of typical traffic patterns.

Count information was obtained at the following 7no. sites (see Figure 11.1):

J1. Cloverhill Road / Cedar Brook Avenue
[3-arm roundabout]
J2. Park West Avenue / Cherry Orchard Green
[3-arm priority-controlled junction]
J3. Park West Avenue / Aspect Hotel
[3-arm priority-controlled junction]
J4. Park West Avenue / Park West Road
[4-arm roundabout with slips]
J5. Yeats Way / Park West Road / Synge Way
[4-arm roundabout with slip]
J6. Park West Avenue / Nangor Road / Oak Road
[4-arm signal-controlled junction with slips]
J7. Killeen Road / Park West Road
[3-arm signal-controlled junction]

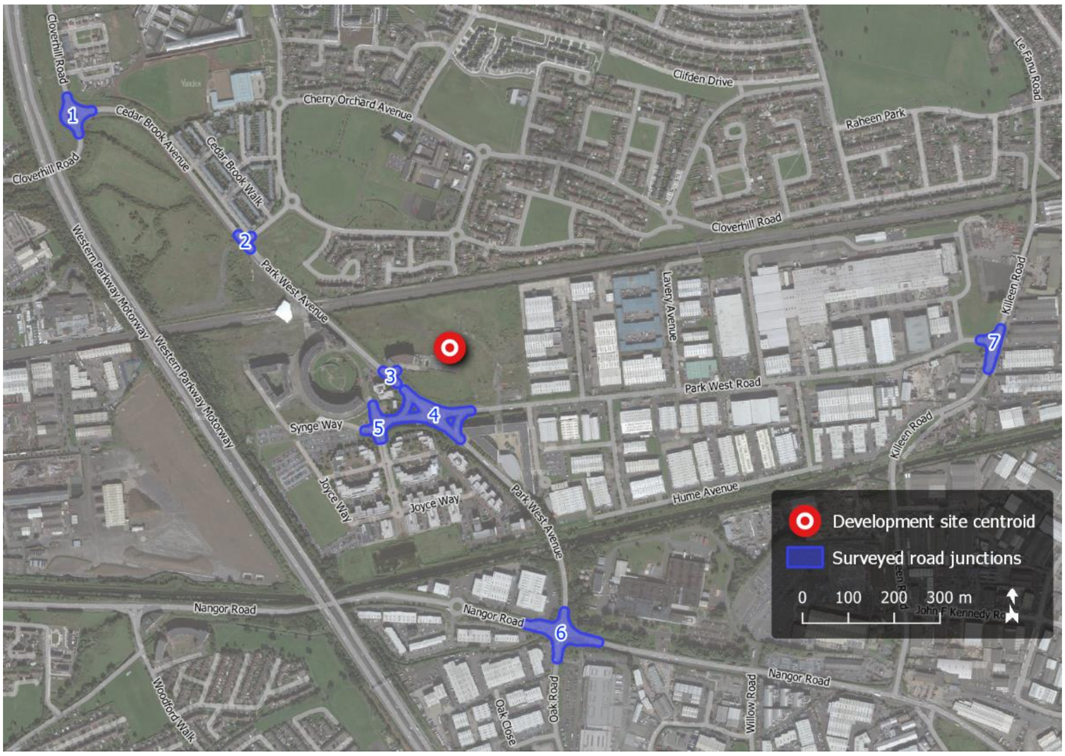


Figure 11.1: Surveyed road junctions (Sources: OSM Contributors, Yandex)

The peak hour traffic flows across all 7no. survey sites were found to be between 08:00 and 09:00 (AM peak hour) and between 16:30 and 17:30 (PM peak hour). Raw data from this traffic survey are provided in Appendix 11A.

11.2.2 Background Traffic Growth

The operational impact of traffic on the road network within the proposed development's area of influence has been assessed for the following years:

2021 Baseline year
2040 Design year (15 years after opening)

Unit 5.3 of the TII *Project Appraisal Guidelines* (PE-PAG-02017 *Travel Demand Projections*) has been used to apply growth factors to the existing surveyed background traffic flows, to obtain traffic flows for the baseline year and for future year junction assessments. The TII annual growth rates applied are given in Table 11.1, and the resultant cumulative growth in background traffic (cumulative percentage increases over 2019 surveyed traffic levels) for each assessment year is given in Table 11.2.

Table 11.1: TII Central Growth Rates (Light Vehicles)

Geographic Area	Background Traffic Growth per Year		
	2016-2030	2030-2040	2040-2050
Dublin Metropolitan Area	+ 1.62%	+ 0.51%	+ 0.44%

Table 11.2: Predicted Background Traffic Growth

2021 (baseline year)	2040 (design year)
+ 3.2%	+ 25.6%

11.2.3 Vehicular Trip Generation of Subject Development

The proposed development comprises:
750no. residential apartment units
a crèche with a gross floor area (GFA) of 410m^2
a community space with a GFA of 48m^2
a retail/commercial unit with a GFA of 156m^2
a café/bar unit with a GFA of 91m^2

Trip generation factors from the Trip Rate Information Computer System (TRICS) database of traffic surveys have been used to predict the vehicular trip generation to and from the proposed development once completed, for both the AM and PM peak hour periods. The TRICS database is maintained by a consortium of English County Councils but covers the entirety of Great Britain and Ireland.

The following TRICS sub-categories have been employed, being the most appropriate for the respective elements of the proposed development:
03 Residential / C – Flats Privately Owned
04 Education / D – Nursery
07 Leisure / Q – Community Centre
01 Retail / O – Convenience Store
06 Hotel, Food & Drink / C – Pub/Restaurant

The TRICS trip rates for the proposed development have been selected from the above categories, restricted insofar as possible to similar outer urban or suburban locations, and further refined with reference to 2016 CSO census data on the basis of:

- the population within 1 mile of the development site (32,000 approx.);
- the population within 5 miles of the development site (645,000 approx.);
- the aggregate mean car ownership rate within 5 miles of the development site (1.0 cars per household).

The trip rates selected for the AM peak hour (08:00–09:00) and PM peak hour (16:30–17:30) are given in Table 11.3.

Table 11.3: TRICS Peak Hour Trip Generation Rates

TRICS Category	Trip Type	AM Peak (08:00-09:00)	PM Peak (16:30-17:30)
Residential (trips per hour per dwelling)			
Flats	Arrivals	0.048	0.089
	Departures	0.165	0.043
Non-Residential (trips per hour per 100m^2 GFA)			
Nursery	Arrivals	5.055	1.329
	Departures	3.439	2.293
Community Centre	Arrivals	0.417	0.174
	Departures	0.174	0.279
Convenience Store	Arrivals	3.410	4.587
	Departures	2.786	4.995
Pub/Restaurant	Arrivals	0.000	4.333
	Departures	0.118	2.343

Full details of the TRICS information used in the assessments are provided in the separate Traffic and Transport Assessment report.

Peak hour trip numbers in this instance have been calculated as a function of the TRICS trip rates given in Table 11.3, the total number of apartments (750no.) within the development, and the gross floor areas of each of the development's non-residential elements. The following trip generation figures are calculated:

Table 11.4: Subject Development Peak Hour Trip Generation

Development Element	**Trip Type**	**AM Peak (08:00-09:00)**	**PM Peak (16:30-17:30)**
Apartments	Arrivals	36	67
	Departures	124	32
	Total Trips	160	99
Crèche	Arrivals	21	5
	Departures	14	9
	Total Trips	35	14
Community Space	Arrivals	0	0
	Departures	0	0
	Total Trips	0	0
Commercial/ Retail Unit	Arrivals	5	7
	Departures	4	8
	Total Trips	9	15
Café/Bar Unit	Arrivals	0	4
	Departures	0	2
	Total Trips	0	6
Development TOTALS	**Arrivals**	**62**	**83**
	Departures	**142**	**51**
	Total Trips	**204**	**134**

11.2.4 Vehicular Trip Distribution

With the exception of the existing Aspect Hotel, the subject development site is currently vacant and does not generate vehicular traffic, it is therefore not possible to use the existing directional splits at surveyed junctions to establish the future distribution of traffic to be generated by the proposed development. An alternative method has therefore been employed, which is based upon the existing surveyed mainline traffic flows at key locations on the surrounding street network.

Vehicular traffic arriving to or departing from the development site is expected to leave or enter the immediate surrounding area via one of the following network points:
(A) Park West Avenue to/from the north
(B) Park West Road to/from the east
(C) Park West Avenue to/from the south

The predicted distribution of vehicular trips to and from the subject development has been established following the proportions of the surveyed inbound and outbound mainline traffic flows at these three points on the local road network, in each of the peak hour periods; these are given in Table 11.5. Given the development site's proximity to the existing Park West Business Park, on the western side of Park West Avenue, it is assumed that no vehicular traffic shall travel between the subject development and the existing Business Park.

Table 11.5: Distribution of Existing Network Traffic

Network Point	Street Name and Direction	AM Peak Flow (PCU)	PM Peak Flow (PCU)	Proportion of Total AM Flow	Proportion of Total PM Flow
Inbound Traffic (towards development site)					
A	Park West Ave (N)	883	319	42.9%	22.4%
B	Park West Road (E)	318	651	15.5%	45.7%
C	Park West Ave (S)	855	454	41.6%	31.9%
Outbound Traffic (away from development site)					
A	Park West Ave (N)	263	766	15.9%	41.2%
B	Park West Road (E)	805	442	48.6%	23.8%
C	Park West Ave (S)	587	650	35.5%	35.0%

The proposed development shall have 2no. vehicular accesses:

- the existing access junction of the Aspect Hotel (traffic survey site J3), which shall also serve as the proposed development’s western access
- a new 3-arm access junction on Park West Road (designated junction site J8), which shall serve as the proposed development’s southern access

As the development’s 2no. access junctions shall be connected by its internal road network, it is assumed that any vehicle arriving to or departing from the development shall use whichever of these access junctions is the more convenient given its origin or destination on the surrounding road network. Therefore:

- all traffic to and from network point A (Park West Avenue, to/from the north) shall travel via the western access junction J3
- all traffic to and from network point B (Park West Road, to/from the east) shall travel via the southern access junction J8

It is assumed that traffic to and from network point C (Park West Avenue, to/from the south) shall be split between access junctions J3 and J8, in the following proportions:

- 40% of arrivals and 60% of departures shall travel via the western access junction J3
- 60% of arrivals and 40% of departures shall travel via the southern access junction J8

Tables 11.6 and 11.7 summarise the distribution of development arrival and departure trips according to the network point from which they arrive or to which they depart. These tables indicate the proportions and numbers of trips from/to each network point, the development access junction used in each case, and the other surveyed junctions through which they will pass (see Figure 11.1 for junction locations).

Table 11.6: Distribution of Development Arrival Trips

Network Entry Point	Dev. Access Junction No.	Other Junctions Traversed	Proportion of AM Trips	Proportion of PM Trips	Number of AM Trips	Number of PM Trips
A	3	1,2	43.0%	22.4%	27	19
B	8	7	15.5%	45.7%	10	38
C	3	6,4	16.6%	12.7%	10	11
	8	6,4	25.0%	19.1%	15	16

Table 11.7: Distribution of Development Departure Trips

Network Exit Point	Dev. Access Junction No.	Other Junctions Traversed	Proportion of AM Trips	Proportion of PM Trips	Number of AM Trips	Number of PM Trips
A	3	2,1	15.9%	41.2%	23	21
B	8	7	48.6%	23.8%	69	12
C	3	4,6	21.3%	21.0%	30	11
	8	4,6	14.2%	14.0%	20	7

These proportions (for both arrivals and departures, in both of the peak hour periods) are shown in Figures 11.2 and 11.3, along with the mapped routes providing the shortest driving distances between the development site and each of the three network points.

Figure 11.2: Distribution of development arrival trips (Sources: OSi, OSM Contributors, Yandex)

Figure 11.3: Distribution of development departure trips (Sources: OSi, OSM Contributors, Yandex)

11.2.5 Subject Development Trip Generation – Construction Stage

Heavy Goods Vehicle (HGV) construction traffic to and from the site shall reach a peak during the preliminary earthworks, which are required to achieve desired levels across the development site. These works shall require the transport from site of approximately 31,000m^3 of excavated spoil material. This material is expected to be transported by HGVs with a typical load capacity of 12m^3, equating to a total of approximately 2,600 HGV journeys to and from the site. Other construction activities requiring HGV trips to and from the site include material delivery and heavy plant transfer; these will be sporadic in nature and also will not occur at the same time as more HGV-intensive activities.

The final programming and scheduling of all construction activities shall be determined by the lead Contractor appointed to the project. As a 'worst-case' scenario, however, it is assumed that at most 6no. HGV trips may be made to the site each hour (one HGV arrival and one HGV departure every 10 minutes). This would equate to total traffic movements of 28 Passenger Car Units (PCU) in each of the background peak hours.

In addition to HGV traffic, periodic deliveries of materials to site shall be made by Light Goods Vehicles. To the extent possible, these shall be scheduled to take place outside of the background peak traffic hours. Such trips are also unlikely to occur frequently during the stages of construction that require frequent GHV trips; LGV trips are therefore unlikely to occur in significant numbers at the same time as HGV trips take place. For the purposes of estimating a worst-case construction traffic generation scenario, however, 6no. LGV arrivals and 6no. LGV departures (total traffic movements of 12 PCU) are assumed in each of the background peak hours.

Limited car parking for construction personnel is likely to be provided on site during construction works. Some additional vehicular trips shall therefore be made to and from the site each day by construction personnel commuting to and from work. The majority of these trips are expected to fall outside the background traffic peak hours. In the worst-case scenario, it is assumed that 25no. such light vehicle trips may be made to the site during the AM peak hour, and 25no. such trips may be made from the site during the PM peak hour.

The anticipated worst-case scenario vehicular trip generation of the subject site during construction is summarised in Table 11.8.

Table 11.8: Maximum Peak Hour Construction Traffic Generation

Vehicle Type	Trip Type	AM Peak (08:00-09:00)	PM Peak (16:30-17:30)
Heavy Goods Vehicles	Arrivals	6	6
	Departures	6	6
	Total Trips	12	12
Light Vehicles (Cars and Vans)	Arrivals	31	6
	Departures	6	31
	Total Trips	37	37
Development TOTALS (Passenger Car Units)	**Arrivals**	**45**	**20**
	Departures	**20**	**45**
	Total Trips	**65**	**65**

11.2.6 Subject Development Trip Distribution – Construction Stage

It is proposed to employ the development's new access junction on Park West Road as the sole vehicular access to the site during construction.

As shown in Figure 11.4, construction traffic shall be routed as follows:

- to/from the west along Park West Road,
- to/from the south along Park West Avenue and the R134 Nangor Road,
- to/from the west along the R110 Naas Road, and
- via the M50 motorway (north/south) or the N7 national road (west).

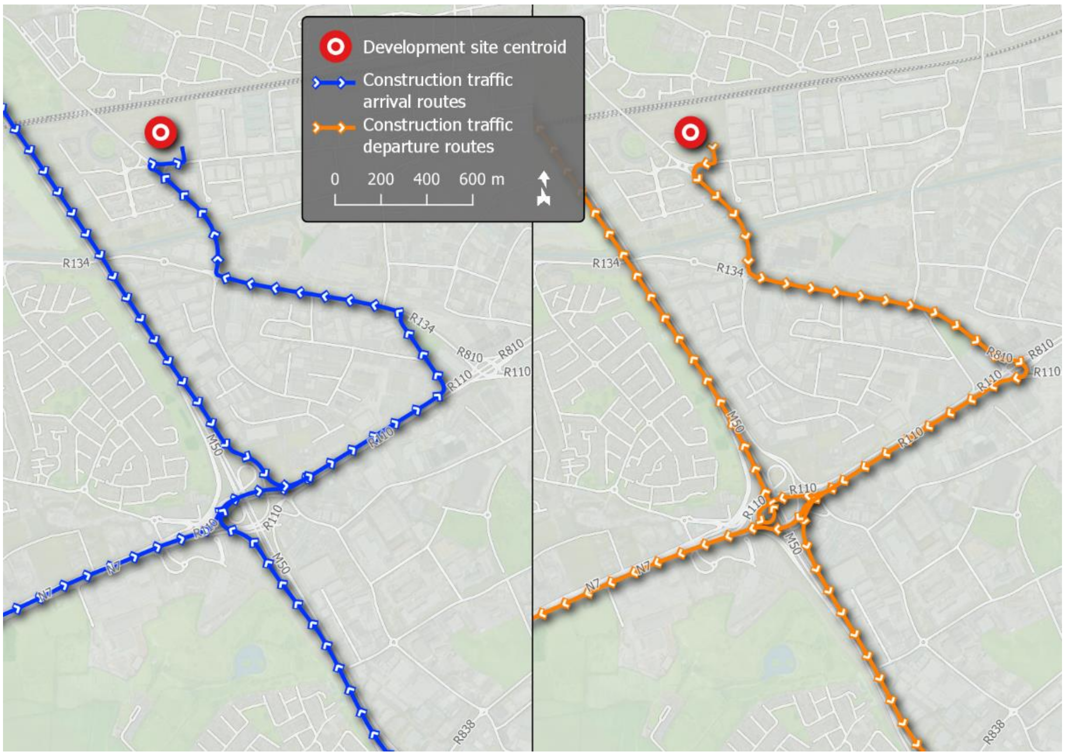


Figure 11.4: Development construction traffic routing (Sources: EPA, OSM Contributors, Google)

11.2.7 Aspect Hotel Trip Generation and Distribution

The Aspect Hotel currently generates approximately 45 PCU of vehicular traffic in the AM peak hour period (arrivals and departures combined) and approximately 18 PCU in the PM peak hour period. All of this travels via the hotel's existing access junction on Park West Avenue (traffic survey site J3), which shall also serve as the western vehicular access to the subject proposed development.

While the proposed development shall entail some changes to the car parking arrangements for the Aspect Hotel, as described in section 11.4.4, the hotel itself does not form part of the development application and no changes are proposed to its operation. It is therefore assumed that there shall be no significant change to the vehicular trip generation of the hotel, nor to the distribution of this traffic across the surrounding road network, and this traffic has simply been included as part of the existing background traffic under all assessment scenarios.

11.2.8 Junction Performance Assessment - Operational Stage

To determine the likely traffic impact of the proposed development, operational assessments of 3no. key junctions have been undertaken using the industry-standard TRL TRANSYT computer program, for both the weekday AM peak hour (08:00-09:00) and the weekday PM peak hour (16:30-17:30).

The following junctions have been modelled and assessed:
J3. Park West Avenue (North/South) / Aspect Hotel & Dev. Site (East)
(existing 3-arm priority junction & proposed 3-arm signal-controlled junction)
J4. Park West Avenue (North/South) / Park West Road (East/West)
(existing 4-arm roundabout with bypass slips)
J8. Park West Road (East/West) / Development Site (North)
(proposed 3-arm signal-controlled junction)

The performances of these junctions have been assessed under the following scenarios:
2021 – existing baseline traffic conditions
2040 (design year) – with & without subject development

Junction performance is assessed based upon the following four metrics:

Degree of Saturation (DoS):
The ratio of current traffic flow to ultimate capacity (also known as RFC) on a link or traffic stream. Effective capacity for a junction approach (or a junction as a whole) is reached at a DoS of 90%, beyond which a junction will not operate efficiently. A DoS of 100% represents ultimate capacity, beyond which significant operational problems will be experienced.

Mean Maximum Queue (MMQ):
The highest estimated mean number of Passenger Car Units (PCU) queued in any lane of a junction approach, averaged over the entire analysis period.

Mean Delay per Vehicle:
The average delay incurred by a vehicle on a junction approach as a result of having to wait at a signal or give way at a priority-controlled junction.

Practical Reserve Capacity:
The percentage by which the arriving traffic flow on a stream could increase before that junction approach would reach its effective capacity (i.e. 90% saturation).

Full TRANSYT outputs are appended to the separate Traffic and Transport Assessment report.

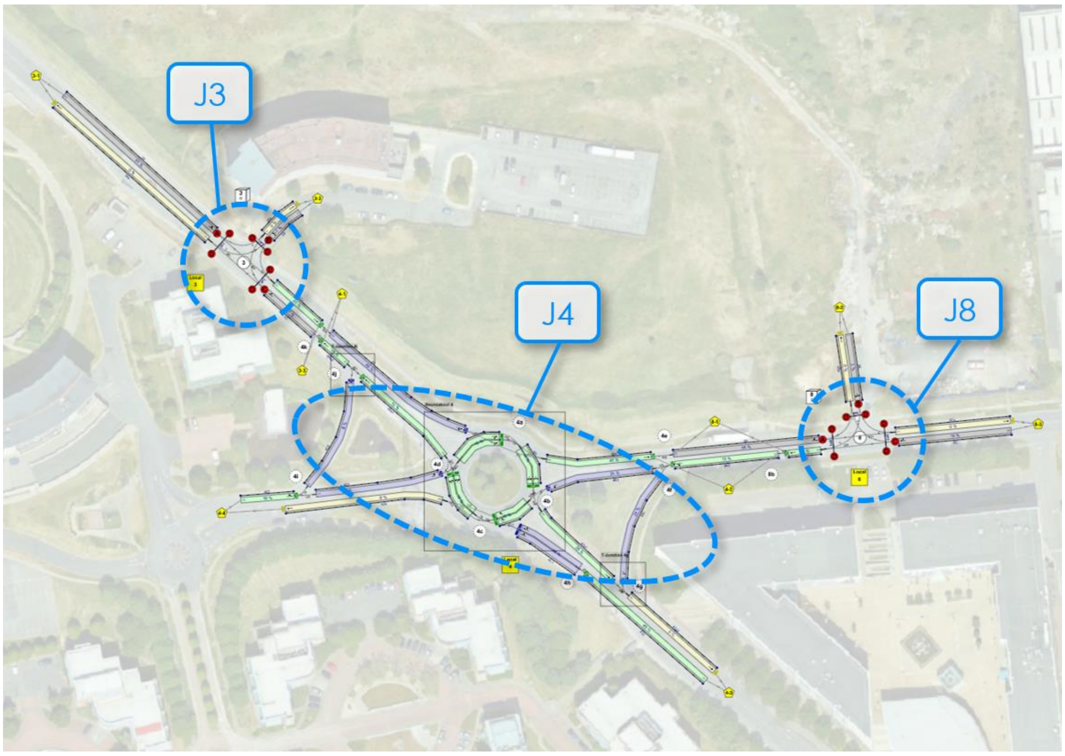


Figure 11.5: TRANSYT model for 'with development' scenarios (Sources: Google)

11.3 RECEIVING ENVIRONMENT

11.3.1 Location

The site of the proposed development is located in Dublin 12, immediately to the north-east of the existing Park West development, approximately 400m to the east of the M50 motorway (between junctions 7 and 9), and immediately to the east of Park West & Cherry Orchard railway station. The development site has a net area of approx. 9.4ha and is located in the operational area of Dublin City Council (DCC).

The site is bounded to the north by the Dublin-Kildare railway line, to the east by an existing industrial estate, to the south by Park West Road (along a road frontage of approx. 180m), and to the west by Park West Avenue (along a road frontage of approx. 300m).

The location of the proposed development site is shown in Figure 11.5; the indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in Figure 11.6.

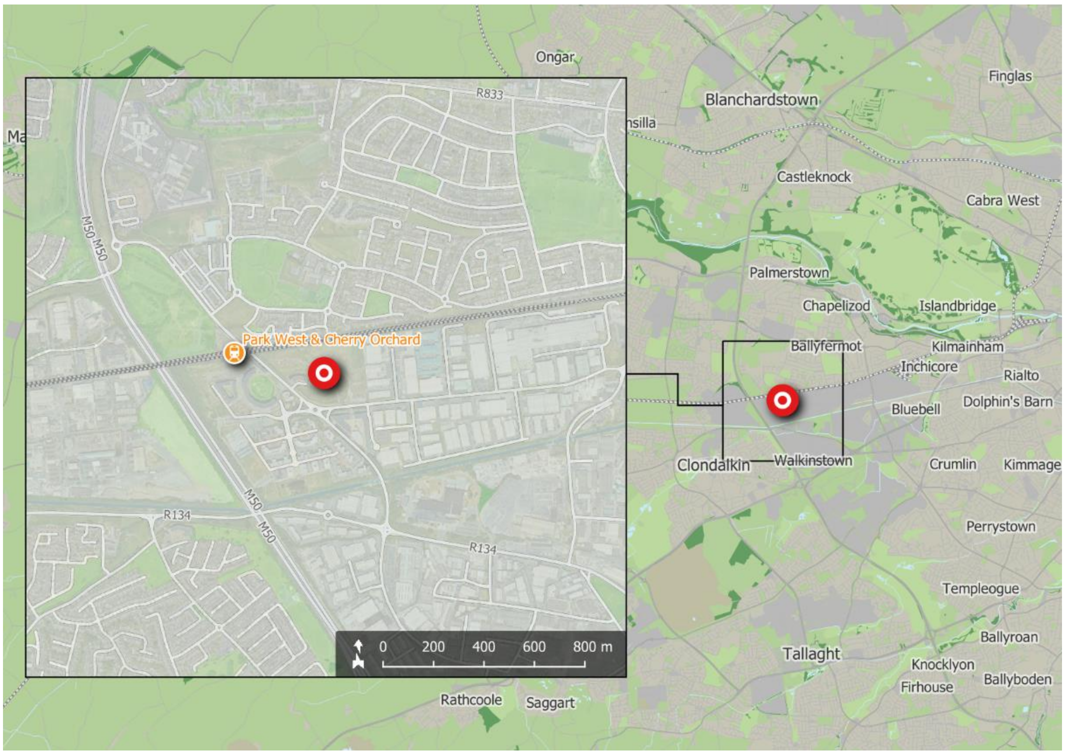


Figure 11.6: Location of proposed development site
(Sources: EPA, OSi, OSM Contributors, Google)

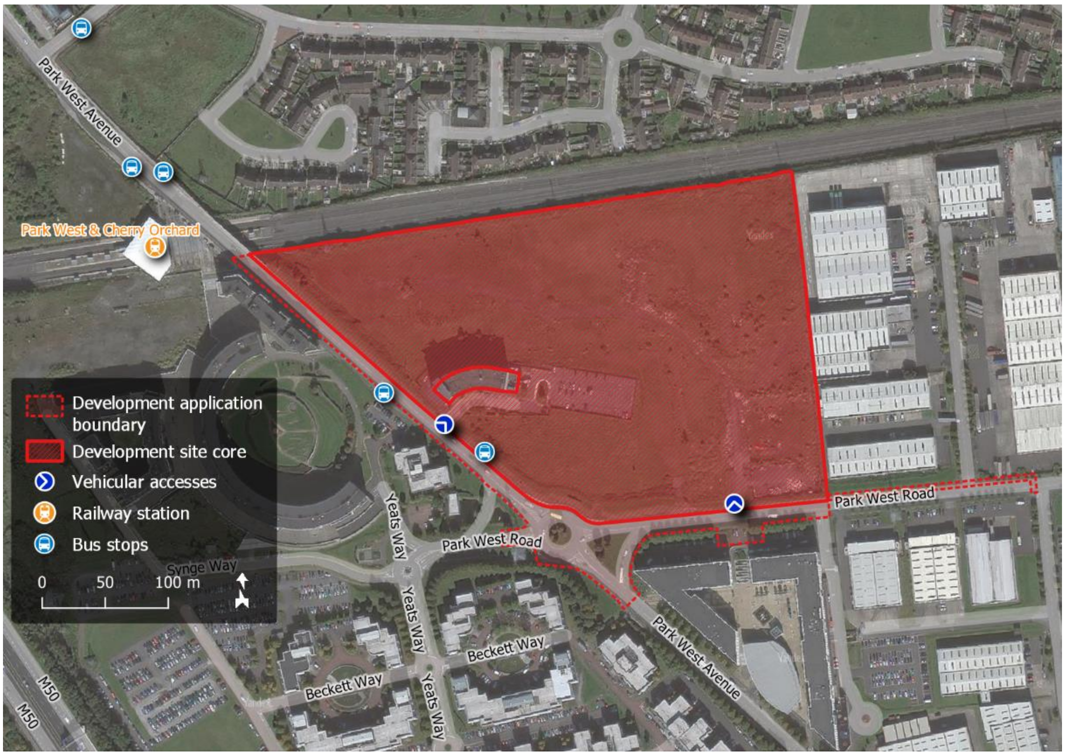


Figure 11.7: Site extents and transport context
(Sources: NTA, OSi, OSM Contributors, Yandex)

11.3.2 Existing Land Use

The site of the proposed development is predominantly greenfield and has never been fully developed. The car park and access road of the existing Aspect Hotel form part of the development site. Limited vehicular traffic is currently generated by the Aspect Hotel, the existing access to which shall also serve as one of the proposed development's 2no. vehicular access junctions.

11.3.3 Existing Road Network Characteristics

Park West Road

- Single carriageway road with a pavement width of 9m in the vicinity of the subject development.
- Regional road with an east-west alignment overall, leading to Park West in the west and to Killeen Road in the east.
- Subject to a 50km/h speed limit.
- Raised footpaths are present along both sides of Park West Road. No bus or cycle lanes are present.
- On-street parking is generally not prohibited along Park West Road in the vicinity of the subject development site.

Park West Avenue

- Single carriageway road with a pavement width of approximately 9m in the vicinity of the subject development site.
- Local road with a north-south alignment, leading to the Fox & Geese in the south and to Palmerstown in the north.
- Subject to a 50km/h speed limit.
- Raised and segregated footpaths are present along both sides of Park West Avenue.
- Raised off-road cycle tracks are present along both sides of Park West Avenue.
- On-street parking is generally not prohibited along Park West Avenue in the vicinity of the subject development site.

11.3.4 Existing Traffic Flows

The 2019 traffic movements at each of the surveyed junctions during the peak hours have been isolated from the count data and have been scaled up to baseline levels for the year 2021 using standard TII growth factors (see section 11.2.2). These total survey year and baseline year peak hour flows at the survey junctions are given in Table 11.9.

Table 11.9: Total Peak Hour Traffic Flows at Surveyed Junctions

Time Period	Total Surveyed Junction Traffic Movements (in Passenger Car Units)						
	J1	J2	J3	J4	J5	J6	J7
2019 – Survey Year							
AM Peak (08:00-09:00)	1425	1199	1176	2251	774	2580	2017
PM Peak (16:30-17:30)	1285	1196	1098	1979	671	2580	1980
2021 – Baseline Year							
AM Peak (08:00-09:00)	1471	1238	1214	2325	799	2664	2082
PM Peak (16:30-17:30)	1327	1235	1132	2043	693	2664	2043

11.3.5 Road Traffic Collision Data

The locations of recorded road traffic collisions in the vicinity of the development site over the 11-year period from 2005 to 2016 (inclusive), which have been collated by the Road Safety

Authority, are shown in Figure 11.8. These indicate a low frequency of traffic collisions in the immediate vicinity of the subject development site.

Figure 11.8: Recorded road traffic collisions on surrounding road network (Sources: RSA, OSM Contributors, Yandex)

11.3.6 Site Accessibility – Walking, Cycling, and Public Transport

Existing pedestrian facilities on the wider street network in the vicinity of the development site are generally of good quality; raised footpaths and public lighting are in place on both Park West Avenue and Park West Road. As part of the proposed development, its access junctions on Park West Avenue and Park West Road shall both incorporate new signal-controlled pedestrian crossings on all arms.

Existing off-road cycle lanes are in place along Park West Avenue, at the western boundary of the development site. These connect to cycle facilities and bus lanes on the R134 Nangor Road and the R110 Long Mile Road, which provide a route into Dublin city centre.

As shown in Figure 11.9, the development site is within a 10-minute bicycle journey of numerous employment concentrations, including the following:

- Cherry Orchard Hospital
- Cherry Orchard Industrial Estate
- Clondalkin Industrial Estate
- Western Industrial Estate
- John F. Kennedy Industrial Estate

Liffey Valley Shopping Centre, Fonthill Retail Park, and Ballymount Industrial Estate are all within a 15-minute bicycle journey, while the Phoenix Park and the western edge of Dublin city centre are within a 20-minute bicycle journey. These bicycle journey times have been calculated on the basis of an average cycling speed of 18km/h.

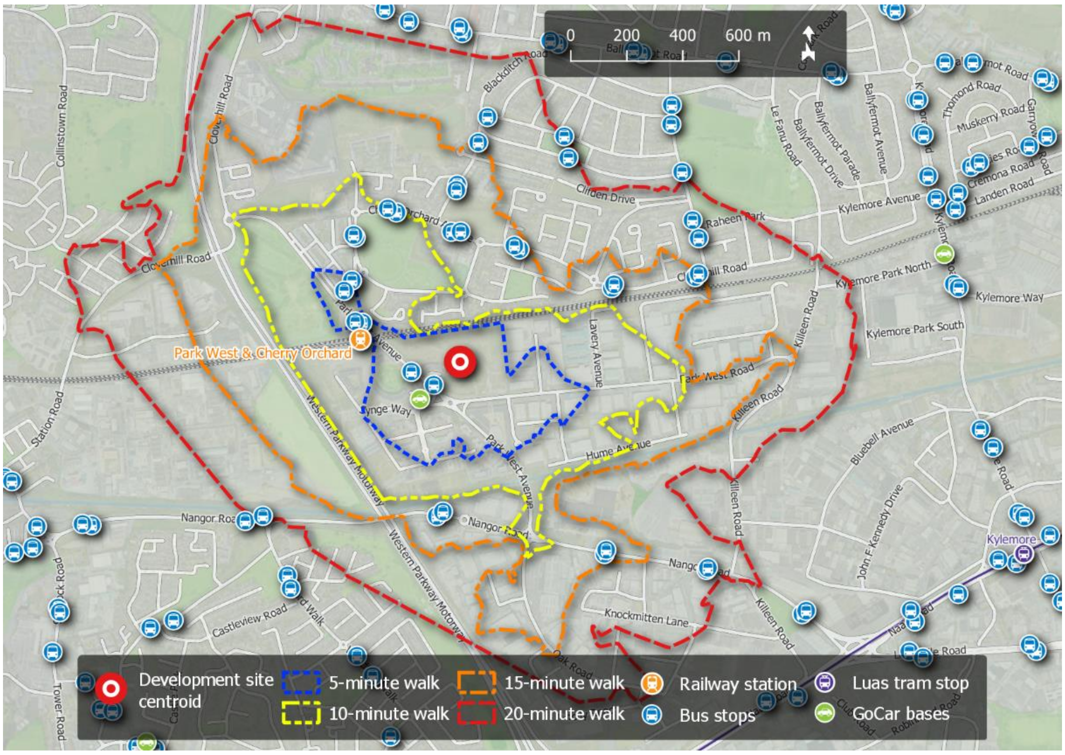


Figure 11.8: Walking times and public/shared transport locations
(Sources: NTA ,OSi, GoCar, OSM Contributors, Google)

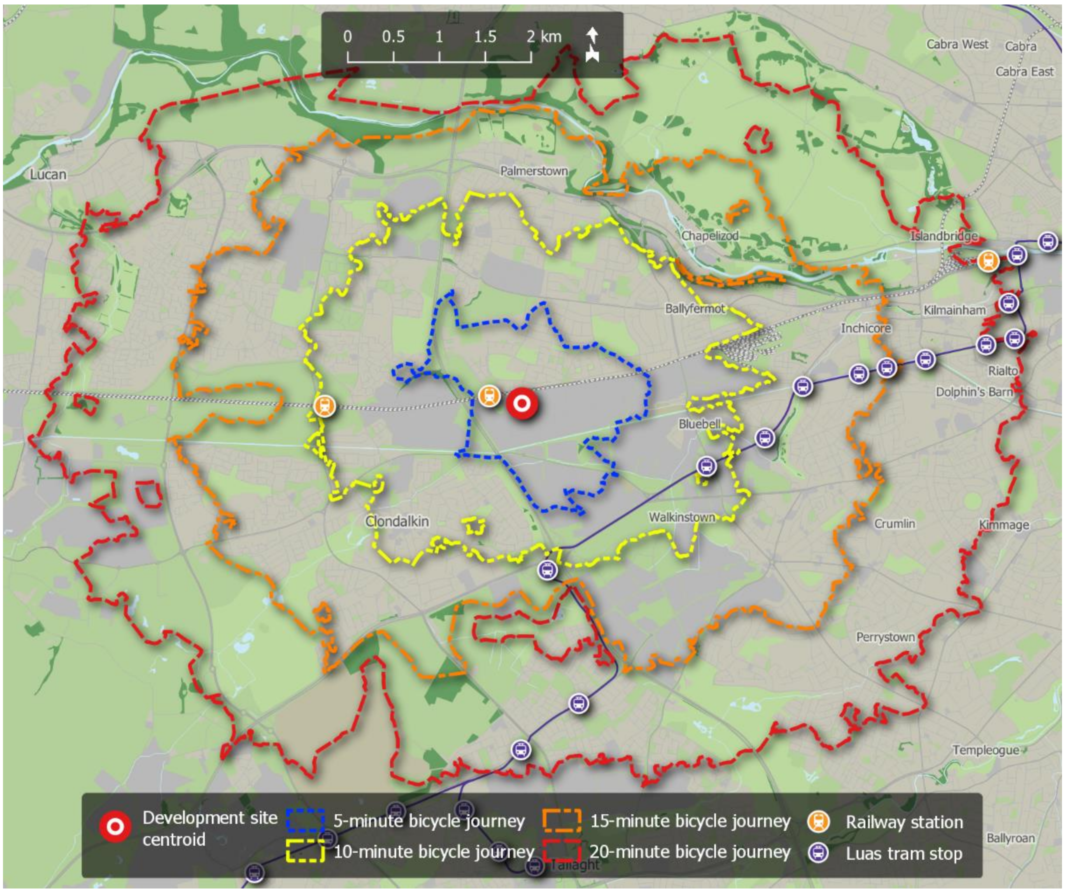


Figure 11.9: Bicycle journey times
(Sources: NTA ,OSi, EPA, OSM Contributors)

The development site is within a 5-minute walk of Park West & Cherry Orchard railway station. Intercity and commuter rail services operating to and from this station connect it directly to Dublin city centre, as well as to other towns and cities including Cork, Waterford, Portlaoise, and Carlow. Details of these train services are given in Table 11.10 and their routes to and from Dublin city centre are illustrated in Figure 11.10.

Table 11.10: Train Services to/from Park West & Cherry Orchard Station

Direction	Destinations	Weekday Services	Peak Interval
Eastbound	Dublin Heuston / Grand Canal Dock	44	15 min
Westbound	Portlaoise / Cork / Waterford	44	15 min

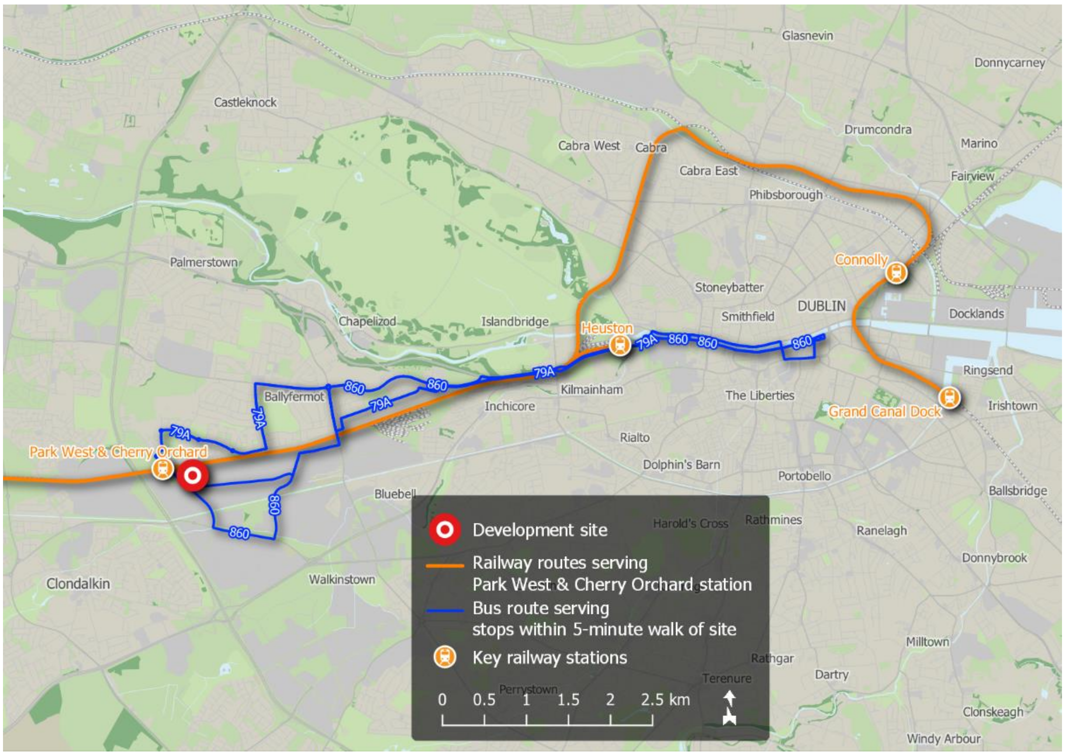


Figure 11.10: Existing nearby rail and bus routes (Sources: EPA, NTA, OSi, OSM Contributors)

Bus stops on Park West Avenue, immediately adjacent to the development site, are served by 2no. NTA-regulated bus routes, details of which are given in Table 11.11. The extents of these routes are also illustrated in Figure 11.10.

Table 11.11: Adjacent Bus Services

Route No.	Operator	Destinations	Weekday Services	Peak Interval
79A	Dublin Bus	Aston Quay – Park West	33	20 min
860	Express Bus	Temple Bar – Park West	22	20 min

Figure 11.11 shows the reach of public transport journeys from the development site by total travel time (including service interchanges, and walking to and between stops), based upon a departure time of 08:00 on a typical weekday.

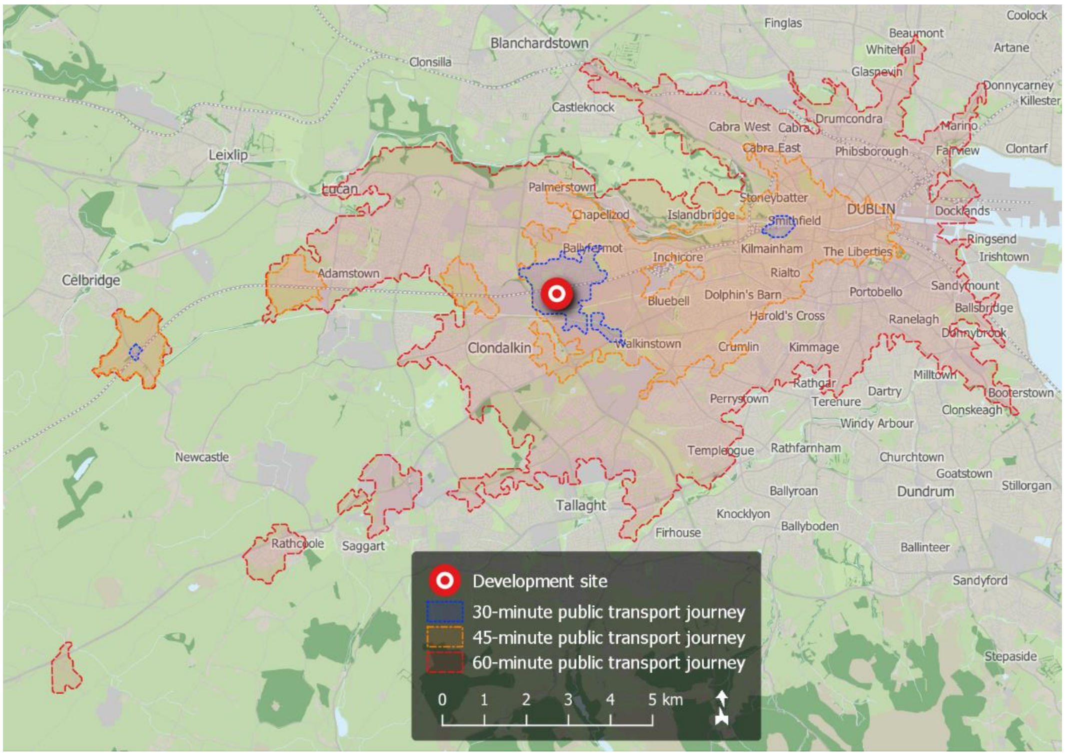


Figure 11.11: Public transport travel times from development site (Sources: EPA, OSM Contributors, TravelTime platform)

11.3.7 Planned Public Transport Improvements

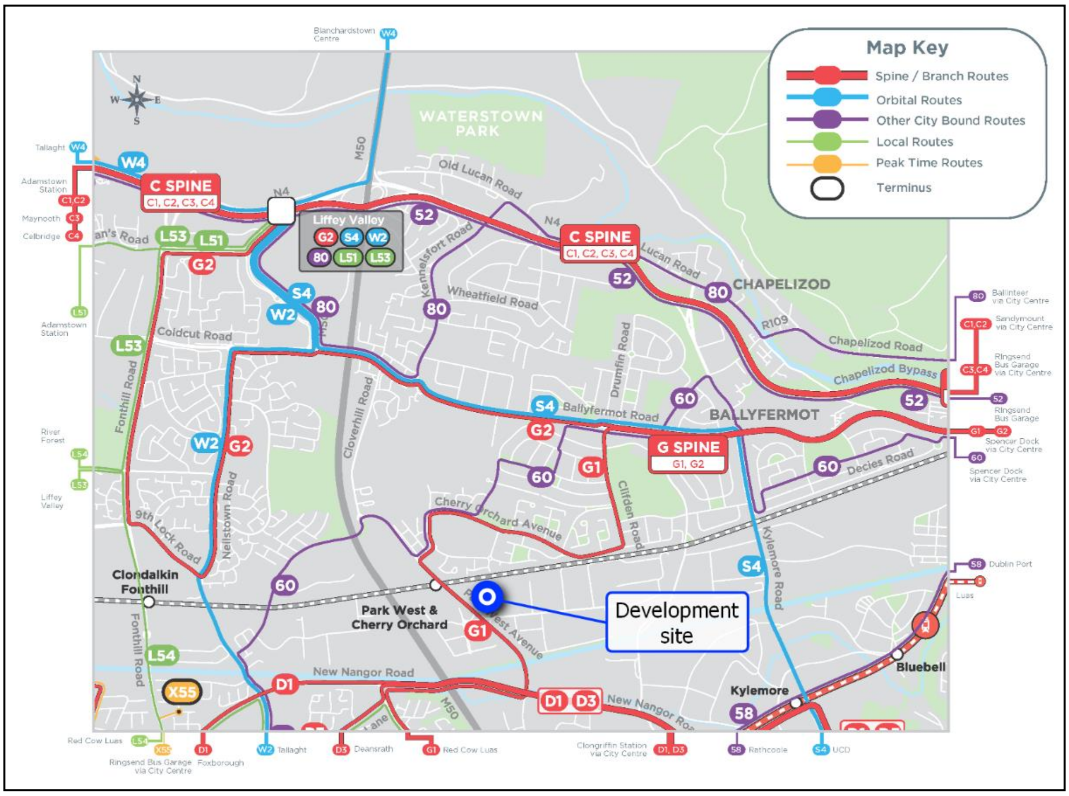


Figure 11.12: Dublin Area Revised Bus Network Ballyfermot area map (Source: NTA)

As part of the NTA's BusConnects framework, the Dublin Area Revised Bus Network initiative seeks to improve the overall convenience and efficiency of the city's bus routes. Under these

Revised Bus Network proposals, which are in the process of being implemented by the NTA, bus stops in proximity to the subject development site will in future be served by the bus routes listed in Table 11.12.

Table 11.12: Future Bus Services in Proximity to Site

Route No.	Route Type	Destinations	Weekday Services	Peak Interval
G1	Spine	Spencer Dock – Red Cow	77	12 min
D1/D3	Spine	Clongriffin – Grange Castle / Clondalkin	144	8 min
60	Radial	Spencer Dock – Red Cow	18	60 min

11.3.8 Nearby Committed Developments

A review of planning data published by the Department of Housing, Local Government, and Heritage has identified no active planning permissions sufficiently close to the subject development site and of sufficient scale to have an impact on the traffic flows at the junctions considered in this report.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

11.4.1 Development Description

A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

A full description of the proposed development is provided in the statutory notices and in Chapter 3 of the EIAR.

Briefly summarised, the development comprises the following elements relevant to traffic and transportation:

- 750no. residential apartment units (321no. 1-bedroom units, 384no. 2-bedroom units, and 45no. 3-bedroom units)
- a crèche with a gross floor area (GFA) of 410m^2
- a community space with a GFA of 48m^2
- a retail/commercial unit with a GFA of 156m^2
- a café/bar unit with a GFA of 91m^2

The development shall include:

- 552no. car parking spaces
- 1,676no. bicycle parking spaces
- 19no. motorcycle parking spaces

11.4.2 Access Arrangements

Vehicular access to the proposed development from the surrounding public road network shall be via 2no. access junctions (see Figure 11.13):

- the existing Aspect Hotel access junction on Park West Avenue, at the site's western boundary, which shall be upgraded to a signal-controlled junction; and
- a new access junction on Park West Road, at the site's southern boundary, which shall also be configured as a 3-arm signal-controlled junction.

The minor arm of each development access junction shall have a carriageway width of 6.0m, allowing 2-way traffic flow into and out from the development. Maximum kerb radii of 6.0m are provided at these junctions, to discourage excessive vehicle speeds on entry to or exit from the development.

In accordance with the requirements of the *Design Manual for Urban Roads and Streets* (DMURS), unobstructed sightlines of 49m in either direction along Park West Avenue and Park West Road are ensured for vehicles exiting the development at either access junction, measured from a setback of 2.4m behind the major carriageway edge. Raised tables are provided at both access junctions, both to ensure low vehicle speeds and to emphasise pedestrian and cyclist priority across the mouth of the junction.

Figure 11.13: Development access points
(Sources: Murray & Associates, NTA, OSi, OSM Contributors, Yandex)

Pedestrian and cyclist access to the proposed development shall be possible at the following locations (see Figure 11.13):

- via the development's western access junction on Park West Avenue (the existing Aspect Hotel access junction);
- via the development's proposed new southern access junction on Park West Road; and
- at multiple points along the development's western boundary, where the development's internal footpaths tie in to the existing footpath along Park West Avenue.

As part of the proposed development, its access junctions on Park West Avenue and Park West Road shall both incorporate signal-controlled pedestrian crossings on all arms.

In addition to these initial access provisions, the development's internal road network and footpaths are continued up to the site's eastern boundary. This facilitate future access to lands to the east, should these be put to residential or retail use in future, ensuring east-west pedestrian permeability through the development.

All connections between the development’s internal road network and the existing external road network have been designed in accordance with the requirements of the *Design Manual for Urban Roads and Streets*.

11.4.3 Internal Layout and Road Hierarchy

The proposed development’s internal road layout comprises a network of local access streets with carriageway widths of between 5.5m and 6.0m. On-street car parking is provided along several sections of the development’s internal road network, in the form of banks of perpendicular and parallel parking spaces. Turning heads are provided at the ends of internal cul-de sac streets, to facilitate the movements of larger vehicles.

In addition to these local access streets, a shared surface road (Road 3) is provided between Road 2 and Road 4, through the centre of the development. This shall be primarily for pedestrian and cyclist use but shall also be open to use by taxis and servicing vehicles (e.g. deliveries or refuse collection). No other motor vehicles will be permitted to use this road.

The development’s internal road layout has been designed for a maximum vehicular speed of 30km/h, and signage to this effect is provided on entry to the development. Several traffic-calming features have been incorporated into the internal road network design. These include kerb radii at internal junctions restricted to 4.0m, as well as raised table treatments and raised pedestrian crossings at internal junctions. The presence of on-street parking bays along significant portions of the internal road network shall also have a natural traffic calming effect, as through traffic shall have to be alert to (and accommodate) parking manoeuvres into and out of these spaces.

At all internal road junctions, it has been ensured that forward visibility splays of at least 23m are achieved, in compliance with the requirements of the *Design Manual for Urban Roads and Streets* (DMURS).

Three undercroft car parks are located at ground level beneath the residential blocks in the northern part of the development. These accommodate a total of 314no. car parking spaces for residential, hotel, and retail use. Car parking spaces are arranged perpendicularly to either side of circulation aisles with a minimum width of 6.0m. A minimum width of 6.6m is provided for sections of 2-way circulation aisle from which parking spaces are accessed. 17no. disabled-accessible spaces are provided within the undercroft car parks; a minimum vertical clearance of 2.6m is maintained at these spaces and along their approach routes, as required by the IStructE *Design Recommendations for Multi-Storey and Underground Car Parks*.

Please refer to the Road Infrastructure Design Report submitted with this application for further details of the subject development’s internal road layout and hierarchy.

11.4.4 Car and Motorcycle Parking

The development shall include a total of 552no. car parking spaces, comprising:

- 463no. new spaces serving residential units (277no. spaces in undercroft parking areas and 186no. on-street spaces)
- 14no. new spaces (on-street) for residential car club vehicles
- 5no. new spaces (4no. on-street and 1no. undercroft) serving the development’s crèche and retail elements
- 70no. existing spaces associated with the Aspect Hotel, which are to be relocated to 34no. new on-street and 36no. new undercroft locations within the development

The car parking provision of the proposed development has been assessed with respect to the *Dublin City Development Plan 2016–2022*, which defines the standard maximum car parking provision for new developments by land use type. Table 11.13 shows the car parking standards applicable to the proposed development and illustrates that the total car parking provision does not exceed the maximum number permitted by the Local Authority development plan.

Table 11.13: Overall Car Parking Provision

Land Use (Zone 2)	Car Parking Maxima	Quantum	Max. Parking Provision	Proposed Provision
New car parking spaces				
Residential	1 space per dwelling	750 dwellings	750 spaces	463 spaces
Schools (Crèche)	1 space per classroom	4 classrooms	4 spaces	4 spaces
Cultural Buildings	1 space per 250m^2 GFA	48m^2 GFA	0 spaces	0 spaces
Retail	1 space per 275m^2 GFA	156m^2 GFA	1 space	1 space
Cafés	1 space per 250m^2 seating area	55m^2 seating area	0 spaces	0 spaces
Residential car club parking			n/a	14 spaces
Relocated existing car parking spaces				
Aspect Hotel			70 spaces	70 spaces
Development Total				
Total			825 spaces	552 spaces

The crèche shall also be served by an on-street loading/set-down bay equivalent to 2no. car spaces. These shall not function as long-term car parking spaces. Refer to CS Consulting drawing PWT-CSC-XX-XX-DR-C-0042 for the locations and uses of car parking spaces within the development. In total, the development shall include 478no. car parking spaces for residential use, equating to a parking ratio of 0.64 spaces per residential unit (or 0.62 spaces per unit if car club spaces are excluded).

The *Dublin City Development Plan 2016–2022* specifies the following in relation to residential car parking in apartment developments:

"Car parking standards are maximum in nature and may be reduced in specific, mainly inner city locations where it is demonstrated that other modes of transport are sufficient for the needs of residents."

"Where sites are constrained or provision of on-site car storage is not possible, alternative solutions will be considered such as residential car clubs or off-site storage."

In addition, the policy document *Sustainable Urban Housing: Design Standards for New Apartments (Guidelines for Planning Authorities)*, published by the Department of Housing, Planning and Local Government in December 2020, gives the following guidance on the provision of residential car parking:

"In larger scale and higher density developments, comprising wholly of apartments in more central locations that are well served by public transport, the default policy is for car parking provision to be minimised, substantially reduced or wholly eliminated in certain circumstances. The policies above would be particularly applicable in highly accessible areas such as in or adjoining city cores or at a confluence of public transport systems such [as] rail and bus stations located in close proximity.

"These locations are most likely to be in cities, especially in or adjacent to (i.e. within 15 minutes walking distance of) city centres or centrally located employment locations. This includes 10 minutes walking distance of DART, commuter rail or Luas stops or within 5 minutes walking distance of high frequency (min 10 minute peak hour frequency) bus services."

As detailed in the Residential Travel Plan Framework document submitted under separate cover in support of this planning application (as well as in section 11.3.6 of this chapter), the development site is situated within a 5-minute walk of Park West & Cherry Orchard railway station. Residents shall therefore have convenient access to reliable, high-frequency commuter rail services to and from Dublin city centre.

The proposed development is therefore considered an appropriate candidate for a limited residential car parking provision, in accordance with the standards and guidelines set out by Dublin City Council and by the Department of Housing, Planning and Local Government.

Table 11.14 gives both the assumed starting modal splits of residents' journeys and the suggested initial Residential Travel Plan targets. The assumed starting modal splits have been informed by CSO census data from the year 2016, as described in the Residential Travel Plan framework document. The development's parking ratio of 0.64 spaces per residential unit is sufficient to cater for the anticipated initial modal share of private car use by development residents.

Table 11.14: Initial Target Modal Splits for Development Occupants

Mode	Assumed Starting Proportion of Trips	Suggested Initial RTP Targets
Driving a Car	41%	35%
Passenger in a Car	14%	11%
Bicycle	5%	7%
Motorcycle	1%	1%
Bus	14%	17%
Train or Tram	7%	9%
Walking	18%	20%
TOTAL	100%	100%

The *Dublin City Development Plan 2016–2022* sets out the minimum requirement for the provision of disabled-accessible parking in new developments, as a proportion of the total development car parking provision. Table 11.15 applies this requirement to the proposed development.

Table 11.15: Disabled-Accessible Car Parking Provision

Proposed Car Parking Provision	Minimum Required Proportion	Accessible Spaces Required	Accessible Spaces Proposed
Internal (undercroft)			
314 spaces	5%	16	17
External (on-street)			
238 spaces	5%	12	13
Development Total			
552 spaces	5%	28	30

The development includes a total of 30no. disabled-accessible car parking spaces, of which:

- 17no. spaces are located within undercroft parking areas; and

- 13no. spaces are arranged along the development's internal road network.

The development's overall provision of disabled-accessible car parking facilities thereby satisfies the requirements of the Dublin City Development Plan 2016–2022.

The *Dublin City Development Plan 2016–2022* sets out the standard requirement for the provision of motorcycle parking in new developments, as a proportion of the total development car parking provision. Table 11.16 applies this requirement to the proposed development.

Table 11.16 Motorcycle Parking Provision

Proposed New Car Parking Provision	**Minimum Required Proportion**	**Motorcycle Spaces Required**	**Motorcycle Spaces Proposed**
482 spaces *(excluding relocated hotel spaces)*	4%	19	20

Refer to CS Consulting drawing PWT-CSC-XX-XX-DR-C-0042 for the locations and uses of motorcycle parking spaces within the development.

11.4.5 Bicycle Parking

Table 11.17: Bicycle Parking Provision (Development Plan)

Land Use (Zone 2)	**Cycle Parking Minima**	**Quantum**	**Min. Parking Provision**	**Proposed Provision**
Long-term cycle parking (secure storage)				
Residential	1 space per unit	750 units	750 spaces	1,276 spaces
Short-stay cycle parking (public realm)				
Employment (Crèche)	1 space per 100m^2 GFA	410m^2 GFA	4 spaces	12 spaces
Cultural Buildings	1 space per 150m^2 GFA	48m^2 GFA	0 spaces	4 spaces
Shops	1 space per 150m^2 GFA	156m^2 GFA	1 spaces	4 spaces
Cafés	1 space per 150m^2 GFA	91m^2 GFA	1 space	4 spaces
Visitor cycle parking			n/a	376 spaces
Development Total				
Total			756 spaces	1,676 spaces

The development shall include a total of 1,676no. bicycle parking spaces, comprising:

- 1,276no. long-term bicycle parking spaces for apartment residents, located in secure dedicated cycle stores
- 400no. publicly-accessible short-stay bicycle parking spaces for visitor and commercial use, distributed at surface level throughout the development site

The proposed development's bicycle parking provision has been assessed with respect to the *Dublin City Development Plan 2016–2022*, which defines the minimum standard bicycle parking provision for new developments by land use type. Table 11.18 shows the standards applicable to the proposed development, illustrating that the proposed bicycle parking provision for the development exceeds the requirements of the Local Authority development plan.

Table 11.18 Residential Bicycle Parking Provision (Apartment Guidelines)

Cycle Parking Recommendation	Quantum	Recommended Provision	Proposed Provision
Long-term bicycle storage			
1 storage space per bedroom	1,224 bedrooms	1,224 spaces	1,276 spaces
Short-stay bicycle parking			
1 visitor parking space per 2 units	750 units	375 spaces	376 spaces
Total residential bicycle parking			
TOTALS		1,599 spaces	1,652 spaces

As shown in Table 11.18, the development's residential bicycle parking provision also complies with the recommendations of the Apartment Guidelines, which state that:

"A general minimum standard of 1 cycle storage space per bedroom shall be applied. For studio units, at least 1 cycle storage space shall be provided. Visitor cycle parking shall also be provided at a standard of 1 space per 2 residential units."

11.4.6 Residential Car Share Parking

It is proposed to establish a car-sharing club for residents of the development. 14no. dedicated shared vehicles shall be provided under this scheme, and 14no. car parking spaces within the development shall be reserved for these vehicles.

A recent study of car clubs in Scotland, commissioned and published by CoMoUK, concluded that a single shared car may replace 14 private cars. On this basis, the 14no. shared car parking spaces may therefore be considered to reduce residential parking demand within the development by approximately 182no. spaces.

11.4.7 Electric Vehicle Charging Facilities

Facilities for the charging of battery electric vehicles (BEVs) shall be provided at 32no. internal (undercroft) car parking spaces and 24no. on-street car parking spaces, representing 10% of the development's overall car parking provision. All remaining car parking spaces within the development shall be 'future-proofed' by the inclusion of ducting and/or cabling to permit the rapid future installation of additional BEV charging points.

11.4.8 Car Parking Management

Access to the development's 3no. undercroft car parking areas shall be regulated by means of barrier control systems. Authorised development occupants shall gain access by means of an RFID key fob or similar automated system. The development's Management Company shall implement suitable measures to prevent unauthorised use of on-street car parking spaces within the development.

Car parking spaces shall be designated by category of use and identifiable through colour-coding, road markings, and/or signage. All car parking spaces within the development (including the 30no. accessible spaces and 14no. car club spaces) shall be controlled by the development's Management Company. Parking spaces shall not be assigned to individual apartment units; spaces shall instead be allocated and/or leased to residents and staff on the basis of availability and need, in part by means of a permit/lottery system, in order to optimise the use of parking.

11.4.9 Development Servicing

The internal layout of the development allows both development servicing (such as deliveries) and waste collection to be conducted within the development itself, thereby avoiding the obstruction of either vehicular or pedestrian traffic on the surrounding road network.

Swept path analyses have been carried out for cars, light vans, fire tenders, refuse collection vehicles, and buses accessing the development and circulating within it. These analyses, provided on drawings PWT-CSC-XX-XX-DR-C-0031 to PWT-CSC-XX-XX-DR-C-0037 within this planning application, indicate that the design of the development accesses and internal layout can accommodate these vehicle movements where required.

11.5 BASELINE ASSESSMENT

TRANSYT assessment of the 2no. modelled existing junctions indicates that these currently operate within effective capacity on all approaches during both the AM peak hour and the PM peak hour. The baseline scenario TRANSYT modelling results are summarised in Table 11.19. Vehicle queue lengths are given in Passenger Car Units (PCU).

Table 11.19: 2021 Baseline Assessment Results

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per Vehicle (sec)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Junction J3 – Park West Avenue / Aspect Hotel								
Park West Ave (N)	51	18	0	0	1	0	78	392
Aspect Hotel (E)	7	2	0	0	1	0	1194	3765
Park West Ave (S)	17	45	0	0	0	1	420	102
Junction J4 – Park West Avenue / Park West Road								
Park West Ave (N)	68	25	1	0	4	1	33	263
Park West Rd (E)	24	53	0	0	1	4	267	68
Park West Ave (S)	65	36	1	0	4	1	37	149
Park West Rd (W)	25	83	0	3	2	25	265	8

The traffic flows employed in these assessments are those surveyed in 2019, scaled up to 2021 levels using standard TII growth factors.

Under these baseline conditions, Junction J3 experiences:

- No discernible vehicle queueing in either the AM peak hour or the PM peak hour
- Mean delays per vehicle of at most 1 second during both the AM peak hour and the PM peak hour

Under these baseline conditions, Junction J4 experiences:

- Mean maximum vehicle queues of at most 1 PCU during the AM peak hour and at most 3 PCU during the PM peak hour
- Mean delays per vehicle of at most 4 seconds during the AM peak hour and at most 25 seconds during the PM peak hour

In summary, these 3no. modelled junctions operate efficiently and within their design limits under the baseline traffic scenario.

11.6 DO NOTHING SCENARIO

Table 11.20 summarises the TRANSYT assessment results for the 2no. modelled existing junctions under the Do-Nothing scenario for the opening year 2025. The traffic flows employed in these assessments are those surveyed in 2019, scaled up to 2025 levels using standard TII growth factors, without any further addition of vehicular traffic.

Under these design year Do-Nothing conditions, Junction J3 shall experience:

- No discernible vehicle queueing in either the AM peak hour or the PM peak hour
- Mean delays per vehicle of at most 1 second during both the AM peak hour and the PM peak hour

Under these design year Do-Nothing conditions, Junction J4 shall experience:

- Mean maximum vehicle queues of at most 2 PCU during the AM peak hour and at most 6 PCU during the PM peak hour
- Mean delays per vehicle of at most 6 seconds during the AM peak hour and at most 49 seconds during the PM peak hour

Table 11.20: Opening Year 2025 Do-Nothing Assessment Results

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per Vehicle (sec)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Junction J3 – Park West Avenue / Aspect Hotel								
Park West Ave (N)	54	20	0	0	1	0	66	362
Aspect Hotel (E)	8	3	0	0	1	0	1051	3430
Park West Ave (S)	19	48	0	0	0	1	383	88
Junction J4 – Park West Avenue / Park West Road								
Park West Ave (N)	74	27	2	0	6	1	22	234
Park West Rd (E)	27	58	0	1	2	5	234	55
Park West Ave (S)	71	39	1	0	5	1	27	131
Park West Rd (W)	27	92	0	6	2	49	234	-2

Junction J3 shall continue to operate well within its effective capacity on all approaches during both peak hour periods. Junction J4 shall slightly exceed its effective capacity on the western approach during the PM peak hour but shall remain within ultimate capacity.

11.6.2 Design Year Do-Nothing Scenario

Table 11.21 summarises the TRANSYT assessment results for the 2no. modelled existing junctions under the Do-Nothing scenario for the design year 2040. The traffic flows employed in these assessments are those surveyed in 2019, scaled up to 2040 levels using standard TII growth factors, without any further addition of vehicular traffic.

Table 11.21: Design Year 2040 Do-Nothing Assessment Results

Junction Approach	Degree of Saturation (%)	Mean Maximum	Mean Delay per Vehicle	Practical Reserve

Arm			Queue (PCU)		(sec)		Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Junction J3 – Park West Avenue / Aspect Hotel								
Park West Ave (N)	62	22	0	0	2	0	46	305
Aspect Hotel (E)	10	3	0	0	1	0	846	2740
Park West Ave (S)	21	54	0	0	0	2	319	65
Junction J4 – Park West Avenue / Park West Road								
Park West Ave (N)	88	31	4	0	14	1	3	189
Park West Rd (E)	33	67	0	1	2	7	176	34
Park West Ave (S)	83	46	3	0	10	2	9	96
Park West Rd (W)	33	115	0	36	3	266	173	-22

Under these design year Do-Nothing conditions, Junction J3 shall experience:

- No discernible vehicle queueing in either the AM peak hour or the PM peak hour
- Mean delays per vehicle of at most 2 seconds during both the AM peak hour and the PM peak hour

Under these design year Do-Nothing conditions, Junction J4 shall experience:

- Mean maximum vehicle queues of at most 4 PCU during the AM peak hour and at most 36 PCU during the PM peak hour
- Mean delays per vehicle of at most 14 seconds during the AM peak hour and at most 266 seconds during the PM peak hour

While Junction J3 shall continue to operate well within its effective capacity on all approaches during both peak hour periods, Junction J4 shall exceed its ultimate capacity on the western approach during the PM peak hour. This shall result in significant vehicle queueing and delays on exit from the existing Park West Business Park. Junction J4 shall also approach its effective capacity on the northern and southern approaches during the AM peak hour.

11.7 PREDICTED IMPACTS

11.7.1 Construction Phase

Table 11.22 summarises the TRANSYT assessment results for the 3no. modelled existing and proposed junctions for the design year 2025 during the development's construction stage. The traffic flows employed in these assessments are those surveyed in 2019, scaled up to 2025 levels using standard TII growth factors, with the addition of vehicular traffic to be generated by the subject proposed development during its construction. Under this assessment scenario, junctions J3 and J8 both function as simple priority-controlled junctions.

Table 11.22: Opening Year 2025 Construction Stage Assessment Results

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per Vehicle (sec)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Junction J3 – Park West Avenue / Aspect Hotel & Development Site								
Park West Ave (N)	54	20	0	0	1	0	66	362
Hotel & Dev. Site (E)	8	3	0	0	1	0	1051	3430
Park West Ave (S)	19	48	0	0	0	1	383	88

Junction J4 – Park West Avenue / Park West Road								
Park West Ave (N)	75	27	2	0	6	1	19	231
Park West Rd (E)	30	58	0	1	2	5	205	55
Park West Ave (S)	74	41	2	0	6	1	22	122
Park West Rd (W)	28	93	0	7	2	55	224	-4
Junction J8 – Park West Road / Development Site								
Park West Rd (E)	52	28	0	0	1	0	74	220
Dev. Site (N)	7	13	0	0	1	1	1273	590
Park West Rd (E)	19	40	0	0	0	1	363	126

Under these opening year construction stage conditions, Junction J3 shall experience:

- No discernible vehicle queueing in either the AM peak hour or the PM peak hour
- Mean delays per vehicle of at most 2 seconds during both the AM peak hour and the PM peak hour

Under these opening year construction stage conditions, Junction J4 shall experience:

- Mean maximum vehicle queues of at most 2 PCU during the AM peak hour and at most 7 PCU during the PM peak hour
- Mean delays per vehicle of at most 6 seconds during the AM peak hour and at most 55 seconds during the PM peak hour

Junction J8 shall operate within effective capacity on all approaches, experiencing:

- No discernible vehicle queueing in either the AM peak hour or the PM peak hour
- Mean delays per vehicle of at most 1 second during both the AM peak hour and the PM peak hour

The impact of the proposed development's construction traffic on the operation of the 2no. existing assessed road junctions may be represented quantitatively by the differences in TRANSYT modelling results between the 2025 Do-Nothing and the 2025 construction stage assessment scenarios at the 2no. existing junctions assessed (J3 and J4). This comparison is given in Table 11.23.

Table 11.23: Opening Year 2025 Proposed Development Influence – Construction Stage

Junction Approach Arm	**Degree of Saturation (%)**		**Mean Maximum Queue (PCU)**		**Mean Delay per Vehicle (sec)**		**Practical Reserve Capacity (%)**	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Junction J3 – Park West Avenue / Aspect Hotel & Development Site								
Park West Ave (N)	0	0	0	0	0	0	0	0
Hotel & Dev. Site (E)	0	0	0	0	0	0	0	0
Park West Ave (S)	0	0	0	0	0	0	0	0
Junction J4 – Park West Avenue / Park West Road								
Park West Ave (N)	+1	0	0	0	0	0	-3	-3
Park West Rd (E)	+3	0	0	0	0	0	-29	0
Park West Ave (S)	+3	+2	+1	0	+1	0	-5	-9
Park West Rd (W)	+1	+1	0	+1	0	+6	-10	-2

At Junction J3 in the opening year 2025, the addition of construction traffic generated by the proposed development is predicted to result in no change to mean maximum vehicle queues or mean delays per vehicle, in either peak hour period.

At Junction J4 in the opening year 2025, the addition of construction traffic generated by the proposed development is predicted to result in:

- Increases in mean maximum vehicle queues of at most 1 PCU in each peak hour period
- Increases in mean delays per vehicle of at most 1 second during the AM peak hour and at most 6 seconds during the PM peak hour

During its construction stage, the proposed development is therefore predicted to result overall in a short-term slight adverse impact on the operation of junctions on the surrounding road network. This impact shall be confined to the duration of construction activity on site and is thus considered fully reversible.

It is recognised that there is potential during the construction stage for construction-related activity to impact upon the surrounding road network in ways beyond the operational performance of the junctions assessed. These further impacts would potentially take the form of surrounding roads being temporarily obstructed by stopped/parked construction vehicles or by delivery/loading operations, or their condition being temporarily degraded by the presence of dirt/debris originating from the construction site. In the absence of mitigation measures, these impacts would be adverse in nature, short-term in duration, and significant.
The construction stage mitigation measures detailed in Section 11.9 are intended to prevent and minimise these impacts, and these measures will be strictly adhered to.

11.7.2 Operational Phase

Table 11.24 summarises the TRANSYT assessment results for the 3no. modelled existing and proposed junctions under the Do-Something scenario for the design year 2040. The traffic flows employed in these assessments are those surveyed in 2019, scaled up to 2040 levels using standard TII growth factors, with the addition of vehicular traffic to be generated by the subject proposed development. This assessment also accounts for the proposed upgrade of Junction J3 from a simple priority-controlled junction to a signal-controlled junction incorporating pedestrian crossing stages.

Table 11.24: Design Year 2040 Do-Something Assessment Results

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per Vehicle (sec)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Junction J3 – Park West Avenue / Aspect Hotel & Development Site								
Park West Ave (N)	81	29	24	4	13	4	12	209
Hotel & Dev. Site (E)	71	51	4	2	88	76	27	76
Park West Ave (S)	33	71	4	17	5	7	177	27
Junction J4 – Park West Avenue / Park West Road								
Park West Ave (N)	91	32	43	0	27	1	-1	181
Park West Rd (E)	35	67	1	8	2	8	160	33
Park West Ave (S)	85	48	6	0	11	2	6	87
Park West Rd (W)	34	118	0	53	3	301	168	-23
Junction J8 – Park West Road / Development Site								
Park West Rd (E)	74	37	17	5	9	4	22	143
Dev. Site (N)	66	32	3	1	78	70	37	184
Park West Rd (E)	32	65	4	12	5	7	178	38

Under these design year Do-Something conditions, Junction J3 shall experience:

- Mean maximum vehicle queues of at most 24 PCU during the AM peak hour and at most 17 PCU during the PM peak hour
- Mean delays per vehicle of at most 88 seconds during the AM peak hour and at most 76 seconds during the PM peak hour

Under these design year Do-Something conditions, Junction J4 shall experience:

- Mean maximum vehicle queues of at most 43 PCU during the AM peak hour and at most 53 PCU during the PM peak hour
- Mean delays per vehicle of at most 27 seconds during the AM peak hour and at most 301 seconds during the PM peak hour

Junction J8 shall operate within effective capacity on all approaches, experiencing:

- Mean maximum vehicle queues of at most 17 PCU during the AM peak hour and at most 12 PCU during the PM peak hour
- Mean delays per vehicle of at most 78 seconds during the AM peak hour and at most 70 seconds during the PM peak hour

Table 11.25: Design Year 2040 Proposed Development Influence – Operational Stage

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per Vehicle (sec)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Junction J3 – Park West Avenue / Aspect Hotel & Development Site								
Park West Ave (N)	+19	+7	+24	+4	+11	+4	-34	-96
Hotel & Dev. Site (E)	+61	+48	+4	+2	+87	+76	-819	-2664
Park West Ave (S)	+12	+17	+4	+17	+5	+5	-142	-38
Junction J4 – Park West Avenue / Park West Road								
Park West Ave (N)	+3	+1	+39	0	+13	0	-4	-8
Park West Rd (E)	+2	0	+1	+7	0	+1	-16	-1
Park West Ave (S)	+2	+2	+3	0	+1	0	-3	-9
Park West Rd (W)	+1	+3	0	+17	0	+35	-5	-1

The impact of the proposed development on the operation of the 2no. existing assessed road junctions in the design year 2040 may be represented quantitatively by the differences in TRANSYT modelling results between the Do-Nothing and Do-Something assessment scenarios for that year at the 2no. existing junctions assessed (J3 and J4). This comparison is given in Table 11.25.

At Junction J3 in the design year 2040, the inclusion of traffic generated by the proposed development (in conjunction with the proposed reconfiguration of this existing junction) is predicted to result in:

- Increases in mean maximum vehicle queues of at most 24 PCU during the AM peak hour and at most 17 PCU during the PM peak hour
- Increases in mean delays per vehicle of at most 87 seconds during the AM peak hour and at most 76 seconds during the PM peak hour

At Junction J4 in the design year 2040, the inclusion of traffic generated by the proposed development is predicted to result in:

- Increases in mean maximum vehicle queues of at most 39 PCU during the AM peak hour

and at most 17 PCU during the PM peak hour
- Increases in mean delays per vehicle of at most 13 seconds during the AM peak hour and at most 35 seconds during the PM peak hour

During its operational stage, the proposed development is therefore predicted to result overall in a long-term moderate adverse impact on the operation of junctions on the surrounding road network. This impact should be considered reversible to a degree, as any future measures that reduce local vehicular traffic volumes (e.g. improvements in public transport or cycling infrastructure, junction redesign, or changes in general traffic flow restrictions) have the potential to improve local traffic flows generally, as well as to reduce vehicle trips to/from the proposed development.

11.8 CUMULATIVE IMPACTS

In the evaluation of traffic impact, the future year junction performance assessments conducted in respect of the proposed development typically also include other traffic flows to be generated by relevant nearby committed development, such that the predicted impacts (as outlined in section 11.7 of this EIAR chapter) also represent the potential cumulative impacts. In this case, however, no relevant nearby committed developments have been identified.

11.9 MITIGATION MEASURES

11.9.1 Construction Phase

The lead contractor appointed for the construction of the development will be required to prepare a site-specific Construction Management Plan (CMP), including a plan for the scheduling and management of construction traffic, which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network. A Designated Community Liaison Officer (DCLO) will be nominated for the proposed development, who will work with DCLOs on other active sites to coordinate construction activities. The DCLO will also act as a point of contact for local residents, Dublin City Council, and An Garda Síochána.

The final site-specific CMP will include (inter alia) the following measures for minimising construction traffic and mitigating its effects:

- Routing all heavy construction traffic to/from the M50 motorway, via Park West Avenue, the R134 Nangor Road, and the R110 Naas Road, avoiding residential areas and narrow roads.
- Conducting all loading and unloading operations within the site, away from the public road.
- Scheduling deliveries outside of peak hour periods to avoid disturbance to surrounding pedestrian and vehicular traffic.
- Staggering HGV movements to/from site to avoid site queues.
- Preventing haulage vehicles travelling in convoys of more than two vehicles at any time and spacing haulage vehicles by a minimum of 250m at all times.
- Installation of a wheel wash at exit from the site to prevent any dirt being carried out into the public road.
- Deployment of a road sweeper as necessary to keep the public roads around the site clean.

Table 11.26: Table of Mitigation Measures – Construction Phase

Ref.	Mitigation measure
MA:T-C1	Deliveries and material removal trips will be scheduled outside of peak hour periods
MA:T-C2	HGV movements to and from the site will be staggered
MA:T-C3	Haulage vehicles will be prevented from travelling in convoys of more than two vehicles at any time
MA:T-C4	Haulage vehicles will be spaced by a minimum of 250m at all times
MA:T-C5	All loading and unloading operations will be conducted within the site
MA:T-C6	Limited essential parking for construction personnel and visitors will be provided within the site
MA:T-C7	Construction personnel will be supported in making use of public transport and/or in cycling, when commuting to site
MA:T-C8	Parking restrictions and parking management measures will be implemented on surrounding streets
MA:T-C9	A vehicle wheel wash will be installed at the exit from the site
MA:T-C10	A road sweeper will be deployed as necessary to keep surrounding streets clean
MA:T-C11	All mitigation measures in the Construction Management Plan will be implemented

Construction personnel will be encouraged to make use of the available high-quality public transport links to the area and/or to commute by bicycle, to minimise private car trips to and from the site. To avoid problems of parking overspill on surrounding streets, however, limited essential staff parking shall be provided within the site. In parallel with this, parking restrictions and management measures on surrounding streets will be reviewed and implemented as necessary in agreement with local residents and Dublin City Council.

11.9.2 Operational Phase

The development shall incorporate several design and management elements intended to mitigate the impact of the development on the surrounding road network during its operational phase. These include:

- A reduced car parking provision, which shall discourage higher vehicle ownership rates and excessive vehicular trips to the development (by residents and visitors).
- A high provision of secure bicycle parking, which shall serve to encourage bicycle journeys by both development occupants and visitors.
- An internal car-share club providing 15no. shared cars for the sole use of the development's residents, which shall support a reduced level of car ownership and help to discourage unnecessary car journeys.

As described in the Residential Travel Plan (RTP) framework document prepared in support of this planning application, a Residential Travel Plan Coordinator shall be appointed for the proposed development, with the remit to implement and oversee an ongoing RTP. This shall assist development occupants and visitors in making the most of sustainable transport opportunities and in avoiding single-occupant car journeys to and from the development site where possible.

Table 11.27: Table of Mitigation Measures – Operational Phase

Ref.	Mitigation measure
MA:T-O1	The development design includes a limited internal car parking provision
MA:T-O2	The development design includes a high provision of internal bicycle parking
MA:T-O3	A residential car-share club will be established for the exclusive use of residents
MA:T-O4	A Residential Travel Plan will be implemented
MA:T-O5	A Residential Travel Plan Coordinator will be appointed to implement the Residential Travel Plan

11.10 WORST CASE SCENARIO

11.10.1 Construction Phase

During the development’s construction phase, the worst-case scenario from a traffic and transport perspective would be an accumulation of inbound construction traffic (e.g. large deliveries or concrete mixer trucks) unable to enter the construction site and consequently obstructing traffic along Park West Avenue and/or Park West Road. The construction phase mitigation measures detailed in Section 11.9 are intended to prevent such a scenario, and these measures will be strictly adhered to.

11.10.2 Operational Phase

In the evaluation of the proposed development’s traffic and transport impact in the operational phase, the worst-case scenario is generally assumed by default. For this reason, trip generation calculations employ the maximum appropriate trip rates, and junction performance assessments are conducted in respect of the AM and PM peak hours with the heaviest background traffic flows on the surrounding road network. During the development’s operational phase, the preceding impacts described should therefore be considered as the worst-case scenario.

11.11 MONITORING AND REINSTATEMENT

11.11.1 Construction Stage

The lead contractor appointed for the construction of the development will be required to prepare a site-specific Construction Environmental Management Plan (CEMP) that shall include a plan for the scheduling and management of construction traffic. This CEMP shall outline measures for monitoring the impact of construction traffic on the operation and condition of the surrounding street network, including remedial actions to be taken in the event of construction traffic causing damage to road infrastructure.

The lead contractor will also be required to monitor the travel habits of construction personnel and to tailor supports for public and shared transport use accordingly. Surrounding streets will be monitored to ensure that no nuisance parking associated with construction activity takes place.

Table 11.28: Table of Mitigation Measures – Monitoring

Ref.	Mitigation measure
MA:T-M1	The CEMP shall outline measures for monitoring the impact of construction traffic on the operation and condition of the surrounding street network, including remedial actions to be taken in the event of construction traffic causing damage to road infrastructure.
MA:T-M2	The lead contractor will also be required to monitor the travel habits of construction personnel and to tailor supports for public and shared transport use accordingly. Surrounding streets will be monitored to ensure that no nuisance parking associated with construction activity takes place.

No reinstatement works of relevance to traffic and transport are proposed as part of the subject development, with the exception of any repair works made necessary by the passage of construction traffic.

11.11.2 Operational Stage

Post-development monitoring of the surrounding street network's performance is not required or proposed in this case.

Within the scope of the Residential Travel Plan (RTP) to be implemented for the development, however, the Residential Travel Plan Coordinator shall be responsible for monitoring the travel habits of development occupants and visitors. An RTP is a dynamic process whereby a package of measures and campaigns is identified, piloted, and then monitored on an ongoing basis. The RTP will identify specific targets against which the effectiveness of the plan can be assessed at each review; these will typically take the form of target modal splits for journeys to and from a site. The Residential Travel Plan Coordinator shall gather data on travel patterns, for instance by conducting periodic travel surveys of development occupants.

Table 11.29: Table of Mitigation Measures – Monitoring

Ref.	Mitigation measure
MA:T-M3	The Residential Travel Plan Coordinator shall be responsible for monitoring the travel habits of development occupants and visitors. The RTP will identify specific targets against which the effectiveness of the plan can be assessed at each review; these will typically take the form of target modal splits for journeys to and from a site. The Residential Travel Plan Coordinator shall gather data on travel patterns, for instance by conducting periodic travel surveys of development occupants.

No reinstatement works of relevance to traffic and transport are proposed as part of the subject development in its operational phase.

11.12 DIFFICULTIES ENCOUNTERED

No significant difficulties were experienced in compiling this Chapter of this EIAR document.

REFERENCES

- Environmental Protection Agency (EPA): *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (2017)
- Transport Infrastructure Ireland (TII): *Traffic and Transport Assessment Guidelines* (2014)
- Transport Infrastructure Ireland (TII): *Project Appraisal Guidelines* (2011)
- Dublin City Council (DCC): *Dublin City Development Plan 2016–2022* (2016)
- Dublin City Council (DCC): *Park West - Cherry Orchard Local Area Plan 2019* (2019)
- Department of Housing, Planning and Local Government (DHPLG): *Sustainable Urban Housing: Design Standards for New Apartments (Guidelines for Planning Authorities)* (2020)
- Department of Transport, Tourism and Sport (DTTS): *Design Manual for Urban Roads and Streets* (2019)
- National Transport Authority (NTA): *National Cycle Manual* (2011)
- National Transport Authority (NTA): *Greater Dublin Area Cycle Network Plan* (2013)
- TRICS Consortium: Trip Rate Information Computer System (TRICS) database
- Central Statistics Office (CSO): 2016 Census data
- CoMoUK: *Car Club Annual Survey for Scotland 2019/2020* (2020)

12 MATERIAL ASSETS: RESOURCE AND WASTE MANAGEMENT

12.1 INTRODUCTION

Byrne Environmental Consulting Ltd have assessed the potential impacts that construction and operational wastes associated which the proposed development may have on the receiving environment.

The assessment includes a comprehensive description of the types and quantities of wastes that will be generated, how wastes will be managed and how the principals of reduce-reuse and recycle shall be implemented into the design of the development to ensure that the development will be constructed and operated in an environmentally sustainable manner.

The waste management strategies' included in this Chapter of the EIAR present the potential environmental impacts, proposed mitigation and monitoring methodologies, based on the concept of Best Practice. Reference to Local, National and International Guidance and Standards are also included where relevant.

The projection of material assets of human origin was conducted and resource use and management of wastes generated were assessed for both the constructional and operational phases of the proposed development and their associated impacts assessed. Mitigation and best practice waste management are proposed where appropriate.

12.2 ASSESSMENT METHODOLOGY

This chapter of the EIAR has been prepared having regard to the following legislation and Best Practice Guidelines for both the Construction Phase and the Operational Phase of the development.

The proposed Construction & Demolition Waste Management Impact Assessment has been prepared to demonstrate how the Demolition & Construction Phase will comply with the following relevant legislation and Best Practice Guidelines:

- Waste Management Act 1996;
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).
- Department of the Environment, Heritage and Local Government – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – July 2006.
- EPA "Guidance on Soil and Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations – Version 3 June 2019
- EPA Draft Best Practice Guidelines for the preparation of resource management plans for construction and demolition projects, April 2021

The predicted volumes and types of construction and demolition waste to be produced have been determined by conducting a range of building surveys including ground investigations. Opportunities for the re-use of demolition phase materials on-site have been explored as part of the Circular Economy concept which will assist in reducing the amount of new or virgin raw materials required to be imported to the site during the construction phase.

12.2.2 Operational Waste Assessment Methodology

The Operational Waste Management Impact Assessment has been prepared to demonstrate how the Operational Phase will comply with the following relevant regulations and Dublin City Council's design standards for waste management in residential developments.

- Waste Management Act 1996.
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).
- Eastern-Midlands Region Waste Management Plan 2015-2021.
- Section's 4.8 and 4.9 Refuse Storage of The Department of Housing, Planning and Local Government – Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities. 2018.
- Dublin City Council Development Plan 2016-2022 Waste Management Policies & Objectives.
- British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice

It is Council policy to conform to the EU and National waste hierarchy as follows:

- waste prevention
- minimisation
- re-use
- recycling
- recovery
- disposal

The predicted volumes of residential and commercial waste that will be produced during the operational phase of the development are established by site-specific waste calculations and modelling. The concept of segregating waste at source is a principal design element of the development which will assist in the sustainability of the development into the future.

12.3 RECEIVING ENVIRONMENT

The subject site is located on undeveloped lands in an urban area. Site investigations conducted by IGSL and O'Callaghan Moran have concluded that soils at the site are non-hazardous and are suitable for export to an appropriately permitted/licenced soil recovery facility.

There is a recycling centre in the local area at Ballymount which serves the local community. Currently Oxygen and Thorntons and AES provide domestic and commercial waste collection services in the local area.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following detail is relevant to the assessment in this Chapter.

The Construction and Operational Waste Management Plans prepared as part of the application shall be implemented throughout the construction phase and operational stage of the development to ensure the following:

- That all site demolition and construction activities are effectively managed to minimise the generation of waste and to maximise the opportunities for on-site reuse and recycling of waste materials.

- To ensure that all demolition and construction waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved waste licensed / permitted facilities in compliance with the Waste Management Act 1996 and all associated Waste Management Regulations.

- The design of the development will ensure that residents of the development are provided with sufficient facilities to segregate, store and recycle domestic and commercial waste.

12.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

Ireland’s national waste policy is ‘A Waste Action Plan for A Circular Economy – Ireland’s National Waste Policy 2020 – 2025 ’. The policy, published September 2020, is intended to move Ireland toward a circular economy in which focus is shifted away from waste disposal, favouring circularity and sustainability by identifying and maximising the value of material through improved design, durability, repair and recycling. By extending the time resources are kept within the local economy, both environmental and economic benefits are foreseen.

The proposed development will implement the above policy as follows:

- Re-Use on-site of all excavated soils and stones as fill material and as landscaping material.
- The purchase of construction materials as needed to prevent over supply and potential for damage whilst in storage.
- The segregation of construction waste streams into separate storage containers to maximise the potential for the re-use of the materials.
- The import of Article 27 soils where possible.

12.5.1 Construction Phase

The development of the subject site will require ground preparation works prior to the commencement of construction activities which will generate a range of waste types.

Construction wastes if not managed and segregated on-site will have the potential to be difficult to separate into different waste streams to allow for further processing, recovery, re-use or to be recycled

Table 12.1 Predicted Construction Waste Generation

Waste Type	Predicted tonnage to be produced	Re-Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Mixed C&D	1250	125	10	1000	80	125	10
Timber	1000	400	40	550	55	50	5
Plasterboard	500	150	30	300	60	50	10
Metals	250	12.5	5	225	90	12.5	5
Concrete	200	60	30	130	65	10	5
Mixed waste	800	160	20	480	60	160	20
Total	4000	907.5		2685		407.5	

Table 12.2 Predicted Waste Soil Generation

Waste Type	Predicted volume to be produced	Re-Use on-site		Recyclable		Disposal	
		Volume	%	Volume	%	Volume	%
Soils	37,320m^3	6112m^3	16	0	0	31,208m^3	84

12.5.2 Operational Phase

The operational phase of the development will consist of:

- Residential units
- Retail / Commercial units
- Community Facilities
- Creche

Tables 12.3 and 12.4 detail the predicted waste types and volumes that will be generated by the fully occupied development.

Table 12.3 Calculated Waste Generation

Source	# Units	Waste/Day	Waste/week
	No.	Kg	Kg
Residential Units	750	2074	14,517
Residents Facilities	1	50	350
Retail Unit	1	500	3500
Creche	1	100	500
Total for development	n/a	2724	18,867

The most recent EPA Waste statistics (2018) on household waste generation states 315kg is produced per person per year or 0.863Kg/day.

Table 12.4 Domestic Waste generation per day/week

Waste Type	% Waste	Kg/week	Kg/day
Organic waste	30.6	4442	635
Paper	12.5	1815	259
Cardboard	3.6	523	75
Composites	1	145	21
Textiles	15.5	2250	321
Plastics	13.6	1974	282
Glass	3.4	494	71
Metals	3.1	450	64
Wood	1.2	174	25
Hazardous municipal waste	0.9	131	19
Unclassified combustables	1.4	203	29
Unclassified incombustables	1.2	174	25
Fines	11.7	1698	243
Bulky Waste & WEEE	0.3	44	6
Totals	*100*	*14517*	*2074*

12.6 DO NOTHING SCENARIO

Should the development not proceed, there shall be no increased waste generated. However, a vacant site may be subject to fly-tipping.

12.7 CUMULATIVE IMPACTS

It is necessary that the subject development in addition to others are operated in a sustainable manner that reduces the generation and disposal of un-segregated domestic mixed waste and that provide the infrastructure and management services to assist residents to segregate domestic waste at source and to maximise recycling of wastes.

12.8 MITIGATION MEASURES

The following mitigation measures shall be implemented during the construction and operational phases of the development to ensure that generated wastes are minimised, segregated and re-used, recycled or disposed of in a manner that reduces their impact on the receiving environment.

12.8.1 Site Specific Construction & Demolition Waste Management Plan

MA:RWM-C1	A dedicated C&D Waste & Resource Manager shall manage all Construction Wastes
MA: RWM -C2	Construction Wastes shall be managed in accordance with the Site-Specific C&D Waste Management Plan
MA: RWM -C3	18% of Excavated soils shall be re-used on site
MA: RWM -C4	An On-Site Construction Waste Compound for the segregation of construction and demolition wastes shall be established
MA: RWM -C5	Tool-Box talks on waste reduction, reuse, recycling and segregation shall be provided to all site staff and Contractors

MA: RWM -C6	Waste Collection Permits and Letters of acceptance from Waste Acceptance Facilities shall be provided to DCC on the appointment of Contractors
MA: RWM -C7	All waste loads leaving the site shall be digitally recorded
MA: RWM -C8	A monthly waste out record shall be issued to Fingal Co Co
MA: RWM -C9	All vehicles exiting the site carrying waste materials shall display a valid NWCPO number and be verified at the site exit gate

12.8.2 Operational Waste Management Plan

MA: RWM -O1	The communal domestic waste storage areas shall be managed by the Facilities Management Company.
MA: RWM -O2	Domestic and Commercial Wastes shall be managed in accordance with the Site-Specific Operational Waste Management Plan
MA: RWM -O3	Residents shall be provided with information by the Facilities Management Company on the correct segregation and disposal of waste in order to minimise the generation of mixed waste streams and to increase recycling rates.
MA: RWM -O4	All residential units shall include a 3-bin waste segregation at source waste bin system.
MA: RWM -O5	The communal waste storage areas shall include WEEE and waste battery storage units.
MA: RWM -O6	The communal waste storage areas shall be of sufficient size to allow for the contingency storage of waste
MA: RWM -O7	An annual bulky waste collection service will be provided to residents by the Facilities Management Company.
MA: RWM -O8	A dedicated retail and commercial waste storage area shall be provided for the retail units and Creche. This area shall be separate from the domestic communal waste storage areas.

12.9 PREDICTED IMPACTS

12.9.1 Predicted Construction Phase Impacts

The management of wastes generated during the construction of the proposed development will be in accordance with Construction & Demolition Waste Management Plan. With regard to how it has been demonstrated how demolition and construction wastes will be managed through design, management and waste reduction and recycling initiatives at the proposed development, it is predicted that the impact of the construction phase of the development will not have an adverse impact on the receiving environment, existing material assets and local and regional waste management services.

Table12.5 Construction Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Regional Construction Waste Infrastructure	Negative	Not Significant	Regional	Likely	Short-Term	Residual

12.9.2 Predicted Operational Phase Impacts

The development shall be designed to provide sufficient domestic waste infrastructure and storage areas for all apartments. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development and thus reduce the potential for the generation of mixed un-recyclable domestic waste streams.

The Table below summarises the identified likely residual effects of the proposed development during the operational phase post application of mitigation measures.

Table 12.6 Operational Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Regional Domestic Waste Infrastructure	Negative	Not Significant	Regional	Likely	Long-Term	Residual

12.9.2 Worst Case Scenario

A worst-case scenario would arise if the construction phase and operational phase wastes streams were not managed in accordance with the Construction Waste Management Plan or the Operational Waste Management Plan. Unmanaged waste streams will reduce the ability to re-use and recycle waste fractions and result in the generation of unsegregated waste streams which will have an increased impact on the environment as a result of the energy required to dispose of them in landfill or by incineration

12.10 MONITORING

Construction Phase

MA:RWM-M1	Routine Waste Management Audits shall be conducted
MA:RWM-M2	Waste Collection Permits and Letters of acceptance from Waste Acceptance Facilities shall be provided to DCC on the appointment of Contractors
MA:RWM-M3	A monthly waste out record shall be issued to DCC
MA:RWM-M4	All waste loads leaving the site shall be digitally recorded

Operational Phase

MA:RWM-M5	The Facilities Management Company shall maintain a record of all domestic waste produced and shall prepare an annual report for residents and DCC detailing how waste reduction and recycling targets are being achieved with regard to The Eastern Region Waste Management Plan.

References

- Waste Management Acts 1996;
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007);

- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008);
- Eastern-Midlands Region Waste Management Plan 2015-2021;
- European Communities (Waste Directive) Regulations 2011;
- Dublin City Development Plan 2016 – 2022;
- Department of the Environment, Heritage and Local Government – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – July 2006;
- Sustainable Urban Housing : Design Standards for New Apartments – Guidelines for Planning Authorities (Revised 2020) Department of Housing, Planning and Local Government, Section's 4.8 and 4.9 Refuse Storage.
- British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.
- EPA Draft Best Practice Guidelines for the preparation of resource management plans for construction and demolition projects, April 2021

13. CULTURAL HERITAGE

13.1 INTRODUCTION

This chapter consists of an appraisal of a proposed residential development (SHD) at Park West, Dublin 12 under the heading of archaeological and cultural heritage (Figure 13.1, ITM 708333/732669). The assessment has been carried by Faith Bailey of IAC Archaeology.

Figure 13.1 Location of proposed development and nearest recorded monument

This study determines, as far as reasonably possible from existing records, the nature of the archaeological and cultural heritage resource in and within the vicinity of the proposed development using appropriate methods of study. Desk-based assessment is defined as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic, and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets (CIfA 2014). This leads to the following:

- determining the presence of known archaeological assets that may be affected by the proposed development;
- assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme;
- determining the impact upon the setting of known cultural heritage sites in the surrounding area; and
- suggested mitigation measures based upon the results of the above research.

The study involved detailed interrogation of the archaeological and historical background of the proposed development area. This included information from the Record of Monuments and Places of County Dublin, the Dublin City Development Plan and Park West - Cherry Orchard Local Area Plan, the topographical files of the National Museum of Ireland, and cartographic and documentary records. Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey, Bing Maps, and Google Earth has also been carried out. A field inspection has been carried out in an attempt to identify any known archaeological and cultural heritage sites and previously unrecorded features, structures, and portable finds within the proposed development area.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural heritage resource, while the mitigation strategy is designed to avoid, reduce, or offset such adverse impacts.

The receiving environment is defined as an area measuring c. 500m from the edge of the proposed development boundary.

Legislation and Guidelines

The following legislation, standards and guidelines were consulted as part of the assessment.

- National Monuments Act 1930 to 2014;
- The Planning and Development Acts 2000 to 2017;
- Heritage Act, 1995, as amended;
- Draft Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), 2015, EPA;
- Draft Guidelines on the Information to be Contained in Environmental Impact Statements. Dublin. Government Publications Office, 2017, EPA; and
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht, and Islands.

Consultation

During scoping and research for the assessment and EIAR, a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the receiving environment and study area, as follows:

- Department of Housing, Local Government and Heritage (DoHLGH) – the Heritage Service and Policy Unit, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders; Register of Historic Monuments;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland; and
- Dublin City County Council: Planning Section

Definitions

In order to assess, distil and present the findings of this study, the following definitions apply:

‘Cultural Heritage’ where used generically, is an over-arching term applied to describe any combination of archaeological, architectural, and cultural heritage features, where –

- the term ‘archaeological heritage’ is applied to objects, monuments, buildings, or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places).
- the term ‘cultural heritage’, where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural association.

Definition of the Significance of Effects

Imperceptible Impact
An impact capable of measurement but without noticeable consequences.

Not Significant
Effects which causes noticeable changes in the character of the environment but without noticeable consequences.

Slight Impact
An impact which causes changes to the character of the environment which are not significant or profound and do not directly impact or affect an archaeological feature or monument.

An impact that causes some minor change in the character of architectural heritage of local or regional importance without affecting its integrity or sensitivities. Although noticeable, the effects do not directly impact on the architectural structure or feature. Impacts are reversible and of relatively short duration. Appropriate mitigation will reduce the impact.

Moderate Impact
An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends. A moderate effect arises where a change to the site is proposed, which although noticeable, is not such that the archaeological integrity of the site is compromised, and which is reversible. This arises where an archaeological feature can be incorporated into modern day development without damage and that all procedures used to facilitate this are reversible.

An impact that results in a change to the architectural heritage which, although noticeable, is not such that alters the integrity of the heritage. The change is likely to be consistent with existing and emerging trends. Impacts are probably reversible and may be of relatively short duration. Appropriate mitigation is very likely to reduce the impact.

Significant Impact
An impact which, by its magnitude, duration, or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity, and data about the archaeological feature/site.

An impact that, by its, magnitude, duration or intensity alters the character and/or setting of the architectural heritage. These effects arise where an aspect or aspects of the architectural heritage is/are permanently impacted upon leading to a loss of character and integrity in the architectural structure or feature. Appropriate mitigation is likely to reduce the impact.

Very Significant
Effects which, by its character, magnitude, duration, or intensity significantly alters the majority of a sensitive aspect of the environment.

Profound Impact
Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise when an archaeological site is completely and irreversibly destroyed by a proposed development.

An impact that obliterates the architectural heritage of a structure or feature of national or international importance. These effects arise where an architectural structure or feature is completely and irreversibly destroyed by the proposed development. Mitigation is unlikely to remove adverse effects.

Impacts as defined by the EPA 2017 (draft) Guidelines (pg. 23).

13.2 ASSESSMENT METHODOLOGY

Research for this report was undertaken in two phases. The first phase comprised a paper survey of all available archaeological, historical, and cartographic sources. The second phase involved a field inspection of the site.

Impact Definitions

- Record of Monuments and Places for County Dublin;
- Sites and Monuments Record for County Dublin;
- National Monuments in State Care Database;
- Preservation Orders List;
- Register of Historic Monuments;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- Dublin City Development Plan 2016–2022;
- Park West - Cherry Orchard Local Area Plan 2019;
- Dublin City Industrial Heritage Record;
- Place name analysis;
- Aerial photographs; and
- Excavations Bulletin (1970–2020);

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR and RMP sites are also listed on a website maintained by the DoHLGH - www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the DoHLGH 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.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. 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.

Register of Historic Monuments was established under Section 5 of the 1987 National Monuments Act, which requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

The topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the Proposed development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

Documentary sources were consulted to gain background information on the archaeological and cultural heritage landscape of the proposed development area.

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The Dublin City Development Plan 2016–2022 and Park West - Cherry Orchard Local Area Plan 2019 was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development area.

Dublin City Industrial Heritage Record (DCIHR) makes recommendations for sites to be added to the Record of Protected Structures (RPS) in the City Development Plan and is maintained by Dublin City Council. It is a policy of the Council to implement the recommendations of the DCIHR (Policy FC68).

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey, Google Earth, and Bing Maps.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970–2020.

Place Names are an important part in understanding both the archaeology, history, and cultural heritage of an area. Place names can be used for generations and in some cases have been found to have their root deep in the historical past. The main reference used for the place name analysis is *Irish Local Names Explained* by P.W Joyce (1870) and the Place Names Database of Ireland.

Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological and historical remains and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

The archaeological field inspection entailed –

- walking the proposed development and its immediate environs;
- noting and recording the terrain type and land usage;
- noting and recording the presence of features of archaeological or historical significance;
- verifying the extent and condition of any recorded sites or structures (RMPs); and
- visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin and of archaeological or cultural heritage significance.

13.3 RECEIVING ENVIRONMENT

Archaeological and Historical Background

The area of proposed development is located in the townland of Gallanstown, within the Parish of Ballyfermot and Barony of Uppercross. The site is bordered to the north by The Great Southern and Western Railway line; to the west by Park West Avenue and Park West Business Park; to the south by Park West Road and Park West Industrial Park to the east.

The site is currently occupied by a hotel car park as well as greenfield and demolished access roads. There are no recorded monuments located within the development area. One site is located within 500m of the site, which consists of a burial ground (DU017-083), c. 128m to the west (Figure 13.1).

Prehistoric Period

Mesolithic Period (8000–4000 BC)
Although recent discoveries indicate that the earliest known human activity in Ireland was over 12,500 years ago (Dowd and Carden 2016), the Mesolithic period is the earliest time for which there is clear and widespread evidence of prehistoric activity in Ireland. During this period, people hunted, foraged and gathered food and appear to have had a mobile lifestyle. The

presence of Mesolithic communities is most commonly evidenced by scatters of worked flint material, a by-product from the production of flint implements.

At this time people made crude flint tools known as Larnian (or Bann) Flakes. Small numbers of these flakes have been found at Dalkey Island, Dun Laoghaire, Rathfarnham and Loughlinstown and may indicate small-scale transient settlement along the riverbanks and seashores (Corlett 1999, 10).

There are no recorded sites of Mesolithic date within the vicinity of the proposed development area.

Neolithic Period (4000–2500 BC)
In the Neolithic period communities became less mobile and their economy became based on the rearing of stock and cereal cultivation. The transition to the Neolithic was marked by major social change. Communities expanded and moved further inland to more permanent settlements. This afforded the development of agriculture which demanded an altering of the physical landscape. Forests were rapidly cleared and field boundaries constructed. Pottery was also being produced, possibly for the first time. The advent of the Neolithic period also provided the megalithic tomb. There are four types of megalithic tomb; court cairn, portal, passage and wedge. The court, portal and passage style tombs are of pure Neolithic date, while the wedge tomb straddles the Neolithic to Bronze Age transition.

There are no recorded monuments or sites within the environs of the proposed development area which date to the Neolithic period.

Bronze Age (2500–800 BC)
The Bronze Age was characterised by the introduction of metalworking technology to Ireland and coincides with many changes in the archaeological record, both in terms of material culture as well as the nature of the sites and monuments themselves. Though this activity has markedly different characteristics to that of the preceding Neolithic period including new structural forms and new artefacts (such as Beaker pottery), it also reflects a degree of continuity.

The most common Bronze Age site within the archaeological record is the burnt mound or *fulacht fiadh*. Over 7000 *fulachta fiadh* have been recorded in the country and hundreds excavated, making them the most common prehistoric monument in Ireland (Waddell, 2010, 174). Although burnt mounds of shattered stone occur as a result of various activities that have been practiced from the Mesolithic to the present day, those noted in close proximity to a trough are generally interpreted as Bronze Age cooking/industrial sites. *Fulacht fiadh* generally consist of a low mound of burnt stone, commonly in horseshoe shape, and are found in low lying marshy areas or close to streams. Often these sites have been ploughed out and survive as a spread of heat shattered stones in charcoal rich soil with no surface expression in close proximity to a trough. The closest *fulacht fiadh* was identified c. 4.1km to the southwest within the townland of Nangor (DU017-084).

There are no upstanding prehistoric monuments within the study area, although placename evidence and the recovery of stray archaeological finds indicate that prehistoric people may have occupied or moved through the landscape during this period. The site of the proposed development is located within the townland of Gallanstown. The placename element 'gallán' often signifies the location of a standing stone, though topographical records indicate it may refer in this case to a family name 'Gallen' or 'Gallan' (https://www.logainm.ie/ga/17245). Standing stones were erected in groups or singly in the Bronze and Iron ages to mark significant locations in the local landscape. Stray archaeological finds including a two flanged bronze axe heads (NMI 1911:242 and NMI 1963:65) dating to the middle Bronze Age have also been recorded from the townland of Clondalkin, c. 1.7km to the southwest of the proposed development.

Iron Age (800 BC–AD 500)

Until recently, the dearth of evidence representing the Irish Iron Age led to it being the most enigmatic and least understood period in Irish prehistory. Large scale commercial excavations carried out over the past two decades have produced large quantities of new data relating to Iron Age settlement and industry across the country. This raw excavation data is still being analysed and a picture of life during the Iron Age is being assembled (Becker 2012, 1).

As in Europe, two phases of the Iron Age have been proposed in Ireland; the Hallstatt and the La Tène (Raftery, 1994). The Hallstatt period generally dates from 700BC onwards and spread rapidly from Austria, across Europe, and then into Ireland. The later Iron Age or La Tène culture also originated in Europe during the middle of the 5th century BC. This theory however has been challenged in recent years by John Koch and Barry Cunliffe, amongst others. Cunliffe has put forward an opposing theory suggesting that the Insular Celtic Cultures originated in Western Europe (Koch and Cunliffe, 2013).

There is no firmly dated evidence for Iron Age activity within the immediate vicinity of the proposed development. However, some monuments, such as barrows or hillforts, located on higher ground, have the potential to have been constructed or in use during the Iron Age. A stepped barrow (DU021-015003) at Ballymount Great c. 3km to the south, is an example of such a monument.

Early Medieval Period (AD 500–1100)

Recorded history in Ireland began in the early medieval period. The surviving literary sources portray Ireland as being entirely rural during this period, characterised by small territories known as a *túath*. Irish society was also deeply hierarchical. Byrne (1973) has estimated that there were at least 150 kings ruling at any one time. In addition to these, there were various grades of lords, nobles, farmers and slaves (Kelly 1988). Various forms of enclosure settlements were dispersed throughout *túatha* and it has been estimated that over 60,000 such sites dating to the period are located throughout the island (O'Sullivan et al. 2014, 49). Ringfort, circular spaces enclosed by an earthen bank and ditch (rath) or stone wall (cashel), were the archetypal settlement form in early medieval Ireland. From the 6th century onwards, the landscape also came to be dominated by scattered rural monasteries. Like many secular settlements, these were often defined by large circular or oval enclosures.

Towards the end of the period, following the arrival of the Vikings in Ireland in AD 795, Dublin came to be one of the most important settlements on the island, and one of the first to become urbanised. This was a gradual process and the first steps towards urbanisation date to AD 841, when the Vikings established a longphort settlement — a type of semi-permanent ship camp which also had a commercial function. By the middle of the 10th century, Dublin was an internationally-renowned urban settlement with an extensive hinterland and it was one of the most important economic centres in the northwest Europe.

A burial mound covering human burials (DU017-083) was uncovered during predevelopment testing in the townland of Gallanstown, c. 128m to the west of the proposed development (Licence: 99E0108, Figure 1). The remains of a number of skeletons were uncovered oriented east-west indicating a likely early medieval date for the cemetery. The remains of a backfilled ditch were also uncovered, pre-dating the burials. Subsequent archaeological excavation at the site revealed the remains of a stone-lined well and further human remains.

The proposed development is located c. 1.7km to the northeast of the historic town of Clondalkin (DU017-041). The monastic site of *Cluain Dolcáin*, which translates as 'Dolcáin Meadow', was founded in the 7th century by St. Mochua. The monastic site served as the focus of a significant urban centre with market, education and religious functions and contains the wall fragments of a medieval parish church, parts of two granite crosses, a dressed granite font and round tower. The settlement would have been enclosed within an earthen or stone-built enclosure. The Vikings attacked the settlement in the early 9th century and had established a settlement near Clondalkin by 867. In this year records indicated that the Viking settlement was attacked and burned by two Leinster chieftains.

Medieval Period (AD 1100–1600)

The beginning of the medieval period was characterised by political unrest that originated from the death of Brian Borumha in 1014. In 1171 AD, Dublin was besieged and taken by Diarmait MacMurchada and his Leinster forces supported by a force of Anglo-Norman knights led by Strongbow (Richard Fitz-Gilbert de Clare) and Raymond le Gros. Diarmait MacMurchada, deposed King of Leinster, sought the support of mercenaries from England, Wales and Flanders to assist him in his challenge for kingship. Norman involvement in Ireland began in 1169 AD, when Richard de Clare and his followers landed in Wexford to support MacMurchada. Two years later de Clare (Strongbow) inherited the Kingdom of Leinster and by the end of the 12th century the Normans had succeeded in conquering much of the country (Stout & Stout, 1997). The initial stage of the invasion of the country was marked by the construction of motte and bailey castles, which were later replaced with stone fortifications.

The coming of the Anglo-Normans in the late 12th and early 13th centuries brought about further change in the appearance of the landscape with the development of town boroughs and manorial villages, underpinned by the presence of castles and monastic orders newly arrived from Britain and the Continent. The Anglo-Norman administration was responsible for reinforcing the town walls with defensive towers. Further improvements to the defences involved erecting a number of gates on the built-up streets outside the walls and supplementing the defensive gates already in place along the town wall itself (Halpin 2000, 34). The nearest castle, which dates to the medieval period, is in Ballyfermot (DU018-031001) located in Le Fanu Park, c. 1.2km northeast of the proposed development. The site of the former castle, which has origins in the 14th century, lies on the summit of a natural ridge, adjacent to the remains of a church (DU018-031003) and graveyard (DU018-031004). The date of the latter sites is unclear but it is possible that both have origins in the medieval period. There are no visible remains of the castle today.

Post-Medieval Period (AD 1600–1800)

With the onset of the 18th century, the political climate settled and this saw a dramatic rise in the establishment of large residential houses around the country. This was largely due to the fact that after the turbulence of the preceding centuries, the success of the Protestant cause and effective removal of any political opposition, the country was at peace. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be dispersed nationally. During the latter part of the 18th century, the establishment of a parkland context (or demesnes) for large houses was the fashion. Although the creation of a parkland landscape involved working with nature, rather than against it, considerable construction effort went into their creation. Major topographical features like rivers and mountains were desirable features for inclusion into, and as a setting, for the large house and parkland. The closest demesne within the area surrounding the proposed development is Collinstown House, c. 1.2km to the northwest.

During the 18th century, the Grand and Royal Canals — which connect Dublin to the River Shannon in the west of Ireland — were excavated. The construction of the canals was essential for the provision of water and the transportation of goods and industry in Dublin and its environs. Textile Manufacturing, brewing, distilling and tanning were some of the dominant industries in Dublin City during the 18th and 19th centuries, although others such as lime burning, brick-making, and flour milling were also important (Goodbody 2014, 6). The Grand Canal lies c. 345m south of the proposed development area, running the length of the Park West area.

The introduction of a railway system to the urban framework of Dublin in the 19th century also facilitated the transportation of goods and suburban development. While canals continued to be used to transport bulk goods such as turf and grain, railways were used to move small to medium consignments of goods as well as livestock (ibid., 8). Located immediately north of the proposed development area, there are three sites included within the DCIHR, all of which are associated with the rail network: two bridges (DCIHR Nos. 17-12-003-01 and 17-16-002-01) and a railway line (DCIHR No. 17-16-001-01).

Summary of Previous Archaeological Investigations

A review of the Excavations Bulletin (1970–2020) has revealed that one previous archaeological investigation has taken place within the proposed development. There have also been a further eight investigations which have been carried out within the study area.

Three test trenches were excavated within the development areas footprint in 2005 prior to the development of the hotel, which remains extant today. Nothing of archaeological significance was noted (Licence 04E0147, Bennett).

During topsoil-stripping before the development of Park West Business Park, human remains were revealed on a very low mound towards the northwest of this development in 1999, c. 128m to the west (DU017-083). A rescue excavation was carried out that revealed three east-west-oriented skeletons and disarticulated bone. Additional trenches were excavated and six burials were partially exposed but were not excavated. In several trenches a wide, a shallow ditch was revealed. This feature appears to have been backfilled in antiquity, and subsequently burials were inserted into it, suggesting that the cemetery extended beyond this ditch on the south-eastern side (Licence 99E0108, Bennett 1999:246).

A second assessment was carried out on the larger area surrounding the cemetery c. 150m to the southwest of the development area. This involved the excavation of 24 test-trenches across an area of the business park known as Sector Two. Of the 24 test-trenches opened, two revealed features of archaeological significance. Trench 18 was located in the southwest of the area assessed and a stone-lined well was revealed that was backfilled in the 18th century, The well was preserved in situ. Archaeological remains were also recovered from Trench 22, directly southeast of the cemetery, with poorly preserved human remains recorded. Two relatively shallow pits were also revealed in Trench 22 (Licence 00E0267, Bennett 2000:0299).

A monitoring programme, c. 192m to the west of the proposed development area, constituted the latest phase of investigation at the site following the discovery of human remains found at Park West Business Park. Several assessments were undertaken to identify the extent of the cemetery, which has been preserved under a large landscaped mound and by a buffer zone. This phase of works confirmed the natural clay horizon and no archaeological features or artefacts were identified (Licence 03E1393 ext, Bennett 2003:0603).

Testing was carried out c. 303m to the northwest of the development site in 2007. No features or deposits of archaeological interest were identified in any of the test-trenches that were opened (Licence 07E0298, Bennett 2007:428).

The remaining investigations did not produce any features or deposits of archaeological interest or significance 07E0298, 01E1015 ext., 02E0161 and 03E1393.

City Development Plan

The Dublin City Development Plan 2016–2022 and Park West - Cherry Orchard Local Area Plan 2019 recognises the statutory protection afforded to archaeological sites included within the Record of Monuments and Places and seeks to protect those monuments, to including their setting, access, views, and prospects. The plans also recognise the value and significance of the county's archaeological heritage, and the importance of fostering a greater public appreciation of this heritage. Through policies contained in these Development Plans, they seek to ensure the effective protection, conservation and enhancement of archaeological sites, monuments, and their settings (Appendix 13.2).

There are no recorded monuments located within the development area; however, there is one site located within 500m of the site, which consists of a burial ground (DU017-083), c. 128m to the west (Figure 13.1; Table 13.1; Appendix 1).

National Museum of Ireland (NMI): Topographical Files

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 review of the topographical files revealed that no stray finds have been recovered from the study area of the proposed development.

Cartographic Sources

Down Survey Map, Barony of Newcastle and Uppercross, c. 1655

William Petty's Down Survey represents the first systematic mapping of Ireland on a large scale. Using the previous Civil Survey of 1654–1656 as a guide, surveyors were tasked with recording the boundaries of every townland and calculating their area. Petty's maps contained great detail, showing roads, rivers, churches, houses, castles and other fortifications. The proposed development area is depicted within the 'Parrish of Balliformet', or Ballyfermot. The site of the proposed development appears as open land at the time, with no buildings or other structures in the immediate vicinity.

John Rocque's Map of the City and County of Dublin, 1760 (Figure 13.2)

As in the Down Survey, Rocque's map shows the landscape containing the proposed development and the site of the development to be primarily characterised by open agricultural fields. Early roads throughout the area are shown for the first time, connecting the various surrounding townlands. The proposed development site is located between Gallanstown to the west and Bally Farmot to the east. The Grand Canal has been constructed and is shown to the south of the proposed development area. Two castles are also recorded to the west of the proposed development area. One of these is 'Rowlough Castle' (DU017-067), while the other lies within the townland of Irishtown. The latter is probably the tower house (DU017-023) known to have been constructed in this area in the early 17th century.

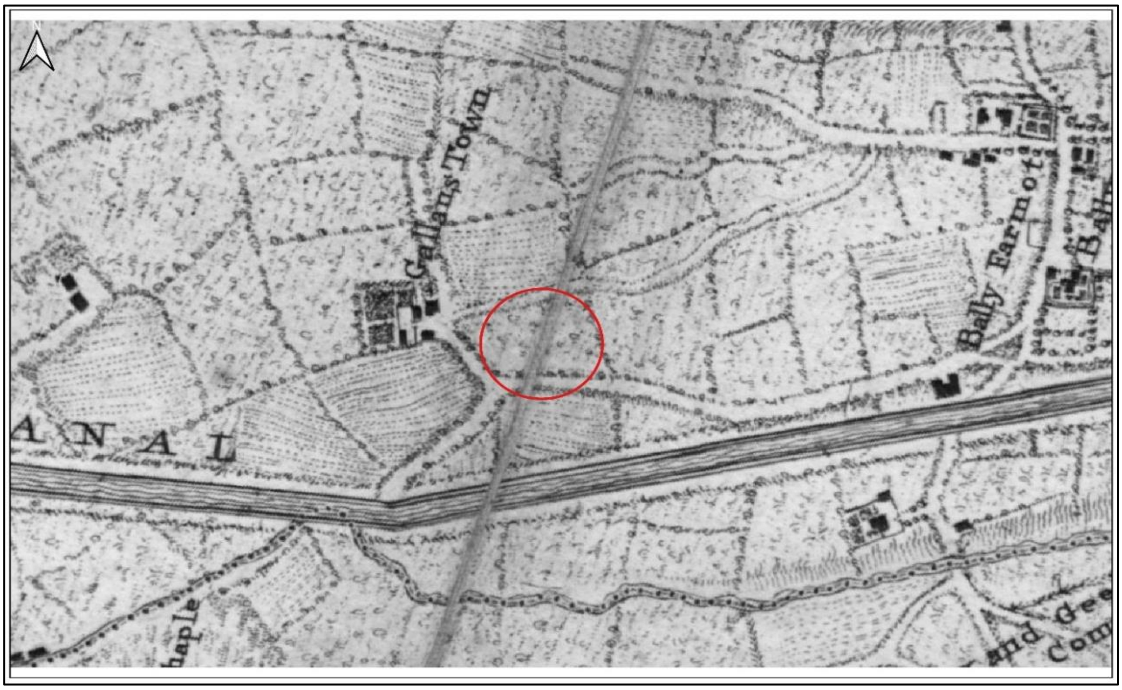


Figure 13.2 John Rocque's Map of the City and County of Dublin, 1760

John Taylor, Map of Dublin City and its Environs, 1816 (Figure 13.3)

The proposed development area and its surrounds remained largely unchanged by the time of the mapping in 1816. The site is characterised by open land south of an area marked 'Lands of Blackditch', which corresponds with the modern townland of Blackditch. Rowlough Castle (DU017-067) and its lands, which appear to be heavily wooded, are depicted to the northwest of the proposed development site. The 'Castle of Ballyfarmot' (DU018-031001) is shown to lie to the northeast of the proposed development. Green Road lies within the site's footprint, connecting Ballymount with Ballymanaggin and Gallanstown with a grouping of structures labelled 'Ruin'.

First Edition Ordnance Survey Map, 1843, scale 1:10,560 (Figure 13.4)

This is the first accurate historic mapping coverage of the area containing the proposed development. The proposed development area and the wider vicinity is comprised of agricultural land made up of possibility five fields. The proposed development is visible within the townland of Gallanstown. To the west lies a grouping of structures, no doubt the site of Gallanstown itself as depicted by Rocque in 1790. This is also the relative location of the Early Christian cemetery (DU017-083), although not denoted or depicted here.

Second Edition Ordnance Survey Map, 1871, scale 1:10,560

There are no major changes noted within the cartography of this map that relate to the proposed development area.

Ordnance Survey Map, 1909, scale 1:2,500 (Figure 13.5)

There are number of significant changes to the proposed development area in this map which now resides within possibly six fields. Immediately to the north lies The Great Southern and Western Railway line which continues east towards central Dublin. To the south lies the water works of Dublin Corporation along the Grand Canal and Gallanstown House is located to the southeast.

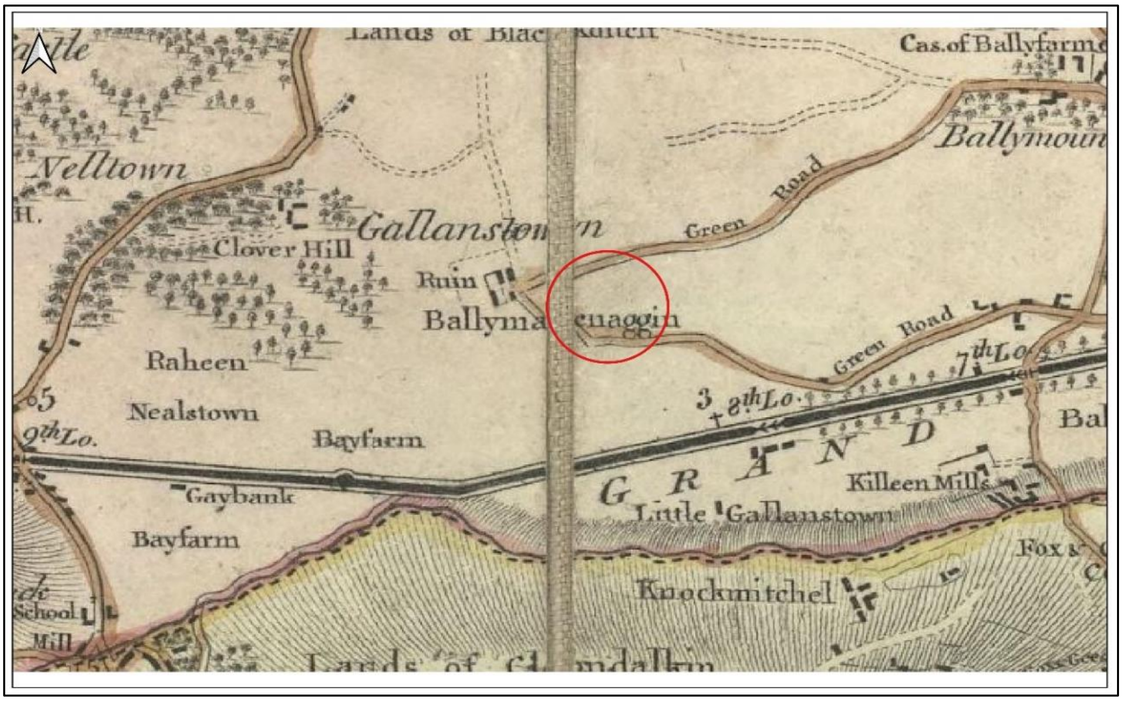


Figure 13.3 John Taylor, Map of Dublin City and its Environs, 1816

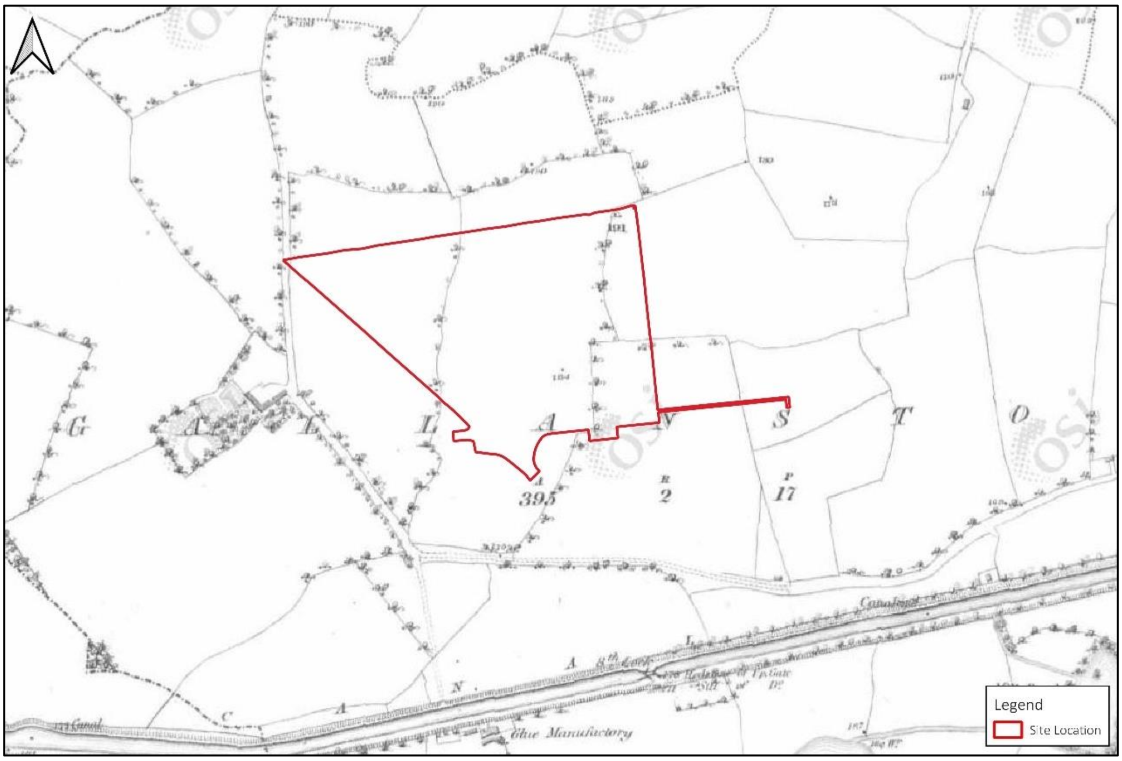


Figure 13.4 Extract from the first edition Ordnance Survey Map, 1843, showing the proposed development area

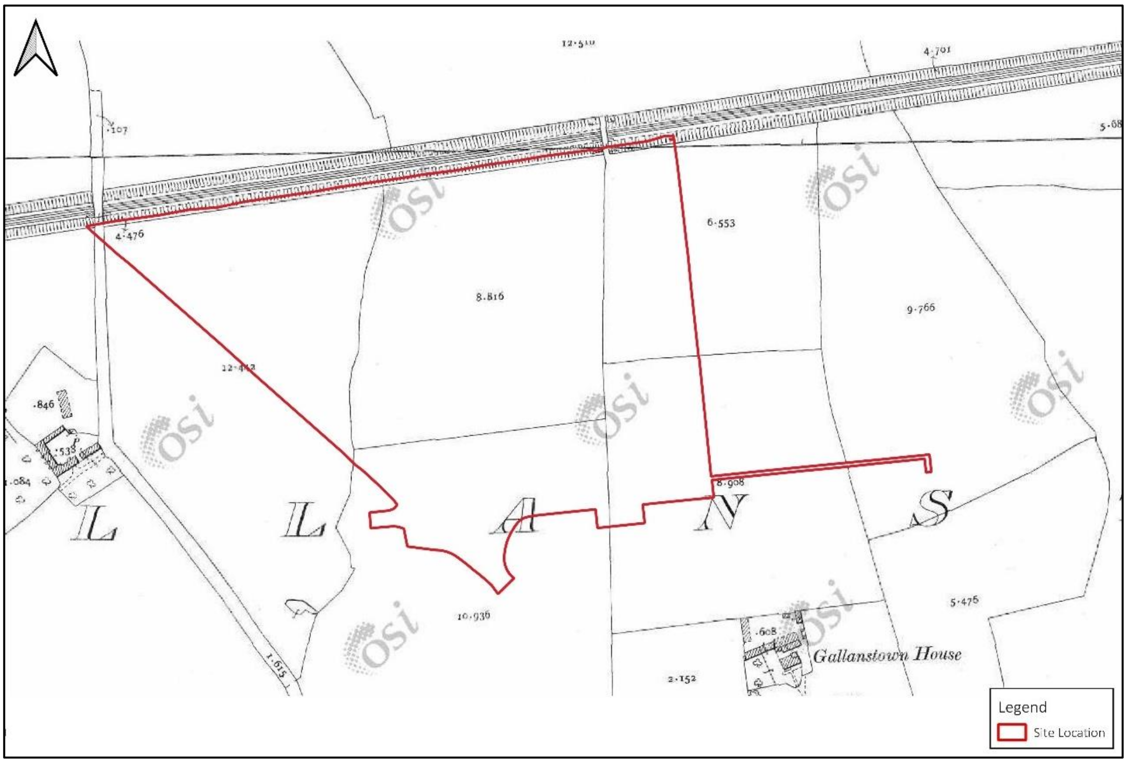


Figure 13.5 Extract from the Ordnance Survey Map, 1909, showing the proposed development area

Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995-2013), Google Earth (2002-2021), and Bing Maps revealed that from 1995 to 2000 the site was within possibly six individual greenfields. From 2000 to 2005 the site was subjected to a large amount of disturbance and contained a car park and access roads running through the extent of the site. From this period onwards the site remained unchanged apart from the construction of a hotel and car park, which remains extant to the present day. No previously unrecorded sites of archaeological potential were noted within the coverage (Figure 13.6).

Dublin City Industrial Heritage Record

There are eight DCIHR sites within the 500m study area (Figure 13.7). These include three bridges (DCIHR Nos. 17-12-003-01, 17_12_002_01 and 17-16-002-01) which cross the Great Southern and Western Railway line, the railway line itself (DCIHR No. 17-16-001-01), a water works (DCIHR No. 17_16_009_01), a lock (DCIHR No. 17_16_008_01) a towing path (17_16_004_01) and the Grand Canal (17_16_003_01).

The Great Southern and Western Railway, which opened in 1846 under the auspices of William Dargan, who was synonymous with the growth of railways in 19th-century Ireland, was one of the main railway operations in Ireland in the late 19th- and early 20th-centuries. This section of railway formed part of the 'Premier Line', the heart of the G.S. & W.R., linking Dublin with Cork and is still one of the most important routes in Ireland today. Though largely replaced, its continuation in use heightens its importance within the industrial and engineering heritage of Dublin and the country as a whole. One of the bridges is no longer extant when looking eastwards from Park West Avenue while the other was replaced with a modern bridge and Park West and Cherry Orchard railway station in c. 2008.

The Gallanstown Waterworks comprise one of the earliest and most intact examples of covered municipal supply treatment in Ireland. Commencing operation in July 1863, the complex represented a superb feat of engineering. Though no longer in use the complex, which survives almost intact, represents a significant component of Dublin's utilities industry.

Canals were one of the major engineering achievements of the 18th-century and this lock provides an important indication of the technical prowess of the canal engineers. Built in c. 1770 as 8th lock along Grand Canal it is comprised of ashlar limestone walls to chamber with pairs of timber gates to east and west ends. Aimed at linking Dublin and the River Shannon, the Grand Canal advanced industrialisation and commercial development as well as encouraging the building of other structures of technical merit such as bridges and locks. The survival of the Grand Canal and its associated structures is a reminder of the once significant industrial importance of waterway transport.

Figure 13.6 Satellite imagery of the proposed development area (Google Earth 2021)

Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun* land and meant 'the land forming an estate or manor' (Culleton 1999, 174).

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (*ibid*. 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully 'laid downe' on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (*ibid*.). Larger tracks of land were divided into several townlands, and named Upper, Middle or Lower, as well as Beg and More (small and large) and north, east, south, and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

The area of proposed development is located in the townland of Gallanstown, within the Parish of Ballyfermot and Barony of Uppercross.

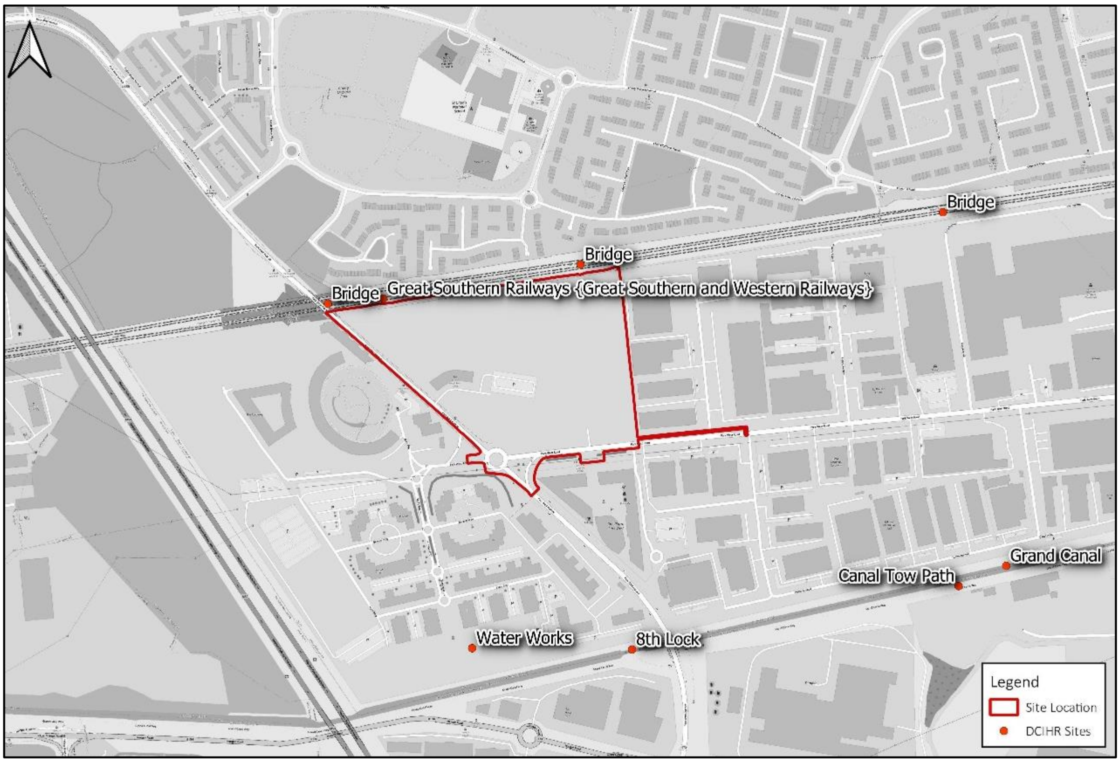


Figure 13.7	Dublin City Industrial Heritage Record Sites

Place name Analysis

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main references used for the place name analysis are Irish Local Names Explained by P.W Joyce (1870) and www.logainm.ie.

Name	**Derived From**	**Meaning**
Gallanstown	*Baile an Ghalóntaigh*	Town of An Galóntach (from the surname Galónt)
Ballyfermot	*Baile Formaid*	Farmstead of Formaid

Uppercross	*An Chrois Uachtarach*	Cross or crossroads

Table 13.1 Townlands, parishes, and baronies within the study area of the proposed development

Field Inspection

The field inspection sought to assess the site, its previous and current land use, the topography, and any additional information relevant to the report. During the course of the field investigation the proposed residential development site and its immediate surrounding environs were inspected (Figure 13.1).

The field inspection confirmed the results of the aerial photographic analysis, which show that the development area has been subject to a large amount of construction disturbance. The site is relatively level (Plate 13.1) and surrounding on all side by modern road infrastructure and a mixture of commercial and residential development. The site contains a hotel and car park (Plate 13.2) and contains multiple areas of dumped material and ground disturbances (Plate 13.3). The northern part of the site has reverted back to grassland, but is uneven under foot.

No features or areas of archaeological or cultural heritage significance were identified during the field inspection.

Plate 13.1 Northern section of proposed development area, facing north-northwest

Plate 13.2 Proposed development area, facing west

Plate 13.3 Proposed development area, facing south-southeast

Conclusions

The proposed residential development is located at Park West, Dublin 12. The site is bordered to the north by The Great Southern and Western Railway line; to the west by Park West Avenue and Park West Business Park; to the south by Park West Road and Park West Industrial Park to the east. The site is currently occupied by a hotel car park as well as disturbed greenfield and demolished access roads. There are no recorded monuments located within the development area. The closest consists of a burial ground (DU017-083), c. 128m to the west (Figure 13.1).

A review of the Excavations Bulletin (1970–2020) has revealed that one previous archaeological investigation has taken place within the proposed development, where nothing of archaeological potential was identified. There have also been a further eight investigations which have been carried out within the study area.

Analysis of cartographic sources has revealed that the proposed development area itself has remained relatively unchanged from the post-medieval up until more recent years, comprising of five open fields. From the early 19th century Green Road is depicted within the site's footprint, which connected Ballymount with Ballymanaggin and Gallanstown.

Analysis of the aerial photographic record available for the area has shown from 2000 to 2005 the site was subjected to a large amount of disturbance with dumping, ground disturbances and access roads running through the site. From this period onwards the site remained unchanged apart from the construction of a hotel and car park that remains extant to the present day.

A field inspection has been carried out, which confirms the site has been subject to extensive disturbance. No previously unrecorded sites or areas of archaeological or cultural heritage potential were noted. Given the high level of disturbance within the site, the overall archaeological potential is considered to be very low.

13.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

A detailed description of the proposed development is set out in Section 3.0 .

13.5 ASSESSMENT OF IMPACTS

Construction Phase
Given the highly disturbed nature of the proposed development area, it is likely that any archaeological remains that may have been present have since been removed. As such no negative impacts upon the archaeological or cultural heritage resource are predicted as a result of the development going ahead.

Operational Phase
No impacts are predicted upon the archaeological or cultural heritage resource as a result of the operation of the proposed development.

13.6 MITIGATION AND MONITORING

No archaeological or cultural heritage mitigation for the construction or operation phase is required, as no impacts are predicted.

13.7 DO-NOTHING SCENARIO

If the proposed development were not to proceed, there would be no impacts upon the archaeological or cultural heritage resource.

13.8 INTERACTIONS

No interactions between archaeology and cultural heritage and any other discipline have been identified during the course of this assessment.

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- Down Survey Map, Barony of Newcastle and Uppercross, c. 1655
- John Rocque's Map of the City and County of Dublin, 1760
- John Taylor, Map of Dublin City and its Environs, 1816
- Ordnance Survey Maps, 1843-1909

Electronic Sources

- www.excavations.ie – Summary of archaeological excavation from 1970-2020.
- www.archaeology.ie – DoHLGH website listing all SMR/RMP sites.
- www.osiemaps.ie – Ordnance Survey aerial photographs dating to 1995-2013 and 6-inch/25-inch OS maps.
- www.heritagemaps.ie – The Heritage Council web-based spatial data viewer which focuses on the built, cultural, and natural heritage.
- www.googleearth.com – Satellite imagery of the proposed development area.
- www.bingmaps.com – Satellite imagery of the proposed development area
- www.booksulster.com/library/plnm/placenamesC.php - Contains the text from Irish Local Names Explained by P.W Joyce (1870).
- www.logainm.ie – Place names Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoHLGH.

14. LANDSCAPE

14.1 INTRODUCTION

This chapter assesses the potential effects of the proposed development, within Local Area Plan Development Strategy for Park West – Cherry Orchard LAP Site 6, on the landscape character and views/visual amenity in the receiving environment. It should be read in conjunction with the verified photomontages contained in Appendix 14A of the EIAR.

The Landscape and Visual Impact Assessment (LVIA) was prepared by David Bolt of Model Works Ltd. David has a degree in Landscape Architecture, is a member of the Landscape Institute (UK) and has over 35 years' experience in urban/landscape design and development and environmental planning, and acts as a landscape expert witness.

14.2 ASSESSMENT METHODOLOGY

The assessment was carried out with reference to:

- *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition, 2013 (GLVIA), published by the Landscape Institute;
- *Technical Information Note on Townscape Character Assessment*, 2016, published by the Landscape Institute;
- *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, 2017, published by the EPA;
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*, 2018, published by the Department of Housing, Planning and Local Government.

The draft EPA guidelines provide a general methodology and impact ratings for all environmental topics covered in an EIAR; the GLVIA provides specific guidelines for landscape and visual impact assessment. Therefore, a combination of the draft EPA guidelines and the GLVIA has informed the methodology for this assessment.

The GLVIA requires that effects on views and visual amenity be assessed separately from the effects on townscape, although the two topics are inherently linked.

'Landscape' (or 'townscape' in built up areas) results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations and spatial distribution of these elements create variations in landscape/townscape character. Landscape/townscape impact assessment identifies the changes to this character which would result from the proposed development and assesses the significance of those effects on the landscape/townscape as a resource.

Visual impact assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity - with particular focus on public views and public visual amenity.

14.2.1 Methodology for Assessment of Townscape Effects

Assessment of potential townscape effects involves (a) classifying the sensitivity of the townscape resource, (b) classifying the magnitude of townscape change which would result from the development, and (c) combining these factors to arrive at a classification of significance of the effects.

Townscape Sensitivity

The sensitivity of the townscape is a function of its land use, patterns and scale, visual enclosure and the distribution of visual receptors, and the value placed on the townscape. The nature and scale of the proposed development is also considered, as are any trends of change, and relevant policy. Five categories are used to classify sensitivity (Table 14.1).

Table 14.1: *Categories of Townscape Sensitivity*

Sensitivity	Description
Very High	Areas where the townscape exhibits very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The townscape character is such that its capacity to accommodate change is very low. These attributes are recognised in policy or designations as being of national or international value and the principal management objective for the area is protection of the existing character from change.
High	Areas where the townscape exhibits strong, positive character with valued elements, features and characteristics. The character is such that it has limited/low capacity to accommodate change. These attributes are recognised in policy or designations as being of national, regional or county value and the principal management objective for the area is conservation of the existing character.
Medium	Areas where the townscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The townscape character is such that there is some capacity for change. These areas may be recognised in policy at local or county level and the principal management objective may be to consolidate townscape character or facilitate appropriate, necessary change.
Low	Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such townscapes are generally unrecognised in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the townscape exhibits negative character, with no valued elements, features or characteristics. The character is such that its capacity to accommodate change is high; where development would make no significant change or would make a positive change. Such townscapes include derelict industrial lands, as well as sites or areas that are designated for a particular type of development. The principal management objective for the area is to facilitate change in the townscape through development, repair or restoration.

Magnitude of Townscape Change

Magnitude of change is a factor of the scale, extent and degree of change imposed on the townscape by a development, with reference to its key elements, features, characteristics and any affected surrounding character areas (collectively known as ‘townscape receptors’). Five categories are used to classify magnitude of change (Table 14.2).

Table 14.2: *Categories of Townscape Change*

Sensitivity	**Description**
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the townscape.
High	Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the townscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the townscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the townscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the townscape character.

Significance of Effects

To classify the significance of effects the magnitude of change is measured against the sensitivity of the landscape/townscape using Table 14.3 and Figure 14.1 as a guide. The significance classification matrix (Table 14.3) is derived from the EPA’s Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017 (specifically Figure 3.5 of the Guidelines – see Figure 1 below). In addition to this guidance the assessor uses professional judgement informed by their expertise, experience and common sense to arrive at a classification of significance that is reasonable and justifiable.

There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

Table 14.3: *Guide to Classification of Significance of Townscape and Visual Effects*

		Sensitivity of the Townscape/View				
		Very High	***High***	***Medium***	***Low***	***Negligible***
Magnitude of Townscape/Visual Change	***Very High***	Profound	Profound to Very Significant	Very Significant to Significant	Moderate	Slight
	High	Profound to Very Significant	Very Significant	Significant	Moderate to Slight	Slight to Not Significant
	Medium	Very Significant to Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate to Slight	Slight	Not Significant	Imperceptible
	Negligible	Slight	Slight to Not Significant	Not Significant	Imperceptible	Imperceptible

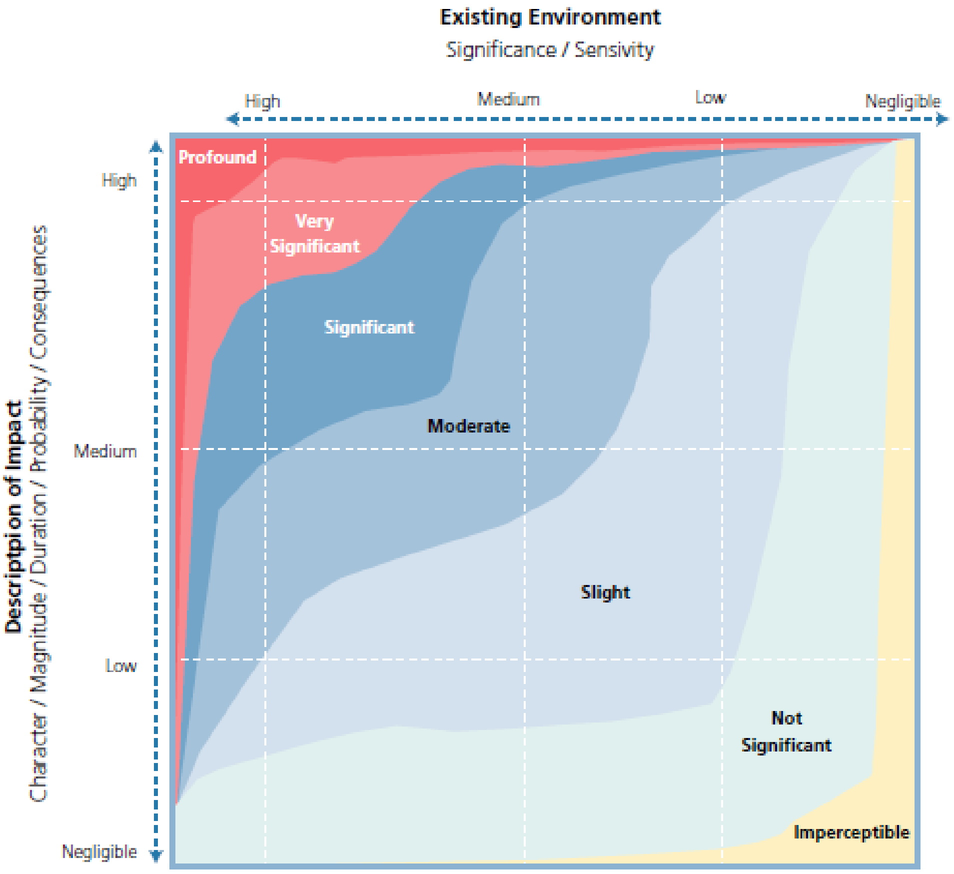


Figure 14.1 *'Chart showing typical classifications of the significance of impacts' (Source: Figure 3.5 of the EPA's Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017)*

14.2.2 Methodology for Assessment of Visual Effects

Assessment of visual effects involves identifying several key/representative viewpoints in the receiving environment, and for each of these: a) classifying the viewpoint sensitivity; b) classifying the magnitude of change which would result in the view (informed by verified photomontages); and c) combining these factors to arrive at a classification of significance of the effects on the view.

Sensitivity of the Viewpoint/Visual Receptor
Viewpoint sensitivity (see five categories in Table 14.4) is a function of two main considerations:

- Susceptibility of the visual receptor to change. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention is focussed on the views or visual amenity they experience at that location. Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g., trail users), and visitors to heritage attractions and places of congregation where the setting contributes to the experience. Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation where the surrounding landscape does not influence the experience, and people in their place of work or shopping.
- Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g., scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g., by appearing in arts).

Table 14.4: *Categories of Viewpoint Sensitivity*

Sensitivity	**Description**
Very High	Iconic viewpoints (views towards or from a townscape feature or area) that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for change is very low. The principal management objective for the view is its protection from change.
High	Viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (e.g., views from houses or outdoor recreation amenities focused on the townscape). The composition, character and quality of the view may be such that its capacity to accommodate change may or may not be low. The principal management objective for the view is its protection from change that reduces visual amenity.
Medium	Views that may not have features or characteristics that are of particular value, but have no major detracting elements, and which thus provide some visual amenity. These views may have capacity for appropriate change and the principal management objective is to facilitate change to the composition that does not detract from visual amenity, or which enhances it.
Low	Views that have no valued feature or characteristic, and where the composition and character are such that there is capacity for change. This category also includes views experienced by people involved in activities with no particular focus on the landscape. For such views the

	principal management objective is to facilitate change that does not detract from visual amenity or enhances it.
Negligible	Views that have no valued feature or characteristic, or in which the composition may be unsightly (e.g., in derelict landscapes). For such views the principal management objective is to facilitate change that repairs, restores or enhances visual amenity.

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral view, or in glimpses). Five categories are used to classify magnitude of visual change to a view (Table 14.5):

Table 14.5: *Categories of Magnitude of Visual Change*

Sensitivity	**Description**
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes dominant in the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Significance of Visual Effects

As with townscape effects, to classify the significance of visual effects the magnitude of change to the view is measured against the sensitivity of the viewpoint using the guide in Table 14.3 above.

14.2.3 Quality of Effects

In addition to predicting the significance of the effects, EIA methodology (draft EPA guidelines Table 3.3, p.50) requires that the quality of the effects be classified as positive/ beneficial, neutral, or negative/ adverse (the terms are interchangeable). For townscape character effects to a degree, but particularly for visual effects, this is an inherently subjective exercise. This is because perception of townscape and visual amenity are subject to variations in the attitude and values - including aesthetic preferences - of the receptor. Perceived susceptibility to change may differ between individual people, and thus their response to the effects of a development on a townscape or view may vary.

Additionally, in certain situations there might be policy encouraging a particular development in an area, in which case the policy is effectively prescribing townscape and visual change. If a development achieves the objective of the policy the resulting effect might be considered positive, even if the townscape character or views are profoundly changed. The classification of quality of townscape and visual effects should seek to take these variables into account and provide a reasonable and robust assessment.

14.2.4 Photomontage Methodology

The photomontages were produced by Model Works Ltd. The photomontage methodology is based on the Landscape Institute advice note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment and 20 years' experience in photomontage production. The method has five main steps:

- Photography
- Survey
- 3D Modelling and Camera Matching
- Rendering and Finishing of Photomontages
- Presentation

Photography

- Date, Time and Conditions: The photography is timed so that the scene conditions, weather conditions and sun position allow - as far as possible - for a clear and representative baseline photograph to be captured. The objective is to ensure that all key elements of the view are clearly visible and unobscured by, for example, vehicular or pedestrian traffic in the foreground, precipitation, darkness/shade, sun glare, etc. The date and time of each photograph are recorded so that the sun position can be accurately portrayed in the 3D model ultimately montaged into the baseline photograph.
- Camera and Camera Set-up: The photographs are taken using a Canon EOS5D Mark II camera with a 21 mega pixel sensor and image resolution of 5616 x 3744 pixels. At each viewpoint the camera is positioned on a tripod with the lens 1.65m above ground level (the level of the average adult's eyes), directed at the site and levelled in the horizontal and vertical axes.
- Lenses: Prime lenses (fixed focal length with no zoom function) are used as this ensures that the image parameters for every photograph are the same and that all photographs taken with the same lens are comparable. For the close-up to middle distant views a 24mm prime lens is normally used. This lens captures a field of view of 73 degrees. This relatively wide field of view is preferred for the purpose of Landscape and Visual Impact Assessment as it shows more of the context landscape/townscape surrounding a site. For distant viewpoints a 50mm prime lens may be used, capturing a 39-degree horizontal field of view.

Survey

The coordinates of each viewpoint/camera position, including the elevation, are recorded using a survey grade GPS receiver, the Trimble Geo7X, which is accurate to within 1cm. For each viewpoint, the coordinates of several static objects in the view are also surveyed (e.g., lamp posts, bollards, corners of buildings, etc.). The coordinates of these 'markers' are used as reference points later in the process, to ensure that the direction of view of the cameras in the 3D model matches the direction of view of the photographs.

3D Model and Camera Matching

- Creation of 3D Model: An Autodesk Revit model of the proposed development was supplied by the architect for the production of the photomontages. Model Works exported the Revit model into the software package Autodesk 3DS Max, in which materials were applied to the model's buildings and surfaces. Model Works built a 3D model of the proposed public realm/landscaping based on AutoCAD drawings provided by the landscape architect.
- 3D Camera Positions: The surveyed camera positions and the markers for each view are inserted into the 3D model, with information on the focal length of the lens attributed to each camera. For each camera/view, the date and time is set to match those of the original photograph. This ensures that the direction of sunlight and shadows in the 3D model match those of the photographs.
- Camera Matching: The photographs are then inserted as backdrops to the views of each camera in the 3D model. The direction of view of the cameras in the 3D model are matched with the direction of view of the photographs using the surveyed markers. This ensures that the camera positions, the direction of the views and the focal length of the cameras in the 3D model are accurate, so that the proposed development appears in the correct position and scale when montaged into the photographs.

Rendering of 3D Model and Finishing of Photomontages

For each view a render of the development is generated. This is the process of creating a photo-realistic image of the 3D model, as seen from each camera position, with sunlight and shadow applied to the model. The render of the development is then montaged into the photograph to create the photomontage.

Presentation and Viewing

The individual photomontages are presented on A3 pages in landscape format in Appendix 14.A. For each photomontage, the viewpoint number, location description, and the date and time of photography are provided on the page.

14.3 RECEIVING ENVIRONMENT

14.3.1 Site Context

For full details of site context refer to Section 3.2. A summary is provided below for ease of reading.

Figure 14.1: *2020 Aerial photograph – site location*

Park West is located c.8km west of Dublin City Centre, directly east of the M50, south of Ballyfermot and Cherry Orchard residential neighbourhoods and north of the John F Kennedy and Naas Road industrial areas.

The Park West neighbourhood is bound by the Dublin to Cork mainline railway to the north, the Grand Canal to the south, the M50 to the west and the Killeen Road to the east. Access through the lands is provided by Park West Road which traverses the area from east to west from the Killeen Road and Park West Avenue. Park West Avenue moves from south to north through the lands connecting the New Nangor Road to the south to Palmerstown Way/ Cloverhill Road to the north.

Park West is generally made up of Park West Industrial Estate, Park West Business Park and Park West residential neighbourhood. Park West Industrial Estate comprises the eastern half of the Park West complex and many industrial and warehouse-type premises with associated parking. Park West Business Park comprises 3 to 5 storey office blocks within a parkland setting located to the southwest of the site. The Park West residential neighbourhood is located primarily to the west of the site, centred around blocks known as the Concert, Academy and Crescent buildings.

There are pockets of undeveloped lands within Park West located along the boundary with the M50 and at the southwestern corner adjoining the Grand Canal. The subject site also comprises an undeveloped area of land located centrally within the Park West complex.

14.3.2 The Site

For a full description of the site, refer to ***Section 3.2 Site and Surroundings***.

The application site (referred to as Site 6 in the LAP) is c.9.4ha in area and is located east of Park West Avenue and north of Park West Road. The Dublin to Cork mainline railway defines the northern boundary with Park West Business Park to the east. The northern and eastern boundaries of the site, to the mainline railway and Park West Business Park respectively, are defined by palisade fencing. An existing berm defines the southern and western boundaries of the site.

The site is divided into 3 plots determined by stages of proposed development phasing. Stage 1 is the subject of the proposed application. Residual lands within Site 6, identified as development Stages 2 and 3, are sites for future development and will be seeded / grassed and fenced until such time as development proposals for those sites are advanced. The Stage 2 lands include a site for a proposed school as identified within the LAP and to be brought forward by the Department of Education and Skills.

Apart from the Aspect Hotel, (an 8-storey hotel building and ancillary surface carpark accessed from Park West Avenue) the site is undeveloped, generally flat with grassed berms to the length of Park West Road to the south and Park West Avenue where it bounds the site to the west. The northern and eastern boundaries of the site, to the railway line and Park West Business Park respectively, are contained by palisade fencing.

14.3.3 Evolution of the Park West Townscape

Late 19th Century

The Ordnance Survey map dating from 1885 indicates that the Park West area was largely rural farmland with dispersed farm buildings, hamlets and villages and scattered woodland. However, urbanising infrastructural influences can already be seen in the form of the Dublin to Cork mainline railway to the north and the Grand Canal and a water works facility to the south. The strongly linear and parallel transportation links overlaid the more ad-hoc, organic field patterns of the agricultural landscape with utilitarian structures that were unsympathetic to the existing landscape.

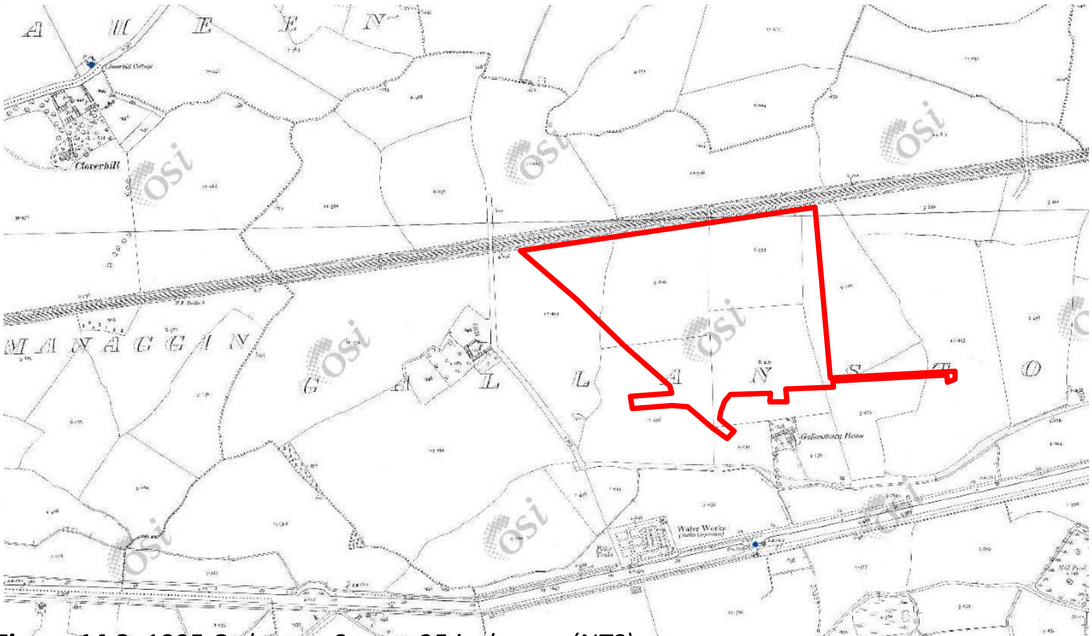


Figure 14.2: *1895 Ordnance Survey 25 inch map (NTS)*

Late 20th Century

The Ordnance Survey aerial photograph from 1985 (Figure 14.3) shows Park West SHD to have been subject to extensive construction work and of a character typical of a development site. The landscape was comprised of both urban generated and rural elements. Both the Grand Canal and the Dublin to Cork mainline railway remain in the locations as indicated on the 1895 map. The Cherry Orchard estate, which appears to have been undergoing development to the north of Site 6, is still bordered by farmland, and adjacent amenity open space has yet to be fully developed. Construction had begun on Cherry Orchard Avenue. There was a corridor of both industrial and residential development emerging along the newly constructed M50, which was to be opened shortly after the photograph was taken.

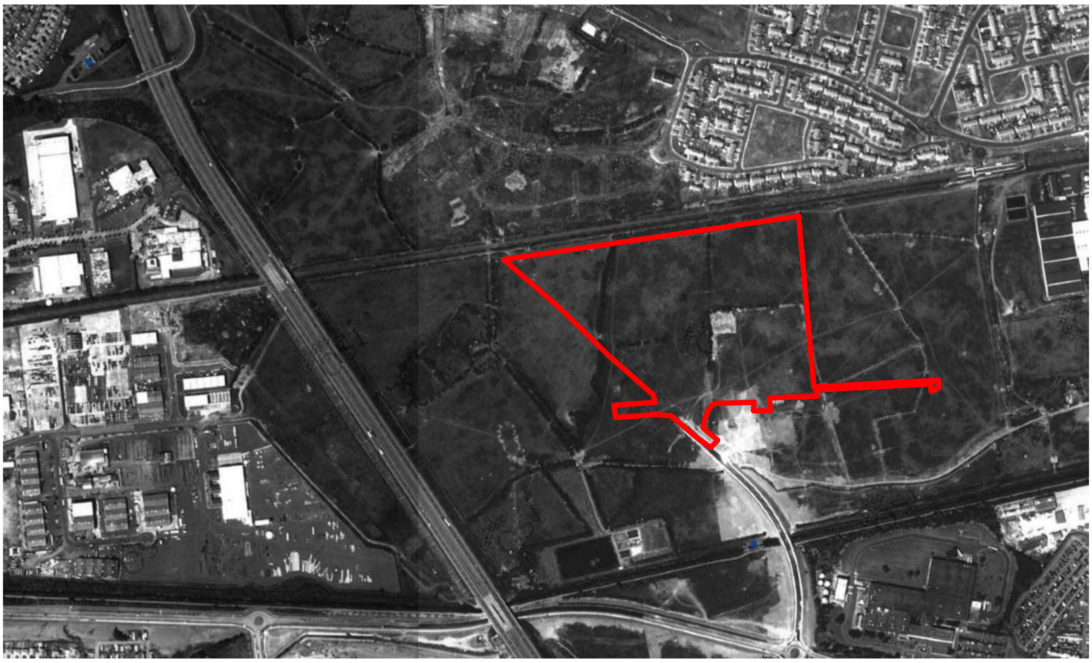


Figure 14.3: *1995 Aerial photograph*

21st Century

The 2005 aerial photograph (Figure 14.4) shows that further residential development had begun to in-fill the former agricultural land to the northwest of the Cherry Orchard community on the former urban edge of Park West Avenue. In the mid-2000s the Cedar Brook Apartments, Park West Industrial Park, and Park West Business Park were largely in place. The Crescent building and Plaza Park West were under construction, but the Cherry Orchard and Park West Railway Station, Academy, Concert and Aspect Hotel had not been commenced.

It is notable that extensive industrial development to the west of the M50 had already taken place. These developments reinforced the local urban/ townscape character, which remained dominated by low density residential use and industry.

A large area of former agricultural land remained in Park West SHD, between Park West Avenue and the M50 to the west.

The mixed use development is aimed to be high density development of distinctly urban character and appreciably high design and material quality. It employed urban design principles such as the use of strong building lines, active frontage and building height to define streets and generate place-identity, improving legibility. There is a diversity of building profiles that reflect their intended use, with five residential storeys above a two-storey commercial base. The quality of the development in combination with the mix of uses were such that they changed the character and raised the quality of the Park West SHD townscape generally.

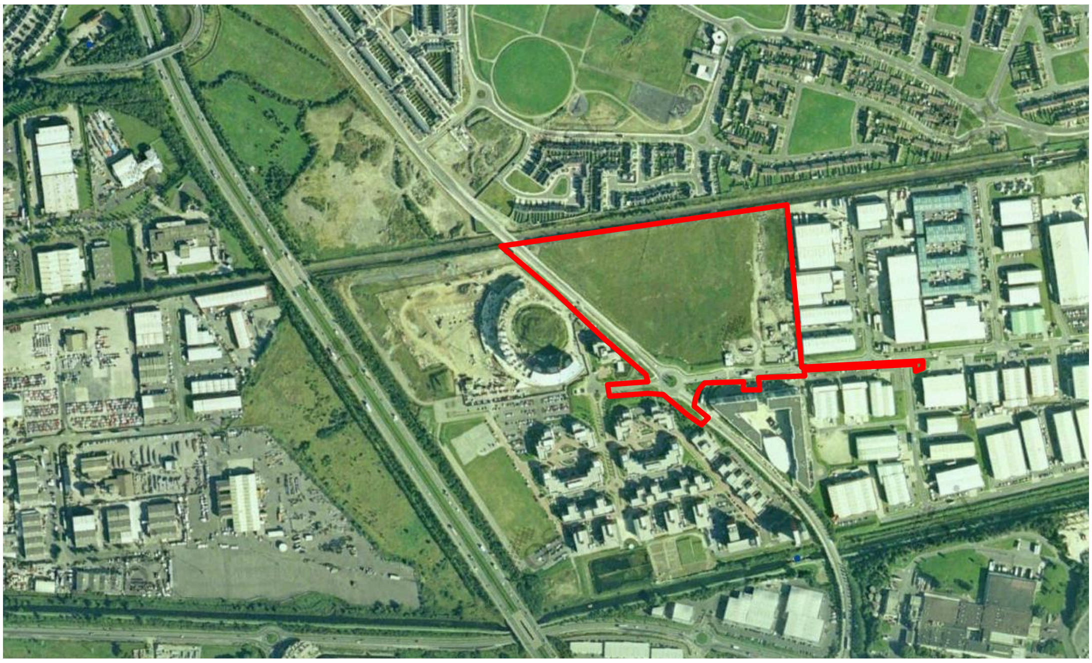


Figure 14.4: *2005 Aerial photograph*

The result of the evolution described above is a mixed use, mixed density townscape of diverse character that is continuing to evolve. It includes elements of urban character and high quality, as well as elements which detract from the townscape (the industrial complexes – although these are a part of the area's identity, and are centres of employment). Importantly, Park West SHD has established a clear identity, due in part to its strong core but also to its location beside the M50, the landmark sculpture and the Crescent building form. There is also a large, lower density residential component to the townscape, which combines with the higher density core to form an urban area of diversity and substance.

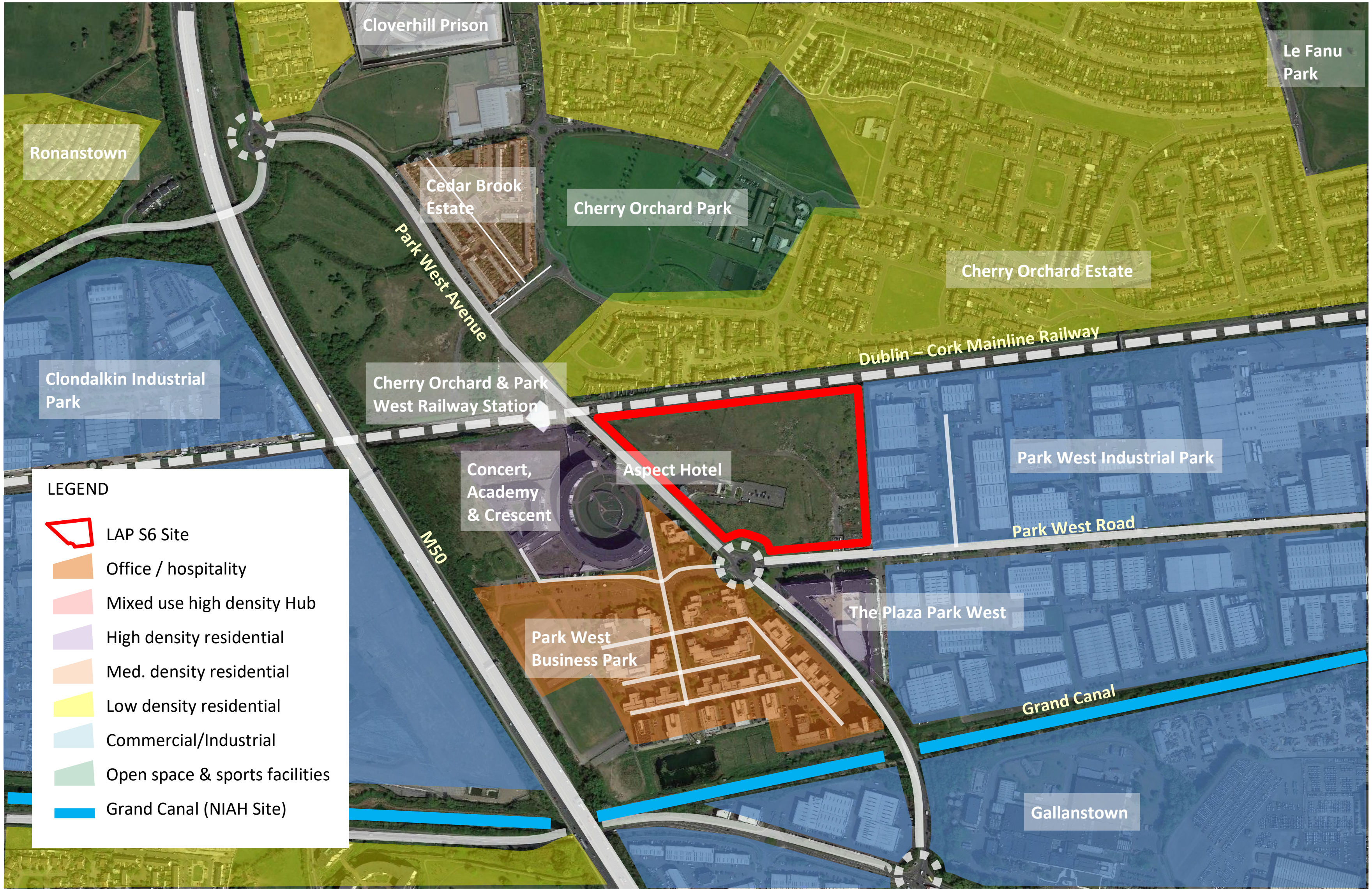


Figure 14.5: *Key Townscape Elements, Features and Character Areas in the Receiving Environment*

14.3.4 Townscape Elements and Character Areas in the Receiving Environment

The key elements and character areas in the receiving environment, i.e., the potential receptors of townscape and visual change on the site, are as follows (refer to Figure 14.3 above, described in terms of direct and indirect association with the site (direct being physically within or adjacent to the site or separated by only a linear feature such as a road or railway, and indirect being removed from the site by other character zones or landscape features):

- Park West Site 6 (direct character association): located within the Park West Development land parcel, the subject site has the characteristics of brownfield land. Large on-site hoardings clearly advertise it to be intended as such. The largely level undeveloped land lies between the Mainline railway (to the north), Park West Avenue (to the west), the Aspect Hotel (to the south) and the Park West Industrial Park (to the east). The site's character typology also includes adjacent vacant development plots. Located adjacent to the new-build structures of the hotel, business park and residential apartment blocks and road infrastructure, the land is unmistakably awaiting future urban development of a character, massing and scale that should reflect the adjacent built-up environment. The vacant land south of the site and the Aspect Hotel that is out with the site boundary is none-the-less integral with the existing landscape character typology of the site.
- The Aspect Hotel (direct character association): partially dissecting the site, the prominent 8 storey Aspect Hotel is located to the central western boundary of the site. A grade-level car park for c. 70 cars is aligned with eastern flank of the hotel building, extending halfway across the site. The hotel partially encloses the site to the south and implies urban enclosure of Park West Avenue.
- The Crescent Building Estate (direct character association): comprising 3 key structures, the Crescent, Academy and Concert Buildings are principally a residential development with capacity for retail and office space, some of which remains unoccupied more than 12 years after completion.
- Park West Business Park (direct character association): developed as a prestige address, the business park is arranged around 3 key distributor streets parking lined with formal avenues of semi-mature trees with segregated internal frontage. The northern-most 4-6 storey office blocks are arranged around amenity open space including courtyards with shared surfaces and a designed landscape layout including water features. The estate is interspersed with public works of art, including the landmark Wave sculpture by Angela Conner, a curvaceously flowing steel kinetic sculpture that is visible at distance on the M50 and surrounding area.
- Cherry Orchard Estate (direct character association): a relatively low-density public housing estate of conventional layout that commenced construction marginally prior to the development of Park West. Set within wide swathes of featureless public open space (e.g., Cherry Orchard Park) with sparse tree cover, largely laid to grass. Several of the estate housing terraces contiguous with the southern boundary of the estate overlook the mainline railway and the site beyond. These houses are particularly exposed to the site, albeit separated by the railway line. In addition to the boundary wall, overgrown hedgerow/ adventitious vegetation within Irish Rail property provides some screening to the rear of these properties.
- The Plaza Park West Complex (indirect character association): comprising a shopping centre with active frontage facing inward towards an internal elevated hard-paved urban space (over sub-surface parking with a leisure pool and higher density adjacent residential use), the Plaza forms Park West's community centre. The buildings fronting Park West Road and Park West Avenue, include a 4-storey block beside the junction, currently being extended by an additional floor height, marking the town centre. An important feature of the Plaza is the accessible pedestrian thoroughfare that traverses the block north to south

via wide steps and an accessible ramp. This route currently terminates at Park West Road, but the development plans illustrate a major pedestrian facility is to extend across the wide street onto the subject site.

- The Park West Industrial Estate (direct character association): lying to the immediate east of the site boundary, between the mainline railway to the north and Park West Road to the south, Park West industrial Estate is comprised of single level (c. 5m height) light grey low commercial / industrial sheds and warehousing. The structures create a physical and visual linear barrier for the full extent of the eastern boundary, enclosing the landscape while allowing distant visual connections from elevated vantage points toward Dublin City Centre to the east.
- Park West Avenue and Roundabout (direct character association): a busy 2 lane urban thoroughfare with dedicated pedestrian and cycle paths on both sides, the vision for Park West Avenue as a key gateway and formal townscape component is only partly realised due to it being enclosed on two sides at only one point (by the Aspect Hotel to the east and Park West Business Park buildings to the west of only one side for only a portion of its length). Connecting the New Nangor Road to the south to Palmerstown Way/ Cloverhill Road to the north (both of which are out with the study area), Park West Avenue intersects Park West Road south of the site at a landscaped roundabout. Located uncomfortably close to the southwest of the roundabout is a visually adverse high voltage power line pylon that dominates the terminus of Avenue's southern vista. The remainder of the route north of the roundabout is bounded by buildings mainly to one side or the other (e.g., the Cedar Brooke development to the north and the Concert, Crescent and Park West Business Park buildings to the southwest, opposite the site). The route continues south of the roundabout as a visually complete urban element with enclosing tree planting and structures to both sides. Grass berms that align with the road to the southeast of the railway bridge (northwest corner of the site) and on approach to the Park West roundabout provide a visual/physical buffer between the developed and undeveloped sections of the wider masterplan. These are evidently temporary structures.
- Park West Road (indirect character association): aligned east-west to the southern boundary of the Park West Development Land area, Park West Road serves the Park West Industrial and Business parks. It is a busy, two land road with pedestrian and cycle lanes either side. A less formal urban component than Park West Avenue, which it intersects at the roundabout, the route is bordered by closely planted semi-mature trees to the south but lacks completion as an urban design component due to the absence of complementary tree planting to the boundary of the adjacent Park West Development Land.
- Cedar Brook Estate (indirect character association): an urban development to the east of Park West Avenue comprised of contemporary residential 3 - 4 storey apartment buildings including flats, duplex terraces and townhouses. The complex is located diagonally across the railway overbridge/station and separated from the site by a grassed vacant plot and the western section of the Cherry Orchard estate, buffering it from change on the Park West site.
- M50 (indirect character association): passing some 250m to the west of the site, the M50 provides indirect vehicular access to Park West via the Naas Road junction / Oak Road to the south and N4 Chapelizod Bypass junction and Kylemore and Ballyfermot Roads to the north. As the motorway passes the Park West subject site, it is elevated (particularly so where it crosses the Dublin to Cork Mainline railway), providing views across the evolving urban area, including the subject site. It is a defining landscape characteristic and of visual importance due to the large cohort of receptors, albeit that the view of the site is transitory and motorway users are considered to be of low sensitivity.
- The Dublin to Cork mainline railway (direct character association): passing to the north of the site, the railway corridor separates it from Cherry Orchard estate and Cedar Brook. While the railway is in cutting and fenced along the full extent of the northern boundary of the site, it creates a physical barrier while not being conspicuously visible from adjacent

open areas. The overgrown hedge / tree line along the site boundary provides a nominal vegetation screen. Park West and Cherry Orchard Train Station is a major point of access to the site which amplifies the influence of the railway as a defining characteristic of the site.

The site is bounded by vacant development plots to the south, and by Park West Road. There are similarly no pedestrian crossing facilities along the length of the road, except at the roundabout junction with Park West Avenue to the southwest of the site.

Two high voltage overhead power line corridors are located adjacent to the site; the dominant utilitarian features, influence character within and beyond the site with direct and indirect adverse characteristics. These pass the site in an east-west orientation, aligned on and leading the eye towards Dublin City centre. The northern power line falls within the site, adjacent to the northern boundary and running parallel to the Mainline railway corridor. The second aligns with Park West Road to the south of the site, with a pylon located incongruously close to the Park West roundabout, drawing significant attention. Regarding tree cover and other green infrastructure, while the existing development out with the site to the west and south contains designed hard and soft landscaped public open space with semi-mature tree planting, there is a lack of tree planting within the site and to the contiguous boundaries with Park West Avenue and Park West Road.

Other features, elements and areas making up the townscape surrounding the site include the Grand Canal (a NIAH Site) passes some 325m to the south of the site in an east-west orientation. Cloverhill and Wheatfield Prisons and Bridgeview Halting Site, a travellers settlement centre, are located to the northwest of the site in neighbouring Clondalkin, beyond Cedar Brook Apartments and the Cherrywood Equine Centre. Due to the physical and visual separation, these elements have no direct influence on the site visually or in terms of character.

Although both residential and commercial development within the vicinity is relatively low rise (8 story structures are the maximum height), such development is not necessarily the prevailing trend. A number of developments that either under construction or have recently received planning approval exceed these heights within the M50 corridor, including Charlestown Place (10 story residential block), Leopardstown and Cherrywood. The urban form surrounding the site supports densification of building footprints, which will both reduce overall land take requirements per capita and relieve further congestion and development pressure within Dublin’s inner core.

The townscape will remain incomplete, however, until the subject site is developed, which will enlarge and strengthen the urban structure of Park West and Park West Avenue as an urban centre. The following photographs illustrate the immediate urban environment of the site.

Figure 14.6: *A view from Park West Avenue towards the site from western front of Park West Plaza, with Aspect Hotel and Park West Business Park in the central distance.*

Figure 14.7: *A view from Park West Avenue north towards site; the Park West roundabout is in the foreground and pylon to the left. The Aspect Hotel and undeveloped site is visible to the right in the middle distance, screened at ground level by a grassed earth bund.*

Figure 14.8: *A view from Park West Avenue north towards site Aspect Hotel and undeveloped site is visible to the right in the middle distance, and the Concert Building is on the left.*

Figure 14.9: *A view from the Cherry Orchard and Park West Train Station towards the site; the Concert Building is on the left and Aspect Hotel is central. The Cherry Orchard estate terraced housing fronting the railway is visible on the left. Note the HVC pylons, rubbish-strewn vacant land and graffiti daubed security wall.*

Figure 14.10: *A view from Park West Avenue south towards the site from in front of the Cedar Brook Apartments; the Concert Building is visible in the central distance. Note unsightly 1.8m height steel paling security fence to the vacant land on the right.*

Figure 14.11: *A view from Park West Road towards the clearly sign-posted site from the front of Park West Plaza, with Aspect Hotel, Park West Business Park and the Crescent Building in the central distance*

Figure 14.12: *A view from the end of the pedestrian throughfare through Park West Plaza Centre towards the site. Note the indicative continuation of the pedestrian route across the road into the site and Cherry Orchard housing on the skyline.*

Figure 14.13: *A view from Yeats Way (within Park West Business Park) towards the site showing the high-quality character, tree planting and materials of the existing townscape.*

Figure 14.14: *A view towards the site and the existing Aspect Hotel from the Crescent building grounds.*

Figure 14.15: *A view from Cedar Brook Apartments towards the site; the Aspect Hotel is visible in the central distance.*

Figure 14.16: *A view from within Cherry Orchard estate towards the site; the Concert Building is visible above the terraced housing to the right and Aspect Hotel can be seen to the left*

Figure 14.17: *A view from Cherry Orchard Estate towards the south; the Aspect Hotel is visible to the central distance.*

14.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

14.4.1 The proposed development

The proposed development is described in detail in the architectural and landscape design statements submitted with the planning application, and in Chapter 3 of the EIAR.

The key aspects of the proposal with regard to its potential townscape and visual effects are (1) the layout, (2) massing and height, (3) the façade treatments, and (4) the landscape proposals, discussed briefly below.

14.4.2 Layout

Within the c.9.4ha. site, the proposed development will comprise 7no. predominantly residential blocks (Blocks A to G), that are arranged in height from tallest nearest to the Train Station, Park West Avenue and Concert Building, to the lowest contiguous with the Park West Industrial Park units. Generally, the height of the apartment blocks ranges from 2 to 9 storeys, c. 7 – 29 metres. Block A ranges from 5 to 15 storeys (5 to 46 metres). Both the Development Plan and LAP make provision for a *"place marker landmark building of up to 60 metres"* at Park West, which Block A is intended to deliver, shifting the epicentre of Park West towards the Railway Station.

The layout allows for active frontages at ground floor, with own door residential unit entrances, main entrances for the apartments, and commercial units. The development prioritises pedestrian and cycle movement and connection throughout the site, with vehicular along the internal road system. The development includes a central public realm/park amenities area for the neighbourhood, as well as communal amenities areas at podium and roof level within the proposed blocks.

The apartment blocks are aligned with the Dublin to Cork mainline railway (and HV overhead power line corridor), from which they are set back by c. 20m. The proposed apartments also align with the grain of the Cherry Orchard Estate terraced housing, the nearest of which lies c. 55m to the north of the nearest proposed apartment building. The alignment fits with existing patterns of development, and while defined by the rail corridor, it mitigates its adverse character and screens its visual effects from the bulk of the new development.

The 15 story Block A stands opposite the Concert Building on Park West Avenue; the two structures constrict views at this point, forming an informal northern urban gateway to Park West. The Aspect Hotel building, standing within Site 6 to the south, also relates in scale and form to the adjacent Blocks A and G. Hence, the proposed apartment structures provide a logical and visually satisfying graduation in mass that melds with existing structures.

Residual lands within the site will be reserved for future expansion and will be seeded/ grassed and fenced to await development of stages 2 and 3. Stage 2 includes provision of a Department of Education and Skills school.

The overall construction will be phased to build-out over an estimated 7-year programme. The proposed site layout plan is illustrated below In Figure 14.18: Proposed Layout - key elements.

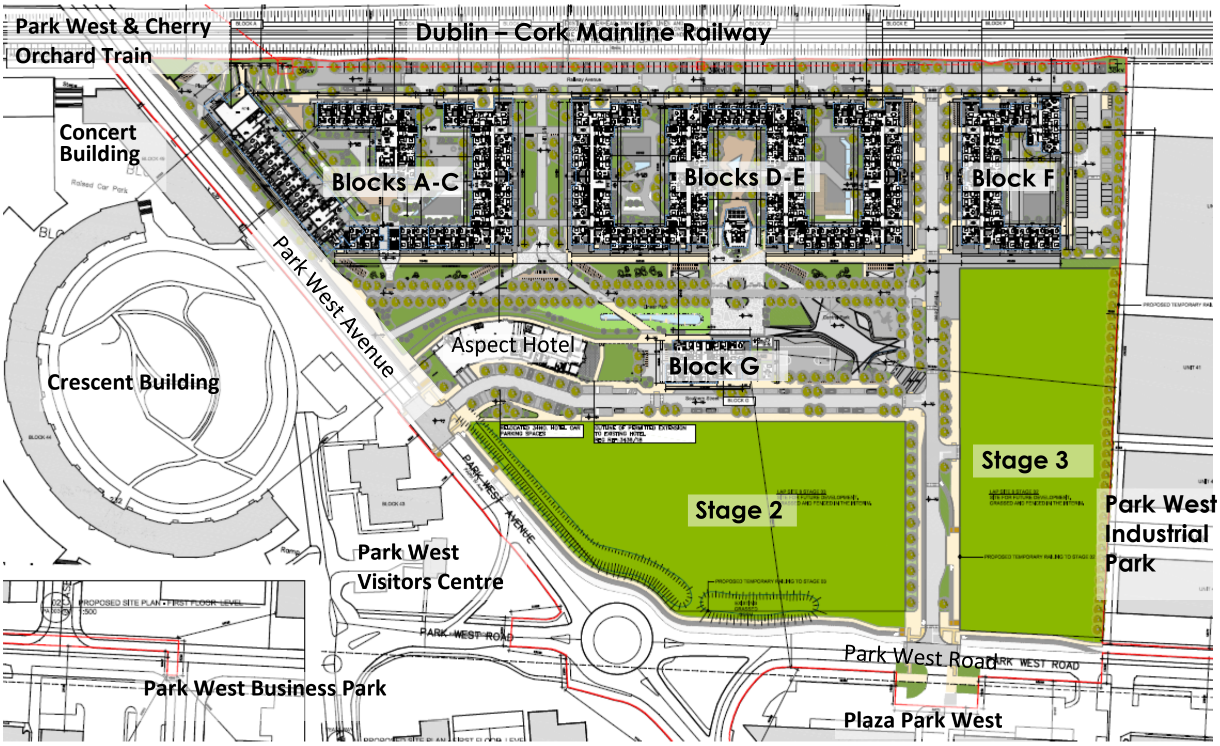


Figure 14.17: Proposed Layout - key elements

A hierarchy of open spaces is proposed (see Figure 14. 18 Public Open Space and Communal Amenity Diagram by Murray & Associates below), including:

- Public Open Space: a linear park of c. 1.35 ha., orientated west to east that functions as a visual link to the established residential areas to the west of Park West Avenue. A public plaza/ square including Multi-Use Games Area (MUGA) located centrally within the site (16% of the total development area) provides a focal point to the open space hierarchy;
- Communal Open Space: totalling c. 0.76ha, these are at podium level in Blocks A to F and roof levels within Block A and G. They include passive open spaces that are visually and functionally accessible to the future residents of the development. They also potentially link the apartments visually to the surrounding open space as 'hanging gardens.
- Private Open Spaces: balconies for the apartments and duplexes and small terrace areas for ground floor units.

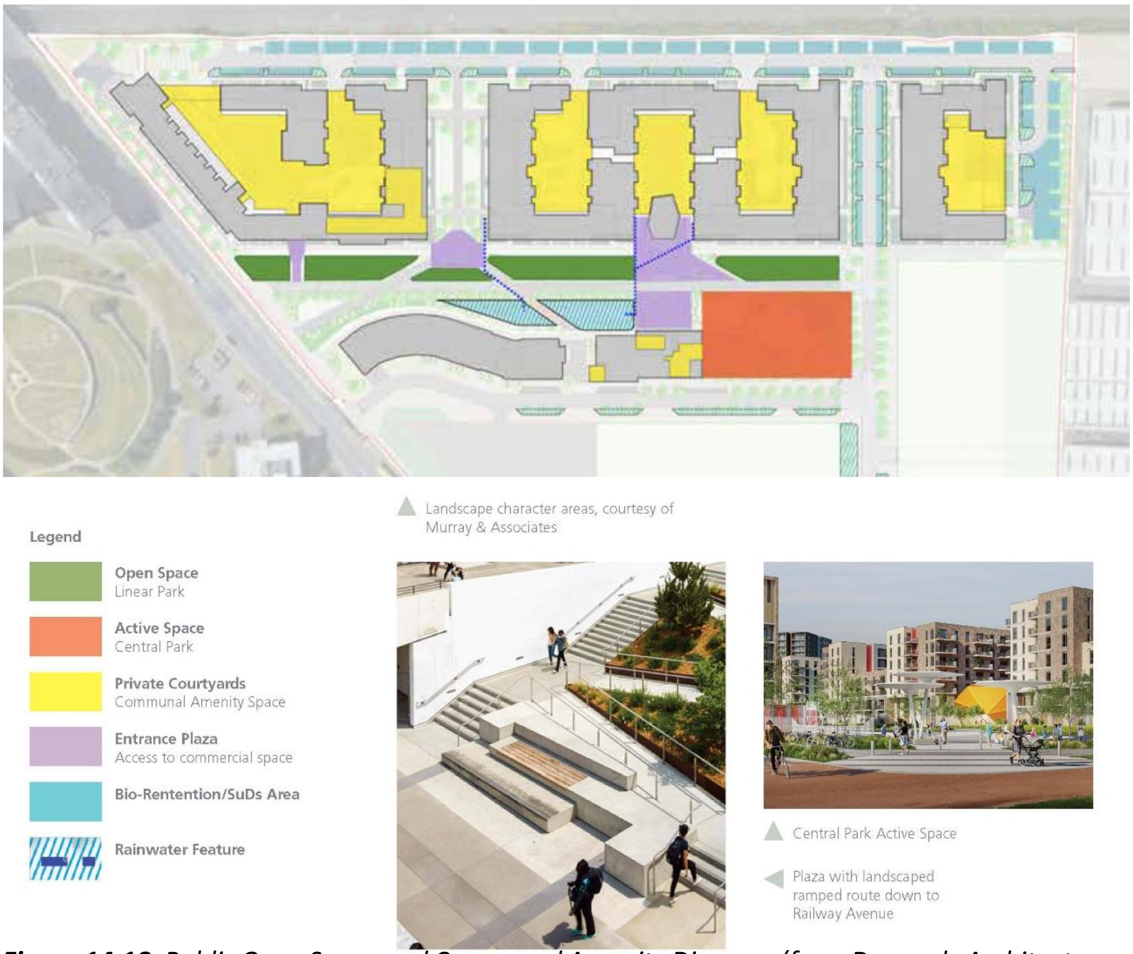


Figure 14.18: *Public Open Space and Communal Amenity Diagram (from Darmody Architecture Design Statement)*

Vehicular access from Park West Road and Park West Avenue include junctions with pedestrian and cycle crossings and separate access, and there are similar arrangements at the north western corner of the site adjoining Park West Avenue, as well as to the proposed west / east street along the northern boundary of the site. The routes link to Park West and Cherry Orchard Train Station (located directly to the northwest across Park West Avenue) as well as the adjacent residential, employment and community hubs.

14.4.3 Massing and Building Height

The gross site area of the site extends to c.9.4ha. With a net residential density of 137 units per ha., the building coverage is c.23% based on the Stage 1 net site area of c.5.4ha, excluding the Stage 2 and 3 sites. These densities of development are in line with the standards set out within Section 16.4 to 16.6 of the DCDP, although the proposed development is a Material Contravention of the Development Plan, as building heights exceed the maximum height set down in Section 16.7.2 for residential use in this location (i.e., 24 metres). This has implications for the townscape impacts and effects.

The proposed development has total gross floor area of 70,694sq.m with floor heights of each block as follows:

- Block A: 5 to 15 storey block (109no. apartments and 1no. retail/ commercial unit);
- Block B: 2 to 8 storey block (44no. apartments and resident services and amenities);
- Block C: 2 to 8 storey block (100no. apartments);

- Block D: 2 to 8 storey block (179no. apartments with residential services and amenities at ground, first and second floor levels);
- Block E: 2 to 8 storey block (179no. apartments);
- Block F: 2 to 8 storey block (99no. apartments);
- Block G: 1 to 8 storey block (40no. apartments, a creche and external play area, a retail unit of and a community space).

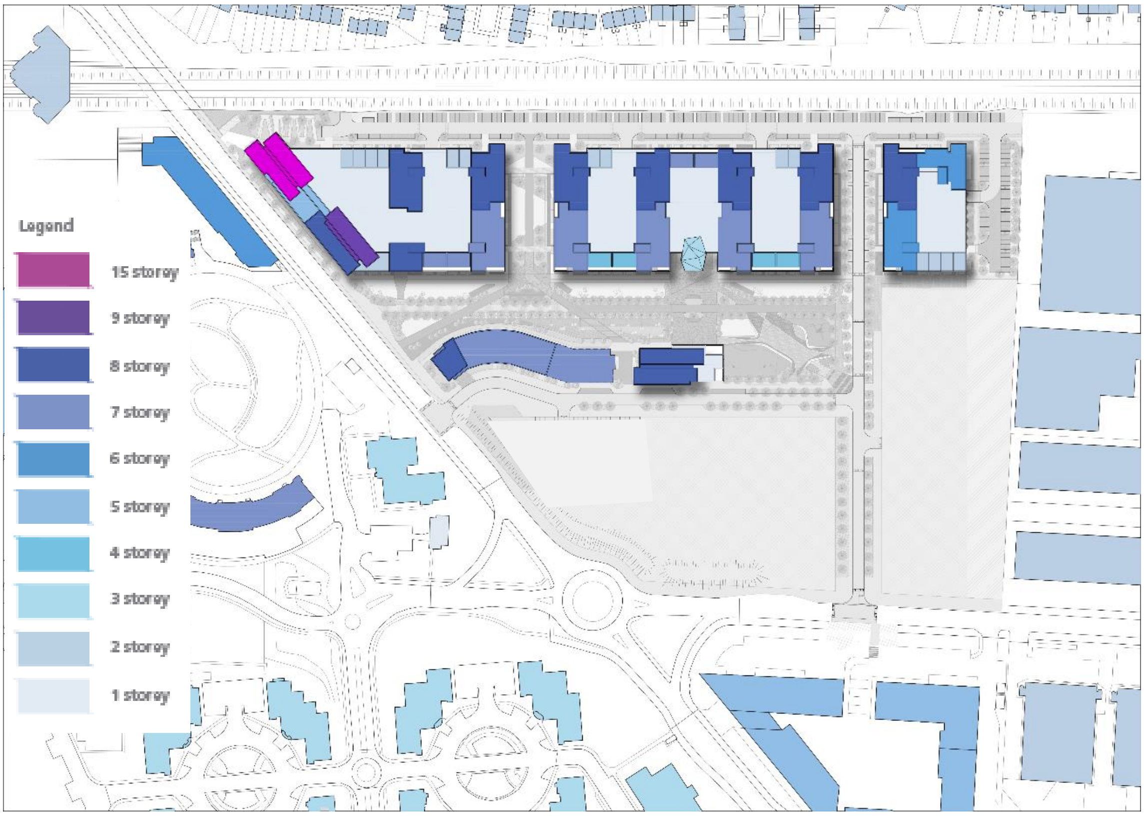


Figure 14.19: *Proposed Building Heights plan (from Darmody Architecture Design Statement) For detailed consideration of the issues of building height, scale and massing, refer to the* ***Architectural Design Statement*** *by Darmody Architecture.*

14.4.4 Character

The layout has been designed with distinct character areas based on the analysis of urban network of streets and spaces that respond to the existing context in terms of height, scale, uses and open spaces, to create a new urban residential development. The new spaces and routes are linked with existing and proposed elements of landscape and public transport, including a new plaza at the gateway to the scheme on the north-west corner, a central public park acting as an anchor for the whole masterplan site, a new linear public park traversing the site east to west and linking all apartment blocks, a new pedestrianized link street between blocks C & D, a new vehicular street with active frontages along the northern boundary with the Railway, and primary vehicular access streets running East/West (to the south) and North/South (to the east), as illustrated by Figure 14.20.

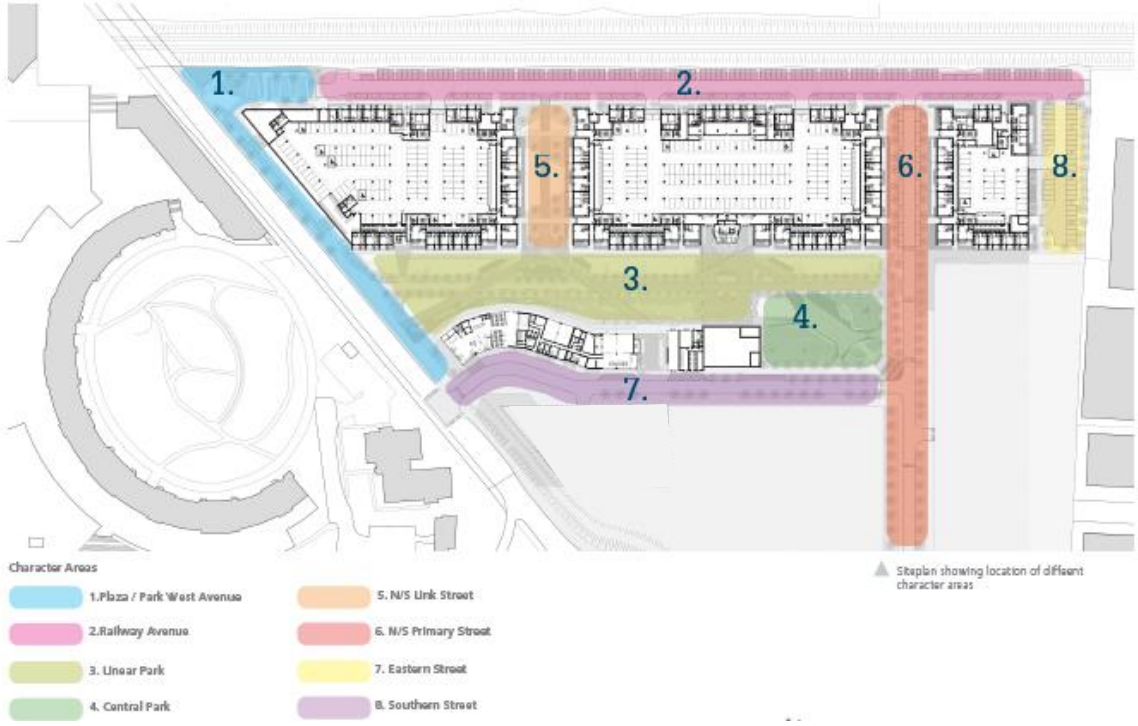


Figure 14.20: *Character Areas plan (from Darmody Architecture Design Statement)*

Each character area is described and illustrated in detail in the ***Architectural Design Statement*** by Darmody Architecture, extracts from which are used to assess their townscape effects as follows:

- **Plaza / Park West Avenue:** The northwest corner of the site acts as a gateway to the proposed development, marked by the 15-storey landmark tower which is anchored at ground level by a retail unit fronted by a formal public plaza.


Reference Image with proposed N-W Block A corner colonade and recessed GFL.

Reference Image with proposed landscaped ramp and stairs zone between north outline of block A, Park West Ave. and north site boundary

Figure 14.21: *Plaza / Park West Avenue Character study*

- **Railway Avenue:** bounded by the six primary proposed Blocks A-F fronted with street trees on its south side, and by a relatively steep grassy berm to the adjacent railway to the north.

Figure 14.22: *Railway Avenue Character Study*

- **Linear Park:** the pedestrian /cyclist primary east-west axis parkway is contained to both sides by the new structures and links series of landscaped character spaces.

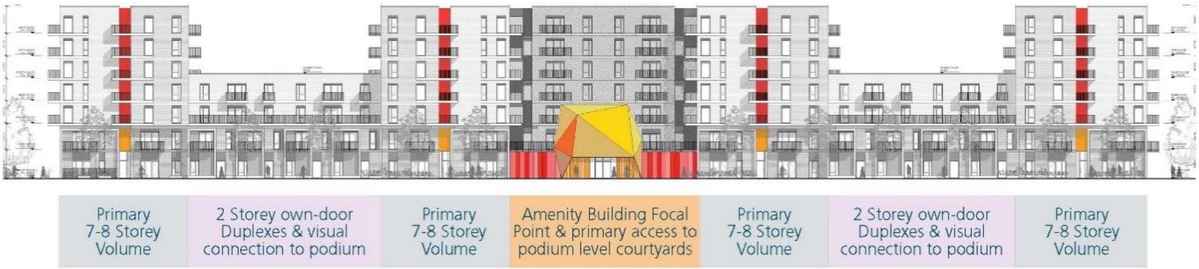


Figure 14.23*: Linear Park Character Study*

- **Central Park:** strategically located as a central meeting space and focal point within the public realm of the scheme.

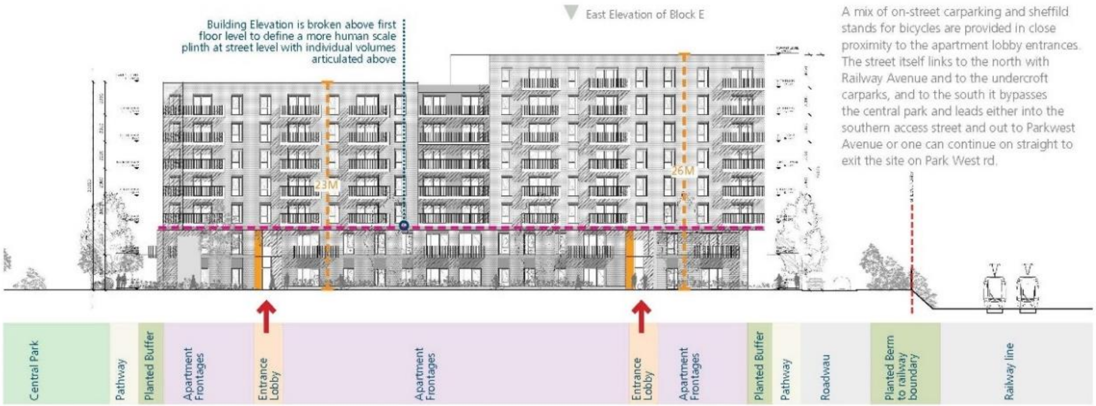
Figure 14.24: View of Central Park (from Darmody Architecture Design Statement)

- **North - South Link Street**: shared surface for controlled vehicles, pedestrian and cyclist Connecting the railway street with the linear park between block C & D, using bollards and materials to calm traffic.

Ref. Images with proposed solutions for East & West Elevation of Link Street and buffer zone planting on GFL

Figure 14.25: *Character Area no. % N/S Link Street (from Darmody Architecture Design Statement)*

North - South Primary Street: flanked on both sides by 7-8 storey structures, the street adds an emphatically urban character to Park West, with interest created by the continuous 2 storey plinth to the street level, and differently articulated 7/8 storey facades above.



Building Elevation is broken above first floor level to define a more human scale plinth at street level with individual volumes articulated above

A mix of on-street carparking and sheffild stands for bicycles are provided in close proximity to the apartment lobby entrances. The street itself links to the north with Railway Avenue and to the undercroft carparks, and to the south it bypasses the central park and leads either into the southern access street and out to Parkwest Avenue or one can continue on straight to exit the site on Park West rd.

Figure 14.26: *Proposed Building Elevations indicating Heights (from Darmody Architecture Design Statement)*

- **Southern Street:** the primary vehicular access route into the site characterized by the existing Park West Hotel, the building line and frontage of which is continued & further strengthened by the proposed Block G and link to the Central Park. Importantly, this character area is open to view from the south and east of the site. The scale of Block G is proportionate to the Aspect Hotel, and extensive planting within Central Park and to the front of Block G softens the view of the new buildings.

Figure 14.27: Proposed Building Elevations indicating Heights (from Darmody Architecture Design Statement)

- **Eastern Street:** the double row of street trees flanking the access road screen neighbouring industrial sheds east of the site from the new development, mitigating the poor neighbouring boundary condition while providing a landscape infrastructure for potential future development within the stage 2 and 3 land parcels.

Figure 14.28: *Detail plan view of Eastern Street (from Darmody Architecture Design Statement)*

Façade Treatments and Materials

While each character area is designed to have a distinctive identity as explained in detail in the Architectural Design Statement, there are elements that are common to all the blocks and open spaces. The principal external finished materials proposed include brick and metal cladding façades, green roof finishes, selected Alu-clad fenestration, recessed/ semi-recessed/ projecting metal structure balcony details. A neutral palette of two contrasting tones of brickwork is offset by the use of strong colour to mark the circulation spines and entrance points.

The contemporary and aesthetically pleasing materials selection complements those applied to the earlier Park West development, and therefore will reinforce their character and design intent.

The elevation strategy for Apartment Blocks A-F incorporates a 2-storey continuous plinth at street level which ties together variable building volumes, differentiating the lower façade from the more massive elevations above. Duplex properties are set back to provide additional articulation. Balconies are used to articulate corners where possible and recessed balconies are used to express breaks between the building volumes, or where there is stepping in height. These measures ensure that the structures are lend the composition a more intimate human scale at street level, while the differing volumes within each block and the range of block heights create visual interest and variety when viewed from further afield.

Figure 14.29: *Typical elevation strategy study – Blocks D-E*

Parking, Open Space and Landscape Proposals

The relatively high total floor areas per building footprint is balanced by a generous allocation public/private open space of high-quality design and sustainable features that support sustainable development objectives. These include in particular pedestrian and cycle facilities and SuDS drainage that are integrated into the landscape masterplan proposals.

14.4.5 Car/ Cycle Parking

The majority of car parking spaces are provided on site below the podium, and therefore the land contiguous to the building is largely available to the pedestrian public realm. The hotel car park will be removed and integrated into the proposed development.

Disabled access and motorcycle parking complies with Development Plan requirements and all car parking spaces will be fitted with Electric Vehicle charging points in future. The cycle parking for the residential and commercial units exceeds the requirements of the DCDP. The substantial number of cycle spaces that are provided demonstrates a commitment to supporting sustainable and alternative transport, provision of which reduces the potentially adverse impact of cars and roads within the scheme, and allows a wider site area to be used for amenity purposes.

Parking provision and allocations are discussed in more detail in Section 3.4.1 of this Report.

14.4.6 Open Space

The public open space strategy comprises of two keys areas – the central linear park and the public plaza/ square. The proposed development exceeds the 10% public open space requirement set out in the Development Plan. The means to achieving this generous allocation is assisted by the pragmatic car and cycle strategy as explained in 14.4.5 above. Communal amenity space for the apartments is being provided in central courtyards (podium level) and at roof Level in Blocks A and G. Private open space for the apartment blocks will be in the form of balconies.

14.4.7 Landscape Proposals

A masterplan scheme designed by Murray & Associates was developed for the site prior to development of this application, addressing the public open spaces, private and communal amenity space and the public realm. The proposals include all associated site and development works, hard and soft landscaping, and boundary treatments. The following are the key elements and aspects of the landscape masterplan with respect to the proposal's potential townscape and visual effects:

- The design concept aims to create a high-quality public realm through the use of placemaking, large areas of planting, and high-quality, robust materials.
- The public realm contains a diverse series of spaces for passive and active recreation for the community.
- Woven into the design are sustainable solutions to stormwater management, habitat, and biodiversity, including residential evergreen buffer planting, continuous canopy along circulation routes, and linked bio- retention areas.
- A series of courtyards within the development has a number of raised planters to create private seating areas and gathering spaces, with vegetated buffers along the edges for visual privacy for the ground floor residences.
- In summary, the development includes
  - High-quality robust materials
  - 7,574 sqm of communal amenity space
  - 1,012 sqm of play spaces (in public and communal areas)
  - 1,271 sqm of unprogrammed open space
  - 300+ trees within the public realm

- Integrated stormwater management
- Active frontages (commercial or own-door units) along the majority of the public realm.

***Figure 14.30:** Proposed Landscape Mastrerplan*

14.4.8 Public Open Space

The public open space strategy comprises of the following key spaces:

Linear Park

- This large west to east orientated space is located centrally within the site. It includes a linear corridor from Park West Avenue in the west and extending east. It is situated south of Blocks A, B, C and D and north of the existing Aspect Hotel.
- Key features of this space include pockets of hard and soft landscaping, bench seating and pathways branching off to the proposed residential blocks and west to the Railway Station.

Public Plaza/ Square

- This public square is located centrally within the site and situated south of Block E, east of Block G and is also bound to the west by the proposed linear park. This space includes a hard landscaped plaza, a multi-use games area and a general play area.
- The 10% requirement in the Development Plan for public open space is met by these two spaces, together amounting to c.1.3ha or 16% of the gross site area. Public Realm Amenity areas are additional to this.

Spaces and incidental spaces throughout the site. These include:

- An east – west street along the northern boundary of the site to be known as Railway Avenue including cycle and pedestrian access to Park West Avenue at the north-western corner of the site.
- An east – west street accessed from Park West Avenue and located south of the existing Aspect Hotel and north of the Phase 3 site.
- A north - south street accessed from Park West Road and bisecting the Stage 2 and 3 sites and the proposed Blocks E and F with connections to Railway Avenue and the proposed street connection west to Park West Avenue.
- A second north-south street separating Blocks A-B-C and Blocks D-E and linking the proposed Linear Park and Railways Avenue.

These features are designed to give pedestrian priority at suitable locations through surface treatments, street furniture and street tree planting. Paving and planting are also used on the proposed streets to create a pedestrian scale at street level.

Public realm planting will be robust, low-maintenance planting which provides year-round interest. The planting will allow clear sight lines through the site, depending on the mounding and elevation of the space. Linear semi-mature tree planting will define paths and sight lines. Bio-retention areas will have native planting integrated into the stormwater management, reflective of the predicted capacity. Screening planting along the base of the buildings is strong and structural providing an element of privacy to the ground floor apartments and a structural yet soft base integrating the development into the landscape.

14.4.9 Communal Amenity Space

Communal Amenity Space is provided for each apartment in compliance with the standards outlined in Annex 1 of 2018 Sustainable Urban Housing: Design Standards for New Apartments. The requirement for Communal Amenity Space based on the 2018 Guidelines - Annex 1 standards is 4,702sqm.

The communal amenity space for each of the apartment Blocks A to F is provided on the podium level courtyards and at roof levels within Blocks A and G. Please refer to the Landscape drawings and the ***Landscape Design Report*** by Murray & Associates for further details on the qualitative aspect of the design.

14.4.10 Private Amenity Space

Private open space in the form of balconies for the apartment blocks is provided for each of the residential units in the proposed development. Further details are provided in the Housing Quality Assessment by Darmody Architecture.

14.4.11 Boundary Treatments

Details of the boundary treatments for the site are presented on the landscape drawings with further detail provided in the ***Landscape Design Report*** by Murray & Associates.

Figure 14.31: *Contextual View of North-West Corner of Proposed Development*

14.5 ASSESSMENT OF IMPACTS

14.5.1 Construction Phase

The construction process would entail the following:

- Set up site perimeter hoarding;
- Set up site construction compound, tree and biodiversity protection measures, internal transport routes;
- Site clearance;
- Excavation;
- Site services installations;
- Construction of new buildings, frames and envelopes;
- Interior fit-out of buildings;
- External and internal streetscapes, landscaping and site boundary works.

During construction the site's character and visual amenity would be adversely impacted by the above activities and the incremental growth of the buildings. This would have unavoidable effects on the context townscape and views from the surroundings. The magnitude of change would be high in the immediate vicinity of the site. Overall, the sensitivity of the townscape can be considered medium (refer to 14.5.2). Therefore, the effects on the townscape and views would be 'moderate to significant' and negative in the immediate vicinity of the site (with the effects on the Park West Avenue residences and the southern-most properties in Cherry Orchard Estate of greatest significance), reducing in significance with distance from the site. The effects would be temporary, however, albeit over the 5 – 7 year estimated duration of the construction programme.

14.5.2 Operational Phase: Townscape Effects

Townscape Sensitivity
The classification of townscape sensitivity takes account of the existing condition of the receiving environment, but also (a) the trends of change in the area, (b) the development policy applying to the affected area, and (c) the nature of the development proposed.

The receiving environment is an urban core in the process of plan-led transformation into an urban community. Park West is designated as *SDRA 4 – Park West Cherry Orchard* and these areas are zoned Z14 where it is the objective *'To seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and "Z6" would be the predominant uses.'* (Section 14.8.13). The proposed development is a Material Contravention of the DCDP and the LAP in relation to building heights. Increased building heights are supported by the Urban Development and Building Heights Guidelines for Planning Authorities (2018) and specifically SPPR3(A).

Potentially susceptible receptors of townscape effects during the operational phase in the receiving environment include the residential neighbourhoods of Cherry Orchard Estate, the Cedar Brook Apartments complex, the Park West Academy, Concert and Crescent Building residential apartments, Plaza West residential apartments and public open spaces adjacent to the scheme. Due to its employment status, the Park West Business Park would not be considered a sensitive receptor by the GLVIA definition, despite the public open spaces surrounding the buildings containing several public artworks of distinction.

Taking account of the relevant policy and the existing condition of the site context (an area in a state of transition towards an urban environment), and the low susceptibility of landscape characteristics to the nature of the proposal, the sensitivity of the receiving environment overall can be classified 'Low' (definition: *Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such townscapes are generally unrecognised in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement*).

Magnitude of Townscape Change

The magnitude of townscape change which would result from the proposed development can be classified 'High' (definition: Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape).

The high magnitude classification arises not from the proposal being uncharacteristic in the context (it is a development of town centre character in a designated town centre area), but rather from the potential for the development to change certain key elements and characteristics of the receiving environment. These changes include:

- The introduction of buildings of urban character and scale to the streetscapes of Park West, resulting in town centre-type enclosure of the streets and strengthening/reinforcing the urban structure. This would make a significant positive contribution to townscape legibility (by appreciably defining Park West Avenue as the main street and emphasising the junction with Park West Road as a 'centre').
- The expansion of the existing Park West infrastructure and building mass, with the new high density residential neighbourhood complementing the existing Park West Business Park, the Aspect Hotel and Crescent, Concert and Academy buildings to collectively form a distinct urban core of scale (in terms of spatial extent, built form, population, etc.) and diversity. The development would make a significant contribution to the realisation of the DCDP Objectives as they apply to Park West.
- The evolution and enhancement of the public amenity open space, most notably by the provision of two features that together provide 10% of the Development Plan public open space requirement, amounting to c.1.3ha or 16% of the gross site area. These are:
  - Linear Park: the linear corridor from Park West Avenue in the west and extending east. Situated south of Blocks A, B, C and D and north of the existing Aspect Hotel, the key features of this space include pockets of hard and soft landscaping, bench seating and pathways branching off to the proposed residential blocks and west to the Railway Station.
  - Public Plaza/ Square: located centrally within the site (situated south of Block E, east of Block G), bound to the west by the proposed linear park. this space includes a hard landscaped plaza, a multi-use games area and a general play area.
- The extension of the public realm, the pedestrian and cycle circulation network and the green infrastructure network across the site, significantly enhancing the permeability and navigability of Park West. Pedestrian priority is provided at suitable locations through surface treatments, street furniture and street tree planting. Paving and planting are also used on the proposed streets to create a pedestrian scale at street level. The most notable elements of the proposal in this regard are:

- The east – west Railway Avenue along the northern boundary of the site, including cycle and pedestrian access to Park West Avenue at the north-western corner of the site.
- An east – west street accessed from Park West Avenue and located south of the existing Aspect Hotel and north of the Phase 3 site.
- A north - south street accessed from Park West Road and bisecting the Stage 2 and 3 sites and the proposed Blocks E and F with connections to Railway Avenue and the proposed street connection west to Park West Avenue. This also aligns with pedestrian access/steps to Plaza Park West.
- A second north-south street separating Blocks A-B-C and Blocks D-E and linking the proposed Linear Park and Railways Avenue.

Communal and private amenity space that meets/exceeds current best practice guidelines throughout the apartment blocks. Boundary treatment likewise consider the best practice guidance and provide screening to neighbouring residential properties where appropriate.

Significance of Townscape Effects
Measuring the magnitude of change against the townscape sensitivity (refer to Table 14.3 above) the significance of the effects is predicted to be 'moderate' (definition: *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends*). Based on the analysis above the townscape effects are predicted to be positive; no negative effects have been identified.

14.5.3 Operational Phase: Visual Effects

To assess the proposed development's potential visual effects on the receiving environment 17 no. viewpoints were selected for detailed assessment informed by verified photomontages (refer to the viewpoint map, Figure 14.18 overleaf). The viewpoints were selected to address all the key elements and character areas around the site (see Section 14.3.3 above), and to show the proposal from a range of angles and distances.

The viewpoints are assessed in Table 14.6 below. The assessment should be read in conjunction with the baseline views (photographs) and verified photomontages provided in Appendix 14A. For the methodology and the criteria and terms used in the assessments, refer to Section 14.2.2 above.

14.32: *Viewpoint Locations for Visual Effects*

Table 14.6: *Visual Effects Assessment*

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
1	View to the northwest from Park West Avenue adjacent to the Plaza Park West. Approx. distance to nearest site boundary: 350m	This viewpoint is from the southern approach road to Park West, single carriageway linked to the junction with New Nangor Road (R 143) and Oak Road, the distributor access to Western Industrial Estate. It is flanked by footpaths and cycle lanes, grassed verges, a linear planted bund to the left-hand side, and extensive formal and informal street tree planting (lime and plane). Office/ commercial structures of Park West Business Park are to the left, while to the right, are 4 storey buildings of Plaza Park West (being converted to residential apartments and raised by an additional floor). A power pylon is located on the Park West roundabout to the left. The extended height of the Aspect Hotel forms a minor landmark to the right of the distant vista and Crescent/Concert residential apartments enclose the left. Lamp column advertising banners add a splash of colour / ceremony to the street-scene. Road user and commuter view receptors have low susceptibility; the view is of a high aesthetic value and therefore overall, of low sensitivity.	Low	• The Block A landmark tower is a strong addition to the view would be visible in the distance, creating a new focal point to the vista and emphasising the location of the Park West and Cherrywood Train Station and therefore introducing a greater intuitive legibility to the urban core of Park West. The tower fits within the context and complements the scale of Park West Avenue as well as that of the Aspect Hotel, the Crescent, Concert and Park West Business Park buildings, by contrasting their more horizontal form with a structure that introduces a vertical punctuation to the composition as an aesthetically balanced element of interest. • Block A is a noticeable, but by no means an unwelcome or dominating, addition to the composition of built form and streetscape.	**Low**
2	View to the northwest from roundabout along Park West Avenue.	The view, dominated by the roundabout at the junction of Park West Road and Park West, is also 'framed' by the high voltage powerline pylon adjacent to the left-hand turn, drawing attention from the view towards the Business Park Visitors Centre and Aspect Hotel in the	Low	• The Block A landmark tower and lower 8-storey plinth structures flank the northeast (right) side of Park West Avenue. As the façade is of contemporary urban character and scale, and of appreciably high quality design and material	Medium

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
	Approx. distance to nearest site boundary: 150m	middle distance. While the pylon detracts from the location's visual amenity, the semi-mature trees within the road edges and traffic island, the green glazing of business park buildings, together with the sweeping curvature of the Aspect Hotel's lift tower roof, impart an elegance to the composition. The road / commuter view receptors have low susceptibility and due to the incongruous presence of the pylon, the view is of a medium / low aesthetic value and therefore of low sensitivity overall.		choice, it would be a complementary change to the character and quality of the street. The strong building line and enclosure augments this view of the existing Park West Avenue, strengthening the urban structure and legibility. • The greater height and density of residential developments appropriate, providing a firm delineation of built urban character and zoning. • This angle of view shows that the height of the buildings (existing and proposed) is proportional and together enclose the street the street. The development would achieve a strongly defined urban typology, and the scale would be softened to a degree by continuation of street tree planting.	
3	View to the northeast from bus stop over Park West Avenue towards the Proposed Development Phase 2 site. Distance to nearest site boundary: c 15m	The view over Park West Avenue toward the site from near the bus stop at the front of the Crescent Building is book-ended to the right by the two-tone grey façade of the 8 storey Aspect Hotel, providing a strong indication of the intended built form of the completed urban quarter. The central area is dominated by a grassed earth bund. To the right and centre is the dark brown of the Cherry Orchard terraced housing, while the eye is drawn to the distance by a power pylon. Again, the townscape in view appears unfinished – the Aspect Hotel in particular stands apart.	Medium	• The view of Block A landmark tower would create a strong vertical focal point, reinforcing the location as an urban centre. • Together with the 7 and stepped back 8 floor apartment block in front of it, the complex of structures enclose the road to the right (east) of view. • Block A lower plinths, softened by street tree planting, would complement the mass and height of Aspect Hotel to right of view. • The building line continuation of the apartments would contain the open space in front of the Crescent building completing the urban space. • With the existing Concert Building to the left (west) of the road, the space created between the	High

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
		Representative of road users, the visual receptors are low susceptibility while the view is of open development land.		buildings, forms a composition of vertical structures enclosing strong vistas. The space so created is as dominant an aspect in the view, as the framing buildings themselves. • No valuable element or characteristic of the view would be lost or compromised, and all currently detrimental features would be removed.	
4	View to southeast from the Park West Avenue adjacent to Park West and Cherry Orchard Train Station Approx. distance to nearest site boundary: 110m	The dominant foreground elements of the view to the right (west) include the Park West Avenue corridor, a wide footpath and cycle lane and white concrete Dublin to Cork Mainline railway bridge parapet. The Concert building to the right, together with the Aspect Hotel and Business Park buildings in the mid-distance, form a partial enclosure to Park West Avenue and the establish an urban centre character. Beneath the bridge to the left of view, a graffiti-daubed boundary wall and metal paling security fencing on litter-strewn waste ground underscores land use issues that frequently blight urban edge locations. Set back and parallel to the railway, the strongly linear form of 2 storey terraced houses of the Cherry Orchard community, leading the eye towards the horizontal shapes of industrial park sheds in the distance. HV power lines and pylons further emphasise the linearity of key elements within the	Low	• The Block A landmark tower dominates the composition, forming a strong vertical gateway feature that punctuates the horizontal massing of Blocks B-F to the left of view. These buildings work together with the Concert building on Park West Avenue to create an enclosing vista resulting in an emphatically urban streetscape. • Block A appropriately bookends the development, defining the edge of high-density development against existing linear physical boundary elements. • From this proximity, the quality of design of Building A (for example, the set-back of the left hand (east) leaf of the tower, the recessed balconies and variance of their placement from site to side), give the building an aesthetically interesting form, and materials of buildings generally would be appreciable. • Tree planting within the scheme helps to soften the structures. The new structures also displace the HV power line infrastructure (which is to be buried) at a stroke removing a key visual detractor and mitigating the post-industrial ambience of the area.	Very High

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
		composition, all leading in a similar direction reinforcing the site's lack of visual amenity. Due to the absence of structures on the site the composition appears incomplete and reinforces this location is part of an unrealised vision. Road and commuter receptors represented by the viewpoint are of low susceptibility. The character is primarily of land allocated and prepared for development, and is therefore of visually low value, and low sensitivity overall.		• Block A's set-back on Park West Avenue, together with the building height, of Block A introduces a pinch-point in conjunction with the Concert Building, shifting the development's epicentre to the Park West and Cherry Orchard Train Station, a functionally important location . The development would achieve an urban enclosure typology without being excessive justifying the height of block A, for example, a) its gateway location b) its position adjacent to the broad railway corridor and c) its potential for enclosure and definition of the Park West Proposed Development's streetscape. • The magnitude of change is quite apparently high, but also highly beneficial.	
5	View to southeast from Park West Avenue adjacent to the Cedar Brook Apartments Approx. distance to nearest site boundary: 350m	As an approach road to Park West, the foreground view from this location is dominated by the road infrastructure and roadside vegetation. The Cedarbrook Apartment buildings, located to the left of the view, are indicative of the structured, urbanised formality to which development in the area is intended to introduce. However, to the right of the view is a 1.8M height galvanised metal paling security fence and unkept regenerating scrub, presenting an unsightly counterbalance to the urbane Cedar Brook frontage. The Academy, Concert and Crescent Building apartments create a visual terminus to the streetscape. Park West Phase 2 site is	Low	• The Block A landmark tower introduces a strong vertical focal feature and attractor to the right centre of the view. Together with the Concert and Academy buildings to the right distance, the pinch-point on the road demarcates the Park West and Cherry Orchard Train Station location, forming an appropriate urban gateway towards the central skyline of the view. • The development would introduce a new building to the existing cluster, reinforcing the contemporary urban character and scale to the composition, expanding the urban core of Park West so that it becomes the dominant/defining element of the townscape in view, and re-centring the development to a functionally important location. There is an improvement of legibility,	Medium

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
		concealed. The view has the appearance of an incomplete composition: an urban environment that is within the throes of regeneration. The view represents low susceptibility road users; it is of low value due to the vacant land. Over all the viewpoint has low sensitivity.		working together with the existing Concert building and Train Station in creating an avenue-like vista. No valuable element or characteristic of the view would be lost or compromised. The magnitude of change would be medium and beneficial.	
6	View to the northwest from Park West Road over the site Approx. distance to nearest site boundary: 120m	The view is taken adjacent to and dominated by Park West Road, a busy single lane carriageway passing the southern boundary of Site 6. It is separated from the application site by the stage 3 land parcel. The Aspect Hotel, and Crescent, Concert and Park West Business Park buildings dominate the left of centre distance of the view, a cluster of structures that are of contemporary urban scale and architectural character. However, the absence of buildings on the site to the right of these prevents the full realisation of the Park West vision. The townscape appears incomplete and unbalanced. The view is dominated by blue hording to the right and vacant land allocated for development and is therefore of low value. The view represents low susceptibility road user receptors; overall sensitivity is therefore low.	Low	• The introduction of the new buildings would, together with the existing cluster of structures, reinforce the evolving character of an emphatically urban environment. • Tree planting on the North /South pedestrian and vehicular link road (central, near distance) to Park West Road softens the appearance of the existing Aspect Hotel and Block G. Block A tower is set behind the hotel and Block G, almost obscured from view. • The view of the vacant Stage 2 and 3 land parcels is, in part, screened or framed by street tree planting, which soften the appearance of both the proposed and existing buildings. • The new street trees would add valuable greenery to the townscape and soften the interface between the buildings and the street. • No valuable element or characteristic of the view would be lost or compromised, and all currently detrimental features would be removed. • The development would substantially strengthen the sense of place and would improve the balance of the composition.	Medium (positive)

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
				• The magnitude of change would be medium and beneficial.	
7	View towards the north from the Plaza Park West towards Site 6 Approx. distance to nearest site boundary: 170m	Representative of leisure, pedestrian and residential receptors, the view sweeps over Park West Road and the grassed Stage 3 site and hard standing to the southeast corner in the foreground, framed by maturing street trees to right and left. The white rendered, brown tiled roofs of the southern-most terraced properties of the Cherry Orchard Estate delineate the skyline; vegetation to the Dublin – Cork mainline railway screens some of the Cherry Orchard properties. The view represents potentially high susceptibility leisure, pedestrian and residential receptors. As vacant scrubland awaiting development, the quality of the view is low. Viewpoint sensitivity is therefore Medium.	Medium	• The view will be directly into the site along the North South pedestrian and vehicular link with Park West Road. The strong building line and built enclosure of Blocks B – F would screen view of the existing Cherry Orchard estate, strengthening the urban structure and legibility. • Framed by the existing Park West Road street trees, the new development will be prominent, although the street trees lining the North South link would soften the interface between the buildings and ground plane. • The linear axis of the proposed North-South Street aligns with Park West Plaza, forming a strong, unifying element. Columnar tree planting also assists in balancing the new building massing and visually linking the existing structures with the proposed Development. • The 8 storey Block G will be prominent to the left hand (west) of the view, accentuated by its podium base. Behind it, this angle of view shows the variety of height of the buildings; the gaps between the blocks allow some visual permeability towards the horizon. • Removal of high voltage power line would aesthetically be a benefit, removing a key visual detractor and mitigating the post-industrial ambience of the area.	High

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
				• No valuable element or characteristic of the view would be lost or compromised, and all currently detrimental features would be removed. The Proposed development will introduce a high degree of change to the view, although the layout of structures will be a continuation of / complementary to Plaza Park West.	
8	View to north from Yeats Way junction with Park West Road, (Park West Business Park) Approx. distance to nearest site boundary: 200m	Dominated in the foreground by a roundabout, the view is taken from the junction of Yeats Way, an access road within the Park West Business Park, with Park West Road. The contemporary 7 storey Crescent Building apartments, with continuous balconies, timber and white rendered façade and a buff masonry podium, occupies the left (west) near distance , typical of the high-quality design articulation of the existing development. Just out of view to the left is a cascade water feature and public art piece. Behind the viewpoint, the road, a single lane dual carriageway is lined with pedestrian paths and a formal avenue of semi-mature trees within lawns to the sides and median, forming a completed and maturing streetscape. To the right, 4 storey office blocks with light red brick and glazed facades sit behind maturing broadleaf trees. The view represents an office / residential receptor environment with medium value and a medium susceptibility to change.	Medium	• The view of the proposed development is restricted by the office blocks to the right (east) of view; the lower 8 – 9 storey apartment block , together with the landmark tower, fill the gap between these and the Crescent Building to the left (west), and the tower forms a central focal feature, creating a composition of an completed urban street scene. • Street trees to the base of the Block A podium continue the well-vegetated theme of the Business Park. • No valuable element or characteristic of the view would be lost or compromised, and all currently detrimental features would be removed. • The magnitude of change would be medium and positive.	Medium

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
9	View to east from the Crescent Building raised landscaped forecourt across SHD Phase 2 site Approx. distance to nearest site boundary: 85m	The view is taken from an elevated position near the centre of the Crescent landscaped forecourt looking east over the subject site. In the existing view the forecourt and Park West Avenue dominate the foreground. The sub-level of the Concert Building is just visible to the left and on the opposite side of the road, the 8 storey Aspect Hotel located to the right partially frames the view over the site. Delineating the skyline, low-lying dark brown rooftiles and white frontage of the terraced housing within Cherry Orchard Estate are visible over the grassed, scrubby vacant development site. The skyline is punctuated by the high voltage power line pylons. On the far horizon construction cranes can be glimpsed, demarking on-going construction work in Dublin city centre. The view represents high sensitivity residential receptors/recreational users; the view is primarily of vacant land allocated for development and is therefore of low value and overall medium sensitivity.	Medium	• On the far side of Park West Avenue, the 7 / 8 storey Block A apartment building, dominates the left hand side (north) of the view.. • Framed between the Aspect Hotel (to the right) and Block A apartment building are Blocks B, C, D, and E, rhythmically aligned along Linear Park, and forming a vista of depth that pulls the eye into the composition to the right. • The massed tree planting and formality of Linear Park create an appropriately scaled setting for both the new development and the existing Aspect Hotel. It also complements and completes the Crescent Building open space from where the view is taken. The scale of the proposed development can be fully appreciated in context with the depth of the vista along Linear Park. • The new street trees add valuable greenery to the townscape, and they soften the interface between the buildings and the ground plane. • The removal of HV power line is visually a significant benefit within this view. • No valuable element or characteristic of the view would be lost or compromised, and all currently detrimental features would be removed. • The magnitude of change is very high, and positive	Very high
10	View towards southeast from Cedar Brook Walk	View 10 is taken from within a nearby public housing development contemporary with the Crescent Building and Aspect Hotel cluster. The view towards the proposed development site is framed by street tree planting and duplex/	Medium	• Block A tower dominates the middle distant view (right hand side), crating a focal feature in the vista formed by the existing properties.	Low

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
	Approx. distance to nearest site boundary: 275m	small apartment buildings either side of the road. Low-lying Cherry Orchard pitched roof terraces can be glimpsed in the mid-distant central view, while the Aspect Hotel creates a focal point beyond. The view represents high susceptibility residential /open space receptors; the land in the middle foreground is allocated and prepared for development and is therefore of low aesthetic value and overall medium sensitivity.		• No valuable element or characteristic of the view would be lost or compromised, and all currently detrimental features would be removed. • The change to the view would be low.	
11	View to south from Barnville Park, Cherry Orchard estate Approx. distance to nearest site boundary: 100m	Typical of views from within Cherry Orchard estate, the view includes public open space (a grassed island), residential housing and access roads/parking. The Mainline railway lies beyond the housing terraces, as does the application site, but neither are visible within the view. A high voltage pylon also punctuates the horizon, imparting an urban-industrial ambience. The differing design and material quality of the Park West structures appreciably contrast with that of the conventional design of Cherry Orchard social housing buildings. The view represents high susceptibility residential and public open space users. The site and existing Aspect Hotel and Concert Building are visible beyond the pitched roof	Medium	• The view of Block A landmark tower is dominant above and beyond pitched roofs of the Estate terraces to the right. • The strong building line of Blocks B and C would cut across the central middle distance, screening the existing Aspect Hotel but strengthening the urban structure and legibility, contributing positively to townscape character. • The removal of the HV power line would visually be a significant benefit. • No valuable element or characteristic of the view would be lost or compromised, and all currently detrimental features would be removed. • The change to the view would be high, but the new development replaces vacant development land with a completed residential scheme, and the lower floors are screened by tree planting along	High

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
		terraces and Mainline Railway with a low aesthetic value and medium sensitivity.		Railway Avenue beyond the Dublin to Cork Mainline Railway .	
12	View to south from Cherry Orchard Court, Cherry Orchard estate Approx. distance to nearest site boundary: 50m	Typical of views from within Cherry Orchard estate, the view is from a residential cul-de-sac and includes housing access roads/parking and a 2m high concrete security barrier that screens both the Mainline railway and application site. The upper floors of the Aspect Hotel, Park West Business Park and Crescent buildings are visible. The differing design and material quality of the Park West SHD structures appreciably contrast with that of the more ‘traditional’ design of Cherry Orchard social housing buildings. The view represents high susceptibility residential receptors with a low aesthetic value and medium sensitivity.	Medium	• The view of Blocks B and C would be prominent additions to the view above and beyond Cherry Orchard Estate terraces and the perimeter wall from this viewpoint; Block A would be just visible to the far right. • The new buildings would form a cluster with the existing Aspect Hotel (although mostly screened from the view). The layout of the new apartments would allow visual permeability between the blocks, the long side of which are aligned perpendicular to the angle of view. • Removal of HV power line would visually be a significant benefit to the view. • New mitigating / softening tree would add valuable greenery to the townscape and soften the interface between the buildings, the railway and the Estate. • No valuable element or characteristic of the view would be lost or compromised, and any currently detrimental features would be removed. • The magnitude of change would be high but beneficial.	High
13	View to south towards Park West SHD site from Cherry Orchard Grove roundabout	The view includes public open space (a grassed roundabout and verges), residential housing and access roads/parking. The Dublin to Cork Mainline railway lies beyond the housing terraces, as does the application site, but neither are visible within the view. The upper	Medium	• View of Blocks B, C and D (Blocks A, F and G are screened from view) would be prominent additions to the view above / beyond Estate perimeter wall. • However, the strong building line and built enclosure would complement the existing Park West buildings beyond, strengthening the urban structure.	Medium

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
	Approx. distance to nearest site boundary: 150m	floor profile of the Aspect Hotel is visible on the skyline. A high voltage pylon punctuates the skyline. The differing design and material quality of the Aspect Hotel appreciably contrast with that of the more 'traditional' design of Cherry Orchard social housing buildings. The view represents high susceptibility residential and public open space users. The site and existing Aspect Hotel and Concert Building are visible beyond the pitched roof terraces and Mainline Railway with a low aesthetic value and overall medium sensitivity.		• The proposed building height is suitable in the context of the existing contiguous Hotel and other Park west structures within the view. The development would emphasise the difference between urban character of Cherry Orchard Estate and the denser Site 6 structures, introducing a sense of enclosure and completeness to the West Park development area. • The magnitude of change would be medium.	
14	View to southeast from Cherry Orchard Crescent Approx. distance to nearest site boundary: 80m	The view from within the Cherry Orchard Estate includes public open space (a grassed amenity open space), residential housing and access roads/parking. The Mainline railway lies beyond lies beyond 2 storey pitched roof terraced housing, as does the application site, but neither are visible within the view. The view represents high susceptibility residential and public open space users with a low aesthetic value and overall medium sensitivity to change of the type proposed.	Medium	• Block A landmark tower is visible in the centre distance above the Cherry Orchard housing. Blocks B, C, D and E are also visible, protruding marginally above the Cherry Orchard estate roofscape. • The articulated façade of the new buildings will replace the vacant development site. The development would contribute to the quantity and diversity of built form, suggesting a more substantial urban core beyond, and while the new development height contrasts with the lower height and density of the Cherry Orchard estate, the oblique angle view illustrates there is a reasonable distance between them, separated by the Dublin to Cork Mainline Railway corridor. • The architecture and materials are of high quality; Block A is intended to be a character-changing landmark building beside the train	High

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
				station, forming the focal feature of the new urban core. It densifies development near to the key public transport hub and is therefore responsive to context and of high quality. • The magnitude of change would be high from this viewpoint, but it would contribute positively to townscape character and legibility.	
15	View to south from Croftwood Crescent Approx. distance to nearest site boundary: 350m	The view from within the Cherry Orchard Estate includes an active public open space (a grassed amenity open space), residential housing and access roads/parking. The Mainline railway lies beyond 2 storey pitched roof terraced housing, as does the application site; neither are visible within the view. There are glimpses of the Park West Concert Building. The view represents high sensitivity residential receptors/recreational users; while it includes public amenity space, the aesthetic quality is of low value. Sensitivity to change of the type proposed is medium.	Medium	• Blocks A, B C and D would be visible, protruding marginally above the Cherry Orchard estate roofscape. • The development would contribute to the quantity and diversity of built form, suggesting a more substantial urban core beyond, and lower height of the eastern-most apartments assist in transitioning between the new development to the lower height and density of the Cherry Orchard estate. • The articulated façade of the new buildings will also be complemented by the variations in materials. • Overall, the development would strengthen the urban structure, character and legibility, reinforcing the urban edge and significantly improving visual amenity.	Low
16	View to north from M50 / maintenance lay-by	The users of the M50 are one of the largest cohorts of potential visual receptors although of low sensitivity to change. The view is screened by the intervening buildings / show rooms and landform from this viewpoint. The view is of low value and motorway users have a low susceptibility to	Negligible	• The site and Proposed Development will not be visible from the viewpoint. However, it is worth noting that from approximately 200m north of the viewpoint, there will be intermittent visibility of the Landmark tower from the M50 both north- and south-bound for approximately 400m.	Negligible

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change
	Approx. distance to nearest site boundary: 860m	change and because the site is out of view,, the viewpoint has negligible sensitivity.			
17	View to southeast from M50 / Palmerston Way over-bridge Approx. distance to nearest site boundary: 650m	The users of the M50 are one of the largest cohorts of potential visual receptors although of low sensitivity to change. While the view is partially obscured by the bridge balustrade, the elevation of the viewpoint affords a panoramic view to the southeast. The existing low-rise residential Cedar Brook apartments are visible beyond the M50, roadside embankment planting and vacant development land to the left of the view. The view also encompasses Park West and Cherry Orchard Railway Station and the Academy Building/Concert Building and Park West Pointe apartments centre and to the right. The Park West site is largely concealed in the middle distance. Although M50 is in cutting at this location, the viewpoint may represent receptors from the motorway further to the south where it is above the site. The view is of low value and motorway users have a low susceptibility to change; it is therefore of low sensitivity.	Low	• The M50 motorway will remain dominant/ unchanged in the foreground view. • The development will be visible as an element within the wider landscape, introducing a cluster of buildings of contemporary urban character and scale to the composition. • There would be a noticeable reinforcement of the existing built mass across the panorama, enhancing the legibility of the emerging urban structure and thus integrating otherwise disparate elements. into a more homogenic and cohesive composition. • Overall, the magnitude of change will be low, although the townscape character and visual amenity would be enhanced.	Low

14.5.4 Mitigation and Monitoring

Townscape and visual impacts are inevitable with the development of a large site in an established urban area. Standard best practice construction site management measures (e.g. erection and maintenance of site hoarding, orderly storage of materials and vehicles, etc.) will reduce these as far as possible, but there would be some residual negative impacts, e.g. the visual effect of buildings under construction intruding in views from the Park West Avenue and Cherry Orchard estate residences.

The buildings, associated engineering, roads, parking and soft/hard landscape works have been designed to pre-emptively mitigate adverse effects on townscape character and sensitive visual receptors where possible, otherwise termed 'embedded mitigation', as assessed and identified above. In summary, key embedded mitigation measures include:

- Generally introducing substantial planting of street trees of suitable species, visually softening and providing a green landscape setting for the structures.
- Screening of lower floors from view of neighbouring residential areas to the north boundary of the proposed development.
- Effective site planning to reinforce existing, and introduce new, vistas and axial lines of sight, anchoring the proposed development into the existing urban structure, particularly in regards to the Aspect Hotel, Crescent and Concert building complex and Dublin to Cork Mainline Railway.
- Optimising orientation of buildings in regards solar insolation and climate control within and around the buildings, reducing energy loss.
- Consciously introducing a landmark building to anchor the built mass to a key focal point within the townscape, taking advantage of the height and existing structural axial vista along Park West Avenue to move the epicentre of the urban core towards the Park West and Cherry Orchard Train Station.
- Integrating the vacant Stage 2 and 3 parcels into a landscape structure through planning of vehicular and pedestrian routes to form vistas aligning with proposed development and linking to existing urban anchors, including the Park West Plaza and Crescent Building.
- Specifying wild flower / meadow seed mix for the vacant stage 2 and 3 parcels to improve biodiversity while the land awaits final development.
- Introducing sedum planting on more than 70% of the flat roofs within the proposed development, mitigation rainwater runoff and heat reflection and increasing biodiversity while extending the vegetated area across the site.
- Introducing deck-level planting to shared amenity spaces within the built-up area.
- Integrating SuDS drainage and rain water run off /flood storage within basins and sub-surface retention structures.
- Introducing a preponderance of permeable paving to surface level parking and paths throughout the proposals
- Placing the majority of car parking below ground, reducing the footprint requirement and making space available for planting and amenity open space.
- Taking advantage of the planned burial of the high voltage power transmission cables and removal of pylons within the proposed layout, to ensure that views in and out of the proposed development are not compromised by their adverse, utilitarian appearance, while allowing planting of substantial tree species to screen intervisible views and protect residential privacy along the northern boundary.

The townscape and visual effects of the proposed Park West development on all landscape and visual receptors are therefore predicted to be neutral or positive at commencement. Therefore, no mitigation measures other than those built into the proposal are considered necessary prior to commencement.

However, for the embedded mitigation to remain effective for the operational life of the scheme, it is recommended that the following Mitigation and Monitoring Measures are incorporated:

Mitigation

L-O1	Introduce measures to safe-guard visual mitigation moving forward, e.g., specification of provision for climate change considerations for long-term maintenance and protection of vegetation with tree irrigation and drainage system.
L-O2	Likewise, introduce maintenance specification of provision to discourage /reduce casual damage by anti-social behaviour and protect landscape features (e.g., substantial plant size selection, including extra-heavy or semi mature tree planting public open space).
L-O3	Specify native trees, shrubs, groundcover and seeds and avoid foreign importation wherever possible to prevent inadvertent introduction of notifiable pests and diseases. This is to mitigate against the loss of planting and failure of embedded mitigation both within the time span of the LVIA and beyond.

Monitoring

L-M1	All site vegetation for damage due to anti-social behaviour change (out with maintenance contract provisions) and rapid restoration if required to ensure long-term effectiveness of mitigation measures.
L-M1	Monitor all site vegetation for adverse effects, particularly drought, water-logging, and exotic pests and diseases due to climate change (out with maintenance contract provisions) and rapid restoration if required to ensure long-term effectiveness of mitigation measures.

14.6 RESIDUAL IMPACTS

14.6.1 Residual Townscape Effects

The sensitivity of the townscape can be classified ‘low’ (definition: ‘*Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for and low susceptibility to change. The development would make no significant change to the character of the area or would make a positive change. Such townscapes are generally unrecognised in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement*’).

The classification of townscape sensitivity takes account of the existing condition of the receiving environment, but also:

a) the trends of change in the area;
b) the development policy applying to the affected area; and
c) the nature of the development proposed.

Potentially sensitive receptors of townscape impacts in the receiving environment include some of the properties within neighbouring residential estates (the Cherry Orchard estate; the Concert and Crescent Buildings; the Park West Plaza residential blocks) and the users of the Aspect Hotel.

The magnitude of townscape change which would result from the proposed development within the site and contiguous townscape character areas identified in section 14.3 can be classified ‘high’ (definition: ‘*Change that is moderate to large in extent, resulting in major* *alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape'*).

The high magnitude classification arises not from the proposal being uncharacteristic in the context (it is a development of town centre character in a designated town centre area), but rather from the potential for the development to change certain key elements and characteristics of the receiving environment. These changes include:

- The introduction of buildings of urban character and scale to the streetscapes of Park West Avenue and Park West Road, resulting in town centre-type enclosure of the streets and strengthening/reinforcing the urban structure. This would make a significant positive contribution to townscape legibility (by appreciably defining Park West Avenue as a continuation of Oak Road, i.e., as a main thoroughfare linking directly to adjacent established urban centres.
- The expansion of a high density, high quality urban environment complementing that of Park West Plaza, the Crescent/Concert and Academy development and Park West Business Park, contributing substantially to putting in place the envisaged distinct urban core and completion of a key element of the Park West SHD masterplan and realisation of the DCDP Reference Section 16.7.2 of the DCDP and Site Brief 6: Park West Avenue/ Road Site as they apply to Park West SHD.
- The completion and improvement of the Park West Avenue along the frontage of the site, most notably by the provision of a pedestrian crossing over Park West Avenue, the provision of improved pedestrian and cycle paths on the site-side of the streets, and the introduction of a large number of street trees in green verges.
- The extension of the public realm, the pedestrian and cycle circulation network and the green infrastructure network across the site, significantly improving the permeability and navigability of the town centre. The most notable elements of the proposal in this regard are the pedestrian boulevard (which is aligned to function as an extension of the pedestrian street in the existing Park West SHD development) and the linear park connecting the new residential housing and amenity spaces to Park West Avenue and Park West Road.
- The provision of the new linear public park at the central are of Site 6, functioning as an anchor/attraction in the public realm and green infrastructure network, which would form a substantial, multi-functional open space in the Park West.
- The introduction of a significant increase in the number and variety of shrubs and trees on the site, by the generous planting proposed in the streetscapes of Park West SHD, in the new linear park, on the internal streets and in the courtyards. This would have significant positive effects on the site's biodiversity, landscape and visual amenity value.

Measuring the magnitude of change against the townscape sensitivity, the significance of the effects is predicted to be 'moderate' (definition: *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends*). Based on the analysis above the townscape effects are predicted to be positive; no negative effects have been identified.

14.6.2 Residual Visual Effects

To assess the proposed development's potential visual effects on the receiving environment 17 no. viewpoints were selected for detailed assessment informed by verified photomontages. The visual effects assessment is summarised in Table 14.7 below.

***Table 14.7**: Summary of Visual Effects Assessment*

No	Viewpoint Location	Sensitivity	Magnitude of Change	Significance of Effects		
				Construction (Temporary)	Operation (Permanent)	Residual (Permanent)
1	View to the northwest from Park West Avenue adjacent to the Plaza Park West	Low	**Low**	Slight (adverse)	Slight (positive)	Slight (positive)
2	View to the northwest from roundabout along Park West Avenue	Low	Medium	Moderate (adverse)	Moderate (positive)	Moderate to slight (positive
3	View to the northeast from bus stop over Park West Avenue towards the SHD Phase 2 site	Medium	High	Very Significant to Significant (adverse)	Significant to Moderate (positive)	Moderate (positive)
4	View to southeast from the Park West Avenue adjacent to Park West and Cherry Orchard Train Station	Low	Very High	Very Significant (adverse)	Significant (positive)	Moderate (positive)
5	View to southeast from Park West Avenue adjacent to the Cedar Brook Apartments	Low	Medium	Significant (adverse)	Moderate (positive)	Moderate to slight (positive)
6	View to the north from the Park West Road over the SHD site	Low	Medium	Significant (adverse)	Moderate (positive)	Moderate to slight (positive)
7	View to the north from the Plaza Park West over the SHD site	Medium	High	Very significant (adverse)	Significant (positive)	Moderate (positive)
8	View to north from Yeats Way junction with Becket Way, (Park West Business Park)	Medium	Medium	significant (adverse)	Medium (positive)	Moderate (positive)
9	View to east from the Crescent Building raised landscaped forecourt	Medium	Very High	Profound to Very Significant (adverse)	Very Significant (positive)	Very Significant to significant (positive)

No	Viewpoint Location	Sensitivity	Magnitude of Change	Significance of Effects		
				Construction (Temporary)	Operation (Permanent)	Residual (Permanent)
10	View towards southeast from Cedar Brook Walk	Medium	Low	Moderate (adverse)	Moderate to slight (positive)	Slight (positive)
11	View to south from Barnville Park, Cherry Orchard estate	Medium	High	Very significant (adverse)	Significant to Moderate (positive)	Moderate (positive)
12	View to south from Cherry Orchard Court, Cherry Orchard estate	Medium	High	Very significant (adverse)	Significant (positive)	Significant to Moderate (positive)
13	View to south towards Park West SHD site from Cherry Orchard Grove roundabout	Medium	Medium	Significant to moderate (adverse)	Moderate (positive)	Moderate (positive)
14	View to southeast from Cherry Orchard Crescent	Medium	High	Very significant (adverse)	Significant to Moderate (positive)	Significant to Moderate (positive)
15	View to south from Croftwood Crescent	Medium	Low	Moderate (adverse)	Slight (positive)	Slight (positive)
16	View to north from M50 maintenance lay-by	Negligible	Negligible	Slight	Imperceptible	Imperceptible
17	View from M50 / Palmerston Way over-bridge	Low	Low	Moderate / slight (negative)	Moderate / slight (positive)	Slight (positive)

The most significant findings of the visual effects assessment are as follows:

- Views from within and adjacent to Park West Site 6 (Viewpoints 6, 7, 8, 9, 10, 11, 12, 13, 14, 15) would be improved. In all these views the development would introduce buildings of high design and material quality to the townscape, generating urban-type street enclosure along the northern boundary of the site without any sense of excessive enclosure. By expanding development across Park West, a critical mass of contemporary urban development would be introduced, reversing the existing situation in which Park West appears incomplete and un-balanced. The streetscapes would also be improved by the introduction of green verges and a large quantity of street trees.
- Views from the approaches to the site (Viewpoints 1, 2, 3, 4, 5) would also be improved. In these views the development would complement the existing Park West SHD buildings, forming a more substantial and diverse urban core, thereby improving townscape legibility.
- The visual effects on Park West Avenue (the public realm) would be between slight to moderate significance and positive (considering the policy for the site). Due to its considered massing and height the visible part of Block A would be a high-quality addition to the townscape, reflecting Park West Avenue’s location adjacent to Park West centre.

- The composition and character of views from the nearest Park West Avenue houses to the site would be changed by the introduction of a building (Block 4) of contemporary urban character to the site c.26m to the rear of the houses. However, given the site's town centre zoning and the associated policy driving its development, and the mitigation measures employed, including a) the stepping down of massing/ height towards the houses, and b) the existing/ proposed vegetation screen on the site boundary, the potential negative effects have been minimised.

No further mitigation or monitoring will be necessary due to the effectiveness of embedded landscape and visual measures within the design, provided that the additional mitigation and monitoring advised above, which will pre-empt long term adverse effects arising, is implemented.

14.7 DO NOTHING SCENARIO

The site would remain as a large vacant plot, with a surface car park and remnant field occupying a prominent position in the designated SDRA of Park West. It would continue to a) detract from the character and quality of the townscape and views/visual amenity in the area, b) contribute to the on-going existing adverse pedestrian user experience and a lack of permeability in Park West, c) keep in place the on-going paucity of green infrastructure in Site 6 generally, and d) prevent the realisation of the Park West development objectives contained in the LAP and masterplan.

14.8 INTERACTIONS

14.8.1 Biodiversity

The landscape proposals would result in a significant increase in species biodiversity within the amenity grassland, shrub and tree cover on the site (which is currently characterised by a considerable lack of green infrastructure), despite the site's high density residential use. The landscape proposals have been informed by the principles of green infrastructure planning, including connectivity (e.g., the inter-connectivity of the linear park and the shared space access routes), the green boundary treatment, the planting within communal residential open space, green roof planting, the central park and multi-functionality (e.g., the inclusion of swales/SUDs measures in the linear open space).

Introduction of wildflower meadow seeding to the stage 2 and 3 parcels while remaining undeveloped as recommended by the LVIA audit will also contribute to construction stage mitigation benefits.

14.8.2 Air and Climate

The introduction of a large quotient of trees and extensive green roofs to the site would have positive effects on air quality, microclimate and carbon sequestration.

14.8.3 Material Assets

Transportation
The proposed development would make a significant contribution to the network of pedestrian and cycle paths in Park West, improving permeability and thereby encouraging the use of non-polluting transport methods. The development would also improve the quality of

the Park West Avenue streetscape by introducing wide green verges and numerous street trees, thus enhancing the environmental quality of the road network.

Sustainable Urban Drainage Systems (SuDS)

Sustainable drainage is integrated with the landscape design, and therefore contributes to landscape character and aesthetic value throughout the scheme, as follows:

- a pond bio-retention system doubling as a water feature is located within the Linear Park;
- specification of tree pit bio-retention to road-side planting and permeable surfaces to parking bays;
- use of permeable surfaces to all podium level courtyards leading to run-off in carpark interception and treatment;
- all roof structures are designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows;
- all (residential) roof spaces are planted with Sedum, a hardy, self-sustaining species that contributes to rainwater run-off management, on-site biodiversity and CO2 reduction.

Please refer to CSR Consulting Engineering Services Report for full details on the proposed surface water management plan.

14.8.4 Cultural Heritage

The proposed development aims to extend the quality of public realm environment provided by the Crescent Building and Park West Business Park, potentially including public works or art within the scheme.

References

Dublin City Council (2016) Dublin City Development Plan 2016-2022

Guidelines for Landscape and Visual Impact Assessment, 3rd edition (2013), Landscape Institute and Institute of Environmental Management and Assessment.

Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, 2018, published by the Department of Housing, Planning and Local Government.

Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2017), Environmental Protection Agency.

National Planning Framework - Ireland 2040 (2018), Government of Ireland.

Photography and Photomontage in Landscape and Visual Impact Assessment (2011), Landscape Institute.

Townscape Character Assessment, Technical Information Note 05/2017 (2017), Landscape Institute.

Urban Design Manual – A Best Practice Guide (2009), Department of Environment, Heritage and Local Government.

Urban Development and Building Height Guidelines for Planning Authorities (2018), Department of Housing, Planning and Local Government.

15. SUMMARY OF SIGNIFICANT EFFECTS, INTERACTIONS AND MITIGATION/ MONITORING MEASURES

15.1 INTRODUCTION

Schedule 6 of the Planning and Development Regulations, 2001, As Amended details the information to be contained in an Environmental Impact Assessment Report, all of which have been complied with, where appropriate, in the relevant Chapter of this EIAR.

This Chapter of the EIAR identifies the significant effects of the project. It also summarises the interactions between impacts by different environmental factors previously discussed in the assessment chapters.

From the description of the project and assessment of effects outlined in the previous chapters, the significant effects of the project are considered under the following Chapter headings:

- Population and Human Health
- Biodiversity / Species and Habitats
- Land and Soils
- Water
- Air and Climate
- Noise and Vibration
- Material Assets: Built Services
- Material Assets: Transportation
- Material Assets: Resource and Waste Management
- Cultural Heritage
- Landscape

Where appropriate, the relevant impact areas are considered in grouped form, as set out below.

15.2 SUMMARY OF PRINCIPAL INTERACTIONS OF EFFECTS

Schedule 6 Item 2(d) of the Planning and Development Regulations, 2001 as amended requires that projects are examined with regard to the inter-relationship of aspects referred to in Item 2(d) of Schedule 6.

The matrix incorporated in Table 15.1 inter-relates the various Chapters of the EIAR to the various impact headings referred to in Schedule 6 Item 2(d) of the Planning and Development Regulations, 2001, As Amended. This matrix does not represent a form of relative assessment of impacts, but merely identifies and amalgamates areas of principal interaction.

15.3 SIGNIFICANT EFFECTS AND PRINCIPAL INTERACTIONS

The likely significant adverse effects of the project are summarised below on a Chapter by Chapter basis taking into consideration the principal interactions between the environmental factors.

The assessment on significant effects includes, where relevant, cumulative effects i.e. the addition of many minor or significant effects and the effects of other projects.

Population and Human Health

All environmental factors interact with Population and Human Health (Chapter 4). The key areas of interactions are:-
- Air and Climate
- Noise and Vibration
- Material Assets: Transportation
- Landscape

There are no significant adverse effects for Population and Human Health.

Biodiversity / Species and Habitats

Impacts to biodiversity are addressed in Biodiversity (Chapter 5) and are strongly related to water quality and impacts which may affect the aquatic environment during both the construction and operation phases. Interactions with the following chapters are therefore relevant:
- Noise and Vibration
- Water
- Landscape

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Land and Soils

Effects to land and soils are related to water quality, dust and waste. Interactions with the following chapters are therefore relevant:
- Water
- Air and Climate
- Material Assets: Resource and Waste Management

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Water

Effects on Water (Chapter 7) interact particularly with the following Chapters:-
- Biodiversity
- Land and Soils
- Material Assets: Built Services

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Air and Climate

The main interaction with respect to Air Quality And Climate (Chapter 8) is with respect to traffic and transportation (used as an input for the air quality and climate assessment of the operational phase). Other key interactions relate to health impacts, dust nuisance and atmospheric emissions (which have the potential to impact on biodiversity). These impacts are considered in the following chapters :

- Material Assets: Transportation
- Population and Human Health
- Biodiversity

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Noise and Vibration

The effects associated with Noise and Vibration (Chapter 9) interact with the following Chapters:-

- Population and Human Health
- Biodiversity
- Material Assets: Transportation

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Material Assets: Built Services

The impacts of Built Services (Chapter 10) interacts with the following Chapters:

- Population and Human Health
- Land and Soils
- Water

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Material Assets: Transportation (Chapter 11)

The impacts of Transportation interact with the following Chapters:-

- Population and Human Health
- Air and Climate
- Noise and Vibration

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Material Assets: Resource and Waste Management (Chapter 12)

The effects of the use of resources and waste management interact with the following Chapters:-

- Population and Human Health
- Land and Soils
- Water
- Material Assets: Transportation

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Cultural Heritage (Chapter 13)

The impact on cultural heritage interacts with the impacts on the Landscape (Chapter 14)
Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Landscape (Chapter 14)

In terms of interactions, the impact on the landscape relates to many of the impact areas considered. In the current context, the most significant interactions are considered in the following Chapters:

- Biodiversity
- Material Assets: Transportation
- Cultural Heritage

The impact on landscape is significant but consistent with the prevailing planning policy context and sustainable development objectives enunciated in international, national, regional and local policy.

15.4 OTHER EFFECTS

Schedule 6 Item 2(e) of the Planning and Development Regulations, 2001 As Amended requires that an EIAR contains a description of the likely significant effects (including direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent and temporary, positive and negative) of the project on the environment resulting from the following:-

- *the Use of Natural Resources*
  No likely significant effects on the environment are expected to arise from the use of natural resources in the construction / operation of the project

- *the emission of pollutants, the creation of nuisances and the disposal and recovery of waste.*
  No likely significant effects on the environment are expected to arise from the emission of pollutants, the creation of nuisances or the elimination of waste associated with this project.

- *the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*
  The likely significant effects of risks due to major accidents or disasters are described in Section 1.5 of this EIAR and in the Assessment Chapters, where relevant.

- *The technologies and the substances used.*
  This is an urban residential development and there are no technologies or substances associated with the project which would adversely affect the environment.

Table 15.1 Summary of Interactions

√ Area of Principal Interaction	Population and Human Health	Biodiversity	Land and Soils	Water	Air and Climate	Noise and Vibration	Material Assets: Built Services	Material Assets: Transportation	Material Assets: Resource and Waste Management	Cultural Heritage	Landscape	Major Accidents / Disasters	Use of Natural Resources	Emission of Pollutants	Technologies and Substances Used
Population and Human Health	▨				√	√	√	√	√		√	√			
Biodiversity		▨		√	√	√					√				
Land and Soils			▨	√			√		√		√				
Water		√	√	▨			√		√		√				
Air and Climate	√		√		▨			√						√	
Noise and Vibration	√	√				▨		√							
Material Assets: Built Services				√			▨								
Material Assets: Transportation	√				√	√		▨	√					√	
Material Assets: Resource and Waste Management			√						▨				√		
Cultural Heritage										▨	√				
Landscape		√			√					√	▨				

15.5 ENVIRONMENTAL COMMITMENTS - MITIGATION AND MONTORING MEASURES

These measures should be implemented through planning conditions imposed by the planning authority.

Mitigation and monitoring measures will be managed by the contractor(s) during the Construction Phase and by the developer/ landowners thereafter.

An objective of EIA is to identify likely significant adverse impacts at the pre-consent stage and, where necessary, to propose measures to mitigate or ameliorate such impacts.

The 2018 EIA Guidelines published by the Department of Housing, Planning and Local Government state:

> *'While not a mandatory requirement an EIAR can very usefully include a summary table of features and/or measures envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects of the proposed development, and a timescale for the implementation of proposed mitigation measures.'*

Therefore, mitigation and monitoring measures to be adopted during the construction and operational phases of the project are detailed within each chapter and collated in Tables 15.1 and 15.2 below under each chapter heading.

EIA related conditions may be imposed by as part of conditions of planning permission and this Chapter brings these together the key mitigation measures arising from the EIA process for this project to facilitate the competent/consent authority in this respect.

It is intended that mitigation and monitoring measures proposed in each of the Chapters by the individual specialists will be incorporated into the Construction and Environmental Management Plan (CEMP) prior to works commencing on site.

15.5.1 Construction Phase - Mitigation

Population & Human Health	
PPH-C1	**Construction and Environmental Management Plan (CEMP)-** In order to mitigate potential temporary community disturbance during construction, a Construction Management Plan (OCMP) has been prepared and is included with the application. If the project is approved and implemented, the appointed contractor will incorporate the environmental commitments contained in this EIAR and prepare a Construction and Environment Management Plan (CEMP) for the agreement of the Planning Authority prior to development commencing on site.
PPH-C2	**Liaison Officer** - The contractor(s) will appoint a liaison officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the Contractor(s) CEMP prepared prior to construction commencing.
PPH-C3	**Working Hours -** Typically, construction working hours will be limited to 7am – 6pm Monday to Friday and 8am to 2pm on Saturday. It is anticipated that there will be times, due to

	exceptional circumstances, that construction work will be necessary outside these standard hours i.e. large concrete pours. Deviations from these standard times will be agreed in advance with the Planning Authority.
PPH-C4	Prior to the erection of cranes on the site the developer shall notify the Irish Aviation Authority.
Biodiversity	
B-C1	Mitigation Measures outlined in Section 7.6 (Hydrology Chapter) will be followed to prevent surface water impacts and downstream impacts on biodiversity.
B-C2	Mitigation Measures outlined in Section 8.4 (Air & Climate Chapter) will be followed to prevent impacts on biodiversity from air quality impacts including dust.
B-C3	Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent.
B-C4	An Invasive Species Management Plan has been prepared (Appendix 5B). Prior to enabling works commencing on site the stand of Japanese knotweed (and soil within 7m buffer) will be removed off site under licence.
B-C5	Pre-Construction surveys will be carried out for mammals and amphibians on site prior to works commencing on site. Should terrestrial faunal species of conservation be present on site appropriate licencing will be acquired from NPWS prior to the commencement of works within the vicinity of the fauna present.
B-C6	Lighting during construction works will face inwardly to the site and will not create excessive spill from the site. Lighting will be carried out in discussion with the project ecologist.
B-C7	A project ecologist will be appointed to oversee enabling and construction works.
Water	
W-C1	Prior to construction the Contractor will be required to develop an Environmental Management Plan which will incorporate mitigation measures such as containment procedures, audit and review schedules and an Emergency Response Plan in the event of spills, flooding or other incidents that may contribute to pollution to water during construction.
W-C2	All batching and mixing activities will be located in areas away from watercourses and drains.
W-C3	Protection measures will be put in place to ensure that all materials used during the construction phase are appropriately handled, stored and disposed of in accordance with recognized standards and manufacturer’s guidance.
W-C4	Surface water drainage around the batching plant will be controlled and washout from mixing plant will be carried out in a designated, contained impermeable area.
W-C5	Spills of concrete, cement, grout or similar materials will not be hosed into drains.
W-C6	Rainwater that accumulates on site will be discharged to the DCC sewer system.

W-C7	The Contractor will comply with the following guidance documents: i) CIRIA – Guideline Document C532 Control of Water Pollution from Construction Sites (CIRIA, 2001) ii) CIRIA – Guideline Document C624 Development and Flood Risk - guidance for the construction industry (CIRIA, 2004).
W-C8	Dewatering and surface water discharges on the site, during construction and prior to completion will be controlled. All necessary facilities will be incorporated such as settlement ponds/tanks, oil/grit interceptors with shut down valves, bunded oil storage tanks adjacent to a petrol interceptor for storage of any recovered oil. A monitoring programme including sampling for water quality before discharge to the Council sewer during construction will be carried out to ensure that only clean surface water is discharged to the receiving systems.
W-C9	The Contractor will make all necessary arrangements for a temporary water supply in agreement with Irish Water and or Dublin City Council, in addition temporary pumping of ground water to facilitate the proposed basement construction will be licensed by Dublin City Council and the water levels monitored.
Air and Climate	
AC-C1	Water dampening on exposed surfaces Screening of building during demolition to contain dust. Cleaning of local roads. Vehicle/Plant engines shall be turned off when not in use Vehicle/Plant engines shall be maintained to ensure efficient operation. Mains power shall be utilised for Site Offices instead of generators.
AC-C2	A programme of dust deposition monitoring shall be initiated prior to the commencement of demolition works. A complaints management procedure shall be developed prior to the commencement of works.
Noise & Vibration	
NV-C1	During the construction phases, the appointed Contractor will implement best practice noise mitigation and control methods and manage the works to comply with noise limits outlined in BS 5228-1:2009+A1 2014. Part 1 – Noise
NV-C2	Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
NV-C3	Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
NV-C4	A comprehensive programme of continuous live noise monitoring shall be conducted at the site boundaries in proximity to noise sensitive receptors for the duration of the demolition and construction phases
NV-0C	Erection of good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level;

NV-C6	Erection of barriers as necessary around items such as generators or high duty compressors; and situate high noise plant as far away from sensitive properties as permitted by site constraints.
NV-C7	Screening of high noise activities such as pneumatic breaking and crushing
NV-C8	During the demolition and construction phases, the appointed Contractor will implement best practice vibration mitigation and control methods outlined in BS 5228-1:2009+A1 2014. Part 2 – Vibration
Material Assets: Built Services	
MA:BS-C1	Foul Effluent generated on site from the contractors sanitary facilities will be discharged to a holding tank and removed off site by a licenced removal contractor in accordance with Dublin City Council requirements. Temporary discharge utilising the existing, or permitted sewerage network will be in agreement with Dublin City Council & Irish Water. All necessary health and safety measures will be undertaken to ensure the safety and welfare of construction personnel, the public and road users during construction of the foul infrastructure.
MA:BS-C2	Water Supply The contractor will make all necessary arrangements for a temporary water supply in agreement with Irish Water & Dublin City Council. A water meter will be installed to monitor water consumption on the site and to enable early detection of any potential leaks.
MA:BS- C3	Electricity The locations of the electricity network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the electricity network in close proximity to the works area. This will ensure that the underground electricity network will not be damaged during the construction phase All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB Networks and will be in compliance with any requirements or guidelines they may have have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines Where new services are required, the Contractor will apply to ESB Networks for a connection permit where appropriate and will adhere to their requirements
MA:BS-C4	Gas

	The locations of the gas network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with Gas Networks Ireland (GNI) Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the gas network in close proximity to the works area. This will ensure that the underground gas network will not be damaged during the construction phase All works in the vicinity of GNI infrastructure will be carried out in ongoing consultation with GNI and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live gas mains. Where new services are required, the Contractor will apply to GNI for a connection permit where appropriate and will adhere to their requirements
MA:BS-C5	<u>Telecommunications</u> The locations of the telecommunications network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant telecommunication provider Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the telecommunications network in close proximity to the works area. This will ensure that the underground telecommunications network will not be damaged during the construction phase All works in the vicinity of the telecommunications providers infrastructure will be carried out in ongoing consultation with the relevant provider and will be in compliance with any requirements or guidelines they may have Where new services are required, the Contractor will apply to the relevant provider for a connection permit where appropriate and will adhere to their requirements It is considered that any likely impacts to overhead cables in the vicinity will be mitigated by applying standard construction practices.
Material Assets: Transportation	
MA:T-O1	The development design includes a limited internal car parking provision
MA:T-O2	The development design includes a high provision of internal bicycle parking
MA:T-O3	A residential car-share club will be established for the exclusive use of residents
MA:T-O4	A Residential Travel Plan will be implemented

MA:T-O5	A Residential Travel Plan Coordinator will be appointed to implement the Residential Travel Plan
Material Assets: Resource & Waste Management	
MA:RWM-C1	A dedicated C&D Waste & Resource Manager shall manage all Construction Wastes
MA: RWM -C2	Construction Wastes shall be managed in accordance with the Site-Specific C&D Waste Management Plan
MA: RWM -C3	18% of Excavated soils shall be re-used on site
MA: RWM -C4	An On-Site Construction Waste Compound for the segregation of construction and demolition wastes shall be established
MA: RWM -C5	Tool-Box talks on waste reduction, reuse, recycling and segregation shall be provided to all site staff and Contractors
MA: RWM -C6	Waste Collection Permits and Letters of acceptance from Waste Acceptance Facilities shall be provided to DCC on the appointment of Contractors
MA: RWM -C7	All waste loads leaving the site shall be digitally recorded
MA: RWM -C8	A monthly waste out record shall be issued to Fingal Co Co
MA: RWM -C9	All vehicles exiting the site carrying waste materials shall display a valid NWCPO number and be verified at the site exit gate
Cultural Heritage	
Not applicable	
Landscape	
Not applicable	

15.5.2 Operational Phase - Mitigation

Population And Human Health	
Not applicable	
Biodiversity	
Not applicable	
Land And Soils	
Not applicable	
Water	
W-O1	Incidental surface run-off from underground basement car parks, compactor units and waste / service yard areas will be discharged into the foul drainage system. Grit / petrol / oil separators will be provided in all of the above areas to improve the quality of water discharging.
W-O2	The provision of flow control with storm-water attenuation will ensure the rate of discharge of surface water is limited to greenfield run-off rates of 2 litres/second/hectare with a total allowable surface water discharge of 10.8 litres/second in line with the recommendations of the Greater Dublin Regional Code of Practice for Drainage Works and the Greater Dublin Strategic Drainage Study.
W-O3	SuDS proposals will improve the quality and reduce the quantity of surface water discharging into the receiving system.
W-O4	Removal of the surface water from the existing combined sewers will reduce the hydraulic loading on the existing sewerage network and Waste Water Treatment Plant (WWTP) at Ringsend.

Air And Climate	
AC-01	Energy Efficiency – All residential units shall be designed and constructed in accordance with The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.
AC-02	U-values for floor and roof will exceed the building regulation backstops
AC-03	Mechanical extract ventilation with heat recovery via heat pump
AC-04	Provision of e-Vehicle charging points for residents
AC-05	Shrub planting with rain garden
AC-06	Bio-Retention Planting
AC-07	Green Roofs
AC-08	10% of parking spaces shall have electric charging points
AC-09	Installation of Photovoltaic Panels on building roofs
Noise & Vibration	
NV-01	Acoustically rated window sets with a minimum Sound Reduction performance of 37Rw shall be installed along building facades facing towards the rail line to the north, Park West Avenue to the west and the Industrial Estate to the east.
NV-02	No passive wall vents shall be installed in the building facades facing towards the rail line to the north, Park West Avenue to the west and the Industrial Estate to the east.
NV-03	The effectiveness of the acoustic windows shall be tested in situ to verify that the ProPG internal noise limit criteria are not exceeded. Testing shall be conducted at the earliest instance on test rooms.
Material Assets: Built Services	
MA:BS-O1	Foul The proposed foul network when completed will be vested to Irish Water whom will have responsibility for the on-going maintenance and operation of the service. Private drainage areas, such as the various apartment blocks, will be maintained by the units maintenance company. Any issues going forward will there for be addressed and mitigation against.
MA:BS-O2	Water Supply The proposed potable water network when completed will be vested to Irish Water whom will have responsibility for the on-going maintenance and operation of the service. Private drainage areas, such as the various apartment blocks, will be maintained by the units maintenance company. Any issues going forward will there for be addressed and mitigation against.
MA:BS-O3	Electricity The power demands during the operational phase on the existing electricity network are considered to be imperceptible due to the energy efficient design including LED lighting, high performance heating equipment
MA:BS-O4	Gas The gas demands during the operational phase on the existing gas network are considered to be low due to the NZEB energy

	efficient design, thermal performance of the buildings and the use of renewable technology to reduce the heating demand. The design and construction of the required electrical services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.
MA:BS-O5	Telecommunications The telecommunications demand during the operational phase on the existing telecommunications network are considered to be imperceptible due to the resilience built into the networks by the relevant providers The design and construction of the required Telecommunication services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.
Material Assets: Transportation	
MA:T-O1	The development design includes a limited internal car parking provision
MA:T-O2	The development design includes a high provision of internal bicycle parking
MA:T-O3	A residential car-share club will be established for the exclusive use of residents
MA:T-O4	A Residential Travel Plan will be implemented
MA:T-O5	A Residential Travel Plan Coordinator will be appointed to implement the Residential Travel Plan
Material Assets: Resource & Waste Management	
MA: RWM -O1	The communal domestic waste storage areas shall be managed by the Facilities Management Company.
MA: RWM -O2	Domestic and Commercial Wastes shall be managed in accordance with the Site-Specific Operational Waste Management Plan
MA: RWM -O3	Residents shall be provided with information by the Facilities Management Company on the correct segregation and disposal of waste in order to minimise the generation of mixed waste streams and to increase recycling rates.
MA: RWM -O4	All residential units shall include a 3-bin waste segregation at source waste bin system.
MA: RWM -O5	The communal waste storage areas shall include WEEE and waste battery storage units.
MA: RWM -O6	The communal waste storage areas shall be of sufficient size to allow for the contingency storage of waste
MA: RWM -O7	An annual bulky waste collection service will be provided to residents by the Facilities Management Company.
MA: RWM -O8	A dedicated retail and commercial waste storage area shall be provided for the retail units and Creche. This area shall be separate from the domestic communal waste storage areas.
Cultural Heritage	
Not applicable	

Landscape	
L-O1	Introduce measures to safe-guard visual mitigation moving forward, e.g., specification of provision for climate change considerations for long-term maintenance and protection of vegetation with tree irrigation and drainage system.
L-O2	Likewise, introduce maintenance specification of provision to discourage /reduce casual damage by anti-social behaviour and protect landscape features (e.g., substantial plant size selection, including extra-heavy or semi mature tree planting public open space).
L-O3	Specify native trees, shrubs, groundcover and seeds and avoid foreign importation wherever possible to prevent inadvertent introduction of notifiable pests and diseases. This is to mitigate against the loss of planting and failure of embedded mitigation both within the time span of the LVIA and beyond.

15.5.3 Monitoring

Population And Human Health	
Not applicable	
Biodiversity	
B-M1	A project ecologist will oversee works on site.
Land & Soils	
LS-M1	Any additional testing and monitoring of soil and made ground that will be excavated for any potentially contaminated material to ensure adequate classification and disposal.
LS-M2	Monitoring of the retaining wall using for example, inclinometers and monitoring of water movements either seepages or through control points.
LS-M3	Monitoring of neighbouring structures immediate to the development site for the effects of any vibration, movement and settlement arising from the excavation works based on condition surveys carried out by the Contractor prior to the works.
LS-M4	Monitoring of interrelated impacts such as noise and vibration levels, dust emissions etc. are dealt with in their other chapters in this EIAR.
LS-M5	Testing and monitoring of water and gas during excavation works.
LS-M6	Monitoring of water movements either seepages or through control points.
Water	
Not applicable	
Air and Climate	
AC-M1	A programme of dust deposition monitoring shall be initiated prior to the commencement of construction works. A complaints management procedure shall be developed prior to the commencement of construction works.
Noise and Vibration	
NV-M1	A comprehensive programme of continuous live noise and vibration

	monitoring shall be conducted at receptors and structures in proximity to the site boundaries for the duration of the construction phase
Material Assets: Built Services	
Not applicable.	
Material Assets: Transportation	
MA:T-M1	The CEMP shall outline measures for monitoring the impact of construction traffic on the operation and condition of the surrounding street network, including remedial actions to be taken in the event of construction traffic causing damage to road infrastructure.
MA:T-M2	The lead contractor will also be required to monitor the travel habits of construction personnel and to tailor supports for public and shared transport use accordingly. Surrounding streets will be monitored to ensure that no nuisance parking associated with construction activity takes place.
MA:T-M3	The Residential Travel Plan Coordinator shall be responsible for monitoring the travel habits of development occupants and visitors. The RTP will identify specific targets against which the effectiveness of the plan can be assessed at each review; these will typically take the form of target modal splits for journeys to and from a site. The Residential Travel Plan Coordinator shall gather data on travel patterns, for instance by conducting periodic travel surveys of development occupants.
Materials Assets: Resource & Waste Management	
MA:RWM-M1	Routine Waste Management Audits shall be conducted
MA:RWM-M2	Waste Collection Permits and Letters of acceptance from Waste Acceptance Facilities shall be provided to DCC on the appointment of Contractors
MA:RWM-M3	A monthly waste out record shall be issued to DCC
MA:RWM-M4	All waste loads leaving the site shall be digitally recorded
MA:RWM-M5	The Facilities Management Company shall maintain a record of all domestic waste produced and shall prepare an annual report for residents and DCC detailing how waste reduction and recycling targets are being achieved with regard to The Eastern Region Waste Management Plan.
Cultural Heritage	
Not applicable	
Landscape	
L-M1	All site vegetation for damage due to anti-social behaviour change (out with maintenance contract provisions) and rapid restoration if required to ensure long-term effectiveness of mitigation measures.
L-M1	Monitor all site vegetation for adverse effects, particularly drought, water-logging, and exotic pests and diseases due to climate change (out with maintenance contract provisions) and rapid restoration if required to ensure long-term effectiveness of mitigation measures.

15.7 CONCLUSION

The EIAR has considered the likely, significant, adverse effects of the proposed project on the receiving environment.

Mitigation measures (see above) are included, to avoid and / or reduce impacts on the environment where considered necessary. This includes mitigation measures incorporated into the design of the proposed development.

The EIAR concludes that there are no material or significant environmental issues arising from the project which would prohibit the competent authority from issuing consent for the development.

APPENDICES

APPENDIX 5A – BAT FAUNA IMPACT ASSESSMENT

Appendix 5A. Bat fauna impact assessment for a proposed Strategic Housing Development (SHD) at Park West Avenue and Park West Road, Park West, Dublin 12.

2nd December 2021

Prepared by: Bryan Deegan (MCIEEM) of Altemar Ltd.
On behalf of: Greenseed Ltd.

Altemar Ltd., 50 Templecarrig Upper, Delgany, Co. Wicklow. 00-353-1-2010713. info@altemar.ie
Directors: Bryan Deegan and Sara Corcoran
Company No.427560 VAT No. 9649832U
www.altemar.ie

<table>
<tr><td colspan="4">**Document Control Sheet**</td></tr>
<tr><td>Client</td><td colspan="3">Greenseed Ltd.</td></tr>
<tr><td>Project</td><td colspan="3">Bat fauna impact assessment for a proposed Strategic Housing Development (SHD) at Park West Avenue and Park West Road, Park West, Dublin 12.</td></tr>
<tr><td>Report</td><td colspan="3">Bat Fauna Assessment</td></tr>
<tr><td>Date</td><td colspan="3">2nd December 2021</td></tr>
<tr><td>Version</td><td>Author</td><td>Reviewed</td><td>Date</td></tr>
<tr><td>Draft 01</td><td>Bryan Deegan</td><td>Jack Doyle</td><td>2nd December 2021</td></tr>
</table>

SUMMARY

Structure:	Existing hotel on site but no works are proposed to this building.
Location:	Park West Avenue and Park West Road, Park West, Dublin 12.
Bat species present:	None Roosting. A single foraging soprano pipistrelle (*Pipistrellus pygmaeus*) *on site*
Proposed work:	Proposed Strategic Housing Development (SHD).
Impact on bats:	None based on successful implementation of mitigation of light spill during construction.
Survey by:	Bryan Deegan MCIEEM
Survey date:	10th September 2021

Introduction
Development Description

Greenseed Ltd. intend to apply for planning permission for a proposed Strategic Housing Development (SHD) at Park West Avenue and Park West Road, Park West, Dublin 12.

Park West is situated c.8km west of Dublin City Centre, directly east of the M50, south of Ballyfermot and Cherry Orchard residential neighbourhoods and north of the John F Kennedy and Naas Road industrial areas. The Park West neighbourhood is bound by the Dublin to Cork mainline railway to the north, the Grand Canal to the south, the M50 to the west and the Killeen Road to the east.
The application site (c.9.4ha) is located within Park West, Dublin 12 and east of Park West Avenue and north of Park West Road. The Dublin to Cork mainline railway defines the northern boundary with Park West Business Park to the east. The northern and eastern boundaries of the site, to the rail line and Park West Business Park respectively, are defined by palisade fencing. An existing berm defines the southern and western boundaries of the site. The site is largely undeveloped with the exception of the Aspect Hotel, comprising an 8-storey hotel building and ancillary surface carpark accessed from Park West Avenue.

The proposed development involves a 10-year permission for 7no. predominantly residential blocks (Blocks A to G) accommodating a total of 750no. apartments. The apartment unit mix comprises 321no. (43%) 1 bed units, 384no. (51%) 2 bed units and 45no. (6%) 3 bed units.

Resident services and amenities are also proposed to serve the future residents and total 487sq.m gross floor area within Blocks B and D. Non-residential uses will comprise 1no. retail unit of 156sq.m within Block A and a creche of 410sq.m, community space of 48sq.m and café/ bar of 91sq.m all within Block G.

13,460sq.m (14%) of public open space is provided and comprises a linear park orientated west to east and functioning as a link to the established residential areas to the west of Park West Avenue and a public plaza/ square including Multi-Use Games Area (MUGA) located centrally within the site. Communal open spaces totalling 6,175sq.m are provided at podium level within each of the proposed Blocks A to F, a roof garden within Block G and include passive open spaces that are visually and functionally accessible to the future residents of the development.

Vehicular access to serve the proposed development will be provided via access roads off Park West Road and Park West Avenue. Tie in works are required to Park West Avenue and Park West Road to provide for suitable junctions and pedestrian crossings at the proposed access points.

The development will also include parking for vehicles and bicycles, landscaping and all associated site and development works.

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

Landscape

The proposed landscape masterplan is demonstrated in Figure 3.

Competency of Assessor

This report has been prepared by Bryan Deegan MSc, BSc (MCIEEM). Bryan has over 26 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 site visits by Bryan Deegan (MCIEEM) on the 10th September 2021 during which the proposed development site was searched for bat use or presence. A bat emergent survey was also carried out.

Survey methodology

At dusk, a bat detector survey was carried out onsite using a *Echometer Touch 2 pro* bat detector to determine bat activity. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations. Surveys were carried out having regard to the following guidelines:
Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016);
Bat Mitigation Guidelines for Ireland (NPWS, 2006); and,
Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006).

Survey constraints

The detector survey was undertaken during the active bat season in August. Weather conditions were good with mild temperatures of 13°C after sunset. Winds were light and there was no rainfall.

Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

ALTEMAR
Marine & Environmental Consultancy

Figure 1. Proposed site outline. Single soprano pipistrelle (yellow line) noted on site.

Figure 2. Proposed site plan

Figure 3. Proposed landscape masterplan

Lighting

A Public Lighitng Report has been prepared by EDC Progressive Engineering to accompany this planning application. In relation to the lighting layout report for the proposed development at Park West, Co. Dublin, this report outlines the following:

General Data

Dimensions in Metres Angles in Degrees

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	Grid 1	585.52	418.14	375.55	337.28	1.50	1.50
2	Grid 2	861.70	470.68	26.02	240.00	1.45	1.50
3	Grid 3	585.52	710.68	374.88	18.56	1.50	1.43
4	Grid 4	658.47	568.65	65.59	28.69	1.49	1.43
5	Grid 5	724.06	568.65	137.64	18.28	1.50	1.41
6	Grid 6	656.94	551.35	16.56	28.08	1.38	1.48
7	Grid 7	852.80	450.22	46.84	22.70	1.46	1.42
8	Grid 8	687.96	654.46	30.19	56.21	1.44	1.48
9	Grid 9	776.03	586.93	85.67	67.09	1.48	1.49
10	Grid 10	610.01	602.91	166.02	51.62	1.50	1.47
11	Grid 11	744.96	586.88	13.75	16.04	1.37	1.46
12	Grid 12	933.96	639.39	24.77	71.39	1.46	1.49
13	Grid 13	887.74	634.80	46.31	8.60	1.49	1.43

Luminaires

Luminaire A Data

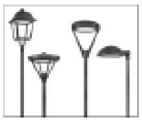
Supplier	Cree Lighting
Type	TRSA-02-150-6L40741W
Lamp(s)	12Du6L41W4K
Lamp Flux (klm)	6.56
File Name	TRSA-02-150-6L-407 41W-481-QL21-S03.IES
Maintenance Factor	0.84
Imax70,80,90(cd/klm)	476.2, 35.8, 0.0
No. in Project	28

Luminaire B Data

Supplier	Cree Lighting
Type	TRSA-02-200-6L40741W
Lamp(s)	12lu6L41W4K
Lamp Flux (klm)	6.56
File Name	TRSA-02-200-6L-407 41W-1408-QL20-S05.IES
Maintenance Factor	0.84
Imax70,80,90(cd/klm)	462.5, 41.7, 0.0
No. in Project	18

Luminaire C Data

Supplier	Cree Lighting
Type	TRSA-02-075-2L407 8W
Lamp(s)	4lu2L8W4K
Lamp Flux (klm)	1.16
File Name	TRSA-02-075-2L-407 8W-1088-QL20-R18.IES
Maintenance Factor	0.76
Imax70,80,90(cd/klm)	418.0, 31.4, 0.0
No. in Project	38



Luminaire D Data

Supplier	Cree Lighting
Type	URBAN Modern E - Type 5SH -D15
Lamp(s)	5 MT-G2 25W 4K
LampFlux(klm)/Colour	3.26 4000/70
File Name	UMDE5SHB40K_24BKD15-PL07330-001.LDT
Maintenance Factor	0.76
Imax70,80,90(cd/klm)	348.7, 82.5, 0.0
No. in Project	8

The proposed public lighting plan is demonstrated in Figure 4. The Horizontal Illuminance (lux) Grids 1-13 are demonstrated in Figures 5-17.

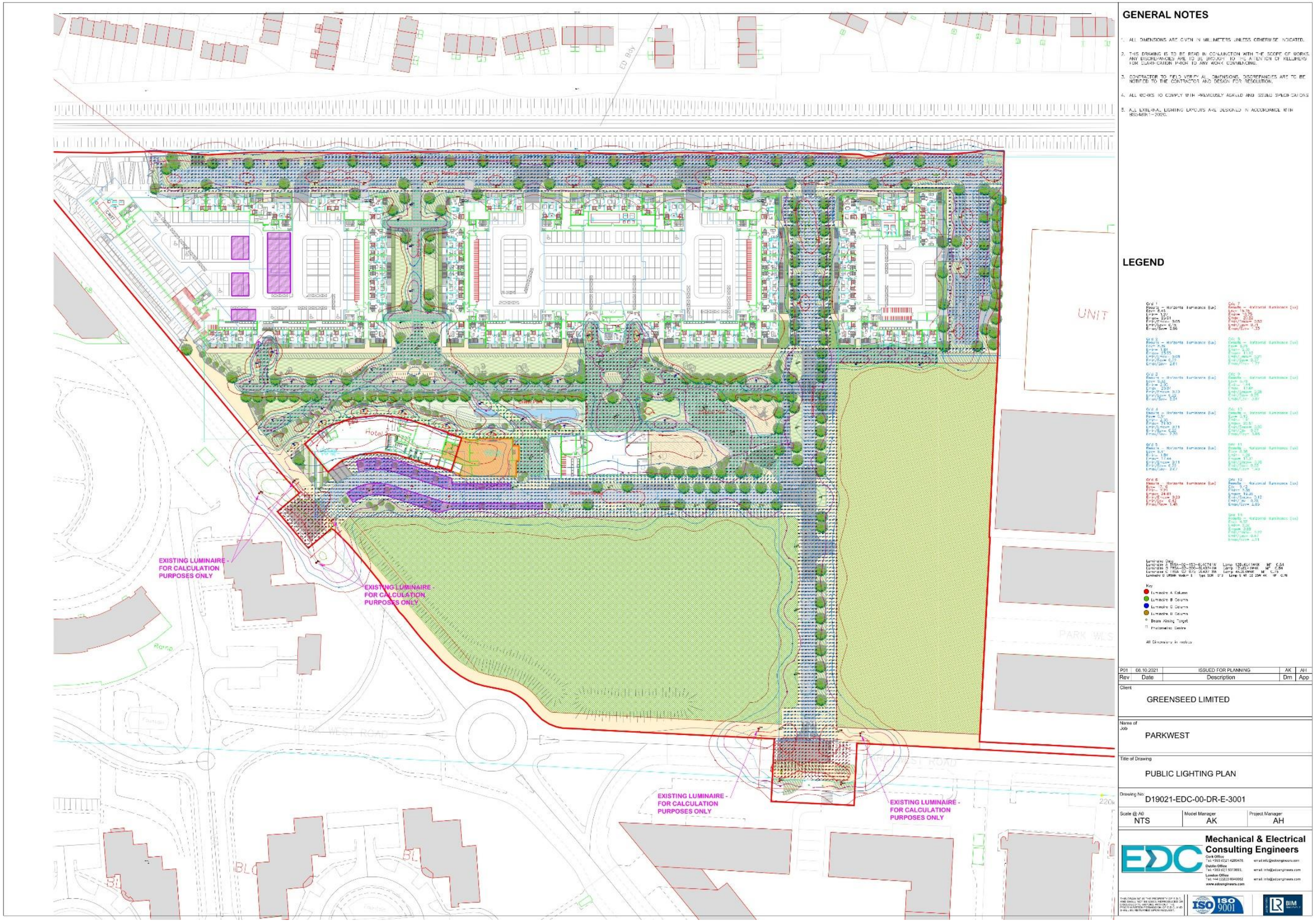


Figure 4. Proposed public lighting plan

Horizontal Illuminance (lux)

Grid 1

Results

Eav	8.46
Emin	1.27
Emax	25.01
Emin/Emax	0.05
Emin/Eav	0.15
Emax/Eav	2.96

Horizontal Illuminance (lux)

Grid 2

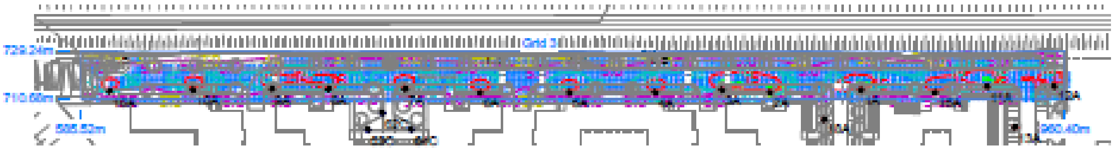
Results

Eav	8.39
Emin	1.84
Emax	23.55
Emin/Emax	0.08
Emin/Eav	0.22
Emax/Eav	2.81

Figures 5 & 6. Horizontal Illuminance (lux) levels – Grids 1 & 2

Horizontal Illuminance (lux)

Grid 3

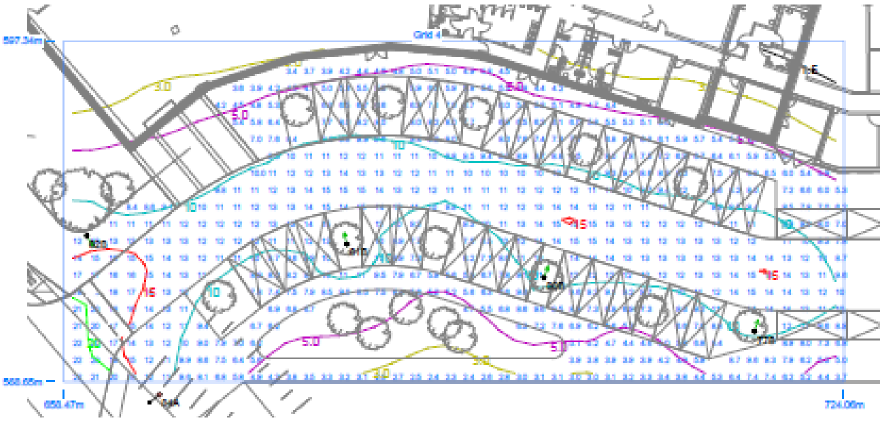


Results

Eav	9.32
Emin	2.05
Emax	20.84
Emin/Emax	0.10
Emin/Eav	0.22
Emax/Eav	2.24

Horizontal Illuminance (lux)

Grid 4

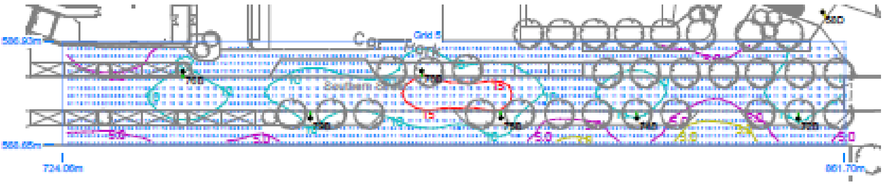


Results

Eav	9.51
Emin	2.35
Emax	21.90
Emin/Emax	0.11
Emin/Eav	0.25
Emax/Eav	2.30

Horizontal Illuminance (lux)

Grid 5



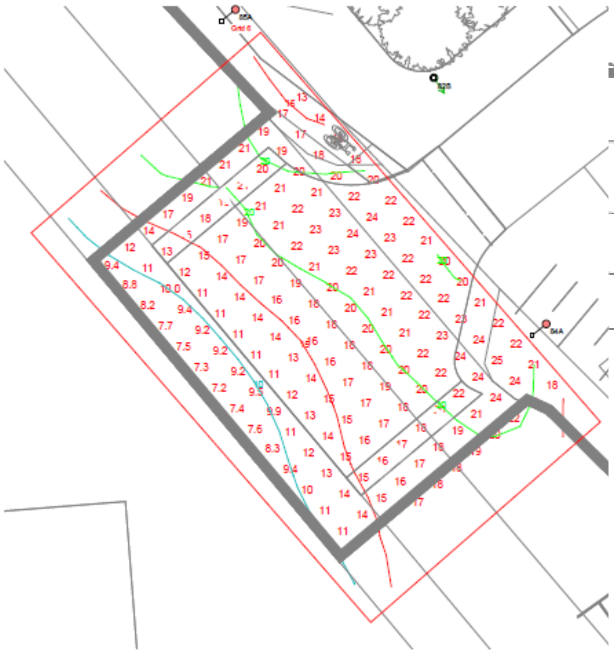
Results

Eav	8.41
Emin	1.84
Emax	17.44
Emin/Emax	0.11
Emin/Eav	0.22
Emax/Eav	2.07

Figures 7, 8, & 9. Horizontal Illuminance (lux) levels – Grids 3, 4, & 5

Horizontal Illuminance (lux)

Grid 6

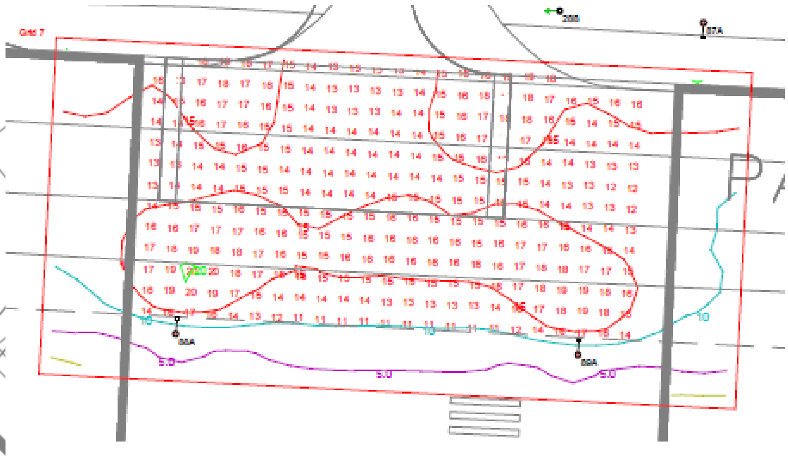


Results

Eav	17.16
Emin	7.21
Emax	24.81
Emin/Emax	0.29
Emin/Eav	0.42
Emax/Eav	1.45

Horizontal Illuminance (lux)

Grid 7

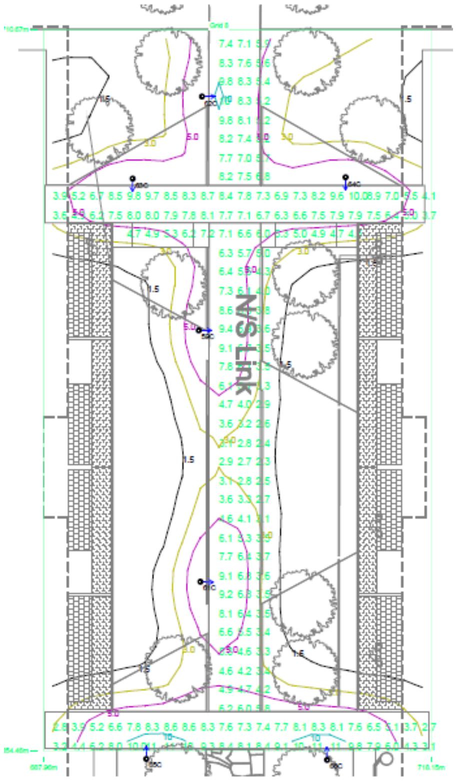


Results

Eav	15.15
Emin	10.75
Emax	20.22
Emin/Emax	0.53
Emin/Eav	0.71
Emax/Eav	1.33

Horizontal Illuminance (lux)

Grid 8

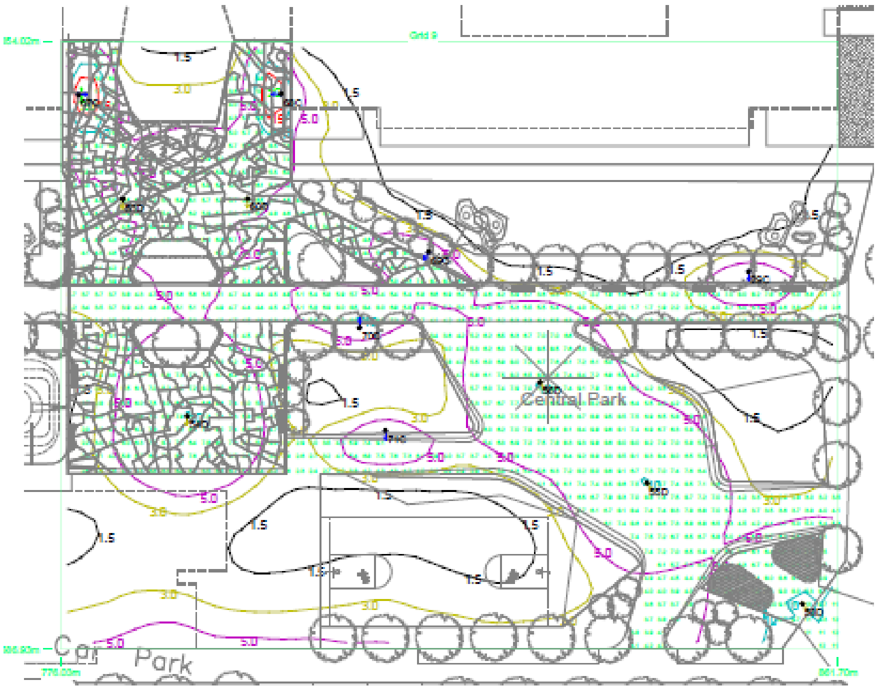


Results

Eav	6.29
Emin	2.35
Emax	11.12
Emin/Emax	0.21
Emin/Eav	0.37
Emax/Eav	1.77

Horizontal Illuminance (lux)

Grid 9



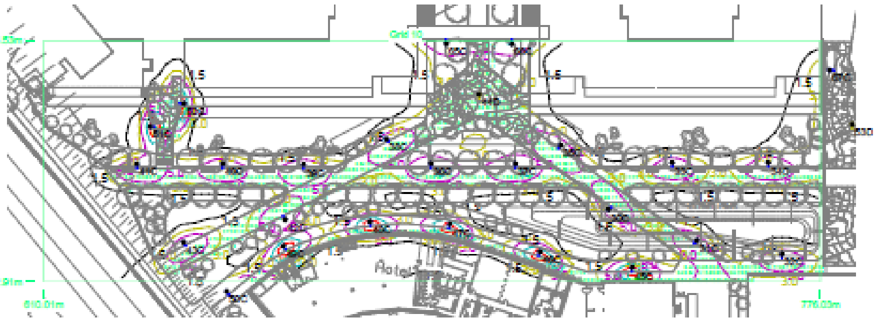
Results

Eav	5.76
Emin	1.44
Emax	17.68
Emin/Emax	0.08
Emin/Eav	0.25
Emax/Eav	3.07

Figures 10-13. Horizontal Illuminance (lux) levels – Grids 6 - 9

Horizontal Illuminance (lux)

Grid 10

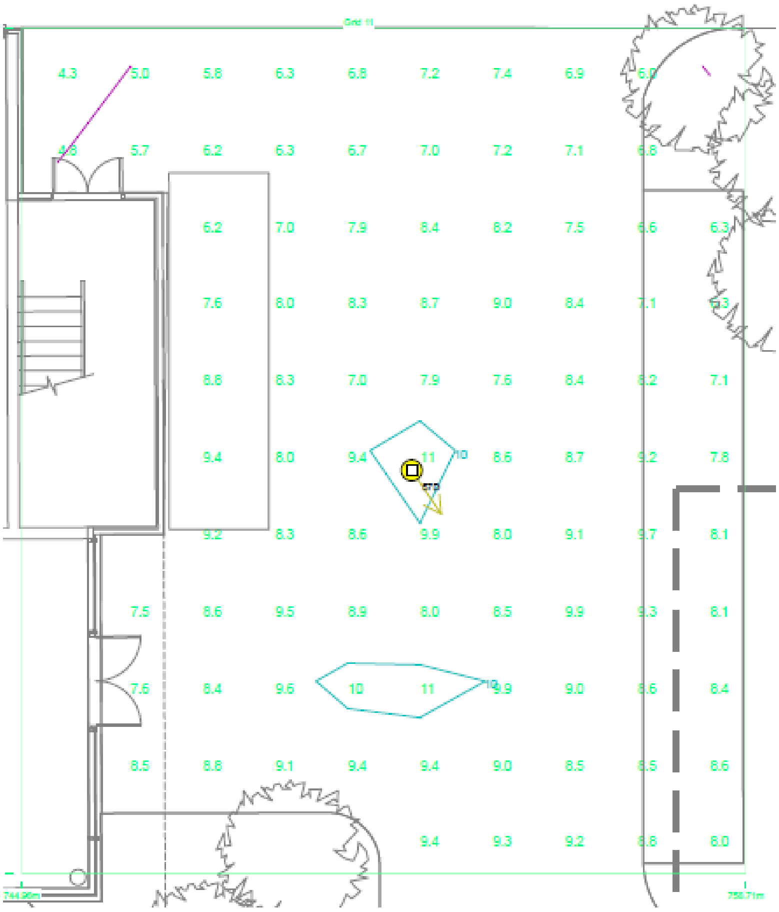


Results

Eav	5.15
Emin	1.91
Emax	20.51
Emin/Emax	0.09
Emin/Eav	0.37
Emax/Eav	3.98

Horizontal Illuminance (lux)

Grid 11



4.3	5.0	5.8	6.3	6.8	7.2	7.4	6.9	6.0	
4.8	5.7	6.2	6.3	6.7	7.0	7.2	7.1	6.8	
		6.2	7.0	7.9	8.4	8.2	7.5	6.6	6.3
		7.6	8.0	8.3	8.7	9.0	8.4	7.1	6.3
		8.8	8.3	7.0	7.9	7.6	8.4	8.2	7.1
		9.4	8.0	9.4	11	8.6	8.7	9.2	7.8
		9.2	8.3	8.6	9.9	8.0	9.1	9.7	8.1
	7.5	8.6	9.5	8.9	8.0	8.5	9.9	9.3	8.1
	7.6	8.4	9.6	10	11	9.9	9.0	8.6	8.4
	8.5	8.8	9.1	9.4	9.4	9.0	8.5	8.5	8.6
					9.4	9.3	9.2	8.8	8.0

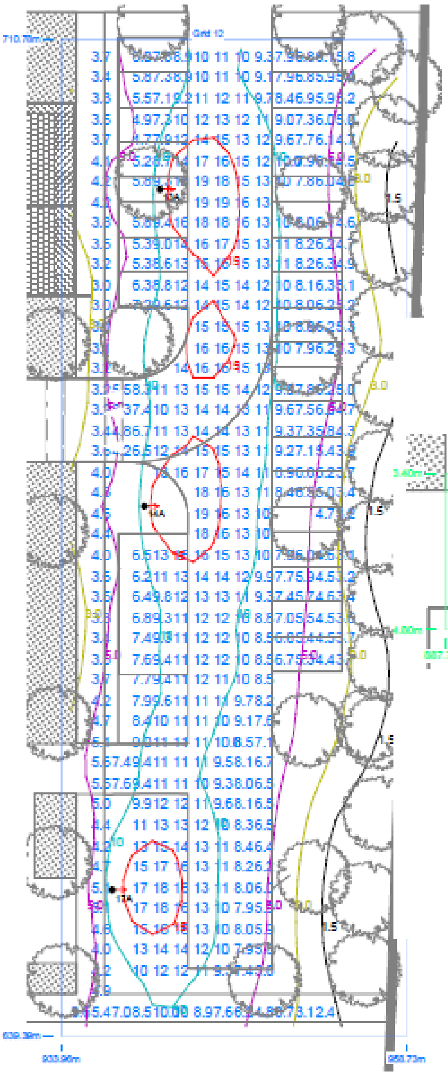
Results

Eav	8.08
Emin	4.29
Emax	11.31
Emin/Emax	0.38
Emin/Eav	0.53
Emax/Eav	1.40

Figures 14 & 15. Horizontal Illuminance (lux) levels – Grids 10 & 11

Horizontal Illuminance (lux)

Grid 12

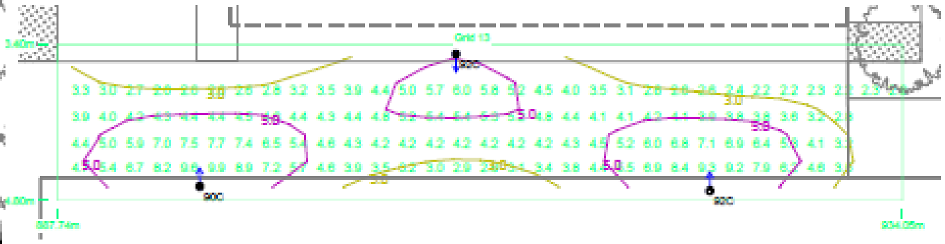


Results

Eav	9.42
Emin	2.35
Emax	19.35
Emin/Emax	0.12
Emin/Eav	0.25
Emax/Eav	2.05

Horizontal Illuminance (lux)

Grid 13



Results

Eav	4.67
Emin	2.20
Emax	9.88
Emin/Emax	0.22
Emin/Eav	0.47
Emax/Eav	2.11

Figures 16 & 17. Horizontal Illuminance (lux) levels – Grids 12 & 13

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 a 2km^2 grid (Reference grid O03W) encompassing the study area reveals that four of the nine known Irish species have been observed locally (Table 1). 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 18 - 20. The following species were noted in the wider area: Brown Long-eared Bat (*Plecotus auritus*), Natterer's Bat (*Myotis nattereri*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Daubenton's Bat (*Myotis 6aubentoniid*), Whiskered Bat (*Myotis mystacinus*), and Pipistrelle (*Pipistrellus pipstrellus sensu* lato) (Figures 18-20).

Table 1: Status of bat species within 2km2 grids encompassing the subject site (Reference No. N92Z)

Species name	Record count	Date of last record	Note
Lesser Noctule (*Nyctalus leisleri*)	4	27/05/2011	National Bat Database of Ireland
Daubenton's Bat (*Myotis daubentonii*)	3	08/07/2007	National Bat Database of Ireland
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	5	27/05/2011	National Bat Database of Ireland
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	3	08/07/2007	National Bat Database of Ireland

Figure 18. Brown Long-eared Bat (*Plecotus auritus*) (yellow), Daubenton's Bat (*Myotis daubentonii*) (purple), and both Brown Long-eared Bat and Daubenton's Bat (orange) (Source NBDC) (Site – red circle)

Figure 19. Natterer's Bat (*Myotis nattereri*) (purple) and Whiskered Bat (*Myotis mystacinus*) (yellow) (Source NBDC) (Site – red circle)

Figure 20. Pipistrelle (*Pipistrellus pipistrellus sensu lato*) (purple) (Species aggregate), Soprano Pipistrelle (*Pipistrellus pygmaeus*) (yellow), and both Pipistrelle and Soprano Pipistrelle (orange) (Source NBDC) (Site – red circle)

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

Pipistrelle (*Pipistrellus pipistrellus sensu lato*) in grid reference O083323. Recorded on 27/09/2008 and approximately 55m South-West of the subject site.
Pipistrelle (*Pipistrellus pipistrellus sensu lato*) in grid reference O080320. Recorded on 08/07/2007 and approximately 455m South-West of the subject site.
Daubenton's Bat (*Myotis daubentonii*) in grid reference O080320. Recorded on 08/07/2007 and approximately 455m South-West of the subject site.
Soprano Pipistrelle (*Pipistrellus pygmaeus*) in grid reference O090320. Recorded on 08/07/2007 and approximately 500m South-East of the subject site.
Daubenton's Bat (*Myotis daubentonii*) in grid reference O090320. Recorded on 08/07/2007 and approximately 500m South-East of the subject site.
Soprano Pipistrelle (*Pipistrellus pygmaeus*) in grid reference O0731. Recorded on 27/06/2008 and approximately 600m North of the subject site.

Detector survey

Foraging activity on site was relatively low on site with a single soprano pipistrelle (*Pipistrellus pygmaeus*) briefly foraging in the eastern section of the site.

Roosting Potential Assessment

There are no buildings to be demolished as part of the development. No trees of bat roosting potential are on site. No bats were observed emerging from buildings within or adjacent to the development site.

Potential impacts of proposed redevelopment on bats

No roosts or bats emerging from the onsite trees were observed. The trees on and adjacent to the site have no features that would act as potential roosting areas. The light spill during construction could have the potential to reduce foraging activity for bats. However, no public lighting is proposed in the eastern section of the site and no operational impacts are foreseen.

Mitigation measures

As no evidence of a bat roost was noted onsite, no mitigation measures in regard to these animals are needed during the proposed works. There is also no requirement for a *National Parks and Wildlife Service* derogation licence application to allow the planned works. No lighting will be placed in the eastern corner of the site during construction or operation. The trees in this area (outside the site) will remain unlit. Lighting during construction will be carried out in consultation with the project ecologist.

Predicted and residual impact of the proposal

There is no evidence of a current bat roost on site, therefore no negative impacts on roosts these animals are expected to result from the proposed development. The proposed development is within a built-up area with existing lighting and light spill and there is only limited foraging on site. The likelihood bat collision is not significant as the materials proposed for the apartment blocks are generally solid and would have good acoustic properties to reflect echolocation signals. As a result the buildings would be clearly visible to bat species. The impact of the proposed development on bats will be negligible in the long term based on the successful implementation mitigation.

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
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
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Wildlife Act 1976 and Wildlife Amendment Acts 2000 and 2010. Government of Ireland
Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016)
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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 5B – INVASIVE SPECIES MANAGEMENT PLAN

Invasive Species Management Plan for a proposed Strategic Housing Development (SHD) at Park West Avenue and Park West Road, Park West, Dublin 12.

30th November 2021

Prepared by: Bryan Deegan MSc., BSc..(MCIEEM) of Altemar Ltd.

On behalf of: Greenseed Ltd.

Altemar Ltd., 50 Templecarrig Upper, Delgany, Co. Wicklow. 00-353-1-2010713. **info@altemar.ie**
Directors: Bryan Deegan and Sara Corcoran
Company No.427560 VAT No. 9649832U

Document Control Sheet			
Client	Greenseed Ltd.		
Project	Invasive Species Management Plan for a proposed Strategic Housing Development (SHD) at Park West Avenue and Park West Road, Park West, Dublin 12.		
Report	Invasive Species Management Plan		
Date	30th November 2021		
Version	Author	Reviewed	Date
Draft 01	Bryan Deegan	Jack Doyle	30th November 2021

Introduction

Greenseed Ltd. intend to apply for planning permission for a proposed Strategic Housing Development (SHD) at Park West Avenue and Park West Road, Park West, Dublin 12.

Park West is situated c.8km west of Dublin City Centre, directly east of the M50, south of Ballyfermot and Cherry Orchard residential neighbourhoods and north of the John F Kennedy and Naas Road industrial areas. The Park West neighbourhood is bound by the Dublin to Cork mainline railway to the north, the Grand Canal to the south, the M50 to the west and the Killeen Road to the east.

The application site (c.9.4ha) is located within Park West, Dublin 12 and east of Park West Avenue and north of Park West Road. The Dublin to Cork mainline railway defines the northern boundary with Park West Business Park to the east. The northern and eastern boundaries of the site, to the rail line and Park West Business Park respectively, are defined by palisade fencing. An existing berm defines the southern and western boundaries of the site. The site is largely undeveloped with the exception of the Aspect Hotel, comprising an 8-storey hotel building and ancillary surface carpark accessed from Park West Avenue.

The proposed development involves a 10-year permission for 7no. predominantly residential blocks (Blocks A to G) accommodating a total of 750no. apartments. The apartment unit mix comprises 321no. (43%) 1 bed units, 384no. (51%) 2 bed units and 45no. (6%) 3 bed units.

Resident services and amenities are also proposed to serve the future residents and total 487sq.m gross floor area within Blocks B and D. Non-residential uses will comprise 1no. retail unit of 156sq.m within Block A and a creche of 410sq.m, community space of 48sq.m and café/ bar of 91sq.m all within Block G.

13,460sq.m (14%) of public open space is provided and comprises a linear park orientated west to east and functioning as a link to the established residential areas to the west of Park West Avenue and a public plaza/ square including Multi-Use Games Area (MUGA) located centrally within the site. Communal open spaces totalling 6,175sq.m are provided at podium level within each of the proposed Blocks A to F, a roof garden within Block G and include passive open spaces that are visually and functionally accessible to the future residents of the development.

Vehicular access to serve the proposed development will be provided via access roads off Park West Road and Park West Avenue. Tie in works are required to Park West Avenue and Park West Road to provide for suitable junctions and pedestrian crossings at the proposed access points.

The development will also include parking for vehicles and bicycles, landscaping and all associated site and development works.

The proposed site outline and location are demonstrated in Figure 1. The proposed site layout is seen in Figure 2.

Project: Residential Development (SHD)
Location: Park West, Dublin 12.
Date: 26th November 2021
Drawn By: Bryan Deegan (Altemar)

ALTEMAR
Marine & Environmental Consultancy

Figure 1. Site Outline

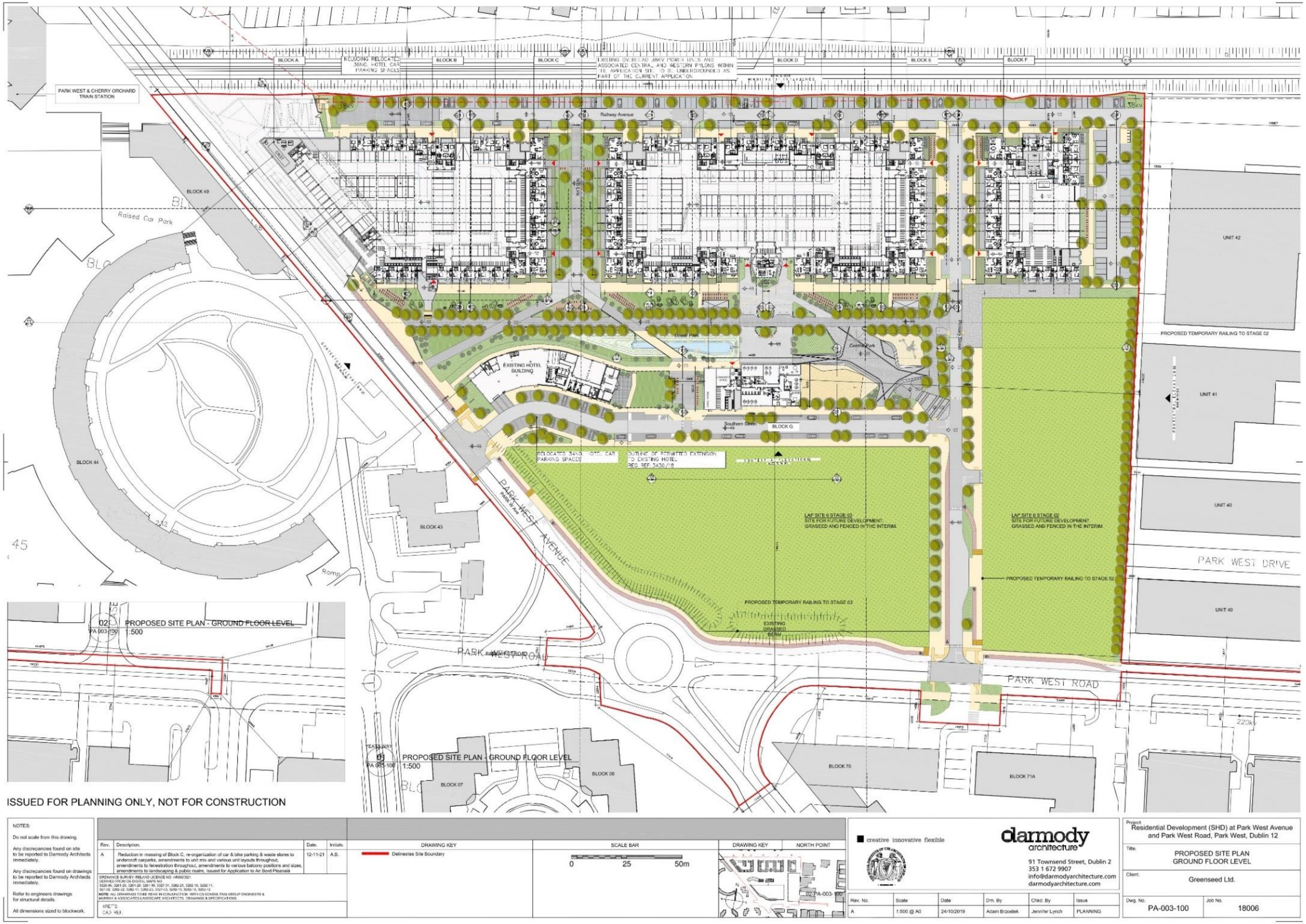
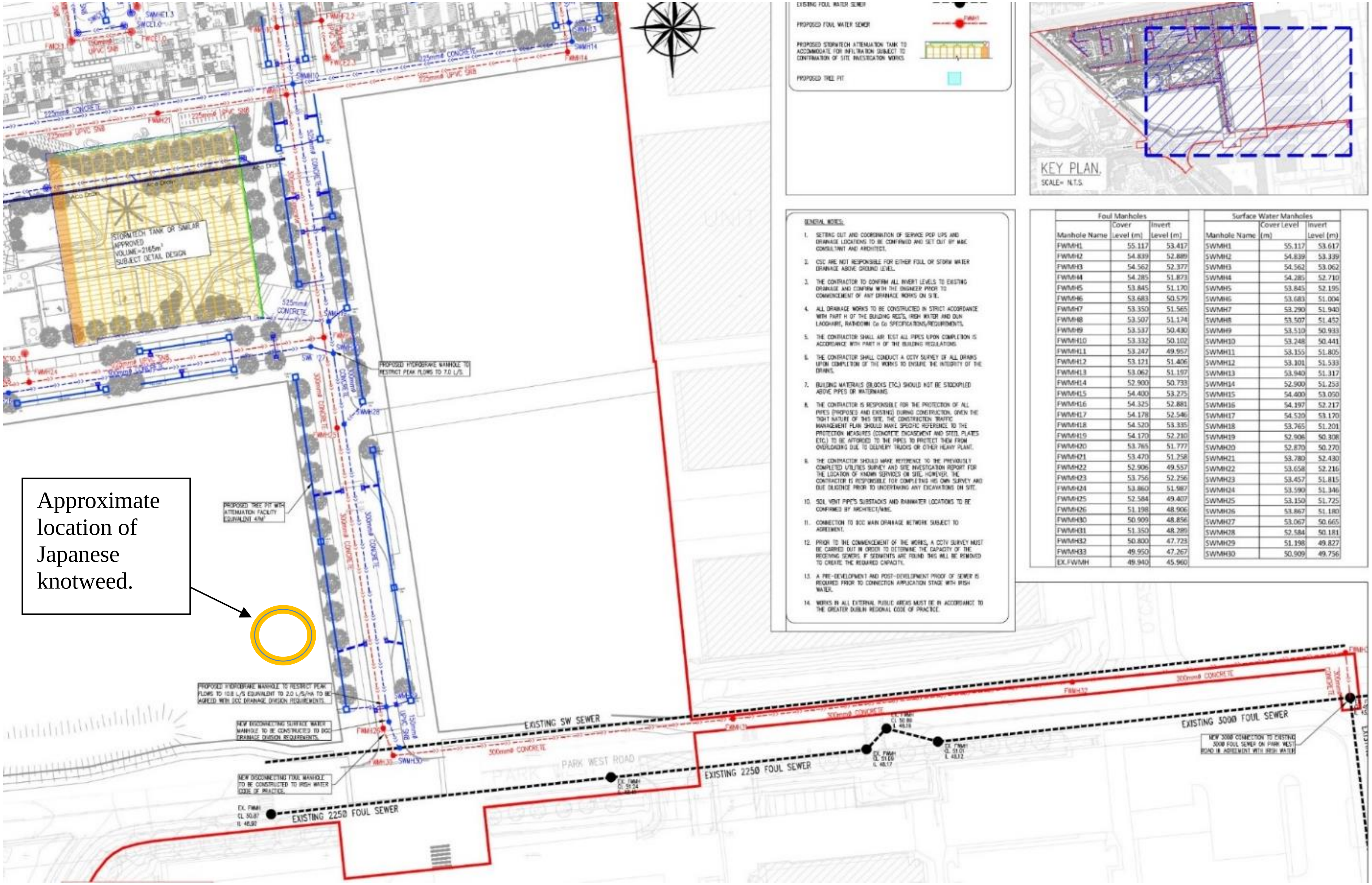


Figure 2. ***Proposed site plan***



Approximate location of Japanese knotweed.

GENERAL NOTES:

1. SETTING OUT AND COORDINATION OF SERVICE POP UPS AND DRAINAGE LOCATIONS TO BE CONFIRMED AND SET OUT BY M&E CONSULTANT AND ARCHITECT.
2. CSC ARE NOT RESPONSIBLE FOR EITHER FOUL OR STORM WATER DRAINAGE ABOVE GROUND LEVEL.
3. THE CONTRACTOR TO CONFIRM ALL INVERT LEVELS TO EXISTING DRAINAGE AND CONFIRM WITH THE ENGINEER PRIOR TO COMMENCEMENT OF ANY DRAINAGE WORKS ON SITE.
4. ALL DRAINAGE WORKS TO BE CONSTRUCTED IN STRICT ACCORDANCE WITH PART H OF THE BUILDING REG'S, IRISH WATER AND DUN LAOGHAIRE, RATHDOWN Co Co SPECIFICATIONS/REQUIREMENTS.
5. THE CONTRACTOR SHALL AIR TEST ALL PIPES UPON COMPLETION IS ACCORDANCE WITH PART H OF THE BUILDING REGULATIONS.
6. THE CONTRACTOR SHALL CONDUCT A CCTV SURVEY OF ALL DRAINS UPON COMPLETION OF THE WORKS TO ENSURE THE INTEGRITY OF THE DRAINS.
7. BUILDING MATERIALS (BLOCKS ETC.) SHOULD NOT BE STOCKPILED ABOVE PIPES OR WATERMAINS.
8. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL PIPES (PROPOSED AND EXISTING) DURING CONSTRUCTION. GIVEN THE TIGHT NATURE OF THIS SITE, THE CONSTRUCTION TRAFFIC MANAGEMENT PLAN SHOULD MAKE SPECIFIC REFERENCE TO THE PROTECTION MEASURES (CONCRETE ENCASEMENT AND STEEL PLATES ETC.) TO BE AFFORDED TO THE PIPES TO PROTECT THEM FROM OVERLOADING DUE TO DELIVERY TRUCKS OR OTHER HEAVY PLANT.
9. THE CONTRACTOR SHOULD MAKE REFERENCE TO THE PREVIOUSLY COMPLETED UTILITIES SURVEY AND SITE INVESTIGATION REPORT FOR THE LOCATION OF KNOWN SERVICES ON SITE. HOWEVER, THE CONTRACTOR IS RESPONSIBLE FOR COMPLETING HIS OWN SURVEY AND DUE DILIGENCE PRIOR TO UNDERTAKING ANY EXCAVATIONS ON SITE.
10. SOIL VENT PIPE'S SUBSTACKS AND RAINWATER LOCATIONS TO BE CONFIRMED BY ARCHITECT/M&E.
11. CONNECTION TO DCC MAIN DRAINAGE NETWORK SUBJECT TO AGREEMENT.
12. PRIOR TO THE COMMENCEMENT OF THE WORKS, A CCTV SURVEY MUST BE CARRIED OUT IN ORDER TO DETERMINE THE CAPACITY OF THE RECEIVING SEWERS. IF SEDIMENTS ARE FOUND THIS WILL BE REMOVED TO CREATE THE REQUIRED CAPACITY.
13. A PRE-DEVELOPMENT AND POST-DEVELOPMENT PROOF OF SEWER IS REQUIRED PRIOR TO CONNECTION APPLICATION STAGE WITH IRISH WATER.
14. WORKS IN ALL EXTERNAL PUBLIC AREAS MUST BE IN ACCORDANCE TO THE GREATER DUBLIN REGIONAL CODE OF PRACTICE.

Foul Manholes		
Manhole Name	Cover Level (m)	Invert Level (m)
FWMH1	55.117	53.417
FWMH2	54.839	52.889
FWMH3	54.562	52.377
FWMH4	54.285	51.873
FWMH5	53.845	51.170
FWMH6	53.683	50.579
FWMH7	53.350	51.565
FWMH8	53.507	51.174
FWMH9	53.537	50.430
FWMH10	53.332	50.102
FWMH11	53.247	49.957
FWMH12	53.121	51.406
FWMH13	53.062	51.197
FWMH14	52.900	50.733
FWMH15	54.400	53.275
FWMH16	54.325	52.881
FWMH17	54.178	52.546
FWMH18	54.520	53.335
FWMH19	54.170	52.210
FWMH20	53.765	51.777
FWMH21	53.470	51.258
FWMH22	52.906	49.557
FWMH23	53.756	52.256
FWMH24	53.860	51.987
FWMH25	52.584	49.407
FWMH26	51.198	48.906
FWMH30	50.909	48.856
FWMH31	51.350	48.289
FWMH32	50.800	47.723
FWMH33	49.950	47.267
EX.FWMH	49.940	45.960

Surface Water Manholes		
Manhole Name	Cover Level (m)	Invert Level (m)
SWMH1	55.117	53.617
SWMH2	54.839	53.339
SWMH3	54.562	53.062
SWMH4	54.285	52.710
SWMH5	53.845	52.195
SWMH6	53.683	51.004
SWMH7	53.290	51.940
SWMH8	53.507	51.452
SWMH9	53.510	50.933
SWMH10	53.248	50.441
SWMH11	53.155	51.805
SWMH12	53.101	51.533
SWMH13	53.940	51.317
SWMH14	52.900	51.253
SWMH15	54.400	53.050
SWMH16	54.197	52.217
SWMH17	54.520	53.170
SWMH18	53.765	51.201
SWMH19	52.906	50.308
SWMH20	52.870	50.270
SWMH21	53.780	52.430
SWMH22	53.658	52.216
SWMH23	53.457	51.815
SWMH24	53.590	51.346
SWMH25	53.150	51.725
SWMH26	53.867	51.180
SWMH27	53.067	50.665
SWMH28	52.584	50.181
SWMH29	51.198	49.827
SWMH30	50.909	49.756

Figure 3. Proposed Drainage Strategy.

Invasive Species Assessment

The following management plan was compiled by Bryan Deegan MCIEEM of Altemar Ltd.. Bryan is an ecologist with over 26 years survey experience and former project manager for the EU LIFE project CAISIE on invasive species. This was a €1.5 million EU project that carried out surveys and developed control tools for aquatic and riparian invasive species in Ireland.

The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000 where it states that ‘*Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora,[‘refers only to exotic species thereof’][...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence*.’

Under the European legislation, the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibit the introduction and dispersal of species listed in the Third Schedule whereby “*any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence.”* Relevant species within this legislation include but, are not limited to (See Table 1):

Giant hogweed	*Heracleum mantegazzianum*	Throughout the State
Giant knotweed	*Fallopia sachalinensis*	Throughout the State
Giant-rhubarb	*Gunnera tinctoria*	Throughout the State
Himalayan balsam	*Impatiens glandulifera*	Throughout the State
Himalayan knotweed	*Persicaria wallichii*	Throughout the State
Japanese knotweed	*Reynoutria japonica*	Throughout the State
Rhododendron	*Rhododendron ponticum*	Throughout the State
Hottentot-fig	*Carpobrotus edulis*	Throughout the State

This report applies the most relevant and current guidance in relation to non-native invasive plant species in construction projects. The following literature was referred to in preparation of this report.
S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011.
http://www.irishstatutebook.ie/eli/2011/si/477/made/en/pdf
NRA Guidelines on The Management of Noxious Weeds and Non-Native
Invasive Plant Species on National Roads

Site Survey

A walkover assessment of the development site was also carried out by Bryan Deegan on the 10th September 2021 All areas were examined for Invasive species during the optimal survey season. A single stand of Japanese knotweed (*Reynoutria japonica*) was present on site. This was a mature stand of approximately 3m in diameter. This species Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011. No other non-native invasive species listed in the third schedule of (SI 477 of 2011) were noted on site (Plants Table 1 & and Animals Table 2). However, additional non-native species (not listed under SI 477 of 2011) were also noted and included Buddleja (*Buddleja davidii*). This invasive species management plan deals specifically with those species covered under SI 477 of 2011 i.e. Japanese knotweed. The location of species covered under SI 477 of 2011 is seen in Figure 3 along with the 7m buffer (containment and no dig zone). As can be seen from Figures 2 and 3 the location of the Japanese knotweed is located proximate to the main access road but within an area of future development.

Table 1. Plant species listed in the Third Schedule of SI 477 of 2011

Common Name	**Species**	**Location**	**Present on site**
American skunk-cabbage	*Lysichiton americanus*	Throughout the State	Not observed
A red alga	*Grateloupia doryphora*	Throughout the State	Not observed
Brazilian giant-rhubarb	*Gunnera manicata*	Throughout the State	Not observed
Broad-leaved rush	*Juncus planifolius*	Throughout the State	Not observed
Cape pondweed	Aponogeton distachyos	Throughout the State	Not observed
Cord-grasses Spartina	*(all species and hybrids)*	Throughout the State	Not observed
Curly waterweed	*Lagarosiphon major*	Throughout the State	Not observed
Dwarf eel-grass	*Zostera japonica*	Throughout the State	Not observed
Fanwort	*Cabomba caroliniana*	Throughout the State	Not observed
Floating pennywort	*Hydrocotyle ranunculoides*	Throughout the State	Not observed
Fringed water-lily	*Nymphoides peltata*	Throughout the State	Not observed
Giant hogweed	*Heracleum mantegazzianum*	Throughout the State	Not observed
Giant knotweed	*Fallopia sachalinensis*	Throughout the State	Not observed
Giant-rhubarb	*Gunnera tinctoria*	Throughout the State	Not observed
Giant salvinia	*Salvinia molesta*	Throughout the State	Not observed
Himalayan balsam	*Impatiens glandulifera*	Throughout the State	Not observed
Himalayan knotweed	*Persicaria wallichii*	Throughout the State	Not observed
Hottentot-fig	*Carpobrotus edulis*	Throughout the State	Not observed
Japanese knotweed	***Fallopia japonica***	**Throughout the State**	**Present**
Large-flowered waterweed	*Egeria densa*	Throughout the State	Not observed
Mile-a-minute weed	*Persicaria perfoliata*	Throughout the State	Not observed
New Zealand pigmyweed	*Crassula helmsii*	Throughout the State	Not observed
Parrot's feather	*Myriophyllum aquaticum*	Throughout the State	Not observed
Rhododendron	*Rhododendron ponticum*	Throughout the State	Not observed
Salmonberry	*Rubus spectabilis*	Throughout the State	Not observed
Sea-buckthorn	*Hippophae rhamnoides*	Throughout the State	Not observed
Spanish bluebell	*Hyacinthoides hispanica*	Throughout the State	Not observed
Three-cornered leek	*Allium triquetrum*	Throughout the State	Not observed
Wakame	*Undaria pinnatifida*	Throughout the State	Not observed
Water chestnut	*Trapa natans*	Throughout the State	Not observed
Water fern	*Azolla filiculoides*	Throughout the State	Not observed
Water lettuce	*Pistia stratiotes*	Throughout the State	Not observed
Water-primrose	*Ludwigia (all* species)	Throughout the State	Not observed
Waterweeds	*Elodea* (all species)	Throughout the State	Not observed
Wireweed	*Sargassum* muticum	Throughout the State	Not observed

Table 2. Animal species listed in the Third Schedule of SI 477 of 2011

Common Name	**Species**	**Location**	**Present on site**
A colonial seasquirt	*Didemnum spp.*	Throughout the State	Not observed
A colonial seasquirt	Perophora japonica	Throughout the State	Not observed
All freshwater crayfish except *Austropotamobius pallipes*	All Freshwater crayfish except *Austropotamobius pallipes*	Throughout the State	Not observed
American bullfrog	*Rana catesbeiana*	Throughout the State	Not observed
American mink	*Neovison vison*	Throughout the State	Not observed
American oyster drill	*Urosalpinx cinerea*	Throughout the State	Not observed
Asian oyster drill	*Ceratostoma inornatum*	Throughout the State	Not observed
Asian rapa whelk	*Rapana venosa*	Throughout the State	Not observed
Asian river clam	*Corbicula fluminea*	Throughout the State	Not observed
Bay barnacle	*Balanus improvisus*	Throughout the State	Not observed
Black rat	*Rattus rattus*	Offshore islands only	N/A
Brown hare	*Lepus europaeus*	Throughout the State	Not observed
Brown rat	*Rattus norvegicus*	Offshore islands only	N/A
Canada goose	*Branta canadensis*	Throughout the State	Not observed
Carp	*Cyprinus carpio*	Throughout the State	Not observed
Chinese mitten crab	*Eriocheir sinensis*	Throughout the State	Not observed
Chinese water deer	*Hydropotes inermis*	Throughout the State	Not observed
Chub	*Leuciscus cephalus*	Throughout the State	Not observed
Common toad	*Bufo bufo*	Throughout the State	Not observed
Coypu	*Myocastor coypus*	Throughout the State	Not observed
Dace	*Leuciscus leuciscus*	Throughout the State	Not observed
Freshwater shrimp	*Dikerogammarus villosus*	Throughout the State	Not observed
Fox	*Vulpes vulpes*	Offshore islands only	N/A
Grey squirrel	*Sciurus carolinensis*	Throughout the State	Not observed
Greylag goose	*Anser anser*	Throughout the State	Not observed
Harlequin Ladybird	*Harmonia axyridis*	Throughout the State	Not observed
Hedgehog	*Erinaceus europaeus*	Offshore islands only	N/A
Irish stoat	*Mustela erminea hibernicus*	Offshore islands only	N/A
Japanese skeleton shrimp	*Caprella mutica*	Throughout the State	Not observed
Muntjac deer	*Muntiacus reevesi*	Throughout the State	Not observed
Muskrat	*Ondatra zibethicus*	Throughout the State	Not observed
Quagga Mussel	*Dreissena rostriformis*	Throughout the State	Not observed
Roach	*Rutilus rutilus*	Throughout the State	Not observed
Roe deer	*Capreolus capreolus*	Throughout the State	Not observed
Ruddy duck	*Oxyura jamaicensis*	Throughout the State	Not observed
Siberian chipmunk	*Tamias sibiricus*	Throughout the State	Not observed
Slipper limpet	*Crepidula fornicata*	Throughout the State	Not observed
Stalked sea squirt	*Styela clava*	Throughout the State	Not observed
Tawny owl	*Strix aluco*	Throughout the State	Not observed
Wild boar	*Sus scrofa*	Throughout the State	Not observed
Zebra mussel	*Dreissena polymorpha*	Throughout the State	Not observed

Figure 3. Invasive species (SI 49 of 2011) observed on site.

Proposed Management

The key objective of the Invasive Species Management Plan is to develop a safe and biosecure approach to the long term control of invasive species throughout the site and to remove the risk of spread and future. The successful implementation of the Plan will prevent the further spread of Japanese knotweed as a result of the proposed works and ensure that future structures on site are not impacted by invasive species. The Management Plan describes procedures that will ensure the effective control of the specific invasive species. It is recommended that all control methods follow the TII 4 phase approach to control of Invasive species as outlined in TII (2020)[3]:

Phase 1 – Site assessment – Mapping – Description of site – Habitat mapping – Presence of IAPS – Sensitive receptors – Proximity to designated sites – Topographical survey
Phase 2 – IAPS Management Plan – Costing – Site management objectives – Treatment required – Risk of re-infestation – Costings of appropriate control strategies – Acquisition of land/Compulsory Purchase Order (CPO) if necessary
Phase 3 – Implement control methods – Treatment reporting – IAPS control (chemical, physical or a combination of both) – Biosecurity measures – Documentation of method of treatment
Phase 4 – Re-growth monitoring – Re-growth reporting – Survey re-growth – Report on re-growth – Make provisions for site protection to prevent future IAPS infestations

No invasive species (SI 49 of 2011) were noted within the initial building development area (Figure 2). However, as seen in figure 3, the proposed drainage strategy will result in works in the vicinity of the Japanese knotweed. With basic precautions in relation to marking out the 7m buffer on site to prevent human or machinery access in the vicinity Japanese knotweed that this area can be avoided and treated chemically as a localised control.

Japanese knotweed is a highly invasive plant species and can unwittingly be transferred easily across a development site. The first stage of management of the species, prior to works commencing on site, will be to mark out all stands on site with a 7m buffer of tape or fencing to ensure that no machinery or personnel come within close proximity to the plants. Failure to do this could result in the transfer of knotweed across the site particularly in the tracks of machinery. Mechanical (excavation or root barriers) and herbicide (foliar application or stem injection) management options can achieve effective control of all knotweed species. However, this is within a future development area and following discussions with the project team the preferred option would be to treat and remove the Japanese knotweed under licence. All works will be supervised by the project ecologist.

Conclusion

A single stand of Japanese knotweed has been noted on site but within an area of future development. The proposed works are not in the vicinity of the Japanese knotweed. However, it is proposed to initially mark out the stand and prevent access within 7m of the stand. The stand of Japanese knotweed will be removed from the site under licence. As part of the management plan ongoing monitoring is required post control to ensure that invasive species have been fully controlled in site.

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[3] TII (2020) The Management of Invasive Alien Plant Species on National Roads – Standard. GE-ENV-01104 https://www.tiipublications.ie/library/GE-ENV-01104-01.pdf

APPENDIX 6A – GROUND INVESTIGATION REPORT

IGSL Limited

CS Consulting
Greenseed Limited

Site 6
Parkwest
Dublin 12

Ground Investigation Report

Report No. 23606

November 2021

Report

**M7 Business Park
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Project: Site 6, Park West, Dublin 12

Project No. 23606

Revision	**Date**	**Title**		
Rev 0	11/11/2021	Ground Investigation Report		
	Copies	Document Format	Prepared By	Reviewed By
		PDF	David Green	Brian Green
	To	CS Consulting		
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			

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Appendix 7	Chemical & Environmental Laboratory Testing
Appendix 8	As-Surveyed Site Plan

Separate Cover

Waste Characterisation Assessment (O'Callaghan Moran)

FOREWORD

The following conditions and notes on the geotechnical site investigation procedures should be read in conjunction with this report.

Standards

The ground investigation works for this project have been carried out by IGSL in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as BS 5930 (1999), BS 1377 (Parts 1 to 9) and Engineers Ireland Specification & Related Documents for Ground Investigation in Ireland (2006). A new National Annex for use in the Republic of Ireland is currently in circulation for comment and will be adopted in the near future. In the mean time, the following Irish (IS) and European Standards or Norms are referenced:

- IS EN 1997-2 Eurocode 7: 2007 – Geotechnical Design – Part 2: Ground Investigation & Testing
- IS EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- IS EN ISO 14688-1:2002 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- IS EN ISO 14688-2:2004 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Classification Principles
- IS EN ISO 14689-1:2004 Geotechnical Investigation and Testing - Identification & Classification of Rock, Part 1: Identification & Description

Reporting

Recommendations made and opinions expressed in this report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations.

The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points.

This report has been prepared for CS Consulting and the information should not be used without prior written permission. The recommendations developed in this report specifically relate to the proposed development. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

Boring Procedures

Unless otherwise stated, 'shell and auger' or cable percussive boring technique has been employed as defined by Section 6.3 of IS EN ISO 22475-1:2006. The boring operations, sampling and in-situ testing complies with the recommendations of IS EN 1997-2:2007 and BS 1377:1990 and EN ISO 22476-3:2005. The shell and auger boring technique allows for continuous sampling in clay and silt above the water table and sand and gravel below the water table (Table 2 of IS EN ISO 22475-1:2006).

It is highlighted that some disturbance and variations is unavoidable in particular ground (e.g. blowing sands, gravel / cobble dominant glacial deposits etc). Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

Rotary Drilling Procedures

Rotary drilling methods have been used to recover bedrock samples in line with Section 3.5 of IS EN 1997-2:2007 and IS EN ISO 22475-1. Where cable percussive boreholes terminated prematurely on an obstruction within overburden, open hole drilling methods (odex or symmetrix) were utilized to advance the drillholes through the superficial deposits with coring in bedrock. The key objectives of the rock sampling were to obtain high core recovery (TCR), minimize sample disturbance and facilitate accurate identification of strength, weathering and discontinuity characteristics.

In-Situ Testing

Standard penetration tests were conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 and the Energy Ratio (E_r). A calibration certificate is available upon request. The E_r is defined as the ratio of the actual energy E_{meas} (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (E_{theor}) as calculated from the drive weight assembly. The measured number of blows (N) reported on the engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level. Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.

Engineering Logging

Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2002 and IS EN ISO 14689-1:2004. Rock weathering classification conforms to IS EN ISO 14689-1:2003 while discontinuities (bedding planes, joints, cleavages, faults etc) are classified in accordance with 4.3.3 of IS EN ISO 14689-1:2003. Rock mechanical indices (TCR, SCR, RQD) are defined in accordance with IS EN ISO 22475-1:2006.

Retention of Samples

Samples shall be retained for a period of 60 days following approval of the final factual report, as detailed in the Scope of Works.

1.0 Introduction and Objectives

It is proposed to develop a site (Site 6) at Park West in Dublin 12. It is understood that the development will be “mixed use” and will include under croft car parking.

The site location is shown on Figure 1.

Figure 1 – Site Location

In August 2021, IGSL Limited were appointed by the project consulting engineers, CS Consulting, on behalf of the client, Greenseed Ltd., to conduct a ground investigation at the site.

The objectives of the investigation were as follows:

- Ascertain the soil stratigraphy
- Ascertain suitable bearing strata for structural foundations
- Determine the infiltration characteristics of the subsoils with respect to soakaway design
- Investigate the potential for sulphate attack on buried concrete
- Investigate for the presence of subsoil contamination
- Assess the suitability for the disposal of excavated soils to an inert landfill

This report presents the findings of the ground investigation and discusses these findings with respect to future development of this site. The environmental elements of the investigation were interpreted by O’Callaghan Moran and discussed in their Waste Characterisation Assessment, which is presented under separate cover.

2.0 Scope of Works

The exploratory works included the following:

- 10 nr. cable percussive boreholes
- 15 nr. trial pits
- 10 nr. rotary coreholes
- 10 nr. infiltration tests
- A programme of geotechnical, chemical and environmental laboratory testing

2.1 Cable Percussive Boreholes

Boreholes were constructed in 10 locations (BH01 to BH10) using a Dando 2000 rig equipped with 200 mm casing. A hand dug inspection pit was excavated at each borehole prior to commencing drilling works and the locations were scanned for services using a CAT detection tool.

The boreholes reached depths of between 1.9 and 4.1 metres below existing ground level (m BGL).

During the course of boring, in-situ Standard Penetration Tests (SPT) were undertaken at regular depth intervals. Samples were also recovered to assist in the visual description of recovered soils and to provide specimens for laboratory testing. Environmental sub-samples were also procured and placed in appropriate containers (amber glass jars and vials).

Instances of groundwater ingress were recorded and monitored for a further 20 minutes to permit the water to rise.

Borehole records are presented in Appendix 1 of this report and their locations are shown on the site plan in Appendix 8.

2.2 Trial Pits

Trial pitting was performed in 15 locations (TP01 to TP15) using a JCB excavator. Depths of between 1.5 and 3.5 m BGL were achieved.

The trial pits were logged and sampled by an IGSL geotechnical engineer in accordance with BS 5930 (2015) and were excavated

Pit sidewalls were assessed in terms of their short-term stability and any instances of groundwater ingress were recorded. Environmental sub-samples were procured and placed in appropriate containers (amber glass jars and vials).

The trial pits were backfilled with the as-dug arisings and reinstated to the satisfaction of IGSL's site geotechnical engineer. The trial pit logs in Appendix 2 include descriptions of the soils encountered, groundwater conditions and stability of the pit sidewalls.

2.3 Rotary Coreholes

Rotary coreholes RC01 to R10 were drilled using a Geo 405 tracked coring rig in order to investigate for the presence of bedrock.

Symmetrix open hole techniques were used to advance through the overburden deposits, reverting to rotary coring in bedrock. It is noted that Symmetrix drilling produces highly pulverised drill returns and therefore, soil descriptions based on these returns are very approximate.

Rotary coring of bedrock was carried out using an air/mist flush to maximize recovery. Cores of 78 mm diameter were recovered and placed securely in wooden storage boxes. The recovered core was inspected by a qualified engineering geologist and logged in detail at IGSL's laboratory.

All cores were labelled and photographed for inclusion in the report. Photographs are presented digitally for ease of browsing and to permit close examination at high resolution. Corehole records and photographs are included in Appendix 3 of this report.

2.4 Infiltration Tests

Infiltration tests were undertaken in 10 locations (SA01 to SA10) 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 is poured into the test pit to ensure total saturation of the sub-soils. This procedure is typically repeated twice more, and records taken of the fall in water level against time.

The infiltration test records are presented in Appendix 4

2.5 Groundwater and Gas Monitoring

Standpipes were installed in RC01, 02, 03, 05, 08, 09 and 10 in order to permit long-term groundwater monitoring.

Gas valves were also fitted to the standpipes in order to facilitate the measurement of ground-generated gases.

The site was revisited post-fieldwork in order to record the groundwater and gas levels in the standpipes. These are tabulated in Appendix 5.

2.6 As-Built Survey

On completion of fieldworks, the location (x,y) and elevation (z) of each exploratory location was determined by detailed survey using GPS Realtime Kinetic survey instrument.

The National Grid survey co-ordinates and ground levels related to Malin Head Datum are presented on the exploratory hole records and these were used to plot the as-built locations on the Site Plan in Appendix 8 of this report.

2.7 Waste Characterisation Assessment

The results of environmental laboratory analyses were issued to environmental specialists O'Callaghan Moran (OCM), who have used this data to produce a detailed Waste Characterisation Assessment (WCA).

Their report, which is presented under separate cover, classifies the samples as either Hazardous or Non-Hazardous and assigns the appropriate List of Waste (LoW) code to each. Also included are recommended waste receptors for landfill disposal purposes.

3.0 Ground Conditions

3.1 Soil Stratification

The general soil stratigraphy can be summarised as follows:

- MADE GROUND
- Stiff to very stiff grey/brown sandy gravelly CLAY with cobbles
- Very stiff dark brown / black sandy gravelly CLAY with cobbles

The in-situ strength (consistency) of the overburden soils was assessed using the results of in-situ Standard Penetration Tests (SPT).

The boreholes penetrated Made Ground in all locations. The Made Ground typically comprised brown sandy gravelly clay and was mostly confined to the upper metre. Extraneous (non-natural) material including plastic, concrete, brick and steel was present within the Made Ground at boreholes BH08, 09 and 10 and at trial pits TP02, 04, 05, 07, 09, 10 and 11.

Within the eastern portion of the site, the Made Ground deepened to between 1.2 and 1.7 m BGL at BH10 and at trial pits TP09, 10 and 11.

Within the southern portion of the site, infiltration test pits SA07 to SA10 encountered Made Ground to the excavated depths of 1.5 m BGL. Extraneous matter (red brick, plastic) was present in SA07.

Below the Made Ground, the boreholes encountered predominately stiff (high strength) deposits of sandy slightly gravelly clay, which had the appearance of over-consolidated glacial till or “boulder clay”. SPT “N” values mostly ranged between 21 and 27 within the upper clay, indicating a stiff (high strength) consistency, with estimated shear strengths of the order of 100 to 125 kPa.

The basal glacial till deposits strengthened with depth, yielding SPT “N” values in excess of 30 below 2 m BGL in almost all locations, thus indicating very stiff (very high strength) soils with estimated shear strengths of the order of 150 to 200 kPa.

The exception to the above occurred at BH10, where stiff gravelly clay persisted to a depth of 3.4 m BGL before encountering very stiff soils.

All boreholes terminated on obstructions within very stiff to hard gravelly clay soils at depths of between 1.9 and 4.1 m BGL.

The trial pits achieved a maximum depth of 3.5 m BGL, with most terminating on coarse obstructions within very stiff gravelly clay. In some instances (TP02, 03, 04, 14, 15), the obstructing material had the appearance of possible weathered bedrock.

Figure 2 shows a plot of SPT “N” values versus Elevation (mOD). It can be seen that a marked increase in SPT N-values occurs below approximately 52 mOD, indicating the transition to very stiff gravelly clay. A notable exception to this was the aforementioned BH10, where stiff clay persisted to a depth of 3.4 m BGL (50.7 mOD).

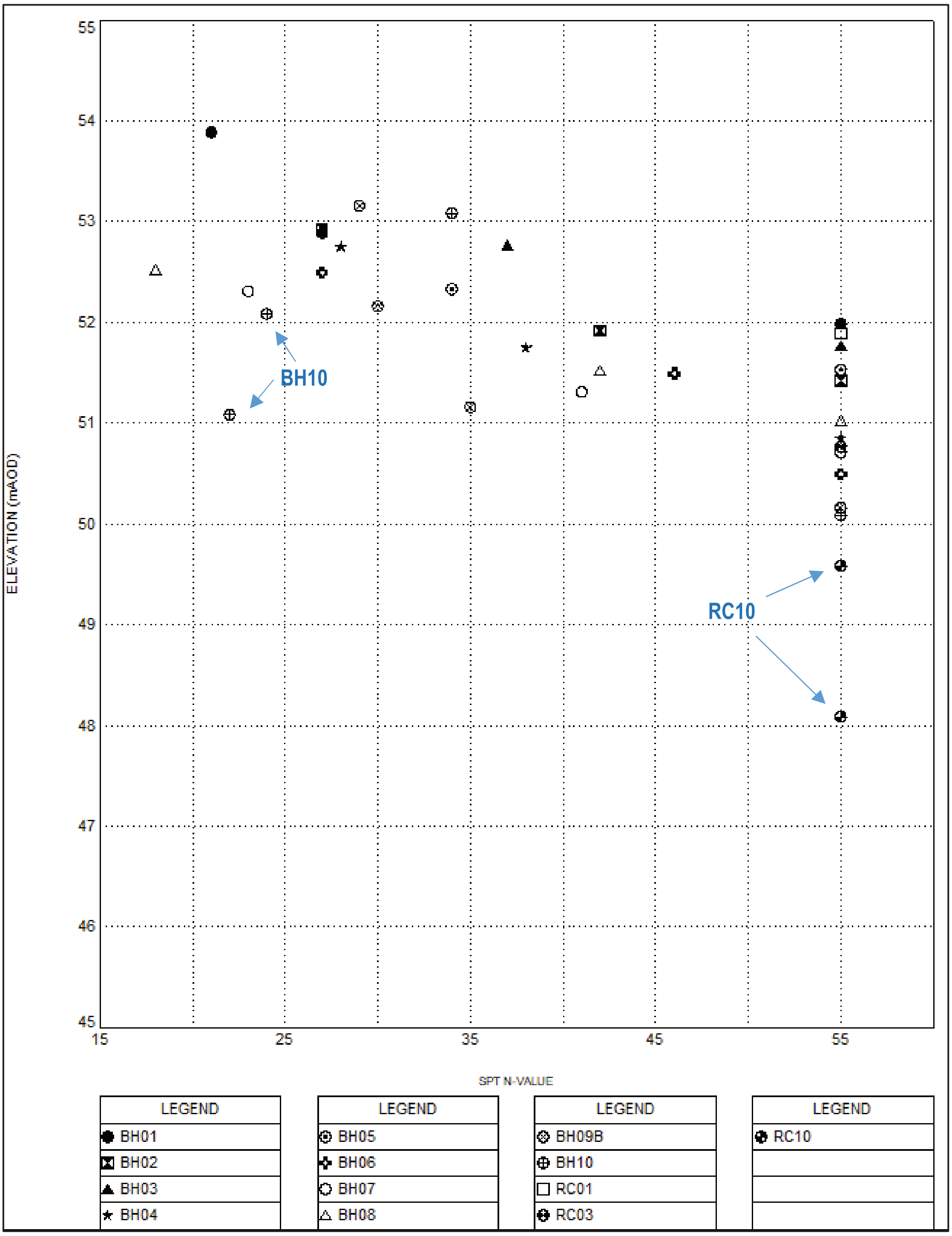


Figure 2 – SPT N Values Vs Depth (m BGL)

3.2 Bedrock

Coreholes RC01 to RC10 were drilled adjacent to corresponding boreholes to investigate for the presence of bedrock.

Symmetrix "open hole" techniques were used to advance through the overburden (soil) in all coreholes. It is noted that Symmetrix drilling produces highly pulverised drill returns and therefore, soil descriptions based on these returns are very approximate.

The coreholes reported brown sandy gravelly clay from the base of the cable percussive boreholes. Standard Penetration Tests commenced below the borehole drilled depths revealed "N" values in excess of 50, thereby confirming the very high strength of the deeper glacial soils.

Table 1 shows the terminal depth of the boreholes and the depths to weathered rock in each adjacent corehole. Also shown are the interpreted soil descriptions below the borehole depths, although it is again stressed that these are based on highly pulverised drill returns and should be taken as approximate only.

Location	Borehole Depth (m BGL)	Overburden below Borehole depth (based on Pulverised Drill Returns only)	Depth to Weathered Bedrock (m BGL)	Elevation of Weathered Bedrock (m OD)
RC01	2.90	Very stiff gravelly CLAY	3.30	51.59
RC02	2.60	Very stiff gravelly CLAY	2.60	51.32
RC03	2.30	Very stiff gravelly CLAY	3.20	50.57
RC04	2.90	Very stiff gravelly CLAY	2.80	50.95
RC05	1.90	Very stiff gravelly CLAY	2.80	50.53
RC06	3.30	Very stiff gravelly CLAY	3.70	49.79
RC07	2.80	Very stiff gravelly CLAY	2.80	50.51
RC08	3.10	Very stiff gravelly CLAY	4.00	49.52
RC09	4.00	Very stiff gravelly CLAY	4.00	50.17
RC10	4.10	Very stiff gravelly CLAY	6.30	47.79

Table 1 – Summary of Rotary Coring

It can be seen from Table 1 that the depth to weathered bedrock ranged between approximately 2.5 and 4.0 m BGL (49.5 to 51.6 mOD) across much of the site. Notably, the bedrock level dipped to 6.3 m BGL (47.8 mOD) at BH10.

The bedrock was classified as predominately strong, locally weak, black / dark grey fine-grained argillaceous LIMESTONE. The limestone was predominately slightly weathered, but locally moderately weathered within mudstone and shale zones. Pyrite crystallisation was locally evident.

Total Core Recovery (TCR) was 100% for all runs. Solid Core Recovery (SCR) was generally in the range 50 to 70%, locally reducing to between 20 and 40% where the bedrock horizon was highly weathered and fractured. RQD values showed similar variations.

Photo 1 shows the core recovery of the upper Limestone at RC01 (3.3 – 6.3 m). The variations in the degree of weathering are clearly evident, with a heavily fractured zone between approximately 5.0 and 5.5 m BGL.

Photo 1 – Core recovery at RC01 (3.3 to 6.3 m BGL)

Photo 2 shows the core recovery of the upper bedrock at RC10 (4.5 – 8.3m). In this corehole, recovery of the overlying very high strength glacial till was possible between 4.5 and 6.0m. The coloration of the glacial till is similar to the underlying limestone from which it is derived.

Fracturing (weathering) of the upper limestone is clearly evident within the upper metre of recovery, with fresher rock present below approximately 7.3 m BGL. Calcite veining is also prominent below approximately 8.0 m BGL.

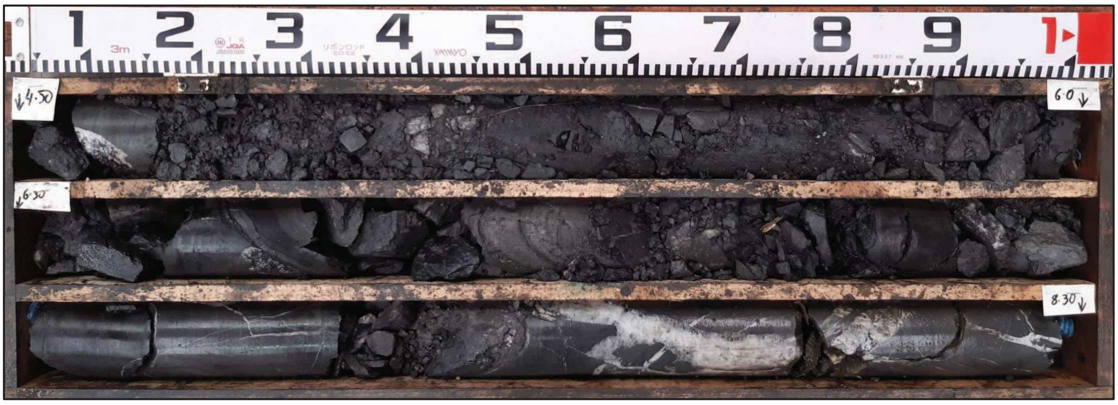


Photo 2 – Core recovery at RC10 (4.5 – 8.3 m BGL)

3.3 Infiltration Tests

Infiltration tests were performed to ascertain the suitability of the sub-soils for soakaway purposes.

Table 2 summarises the ground conditions encountered in the test pits and the infiltration rates, which are based on the slowest cycle.

It is noted that all test pits remained dry during excavation.

Test No.	Pit Depth (m BGL)	Soil Strata	Infiltration Rate (m/min)
SA01	1.50	Made Ground (0.4m) overlying sandy gravelly CLAY	0.0003
SA02	1.80	Made Ground (0.2m) overlying sandy gravelly CLAY	0.0001
SA03	1.50	Made Ground (0.6m) overlying sandy gravelly CLAY	0.0002
SA04	1.50	Made Ground (sandy gravelly clay)	6×10^{-5}
SA05	1.70	Made Ground (0.6m) overlying sandy gravelly CLAY	7×10^{-5}
SA06	1.60	Made Ground (0.65m) overlying sandy gravelly CLAY	0.0002
SA07	1.50	Made Ground (sandy gravelly clay)	9×10^{-5}
SA08	1.50	Made Ground (sandy gravelly clay)	7×10^{-5}
SA09	1.50	Made Ground (sandy gravelly clay)	0
SA10	1.50	Made Ground (sandy gravelly clay)	3×10^{-5}

Table 2 – Summary of Infiltration Test Results

3.4 Groundwater Monitoring

No groundwater ingress was observed during drilling of the cable percussive boreholes.

Water strikes during rotary drilling occurred in the form of “seepage” or “slow inflow” at depths mostly in the range 2.8 to 3.8 m BGL, with some deeper strikes observed. However, it is noted that the water flush medium used during rotary drilling can mask or obscure groundwater strikes.

On completion of drilling, the water levels varied significantly, although the shallowest levels ranged between 2.2 and 2.5 m BGL (RC04, 05, 06, 07 and 08).

Since the short period of drilling rarely permits the true groundwater levels to establish, standpipes were installed in coreholes RC01, 02, 03, 05, 08, 09 and RC10 in order to facilitate long term groundwater monitoring.

The site was revisited post-fieldwork in order to record groundwater levels in the standpipes. These are summarised on Table 3 and show levels ranging between 50.7 and 51.4 mOD across the site.

Location	Corehole Depth (m BGL)	Top of Response Zone (m BGL)	Base of Response Zone (m BGL)	Groundwater Depth 19/10/2021 (m BGL)	Groundwater Level 19/10/2021 (m OD)
RC01	8.3	1.0	8.3	3.52	51.37
RC02	7.6	1.0	7.6	2.67	51.25
RC03	8.2	1.0	8.2	2.92	50.85
RC05	8.6	1.0	8.6	2.27	51.06
RC08	9.0	1.0	9.0	2.16	51.36
RC09	9.0	1.0	9.0	3.41	50.76
RC10	11.3	1.0	11.3	3.43	50.66

Table 3 – Summary of Groundwater Monitoring

3.5 Gas Monitoring

The standpipes were fitted with rubber bungs to permit gas monitoring. Gas readings were recorded on 19th October 2021 using a GA5000 infra-red gas detector. The results are shown on Table 4.

Location	Groundwater Depth (m BGL)	Carbon Dioxide (%)	Methane (%)	Oxygen (%)	Barometric Pressure (mBar)
RC01	3.52	1.0	0.1	17.9	995
RC02	2.67	0.2	0.1	20.1	995
RC03	2.92	0.3	0.1	20.1	995
RC05	2.27	2.1	0.1	18.5	995
RC08	2.16	0.2	0.1	20.2	995
RC09	3.41	0.5	0.1	19.7	995
RC10	3.43	0.0	0.1	20.5	995

Table 4 – Summary of Gas Monitoring (19/10/2021)

4.0 Laboratory Testing

Laboratory testing was undertaken on selected samples of soil and rock. The geotechnical laboratory test results are included in Appendix 6, while the results of chemical and environmental testing are presented in Appendix 7.

4.1 Soil Classification

Atterberg Limits tests classified the cohesive soils as predominately CLAY of low and intermediate plasticity (CL and CI). Moisture contents mostly ranged between 11 and 15%

Particle Size Distribution (PSD) tests showed that the firm / stiff gravelly clay soils are relatively well graded, with fines (SILT/CLAY) contents in the range 22 to 56%.

Testing of a sample from TP09 (1.50m) confirmed the presence of a coarse granular stratum overlying the gravelly clay. This sample, which graded as a silty sandy gravel, exhibited a fines content of only 10%, while 76% of the sample comprised gravel sized particles by mass.

4.2 Moisture Condition Value (MCV)

MCV tests provide a rapid indication of the potential for soil reusability at the current moisture content. For the purposes of preliminary assessment, an MCV of 8 or greater is a typical requirement of earthworks specifications for soils to be reused as engineering fill. A total of 4 samples were tested and the results are summarised on Table 5.

Location	Depth (m BGL)	Moisture Content (%)	Soil Type	MCV
TP02	1.40	14	Firm to stiff sandy gravelly CLAY	11.4
TP05	1.80	14	Firm to stiff sandy gravelly CLAY	11.4
TP12	1.40	13	Firm sandy gravelly CLAY	6.8
TP14	1.50	16	Stiff sandy gravelly SILT	6.8

Table 5 – Summary of MCV results

The results show that two samples significantly exceeded the typical minimum MCV of 8 for site-won cohesive fill, while two samples were only marginally below this value. The indigenous gravelly clay (glacial till) soils therefore have the potential to be reused as site-won fill, subject to strict control of the moisture content.

4.3 California Bearing Ratio (CBR)

CBR testing was performed on 4 samples in accordance with test No.7 of BS 1377: Part 4: 1990. To minimise disturbance, specimens were prepared in accordance with clause 7.2.3.3 Method 2. This entails compressing the soil into the test mould in three equal layers using static compaction. In accordance with the specification the test specimens had a maximum particle size of 20 mm.

The CBR results are summarised in Table 6.

Location	Depth (m BGL)	Moisture Content (%)	Description	CBR (%) average
TP02	1.40	13	Firm to stiff sandy gravelly CLAY	16
TP05	1.80	8	Firm to stiff sandy gravelly CLAY	22
TP12	1.40	13	Firm sandy gravelly CLAY	3.9
TP14	1.50	17	Stiff sandy gravelly SILT	11

Table 6 – Summary of CBR Test Results

Table 6 shows that all 4 samples yielded CBR values that were significantly greater than 2.5% (typical minimum acceptable value), thereby indicting the potential for reuse as site-won fill.

4.4 Compaction Test (Dry Density / Moisture Content Relationship)

Compaction testing was undertaken to determine the dry density of soil when it is compacted in a specific manner over a range of moisture content values. The results are plotted as a graph of moisture content against dry density to determine the optimum moisture content (OMC) i.e. the moisture content at which the maximum dry density is achieved.

Testing was performed in accordance with method 3.3 of BS 1377: Part 4: 1990. In this test, soil passing the 20 mm sieve is compacted into a one litre compaction mould, in three layers, with a vibrating hammer.

The results are summarised in Table 7, which also shows the dry density and moisture content values for the sample in its “as-received” condition. The dry density of the as-received sample is expressed as a percentage of the optimum.

Location	Depth (m BGL)	As-Received Moisture Content (%)	Soil Type	Dry Density at Natural Moisture Content (Mg/m^3)	Maximum Dry Density (Mg/m^3)	NDD/ MDD (%)	Optimum Moisture Content (%)
TP02	1.40	10	Firm to stiff sandy gravelly CLAY	1.98	1.98	100	10
TP05	1.80	7	Firm to stiff sandy gravelly CLAY	2.03	2.07	98	8
TP12	1.40	13	Firm sandy gravelly CLAY	1.95	2.02	97	9
TP14	1.50	17	Stiff sandy gravelly SILT	1.82	1.85	98	14

Table 7 – Summary of Compaction Test Results

The samples revealed Optimum Moisture Contents (OMC) in the range 9 to 14%. While the test specimens for TP02 and TP05 were already at their optimum moisture contents, the as-received moisture contents of the samples from TP12 and TP14 were 3 to 4% “wet of optimum”. With reference to the general moisture contents for this site, it is expected that indigenous glacial till soils in their natural state should be within 3 to 4% of its optimum moisture content for reuse. Monitoring of moisture contents will be critical when re-using site-won soils.

4.5 Point Load and Uniaxial Compressive Strength Tests (Rock Core Samples)

Point Load Index tests were undertaken on selected rock core samples.

The Point Load Index Test provides a rapid strength assessment from rock fragments or cores. 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. The compressive strength of the rock (qc) can be established using a correlation suggested by Goodman where UCS ≈ 18 to 24 x Is50.

The results of rock strength testing showed Is50 values mostly in the range 1 to 5 MPa, with an average of 3 MPa. These values correlated to equivalent UCS values in the range 20 to 100 MPa.

In accordance with Table 5 of EN ISO 14869-1, these strengths would confirm the rock to be predominately Medium Strong to Strong.

4.6 Sulphate and pH Analyses

Determination of pH values and Sulphate content were conducted on five samples by a nominated accredited environmental laboratory (Eurofins Chemtest). Results are presented in reports prepared by the laboratory (Appendix 6).

The results of water-soluble (water/soil extract) Sulphate and pH analyses of soils revealed very low SO_4 levels (<0.01 g/l) and near-neutral pH levels of 8.8 to 9.1.

4.7 Environmental Laboratory Testing

A total of 27 soil samples were tested in accordance with the RILTA Suite, which is used to determine the suitability of soils for disposal to a landfill. The RILTA suite includes Heavy Metals, Polycyclic Aromatic Hydrocarbons (PAH), TPH-CWG, 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.

The analyses were carried out by Eurofins Chemtest Laboratory and their reports are presented in Appendix 7. The results are also included in the Waste Characterisation Assessment, which is presented by OCM under separate cover.

5.0 Discussion

5.1 General

The ground conditions have been shown to be relatively homogenous.

Made Ground comprising reworked sandy gravelly clay fill mantles the site and, in places, Construction and Demolition (C&D) waste is present within the fill material. While mostly confined to the upper metre, the Made Ground appears to deepen within the eastern portion of the site to depths of up to 1.7 m BGL. Within the southern portion of the site, infiltration test pits terminated within Made Ground at a depth of 1.5 m BGL, thereby implying that the fill could be deeper.

The underlying natural soils comprise predominately stiff (high strength) grey/brown sandy gravelly CLAY. This material strengthens with depth, becoming very stiff (very high strength) within the upper 2 metres (deepening to 3.5 metres in BH10 at the eastern end of the proposed structural development).

The upper grey/brown and lower dark grey/brown and black gravelly clays represent glacial till, which is often referred to as the “Dublin Boulder Clay”. The difference in coloration and consistency between the upper grey/brown and lower very stiff dark brown/grey deposits are usually attributed to weathering of the upper till.

Rotary drilling below the refusal depths of the boreholes produced returns of very high strength gravelly clay (glacial till) overlying bedrock at depths in the range (49.5 to 51.6 mOD) across much of the site, dipping to 6.3 m BGL (47.8 mOD) in RC10.

The underlying limestone bedrock is in a medium strong to strong condition, and this has been proven to a maximum depth of 11.3 m BGL (42.8 mOD).

5.2 Structural Foundations

It is understood that the proposed multi-storey mixed-use development will incorporate under-croft car park, which will entail a degree of excavation to reduce the site levels.

Depending on the depth of excavation, it is expected that structural foundations will be constructed either on the glacial till soils or on the underlying limestone bedrock.

At the base of the Made Ground, the glacial till is in an initially stiff condition, with estimated undrained shear strengths in the range 100 to 125 kPa. Allowable bearing pressures of the order of 175 to 200 kPa could therefore be assumed for the upper glacial till.

Within the depth range 1 to 2 m BGL, the glacial till strengthens to very stiff (very high strength) and undrained shear strengths for this material would be expected to range between 200 and 250 kPa. Foundations constructed on the very stiff glacial till soils could assume allowable bearing pressures of the order of 300 kPa.

With reference to Table 1, it can be seen that the weathered limestone can be expected at depths ranging between 2.5 and 4 m BGL over much of the site. Therefore, excavations extending to typical single-basement level (c. 4m) could intercept the upper bedrock in places.

Where foundations are constructed directly on the limestone bedrock, an allowable bearing pressure of the order of 600 kPa could be assumed at the upper weathered and highly fractured bedrock horizon, increasing to c. 1.5 MPa within the "intact" medium to strong limestone. Based on the findings of the coreholes, it is expected that the removal of circa 0.5 metres of upper bedrock would be sufficient to reach the "intact" limestone.

If it is proposed to support all foundations on the bedrock, the observed dip in bedrock level to 6.3 m BGL at the eastern end of the proposed structures should be borne in mind. In this location, consideration could instead be given to utilising the "hard" black gravelly clay (glacial till), present below approximately 3.5 m BGL (50.59 mOD) as a founding medium, while reducing the design bearing pressure to 300 kPa.

Founding a portion of a structure on glacial till and the remainder on limestone bedrock may induce some differential settlement between individual pads at the transition between soil and rock. However, the differential settlement would be expected to be low (< 5 mm), due to the highly over-consolidated state and very low compressibility of the hard glacial till.

Where a foundation pit for a single pad exposes both limestone bedrock and glacial till at its base, the pit should be locally deepened as necessary to reach bedrock over its full area.

5.3 Groundwater and Trench Stability

Groundwater ingress was not observed within the boreholes or trial pits. However, water strikes occurred during rotary drilling and were observed at a shallowest depth of 2.6 m BGL during the drilling period.

Subsequent groundwater monitoring of standpipes has shown standing groundwater levels in the range 2.2 to 3.5 m BGL (50.7 to 51.4 mOD).

The results of groundwater monitoring therefore indicates that excavations below c. 2 m BGL could intercept the groundwater table. While water ingress through the glacial clays would be expected to be slow, any open excavations will ultimately fill with water as the groundwater table re-establishes to its true level.

It is also noted that granular (sand/gravel) lenses are not uncommon within glacial till, and, if intercepted, the rate of water ingress through such lenses would be significantly higher. The rate of water ingress could also increase where the upper highly fractured bedrock is intercepted.

A key consideration if adopting trench / fill techniques for foundations will be the stability of open excavations. All trial pits remained stable during the period of excavation, indicating that temporary excavations should remain stable in the short-term.

Where excavations are left open for extended periods (e.g. drainage trenches), instability is likely to occur as the sidewalls relax, in which case trench control measures (e.g. trench box) will be required.

If basements (or partial basements) are constructed, the associated mass excavation (typically c. 4 metres for single-level) would be expected to intercept the groundwater table. The rate of ingress is difficult to predict, since no excavation of bedrock was undertaken and therefore the rate of ingress through the upper limestone could not be observed. However, increased flow rates could be expected where excavations intercept the upper bedrock, which is highly fractured and will likely permit relatively free flowing ingress.

Based on the monitoring to date, water levels could rise to c.2m BGL, and possibly higher. For this reason, ongoing monitoring of standpipes would be recommended in order to provide a better understanding of the true groundwater level, and its fluctuations due to seasonal change or prolonged periods of heavy rainfall.

5.4 Excavation of Existing Materials

The inclusion of basement implies that mass excavation works will be required. The majority of excavated materials will comprise:

- Made Ground (clay / gravel)
- Stiff grey/brown sandy gravelly CLAY (glacial till)
- Very stiff (becoming hard) dark brown / grey gravelly CLAY (glacial till)
- Limestone Bedrock

The Made Ground soils were excavated during the ground investigation using a JCB. It is therefore anticipated that these soils will provide little resistance to excavation and should be removable using conventional wheeled or tracked excavators. Vibrations should also be low.

The stiff grey/brown gravelly clay soils should also be excavatable using conventional excavators.

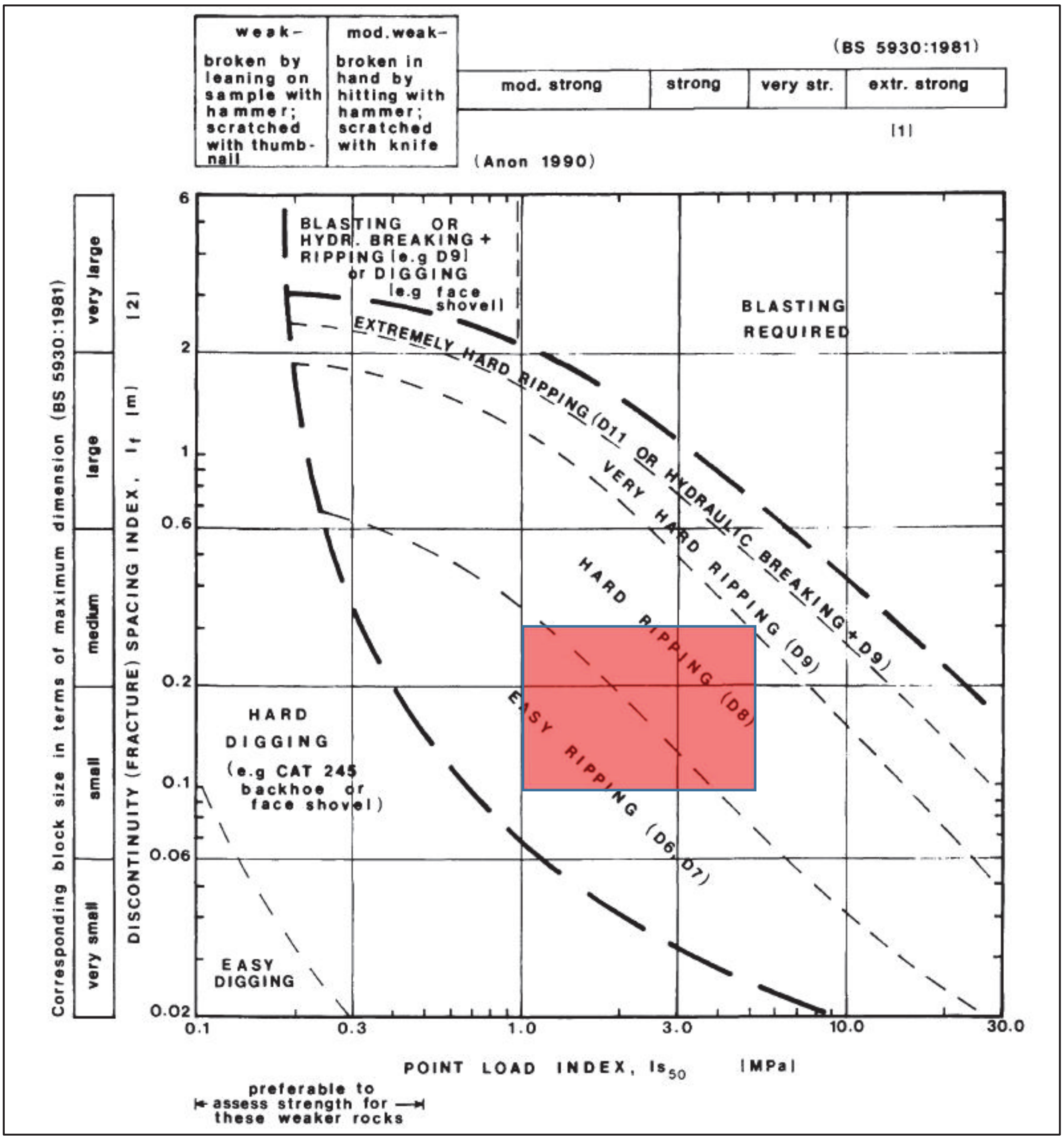
Excavation of the very stiff to hard glacial till deposits will require more effort, and may induce occasional vibrations, particularly where large boulders are present. Conventional large (40 tonne) tracked excavators with toothed buckets are expected to be required to efficiently remove the very stiff / hard black boulder clay. Hydraulic breakers may be required in places to dislodge and remove large boulders.

If a single-level basement is proposed, a minimum excavation depth of circa 4 metres would be expected. With reference to Table 1, the removal of circa 1.5 metres of Limestone bedrock may therefore be required in order to form the basement dig.

When estimating the excavatability of the limestone bedrock, reference should be made to the graph produced by Pettifer and Fookes, which categorises rock excavatability based on the Fracture Spacing Index and Point Load Index (Is_{50}) of the rock.

The Is_{50} values mostly range between 1 and 5 MPa. The bedrock Fracture Spacings above the typical basement depth of c. 4 m BGL are mostly clustered in the range 100 to 300 mm, although there are some instances of up to 500 mm spacings. To permit a preliminary assessment of rock excavatability with respect to the Pettifer and Fookes Chart, a typical Fracture Spacing range of 100 to 300 mm is suggested.

The adopted Fracture Spacing and Is_{50} strength ranges have been plotted on the Pettifer and Fookes chart. The relevant zone within the chart, corresponding to the adopted ranges is highlighted.



Pettifer and Fookes Excavatability Chart

Using these guideline parameters, the excavatability of the upper limestone bedrock is categorised as Easy to Hard Ripping, requiring the use of a D7 or D8 Caterpillar (32 tonne) or equivalent. However, it should be noted that the Pettifer and Fookes chart tends to underestimate the excavatability characteristics of Irish rock masses. Civil engineering contractors should be aware of this and carefully consider the difficulties associated with excavatability within intact limestone. It is therefore anticipated that large tracked excavators (40T) equipped with heavy duty hydraulic breakers (8T) will be required to efficiently or economically loosen the rock mass

Due to the nature of ripping and breaking, this will cause both vibratory and noise disturbance. Tolerable levels of both should be established and agreed with the civils contractor prior to excavation works commencing. It will be necessary to position vibration monitors adjacent to nearby structures to check that specified peak particle velocities are not exceeded.

In advance of excavation operations, it would be advisable to conduct dilapidation surveys of any vulnerable structures so that their initial condition can be established.

5.5 Ground Retention

The construction of single level basements will require temporary ground retention measures. Due to the close proximity of existing roads to the north and west, it is likely that an embedded retaining wall will be utilised in preference to battered slopes.

Temporary basement excavations are typically retained using embedded retaining walls constructed using either secant or contiguous piles. It should be noted that only secant pile walls provide retention to groundwater.

Groundwater monitoring to date has revealed a shallowest standing water level of 2.2 m BGL (51.4 mOD), and therefore basement excavations to c.4 metres would be expected to intercept the groundwater table.

It would be therefore prudent to assume that a secant piled retaining wall will be required to provide the necessary retention to both soil and groundwater.

Laterally loaded piles will achieve fixity within the Limestone bedrock. While CFA or bored pile techniques could be used to form pile shafts within the overburden soils, heavy duty “odex” drilling will be necessary to form the rock socket.

The information obtained in this ground investigation should be sufficient to facilitate an embedded retaining wall design.

5.6 Chemical Attack on Buried Concrete

The results of Sulphate and pH testing showed low Sulphate and near-neutral pH levels.

With reference to Table C1 of BRE Special Digest 1: 2005, the level of Sulphate suggests a design Sulphate Class of DS-1. Assuming a static groundwater table, an ACEC (Aggressive Chemical Environment for Concrete) Classification of AC-1s is applicable, since the pH levels are greater than 5.5.

In terms of concrete to I.S. EN 206-1:2013, the chemical testing demonstrates that concrete could be manufactured to Class XA1.

5.7 Soakaway Design

Infiltration testing in ten locations recorded generally low infiltration rates. This is not surprising, since very low permeability would be expected of the upper glacial clays. In soils such as these, it is generally recommended that conventional soakaway systems are not attempted.

While deepening of the soakaways would ordinarily be considered in these circumstances, it is noted that the groundwater levels are relatively shallow (up to 2 m BGL) and conventional soakaway systems will not function below the water table.

In light of the above, it may be preferable to discharge surface run-off water to an existing surface water system, using attenuation techniques to regulate the flow.

5.8 Potential for Pyritic Heave

As discussed in Section 3.2, the bedrock comprises grey/black argillaceous limestone. There was evidence of localised pyrite crystallisation, which is not uncommon amongst the Dublin limestones.

With regard to the potential for pyritic heave of foundations, there should be no concerns where foundations are constructed on suitably prepared limestone. Any loose / unconsolidated material (mudstone / shale) should be removed and the bedrock formation blinded with lean-mix concrete without delay. The purpose of this is to reduce the timeframe for potential oxidation.

Foundations can then be constructed directly on the lean mix concrete with no residual concerns regarding pyritic heave.

5.9 Ground-Generated Gases

Gas monitoring has revealed Carbon Dioxide levels of up to 2.1%, while the levels of Methane were negligible.

It is therefore evident that Carbon Dioxide is being generated to varying concentrations within the Made Ground. This occurs when biodegradable materials decompose.

The long-term exposure limit for Carbon Dioxide is 0.5% (Ref: *Construction of New Buildings on Gas Contaminated Land – BRE Publication*). It is therefore apparent that the Carbon Dioxide levels at RC01, RC05 and RC09 are potentially harmful if permitted to enter an occupied building.

Landfill gases can enter buildings through gaps around service pipes, cracks in walls below ground and floor slabs, construction joints and wall cavities. For this site, the risk of gas ingress to structures will be somewhat mitigated by the construction of an under-croft car park, which will support ventilation. Nevertheless, a full risk assessment should be undertaken with regard to all structures, particularly those where no under-croft construction is proposed.

Guidance on the construction of passive soil gas protective measures is provided in the Environment Agency and BRE publication **"***Protective measures for housing on gas-contaminated ground***".**

It will be extremely important to seek advice on the Health and Safety issues relating to construction personnel operating on a site where Carbon Dioxide is present in the ground.

6.0 References

1. BS 5930:1999 +A2:2010 Code of Practice for Site Investigations; British Standards Institute
2. Manual of Contract Documents for Highway Works, Volume 5, Section 3, Ground Investigation, Part 4: Specification
3. BRE Special Digest 1: 2005 – Concrete in aggressive ground
4. EN 1997-3; Eurocode 7: Geotechnical Design – Part 3: Design assisted by field testing; 1997
5. BS1377; British Standard Methods of Test for Soils for Civil Engineering Purposes; British Standards Institute;1990.
6. BRE Digest 365, September 1991, British Research Establishment
7. Manual of Contract Documents for Road Works, Volume 1: Specification for Road Works (March 2007)
8. Manual of Soil Laboratory Testing, Volume 3; K.H. Head
9. ISRM – Suggested Methods for Determining Point Load Strength
10. ISRM – Suggested Methods for Determining the Uniaxial Compressive Strength and Deformability of Rock Materials
11. TRL Report 447- Sulphate specification for structural backfills

Appendix 1

Cable Percussive Borehole Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

BOREHOLE NO. BH01
SHEET Sheet 1 of 1

CO-ORDINATES 708,134.34 E
732,734.62 N
GROUND LEVEL (m AOD) 54.89

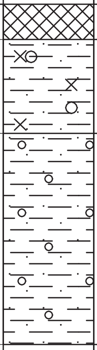
RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm)
BOREHOLE DEPTH (m) 2.90

DATE COMMENCED 27/09/2021
DATE COMPLETED 27/09/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY P.Thomas
PROCESSED BY F.C



Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND (Comprised of CL804 stone fill)		54.59	0.30						
	Stiff brown sandy SILT/CLAY with some gravel (Possible Made Ground)		53.79	1.10	AA165810	B	1.00		N = 21 (3, 3, 4, 5, 5, 7)	
1	Stiff to very stiff grey/brown very sandy gravelly CLAY with angular cobbes									
2			51.99	2.90	AA165811	B	2.00		N = 27 (7, 6, 8, 5, 5, 9)	
3	Obstruction End of Borehole at 2.90 m								N = 50/75 mm (25, 50)	
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.7	2.9	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 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

Sample Legend

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH02**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,213.73 E 732,696.79 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.92	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	2.60
		DATE COMMENCED	27/09/2021
		DATE COMPLETED	28/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	Brown sandy SILT/CLAY (Possibly Made Ground)		53.02	0.90						
1	Stiff to very stiff dark brown sandy gravelly CLAY with some angular cobbles		51.32	2.60	AA165812	B	1.00		N = 27 (4, 6, 7, 5, 8, 7)	
					AA165813	B	1.50			
2					AA165814	B	2.00		N = 42 (5, 5, 8, 8, 10, 16)	
									N = 50/75 mm (25, 50)	
3	Obstruction End of Borehole at 2.60 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.4	1.6	1	
2.4	2.6	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER	23606
CONTRACT	Site 6 , Parkwest , Dublin 12
BOREHOLE NO.	**BH03**
SHEET	Sheet 1 of 1
CO-ORDINATES	708,262.18 E 732,751.27 N
GROUND LEVEL (m AOD)	53.77
RIG TYPE	Dando 2000
BOREHOLE DIAMETER (mm)	
BOREHOLE DEPTH (m)	2.30
DATE COMMENCED	28/09/2021
DATE COMPLETED	28/09/2021
CLIENT	Greenseed Ltd
ENGINEER	CS Consulting
SPT HAMMER REF. NO.	
ENERGY RATIO (%)	
BORED BY	P.Thomas
PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND (Comprised of brown sandy SILT/CLAY)		53.47	0.30						
	Brown sandy SILT/CLAY with occasional gravel		52.97	0.80						
1	Very stiff dark brown sandy gravelly CLAY with some angular cobbles				AA165818	B	1.00		N = 37 (4, 6, 9, 8, 10, 10)	
2			51.47	2.30	AA165819	B	2.00		N = 50/225 mm (9, 15, 17, 22, 11)	
	Obstruction End of Borehole at 2.30 m									
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.1	2.3	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

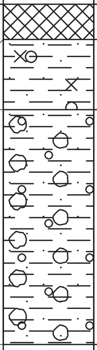
REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER	23606		
CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH04**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,262.08 E 732,706.46 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.75	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	2.90
DATE COMMENCED	28/09/2021	**DATE COMPLETED**	28/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND (Comprised of brown sandy SILT/CLAY)		53.45	0.30						
	Brown sandy SILT/CLAY with some gravel		52.85	0.90						
1	Stiff to very stiff dark brown sandy gravelly CLAY with occasional angular cobbles				AA165815	B	1.00		N = 28 (4, 5, 6, 8, 7, 7)	
2					AA165816	B	2.00		N = 38 (3, 5, 7, 9, 10, 12)	
			50.85	2.90						
3	Obstruction End of Borehole at 2.90 m				AA165817	B	2.90		N = 50/75 mm (11, 14, 50)	
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.6	0.7	0.75	
2.7	2.9	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

Sample Legend

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

BOREHOLE NO. BH05
SHEET Sheet 1 of 1

CO-ORDINATES 708,326.95 E
732,758.44 N
GROUND LEVEL (m AOD) 53.33

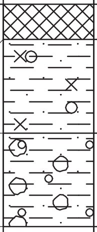
RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm)
BOREHOLE DEPTH (m) 1.90

DATE COMMENCED 29/09/2021
DATE COMPLETED 29/09/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY P.Thomas
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	MADE GROUND (Comprised of brown sandy SILT/CLAY)		53.03	0.30						
	Firm brown sandy SILT/CLAY with some gravel		52.23	1.10	AA165820	B	1.00		N = 34 (3, 5, 7, 8, 8, 11)	
1	Stiff to very stiff dark brown sandy gravelly CLAY with occasional angular cobbles		51.43	1.90	AA165821	B	1.80		N = 50/75 mm (25, 38, 50)	
2	Obstruction End of Borehole at 1.90 m									
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.7	1.9	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

BOREHOLE NO. BH06
SHEET Sheet 1 of 1

CO-ORDINATES 708,333.13 E
732,719.94 N
GROUND LEVEL (m AOD) 53.49

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm)
BOREHOLE DEPTH (m) 3.30

DATE COMMENCED 29/09/2021
DATE COMPLETED 29/09/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY P.Thomas
PROCESSED BY F.C

Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
Brown sandy SILT/CLAY with occasional gravel (Possibly Made Ground)		52.99	0.50						
Firm brown sandy SILT/CLAY with some gravel		52.59	0.90						
Stiff to very stiff dark brown very gravelly sandy CLAY with occasional angular cobbles				AA165822	B	1.00		N = 27 (3, 3, 4, 8, 8, 7)	
				AA165823	B	2.00		N = 46 (4, 9, 10, 10, 12, 14)	
		50.19	3.30	AA165824	B	3.00		N = 50/75 mm (14, 11, 50)	
Obstruction End of Borehole at 3.30 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.1	3.3	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.10	3.10	No	2.40	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH07**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,365.29 E 732,774.10 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	
GROUND LEVEL (m AOD)	53.31	**BOREHOLE DEPTH (m)**	2.80
		DATE COMMENCED	30/09/2021
		DATE COMPLETED	30/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	Brown sandy SILT/CLAY with occasional gravel (Possibly Made Ground)		52.61	0.70						
1	Stiff grey/brown sandy SILT/CLAY with frequent gravel		51.91	1.40	AA165825	B	1.00		N = 23 (4, 6, 5, 5, 6, 7)	
2	Very stiff grey/brown and black sandy gravelly CLAY with some angular cobbles		50.51	2.80	AA165826	B	2.00		N = 41 (5, 6, 6, 9, 11, 15)	
					AA165827	B	2.50		N = 50/75 mm (10, 15, 50)	
3	Obstruction End of Borehole at 2.80 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.6	2.8	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH08**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,385.70 E 732,722.64 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.52	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	3.10
DATE COMMENCED	30/09/2021	**DATE COMPLETED**	30/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	MADE GROUND (Comprised of light brown sandy SILT/CLAY with gravel and plastic fragments)	▨	52.52	1.00						
1	Firm to stiff dark brown SILT/CLAY with frequent gravel	▨	51.62	1.90	AA165828	B	1.00		N = 18 (3, 3, 4, 4, 4, 6)	
2	Very stiff dark brown sandy very gravelly CLAY with some angular cobbles	▨	50.42	3.10	AA165829 AA165830	B B	2.00 2.50		N = 42 (5, 8, 9, 7, 14, 12) N = 50/150 mm (16, 9, 33, 17)	
3	Obstruction End of Borehole at 3.10 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.7	3.1	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 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

BOREHOLE NO. BH09
SHEET Sheet 1 of 1

CO-ORDINATES 708,444.44 E
732,770.45 N
GROUND LEVEL (m AOD) 54.17

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm)
BOREHOLE DEPTH (m) 0.60

DATE COMMENCED 30/09/2021
DATE COMPLETED 30/09/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY P.Thomas
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	MADE GROUND (comprised of brown sandy gravelly silty/clayey fill with reinforced concrete pieces)	▨	53.57	0.60						
	Obstruction End of Borehole at 0.60 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.5	0.6	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out. Obstruction encountered . Moved to BH09A 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

GEOTECHNICAL BORING RECORD

REPORT NUMBER	23606
CONTRACT	Site 6 , Parkwest , Dublin 12
BOREHOLE NO.	**BH09A**
SHEET	Sheet 1 of 1
CO-ORDINATES	708,444.45 E 732,770.01 N
GROUND LEVEL (m AOD)	54.17
RIG TYPE	Dando 2000
BOREHOLE DIAMETER (mm)	
BOREHOLE DEPTH (m)	0.40
DATE COMMENCED	30/09/2021
DATE COMPLETED	30/09/2021
CLIENT	Greenseed Ltd
ENGINEER	CS Consulting
SPT HAMMER REF. NO.	
ENERGY RATIO (%)	
BORED BY	P.Thomas
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	MADE GROUND (comprised of brown sandy gravelly silty/clayey fill with reinforced concrete pieces)	▨	53.77	0.40						
	Obstruction End of Borehole at 0.40 m									
1										
2										
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.3	0.4	1	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out. Obstruction encountered . Moved to BH09B and attempted rebore.

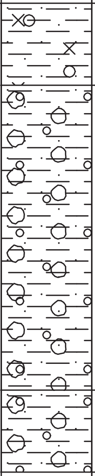
Sample Legend

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH09B**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,444.69 E 732,771.39 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	54.16	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	4.00
		DATE COMMENCED	01/10/2021
		DATE COMPLETED	01/10/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	Brown SILT/CLAY with some gravel (Possibly Made Ground)		53.46	0.70						
1	Stiff to very stiff grey/brown gravelly sandy CLAY with occasional angular cobbles				AA165831	B	1.00		N = 29 (5, 9, 6, 8, 8, 7)	
2					AA165832	B	2.00		N = 30 (3, 3, 7, 9, 5, 9)	
3			50.86	3.30	AA165833	B	3.00		N = 35 (6, 8, 8, 7, 8, 12)	
	Very stiff to hard black very gravelly sandy CLAY with angular cobbles		50.16	4.00	AA165834	B	3.50			
4	Obstruction End of Borehole at 4.00 m								N = 50/150 mm (18, 7, 40, 10)	
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.8	4	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 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

Sample Legend

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

BOREHOLE NO. BH10
SHEET Sheet 1 of 1

CO-ORDINATES 708,448.53 E
732,739.74 N
GROUND LEVEL (m AOD) 54.09

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm)
BOREHOLE DEPTH (m) 4.10

DATE COMMENCED 01/10/2021
DATE COMPLETED 01/10/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY P.Thomas
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	MADE GROUND (Comprised of brown sandy silty/clayey fill with cobbles , concrete and teel)									
1					AA165835	B	1.00		N = 34 (4, 5, 5, 8, 10, 11)	
			52.39	1.70						
	Stiff to very stiff dark brown sandy gravelly CLAY with some angular cobbles									
2					AA165836	B	2.00		N = 24 (6, 4, 5, 7, 6, 6)	
3					AA165837	B	3.00		N = 22 (3, 5, 4, 5, 5, 8)	
			50.69	3.40						
	Very stiff black gravelly CLAY with occasional cobbles									
4			49.99	4.10	AA165838	B	4.00		N = 50/75 mm (7, 18, 50)	
	End of Borehole at 4.10 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4	4.1	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 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

Appendix 2

Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	708,197.23 E 732,753.25 N
		GROUND LEVEL (m)	54.41
CLIENT	Greenseed Ltd	**DATE STARTED**	29/09/2021
ENGINEER	CS Consulting	**DATE COMPLETED**	29/09/2021
		EXCAVATION METHOD	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
					Sample Ref	Type	Depth		
MADE GROUND (comprised of brown sandy gravelly clay, many angular to subangular cobbles)	▨	0.30	54.11						
Stiff, brown, slightly sandy gravelly CLAY with medium subangular cobbles content	▨	1.00	53.41		AA150651	B	0.50		
Very stiff, brown, slightly sandy gravelly CLAY with high subangular cobbles content	▨	1.50	52.91						
TP termianted due to possible boulders End of Trial Pit at 1.60m					AA150652	B	1.50		

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP02**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES	708,171.60 E 732,692.90 N	**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)	54.39	**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
MADE GROUND (comprised of topsoil, brown sandy gravelly clay, angular to subangular cobbles)		0.30	54.09						
MADE GROUND (comprised of brown/dark brown sandy gravelly clay, cobbles, occasional red brick pieces)		0.60	53.79		AA150653	B	0.50		
Firm to stiff, brown to greyis brown, slightly sandy gravelly slightly silty CLAY with medium subangular cobbles content		3.00	51.39		AA150654 AA150655	B B	1.40 2.40		
Firm to stiff, dark grey, slightly sandy gravelly silty CLAY with high subangular cobbles content		3.30	51.09		AA150656	B	3.20		
TP termianted due to possible boulders or rock End of Trial Pit at 3.30m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER	23606
CONTRACT	Site 6 , Parkwest , Dublin 12
TRIAL PIT NO.	**TP03**
SHEET	Sheet 1 of 1
LOGGED BY	I.Reder
CO-ORDINATES	708,301.57 E 732,765.19 N
GROUND LEVEL (m)	53.41
DATE STARTED	29/09/2021
DATE COMPLETED	29/09/2021
CLIENT	Greenseed Ltd
ENGINEER	CS Consulting
EXCAVATION METHOD	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
MADE GROUND (comprised of topsoil with many angular to subangular cobbles)		0.20	53.21						
Firm to stiff, greyish brown, slightly sandy gravelly silty CLAY with medium subangular cobbles content		0.90	52.51		AA150669	B	0.70		
Firm, brown/grey mottled SILT		1.60	51.81		AA150670	B	1.50		
Firm, dark grey, SILT		2.50	50.91						
Dense, dark grey, silty angular COBBLES (possible weathered rock)		2.60	50.81		AA150671	B	2.50		
TP termianted due to possible rock End of Trial Pit at 2.60m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES	708,306.76 E 732,702.50 N	**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)	53.48	**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of grey slightly sandy angular gravel - C.L.804)		0.30	53.18						
	MADE GROUND (comprised of brown sandy gravelly clay, cobbles, very occasional plastic rubbish, very occasional steel rebars)		0.50	52.98						
	Firm, brown, slightly sandy SILT/CLAY with low gravel content		0.90	52.58		AA150666	B	0.60		
1.0	Firm, brown, slightly sandy gravelly slightly silty CLAY with medium subangular cobbles content		1.30	52.18						
	Medium dense, brown silty fine SAND		1.60	51.88		AA150667	B	1.50		
2.0	Firm to stiff, brown, sandy gravelly SILT/CLAY with medium subangular cobbles content		2.20	51.28		AA150668	B	2.10		
	TP termianted due to possible boulders or rock End of Trial Pit at 2.20m									
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP05**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES	708,185.28 E 732,673.63 N	**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)	53.91	**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of topsoil, brown sandy gravelly clay, angular to subangular cobbles, occasional plastic rubbish)		0.50	53.41						
1.0 2.0	Firm to stiff, brown, slightly sandy gravelly silty CLAY with high subangular cobbles and low boulders content		2.50	51.41		AA150657 AA150658	B B	0.80 1.80		
3.0 4.0	TP termianted due to possible boulders End of Trial Pit at 2.50m					AA150659	B	2.50		

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER	23606		
CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP06**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES	708,341.72 E 732,771.52 N	**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)	53.35	**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of topsoil with angular to subangular cobbles)		0.20	53.15						
	Firm to stiff, brown, sandy gravelly silty CLAY medium subangular cobbles content		0.90	52.45		AA150672	B	0.50		
1.0	Stiff, greyish brown, slightly sandy very gravelly SILT with high angular cobbles and low boulders content		1.80	51.55		AA150673	B	1.50		
2.0	TP termianted due to possible boulders End of Trial Pit at 1.80m									
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

TRIAL PIT NO. **TP07**
SHEET Sheet 1 of 1

LOGGED BY I.Reder

CO-ORDINATES 708,347.53 E
732,712.30 N

GROUND LEVEL (m) 53.61

DATE STARTED 30/09/2021
DATE COMPLETED 30/09/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

EXCAVATION METHOD JCB

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL with some subangular cobbles		0.10	53.51						
	MADE GROUND (comprised of brown sandy gravelly clay, cobbles, boulders, very occasional plastic rubbish)		0.60	53.01		AA150689	B	0.50		
	Firm, light brown/brown, slightly sandy slightly gravelly silty CLAY		0.90	52.71						
1.0 2.0	Firm to stiff, brownish grey, slightly sandy gravelly SILT/CLAY with high subangular to angular cobbles and low boulders content		2.50	51.11		AA150690 AA150691	B B	1.30 2.30		
3.0 4.0	TP termianted due to possible boulders End of Trial Pit at 2.50m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

TRIAL PIT NO. TP08

SHEET Sheet 1 of 1

LOGGED BY I.Reder

CO-ORDINATES 708,423.11 E
732,776.87 N

GROUND LEVEL (m) 53.75

DATE STARTED 29/09/2021

DATE COMPLETED 29/09/2021

CLIENT Greenseed Ltd

ENGINEER CS Consulting

EXCAVATION METHOD JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples Sample Ref	Samples Type	Samples Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
MADE GROUND (comprised of topsoil with angular to subangular cobbles)		0.15	53.60						
MADE GROUND (comprised of brown sandy gravelly clay, cobbles, organic pieces)		0.40	53.35						
Stiff, brown, slightly sandy gravelly silty CLAY with high subangular cobbles content		1.00	52.75		AA150674	B	0.50		
Firm to stiff, brown, very sandy very gravelly CLAY with high subangular cobbles content (possible very clayey sandy gravel)		2.60	51.15		AA150675 AA150676	B B	1.50 2.50		
Very stiff, dark grey, slightly sandy gravelly SILT/CLAY with high subangular cobbles content		2.80	50.95		AA150677	B	2.80		
End of Trial Pit at 2.80m									

Groundwater Conditions
TP dry

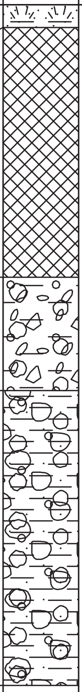
Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP09**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	30/09/2021
CO-ORDINATES	708,468.04 E 732,782.92 N	**DATE COMPLETED**	30/09/2021
GROUND LEVEL (m)	53.94	**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		



	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL with some subangular cobbles		0.10	53.84						
	MADE GROUND (comprised of brown sandy gravelly clay with cobbles, occasional plastic rubbish, red rbick pieces)					AA150686	B	0.50		
1.0			1.20	52.74						
	Dense, brown, clayey sandy fine to coarse GRAVEL with some subrounded to rounded cobbles					AA150687	B	1.50		
	Firm to sitff, brown, very sandy very gravelly CLAY with high subangular to subrounded cobbles and low boulders content		1.70	52.24						
2.0						AA150688	B	2.50		
3.0	End of Trial Pit at 3.00m		3.00	50.94						
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP10**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	708,425.83 E 732,723.82 N
		GROUND LEVEL (m)	54.19
CLIENT	Greenseed Ltd	**DATE STARTED**	30/09/2021
ENGINEER	CS Consulting	**DATE COMPLETED**	30/09/2021
		EXCAVATION METHOD	JCB

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL with some subangular cobbles	▨	0.10	54.09						
1.0	MADE GROUND (comprised of brown sandy gravelly clay with cobbles, occasional plastic rubbish, timber pieces, boulders)	▨	1.50	52.69		AA150678	B	0.70		
2.0	Firm, brown, very sandy very gravelly CLAY with high subangular cobbles content (possible very clayey sandy gravel)	▨	2.80	51.39		AA150679 AA150680	B B	1.60 2.50		
3.0	Firm, brown, sandy gravelly CLAY with high subangular to angular cobbles content	▨	3.10	51.09		AA150681	B	3.00		
4.0	End of Trial Pit at 3.10m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP11**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	30/09/2021
CO-ORDINATES	708,478.29 E 732,736.23 N	**DATE COMPLETED**	30/09/2021
GROUND LEVEL (m)	53.74	**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples Sample Ref	Samples Type	Samples Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL with some subangular cobbles		0.10	53.64						
MADE GROUND (comprised of brown/grey sandy gravelly clay, cobbles, boulders, timber, red brick, steel rebars, plastic rubbish)	▨	1.70	52.04		AA150682 AA150683	B B	0.50 1.50		
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with medium subangular cobbles content		3.20	50.54		AA150684	B	2.50		
Stiff, grey, slightly sandy gravelly SILT/CLAY with medium subangular cobbles content		3.50	50.24		AA150685	B	3.50		
End of Trial Pit at 3.50m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

TRIAL PIT NO. TP12
SHEET Sheet 1 of 1

LOGGED BY I.Reder

CO-ORDINATES 708,374.13 E
732,636.51 N

GROUND LEVEL (m) 53.06

DATE STARTED 30/09/2021
DATE COMPLETED 30/09/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

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		0.10	52.96						
MADE GROUND (comprised of brown sandy gravelly clay, cobbles, red brick pieces, very occasional plastic rubbish)		0.60	52.46		AA150695	B	0.50		
Firm, brown, very sandy very gravelly CLAY with medium subangular cobbles content		1.50	51.56		AA150696	B	1.40		
Firm to stiff, greyish brown, sandy gravelly silty CLAY with high subangular cobbles and low subangular boulders content		2.90	50.16		AA150697	B	2.40		
Stiff, dark grey, slightly sandy gravelly SILT/CLAY with high subangular cobbles content		3.10	49.96		AA150698	B	3.10		
End of Trial Pit at 3.10m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP13**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	30/09/2021
CO-ORDINATES	708,343.00 E 732,666.63 N	**DATE COMPLETED**	30/09/2021
GROUND LEVEL (m)	53.91	**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
MADE GROUND (comprised of brown sandy gravelly clay, cobbles, organic pieces)		0.50	53.41		AA150692	B	0.50		
Firm, brown, very sandy very gravelly CLAY with medium subangular cobbles content		1.70	52.21		AA150693	B	1.50		
Firm to stiff, brown, slightly sandy gravelly silty CLAY with high subangular cobbles and medium boulders content		2.60	51.31		AA150694	B	2.50		
TP termianted due to possible boulders End of Trial Pit at 2.60m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER	23606
CONTRACT	Site 6 , Parkwest , Dublin 12
TRIAL PIT NO.	**TP14**
SHEET	Sheet 1 of 1
LOGGED BY	I.Reder
CO-ORDINATES	708,233.15 E 732,757.07 N
GROUND LEVEL (m)	54.01
DATE STARTED	29/09/2021
DATE COMPLETED	29/09/2021
CLIENT	Greenseed Ltd
ENGINEER	CS Consulting
EXCAVATION METHOD	JCB

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of topsoil with many angular to subangular cobbles)		0.20	53.81						
	Stiff, light brown/brown, slightly sandy slightly gravelly silty CLAY (possible fill)		0.60	53.41		AA150660	B	0.50		
1.0	Stiff, brown, slightly sandy gravelly silty CLAY with high subangular cobblrs content		1.10	52.91						
	Stiff, greyish brown, slightly gravelly SILT with low subangular cobbles content		1.80	52.21		AA150661	B	1.50		
2.0	Stiff, brownish grey, very gravelly SILT with high angular cobbles and medium boulders content		2.50	51.51						
	TP termianted due to possible boulders or rock End of Trial Pit at 2.50m					AA150662	B	2.50		
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER	23606		
CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP15**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES	708,236.96 E 732,699.02 N	**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)	53.81	**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of topsoil with angular to subangular cobbles, sandy gravelly clay)		0.20	53.61						
	Stiff, brown, slightly sandy gravelly CLAY with high subangular cobbles		1.10	52.71		AA150663	B	0.80		
1.0	Stiff, brownish grey, slightly sandy slightly gravelly SILT with low angular coblles content		1.60	52.21		AA150664	B	1.50		
2.0	Stiff, grey, slightly sandy gravelly SILT with high subangular to angular cobbles and low boulders content		2.20	51.61						
	Dense, grey, silty angular GRAVEL with angular cobbles (weathered rock)		2.50	51.31						
	TP termianted due to possible rock End of Trial Pit at 2.50m					AA150665	B	2.50		
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

Appendix 3

Rotary Corehole Records

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

DRILLHOLE NO RC01
SHEET Sheet 1 of 1

CO-ORDINATES 708,134.34 E
732,734.62 N
GROUND LEVEL (mOD) 54.89

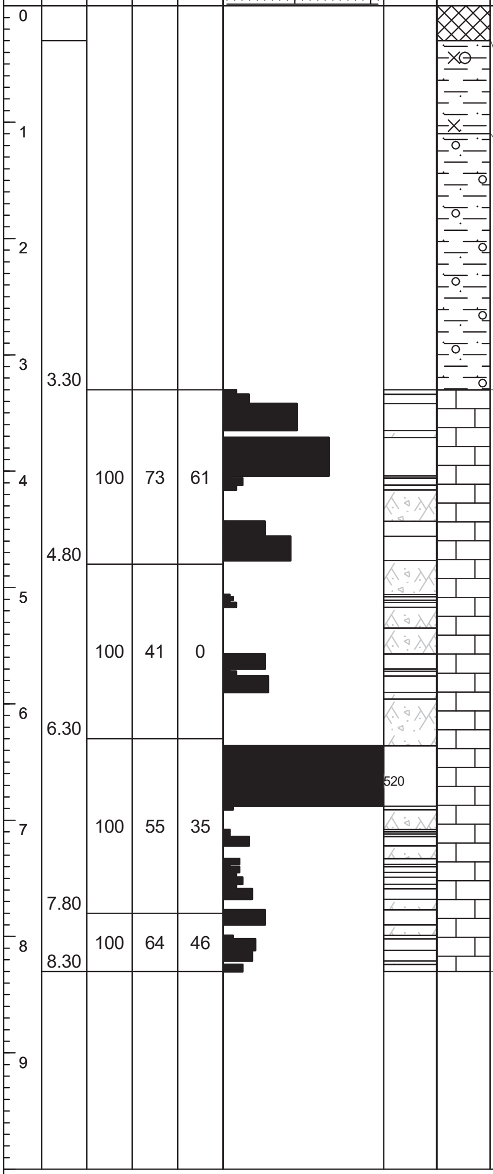
RIG TYPE Geo405
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 12/10/2021
DATE LOGGED 12/10/2021

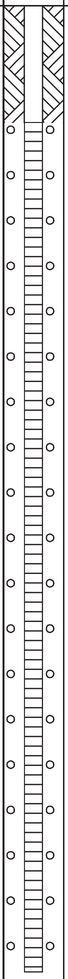
CLIENT Greenseed Ltd
ENGINEER CS Consulting

DRILLED BY IGSL
LOGGED BY D.O'Shea

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
3.30			
4.80	100	73	61
6.30	100	41	0
7.80	100	55	35
8.30	100	64	46



Description	Depth (m)	Elevation
SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of CL804 stone fill)	0.30	54.59
SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown sandy SILT/CLAY with some gravel (Possible Made Ground)	1.10	53.79
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown very sandy gravelly CLAY with angular cobbes	3.30	51.59
Very strong to locally weak, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.80m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (5.17-5.35m, 5.90-5.96m, 6.88-6.91m, 7.22-7.33m, 7.90-7.99m & 8.21-8.24m). Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-25mm thick). Dips are 20-30° & locally 45° & irregular.	8.30	46.59
End of Borehole at 8.30 m		



SPT (N Value)
N = 62/105 mm (1, 4, 12, 25, 25)

REMARKS
Hole cased 0.00-3.30m. Erect Covid-19 Safe Zone - 1hr.

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
12-10-21	8.30	1.00	8.30	50mm SP

GROUNDWATER DETAILS

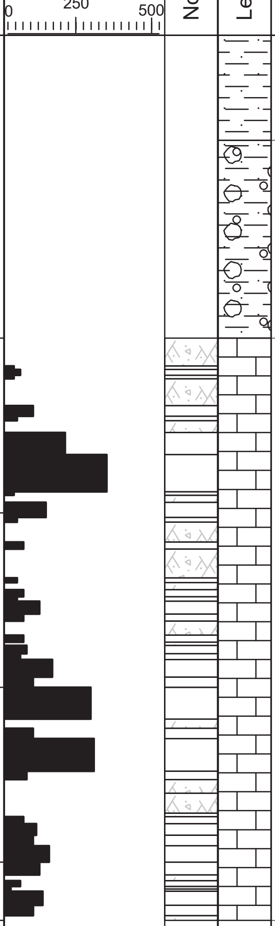
Date	Hole Depth	Casing Depth	Depth to Water	Comments
12-10-21	8.30	3.30	7.40	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

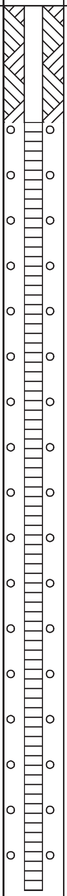
REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12
DRILLHOLE NO	**RC02**
SHEET	Sheet 1 of 1
CO-ORDINATES	708,213.73 E 732,696.79 N
GROUND LEVEL (mOD)	53.92
RIG TYPE	Geo405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78
DATE DRILLED	13/10/2021
DATE LOGGED	13/10/2021
CLIENT	Greenseed Ltd
ENGINEER	CS Consulting
DRILLED BY	IGSL
LOGGED BY	D.O'Shea

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
2.60			
4.10	100	51	36
5.60	100	41	23
7.10	100	65	53
7.60	100	72	46



Description	Depth (m)	Elevation
SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown sandy SILT/CLAY (Possibly Made Ground)	0.90	53.02
SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark brown sandy gravelly CLAY with some angular cobbles	2.60	51.32
Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.80m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (2.60-2.84m, 2.95-3.18m, 3.95-4.01m, 4.18-4.35m, 4.70-4.76m, 5.21-5.24m, 6.39-6.51m & 6.68-6.71m). Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-10mm thick). Dips are 20-30° & locally 45° & irregular.	7.60	46.32
End of Borehole at 7.60 m		



REMARKS

Hole cased 0.00-2.60m. Erect Covid-19 Safe Zone - 1hr.

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
13-10-21	7.60	1.00	7.60	50mm SP

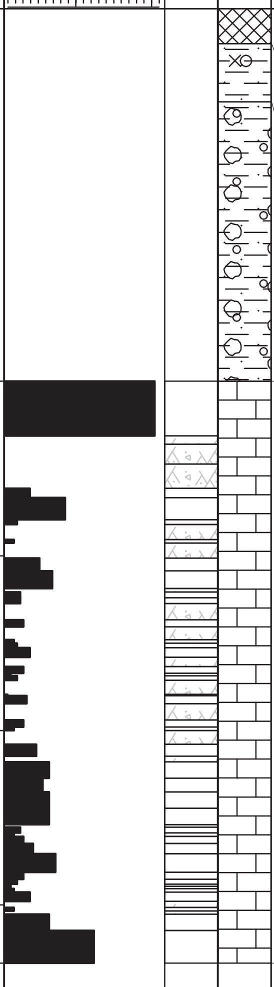
GROUNDWATER DETAILS

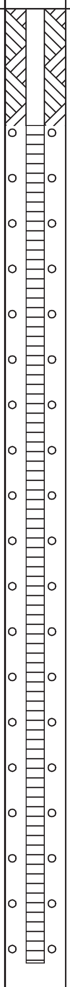
Date	Hole Depth	Casing Depth	Depth to Water	Comments
13-10-21	7.60	2.60	6.90	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**DRILLHOLE NO**	**RC03**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,262.18 E 732,751.27 N	**DATE DRILLED**	13/10/2021
GROUND LEVEL (mOD)	53.77	**DATE LOGGED**	13/10/2021
RIG TYPE	Geo405		
FLUSH	Air/Mist		
CLIENT	Greenseed Ltd	**DRILLED BY**	IGSL
ENGINEER	CS Consulting	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		





Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Elevation	SPT (N Value)
				SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of brown sandy SILT/CLAY)	0.30	53.47	
				SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown sandy SILT/CLAY with occasional gravel	0.80	52.97	
3.20				SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark brown sandy gravelly CLAY with some angular cobbles	3.20	50.57	N = 67/95 mm (4, 19, 17, 25, 25)
4.70	100	51	41	Strong to locally weak, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.40m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (3.74-3.91m, 4.43-4.56m, 4.98-5.01m, 5.77-5.89m, 6.42-6.47m & 7.01-7.03m). Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-20mm thick). Dips are 20-30° & locally 45°, subvertical & irregular.			
6.20	100	35	17				
7.70	100	71	32				
8.20	100	84	82		8.20	45.57	
				End of Borehole at 8.20 m			

REMARKS

Hole cased 0.00-3.20m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

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

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
13-10-21	8.20	3.20	5.30	Water level recorded 5 mins after end of drilling.

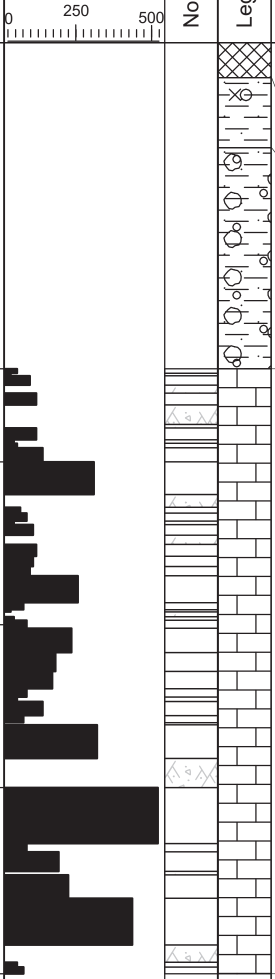
INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
13-10-21	8.20	1.00	8.20	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**DRILLHOLE NO**	**RC04**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,262.08 E 732,706.46 N	**DATE DRILLED**	06/10/2021
GROUND LEVEL (mOD)	53.75	**DATE LOGGED**	07/10/2021
RIG TYPE	Geo205	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		



Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
2.80			
3.60	100	58	29
5.00	100	76	44
6.40	100	74	55
8.00	100	91	79

Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of brown sandy SILT/CLAY)	0.30	53.45		
SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown sandy SILT/CLAY with some gravel	0.90	52.85		
SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark brown sandy gravelly CLAY with occasional angular cobbles	2.80	50.95		
Strong to locally weak, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.80m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (3.28-3.31m, 3.88-3.99m, 4.89-4.93m, 5.84-5.86m & 7.12-7.15m). Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-15mm thick). Dips are 20-30° & locally 70° & irregular.	8.00	45.75		
End of Borehole at 8.00 m				

REMARKS

Hole cased 0.00-2.80m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.80	2.80	N/S			Seepage

GROUNDWATER DETAILS

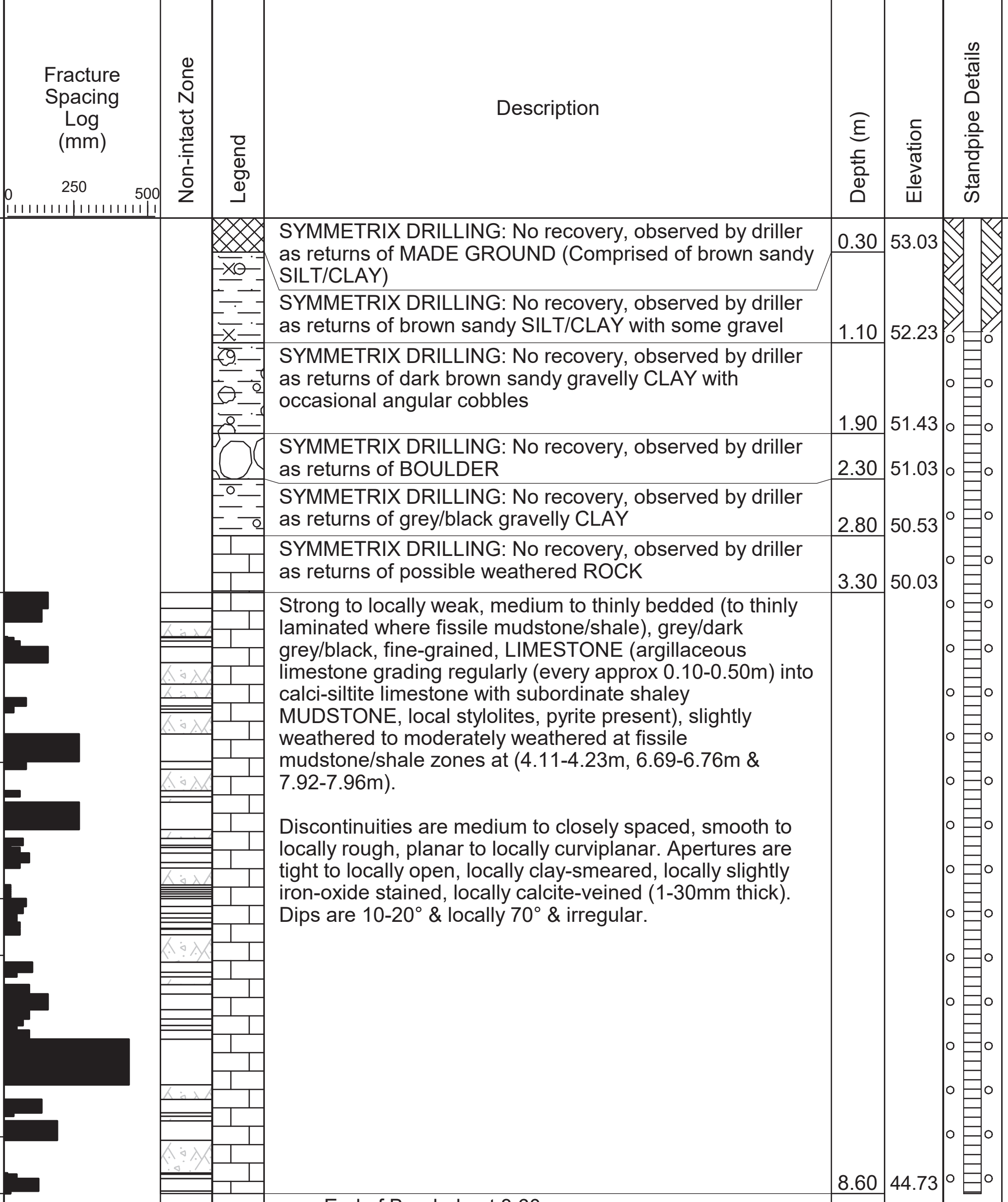
Date	Hole Depth	Casing Depth	Depth to Water	Comments
07-10-21	8.00	2.80	2.40	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER	23606
CONTRACT	Site 6 , Parkwest , Dublin 12
DRILLHOLE NO	RC05
SHEET	Sheet 1 of 1
CO-ORDINATES	708,326.95 E 732,758.44 N
GROUND LEVEL (mOD)	53.33
RIG TYPE	Geo205
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78
DATE DRILLED	12/10/2021
DATE LOGGED	13/10/2021
CLIENT	Greenseed Ltd
ENGINEER	CS Consulting
DRILLED BY	IGSL
LOGGED BY	D.O'Shea



Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
0 – 3.30	3.30			
3.30 – 4.80	4.80	100	45	34
4.80 – 6.00	6.00	100	57	26
6.00 – 6.50	6.50	100	36	0
6.50 – 8.10	8.10	100	56	26
8.10 – 8.60	8.60	100	56	20

Description	Depth (m)	Elevation
SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of brown sandy SILT/CLAY)	0.30	53.03
SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown sandy SILT/CLAY with some gravel	1.10	52.23
SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark brown sandy gravelly CLAY with occasional angular cobbles	1.90	51.43
SYMMETRIX DRILLING: No recovery, observed by driller as returns of BOULDER	2.30	51.03
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY	2.80	50.53
SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered ROCK	3.30	50.03
Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.50m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (4.11-4.23m, 6.69-6.76m & 7.92-7.96m). Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-30mm thick). Dips are 10-20° & locally 70° & irregular.	8.60	44.73
End of Borehole at 8.60 m		

REMARKS

Hole cased 0.00-3.30m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.90	2.90	N/S			Seepage

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
13-10-21	8.60	1.00	8.60	50mm SP

GROUNDWATER DETAILS

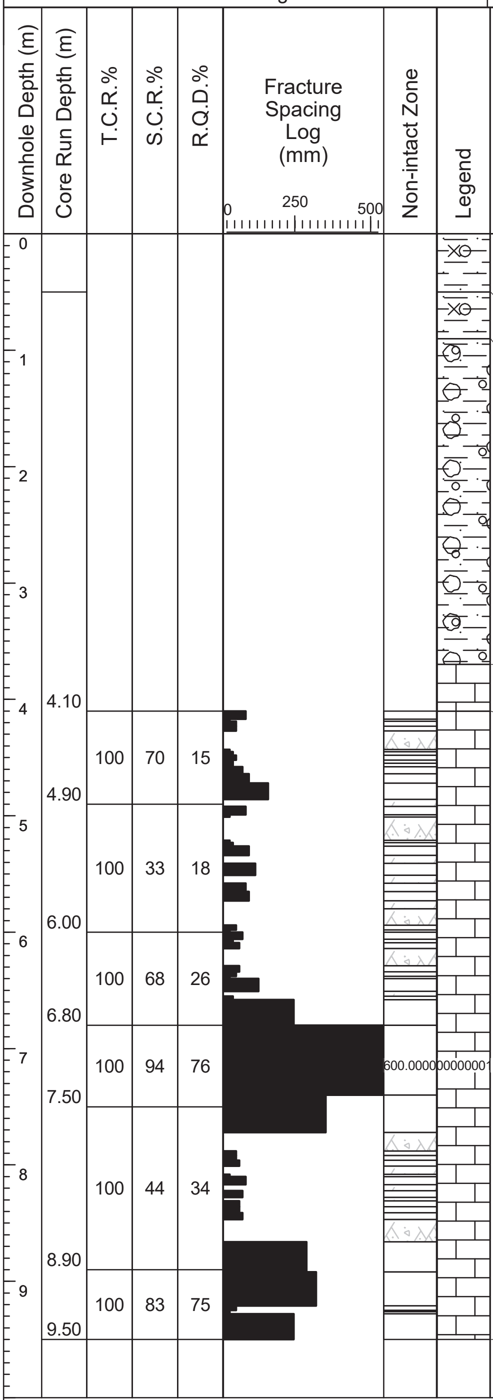
Date	Hole Depth	Casing Depth	Depth to Water	Comments
13-10-21	8.60	3.30	2.30	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**DRILLHOLE NO**	**RC06**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,333.13 E 732,719.94 N	**DATE DRILLED**	08/10/2021
GROUND LEVEL (mOD)	53.49	**DATE LOGGED**	08/10/2021
RIG TYPE	Geo205		
FLUSH	Air/Mist		
CLIENT	Greenseed Ltd	**INCLINATION (deg)**	-90
ENGINEER	CS Consulting	**CORE DIAMETER (mm)**	78
DRILLED BY	IGSL	**LOGGED BY**	D.O'Shea

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
4.10			
4.10-4.90	100	70	15
4.90-6.00	100	33	18
6.00-6.80	100	68	26
6.80-7.50	100	94	76
7.50-8.90	100	44	34
8.90-9.50	100	83	75



Description	Depth (m)	Elevation
SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown sandy SILT/CLAY with occasional gravel (Possibly Made Ground)	0.50	52.99
SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown sandy SILT/CLAY with some gravel	0.90	52.59
SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark brown very gravelly sandy CLAY with occasional angular cobbles	3.70	49.79
SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered ROCK	4.10	49.39
Strong to locally weak, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.90m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (5.73-5.80m, 6.51-6.55m, 7.72-7.88m & 8.01-8.08m). Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-30mm thick). Dips are 20-30° & locally 70° & irregular.	9.50	43.99
End of Borehole at 9.50 m		

Standpipe Details | SPT (N Value)

REMARKS

Hole cased 0.00-4.10m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.80	3.80	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08-10-21	9.50	4.10	2.20	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

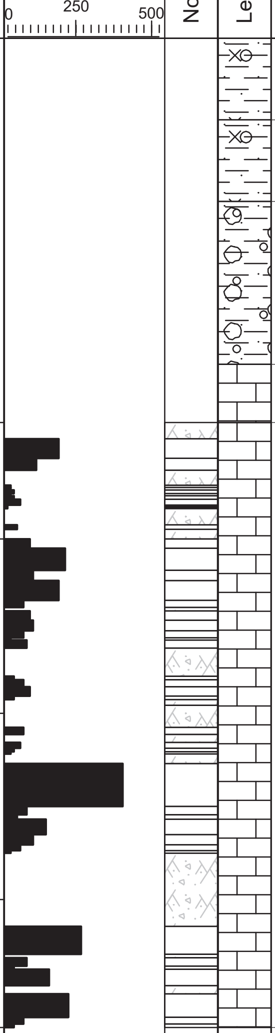
Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**DRILLHOLE NO**	**RC07**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,365.29 E 732,774.10 N	**DATE DRILLED**	11/10/2021
GROUND LEVEL (mOD)	53.31	**DATE LOGGED**	12/10/2021
RIG TYPE	Geo205	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
3.30			
4.30	100	27	0
5.80	100	78	31
7.40	100	55	37
8.50	100	69	52



Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown sandy SILT/CLAY with occasional gravel (Possibly Made Ground)	0.70	52.61		
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown sandy SILT/CLAY with frequent gravel	1.40	51.91		
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown and black sandy gravelly CLAY with some angular cobbles	2.80	50.51		
SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered ROCK	3.30	50.01		
Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.50m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (4.04-4.18m, 4.22-4.30m, 5.68-5.73m, 6.15-6.23m & 7.87-7.90m). Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-30mm thick). Dips are 10-20° & locally 70° & irregular.	8.50	44.81		
End of Borehole at 8.50 m				

REMARKS

Hole cased 0.00-3.30m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.00	3.00	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
12-10-21	8.50	3.30	2.40	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

DRILLHOLE NO **RC08**
SHEET Sheet 1 of 1

CO-ORDINATES 708,385.70 E
732,722.64 N
GROUND LEVEL (mOD) 53.52

RIG TYPE Geo405
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

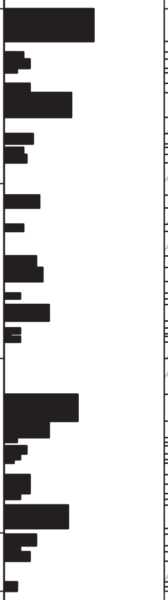
DATE DRILLED 14/10/2021
DATE LOGGED 14/10/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

DRILLED BY IGSL
LOGGED BY D.O'Shea

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Elevation
				SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of light brown sandy SILT/CLAY with gravel and plastic fragments)	1.00	52.52
				SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark brown SILT/CLAY with frequent gravel	1.90	51.62
4.00				SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark brown sandy very gravelly CLAY with some angular cobbles	4.00	49.52
5.50	100	61	35	Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.50m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (4.28-4.37m, 5.16-5.19m, 6.49-6.54m & 7.72-7.75m). Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-5mm thick). Dips are 20-30° & locally 70° & irregular.		
7.00	100	51	26			
8.50	100	57	39			
9.00	100	62	0		9.00	44.52

End of Borehole at 9.00 m



REMARKS

Hole cased 0.00-4.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.50	3.50	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-10-21	9.00	1.00	9.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
14-10-21	9.00	4.00	2.50	Water level recorded 5 mins after end of drilling.

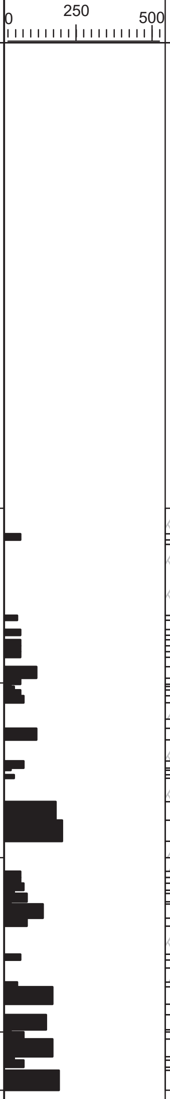
GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**DRILLHOLE NO**	**RC09**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,444.44 E 732,770.45 N	**DATE DRILLED**	15/10/2021
GROUND LEVEL (mOD)	54.17	**DATE LOGGED**	15/10/2021
RIG TYPE	Geo405	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
4.00			
5.50	100	23	0
7.00	100	36	21
8.50	100	47	17
9.00	100	84	36

Fracture Spacing Log (mm)



Description	Depth (m)	Elevation
SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown SILT/CLAY with some gravel (Possibly Made Ground)	0.70	53.47
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown gravelly sandy CLAY with occasional angular cobbles	3.30	50.87
SYMMETRIX DRILLING: No recovery, observed by driller as returns of black very gravelly sandy CLAY with angular cobbles	4.00	50.17
Very strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.50m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (4.27m, 5.23-5.28m, 5.81-5.87m, 6.25-6.29m, 7.95-8.07m, 8.26-8.35m & 8.80-8.83m). Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-5mm thick). Dips are 20-30° & locally 70° & irregular.	9.00	45.17
End of Borehole at 9.00 m		

REMARKS

Hole cased 0.00-4.00m. Erect Covid-19 Safe Zone - 1hr.

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
15-10-21	9.00	1.00	9.00	50mm SP

GROUNDWATER DETAILS

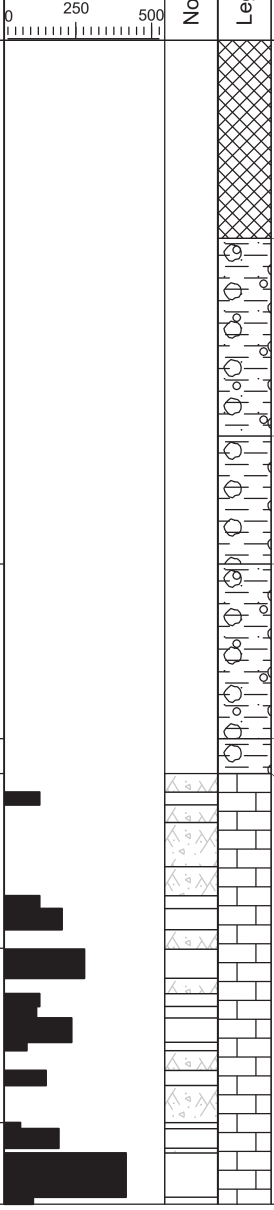
Date	Hole Depth	Casing Depth	Depth to Water	Comments
15-10-21	9.00	4.00	7.20	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**DRILLHOLE NO**	**RC10**
		SHEET	Sheet 1 of 2
CO-ORDINATES	708,448.53 E 732,739.74 N	**DATE DRILLED**	18/10/2021
GROUND LEVEL (mOD)	54.09	**DATE LOGGED**	18/10/2021
RIG TYPE	Geo405	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
4.50			
6.00	67	0	0
6.30	0	0	0
7.80	100	25	11
9.30	100	59	35



Description	Depth (m)	Elevation	SPT (N Value)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of brown sandy silty/clayey fill with cobbles , concrete and teel)	1.70	52.39	
SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark brown sandy gravelly CLAY with some angular cobbles	3.40	50.69	
SYMMETRIX DRILLING: No recovery, observed by driller as returns of black gravelly CLAY with occasional cobbles	4.50	49.59	N = 25/10 mm (25, 25)
Returns of hard, dark brown sandy gravelly CLAY with occasional cobbles. Sand is fine to medium. Gravel is anglar to subrounded fine to coare of limestone.	6.00	48.09	N = 74/170 mm (1, 4, 9, 15, 25, 25)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of black gravelly CLAY with occasional cobbles	6.30	47.79	
Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.50m) into calci-siltite limestone with subordinate shaley MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately weathered at fissile mudstone/shale zones at (6.72-7.10m, 7.64-7.81m, 8.68-8.85m, 9.52-9.56m, 9.52-9.56m & 11.19-11.30m). Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-40mm thick). Dips are 30-40° & locally 70° & irregular.			

REMARKS

Hole cased 0.00-6.30m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.10	6.10	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
18-10-21	11.30	1.00	11.30	50mm SP

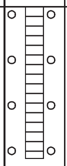
GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
18-10-21	11.30	6.30	6.10	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**DRILLHOLE NO**	**RC10**
		SHEET	Sheet 2 of 2
CO-ORDINATES	708,448.53 E 732,739.74 N	**DATE DRILLED**	18/10/2021
GROUND LEVEL (mOD)	54.09	**DATE LOGGED**	18/10/2021
RIG TYPE	Geo405		
FLUSH	Air/Mist		
CLIENT	Greenseed Ltd	**DRILLED BY**	IGSL
ENGINEER	CS Consulting	**LOGGED BY**	D.O'Shea
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)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10		100	65	58								
	10.80											
11		100	22	0								
	11.30								11.30	42.79		
								End of Borehole at 11.30 m				
12												
13												
14												
15												
16												
17												
18												
19												

REMARKS

Hole cased 0.00-6.30m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.10	6.10	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
18-10-21	11.30	1.00	11.30	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
18-10-21	11.30	6.30	6.10	Water level recorded 5 mins after end of drilling.

RC01 Box 1 of 2 – 3.30-6.30m

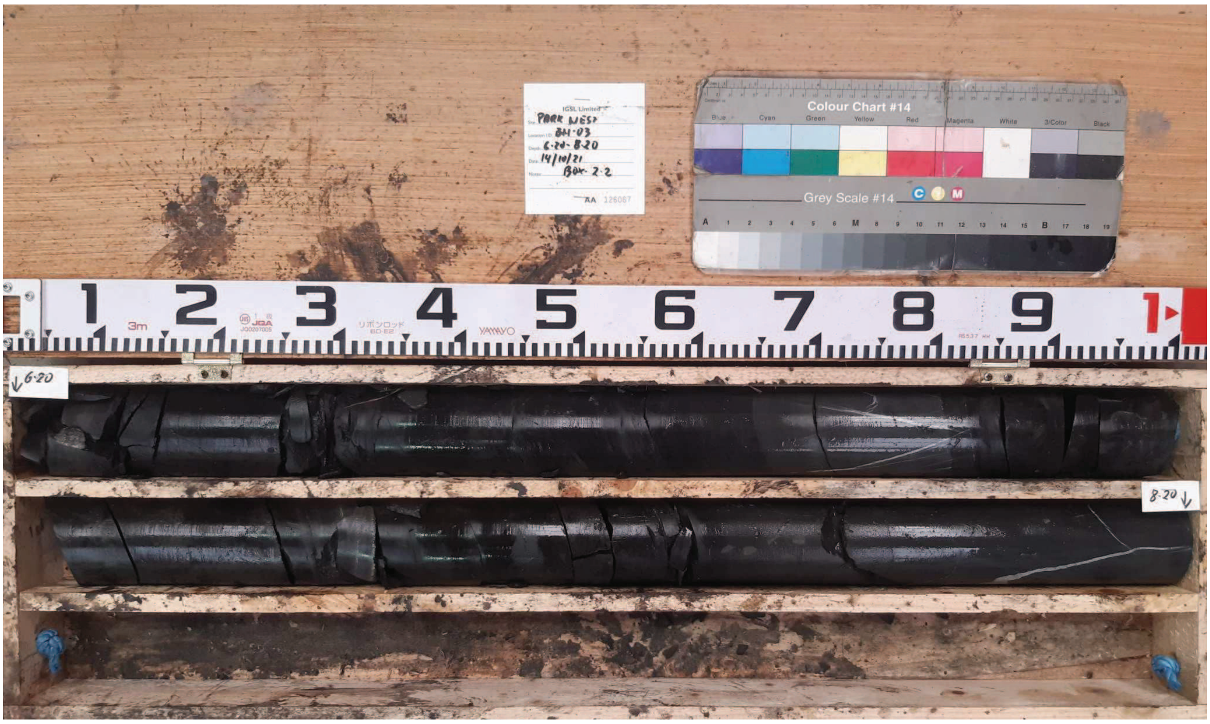
RC01 Box 2 of 2 – 6.30-8.30m

RC02 Box 1 of 2 – 2.60-5.60m

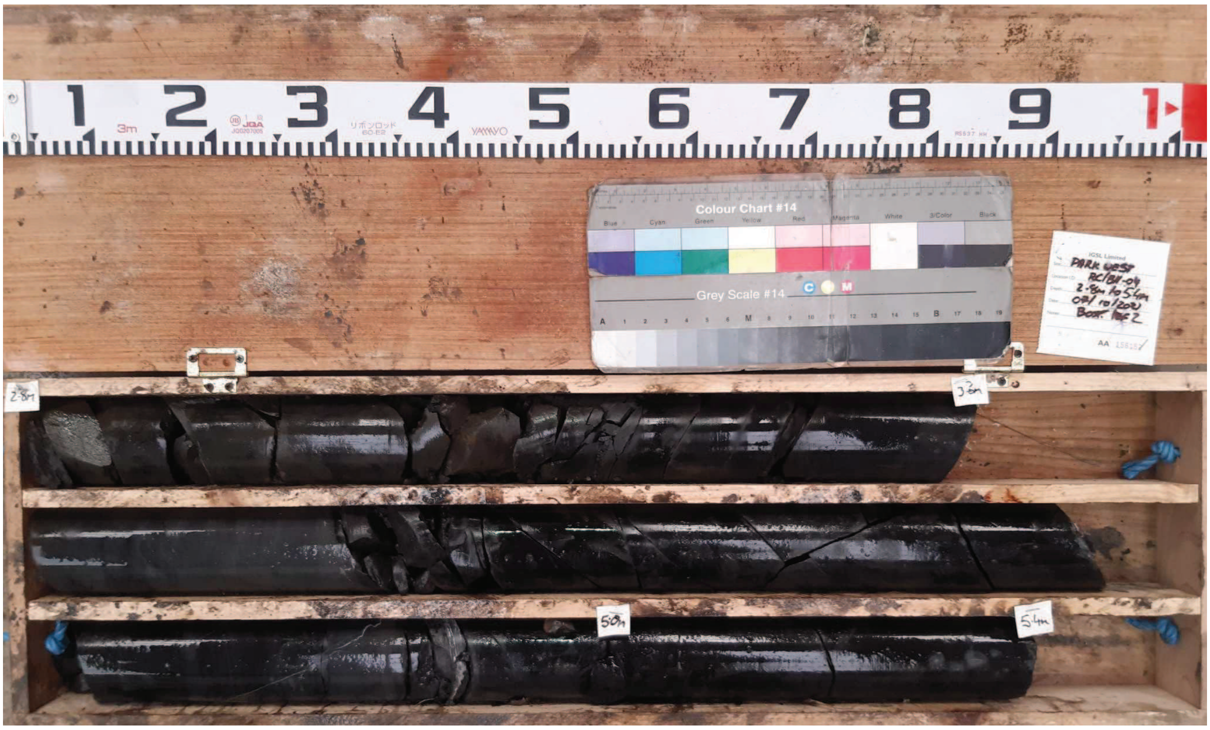
RC02 Box 2 of 2 – 5.60-7.60m

RC03 Box 1 of 2 – 3.20-6.20m

RC03 Box 2 of 2 – 6.20-8.20m



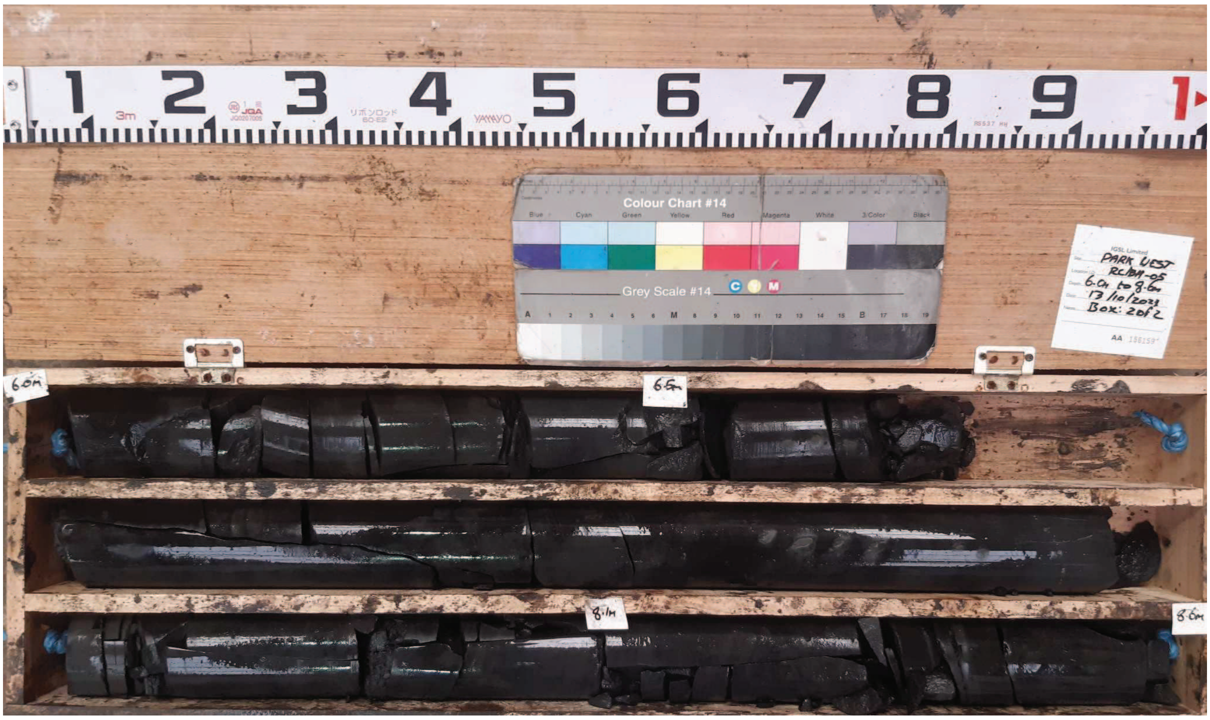
RC04 Box 1 of 2 – 2.80-5.40m



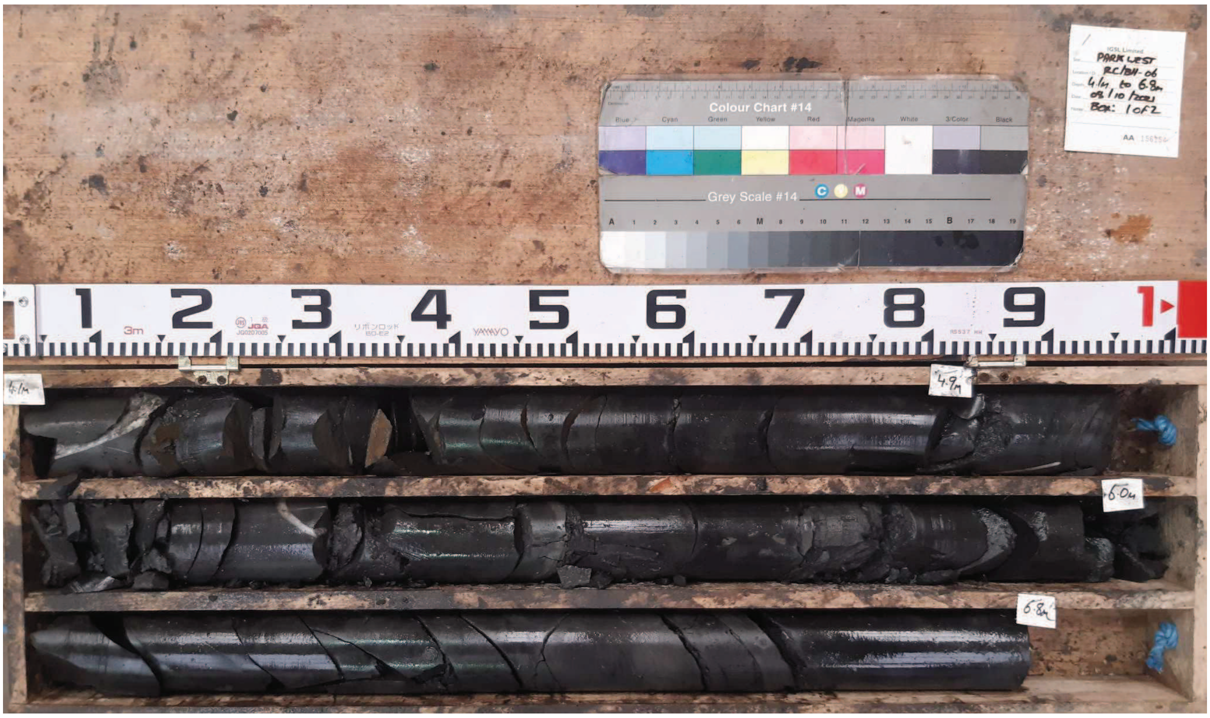
RC04 Box 2 of 2 – 5.40-8.00m

RC05 Box 1 of 2 – 3.30-6.00m

RC05 Box 2 of 2 – 6.00-8.60m



RC06 Box 1 of 2 – 4.10-6.80m



RC06 Box 2 of 2 – 6.80-9.50m

RC07 Box 1 of 2 – 3.30-6.10m

RC07 Box 2 of 2 – 6.10-8.50m

RC08 Box 1 of 2 – 4.00-7.00m

RC08 Box 2 of 2 – 7.00-9.00m

RC09 Box 1 of 2 – 4.00-7.00m

RC09 Box 2 of 2 – 7.00-9.00m

RC10 Box 1 of 2 – 4.50-8.30m

RC10 Box 2 of 2 – 4.50-8.30m

Appendix 4

Infiltration Test Records

Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Contract No. 23606
Test No. SA01
Engineer CS Consulting
Date: 01/10/2021

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	MADE GROUND (topsoil, sandy gravelly clay, cobbles)	DRY
0.40	1.50	Firm to stiff, greyish brown, slightly sandy gravelly silty CLAY with high subangul	
		to angular cobbles	

Notes: SA01 location: E:708162.354; N:732753.228; G.L.54.886mOD

Field Data

Depth to Water (m)	Elapsed Time (min)
0.900	0.00
0.900	1.00
0.905	2.00
0.907	3.00
0.907	4.00
0.910	5.00
0.910	6.00
0.912	7.00
0.912	8.00
0.912	9.00
0.912	10.00
0.915	12.00
0.917	14.00
0.920	16.00
0.922	18.00
0.925	20.00
0.930	25.00
0.935	30.00
0.940	35.00
0.945	40.00
0.950	45.00
0.955	50.00
0.960	55.00
0.965	60.00

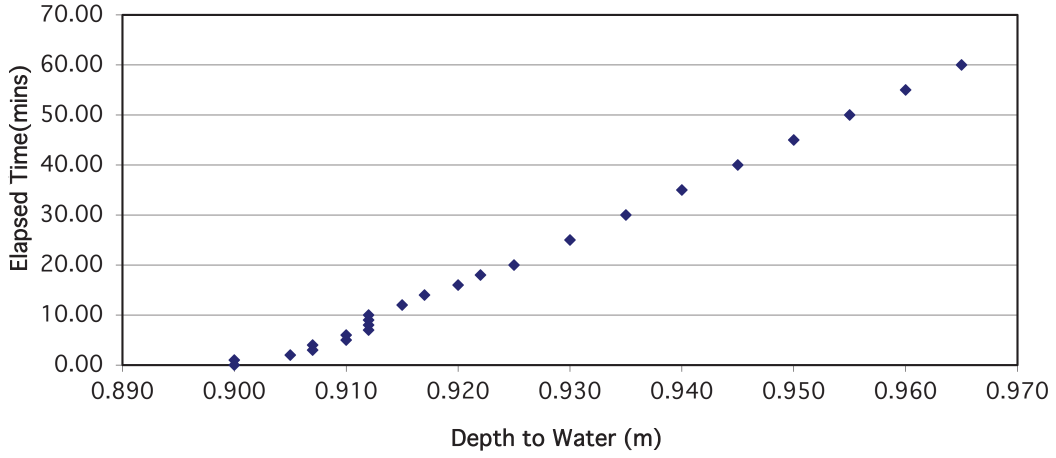
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.90	m
Final depth to water =	0.965	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1	m2
*Av. side area of permeable stratum over test perio	2.8375	m2
Total Exposed area =	3.8375	m2

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

f= 0.00028 m/min or 4.70503E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Test No. SA02
Engineer CS Consulting
Date: 01/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	MADE GROUND (topsoil with many cobbles)	DRY
0.20	0.60	Firm, light brown/brown slightly sandy gravelly CLAY	
0.60	1.10	Firm, brown, sandy gravelly silty CLAY with low cobbles content	
1.10	1.80	Firm, brown/grey, slightly sandy slightly gravelly SILT with low cobbles content	

Notes: SA02 location: E:708283.654; N:732768.658; G.L. 53.508mOD

Field Data

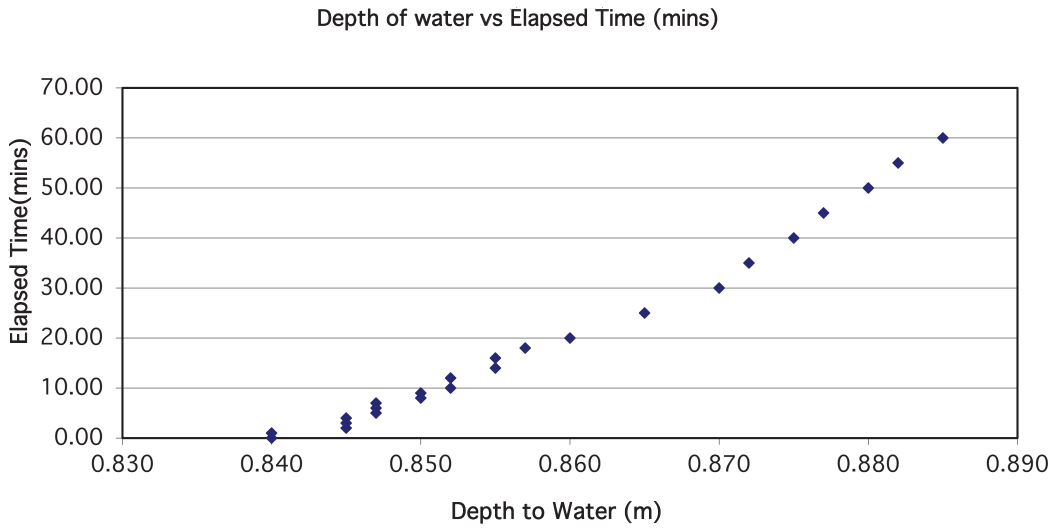
Depth to Water (m)	Elapsed Time (min)
0.840	0.00
0.840	1.00
0.845	2.00
0.845	3.00
0.845	4.00
0.847	5.00
0.847	6.00
0.847	7.00
0.850	8.00
0.850	9.00
0.852	10.00
0.852	12.00
0.855	14.00
0.855	16.00
0.857	18.00
0.860	20.00
0.865	25.00
0.870	30.00
0.872	35.00
0.875	40.00
0.877	45.00
0.880	50.00
0.882	55.00
0.885	60.00

Field Test

Depth of Pit (D)	1.80	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.84	m
Final depth to water =	0.885	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1	m2
*Av. side area of permeable stratum over test perioc	4.6875	m2
Total Exposed area =	5.6875	m2

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

f= 0.00013 m/min or 2.1978E-06 m/sec



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Contract No. 23606
Test No. SA03
Engineer CS Consulting
Date: 01/10/2021

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	DRY
0.10	0.60	MADE GROUND (brown sandy gravelly clay, cobbles, occasional plastic rubbish,	
		old steel wires)	
0.60	1.50	Firm to stiff, brown, sandy very gravelly CLAY with medium cobbles content	

Notes: SA03 location: E:708408.892, N:732787.278, G.L. 53.561mOD

Field Data

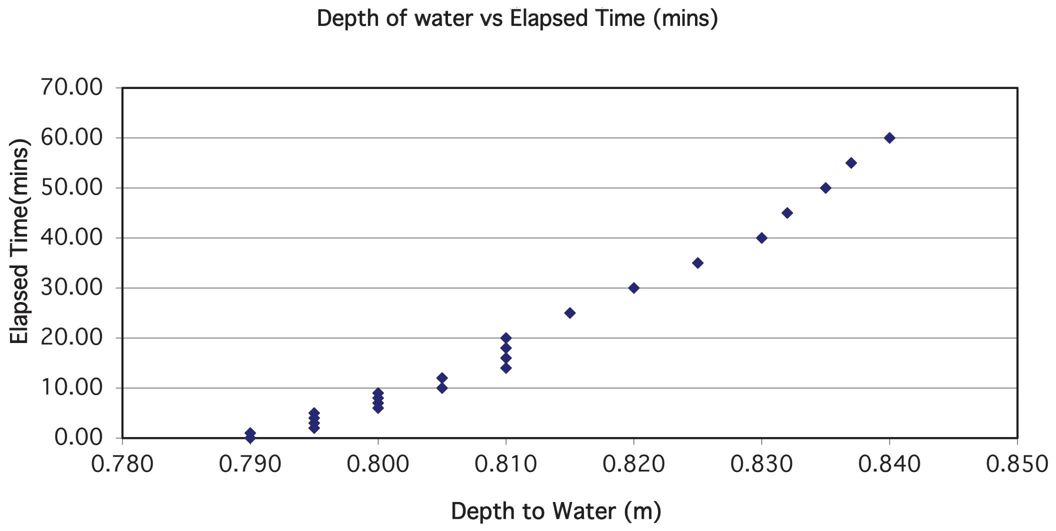
Depth to Water (m)	Elapsed Time (min)
0.790	0.00
0.790	1.00
0.795	2.00
0.795	3.00
0.795	4.00
0.795	5.00
0.800	6.00
0.800	7.00
0.800	8.00
0.800	9.00
0.805	10.00
0.805	12.00
0.810	14.00
0.810	16.00
0.810	18.00
0.810	20.00
0.815	25.00
0.820	30.00
0.825	35.00
0.830	40.00
0.832	45.00
0.835	50.00
0.837	55.00
0.840	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.79	m
Final depth to water =	0.840	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1	m2
*Av. side area of permeable stratum over test perioc	3.425	m2
Total Exposed area =	4.425	m2

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

f= 0.00019 m/min or 3.13873E-06 m/sec



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West Contract No. 23606
Test No. SA04 cycle01
Engineer CS Consulting
Date: 14/10/2021

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	DRY
0.20	1.50	MADE GROUND comprised of firm to stiff brown sandy gravelly CLAY with low cobble content. Also contains red brick and plastic	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.740	0.00
0.740	1.00
0.740	2.00
0.740	3.00
0.740	4.00
0.740	5.00
0.750	6.00
0.750	7.00
0.750	8.00
0.750	9.00
0.750	10.00
0.750	12.00
0.750	14.00
0.750	16.00
0.750	18.00
0.760	20.00
0.760	25.00
0.760	30.00
0.770	35.00
0.770	40.00
0.770	45.00
0.770	50.00
0.780	55.00
0.780	60.00

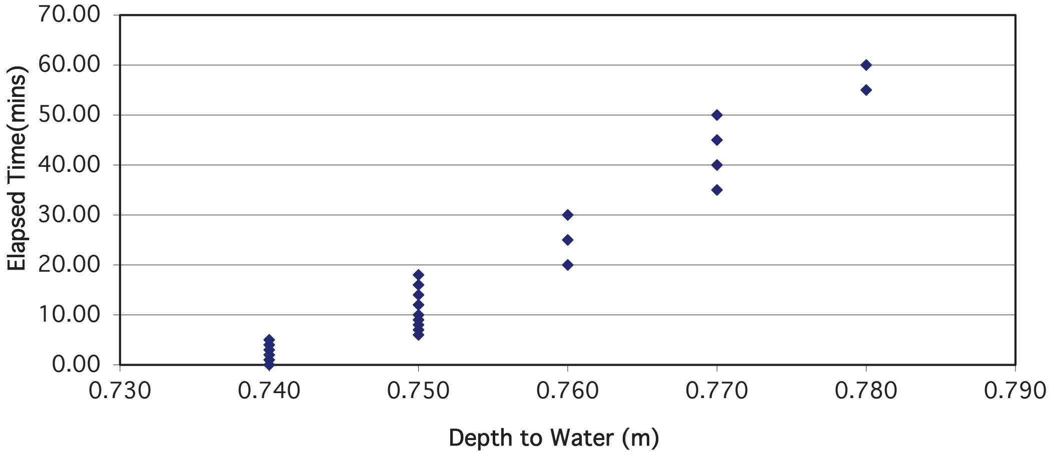
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.10	m
Initial depth to Water =	0.740	m
Final depth to water =	0.780	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.55	m2
*Av. side area of permeable stratum over test perioc	2.368	m2
Total Exposed area =	2.918	m2

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

f= 0.00013 m/min or 2.09428E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Contract No. 23606
Test No. SA04 cycle02
Engineer CS Consulting
Date: 14/10/2021

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	DRY
0.20	1.50	MADE GROUND comprised of firm to stiff brown sandy gravelly CLAY with low cobble content. Also contains red brick and plastic	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.670	0.00
0.670	1.00
0.670	2.00
0.670	3.00
0.670	4.00
0.670	5.00
0.670	6.00
0.670	7.00
0.670	8.00
0.680	9.00
0.680	10.00
0.680	12.00
0.680	14.00
0.680	16.00
0.680	18.00
0.680	20.00
0.680	25.00
0.680	30.00
0.680	35.00
0.680	40.00
0.690	45.00
0.690	50.00
0.690	55.00
0.690	60.00

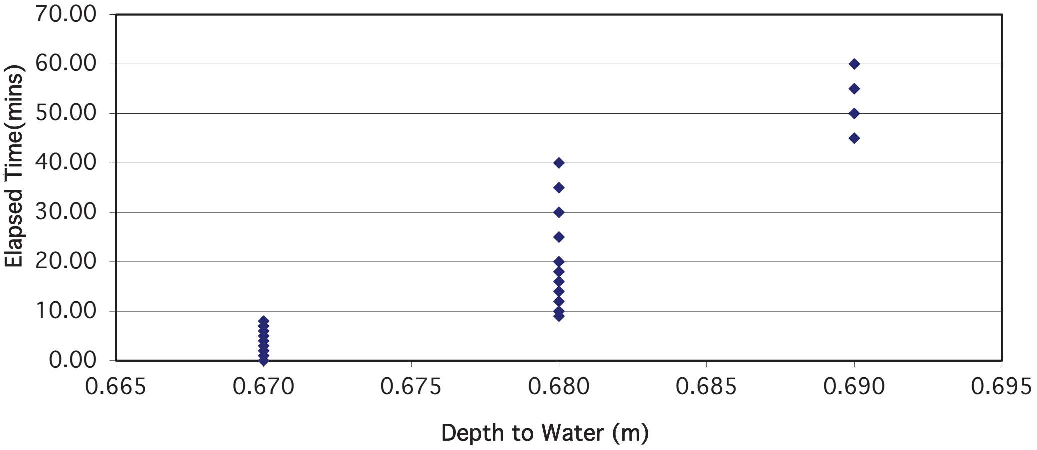
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.10	m
Initial depth to Water =	0.670	m
Final depth to water =	0.690	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.55	m2
*Av. side area of permeable stratum over test period	2.624	m2
Total Exposed area =	3.174	m2

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

f= 5.8E-05 m/min or 9.62683E-07 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Test No. SA05
Engineer CS Consulting
Date: 01/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL with many angular cobbles	DRY
0.10	0.60	MADE GROUND (brown sandy gravelly clay, many angular cobbles)	
0.60	1.70	Firm to stiff, brown, sandy very gravelly CLAY with medium cobbles content	

Notes: SA05 location: E:708409.677, N:732740.093, G.L. 53.684mOD

Field Data

Depth to Water (m)	Elapsed Time (min)
0.895	0.00
0.895	1.00
0.895	2.00
0.900	3.00
0.900	4.00
0.900	5.00
0.900	6.00
0.900	7.00
0.900	8.00
0.902	9.00
0.902	10.00
0.902	12.00
0.902	14.00
0.905	16.00
0.905	18.00
0.905	20.00
0.907	25.00
0.910	30.00
0.910	35.00
0.912	40.00
0.912	45.00
0.915	50.00
0.915	55.00
0.915	60.00

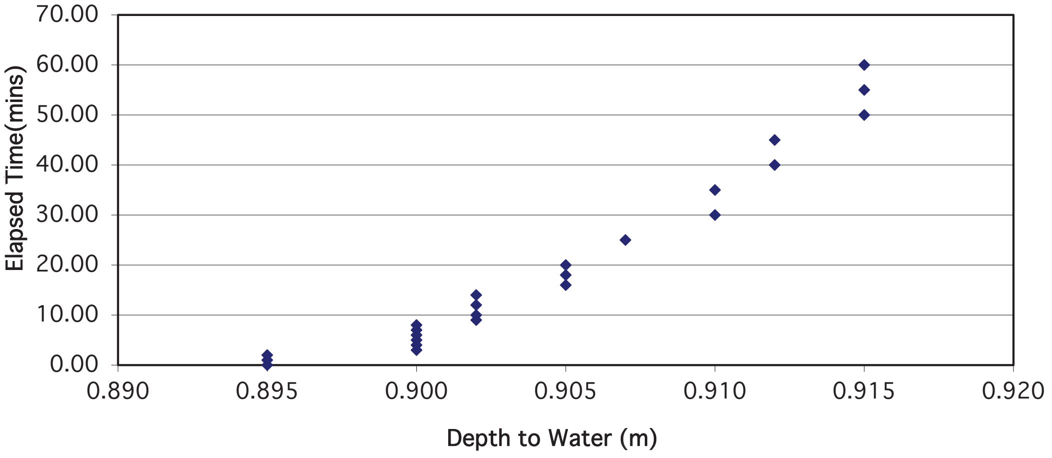
Field Test

Depth of Pit (D)	1.70	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.895	m
Final depth to water =	0.915	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1	m2
*Av. side area of permeable stratum over test perioc	3.975	m2
Total Exposed area =	4.975	m2

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

f= 6.7E-05 m/min or 1.11669E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests **IGSL**

Contract: Unit 6, Park West
Test No. SA06
Engineer CS Consulting
Date: 01/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.35	MADE GROUND (topsoil, many angular cobbles)	DRY
0.35	1.60	Firm, brown, sandy gravelly silty CLAY with medium cobbles content	

Notes: SA06 location: E:708232.636, N:732735.765, G.L. 53.774mOD

Field Data

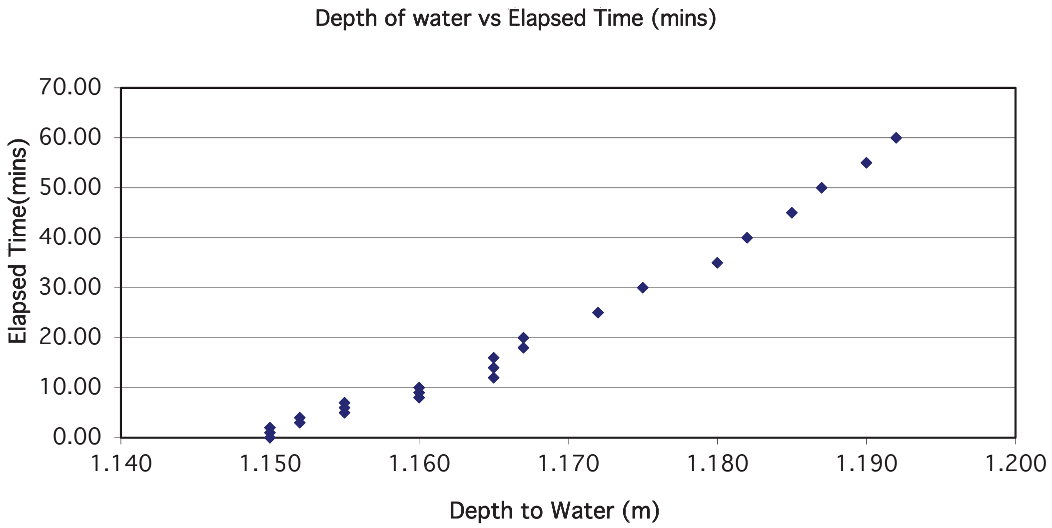
Depth to Water (m)	Elapsed Time (min)
1.150	0.00
1.150	1.00
1.150	2.00
1.152	3.00
1.152	4.00
1.155	5.00
1.155	6.00
1.155	7.00
1.160	8.00
1.160	9.00
1.160	10.00
1.165	12.00
1.165	14.00
1.165	16.00
1.167	18.00
1.167	20.00
1.172	25.00
1.175	30.00
1.180	35.00
1.182	40.00
1.185	45.00
1.187	50.00
1.190	55.00
1.192	60.00

Field Test

Depth of Pit (D)	1.60	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	1.150	m
Final depth to water =	1.192	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1	m2
*Av. side area of permeable stratum over test perioc	2.145	m2
Total Exposed area =	3.145	m2

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

f= 0.00022 m/min or 3.70959E-06 m/sec



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Test No. SA07 cycle01
Engineer CS Consulting
Date: 14/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	DRY
0.10	1.50	MADE GROUND comprised of firm to very stiff brown sandy gravelly CLAY with low cobble content. Also contains red brick and plastic	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.700	0.00
0.700	1.00
0.700	2.00
0.700	3.00
0.700	4.00
0.700	5.00
0.710	6.00
0.710	7.00
0.710	8.00
0.710	9.00
0.710	10.00
0.720	12.00
0.720	14.00
0.720	16.00
0.730	18.00
0.730	20.00
0.740	25.00
0.740	30.00
0.740	35.00
0.750	40.00
0.750	45.00
0.750	50.00
0.760	55.00
0.760	60.00

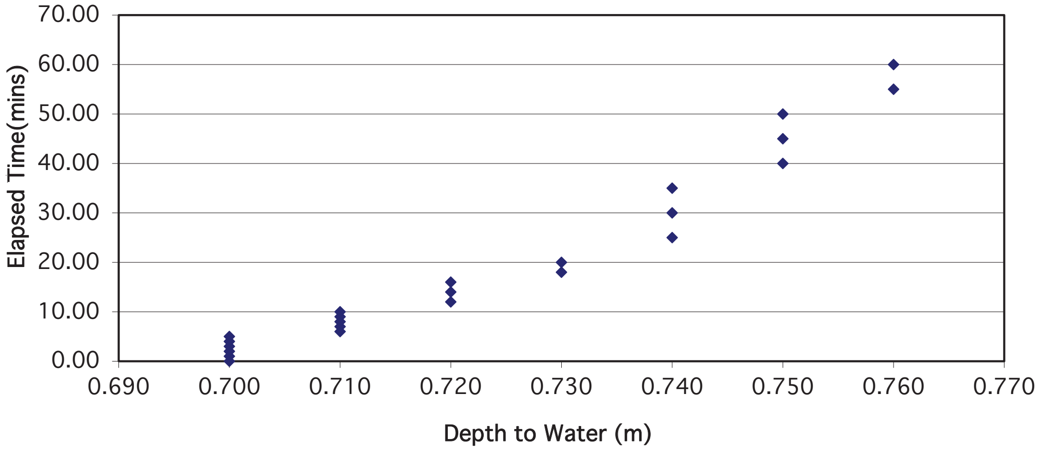
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.10	m
Initial depth to Water =	0.70	m
Final depth to water =	0.760	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.55	m2
*Av. side area of permeable stratum over test period	2.464	m2
Total Exposed area =	3.014	m2

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

f= 0.00018 m/min or 3.04136E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Test No. SA07 cycle02
Engineer CS Consulting
Date: 14/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	DRY
0.10	1.50	MADE GROUND comprised of firm to very stiff brown sandy gravelly CLAY with low cobble content. Also contains red brick and plastic	

Notes:

Field Data

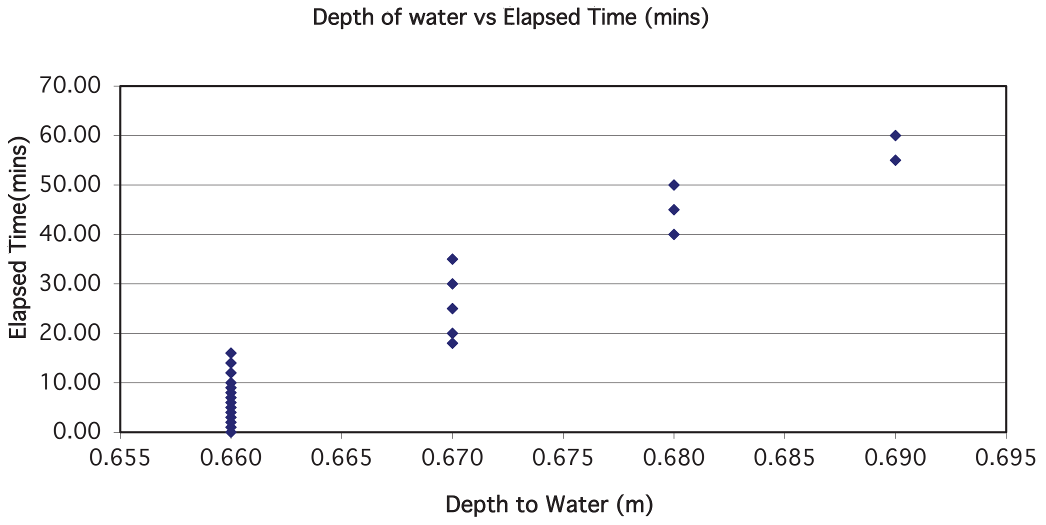
Depth to Water (m)	Elapsed Time (min)
0.660	0.00
0.660	1.00
0.660	2.00
0.660	3.00
0.660	4.00
0.660	5.00
0.660	6.00
0.660	7.00
0.660	8.00
0.660	9.00
0.660	10.00
0.660	12.00
0.660	14.00
0.660	16.00
0.670	18.00
0.670	20.00
0.670	25.00
0.670	30.00
0.670	35.00
0.680	40.00
0.680	45.00
0.680	50.00
0.690	55.00
0.690	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.10	m
Initial depth to Water =	0.66	m
Final depth to water =	0.690	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.55	m2
*Av. side area of permeable stratum over test period	2.64	m2
Total Exposed area =	3.19	m2

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

f= 8.6E-05 m/min or 1.43678E-06 m/sec



Soakaway Design f -value from field tests **IGSL**

Contract: Unit 6, Park West
Test No. SA08 cycle01
Engineer CS Consulting
Date: 14/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	DRY
0.20	1.50	MADE GROUND comprised of firm brown sandy gravell CLAY with low to medium cobble content.	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.910	0.00
0.910	1.00
0.910	2.00
0.910	3.00
0.910	4.00
0.910	5.00
0.920	6.00
0.920	7.00
0.920	8.00
0.920	9.00
0.920	10.00
0.920	12.00
0.920	14.00
0.920	16.00
0.920	18.00
0.920	20.00
0.920	25.00
0.930	30.00
0.930	35.00
0.930	40.00
0.930	45.00
0.940	50.00
0.940	55.00
0.940	60.00

Field Test

Depth of Pit (D) 1.50 m
Width of Pit (B) 0.50 m
Length of Pit (L) 1.10 m

Initial depth to Water = 0.910 m
Final depth to water = 0.940 m
Elapsed time (mins)= 60.00

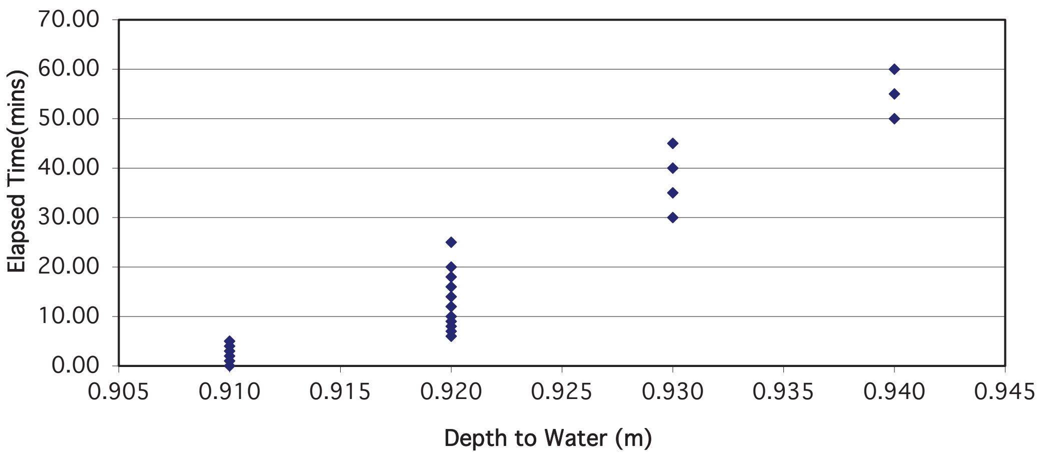
Top of permeable soil m
Base of permeable soil m

Base area= 0.55 m2
*Av. side area of permeable stratum over test perioc 1.84 m2
Total Exposed area = 2.39 m2

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

f= 0.00012 m/min or 1.91771E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Test No. SA08 cycle02
Engineer CS Consulting
Date: 14/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	DRY
0.20	1.50	MADE GROUND comprised of firm brown sandy gravell CLAY with low to medium cobble content.	

Notes:

Field Data

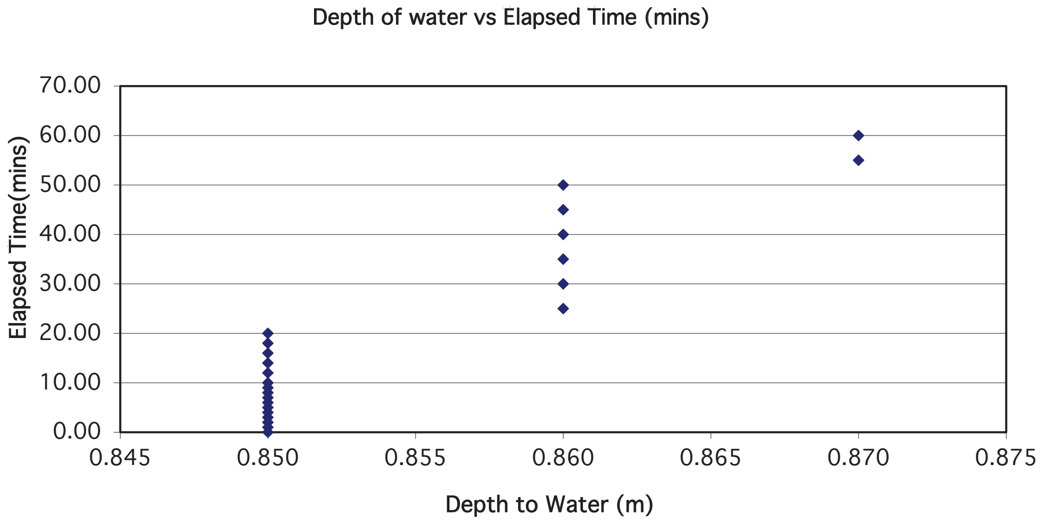
Depth to Water (m)	Elapsed Time (min)
0.850	0.00
0.850	1.00
0.850	2.00
0.850	3.00
0.850	4.00
0.850	5.00
0.850	6.00
0.850	7.00
0.850	8.00
0.850	9.00
0.850	10.00
0.850	12.00
0.850	14.00
0.850	16.00
0.850	18.00
0.850	20.00
0.860	25.00
0.860	30.00
0.860	35.00
0.860	40.00
0.860	45.00
0.860	50.00
0.870	55.00
0.870	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.10	m
Initial depth to Water =	0.850	m
Final depth to water =	0.870	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.55	m2
*Av. side area of permeable stratum over test period	2.048	m2
Total Exposed area =	2.598	m2

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

f= 7.1E-05 m/min or 1.17612E-06 m/sec



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Test No. SA09
Engineer CS Consulting
Date: 14/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	DRY
0.10	1.50	MADE GROUND comprised of stiff to very stiff light brown sandy gravelly CLAY. Also contains red brick and metal rods.	

Notes:

Field Data

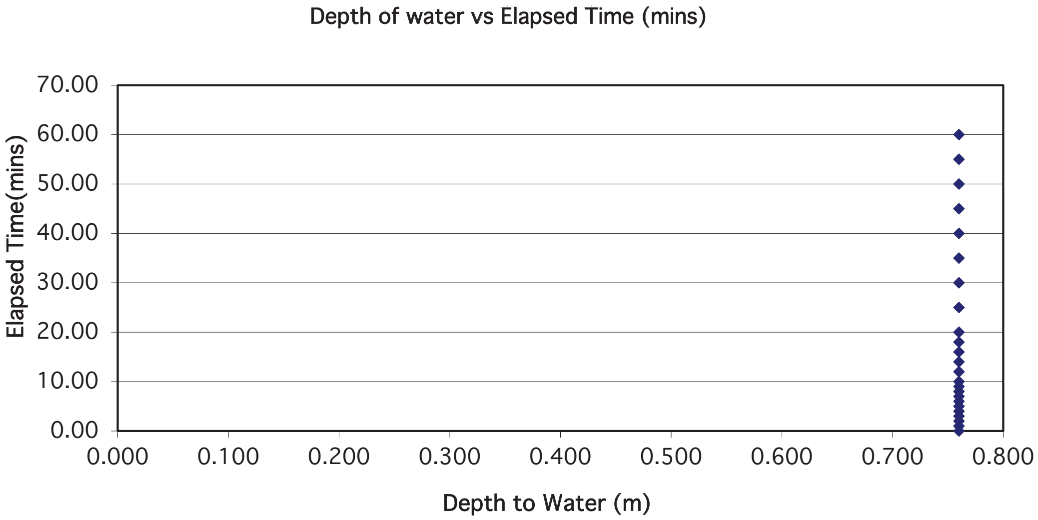
Depth to Water (m)	Elapsed Time (min)
0.760	0.00
0.760	1.00
0.760	2.00
0.760	3.00
0.760	4.00
0.760	5.00
0.760	6.00
0.760	7.00
0.760	8.00
0.760	9.00
0.760	10.00
0.760	12.00
0.760	14.00
0.760	16.00
0.760	18.00
0.760	20.00
0.760	25.00
0.760	30.00
0.760	35.00
0.760	40.00
0.760	45.00
0.760	50.00
0.760	55.00
0.760	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.10	m
Initial depth to Water =	0.760	m
Final depth to water =	0.760	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.55	m2
*Av. side area of permeable stratum over test period	2.368	m2
Total Exposed area =	2.918	m2

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

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Test No. SA010 cycle1
Engineer CS Consulting
Date: 14/10/2021

Contract No. 23606

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	DRY
0.10	0.50	MADE GROUND comprised of brown very clayey sandy GRAVEL with cobbles	
0.50	0.70	MADE GROUND comprised of dark grey slightly clayey sandy gravel.	
0.70	1.50	MADE GROUND comprised of stiff light brown sandy slightly gravelly CLAY.	

Notes:

Field Data

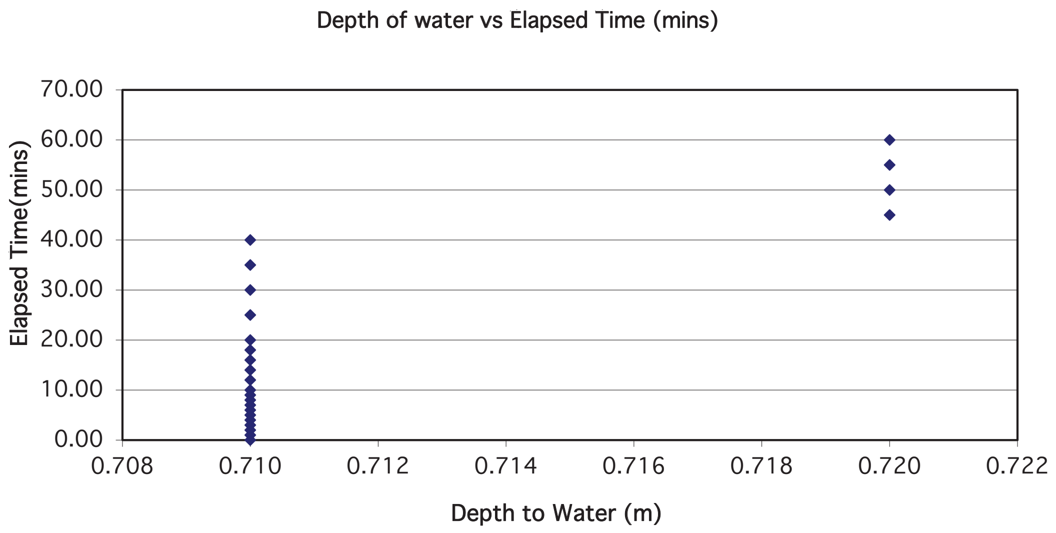
Depth to Water (m)	Elapsed Time (min)
0.710	0.00
0.710	1.00
0.710	2.00
0.710	3.00
0.710	4.00
0.710	5.00
0.710	6.00
0.710	7.00
0.710	8.00
0.710	9.00
0.710	10.00
0.710	12.00
0.710	14.00
0.710	16.00
0.710	18.00
0.710	20.00
0.710	25.00
0.710	30.00
0.710	35.00
0.710	40.00
0.720	45.00
0.720	50.00
0.720	55.00
0.720	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.710	m
Final depth to water =	0.720	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.5	m2
*Av. side area of permeable stratum over test perioc	2.355	m2
Total Exposed area =	2.855	m2

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

f= 2.9E-05 m/min or 4.86476E-07 m/sec



Soakaway Design f -value from field tests IGSL

Contract: Unit 6, Park West
Contract No. 23606
Test No. SA010 cycle02
Engineer CS Consulting
Date: 14/10/2021

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	DRY
0.10	0.50	MADE GROUND comprised of brown very clayey sandy GRAVEL with cobbles	
0.50	0.70	MADE GROUND comprised of dark grey slightly clayey sandy gravel.	
0.70	1.50	MADE GROUND comprised of stiff light brown sandy slightly gravelly CLAY.	

Notes:

Field Data

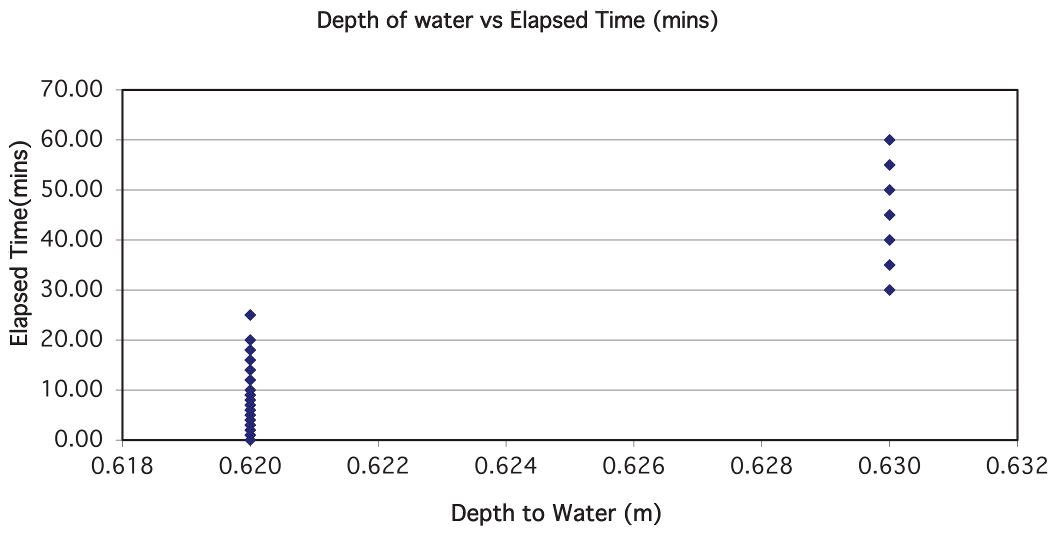
Depth to Water (m)	Elapsed Time (min)
0.620	0.00
0.620	1.00
0.620	2.00
0.620	3.00
0.620	4.00
0.620	5.00
0.620	6.00
0.620	7.00
0.620	8.00
0.620	9.00
0.620	10.00
0.620	12.00
0.620	14.00
0.620	16.00
0.620	18.00
0.620	20.00
0.620	25.00
0.630	30.00
0.630	35.00
0.630	40.00
0.630	45.00
0.630	50.00
0.630	55.00
0.630	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.620	m
Final depth to water =	0.630	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.5	m2
*Av. side area of permeable stratum over test period	2.625	m2
Total Exposed area =	3.125	m2

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

f= 2.7E-05 m/min or 4.44444E-07 m/sec



Appendix 5

Groundwater and Gas Monitoring

Gas & Groundwater Monitoring

IGSL Ltd.

Site Location	**Unit 6, Park West**
Project No.	**23606**
Client	**CS Consulting**
Date	**19/10/2021**

	BH1 (RC)	BH2 (RC)	BH3 (RC)	BH5 (RC)	BH8 (RC)	BH9 (RC)	BH10 (RC)	
WATER LEVEL (m bgl)	3.52	2.67	2.92	2.27	2.16	3.41	3.43	
CH4(%)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
CO2(%)	1.0	0.2	0.3	2.1	0.2	0.5	0	
O2(%)	17.9	20.1	20.1	18.5	20.2	19.7	20.5	
CO(%)	0.0	0.0	0.0	0.0	0	0	0	
H2S(%)	0.0	0.0	0.0	0.0	0	0	0	
Balance(%)	81.0	79.6	79.5	79.3	79.5	79.7	79.4	
BAROMETRIC PRESURE (mb)	995	995	995	995	995	995	995	
GAS FLOW	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
WEATHER	Good/Dry	Good/Dry	Good/Dry	Good/Dry	Good/Dry	Good/Dry	Good/Dry	
COMMENTS								

Appendix 6

Geotechnical Laboratory Testing

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**

ISO 17025
INAB ACCREDITED TESTING
DETAILED IN SCOPE REG NO.133T

Report No. **R128332** Contract No. 23606 Contract Name: Parkwest , Dublin 12

Customer CS Consulting

Samples Received: 01/11/21 Date Tested: 01/11/21

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
TP02	AA150654	1.4	A21/5617	B	12	31	15	16	35	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
TP03	AA150670	1.5	A21/5618	B	26	36	21	15	81	WS	4.4	C I	Brown sandy gravelly CLAY
TP04	AA150668	2.1	A21/5619	B	15	33	15	18	53	WS	4.4	C L	Brown sandy gravelly CLAY
TP05	AA150658	1.8	A21/5620	B	12	33	16	17	71	WS	4.4	C L	Brown slightly sandy, gravelly, CLAY
TP07	AA150690	1.3	A21/5620	B	14	37	17	20	67	WS	4.4	C I	Brown sandy gravelly CLAY
TP08	AA150675	1.5	A21/5621	B	8.3	30	16	14	38	WS	4.4	C L	Brown slightly sandy, gravelly, CLAY
TP08	AA150677	2.8	A21/5622	B	12	35	20	15	54	WS	4.4	C L	Brown sandy gravelly CLAY
TP09	AA150688	2.5	A21/5624	B	13	29	15	14	39	WS	4.4	C L	Brown sandy gravelly CLAY
TP10	AA150680	2.5	A21/5625	B	7.3	27	16	11	38	WS	4.4	C L	Brown sandy gravelly CLAY
TP11	AA150684	2.5	A21/5626	B	12	30	14	16	58	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
TP12	AA150696	1.4	A21/5627	B	11	26	14	12	53	WS	4.4	C L	Brown slightly sandy, gravelly, CLAY with some cobbles
TP13	AA150693	1.5	A21/5628	B	14	27	15	12	39	WS	4.4	C L	Brown sandy gravelly CLAY
TP14	AA150661	1.5	A21/5629	B	15	35	19	16	67	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
TP15	AA150664	1.5	A21/5630	B	14	34	16	18	37	WS	4.4	C L	Brown sandy gravelly CLAY

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:
Results relate only to the specimen tested,in as received condition unless otherwise noted.
NOTE: **These clauses have been superceded by EN 17892-1 and EN17892-12.
Opinions and interpretations are outside the scope of accreditation. * denotes Customer supplied information.
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IGSL Ltd Materials Laboratory	Persons authorized to approve reports H Byrne (Laboratory Manager)	Approved by	Date	Page
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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**

ISO 17025
INAB
ACCREDITED
TESTING
DETAILED IN SCOPE REG NO.133T

Report No. **R128333** Contract No. 23606 Contract Name: Parkwest , Dublin 12

Customer CS Consulting

Samples Received: 01/11/21 Date Tested: 01/11/21

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
BH02	AA165813	1.5	A21/5631	B	11	31	15	16	64	WS	4.4	C L	Brown sandy gravelly CLAY
BH04	AA165816	2.0	A21/5632	B	13	35	17	18	44	WS	4.4	C L	Brown sandy gravelly CLAY
BH06	AA165283	2.0	A21/5633	B	14	26	14	12	57	WS	4.4	C L	Brown sandy gravelly CLAY
BH07	AA165826	2.0	A21/5634	B	13	37	16	21	60	WS	4.4	C I	Brown slightly sandy, gravelly, CLAY with many cobbles
BH08	AA165830	2.5	A21/5635	B	15	39	18	21	43	WS	4.4	C I	Brown sandy gravelly CLAY
BH09B	AA165834	3.5	A21/5636	B	22	24	12	12	47	WS	4.4	C L	Brown sandy gravelly CLAY
BH10	AA165837	3.0	A21/5637	B	12	28	17	11	45	WS	4.4	C L	Brown slightly sandy, gravelly, CLAY

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:
Results relate only to the specimen tested,in as received condition unless otherwise noted.
NOTE: **These clauses have been superceded by EN 17892-1 and EN17892-12.
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IGSL Ltd Materials Laboratory

Persons authorized to approve reports
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Approved by	Date	Page
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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)

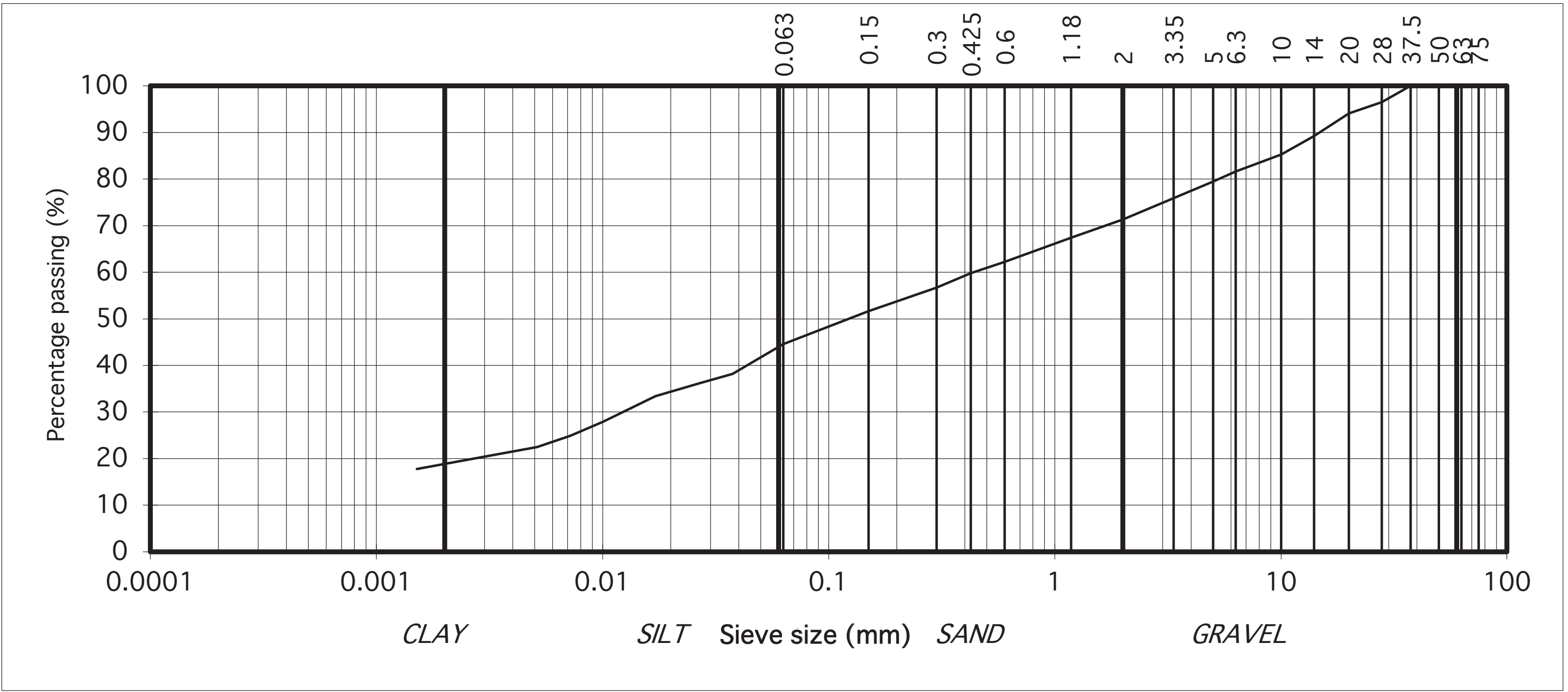
ISO 17025
INAB
ACCREDITED
TESTING
DETAILED IN SCOPE REG NO.133T

Contract No. 23606 Report No. R128334
Contract Name: Parkwest , Dublin 12
BH/TP* : TP02
Sample No.* AA150654 Lab. Sample No. A21/5616
Sample Type: B
Depth* (m) 1.40 Customer: CS Consulting
Date Received 01/11/2021 Date Testing started 01/11/2021
Description: Brown slightly sandy, slightly gravelly, CLAY

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

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory.

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	97	
20	94	
14	89	
10	85	
6.3	82	
5	80	
3.35	76	
2	71	
1.18	67	SAND
0.6	62	
0.425	60	
0.3	57	
0.15	52	
0.063	45	
0.038	38	SILT/CLAY
0.027	36	
0.017	33	
0.010	28	
0.007	25	
0.005	23	
0.002	18	



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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)

Contract No. 23606 Report No. R128335

Contract Name: Parkwest , Dublin 12

BH/TP* : TP05

Sample No.* AA150658 Lab. Sample No. A21/5614

Sample Type: B

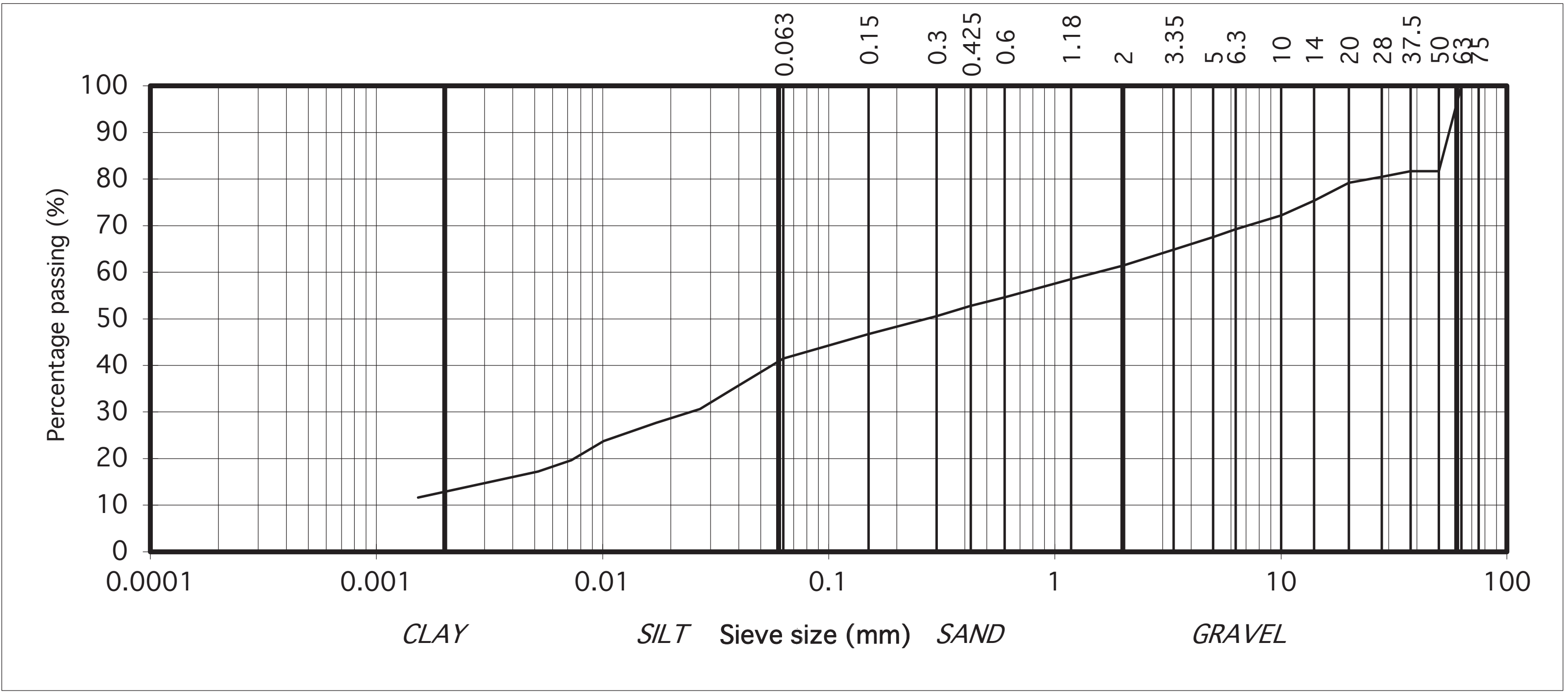
Depth* (m) 1.80 Customer: CS Consulting

Date Received 01/11/2021 Date Testing started 01/11/2021

Description: Brown slightly sandy, gravelly, CLAY

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

particle size	% passing	
75	100	COBBLES
63	100	
50	82	GRAVEL
37.5	82	
28	80	
20	79	
14	75	
10	72	
6.3	69	
5	68	
3.35	65	
2	61	
1.18	59	SAND
0.6	55	
0.425	53	
0.3	51	
0.15	47	
0.063	41	SILT/CLAY
0.037	35	
0.027	31	
0.017	28	
0.010	24	
0.007	20	
0.005	17	
0.002	12	



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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)

TEST REPORT
Determination of Particle Size Distribution

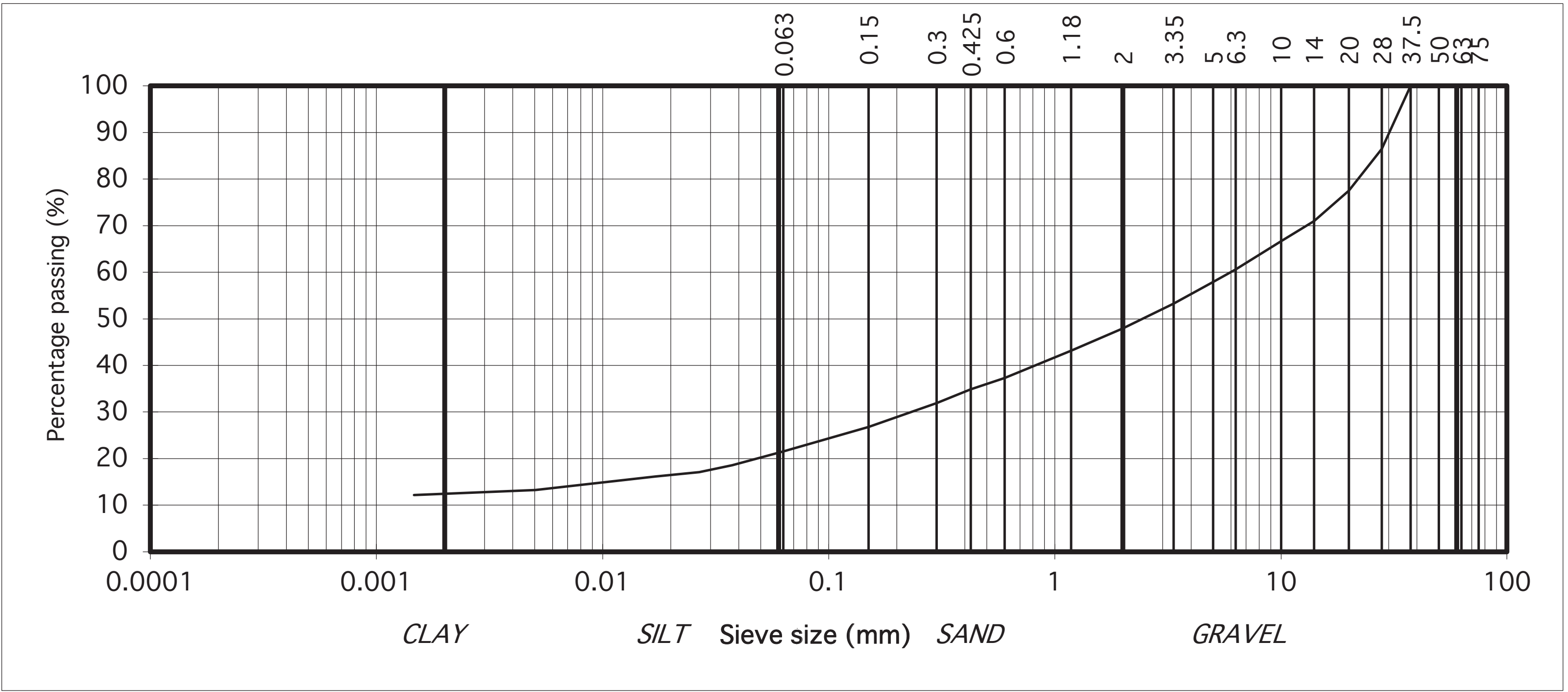
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

Contract No. 23606 Report No. R128336
Contract Name: Parkwest , Dublin 12
BH/TP* : TP08
Sample No.* AA150675 Lab. Sample No. A21/5621
Sample Type: B
Depth* (m) 1.50 Customer: CS Consulting
Date Received 01/11/2021 Date Testing started 01/11/2021
Description: Brown slightly sandy, gravelly, CLAY

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

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	86	
20	78	
14	71	
10	67	
6.3	61	
5	58	
3.35	53	
2	48	
1.18	43	SAND
0.6	37	
0.425	35	
0.3	32	
0.15	27	
0.063	22	SILT/CLAY
0.037	19	
0.027	17	
0.017	16	
0.010	15	
0.007	14	
0.005	13	
0.001	12	



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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**

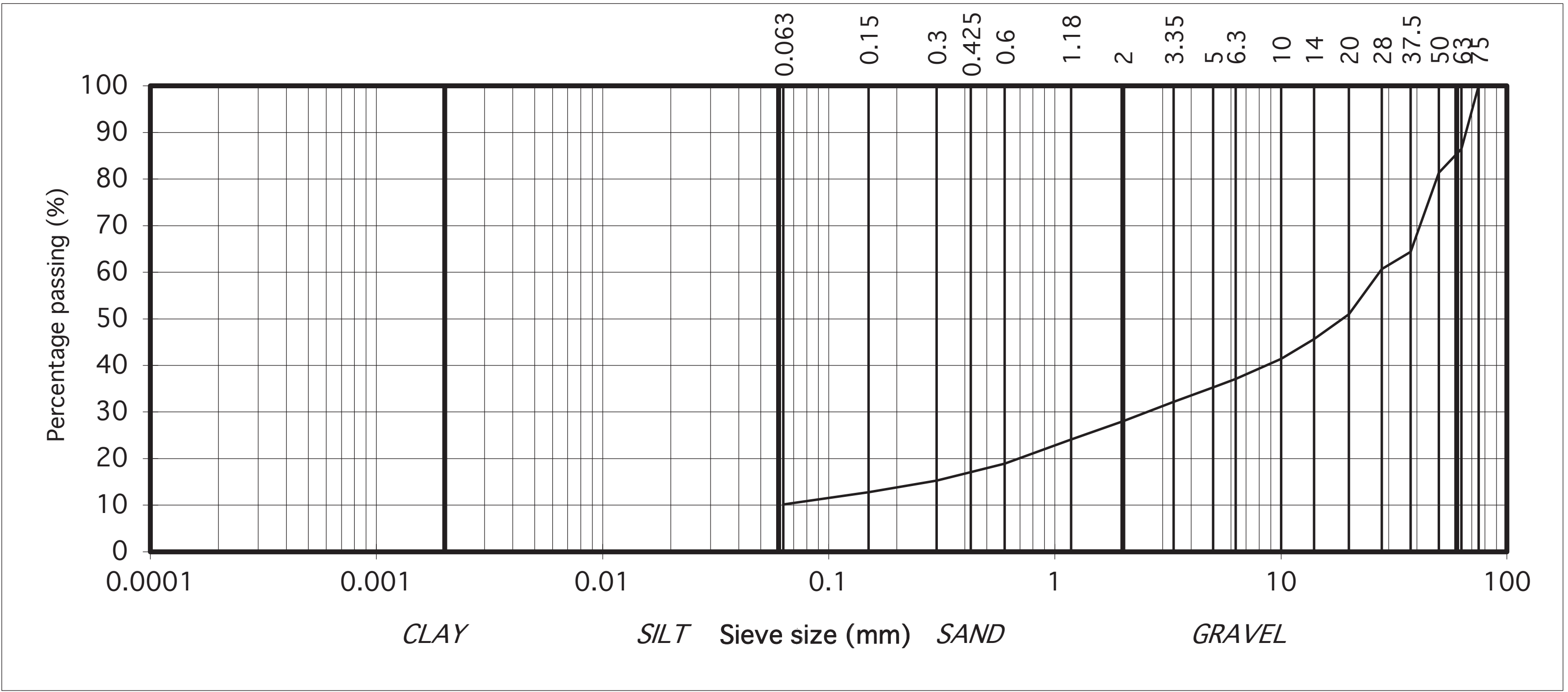
(note: Sedimentation stage not accredited)

ISO 17025
INAB
ACCREDITED
TESTING
DETAILED IN SCOPE REG NO.133T

particle size	% passing	
75	100	COBBLES
63	86	
50	81	GRAVEL
37.5	64	
28	61	
20	51	
14	46	
10	41	
6.3	37	
5	35	
3.35	32	
2	28	
1.18	24	SAND
0.6	19	
0.425	17	
0.3	15	
0.15	13	
0.063	10	SILT/CLAY

Contract No. 23606 Report No. R128337
Contract Name: Parkwest , Dublin 12
BH/TP* : TP09
Sample No.* AA150687 Lab. Sample No. A21/5623
Sample Type: B
Depth* (m) 1.50 Customer: CS Consulting
Date Received 01/11/2021 Date Testing started 01/11/2021
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 ISO17892-4:2 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)

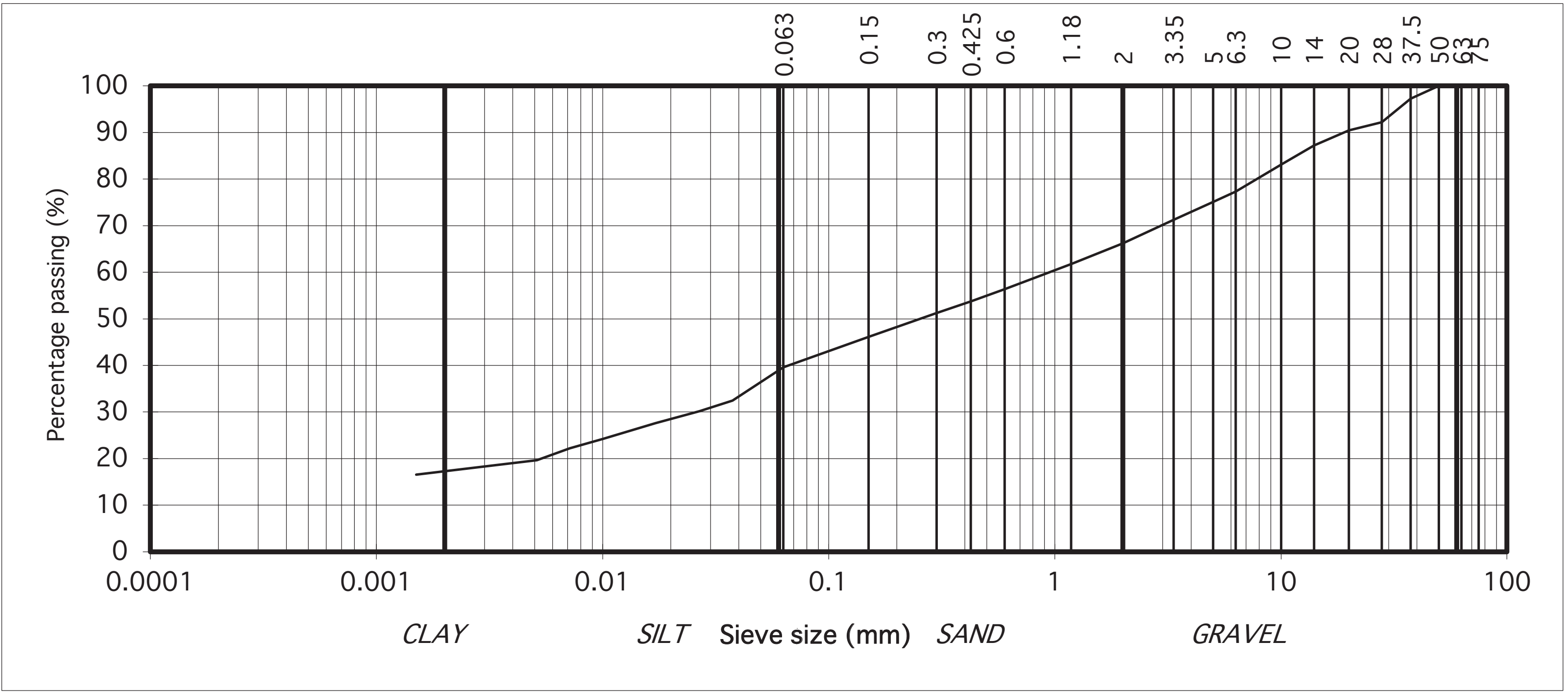
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025
INAB
ACCREDITED
TESTING
DETAILED IN SCOPE REG NO.133T

Contract No. 23606 Report No. R128527
Contract Name: Parkwest , Dublin 12
BH/TP* : TP11
Sample No.* AA150684 Lab. Sample No. A21/5626
Sample Type: B
Depth* (m) 2.50 Customer: CS Consulting
Date Received 01/11/2021 Date Testing started 01/11/2021
Description: Brown slightly sandy, slightly gravelly, CLAY

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

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	97	
28	92	
20	90	
14	87	
10	83	
6.3	77	
5	75	
3.35	71	
2	66	
1.18	62	SAND
0.6	56	
0.425	54	
0.3	51	
0.15	46	
0.063	40	SILT/CLAY
0.037	32	
0.027	30	
0.017	28	
0.010	24	
0.007	22	
0.005	20	
0.001	17	



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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
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TESTING
DETAILED IN SCOPE REG NO.133T

Contract No. 23606 Report No. R128338
Contract Name: Parkwest , Dublin 12
BH/TP* : TP12
Sample No.* AA150696 Lab. Sample No. A21/5627
Sample Type: B
Depth* (m) 1.40 Customer: CS Consulting
Date Received 01/11/2021 Date Testing started 01/11/2021
Description: Brown slightly sandy, gravelly, CLAY with some cobbles

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

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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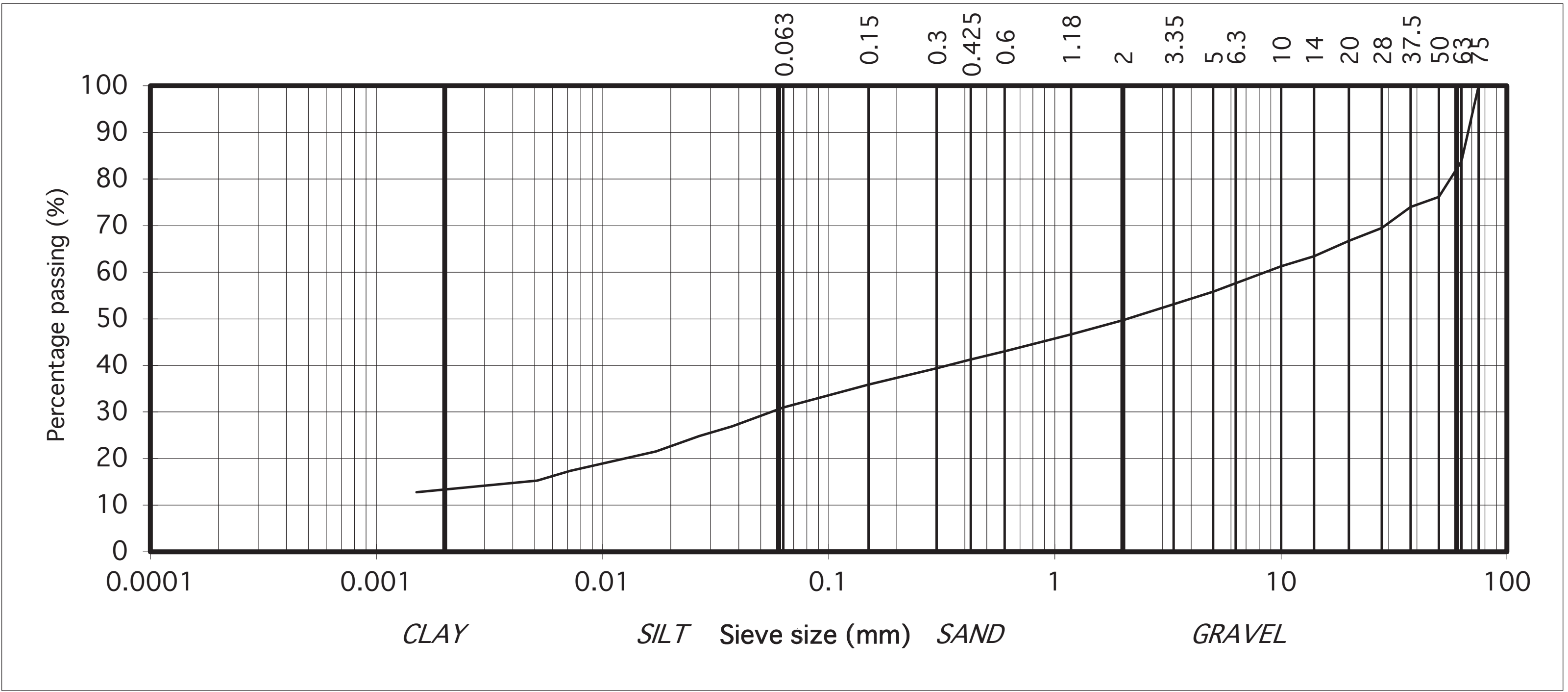
particle size	% passing	
75	100	COBBLES
63	84	
50	76	GRAVEL
37.5	74	
28	69	
20	67	
14	63	
10	61	
6.3	58	
5	56	
3.35	53	
2	50	
1.18	47	SAND
0.6	43	
0.425	41	
0.3	39	
0.15	36	
0.063	31	
0.037	27	SILT/CLAY
0.027	25	
0.017	22	
0.010	19	
0.007	17	
0.005	15	
0.002	13	



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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)

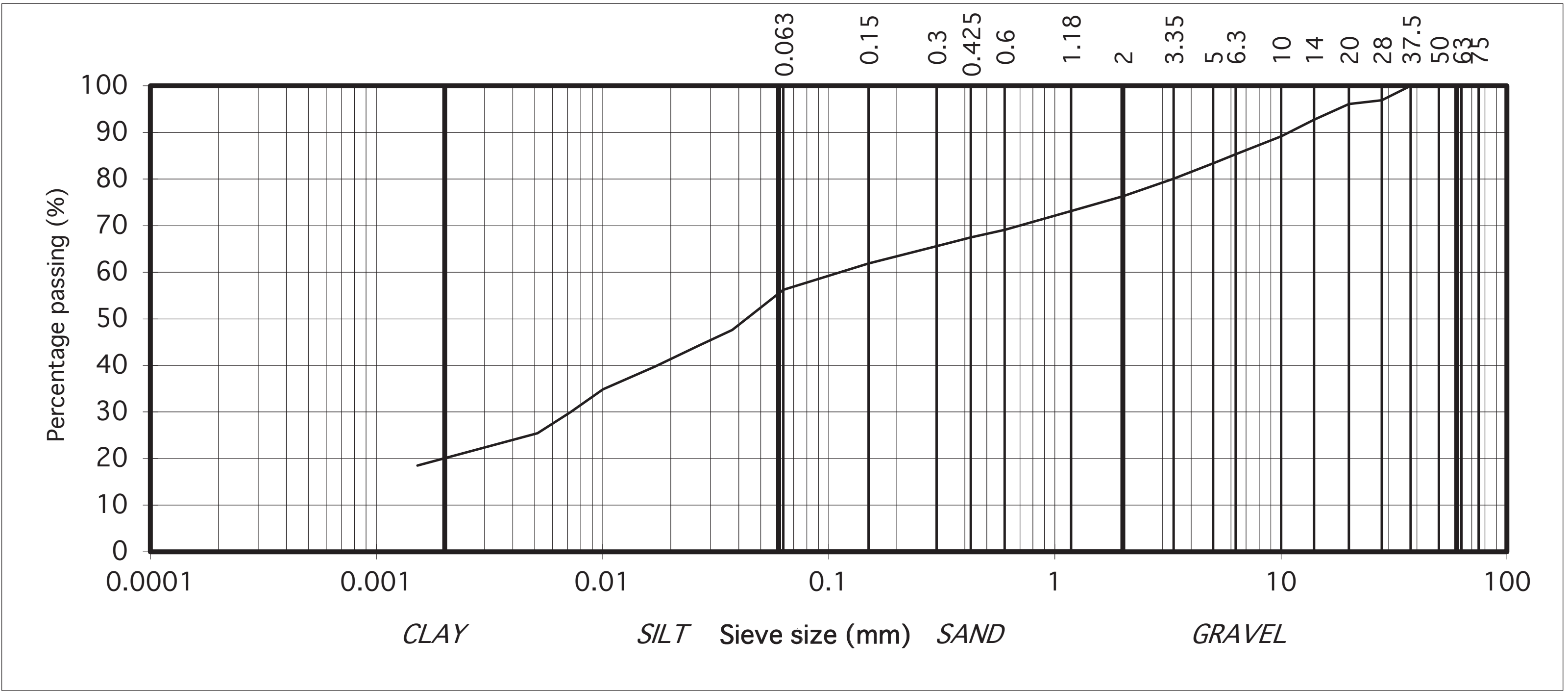
ISO 17025 INAB ACCREDITED TESTING
DETAILED IN SCOPE REG NO.133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	97	
20	96	
14	93	
10	89	
6.3	85	
5	83	
3.35	80	
2	76	
1.18	73	SAND
0.6	69	
0.425	68	
0.3	66	
0.15	62	
0.063	56	SILT/CLAY
0.037	48	
0.027	44	
0.017	40	
0.010	35	
0.007	30	
0.005	25	
0.002	18	

Contract No. 23606 Report No. R128339
Contract Name: Parkwest , Dublin 12
BH/TP* : TP14
Sample No.* AA150661 Lab. Sample No. A21/5629
Sample Type: B
Depth* (m) 1.50 Customer: CS Consulting
Date Received 01/11/2021 Date Testing started 01/11/2021
Description: Brown slightly sandy, slightly gravelly, CLAY

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

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation. This report shall not be reproduced except in full without the written approval of the 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)

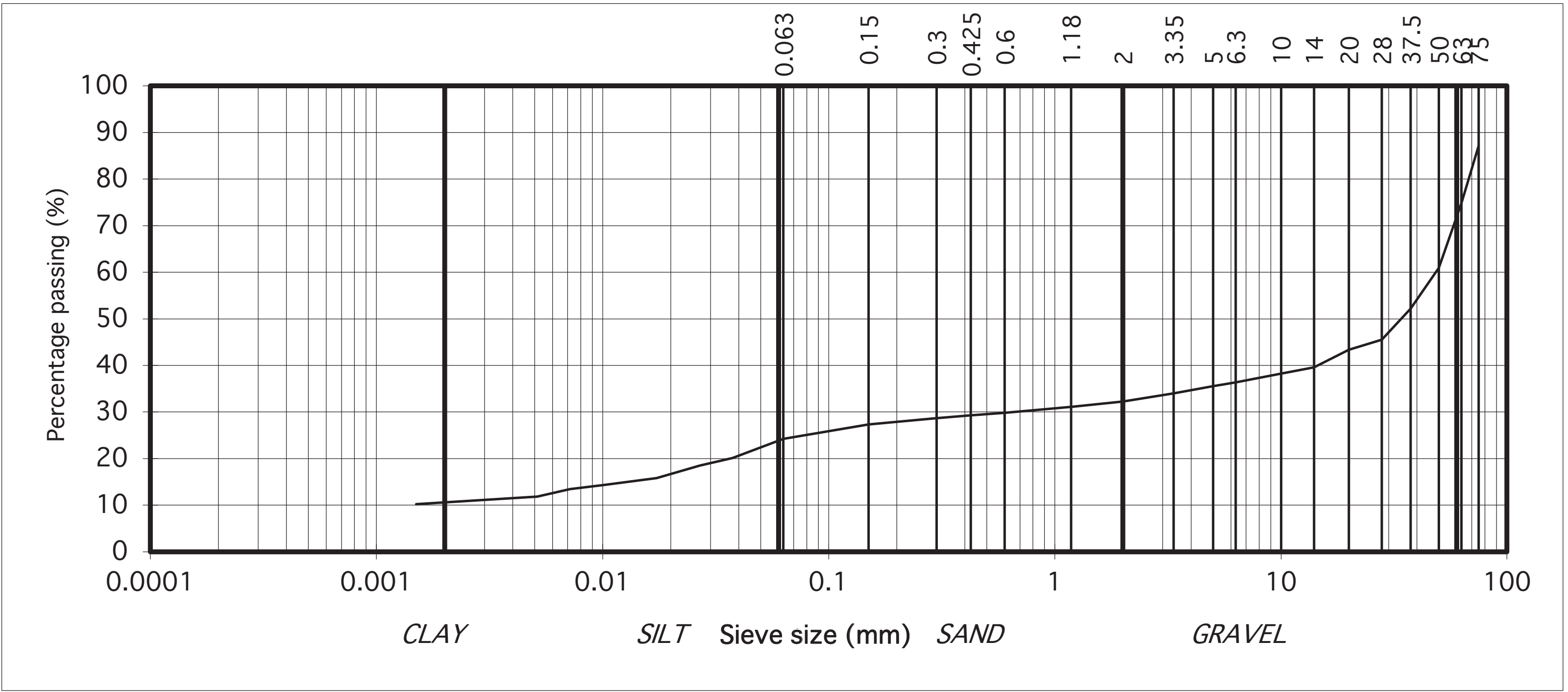
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

Contract No.	23606	Report No.	R128340
Contract Name:	Parkwest , Dublin 12		
BH/TP* :	BH07		
Sample No.*	AA165826	Lab. Sample No.	A21/5634
Sample Type:	B		
Depth* (m)	2.00	Customer:	CS Consulting
Date Received	01/11/2021	Date Testing started	01/11/2021
Description:	Brown slightly sandy, gravelly, CLAY with many cobbles		

Remarks

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

particle size	% passing	
75	87	COBBLES
63	75	
50	61	GRAVEL
37.5	52	
28	46	
20	43	
14	40	
10	38	
6.3	36	
5	36	
3.35	34	
2	32	
1.18	31	SAND
0.6	30	
0.425	29	
0.3	29	
0.15	27	
0.063	24	
0.038	20	SILT/CLAY
0.027	19	
0.017	16	
0.010	14	
0.007	13	
0.005	12	
0.001	10	



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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)

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.133T

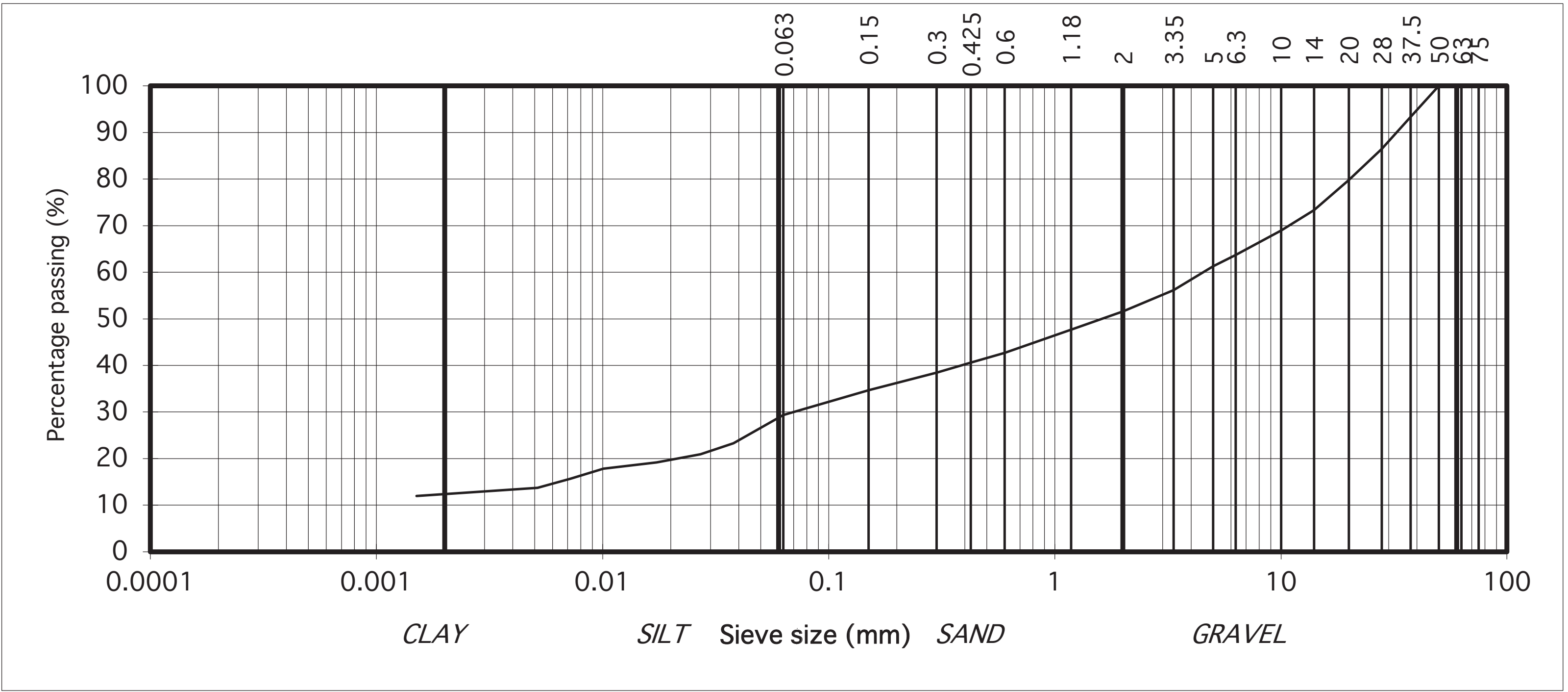
Contract No.	23606	Report No.	R128341
Contract Name:	Parkwest , Dublin 12		
BH/TP* :	BH10		
Sample No.*	AA165837	Lab. Sample No.	A21/5637
Sample Type:	B		
Depth* (m)	3.00	Customer:	CS Consulting
Date Received	01/11/2021	Date Testing started	01/11/2021
Description:	Brown slightly sandy, gravelly, CLAY		

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
This report shall not be reproduced except in full without the written approval of the Laboratory.

Remarks

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

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	93	
28	87	
20	80	
14	73	
10	69	
6.3	64	
5	61	
3.35	56	
2	52	
1.18	48	SAND
0.6	43	
0.425	41	
0.3	38	
0.15	35	
0.063	29	SILT/CLAY
0.038	23	
0.027	21	
0.017	19	
0.010	18	
0.007	16	
0.005	14	
0.002	12	



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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
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

Report No.	**R128371**
Contract No.	23606
Contract Name:	Parkwest , Dublin 12
Customer:	CS Consulting
BH/TP*	TP02
Sample No.*	AA150654
Depth* (m)	1.40
Sample Type:	B
Lab Sample No.	A21/5616
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	01/11/21
Date Tested:	09/11/21
Sample Cert:	Not Provided
Moisture Content (%):	14
% Particles > 20mm (By dry mass):	28
MCV:	11.4
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, slightly gravelly, CLAY

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
* denotes Customer supplied information.
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Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

Report No.	**R128372**
Contract No.	23606
Contract Name:	Parkwest , Dublin 12
Customer:	CS Consulting
BH/TP*	TP05
Sample No.*	AA150658
Depth* (m)	1.80
Sample Type:	B
Lab Sample No.	A21/5619
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	01/11/21
Date Tested:	09/11/21
Sample Cert:	Not Provided
Moisture Content (%):	14
% Particles > 20mm (By dry mass):	23
MCV:	11.4
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, gravelly, CLAY

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
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Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025
INAB ACCREDITED
TESTING
DETAILED IN SCOPE REG NO.133T

Report No.	**R128373**
Contract No.	23606
Contract Name:	Parkwest , Dublin 12
Customer:	CS Consulting
BH/TP*	TP12
Sample No.*	AA150696
Depth* (m)	1.40
Sample Type:	B
Lab Sample No.	A21/5629
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	01/11/21
Date Tested:	09/11/21
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	17
MCV:	6.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, gravelly, CLAY with some cobbles

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
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H Byrne (Laboratory Manager)

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 INAB ACCREDITED TESTING
DETAILED IN SCOPE REG NO.133T

Report No.	**R128374**
Contract No.	23606
Contract Name:	Parkwest , Dublin 12
Customer:	CS Consulting
BH/TP*	TP14
Sample No.*	AA150661
Depth* (m)	1.50
Sample Type:	B
Lab Sample No.	A21/5629
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	01/11/21
Date Tested:	09/11/21
Sample Cert:	Not Provided
Moisture Content (%):	16
% Particles > 20mm (By dry mass):	31
MCV:	6.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, slightly gravelly, CLAY

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
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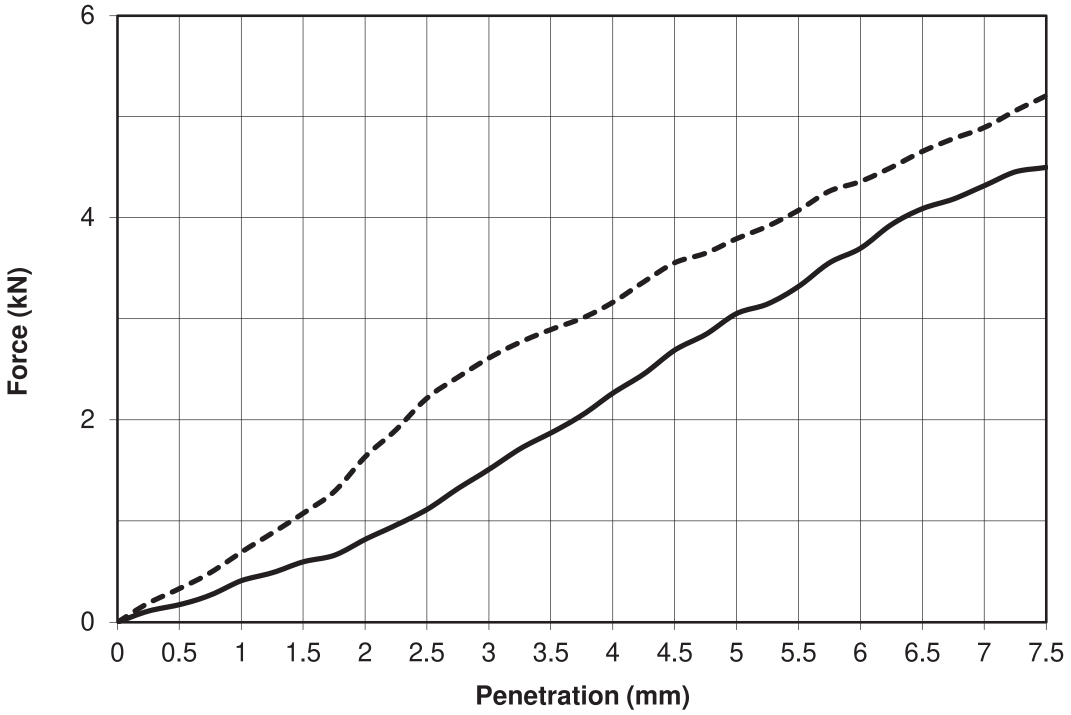
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025 INAB ACCREDITED TESTING
DETAILED IN SCOPE REG NO.133T

Report No. R128368
Contract Parkwest , Dublin 12
Contract No. 23606
Customer CS Consulting
Date received 01/11/21
Date Tested 09/11/21
BH/TP No.* TP02
Sample No.* AA150654 Type: B
Depth* (m) 1.40
Lab sample No. A21/5616



Key: ———— Top ----------------- Base

Description: Brown slightly sandy, slightly gravelly, CLAY

Initial Condition: Unsoaked
Moisture Content (%): 13
Bulk Density (Mg/m^3): 2.22
Surcharge (kg): 4
Dry Density (Mg/m^3): 1.97
% Material >20mm: 25
Method of compaction: Static Compaction Method 2

Test Result	**Top**	**Base**
CBR %	**15**	**19**
Moisture Content %	13	13

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Approved by	Date	Page No.
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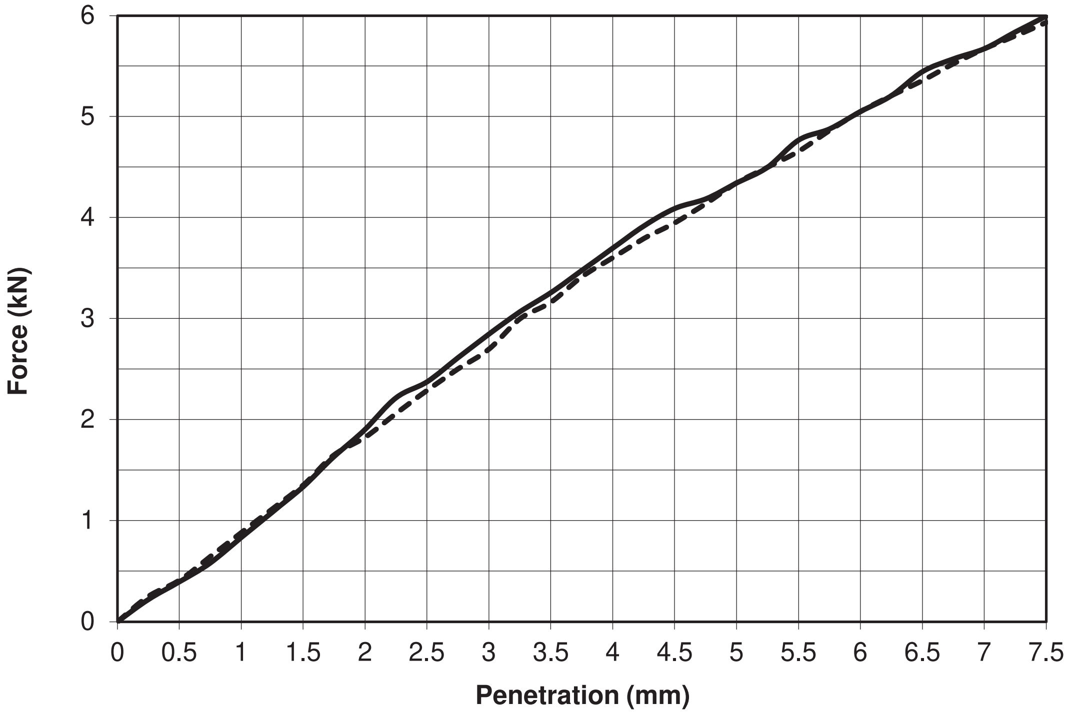
IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas Co.Kildare
045 899324

TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025
INAB
ACCREDITED
TESTING
DETAILED IN SCOPE REG NO.133T

Report No.	R128369	Contract	Parkwest , Dublin 12		
Contract No.	23606	Customer	CS Consulting		
Date received	01/11/21	Date Tested	09/11/21		
BH/TP No.*	TP05	Sample No.*	AA150658	Type:	B
Depth* (m)	1.80	Lab sample No.		A21/5614	



Key: ———— Top ----------------- Base

Description: Brown slightly sandy, gravelly, CLAY

Initial Condition:	Unsoaked		
Moisture Content (%):	8	Bulk Density (Mg/m^3):	2.19
Surcharge (kg):	4	Dry Density (Mg/m^3):	2.03
% Material >20mm:	11		
Method of compaction:	Static Compaction Method 2		

Test Result	**Top**	**Base**
CBR %	**22**	**22**
Moisture Content %	8	8

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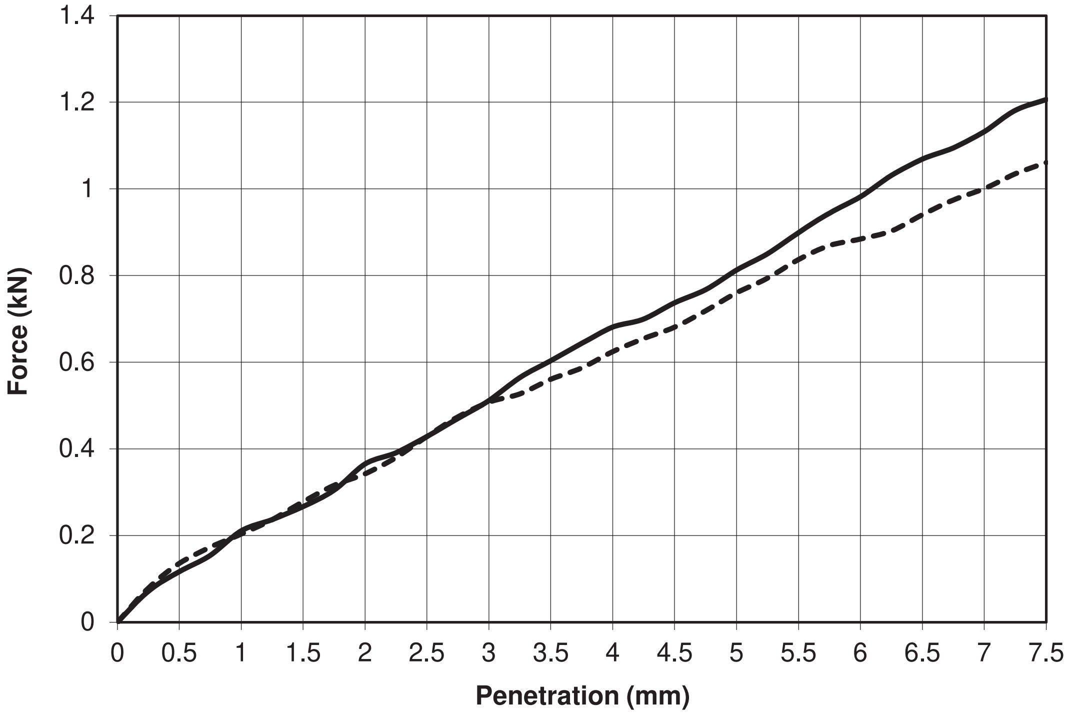
IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas Co.Kildare
045 899324

TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025 INAB ACCREDITED TESTING
DETAILED IN SCOPE REG NO.133T

Report No.	R128370	Contract	Parkwest , Dublin 12
Contract No.	23606	Customer	CS Consulting
Date received	01/11/21	Date Tested	09/11/21
BH/TP No.*	TP12	Sample No.*	AA150696 Type: B
Depth* (m)	0.50	Lab sample No.	A21/5627



Key: ———— Top ----------------- Base

Description: Brown slightly sandy, gravelly, CLAY with some cobbles

Initial Condition:	Unsoaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.25
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.98
% Material >20mm:	17		
Method of compaction:	Static Compaction Method 2		

Test Result	**Top**	**Base**
CBR %	**4.1**	**3.8**
Moisture Content %	13	13

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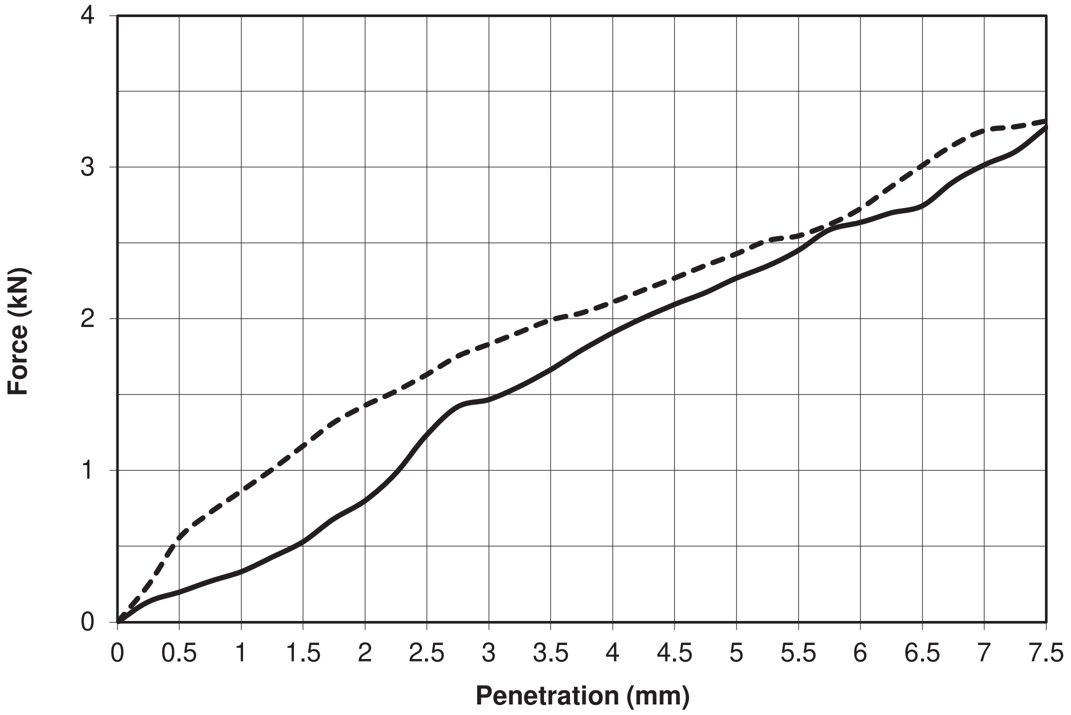
IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas Co.Kildare
045 899324

TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025 INAB ACCREDITED TESTING
DETAILED IN SCOPE REG NO.133T

Report No.	R128367	Contract	Parkwest , Dublin 12		
Contract No.	23606	Customer	CS Consulting		
Date received	01/11/21	Date Tested	03/11/21		
BH/TP No.*	TP14	Sample No.*	AA150661	Type:	B
Depth* (m)	1.50	Lab sample No.			A21/5629



Key: ———— Top ----------------- Base

Description: Brown slightly sandy, slightly gravelly, CLAY

Initial Condition:	Unsoaked		
Moisture Content (%):	17	Bulk Density (Mg/m^3):	2.13
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.82
% Material >20mm:	21		
Method of compaction:	Static Compaction Method 2		

Test Result	**Top**	**Base**
CBR %	**11**	**12**
Moisture Content %	17	17

Persons authorized to approve reports
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H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory	Approved by	Date	Page No.
	H Byrne	10/11/21	1 of 1

IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

Report No. R128375 Contract No. 23606

Contract Name: Parkwest,Dublin 12

Location*: TP02

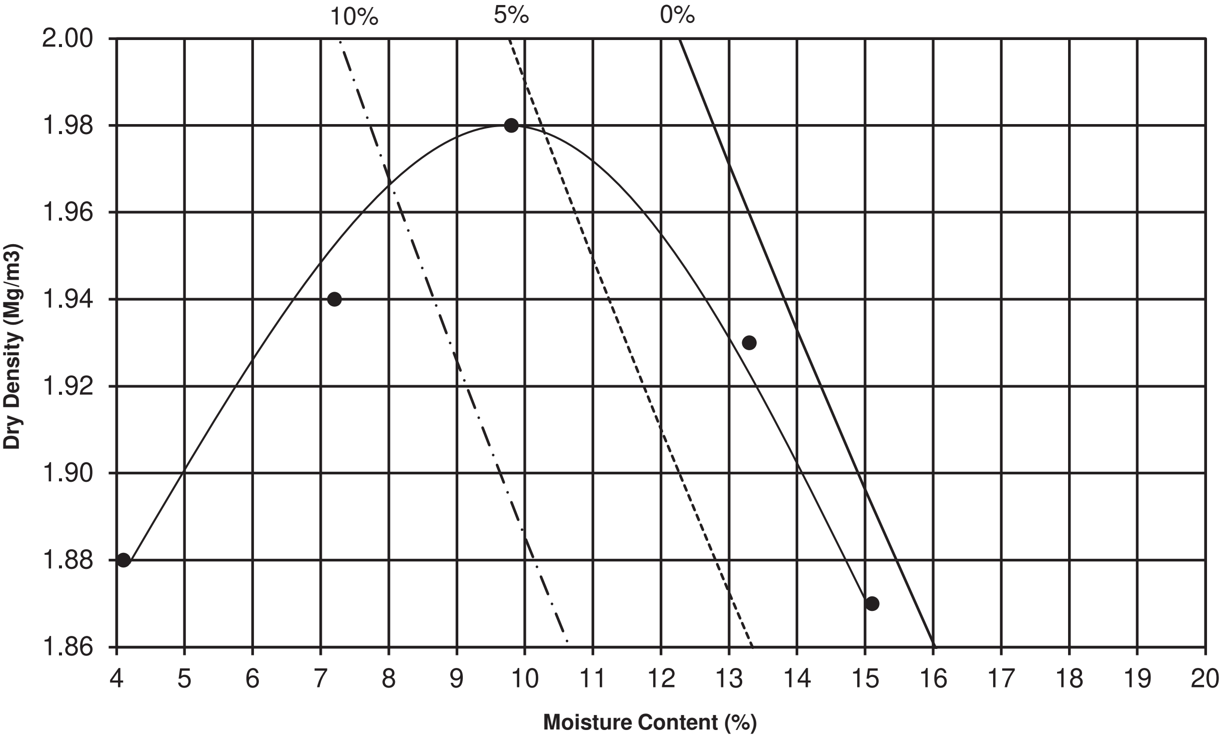
Sample No*. AA150654 Depth* (m) 1.4 Material Type B

Lab sample no. A21/5616 Customer: CS Consulting

Date Received: 01/11/2021 Test Method: 2.5 KG Rammer

Date Tested: 09/11/2021 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.98	1.93	1.87	1.94	1.88	0.00	
Moisture Content (%)	10	13	15	7.2	4.1	0	



Maximum Dry Density (Mg/m^3): 1.98 Optimum Moisture Content (%): 10

Description: Brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 1

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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	H Byrne	11/11/21	1 of 1

IGSL Ltd
Materials Laboratory
M7 Business Park
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Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025
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TESTING
DETAILED IN SCOPE REG NO. 133T

Report No. R128375 Contract No. 23606

Contract Name: Parkwest,Dublin 12

Location*: TP05

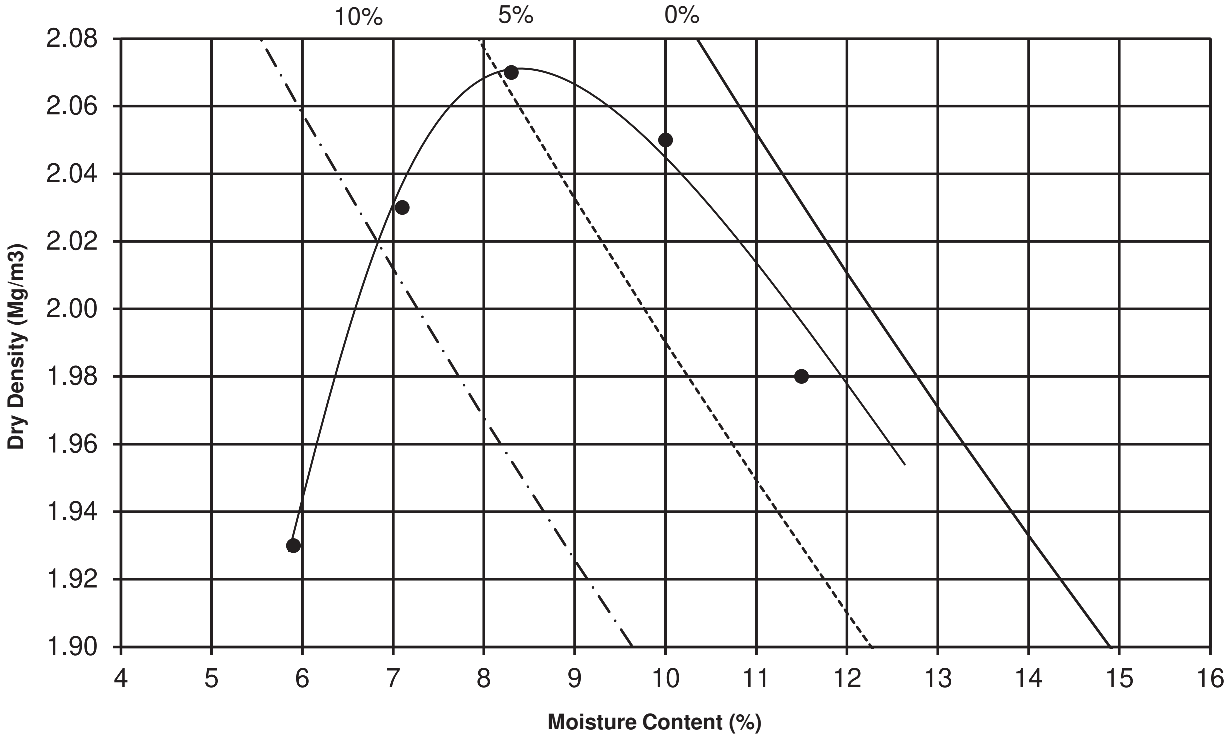
Sample No*. AA150658 Depth* (m) 1.8 Material Type B

Lab sample no. A21/5614 Customer: CS Consulting

Date Received: 01/11/2021 Test Method: 2.5 KG Rammer

Date Tested: 09/11/2021 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	2.03	1.93	2.07	2.05	1.98	0.00	
Moisture Content (%)	7.1	5.9	8.3	10	12	0	



Maximum Dry Density (Mg/m^3): 2.07 Optimum Moisture Content (%): 8

Description: Brown slightly sandy, gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 20

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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

Report No. R128376 Contract No. 23606

Contract Name: Parkwest,Dublin 12

Location*: TP12

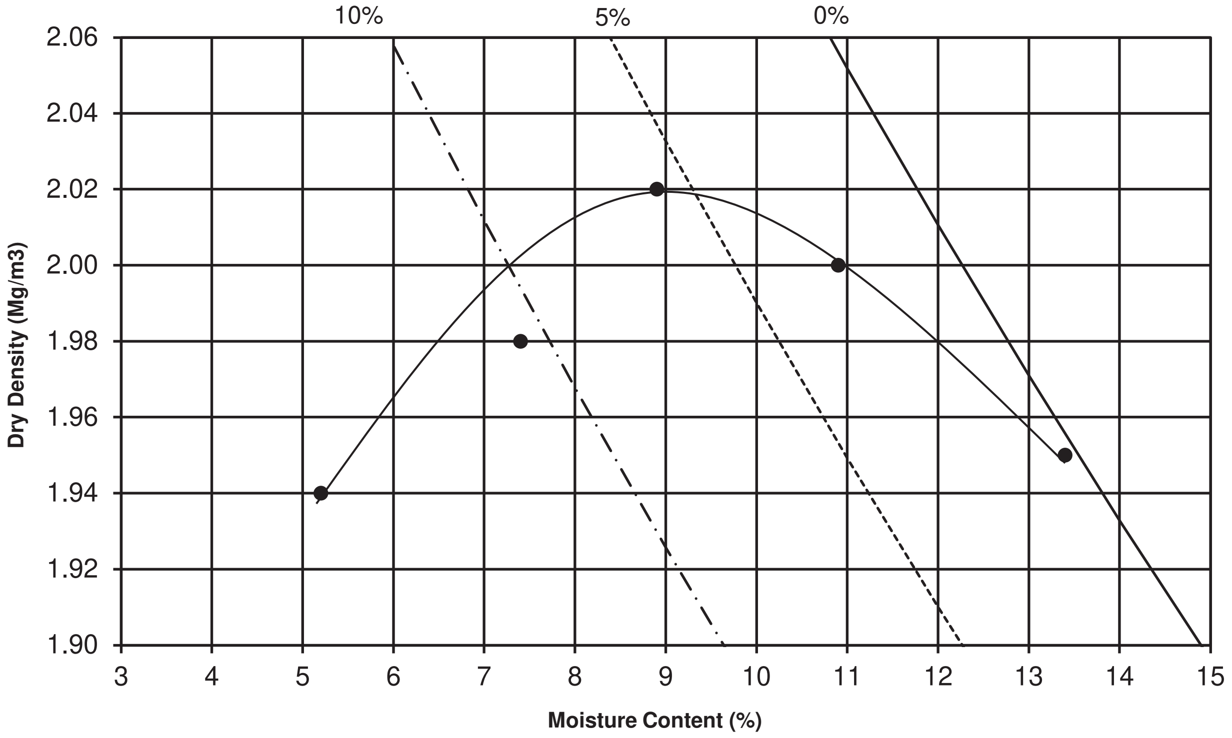
Sample No*. AA150696 Depth* (m) 1.4 Material Type B

Lab sample no. A21/5627 Customer: CS Consulting

Date Received: 01/11/2021 Test Method: 2.5 KG Rammer

Date Tested: 09/11/2021 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.95	2.00	2.02	1.98	1.94	0.00	
Moisture Content (%)	13	11	8.9	7.4	5.2	0	



Maximum Dry Density (Mg/m^3): 2.02 Optimum Moisture Content (%): 9

Description: Brown slightly sandy, gravelly, CLAY with some cobbles

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 15

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Persons authorised to approve reports
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IGSL Materials Laboratory	Approved by	Date	Page
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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

Report No. R128377 Contract No. 23606

Contract Name: Parkwest,Dublin 12

Location*: TP14

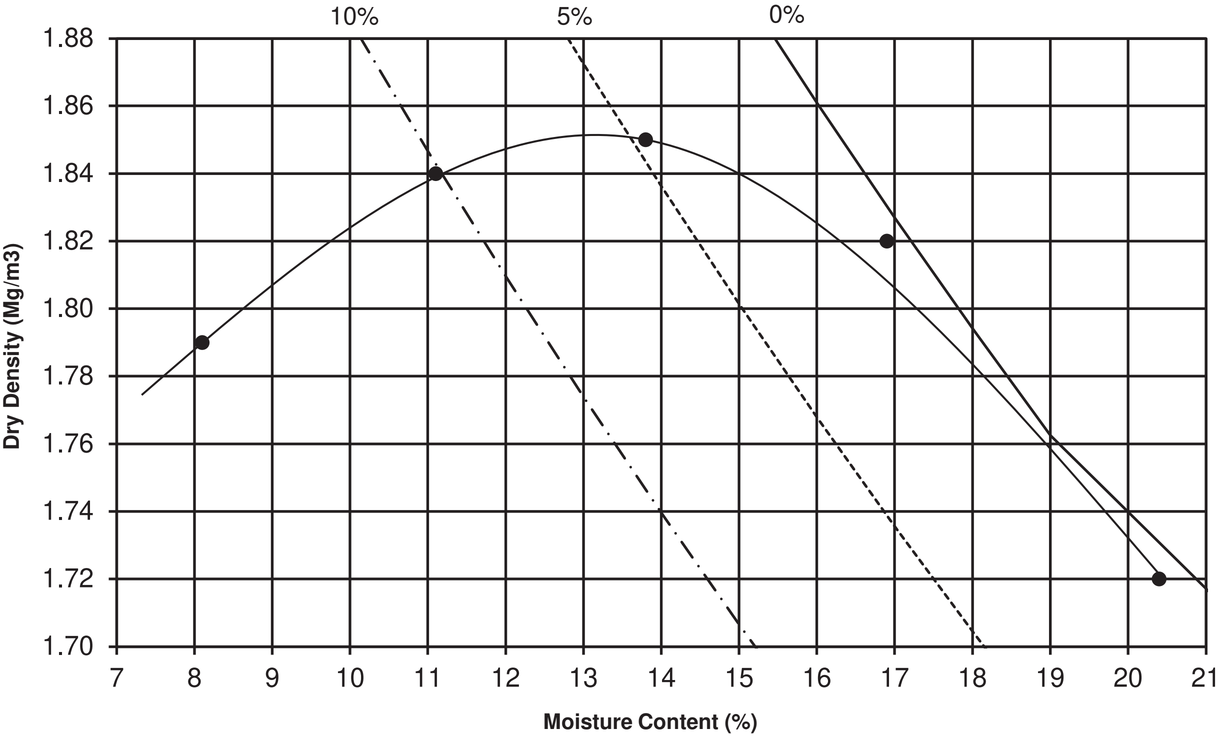
Sample No*. AA150661 Depth* (m) 1.5 Material Type B

Lab sample no. A21/5629 Customer: CS Consulting

Date Received: 01/11/2021 Test Method: 2.5 KG Rammer

Date Tested: 09/11/2021 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.82	1.85	1.84	1.79	1.72	0.00	
Moisture Content (%)	17	14	11	8	20	0	



Maximum Dry Density (Mg/m^3): 1.85 Optimum Moisture Content (%): 14

Description: Brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 21

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IGSL Materials Laboratory	Approved by	Date	Page
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(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Site 6, Parkwest, Dublin 12
Contract no. 23606
Date of test: 1/11/21

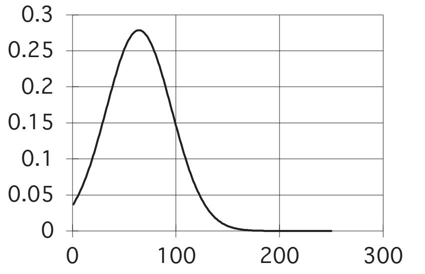
Sample Type: Core

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	3.5	78	28.0	1.222	4.60	5.62	112	d	//
	3.9	78	25.0	1.222	4.11	5.02	100	d	//
	5.8	78	4.0	1.222	0.66	0.80	16	d	//
	6.6	78	24.0	1.222	3.94	4.82	96	d	//
	6.7	78	27.0	1.222	4.44	5.42	108	d	//
	8.1	78	6.0	1.222	0.99	1.20	24	d	//
RC02	3.5	78	19.0	1.222	3.12	3.81	76	d	//
	5.5	78	15.0	1.222	2.47	3.01	60	d	//
	5.7	78	21.0	1.222	3.45	4.22	84	d	//
	7.5	78	6.0	1.222	0.99	1.20	24	d	//
RC03	3.3	78	11.0	1.222	1.81	2.21	44	d	//
	4.9	78	5.0	1.222	0.82	1.00	20	d	//
	6.8	78	19.0	1.222	3.12	3.81	76	d	//
	8.1	78	24.0	1.222	3.94	4.82	96	d	//
RC04	3.1	78	14.0	1.222	2.30	2.81	56	d	//
	5.3	78	10.0	1.222	1.64	2.01	40	d	//
	6.0	78	19.0	1.222	3.12	3.81	76	d	//
	7.6	78	21.0	1.222	3.45	4.22	84	d	//
RC05	3.4	78	19.0	1.222	3.12	3.81	76	d	//
	5.2	78	18.0	1.222	2.96	3.61	72	d	//
	6.6	78	2.0	1.222	0.33	0.40	8	d	//
	7.3	78	15.0	1.222	2.47	3.01	60	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	22	22
Minimum	0.40	8
Average	3.21	64
Maximum	5.62	112
Standard Dev.	1.57	31
Upper 95% Confidence Limit	6.30	125.98
Lower 95% Confidence Limit	0.13	2.52

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*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

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Site 6, Parkwest, Dublin 12
Contract no. 23606
Date of test: 1/11/21

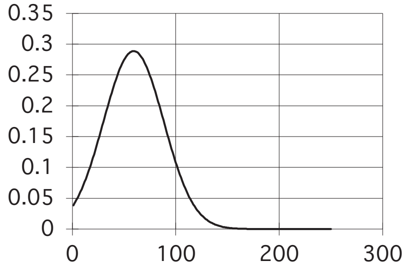
Sample Type: Core

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
RC06	5.0	78	19.0	1.222	3.12	3.81	76	d	//
	6.7	78	15.0	1.222	2.47	3.01	60	d	//
	7.6	78	23.0	1.222	3.78	4.62	92	d	//
	9.4	78	6.0	1.222	0.99	1.20	24	d	//
RC07	4.6	78	11.0	1.222	1.81	2.21	44	d	//
	5.6	78	6.0	1.222	0.99	1.20	24	d	//
	7.7	78	18.0	1.222	2.96	3.61	72	d	//
	8.3	78	15.0	1.222	2.47	3.01	60	d	//
RC08	4.1	78	22.0	1.222	3.62	4.42	88	d	//
	5.7	78	4.0	1.222	0.66	0.80	16	d	//
	7.5	78	21.0	1.222	3.45	4.22	84	d	//
	8.4	78	18.0	1.222	2.96	3.61	72	d	//
RC09	5.3	78	6.0	1.222	0.99	1.20	24	d	//
	6.8	78	21.0	1.222	3.45	4.22	84	d	//
	7.5	78	9.0	1.222	1.48	1.81	36	d	//
	8.9	78	26.0	1.222	4.27	5.22	104	d	//
RC10	6.5	78	4.0	1.222	0.66	0.80	16	d	//
	8.2	78	17.0	1.222	2.79	3.41	68	d	//
	8.5	78	22.0	1.222	3.62	4.42	88	d	//
	9.8	78	21.0	1.222	3.45	4.22	84	d	//
	10.4	78	6.0	1.222	0.99	1.20	24	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	21	21
Minimum	0.80	16
Average	2.96	59
Maximum	5.22	104
Standard Dev.	1.45	29
Upper 95% Confidence Limit	5.81	116.19
Lower 95% Confidence Limit	0.12	2.36

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*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

Appendix 7

Chemical and Environmental Laboratory Testing (Eurofins Chemtest Laboratory)

UKAS TESTING
2183

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-36583-1		
Initial Date of Issue:	01-Nov-2021		
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	John Clancy		
Project	23606 Parkwest Dublin (Cronin Sutton)		
Quotation No.:	Q20-21693	**Date Received:**	20-Oct-2021
Order No.:		**Date Instructed:**	20-Oct-2021
No. of Samples:	11		
Turnaround (Wkdays):	7	**Results Due:**	28-Oct-2021
Date Approved:	01-Nov-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Leachate

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**					21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583
Quotation No.: Q20-21693	**Chemtest Sample ID.:**					1302545	1302546	1302548	1302549	1302551	1302552	1302553	1302554	1302555
Order No.:	Client Sample Ref.:					AA165810	AA165812	AA165818	AA165815	AA165820	AA165822	AA165831	AA165835	AA165836
	Sample Location:					BH01	BH02	BH03	BH04	BH05	BH06	BH09B	BH10	BH10
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00
	Bottom Depth (m):					1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**									
pH	U	1010	10:1		N/A	8.6	8.7	8.7	8.8	8.7	8.6	8.5	8.4	8.6
Ammonium	U	1220	10:1	mg/l	0.050	< 0.050	< 0.050	0.057	< 0.050	< 0.050	0.062	0.079	< 0.050	0.050
Ammonium	N	1220	10:1	mg/kg	0.10	0.34	0.54	0.72	0.49	0.42	0.75	0.92	0.48	0.60
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	0.36	0.35	0.33	0.32	0.32	0.33	0.35	0.33	0.34
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583
Quotation No.: Q20-21693	**Chemtest Sample ID.:**				1302545	1302546	1302547	1302548	1302549	1302550	1302551	1302552	1302553
Order No.:	Client Sample Ref.:				AA165810	AA165812	AA165813	AA165818	AA165815	AA165816	AA165820	AA165822	AA165831
	Sample Location:				BH01	BH02	BH02	BH03	BH04	BH04	BH05	BH06	BH09B
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
	Bottom Depth (m):				1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	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		N/A	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	9.9	9.0	9.5	11	8.9	10	12	11	17
pH (2.5:1)	N	2010		4.0			[A] 8.8			[A] 9.1			
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40		[A] < 0.40	[A] < 0.40		[A] < 0.40	[A] < 0.40	[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010			[A] < 0.010			[A] < 0.010			
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			[A] < 0.010			[A] 0.015			
Total Sulphur	U	2175	%	0.010			[A] 0.048			[A] 0.14			
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] < 1.0		[A] 1.1	[A] < 1.0		[A] < 1.0	[A] 1.0	[A] 1.1
Chloride (Water Soluble)	U	2220	g/l	0.010			[A] < 0.010			[A] < 0.010			
Nitrate (Water Soluble)	N	2220	g/l	0.010			< 0.010			< 0.010			
Cyanide (Total)	U	2300	mg/kg	0.50	[A] 1.3	[A] 1.5		[A] 2.0	[A] < 0.50		[A] < 0.50	[A] 1.7	[A] 1.7
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 4.0	[A] 8.5		[A] 9.5	[A] 12		[A] 16	[A] 4.8	[A] 3.7
Ammonium (Water Soluble)	U	2220	g/l	0.01			< 0.01			< 0.01			
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.026	[A] 0.024	[A] 0.026	[A] 0.034	[A] 0.022	[A] 0.034	[A] 0.013	[A] 0.035	[A] 0.052
Arsenic	U	2450	mg/kg	1.0	19	33		21	28		15	24	14
Barium	U	2450	mg/kg	10	62	55		39	79		21	110	71
Cadmium	U	2450	mg/kg	0.10	2.6	2.6		1.5	2.8		0.79	2.4	2.5
Chromium	U	2450	mg/kg	1.0	17	15		10	13		6.7	26	18
Molybdenum	U	2450	mg/kg	2.0	4.3	4.6		3.7	5.5		3.1	4.0	4.0
Antimony	N	2450	mg/kg	2.0	2.1	2.4		< 2.0	2.0		< 2.0	2.0	3.8
Copper	U	2450	mg/kg	0.50	40	45		27	59		17	46	64
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10		< 0.10	0.11	0.15
Nickel	U	2450	mg/kg	0.50	54	46		29	53		27	51	50
Lead	U	2450	mg/kg	0.50	23	25		17	25		8.9	37	35
Selenium	U	2450	mg/kg	0.20	0.56	< 0.20		0.47	0.26		< 0.20	0.32	0.63
Zinc	U	2450	mg/kg	0.50	92	79		45	77		23	92	96
Chromium (Trivalent)	N	2490	mg/kg	1.0	17	15		10	13		6.7	26	18
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50		< 0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	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

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583
Quotation No.: Q20-21693	**Chemtest Sample ID.:**				1302545	1302546	1302547	1302548	1302549	1302550	1302551	1302552	1302553
Order No.:	Client Sample Ref.:				AA165810	AA165812	AA165813	AA165818	AA165815	AA165816	AA165820	AA165822	AA165831
	Sample Location:				BH01	BH02	BH02	BH03	BH04	BH04	BH05	BH06	BH09B
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
	Bottom Depth (m):				1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
	Asbestos Lab:				COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
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
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	N	2800	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
Acenaphthylene	N	2800	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
Acenaphthene	N	2800	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
Fluorene	N	2800	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
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] 0.15
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] 0.039
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] 0.040	[A] 0.23
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] 0.040	[A] 0.22
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] 0.12
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] 0.13
Benzo[b]fluoranthene	N	2800	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
Benzo[k]fluoranthene	N	2800	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
Benzo[a]pyrene	N	2800	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
Indeno(1,2,3-c,d)Pyrene	N	2800	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
Dibenz(a,h)Anthracene	N	2800	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
Benzo[g,h,i]perylene	N	2800	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
Coronene	N	2800	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 Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20	[A] < 0.20		[A] < 0.20	[A] < 0.20		[A] < 0.20	[A] < 0.20	[A] 0.89
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583
Quotation No.: Q20-21693				**Chemtest Sample ID.:**	1302545	1302546	1302547	1302548	1302549	1302550	1302551	1302552	1302553
Order No.:				Client Sample Ref.:	AA165810	AA165812	AA165813	AA165818	AA165815	AA165816	AA165820	AA165822	AA165831
				Sample Location:	BH01	BH02	BH02	BH03	BH04	BH04	BH05	BH06	BH09B
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
				Bottom Depth (m):	1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
				Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10		< 0.10	< 0.10	< 0.10

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36583	21-36583
Quotation No.: Q20-21693				**Chemtest Sample ID.:**	1302554	1302555
Order No.:				Client Sample Ref.:	AA165835	AA165836
				Sample Location:	BH10	BH10
				Sample Type:	SOIL	SOIL
				Top Depth (m):	1.00	2.00
				Bottom Depth (m):	1.00	2.00
				Asbestos Lab:	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	12	11
pH (2.5:1)	N	2010		4.0		
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010		
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		
Total Sulphur	U	2175	%	0.010		
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 3.1	[A] < 1.0
Chloride (Water Soluble)	U	2220	g/l	0.010		
Nitrate (Water Soluble)	N	2220	g/l	0.010		
Cyanide (Total)	U	2300	mg/kg	0.50	[A] 1.7	[A] 1.5
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 9.7	[A] 6.0
Ammonium (Water Soluble)	U	2220	g/l	0.01		
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.059	[A] 0.020
Arsenic	U	2450	mg/kg	1.0	17	24
Barium	U	2450	mg/kg	10	51	74
Cadmium	U	2450	mg/kg	0.10	0.96	2.5
Chromium	U	2450	mg/kg	1.0	16	16
Molybdenum	U	2450	mg/kg	2.0	< 2.0	4.2
Antimony	N	2450	mg/kg	2.0	< 2.0	2.6
Copper	U	2450	mg/kg	0.50	34	50
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	25	46
Lead	U	2450	mg/kg	0.50	29	27
Selenium	U	2450	mg/kg	0.20	0.29	0.22
Zinc	U	2450	mg/kg	0.50	64	78
Chromium (Trivalent)	N	2490	mg/kg	1.0	16	16
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36583	21-36583
Quotation No.: Q20-21693	**Chemtest Sample ID.:**				1302554	1302555
Order No.:	Client Sample Ref.:				AA165835	AA165836
	Sample Location:				BH10	BH10
	Sample Type:				SOIL	SOIL
	Top Depth (m):				1.00	2.00
	Bottom Depth (m):				1.00	2.00
	Asbestos Lab:				COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] 260	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] 260	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] 260	[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] 0.16	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] 0.026	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] 0.16	[A] < 0.010
Pyrene	N	2800	mg/kg	0.010	[A] 0.18	[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] 0.11	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] 0.16	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] 0.15	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] 0.061	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] 0.15	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] 1.2	[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36583	21-36583
Quotation No.: Q20-21693				**Chemtest Sample ID.:**	1302554	1302555
Order No.:				Client Sample Ref.:	AA165835	AA165836
				Sample Location:	BH10	BH10
				Sample Type:	SOIL	SOIL
				Top Depth (m):	1.00	2.00
				Bottom Depth (m):	1.00	2.00
				Asbestos Lab:	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36583
Chemtest Sample ID: 1302545
Sample Ref: AA165810
Sample ID:
Sample Location: BH01
Top Depth(m): 1.00
Bottom Depth(m): 1.00
Sampling Date:

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.50	3	5	6
Loss On Ignition	2610	U	%	4.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.10	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0006	0.0064	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0070	0.070	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	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	6.2	62	1000	20000	50000
Total Dissolved Solids	1020	N	160	1600	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 (%)	9.9

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302546						
Sample Ref:	AA165812				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH02						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.40	3	5	6
Loss On Ignition	2610	U	%	4.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.094	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0005	0.0051	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0043	0.043	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	5.4	54	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	4.8	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.0

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302548						
Sample Ref:	AA165818				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH03						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.60	3	5	6
Loss On Ignition	2610	U	%	5.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.072	--	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	1455	U	0.0008	0.0075	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0032	0.032	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.012	0.12	0.5	10	30
Nickel	1455	U	0.0023	0.023	0.4	10	40
Lead	1455	U	0.0008	0.0078	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.006	0.055	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.48	4.8	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	18	180	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302549						
Sample Ref:	AA165815				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH04						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.30	3	5	6
Loss On Ignition	2610	U	%	3.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.069	--	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	1455	U	0.0002	0.0025	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0005	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0060	0.060	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0006	0.0057	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.22	2.2	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	52	520	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.1	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.9

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302551						
Sample Ref:	AA165820				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH05						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.40	3	5	6
Loss On Ignition	2610	U	%	3.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.13	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0005	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.011	0.11	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	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	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	56	560	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.5	55	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302552						
Sample Ref:	AA165822				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH06						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.80	3	5	6
Loss On Ignition	2610	U	%	4.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.083	--	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	1455	U	0.0004	0.0045	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0057	0.5	10	70
Copper	1455	U	0.0015	0.015	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0060	0.060	0.5	10	30
Nickel	1455	U	0.0007	0.0069	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.41	4.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	12	120	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302553						
Sample Ref:	AA165831				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH09B						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 1.3	3	5	6
Loss On Ignition	2610	U	%	5.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.89	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.083	--	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	1455	U	0.0013	0.013	0.5	2	25
Barium	1455	U	0.005	0.053	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0008	0.0076	0.5	10	70
Copper	1455	U	0.0028	0.029	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0069	0.069	0.5	10	30
Nickel	1455	U	0.0013	0.013	0.4	10	40
Lead	1455	U	0.0007	0.0070	0.5	10	50
Antimony	1455	U	0.0007	0.0066	0.06	0.7	5
Selenium	1455	U	0.0005	0.0053	0.1	0.5	7
Zinc	1455	U	0.003	0.035	4	50	200
Chloride	1220	U	1.4	14	800	15000	25000
Fluoride	1220	U	0.45	4.5	10	150	500
Sulphate	1220	U	7.2	72	1000	20000	50000
Total Dissolved Solids	1020	N	91	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	23	230	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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302554						
Sample Ref:	AA165835				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH10						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 2.1	3	5	6
Loss On Ignition	2610	U	%	3.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 260	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 1.2	100	--	--
pH	2010	U		8.7	--	>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	1455	U	0.0006	0.0057	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0058	0.5	10	70
Copper	1455	U	0.0025	0.025	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0036	0.036	0.5	10	30
Nickel	1455	U	0.0012	0.012	0.4	10	40
Lead	1455	U	0.0005	0.0054	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.004	0.040	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.32	3.2	10	150	500
Sulphate	1220	U	1.7	17	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	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 (%)	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36583
Chemtest Sample ID: 1302555
Sample Ref: AA165836
Sample ID:
Sample Location: BH10
Top Depth(m): 2.00
Bottom Depth(m): 2.00
Sampling Date:

Determinand	**SOP**	**Accred.**	**Units**		**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.50	3	5	6
Loss On Ignition	2610	U	%	4.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.033	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0005	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0076	0.076	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	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	2.5	25	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	3.3	< 50	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.

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:
1302545	AA165810		BH01		A	Amber Glass 250ml
1302545	AA165810		BH01		A	Plastic Tub 500g
1302546	AA165812		BH02		A	Amber Glass 250ml
1302546	AA165812		BH02		A	Plastic Tub 500g
1302547	AA165813		BH02		A	Amber Glass 250ml
1302547	AA165813		BH02		A	Plastic Tub 500g
1302548	AA165818		BH03		A	Amber Glass 250ml
1302548	AA165818		BH03		A	Plastic Tub 500g
1302549	AA165815		BH04		A	Amber Glass 250ml
1302549	AA165815		BH04		A	Plastic Tub 500g
1302550	AA165816		BH04		A	Amber Glass 250ml
1302550	AA165816		BH04		A	Plastic Tub 500g
1302551	AA165820		BH05		A	Amber Glass 250ml
1302551	AA165820		BH05		A	Plastic Tub 500g
1302552	AA165822		BH06		A	Amber Glass 250ml
1302552	AA165822		BH06		A	Plastic Tub 500g
1302553	AA165831		BH09B		A	Amber Glass 250ml
1302553	AA165831		BH09B		A	Plastic Tub 500g
1302554	AA165835		BH10		A	Amber Glass 250ml
1302554	AA165835		BH10		A	Plastic Tub 500g
1302555	AA165836		BH10		A	Amber Glass 250ml
1302555	AA165836		BH10		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters 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	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
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.

Test Methods

SOP	Title	Parameters included	Method summary
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
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 C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

UKAS
TESTING
2183

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Tel: 01638 606070
Email: info@chemtest.com

Amended Report

Report No.:	21-36473-2		
Initial Date of Issue:	01-Nov-2021	**Date of Re-Issue:**	10-Nov-2021
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	Darren Keogh		
Project	23606 Parkwest Dublin (Cronin Sutton)		
Quotation No.:	Q20-19951	**Date Received:**	20-Oct-2021
Order No.:		**Date Instructed:**	20-Oct-2021
No. of Samples:	23		
Turnaround (Wkdays):	16	**Results Due:**	10-Nov-2021
Date Approved:	10-Nov-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Leachate

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL					**Chemtest Job No.:**	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951					**Chemtest Sample ID.:**	1302004	1302005	1302006	1302008	1302009	1302010	1302011	1302012	1302013	1302014	1302015
Order No.:					Client Sample Ref.:	AA150651	AA150653	AA150669	AA150666	AA150657	AA150660	AA150672	AA150689	AA150674	AA150686	AA150678
					Sample Location:	TP01	TP02	TP03	TP04	TP05	TP14	TP06	TP07	TP08	TP09	TP10
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	0.50	0.70	0.60	0.80	0.50	0.50	0.50	0.50	0.50	0.70
					Bottom Depth (m):	0.50	0.50	0.70	0.60	0.80	0.50	0.50	0.50	0.50	0.50	0.70
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**											
pH	U	1010	10:1		N/A	8.5	8.4	8.5	8.2	8.5	8.2	8.2	8.4	8.4	8.2	8.2
Ammonium	U	1220	10:1	mg/l	0.050	< 0.050	0.073	< 0.050	0.075	0.050	0.066	0.076	0.060	< 0.050	< 0.050	0.056
Ammonium	N	1220	10:1	mg/kg	0.10	0.52	0.82	0.45	0.82	0.58	0.72	0.83	0.68	0.38	0.41	0.62
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	< 0.01	0.12	< 0.01	0.15	< 0.01	0.13	< 0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Leachate

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**					21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**					1302016	1302018	1302019	1302020	1302021	1302022	1302025	1302026
Order No.:	Client Sample Ref.:					AA150679	AA150682	AA150683	AA150695	AA150692	AA150663	AA165825	AA165828
	Sample Location:					TP10	TP11	TP11	TP12	TP13	TP15	BH07	BH08
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					1.60	0.50	1.50	0.50	0.50	0.80	1.00	1.00
	Bottom Depth (m):					1.60	0.50	1.50	0.50	0.50	0.80	1.00	1.00
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**								
pH	U	1010	10:1		N/A	8.4	8.2	8.3	8.3	8.5	8.4	8.6	8.3
Ammonium	U	1220	10:1	mg/l	0.050	< 0.050	0.061	0.056	< 0.050	0.059	< 0.050	< 0.050	< 0.050
Ammonium	N	1220	10:1	mg/kg	0.10	0.45	0.67	0.62	0.47	0.69	0.39	0.50	0.55
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302004	1302005	1302006	1302007	1302008	1302009	1302010	1302011	1302012
Order No.:	Client Sample Ref.:				AA150651	AA150653	AA150669	AA150670	AA150666	AA150657	AA150660	AA150672	AA150689
	Sample Location:				TP01	TP02	TP03	TP03	TP04	TP05	TP14	TP06	TP07
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-		-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	6.5	7.7	10	23	14	8.0	9.9	12	10
pH (2.5:1)	N	2010		4.0				[A] 8.8					
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40		[A] 0.53	[A] < 0.40	[A] 1.1	[A] 0.57	[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010				[A] < 0.010					
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010				[A] < 0.010					
Total Sulphur	U	2175	%	0.010				[A] 0.029					
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 4.8	[A] 110	[A] 1.4		[A] 3.4	[A] < 1.0	[A] 220	[A] 1.3	[A] 1.4
Chloride (Water Soluble)	U	2220	g/l	0.010				[A] < 0.010					
Nitrate (Water Soluble)	N	2220	g/l	0.010				< 0.010					
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	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 7.3	[A] 4.9	[A] 20		[A] 5.1	[A] 5.2	[A] 2.9	[A] 4.1	[A] 6.1
Ammonium (Water Soluble)	U	2220	g/l	0.01				< 0.01					
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.026	[A] 0.025	[A] 0.027	[A] 0.027	[A] 0.054	[A] 0.028	[A] 0.037	[A] 0.036	[A] 0.037
Arsenic	U	2450	mg/kg	1.0	4.3	2.7	24		40	22	10	10	30
Barium	U	2450	mg/kg	10	20	23	49		52	45	71	70	56
Cadmium	U	2450	mg/kg	0.10	< 0.10	< 0.10	2.9		1.2	2.8	2.5	1.8	1.4
Chromium	U	2450	mg/kg	1.0	15	31	17		80	14	18	17	20
Molybdenum	U	2450	mg/kg	2.0	< 2.0	< 2.0	4.3		2.1	3.6	2.4	2.3	2.7
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	11	12	43		66	36	43	36	49
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	0.12
Nickel	U	2450	mg/kg	0.50	7.8	21	49		56	43	43	31	33
Lead	U	2450	mg/kg	0.50	5.9	8.9	22		36	21	23	30	49
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	0.43		0.31	0.30	0.43	0.52	0.50
Zinc	U	2450	mg/kg	0.50	18	38	87		100	77	210	88	240
Chromium (Trivalent)	N	2490	mg/kg	1.0	15	31	17		80	14	18	17	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 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	[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	[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	[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	[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	[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	[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] 9.9	[A] 3.3

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302004	1302005	1302006	1302007	1302008	1302009	1302010	1302011	1302012
Order No.:	Client Sample Ref.:				AA150651	AA150653	AA150669	AA150670	AA150666	AA150657	AA150660	AA150672	AA150689
	Sample Location:				TP01	TP02	TP03	TP03	TP04	TP05	TP14	TP06	TP07
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
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	[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] 9.9	[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	[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	[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	[A] < 1.0
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	[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	[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	[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] 240	[A] 460
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	[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] 240	[A] 460
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10		[A] < 10	[A] < 10	[A] < 10	[A] 250	[A] 460
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	[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	[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	[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	[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	[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	[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.066	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.017	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.044	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Fluorene	N	2800	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	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] 0.065	[A] < 0.010	[A] < 0.010		[A] 0.080	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] 0.049	[A] < 0.010	[A] < 0.010		[A] 0.038	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] 0.058	[A] 0.079	[A] < 0.010		[A] 0.13	[A] < 0.010	[A] < 0.010	[A] 0.11	[A] 0.14
Pyrene	N	2800	mg/kg	0.010	[A] 0.049	[A] 0.089	[A] < 0.010		[A] 0.16	[A] < 0.010	[A] < 0.010	[A] 0.12	[A] 0.17
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.086	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.11	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.10	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.062	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.090	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.049	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.037	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.073	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Coronene	N	2800	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	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] 0.22	[A] < 0.20	[A] < 0.20		[A] 1.1	[A] < 0.20	[A] < 0.20	[A] 0.23	[A] 0.31
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302004	1302005	1302006	1302007	1302008	1302009	1302010	1302011	1302012
Order No.:	Client Sample Ref.:				AA150651	AA150653	AA150669	AA150670	AA150666	AA150657	AA150660	AA150672	AA150689
	Sample Location:				TP01	TP02	TP03	TP03	TP04	TP05	TP14	TP06	TP07
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302013	1302014	1302015	1302016	1302017	1302018	1302019	1302020	1302021
Order No.:	Client Sample Ref.:				AA150674	AA150686	AA150678	AA150679	AA150680	AA150682	AA150683	AA150695	AA150692
	Sample Location:				TP08	TP09	TP10	TP10	TP10	TP11	TP11	TP12	TP13
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-	-		-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	11	12	8.4	11	9.4	13	15	12	8.3
pH (2.5:1)	N	2010		4.0					[A] 9.0				
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40		[A] 0.76	[A] 0.61	[A] < 0.40	[A] 0.72
Magnesium (Water Soluble)	N	2120	g/l	0.010					[A] < 0.010				
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010					[A] < 0.010				
Total Sulphur	U	2175	%	0.010					[A] 0.025				
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] 1.7	[A] 2.0	[A] 1.0		[A] 2.3	[A] 5.3	[A] 1.1	[A] 1.2
Chloride (Water Soluble)	U	2220	g/l	0.010					[A] < 0.010				
Nitrate (Water Soluble)	N	2220	g/l	0.010					< 0.010				
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	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 5.3	[A] 9.9	[A] 10	[A] 6.9		[A] 6.6	[A] 7.3	[A] 6.4	[A] 12
Ammonium (Water Soluble)	U	2220	g/l	0.01					< 0.01				
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.042	[A] 0.048	[A] 0.040	[A] 0.043	[A] 0.023	[A] 0.079	[A] 0.062	[A] 0.034	[A] 0.033
Arsenic	U	2450	mg/kg	1.0	19	16	20	28		38	20	11	33
Barium	U	2450	mg/kg	10	67	71	65	87		100	120	52	64
Cadmium	U	2450	mg/kg	0.10	2.7	1.7	2.1	3.3		2.3	1.4	1.4	3.2
Chromium	U	2450	mg/kg	1.0	20	18	22	25		31	18	14	20
Molybdenum	U	2450	mg/kg	2.0	3.7	3.7	4.1	4.5		3.9	2.9	< 2.0	5.3
Antimony	N	2450	mg/kg	2.0	2.0	2.3	2.0	2.6		2.9	2.3	< 2.0	2.2
Copper	U	2450	mg/kg	0.50	65	39	60	52		66	49	69	45
Mercury	U	2450	mg/kg	0.10	0.10	0.16	0.13	0.15		0.32	0.39	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	52	38	55	59		54	37	29	57
Lead	U	2450	mg/kg	0.50	28	55	46	41		110	130	49	34
Selenium	U	2450	mg/kg	0.20	0.45	0.76	0.85	0.50		0.82	0.60	0.36	0.97
Zinc	U	2450	mg/kg	0.50	100	87	94	130		180	140	84	120
Chromium (Trivalent)	N	2490	mg/kg	1.0	20	18	22	25		31	18	14	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10	13	< 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	[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	[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	[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	[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	[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	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] 13	[A] < 1.0		[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302013	1302014	1302015	1302016	1302017	1302018	1302019	1302020	1302021
Order No.:	Client Sample Ref.:				AA150674	AA150686	AA150678	AA150679	AA150680	AA150682	AA150683	AA150695	AA150692
	Sample Location:				TP08	TP09	TP10	TP10	TP10	TP11	TP11	TP12	TP13
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
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	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] 13	[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	[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	[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	[A] < 1.0
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	[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	[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	[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] 200	[A] 190	[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	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] 200	[A] 190	[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] 200	[A] 210	[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	[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	[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	[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	[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	[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	[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.10		[A] 0.095	[A] 0.14	[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] 0.038	[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.041		[A] 0.050	[A] 0.062	[A] < 0.010	[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.042		[A] 0.045	[A] 0.048	[A] < 0.010	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] 0.083	[A] < 0.010	[A] 0.13		[A] 0.31	[A] 0.39	[A] < 0.010	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] 0.031	[A] < 0.010	[A] 0.032		[A] 0.048	[A] 0.087	[A] < 0.010	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] 0.14	[A] 0.061	[A] 0.10		[A] 0.37	[A] 0.67	[A] 0.11	[A] 0.045
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] 0.14	[A] 0.070	[A] 0.10		[A] 0.34	[A] 0.62	[A] 0.10	[A] 0.037
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.063		[A] 0.19	[A] 0.32	[A] 0.060	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.057		[A] 0.20	[A] 0.40	[A] 0.080	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.054		[A] 0.25	[A] 0.50	[A] < 0.010	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.038		[A] 0.075	[A] 0.19	[A] < 0.010	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.040		[A] 0.18	[A] 0.36	[A] < 0.010	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.12	[A] 0.24	[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.069	[A] 0.081	[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.15	[A] 0.28	[A] < 0.010	[A] < 0.010
Coronene	N	2800	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	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20	[A] 0.39	[A] < 0.20	[A] 0.80		[A] 2.5	[A] 4.4	[A] 0.35	[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1302013	1302014	1302015	1302016	1302017	1302018	1302019	1302020	1302021
Order No.:				Client Sample Ref.:	AA150674	AA150686	AA150678	AA150679	AA150680	AA150682	AA150683	AA150695	AA150692
				Sample Location:	TP08	TP09	TP10	TP10	TP10	TP11	TP11	TP12	TP13
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
				Bottom Depth (m):	0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
				Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1302022	1302023	1302024	1302025	1302026
Order No.:				Client Sample Ref.:	AA150663	AA150664	AA165823	AA165825	AA165828
				Sample Location:	TP15	TP15	BH06	BH07	BH08
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.80	1.50	2.00	1.00	1.00
				Bottom Depth (m):	0.80	1.50	2.00	1.00	1.00
				Asbestos Lab:	DURHAM			DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-			-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected			No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	10	14	15	8.1	16
pH (2.5:1)	N	2010		4.0		[A] 8.9	[A] 8.9		
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40			[A] < 0.40	[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010	[A] < 0.010		
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010	[A] < 0.010		
Total Sulphur	U	2175	%	0.010		[A] 0.044	[A] 0.020		
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] < 0.010	[A] < 0.010		
Nitrate (Water Soluble)	N	2220	g/l	0.010		< 0.010	< 0.010		
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] 20			[A] 15	[A] 12
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01	< 0.01		
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.034	[A] 0.025	[A] 0.027	[A] 0.028	[A] 0.020
Arsenic	U	2450	mg/kg	1.0	27			30	13
Barium	U	2450	mg/kg	10	90			63	58
Cadmium	U	2450	mg/kg	0.10	2.5			2.6	1.2
Chromium	U	2450	mg/kg	1.0	17			16	19
Molybdenum	U	2450	mg/kg	2.0	4.0			4.6	2.3
Antimony	N	2450	mg/kg	2.0	2.0			< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	36			36	32
Mercury	U	2450	mg/kg	0.10	< 0.10			< 0.10	0.13
Nickel	U	2450	mg/kg	0.50	62			47	35
Lead	U	2450	mg/kg	0.50	27			23	31
Selenium	U	2450	mg/kg	0.20	< 0.20			< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	67			110	220
Chromium (Trivalent)	N	2490	mg/kg	1.0	17			16	19
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50			< 0.50	< 0.50
Mineral Oil (TPH Calculation)	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

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302022	1302023	1302024	1302025	1302026
Order No.:	Client Sample Ref.:				AA150663	AA150664	AA165823	AA165825	AA165828
	Sample Location:				TP15	TP15	BH06	BH07	BH08
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.80	1.50	2.00	1.00	1.00
	Bottom Depth (m):				0.80	1.50	2.00	1.00	1.00
	Asbestos Lab:				DURHAM			DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
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
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	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] 0.062
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] 0.045
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20			[A] < 0.20	[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1302022	1302023	1302024	1302025	1302026
Order No.:				Client Sample Ref.:	AA150663	AA150664	AA165823	AA165825	AA165828
				Sample Location:	TP15	TP15	BH06	BH07	BH08
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.80	1.50	2.00	1.00	1.00
				Bottom Depth (m):	0.80	1.50	2.00	1.00	1.00
				Asbestos Lab:	DURHAM			DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10			< 0.10	< 0.10

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-36473						
Chemtest Sample ID:	1302004						
Sample Ref:	AA150651						
Sample ID:							
Sample Location:	TP01						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
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] 0.30	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	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.22	100	--	--
pH	2010	U		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0070	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0005	0.0050	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0032	0.032	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.29	2.9	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	11	110	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.5

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302005						
Sample Ref:	AA150653				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP02						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.40	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	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.015	--	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	1455	U	0.0008	0.0081	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0013	0.013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0049	0.049	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.60	6.0	10	150	500
Sulphate	1220	U	1.6	16	1000	20000	50000
Total Dissolved Solids	1020	N	72	720	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 (%)	7.7

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302006						
Sample Ref:	AA150669				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP03						
Top Depth(m):	0.70						
Bottom Depth(m):	0.70						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.30	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	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0007	0.0070	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0094	0.094	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.35	3.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	55	550	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	15	150	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473
Chemtest Sample ID:	1302008
Sample Ref:	AA150666
Sample ID:	
Sample Location:	TP04
Top Depth(m):	0.60
Bottom Depth(m):	0.60
Sampling Date:	

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 1.0	3	5	6
Loss On Ignition	2610	U	%	3.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 1.1	100	--	--
pH	2010	U		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.012	--	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	1455	U	0.0007	0.0069	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0057	0.5	10	70
Copper	1455	U	0.0032	0.032	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0060	0.060	0.5	10	30
Nickel	1455	U	0.0021	0.021	0.4	10	40
Lead	1455	U	0.0007	0.0073	0.5	10	50
Antimony	1455	U	0.0005	0.0054	0.06	0.7	5
Selenium	1455	U	0.0006	0.0056	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.37	3.7	10	150	500
Sulphate	1220	U	22	220	1000	20000	50000
Total Dissolved Solids	1020	N	100	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	43	430	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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302009						
Sample Ref:	AA150657				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP05						
Top Depth(m):	0.80						
Bottom Depth(m):	0.80						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.40	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	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0007	0.0067	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0039	0.039	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	57	570	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	12	120	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.0

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302010						
Sample Ref:	AA150660				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP14						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.82	3	5	6
Loss On Ignition	2610	U	%	4.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	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	1455	U	0.0003	0.0028	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0015	0.015	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0022	0.022	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.40	4.0	10	150	500
Sulphate	1220	U	2.3	23	1000	20000	50000
Total Dissolved Solids	1020	N	91	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.9	89	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.9

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302011						
Sample Ref:	AA150672				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP06						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 1.4	3	5	6
Loss On Ignition	2610	U	%	4.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 250	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.23	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	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	1455	U	0.0002	0.0024	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0023	0.023	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0040	0.040	0.5	10	30
Nickel	1455	U	0.0018	0.018	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.41	4.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	35	350	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36473
Chemtest Sample ID: 1302012
Sample Ref: AA150689
Sample ID:
Sample Location: TP07
Top Depth(m): 0.50
Bottom Depth(m): 0.50
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] 1.1	3	5	6
Loss On Ignition	2610	U	%	3.4	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 460	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.31	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.010	--	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	1455	U	0.0022	0.022	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0027	0.027	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0049	0.049	0.5	10	30
Nickel	1455	U	0.0008	0.0084	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0008	0.0075	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.44	4.4	10	150	500
Sulphate	1220	U	5.3	53	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	48	480	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473
Chemtest Sample ID:	1302013
Sample Ref:	AA150674
Sample ID:	
Sample Location:	TP08
Top Depth(m):	0.50
Bottom Depth(m):	0.50
Sampling Date:	

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.70	3	5	6
Loss On Ignition	2610	U	%	3.4	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0017	0.017	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0021	0.021	0.5	10	30
Nickel	1455	U	0.0007	0.0069	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.012	0.12	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.38	3.8	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	24	240	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302014						
Sample Ref:	AA150686				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP09						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 1.5	3	5	6
Loss On Ignition	2610	U	%	4.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 200	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.39	100	--	--
pH	2010	U		8.4	--	>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	1455	U	0.0003	0.0025	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0022	0.022	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0057	0.057	0.5	10	30
Nickel	1455	U	0.0008	0.0078	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.34	3.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	39	390	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302015						
Sample Ref:	AA150678				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP10						
Top Depth(m):	0.70						
Bottom Depth(m):	0.70						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.90	3	5	6
Loss On Ignition	2610	U	%	3.4	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 210	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.062	--	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	1455	U	0.0003	0.0031	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0010	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0067	0.067	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0006	0.0056	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.32	3.2	10	150	500
Sulphate	1220	U	8.5	85	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	15	150	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.4

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302016						
Sample Ref:	AA150679				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP10						
Top Depth(m):	1.60						
Bottom Depth(m):	1.60						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.70	3	5	6
Loss On Ignition	2610	U	%	3.2	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.80	100	--	--
pH	2010	U		8.5	--	>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	1455	U	0.0003	0.0032	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0010	0.010	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0028	0.028	0.5	10	30
Nickel	1455	U	0.0006	0.0063	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0005	0.0051	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.34	3.4	10	150	500
Sulphate	1220	U	3.7	37	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	21	210	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302018						
Sample Ref:	AA150682				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP11						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 2.3	3	5	6
Loss On Ignition	2610	U	%	6.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 2.5	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	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	1455	U	0.0010	0.0098	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0037	0.037	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0039	0.039	0.5	10	30
Nickel	1455	U	0.0010	0.0099	0.4	10	40
Lead	1455	U	0.0005	0.0051	0.5	10	50
Antimony	1455	U	0.0010	0.010	0.06	0.7	5
Selenium	1455	U	0.0005	0.0051	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.39	3.9	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	29	290	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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302019						
Sample Ref:	AA150683				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP11						
Top Depth(m):	1.50						
Bottom Depth(m):	1.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 3.9	3	5	6
Loss On Ignition	2610	U	%	6.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 4.4	100	--	--
pH	2010	U		8.3	--	>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	1455	U	0.0017	0.017	0.5	2	25
Barium	1455	U	0.006	0.063	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0030	0.031	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0090	0.090	0.5	10	30
Nickel	1455	U	0.0008	0.0082	0.4	10	40
Lead	1455	U	0.0009	0.0090	0.5	10	50
Antimony	1455	U	0.0010	0.010	0.06	0.7	5
Selenium	1455	U	0.0007	0.0065	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.41	4.1	10	150	500
Sulphate	1220	U	4.6	46	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	38	380	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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473
Chemtest Sample ID:	1302020
Sample Ref:	AA150695
Sample ID:	
Sample Location:	TP12
Top Depth(m):	0.50
Bottom Depth(m):	0.50
Sampling Date:	

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 1.0	3	5	6
Loss On Ignition	2610	U	%	4.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.35	100	--	--
pH	2010	U		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.020	--	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	1455	U	0.0006	0.0063	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0040	0.041	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0075	0.075	0.5	10	30
Nickel	1455	U	0.0008	0.0078	0.4	10	40
Lead	1455	U	0.0011	0.011	0.5	10	50
Antimony	1455	U	0.0075	0.075	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.42	4.2	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	39	390	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473
Chemtest Sample ID:	1302021
Sample Ref:	AA150692
Sample ID:	
Sample Location:	TP13
Top Depth(m):	0.50
Bottom Depth(m):	0.50
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] 0.50	3	5	6
Loss On Ignition	2610	U	%	2.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.013	--	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	1455	U	0.0004	0.0041	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0014	0.015	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0054	0.054	0.5	10	30
Nickel	1455	U	0.0005	0.0052	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	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	1.1	11	1000	20000	50000
Total Dissolved Solids	1020	N	64	640	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	25	250	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.3

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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302022						
Sample Ref:	AA150663						
Sample ID:							
Sample Location:	TP15						
Top Depth(m):	0.80						
Bottom Depth(m):	0.80						
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] 0.40	3	5	6
Loss On Ignition	2610	U	%	3.2	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.014	--	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	1455	U	0.0003	0.0026	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0013	0.013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0025	0.025	0.5	10	30
Nickel	1455	U	0.0010	0.010	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.60	6.0	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	62	620	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	37	370	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36473
Chemtest Sample ID: 1302025
Sample Ref: AA165825
Sample ID:
Sample Location: BH07
Top Depth(m): 1.00
Bottom Depth(m): 1.00
Sampling Date:

Determinand	SOP	Accred.	Units		Landfill Waste Acceptance Criteria Limits		
					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon	2625	U	%	[A] 0.40	3	5	6
Loss On Ignition	2610	U	%	2.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0070	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0006	0.0059	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0052	0.052	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.34	3.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	51	510	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 (%)	8.1

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36473
Chemtest Sample ID: 1302026
Sample Ref: AA165828
Sample ID:
Sample Location: BH08
Top Depth(m): 1.00
Bottom Depth(m): 1.00
Sampling Date:

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.40	3	5	6
Loss On Ignition	2610	U	%	3.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0009	0.0091	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0027	0.027	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.47	4.7	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	9.6	96	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.

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:
1302004	AA150651		TP01		A	Amber Glass 250ml
1302004	AA150651		TP01		A	Plastic Tub 500g
1302005	AA150653		TP02		A	Amber Glass 250ml
1302005	AA150653		TP02		A	Plastic Tub 500g
1302006	AA150669		TP03		A	Amber Glass 250ml
1302006	AA150669		TP03		A	Plastic Tub 500g
1302007	AA150670		TP03		A	Amber Glass 250ml
1302007	AA150670		TP03		A	Plastic Tub 500g
1302008	AA150666		TP04		A	Amber Glass 250ml
1302008	AA150666		TP04		A	Plastic Tub 500g
1302009	AA150657		TP05		A	Amber Glass 250ml
1302009	AA150657		TP05		A	Plastic Tub 500g
1302010	AA150660		TP14		A	Amber Glass 250ml
1302010	AA150660		TP14		A	Plastic Tub 500g
1302011	AA150672		TP06		A	Amber Glass 250ml
1302011	AA150672		TP06		A	Plastic Tub 500g
1302012	AA150689		TP07		A	Amber Glass 250ml
1302012	AA150689		TP07		A	Plastic Tub 500g
1302013	AA150674		TP08		A	Amber Glass 250ml
1302013	AA150674		TP08		A	Plastic Tub 500g
1302014	AA150686		TP09		A	Amber Glass 250ml
1302014	AA150686		TP09		A	Plastic Tub 500g

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:
1302015	AA150678		TP10		A	Amber Glass 250ml
1302015	AA150678		TP10		A	Plastic Tub 500g
1302016	AA150679		TP10		A	Amber Glass 250ml
1302016	AA150679		TP10		A	Plastic Tub 500g
1302017	AA150680		TP10		A	Amber Glass 250ml
1302017	AA150680		TP10		A	Plastic Tub 500g
1302018	AA150682		TP11		A	Amber Glass 250ml
1302018	AA150682		TP11		A	Plastic Tub 500g
1302019	AA150683		TP11		A	Amber Glass 250ml
1302019	AA150683		TP11		A	Plastic Tub 500g
1302020	AA150695		TP12		A	Amber Glass 250ml
1302020	AA150695		TP12		A	Plastic Tub 500g
1302021	AA150692		TP13		A	Amber Glass 250ml
1302021	AA150692		TP13		A	Plastic Tub 500g
1302022	AA150663		TP15		A	Amber Glass 250ml
1302022	AA150663		TP15		A	Plastic Tub 500g
1302023	AA150664		TP15		A	Amber Glass 250ml
1302023	AA150664		TP15		A	Plastic Tub 500g
1302024	AA165823		BH06		A	Amber Glass 250ml
1302024	AA165823		BH06		A	Plastic Tub 500g
1302025	AA165825		BH07		A	Amber Glass 250ml
1302025	AA165825		BH07		A	Plastic Tub 500g

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:
1302026	AA165828		BH08		A	Amber Glass 250ml
1302026	AA165828		BH08		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters 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	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
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.

Test Methods

SOP	Title	Parameters included	Method summary
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
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 C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix 8

As-Surveyed Site Plan

ExpertGPS

23606 Site 6, Parkwest, Dublin 2

25 0 25 50 75 100 125 150 175 200 225 m

Scale: 1 : 1350.

MN
2°07'

APPENDIX 6B – WASTE CHARACTERISATION ASSESSMENT

Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89

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Waste Characterisation Assessment

Site 6

Parkwest

Dublin 12

Prepared For: -

IGSL Limited
Unit F
M7 Business Park
Naas
County Kildare

Prepared By: -

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Project	Waste Characterisation: Parkwest, Dublin 12			
Client	IGSL Limited			
Report No	Date	Status	Prepared By	Reviewed By
210013601	12/11/2021	Final	Austin Hynes MSc	Sean Moran B.Sc. MSc

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APPENDICES

1 INTRODUCTION

IGSL Limited requested O'Callaghan Moran & Associates (OCM) to undertake a waste characterisation assessment of samples of made ground and natural soils collected from ten (10 No.) cable percussion boreholes and fifteen (15 No.) trial pits at the site of a proposed development in Parkwest, Dublin 12.

1.1 Methodology

IGSL provided a description of the ground conditions and collected samples of the soils from the trial pit locations. The samples were analysed at an accredited laboratory and the results formed the basis for a waste classification assessment, which was undertaken by OCM in accordance with the Environmental Protection Agency (EPA) Guidelines on the Classification of Waste (2015).

2 WASTE CLASSIFICATION ASSESSMENT

2.1 Soil Sampling and Laboratory Analysis

2.1.1 *Site Investigation*

The site investigation was completed by IGSL Limited in September 2021 and included the collection of nine composite samples from eight (8 No.) borehole and seventeen samples from fifteen (15 no.) trial pits. The locations are shown on Figure 2.1. The logs are in Appendix 1.

There is Made Ground at the surface of all locations. The Made Ground is composed of firm, brown, sandy gravelly CLAY/SILT to generally between 0.70-1.00 mbgl. This is underlain by Natural Ground composed of stiff to very stiff, brown sandy gravelly CLAY with some cobble content.

The Made Ground at BH10 and TP11 extends to 1.70 mbgl and contains man-made material <2% (concrete, red brick, metal and timber fragments) of the soil matrix.

2.1.2 *Sample Collection*

IGSL collected the samples and placed them in laboratory prepared containers that were stored in coolers prior to shipment to Chemtest Ltd.

2.1.3 *Laboratory Analysis*

The samples were tested for, metals (arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, total organic carbon (TOC), BTEX (benzene, toluene, ethylbenzene and xylene) aliphatic and aromatic hydrocarbons, polychlorinated biphenyls (PCB), mineral oil, polyaromatic hydrocarbons (PAH) and asbestos. Leachate generated from the samples was tested for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, chloride, fluoride, soluble sulphate, phenols, dissolved organic carbon (DOC), total dissolved solids (TDS).

This parameter range facilitates an assessment of the hazardous properties of the waste, and also allows a determination of appropriate off-site management options based on the Waste Acceptance Criteria (WAC) applied by landfill operators.

The analytical methods were all ISO/CEN approved and the method detection limits were below the relevant guidance/threshold values. The full laboratory report is in Appendix 2.

2.2 Waste Classification

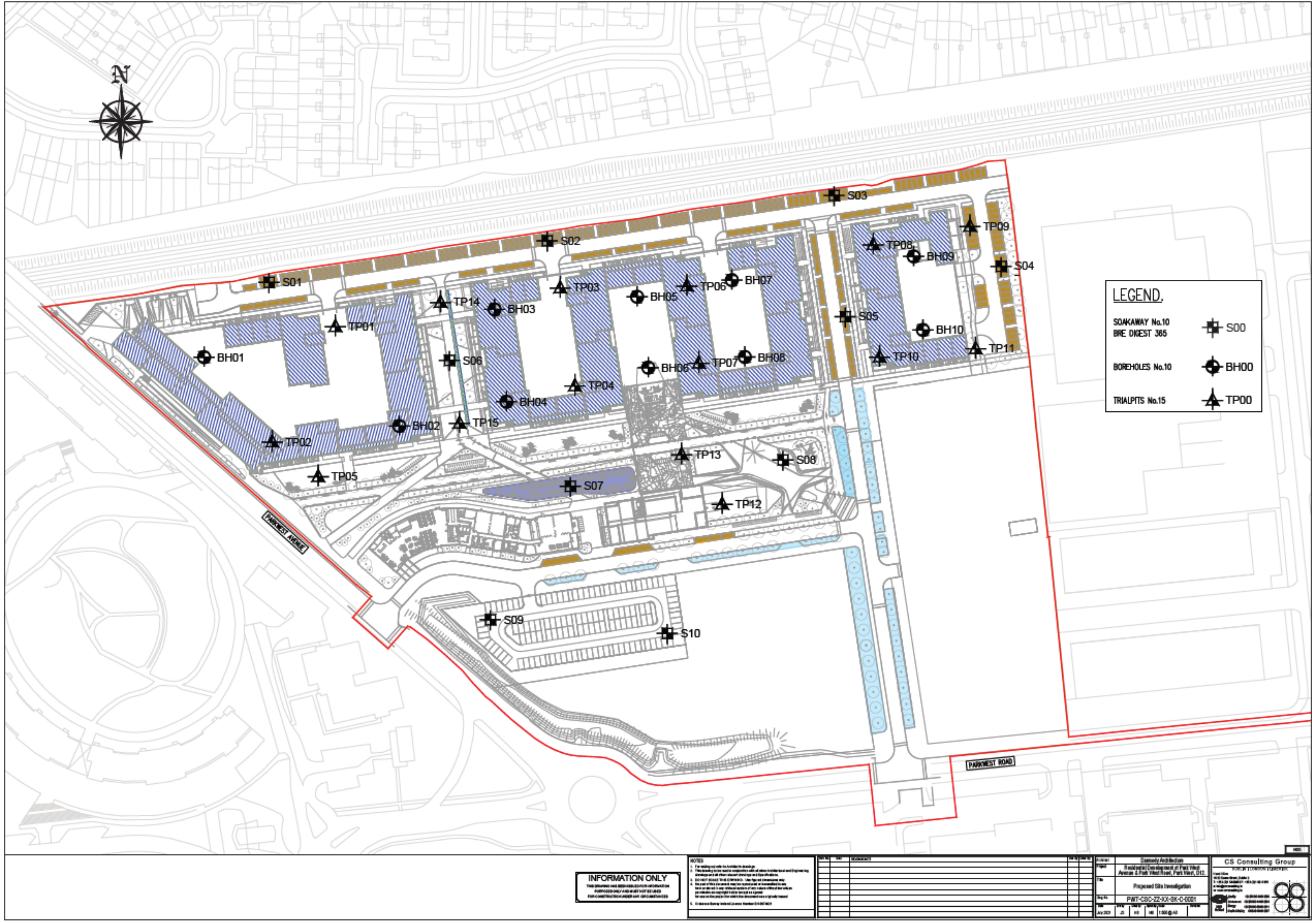
The Haz Waste Online Classification Engine, developed in the UK by One Touch Data Ltd, was used to determine the waste classification. This tool was developed specifically to establish whether waste is non-hazardous or hazardous and has been approved for use in Ireland by the Environmental Protection Agency. The full Waste Classification Report is in Appendix 3 and the results are summarised in Table 2.1.

Table 2.1 Waste Classification

Sample No.	Depth	Classification	LoW Code
BH01	1.00	Non-Hazardous	17 05 04
BH02	1.00	Non-Hazardous	17 05 04
BH03	1.00	Non-Hazardous	17 05 04
BH04	1.00	Non-Hazardous	17 05 04
BH05	1.00	Non-Hazardous	17 05 04
BH06	1.00	Non-Hazardous	17 05 04
BH07	1.00	Non-Hazardous	17 05 04
BH08	1.00	Non-Hazardous	17 05 04
BH09B	1.00	Non-Hazardous	17 05 04
BH10	1.00	Non-Hazardous	17 05 04
BH10	2.00	Non-Hazardous	17 05 04
TP01	0.50	Non-Hazardous	17 05 04
TP02	0.50	Non-Hazardous	17 05 04
TP03	0.70	Non-Hazardous	17 05 04
TP04	0.60	Non-Hazardous	17 05 04
TP05	0.80	Non-Hazardous	17 05 04
TP06	0.50	Non-Hazardous	17 05 04
TP07	0.50	Non-Hazardous	17 05 04
TP08	0.50	Non-Hazardous	17 05 04
TP09	0.50	Non-Hazardous	17 05 04
TP10	0.70	Non-Hazardous	17 05 04
TP10	1.60	Non-Hazardous	17 05 04
TP11	0.50	Non-Hazardous	17 05 04
TP11	1.50	Non-Hazardous	17 05 04
TP12	0.50	Non-Hazardous	17 05 04
TP13	0.50	Non-Hazardous	17 05 04
TP14	0.50	Non-Hazardous	17 05 04
TP15	0.80	Non-Hazardous	17 05 04

Asbestos was not detected in any of the samples.

All samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*).



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Title:

Figure 2.1 Sample Location Plan

Legend

This drawing is the property of O'Callaghan Moran & Associates and shall not be used, reproduced or disclosed to anyone without the prior written permission of O'Callaghan Moran & Associates and shall be returned upon request.

Client:

IGSL Limited

2.3 **Waste Acceptance Criteria**

The results of the WAC testing are presented in Table 2.2-2.3, which includes for comparative purposes the WAC for Inert, Non Hazardous and Hazardous Waste Landfills pursuant to Article 16 of the EU Landfill Directive 1999/31/EC Annex II which establishes criteria and procedures for the acceptance of waste at landfills.

The sample from TP11 (1.50m) exceeds the inert WAC for Total Dissolved Solids (TDS). The sample from TP12 (0.50m) exceeds the inert WAC for Antimony. All other samples meet the inert landfill WAC.

Table 2.2 WAC Results

Parameter	Unit	BH01	BH02	BH03	BH04	BH05	BH06	BH09B	BH10	BH10	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	**m**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**2.00**				
Antimony	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0066	< 0.0005	< 0.0005	0.06	0.18	0.7	5
Arsenic	mg/kg	< 0.0002	< 0.0002	0.0075	0.0025	< 0.0002	0.0045	0.013	0.0057	< 0.0002	0.5	1.5	2	25
Barium	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.053	< 0.0005	< 0.0005	20	20	100	300
Cadmium	mg/kg	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	0.04	1	5
Chromium	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0057	0.0076	0.0058	< 0.0005	0.5	0.5	10	70
Copper	mg/kg	0.0064	0.0051	0.032	< 0.0005	< 0.0005	0.015	0.029	0.025	< 0.0005	2	2	50	100
Lead	mg/kg	< 0.0005	< 0.0005	0.0078	< 0.0005	< 0.0005	< 0.0005	0.0070	0.0054	< 0.0005	0.5	0.5	10	50
Molybdenum	mg/kg	0.070	0.043	0.12	0.060	0.11	0.060	0.069	0.036	0.076	0.5	1.5	10	30
Nickel	mg/kg	< 0.0005	< 0.0005	0.023	< 0.0005	< 0.0005	0.0069	0.013	0.012	< 0.0005	0.4	0.4	10	40
Selenium	mg/kg	< 0.0005	< 0.0005	< 0.0005	0.0057	< 0.0005	< 0.0005	0.0053	< 0.0005	< 0.0005	0.1	0.3	0.5	7
Zinc	mg/kg	< 0.003	< 0.003	0.055	< 0.003	< 0.003	< 0.003	0.035	0.040	< 0.003	4	4	50	200
Mercury	mg/kg	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	3.3	2.6	4.8	2.2	3.3	4.1	4.5	3.2	3.3	10	10	150	500
Chloride	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	14	< 10	< 10	800	2,400	15,000	25,000
Sulphate	mg/kg	62	54	< 10	< 10	< 10	< 10	72	17	25	1000*	3,000	20000*	50,000
DOC **	mg/kg	< 50	< 50	180	< 50	55	120	230	140	< 50	500	500	800	1,000
pH	pH units	8.5	8.5	8.5	8.6	8.6	8.7	8.5	8.7	8.6	NE	NE	NE	NE
TDS ***	mg/kg	1600	710	780	520	560	780	910	780	650	4,000	12,000	60,000	100,000
TOC	%	0.5	0.4	0.6	0.3	0.4	0.8	1.3	2.1	0.5	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	1	1	NE	NE
Total 17 PAH's	mg/kg	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.89	1.2	< 0.20	NE	100	NE	NE
Mineral Oil	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.

** denotes a higher limit may be accepted provided the DOC alternative values of 500mg/kg is achieved

*** denotes TDS. The values for TDS can be used to sulphate and chloride.

🟧 PAH over 1mg/kg and Mineral Oil over 50 mg/kg exceeds limit at soil recovery site in Ireland

Table 2.3 WAC Results

Parameter	Unit	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08	TP09	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	**m**	**0.50**	**0.50**	**0.70**	**0.60**	**0.80**	**0.50**	**0.50**	**0.50**	**0.50**				
Antimony	mg/kg	< 0.0005	< 0.0005	< 0.0005	0.0054	< 0.0005	< 0.0005	0.0075	< 0.0005	< 0.0005	0.06	0.18	0.7	5
Arsenic	mg/kg	< 0.0002	0.0081	< 0.0002	0.0069	< 0.0002	0.0024	0.022	< 0.0002	0.0025	0.5	1.5	2	25
Barium	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	20	20	100	300
Cadmium	mg/kg	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	0.04	1	5
Chromium	mg/kg	< 0.0005	< 0.0005	< 0.0005	0.0057	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	0.5	10	70
Copper	mg/kg	0.0050	0.013	0.0070	0.032	0.0067	0.023	0.027	0.017	0.022	2	2	50	100
Lead	mg/kg	< 0.0005	< 0.0005	< 0.0005	0.0073	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	0.5	10	50
Molybdenum	mg/kg	0.032	0.049	0.094	0.060	0.039	0.040	0.049	0.021	0.057	0.5	1.5	10	30
Nickel	mg/kg	< 0.0005	< 0.0005	< 0.0005	0.021	< 0.0005	0.018	0.0084	0.0069	0.0078	0.4	0.4	10	40
Selenium	mg/kg	< 0.0005	< 0.0005	< 0.0005	0.0056	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.3	0.5	7
Zinc	mg/kg	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.12	< 0.003	4	4	50	200
Mercury	mg/kg	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	2.9	6.0	3.5	3.7	2.6	4.1	4.4	3.8	3.4	10	10	150	500
Chloride	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	800	2,400	15,000	25,000
Sulphate	mg/kg	< 10	16	< 10	220	< 10	< 10	53	< 10	< 10	1000*	3,000	20000*	50,000
DOC **	mg/kg	110	160	150	430	120	350	480	240	390	500	500	800	1,000
pH	pH units	8.8	8.6	8.7	8.4	8.7	8.5	8.5	8.5	8.4	NE	NE	NE	NE
TDS ***	mg/kg	780	720	550	1000	570	840	710	650	780	4,000	12,000	60,000	100,000
TOC	%	0.3	0.4	0.3	1	0.4	1.4	1.1	0.7	1.5	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	1	1	NE	NE
Total 17 PAH's	mg/kg	0.22	< 0.20	< 0.20	1.1	< 0.20	0.23	0.31	< 0.20	0.39	NE	100	NE	NE
Mineral Oil	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.

** denotes a higher limit may be accepted provided the DOC alternative values of 500mg/kg is achieved

*** denotes TDS. The values for TDS can be used to sulphate and chloride.

🟧 PAH over 1mg/kg and Mineral Oil over 50 mg/kg exceeds limit at soil recovery site in Ireland

Table 2.4 WAC Results

Parameter	Unit	TP10	TP10	TP11	TP11	TP12	TP13	TP14	TP15	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	**m**	**0.70**	**1.60**	**0.50**	**1.50**	**0.50**	**0.50**	**0.50**	**0.80**				
Antimony	mg/kg	< 0.0005	0.0051	0.010	0.010	0.075	< 0.0005	< 0.0005	< 0.0005	0.06	0.18	0.7	5
Arsenic	mg/kg	0.0031	0.0032	0.0098	0.017	0.0063	0.0041	0.0028	0.0026	0.5	1.5	2	25
Barium	mg/kg	< 0.0005	< 0.0005	< 0.0005	0.063	< 0.0005	< 0.0005	< 0.0005	< 0.0005	20	20	100	300
Cadmium	mg/kg	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	0.04	1	5
Chromium	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	0.5	10	70
Copper	mg/kg	0.011	0.010	0.037	0.031	0.041	0.015	0.015	0.013	2	2	50	100
Lead	mg/kg	< 0.0005	< 0.0005	0.0051	0.0090	0.011	< 0.0005	< 0.0005	< 0.0005	0.5	0.5	10	50
Molybdenum	mg/kg	0.067	0.028	0.039	0.090	0.075	0.054	0.022	0.025	0.5	1.5	10	30
Nickel	mg/kg	< 0.0005	0.0063	0.0099	0.0082	0.0078	0.0052	< 0.0005	0.010	0.4	0.4	10	40
Selenium	mg/kg	0.0056	< 0.0005	0.0051	0.0065	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.3	0.5	7
Zinc	mg/kg	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	4	4	50	200
Mercury	mg/kg	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	3.2	3.4	3.9	4.1	4.2	5.2	4.0	6.0	10	10	150	500
Chloride	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	800	2,400	15,000	25,000
Sulphate	mg/kg	85	37	< 10	46	< 10	11	23	< 10	1000*	3,000	20000*	50,000
DOC **	mg/kg	150	210	290	380	390	250	89	370	500	500	800	1,000
pH	pH units	8.5	8.5	8.3	8.3	8.4	8.6	8.7	8.6	NE	NE	NE	NE
TDS ***	mg/kg	780	650	780	710	710	640	910	620	4,000	12,000	60,000	100,000
TOC	%	0.9	0.7	2.3	3.9	1	0.5	0.82	0.4	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	1	1	NE	NE
Total 17 PAH's	mg/kg	< 0.20	0.8	2.5	4.4	0.35	< 0.20	< 0.20	< 0.20	NE	100	NE	NE
Mineral Oil	mg/kg	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.

** denotes a higher limit may be accepted provided the DOC alternative values of 500mg/kg is achieved

*** denotes TDS. The values for TDS can be used to sulphate and chloride.

🟧 PAH over 1mg/kg and Mineral Oil over 50 mg/kg exceeds limit at soil recovery site in Ireland

2.4 Waste Management Options

The EPA has issued guidance on acceptance criteria for a range of parameters for soil recovery sites. This includes;

- Metals (solid concentration not leachability) in soil and stone (including As, Cd, Cr, Cu, Hg, Ni, Pb, Zn);
- Total organic carbon in soil and stone;
- Total BTEX (benzene, toluene, ethylbenzene, xylenes) in soil and stone;
- Mineral oil in soil and stone;
- Polycyclic aromatic hydrocarbons (PAHs) in soil and stone;
- Polychlorinated Biphenyls (PCBs) in soil and stone;
- Asbestos fibres in soil and stone.

The guidance requires that soils from brownfield sites should not exceed the limits for the parameters specified in Table 2.3 and 2.4. For metals limits have been specified for a range of soil types nationally separated into six domain areas.

Table 2.3 Soil Recovery Site Criteria

Parameter	Limit for Soil Recovery Sites
Total BTEX	0.05 mg/kg
Mineral oil	50 mg/kg
Total PAHs	1 mg/kg
Total PCBs	0.05 mg/kg

The samples from BH10 (1.00m), TP04 (0.60m) and TP11 (1.50m) exceed the soil recovery criteria for PAH's. These sample has therefore been classified as (B-1) suitable for disposal/recovery to inert Landfill.

The soil and stone cannot be sent to soil recovery sites if the trigger levels for a particular domain are exceeded. There is however some flexibility in applying the limits. A derogation applies where up to three parameters can exceed the limit for a sample provided the concentration in the samples is no more than 1.5 times the trigger level. The site which is subject to this investigation is located in Domain 2 and the trigger levels are listed in Table 2.4.

Table 2.4 Soil Recovery Trigger Levels

		Domain 2 Trigger Level	1.5 times Trigger Level
Arsenic	**mg/kg**	24.90	37.35
Cadmium	**mg/kg**	3.28	4.92
Chromium	**mg/kg**	50.30	75.45
Copper	**mg/kg**	63.50	95.25
Mercury	**mg/kg**	0.36	0.54
Nickel	**mg/kg**	61.90	92.85
Lead	**mg/kg**	86.10	129.15
Zinc	**mg/kg**	197.00	295.5

The samples from TP04 (0.60m) and TP11 (0.50m) exceed the 1.5 times trigger level for metal concentrations. The sample from TP04 (0.60m) exceeds the 1.5 times trigger level for Arsenic and Chromium. The sample from TP11 (0.50m) exceeds the 1.5 times trigger level for Arsenic. These samples have therefore been classified as (B-1) suitable for disposal to inert landfill. The sample from TP11 (1.50m) exceeds the 1.5 times trigger level for Lead, however as this sample already exceeds the inert WAC, the soil recovery criteria do not apply. All other samples meet the soil recovery site criteria for metal concentrations.

Waste management options are summarised on Table 2.5. All are subject to approval of the waste management facility operators. Class A wastes are suitable for recovery at a permitted soils recovery facility. Class B-1 wastes are suitable for recovery/disposal to inert waste landfill. Class B-2 wastes are suitable for recovery/disposal to inert landfill with increased limits.

Table 2.5 Waste Management Options

Sample No.	Depth	Classification	LoW Code	Category
BH01	1.00	Non-Hazardous	17 05 04	A
BH02	1.00	Non-Hazardous	17 05 04	A
BH03	1.00	Non-Hazardous	17 05 04	A
BH04	1.00	Non-Hazardous	17 05 04	A
BH05	1.00	Non-Hazardous	17 05 04	A
BH06	1.00	Non-Hazardous	17 05 04	A
BH07	1.00	Non-Hazardous	17 05 04	A
BH08	1.00	Non-Hazardous	17 05 04	A
BH09B	1.00	Non-Hazardous	17 05 04	A
BH10	1.00	Non-Hazardous	17 05 04	B-1
BH10	2.00	Non-Hazardous	17 05 04	A
TP01	0.50	Non-Hazardous	17 05 04	A
TP02	0.50	Non-Hazardous	17 05 04	A
TP03	0.70	Non-Hazardous	17 05 04	A
TP04	0.60	Non-Hazardous	17 05 04	B-1
TP05	0.80	Non-Hazardous	17 05 04	A
TP06	0.50	Non-Hazardous	17 05 04	A
TP07	0.50	Non-Hazardous	17 05 04	A
TP08	0.50	Non-Hazardous	17 05 04	A
TP09	0.50	Non-Hazardous	17 05 04	A
TP10	0.70	Non-Hazardous	17 05 04	A
TP10	1.60	Non-Hazardous	17 05 04	A
TP11	0.50	Non-Hazardous	17 05 04	B-1
TP11	1.50	Non-Hazardous	17 05 04	B-2
TP12	0.50	Non-Hazardous	17 05 04	B-2
TP13	0.50	Non-Hazardous	17 05 04	A
TP14	0.50	Non-Hazardous	17 05 04	A
TP15	0.80	Non-Hazardous	17 05 04	A

A	Classified as Non-Hazardous, 17 05 04 meets soil recovery criteria
B-1	Classified as Non-Hazardous, 17 05 04 meets inert WAC
B-2	Classified as Non-Hazardous, 17 05 04 meets inert WAC increased limits

3 CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

3.1.1 *Waste Classification*

Asbestos was not detected in any of the samples.

All samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*).

The recovery/disposal options are discussed in Section 2.4.

An excavation plan for the planned retention/disposal of the onsite material is presented in Appendix 4.

3.2 Recommendations

OCM recommend that a copy of this report be provided in full to the relevant waste management facilities to which the made ground and subsoils will be consigned to confirm its suitability for acceptance.

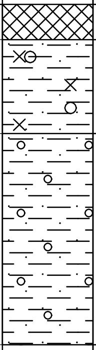
Appendix 1

Borehole and Trial Pit Logs

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,134.34 E 732,734.62 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	54.89	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	2.90
DATE COMMENCED	27/09/2021	**DATE COMPLETED**	27/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	MADE GROUND (Comprised of CL804 stone fill)		54.59	0.30						
	Stiff brown sandy SILT/CLAY with some gravel (Possible Made Ground)		53.79	1.10						
1	Stiff to very stiff grey/brown very sandy gravelly CLAY with angular cobbes				AA165810	B	1.00		N = 21 (3, 3, 4, 5, 5, 7)	
2			51.99	2.90	AA165811	B	2.00		N = 27 (7, 6, 8, 5, 5, 9)	
3	Obstruction End of Borehole at 2.90 m								N = 50/75 mm (25, 50)	
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.7	2.9	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH02**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,213.73 E 732,696.79 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.92	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	2.60
DATE COMMENCED	27/09/2021	**DATE COMPLETED**	28/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	Brown sandy SILT/CLAY (Possibly Made Ground)		53.02	0.90						
1	Stiff to very stiff dark brown sandy gravelly CLAY with some angular cobbles				AA165812	B	1.00		N = 27 (4, 6, 7, 5, 8, 7)	
					AA165813	B	1.50			
2					AA165814	B	2.00		N = 42 (5, 5, 8, 8, 10, 16)	
			51.32	2.60					N = 50/75 mm (25, 50)	
3	Obstruction End of Borehole at 2.60 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.4	1.6	1	
2.4	2.6	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH03**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,262.18 E 732,751.27 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.77	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	2.30
		DATE COMMENCED	28/09/2021
		DATE COMPLETED	28/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
		BORED BY	P.Thomas
		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	MADE GROUND (Comprised of brown sandy SILT/CLAY)	▨	53.47	0.30						
	Brown sandy SILT/CLAY with occasional gravel	▤	52.97	0.80						
1	Very stiff dark brown sandy gravelly CLAY with some angular cobbles	▤			AA165818	B	1.00		N = 37 (4, 6, 9, 8, 10, 10)	
2			51.47	2.30	AA165819	B	2.00		N = 50/225 mm (9, 15, 17, 22, 11)	
	Obstruction End of Borehole at 2.30 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.1	2.3	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH04**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,262.08 E 732,706.46 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.75	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	2.90
		DATE COMMENCED	28/09/2021
		DATE COMPLETED	28/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	MADE GROUND (Comprised of brown sandy SILT/CLAY)	▨	53.45	0.30						
	Brown sandy SILT/CLAY with some gravel	▨	52.85	0.90						
1	Stiff to very stiff dark brown sandy gravelly CLAY with occasional angular cobbles	▨			AA165815	B	1.00		N = 28 (4, 5, 6, 8, 7, 7)	
2			50.85	2.90	AA165816	B	2.00		N = 38 (3, 5, 7, 9, 10, 12)	
3	Obstruction End of Borehole at 2.90 m				AA165817	B	2.90		N = 50/75 mm (11, 14, 50)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.6	0.7	0.75	
2.7	2.9	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 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH05**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,326.95 E 732,758.44 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.33	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	1.90
		DATE COMMENCED	29/09/2021
		DATE COMPLETED	29/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND (Comprised of brown sandy SILT/CLAY)		53.03	0.30						
	Firm brown sandy SILT/CLAY with some gravel		52.23	1.10	AA165820	B	1.00		N = 34 (3, 5, 7, 8, 8, 11)	
1	Stiff to very stiff dark brown sandy gravelly CLAY with occasional angular cobbles		51.43	1.90	AA165821	B	1.80		N = 50/75 mm (25, 38, 50)	
2	Obstruction End of Borehole at 1.90 m									
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.7	1.9	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER	23606
CONTRACT	Site 6 , Parkwest , Dublin 12
BOREHOLE NO.	**BH06**
SHEET	Sheet 1 of 1
CO-ORDINATES	708,333.13 E 732,719.94 N
GROUND LEVEL (m AOD)	53.49
RIG TYPE	Dando 2000
BOREHOLE DIAMETER (mm)	
BOREHOLE DEPTH (m)	3.30
DATE COMMENCED	29/09/2021
DATE COMPLETED	29/09/2021
CLIENT	Greenseed Ltd
ENGINEER	CS Consulting
SPT HAMMER REF. NO.	
ENERGY RATIO (%)	
BORED BY	P.Thomas
PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	Brown sandy SILT/CLAY with occasional gravel (Possibly Made Ground)		52.99	0.50						
	Firm brown sandy SILT/CLAY with some gravel		52.59	0.90						
1	Stiff to very stiff dark brown very gravelly sandy CLAY with occasional angular cobbles				AA165822	B	1.00		N = 27 (3, 3, 4, 8, 8, 7)	
2					AA165823	B	2.00		N = 46 (4, 9, 10, 10, 12, 14)	
3			50.19	3.30	AA165824	B	3.00		N = 50/75 mm (14, 11, 50)	
	Obstruction End of Borehole at 3.30 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.1	3.3	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.10	3.10	No	2.40	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

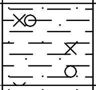
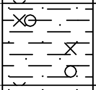
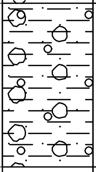
REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH07**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,365.29 E 732,774.10 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.31	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	2.80
		DATE COMMENCED	30/09/2021
		DATE COMPLETED	30/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
		BORED BY	P.Thomas
		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	Brown sandy SILT/CLAY with occasional gravel (Possibly Made Ground)		52.61	0.70						
1	Stiff grey/brown sandy SILT/CLAY with frequent gravel		51.91	1.40	AA165825	B	1.00		N = 23 (4, 6, 5, 5, 6, 7)	
2	Very stiff grey/brown and black sandy gravelly CLAY with some angular cobbles		50.51	2.80	AA165826	B	2.00		N = 41 (5, 6, 6, 9, 11, 15)	
					AA165827	B	2.50		N = 50/75 mm (10, 15, 50)	
3	Obstruction End of Borehole at 2.80 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.6	2.8	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER	23606		
CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH08**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,385.70 E 732,722.64 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	53.52	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	3.10
DATE COMMENCED	30/09/2021	**DATE COMPLETED**	30/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	MADE GROUND (Comprised of light brown sandy SILT/CLAY with gravel and plastic fragments)	▨	52.52	1.00						
1	Firm to stiff dark brown SILT/CLAY with frequent gravel	▨	51.62	1.90	AA165828	B	1.00		N = 18 (3, 3, 4, 4, 4, 6)	
2	Very stiff dark brown sandy very gravelly CLAY with some angular cobbles	▨	50.42	3.10	AA165829 AA165830	B B	2.00 2.50		N = 42 (5, 8, 9, 7, 14, 12) N = 50/150 mm (16, 9, 33, 17)	
3	Obstruction End of Borehole at 3.10 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.7	3.1	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

Sample Legend

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH09**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,444.44 E 732,770.45 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	54.17	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	0.60
DATE COMMENCED	30/09/2021	**DATE COMPLETED**	30/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND (comprised of brown sandy gravelly silty/clayey fill with reinforced concrete pieces)	▨	53.57	0.60						
	Obstruction End of Borehole at 0.60 m									
1										
2										
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.5	0.6	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 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out. Obstruction encountered . Moved to BH09A 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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH09A**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,444.45 E 732,770.01 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	54.17	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	0.40
DATE COMMENCED	30/09/2021	**DATE COMPLETED**	30/09/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	MADE GROUND (comprised of brown sandy gravelly silty/clayey fill with reinforced concrete pieces)	▨	53.77	0.40						
	Obstruction End of Borehole at 0.40 m									
1										
2										
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.3	0.4	1	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out. Obstruction encountered . Moved to BH09B 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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH09B**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,444.69 E 732,771.39 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	54.16	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	4.00
DATE COMMENCED	01/10/2021	**DATE COMPLETED**	01/10/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
BORED BY	P.Thomas	**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	Brown SILT/CLAY with some gravel (Possibly Made Ground)		53.46	0.70						
1	Stiff to very stiff grey/brown gravelly sandy CLAY with occasional angular cobbles				AA165831	B	1.00		N = 29 (5, 9, 6, 8, 8, 7)	
2					AA165832	B	2.00		N = 30 (3, 3, 7, 9, 5, 9)	
3			50.86	3.30	AA165833	B	3.00		N = 35 (6, 8, 8, 7, 8, 12)	
	Very stiff to hard black very gravelly sandy CLAY with angular cobbles		50.16	4.00	AA165834	B	3.50			
4	Obstruction End of Borehole at 4.00 m								N = 50/150 mm (18, 7, 40, 10)	
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.8	4	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**BOREHOLE NO.**	**BH10**
		SHEET	Sheet 1 of 1
CO-ORDINATES	708,448.53 E 732,739.74 N	**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)	54.09	**BOREHOLE DIAMETER (mm)**	
		BOREHOLE DEPTH (m)	4.10
		DATE COMMENCED	01/10/2021
		DATE COMPLETED	01/10/2021
CLIENT	Greenseed Ltd	**SPT HAMMER REF. NO.**	
ENGINEER	CS Consulting	**ENERGY RATIO (%)**	
		BORED BY	P.Thomas
		PROCESSED BY	F.C

Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
MADE GROUND (Comprised of brown sandy silty/clayey fill with cobbles , concrete and teel)		52.39	1.70	AA165835	B	1.00		N = 34 (4, 5, 5, 8, 10, 11)	
Stiff to very stiff dark brown sandy gravelly CLAY with some angular cobbles		50.69	3.40	AA165836 AA165837	B B	2.00 3.00		N = 24 (6, 4, 5, 7, 6, 6) N = 22 (3, 5, 4, 5, 5, 8)	
Very stiff black gravelly CLAY with occasional cobbles		49.99	4.10	AA165838	B	4.00		N = 50/75 mm (7, 18, 50)	
End of Borehole at 4.10 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4	4.1	1.5	

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit was carried out.

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

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES		**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of brown sandy gravelly clay, many angular to subangular cobbles)	▨	0.30							
	Stiff, brown, slightly sandy gravelly CLAY with medium subangular cobbles content	▨	1.00			AA150651	B	0.50		
1.0	Very stiff, brown, slightly sandy gravelly CLAY with high subangular cobbles content	▨	1.50							
	TP termianted due to possible boulders End of Trial Pit at 1.60m					AA150652	B	1.50		
2.0										
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

TRIAL PIT NO. TP02

SHEET Sheet 1 of 1

LOGGED BY I.Reder

CO-ORDINATES

GROUND LEVEL (m)

DATE STARTED 29/09/2021

DATE COMPLETED 29/09/2021

CLIENT Greenseed Ltd

ENGINEER CS Consulting

EXCAVATION METHOD JCB

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND (comprised of topsoil, brown sandy gravelly clay, angular to subangular cobbles)		0.30							
	MADE GROUND (comprised of brown/dark brown sandy gravelly clay, cobbles, occasional red brick pieces)		0.60			AA150653	B	0.50		
1.0	Firm to stiff, brown to greyis brown, slightly sandy gravelly slightly silty CLAY with medium subangular cobbles content		3.00			AA150654 AA150655	B B	1.40 2.40		
2.0										
3.0	Firm to stiff, dark grey, slightly sandy gravelly silty CLAY with high subangular cobbles content		3.30			AA150656	B	3.20		
	TP termianted due to possible boulders or rock End of Trial Pit at 3.30m									
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.** **SHEET**	**TP03** Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	
		DATE STARTED **DATE COMPLETED**	29/09/2021 29/09/2021
CLIENT **ENGINEER**	Greenseed Ltd CS Consulting	**GROUND LEVEL (m)**	
		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	MADE GROUND (comprised of topsoil with many angular to subangular cobbles)		0.20							
	Firm to stiff, greyish brown, slightly sandy gravelly silty CLAY with medium subangular cobbles content		0.90			AA150669	B	0.70		
1.0	Firm, brown/grey mottled SILT		1.60			AA150670	B	1.50		
2.0	Firm, dark grey, SILT		2.50							
	Dense, dark grey, silty angular COBBLES (possible weathered rock)		2.60			AA150671	B	2.50		
3.0	TP termianted due to possible rock End of Trial Pit at 2.60m									
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER	23606		
CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES		**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of grey slightly sandy angular gravel - C.L.804)		0.30							
	MADE GROUND (comprised of brown sandy gravelly clay, cobbles, very occasional plastic rubbish, very occasional steel rebars)		0.50							
	Firm, brown, slightly sandy SILT/CLAY with low gravel content		0.90			AA150666	B	0.60		
1.0	Firm, brown, slightly sandy gravelly slightly silty CLAY with medium subangular cobbles content		1.30							
	Medium dense, brown silty fine SAND		1.60			AA150667	B	1.50		
2.0	Firm to stiff, brown, sandy gravelly SILT/CLAY with medium subangular cobbles content		2.20			AA150668	B	2.10		
	TP termianted due to possible boulders or rock End of Trial Pit at 2.20m									
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER	23606		
CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP05**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES		**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of topsoil, brown sandy gravelly clay, angular to subangular cobbles, occasional plastic rubbish)		0.50							
1.0 2.0	Firm to stiff, brown, slightly sandy gravelly silty CLAY with high subangular cobbles and low boulders content		2.50			AA150657 AA150658 AA150659	B B B	0.80 1.80 2.50		
3.0 4.0	TP termianted due to possible boulders End of Trial Pit at 2.50m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP06**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES		**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of topsoil with angular to subangular cobbles)		0.20							
	Firm to stiff, brown, sandy gravelly silty CLAY medium subangular cobbles content		0.90			AA150672	B	0.50		
1.0	Stiff, greyish brown, slightly sandy very gravelly SILT with high angular cobbles and low boulders content		1.80			AA150673	B	1.50		
	TP termianted due to possible boulders End of Trial Pit at 1.80m									
2.0										
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

TRIAL PIT NO. TP07
SHEET Sheet 1 of 1

LOGGED BY I.Reder

CO-ORDINATES

GROUND LEVEL (m)

DATE STARTED 30/09/2021
DATE COMPLETED 30/09/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

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 with some subangular cobbles		0.10							
	MADE GROUND (comprised of brown sandy gravelly clay, cobbles, boulders, very occasional plastic rubbish)		0.60			AA150689	B	0.50		
	Firm, light brown/brown, slightly sandy slightly gravelly silty CLAY		0.90							
1.0 2.0	Firm to stiff, brownish grey, slightly sandy gravelly SILT/CLAY with high subangular to angular cobbles and low boulders content		2.50			AA150690 AA150691	B B	1.30 2.30		
3.0 4.0	TP termianted due to possible boulders End of Trial Pit at 2.50m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP08**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES		**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of topsoil with angular to subangular cobbles)		0.15							
	MADE GROUND (comprised of brown sandy gravelly clay, cobbles, organic pieces)		0.40							
	Stiff, brown, slightly sandy gravelly silty CLAY with high subangular cobbles content		1.00			AA150674	B	0.50		
1.0 2.0	Firm to stiff, brown, very sandy very gravelly CLAY with high subangular cobbles content (possible very clayey sandy gravel)		2.60			AA150675 AA150676	B B	1.50 2.50		
	Very stiff, dark grey, slightly sandy gravelly SILT/CLAY with high subangular cobbles content		2.80			AA150677	B	2.80		
3.0 4.0	End of Trial Pit at 2.80m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP09**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	30/09/2021
CO-ORDINATES		**DATE COMPLETED**	30/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL with some subangular cobbles	▨	0.10							
	MADE GROUND (comprised of brown sandy gravelly clay with cobbles, occasional plastic rubbish, red rbick pieces)	▨	1.20			AA150686	B	0.50		
1.0	Dense, brown, clayey sandy fine to coarse GRAVEL with some subrounded to rounded cobbles	▨	1.70			AA150687	B	1.50		
2.0	Firm to sitff, brown, very sandy very gravelly CLAY with high subangular to subrounded cobbles and low boulders content	▨	3.00			AA150688	B	2.50		
3.0	End of Trial Pit at 3.00m									
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER

23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP10**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	30/09/2021
CO-ORDINATES		**DATE COMPLETED**	30/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL with some subangular cobbles		0.10							
	MADE GROUND (comprised of brown sandy gravelly clay with cobbles, occasional plastic rubbish, timber pieces, boulders)		1.50			AA150678	B	0.70		
1.0										
	Firm, brown, very sandy very gravelly CLAY with high subangular cobbles content (possible very clayey sandy gravel)		2.80			AA150679	B	1.60		
2.0										
						AA150680	B	2.50		
	Firm, brown, sandy gravelly CLAY with high subangular to angular cobbles content		3.10			AA150681	B	3.00		
3.0										
	End of Trial Pit at 3.10m									
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP11**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	30/09/2021
CO-ORDINATES		**DATE COMPLETED**	30/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples Sample Ref	Samples Type	Samples Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL with some subangular cobbles		0.10							
MADE GROUND (comprised of brown/grey sandy gravelly clay, cobbles, boulders, timber, red brick, steel rebars, plastic rubbish)		1.70			AA150682 AA150683	B B	0.50 1.50		
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with medium subangular cobbles content		3.20			AA150684	B	2.50		
Stiff, grey, slightly sandy gravelly SILT/CLAY with medium subangular cobbles content		3.50							
End of Trial Pit at 3.50m					AA150685	B	3.50		

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP12**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	30/09/2021
CO-ORDINATES		**DATE COMPLETED**	30/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL		0.10							
MADE GROUND (comprised of brown sandy gravelly clay, cobbles, red brick pieces, very occasional plastic rubbish)		0.60			AA150695	B	0.50		
Firm, brown, very sandy very gravelly CLAY with medium subangular cobbles content		1.50			AA150696	B	1.40		
Firm to stiff, greyish brown, sandy gravelly silty CLAY with high subangular cobbles and low subangular boulders content		2.90			AA150697	B	2.40		
Stiff, dark grey, slightly sandy gravelly SILT/CLAY with high subangular cobbles content		3.10			AA150698	B	3.10		
End of Trial Pit at 3.10m									

Groundwater Conditions
TP dry

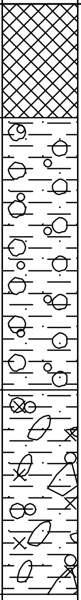
Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP13**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	30/09/2021
CO-ORDINATES		**DATE COMPLETED**	30/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		



	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of brown sandy gravelly clay, cobbles, organic pieces)		0.50							
1.0	Firm, brown, very sandy very gravelly CLAY with medium subangular cobbles content		1.70			AA150692 AA150693	B B	0.50 1.50		
2.0	Firm to stiff, brown, slightly sandy gravelly silty CLAY with high subangular cobbles and medium boulders content		2.60			AA150694	B	2.50		
3.0 4.0	TP termianted due to possible boulders End of Trial Pit at 2.60m									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT	Site 6 , Parkwest , Dublin 12	**TRIAL PIT NO.**	**TP14**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**DATE STARTED**	29/09/2021
CO-ORDINATES		**DATE COMPLETED**	29/09/2021
GROUND LEVEL (m)		**EXCAVATION METHOD**	JCB
CLIENT	Greenseed Ltd		
ENGINEER	CS Consulting		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND (comprised of topsoil with many angular to subangular cobbles)		0.20							
	Stiff, light brown/brown, slightly sandy slightly gravelly silty CLAY (possible fill)		0.60			AA150660	B	0.50		
1.0	Stiff, brown, slightly sandy gravelly silty CLAY with high subangular cobblrs content		1.10							
	Stiff, greyish brown, slightly gravelly SILT with low subangular cobbles content		1.80			AA150661	B	1.50		
2.0	Stiff, brownish grey, very gravelly SILT with high angular cobbles and medium boulders content		2.50							
	TP termianted due to possible boulders or rock End of Trial Pit at 2.50m					AA150662	B	2.50		
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 23606

CONTRACT Site 6 , Parkwest , Dublin 12

TRIAL PIT NO. **TP15**
SHEET Sheet 1 of 1

LOGGED BY I.Reder

CO-ORDINATES

GROUND LEVEL (m)

DATE STARTED 29/09/2021
DATE COMPLETED 29/09/2021

CLIENT Greenseed Ltd
ENGINEER CS Consulting

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	MADE GROUND (comprised of topsoil with angular to subangular cobbles, sandy gravelly clay)		0.20							
1.0	Stiff, brown, slightly sandy gravelly CLAY with high subangular cobbles		1.10			AA150663	B	0.80		
	Stiff, brownish grey, slightly sandy slightly gravelly SILT with low angular coblles content		1.60			AA150664	B	1.50		
2.0	Stiff, grey, slightly sandy gravelly SILT with high subangular to angular cobbles and low boulders content		2.20							
	Dense, grey, silty angular GRAVEL with angular cobbles (weathered rock)		2.50							
	TP termianted due to possible rock End of Trial Pit at 2.50m					AA150665	B	2.50		
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

Appendix 2

Laboratory Reports

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.: 21-36583-1

Initial Date of Issue: 01-Nov-2021

Client IGSL

Client Address: M7 Business Park
Naas
County Kildare
Ireland

Contact(s): John Clancy

Project 23606 Parkwest Dublin (Cronin Sutton)

Quotation No.: Q20-21693

Date Received: 20-Oct-2021

Order No.:

Date Instructed: 20-Oct-2021

No. of Samples: 11

Turnaround (Wkdays): 7

Results Due: 28-Oct-2021

Date Approved: 01-Nov-2021

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Leachate

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**					21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583
Quotation No.: Q20-21693	**Chemtest Sample ID.:**					1302545	1302546	1302548	1302549	1302551	1302552	1302553	1302554	1302555
Order No.:	Client Sample Ref.:					AA165810	AA165812	AA165818	AA165815	AA165820	AA165822	AA165831	AA165835	AA165836
	Sample Location:					BH01	BH02	BH03	BH04	BH05	BH06	BH09B	BH10	BH10
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00
	Bottom Depth (m):					1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**									
pH	U	1010	10:1		N/A	8.6	8.7	8.7	8.8	8.7	8.6	8.5	8.4	8.6
Ammonium	U	1220	10:1	mg/l	0.050	< 0.050	< 0.050	0.057	< 0.050	< 0.050	0.062	0.079	< 0.050	0.050
Ammonium	N	1220	10:1	mg/kg	0.10	0.34	0.54	0.72	0.49	0.42	0.75	0.92	0.48	0.60
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	0.36	0.35	0.33	0.32	0.32	0.33	0.35	0.33	0.34
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583
Quotation No.: Q20-21693				**Chemtest Sample ID.:**	1302545	1302546	1302547	1302548	1302549	1302550	1302551	1302552	1302553
Order No.:				Client Sample Ref.:	AA165810	AA165812	AA165813	AA165818	AA165815	AA165816	AA165820	AA165822	AA165831
				Sample Location:	BH01	BH02	BH02	BH03	BH04	BH04	BH05	BH06	BH09B
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
				Bottom Depth (m):	1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	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		N/A	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	9.9	9.0	9.5	11	8.9	10	12	11	17
pH (2.5:1)	N	2010		4.0			[A] 8.8			[A] 9.1			
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40		[A] < 0.40	[A] < 0.40		[A] < 0.40	[A] < 0.40	[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010			[A] < 0.010			[A] < 0.010			
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			[A] < 0.010			[A] 0.015			
Total Sulphur	U	2175	%	0.010			[A] 0.048			[A] 0.14			
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] < 1.0		[A] 1.1	[A] < 1.0		[A] < 1.0	[A] 1.0	[A] 1.1
Chloride (Water Soluble)	U	2220	g/l	0.010			[A] < 0.010			[A] < 0.010			
Nitrate (Water Soluble)	N	2220	g/l	0.010			< 0.010			< 0.010			
Cyanide (Total)	U	2300	mg/kg	0.50	[A] 1.3	[A] 1.5		[A] 2.0	[A] < 0.50		[A] < 0.50	[A] 1.7	[A] 1.7
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 4.0	[A] 8.5		[A] 9.5	[A] 12		[A] 16	[A] 4.8	[A] 3.7
Ammonium (Water Soluble)	U	2220	g/l	0.01			< 0.01			< 0.01			
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.026	[A] 0.024	[A] 0.026	[A] 0.034	[A] 0.022	[A] 0.034	[A] 0.013	[A] 0.035	[A] 0.052
Arsenic	U	2450	mg/kg	1.0	19	33		21	28		15	24	14
Barium	U	2450	mg/kg	10	62	55		39	79		21	110	71
Cadmium	U	2450	mg/kg	0.10	2.6	2.6		1.5	2.8		0.79	2.4	2.5
Chromium	U	2450	mg/kg	1.0	17	15		10	13		6.7	26	18
Molybdenum	U	2450	mg/kg	2.0	4.3	4.6		3.7	5.5		3.1	4.0	4.0
Antimony	N	2450	mg/kg	2.0	2.1	2.4		< 2.0	2.0		< 2.0	2.0	3.8
Copper	U	2450	mg/kg	0.50	40	45		27	59		17	46	64
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10		< 0.10	0.11	0.15
Nickel	U	2450	mg/kg	0.50	54	46		29	53		27	51	50
Lead	U	2450	mg/kg	0.50	23	25		17	25		8.9	37	35
Selenium	U	2450	mg/kg	0.20	0.56	< 0.20		0.47	0.26		< 0.20	0.32	0.63
Zinc	U	2450	mg/kg	0.50	92	79		45	77		23	92	96
Chromium (Trivalent)	N	2490	mg/kg	1.0	17	15		10	13		6.7	26	18
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50		< 0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	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

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583
Quotation No.: Q20-21693	**Chemtest Sample ID.:**				1302545	1302546	1302547	1302548	1302549	1302550	1302551	1302552	1302553
Order No.:	Client Sample Ref.:				AA165810	AA165812	AA165813	AA165818	AA165815	AA165816	AA165820	AA165822	AA165831
	Sample Location:				BH01	BH02	BH02	BH03	BH04	BH04	BH05	BH06	BH09B
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
	Bottom Depth (m):				1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
	Asbestos Lab:				COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
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
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	N	2800	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
Acenaphthylene	N	2800	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
Acenaphthene	N	2800	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
Fluorene	N	2800	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
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] 0.15
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] 0.039
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] 0.040	[A] 0.23
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] 0.040	[A] 0.22
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] 0.12
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] 0.13
Benzo[b]fluoranthene	N	2800	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
Benzo[k]fluoranthene	N	2800	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
Benzo[a]pyrene	N	2800	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
Indeno(1,2,3-c,d)Pyrene	N	2800	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
Dibenz(a,h)Anthracene	N	2800	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
Benzo[g,h,i]perylene	N	2800	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
Coronene	N	2800	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 Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20	[A] < 0.20		[A] < 0.20	[A] < 0.20		[A] < 0.20	[A] < 0.20	[A] 0.89
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583	21-36583
Quotation No.: Q20-21693	**Chemtest Sample ID.:**				1302545	1302546	1302547	1302548	1302549	1302550	1302551	1302552	1302553
Order No.:	Client Sample Ref.:				AA165810	AA165812	AA165813	AA165818	AA165815	AA165816	AA165820	AA165822	AA165831
	Sample Location:				BH01	BH02	BH02	BH03	BH04	BH04	BH05	BH06	BH09B
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
	Bottom Depth (m):				1.00	1.00	1.50	1.00	1.00	2.00	1.00	1.00	1.00
	Asbestos Lab:				COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10		< 0.10	< 0.10	< 0.10

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36583	21-36583
Quotation No.: Q20-21693				**Chemtest Sample ID.:**	1302554	1302555
Order No.:				Client Sample Ref.:	AA165835	AA165836
				Sample Location:	BH10	BH10
				Sample Type:	SOIL	SOIL
				Top Depth (m):	1.00	2.00
				Bottom Depth (m):	1.00	2.00
				Asbestos Lab:	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	12	11
pH (2.5:1)	N	2010		4.0		
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010		
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		
Total Sulphur	U	2175	%	0.010		
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 3.1	[A] < 1.0
Chloride (Water Soluble)	U	2220	g/l	0.010		
Nitrate (Water Soluble)	N	2220	g/l	0.010		
Cyanide (Total)	U	2300	mg/kg	0.50	[A] 1.7	[A] 1.5
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 9.7	[A] 6.0
Ammonium (Water Soluble)	U	2220	g/l	0.01		
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.059	[A] 0.020
Arsenic	U	2450	mg/kg	1.0	17	24
Barium	U	2450	mg/kg	10	51	74
Cadmium	U	2450	mg/kg	0.10	0.96	2.5
Chromium	U	2450	mg/kg	1.0	16	16
Molybdenum	U	2450	mg/kg	2.0	< 2.0	4.2
Antimony	N	2450	mg/kg	2.0	< 2.0	2.6
Copper	U	2450	mg/kg	0.50	34	50
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	25	46
Lead	U	2450	mg/kg	0.50	29	27
Selenium	U	2450	mg/kg	0.20	0.29	0.22
Zinc	U	2450	mg/kg	0.50	64	78
Chromium (Trivalent)	N	2490	mg/kg	1.0	16	16
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36583	21-36583
Quotation No.: Q20-21693	**Chemtest Sample ID.:**				1302554	1302555
Order No.:	Client Sample Ref.:				AA165835	AA165836
	Sample Location:				BH10	BH10
	Sample Type:				SOIL	SOIL
	Top Depth (m):				1.00	2.00
	Bottom Depth (m):				1.00	2.00
	Asbestos Lab:				COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] 260	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] 260	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] 260	[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] 0.16	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] 0.026	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] 0.16	[A] < 0.010
Pyrene	N	2800	mg/kg	0.010	[A] 0.18	[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] 0.11	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] 0.16	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] 0.15	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] 0.061	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] 0.15	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] 1.2	[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36583	21-36583
Quotation No.: Q20-21693				**Chemtest Sample ID.:**	1302554	1302555
Order No.:				Client Sample Ref.:	AA165835	AA165836
				Sample Location:	BH10	BH10
				Sample Type:	SOIL	SOIL
				Top Depth (m):	1.00	2.00
				Bottom Depth (m):	1.00	2.00
				Asbestos Lab:	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-36583						
Chemtest Sample ID:	1302545						
Sample Ref:	AA165810						
Sample ID:							
Sample Location:	BH01						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.50	3	5	6
Loss On Ignition	2610	U	%	4.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.10	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0006	0.0064	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0070	0.070	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	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	6.2	62	1000	20000	50000
Total Dissolved Solids	1020	N	160	1600	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 (%)	9.9

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36583
Chemtest Sample ID: 1302546
Sample Ref: AA165812
Sample ID:
Sample Location: BH02
Top Depth(m): 1.00
Bottom Depth(m): 1.00
Sampling Date:

Determinand	**SOP**	**Accred.**	**Units**		**Landflll Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.40	3	5	6
Loss On Ignition	2610	U	%	4.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.094	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0005	0.0051	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0043	0.043	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	5.4	54	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	4.8	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.0

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302548						
Sample Ref:	AA165818				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH03						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.60	3	5	6
Loss On Ignition	2610	U	%	5.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.072	--	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	1455	U	0.0008	0.0075	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0032	0.032	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.012	0.12	0.5	10	30
Nickel	1455	U	0.0023	0.023	0.4	10	40
Lead	1455	U	0.0008	0.0078	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.006	0.055	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.48	4.8	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	18	180	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landflll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302549						
Sample Ref:	AA165815				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH04						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.30	3	5	6
Loss On Ignition	2610	U	%	3.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.069	--	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	1455	U	0.0002	0.0025	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0005	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0060	0.060	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0006	0.0057	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.22	2.2	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	52	520	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.1	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.9

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36583
Chemtest Sample ID: 1302551
Sample Ref: AA165820
Sample ID:
Sample Location: BH05
Top Depth(m): 1.00
Bottom Depth(m): 1.00
Sampling Date:

					Landflll 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] 0.40	3	5	6
Loss On Ignition	2610	U	%	3.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.13	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0005	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.011	0.11	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	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	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	56	560	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.5	55	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302552						
Sample Ref:	AA165822				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH06						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.80	3	5	6
Loss On Ignition	2610	U	%	4.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.083	--	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	1455	U	0.0004	0.0045	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0057	0.5	10	70
Copper	1455	U	0.0015	0.015	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0060	0.060	0.5	10	30
Nickel	1455	U	0.0007	0.0069	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.41	4.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	12	120	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36583
Chemtest Sample ID:	1302553
Sample Ref:	AA165831
Sample ID:	
Sample Location:	BH09B
Top Depth(m):	1.00
Bottom Depth(m):	1.00
Sampling Date:	

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 1.3	3	5	6
Loss On Ignition	2610	U	%	5.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.89	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.083	--	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	1455	U	0.0013	0.013	0.5	2	25
Barium	1455	U	0.005	0.053	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0008	0.0076	0.5	10	70
Copper	1455	U	0.0028	0.029	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0069	0.069	0.5	10	30
Nickel	1455	U	0.0013	0.013	0.4	10	40
Lead	1455	U	0.0007	0.0070	0.5	10	50
Antimony	1455	U	0.0007	0.0066	0.06	0.7	5
Selenium	1455	U	0.0005	0.0053	0.1	0.5	7
Zinc	1455	U	0.003	0.035	4	50	200
Chloride	1220	U	1.4	14	800	15000	25000
Fluoride	1220	U	0.45	4.5	10	150	500
Sulphate	1220	U	7.2	72	1000	20000	50000
Total Dissolved Solids	1020	N	91	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	23	230	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: 23606 Parkwest Dublin (Cronin Sutton)

					Landfill Waste Acceptance Criteria Limits		
					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Chemtest Job No:	21-36583						
Chemtest Sample ID:	1302554						
Sample Ref:	AA165835						
Sample ID:							
Sample Location:	BH10						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 2.1	3	5	6
Loss On Ignition	2610	U	%	3.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 260	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 1.2	100	--	--
pH	2010	U		8.7	--	>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	1455	U	0.0006	0.0057	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0058	0.5	10	70
Copper	1455	U	0.0025	0.025	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0036	0.036	0.5	10	30
Nickel	1455	U	0.0012	0.012	0.4	10	40
Lead	1455	U	0.0005	0.0054	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.004	0.040	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.32	3.2	10	150	500
Sulphate	1220	U	1.7	17	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	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 (%)	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36583
Chemtest Sample ID: 1302555
Sample Ref: AA165836
Sample ID:
Sample Location: BH10
Top Depth(m): 2.00
Bottom Depth(m): 2.00
Sampling Date:

					Landfilll Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.50	3	5	6
Loss On Ignition	2610	U	%	4.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.033	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0005	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0076	0.076	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	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	2.5	25	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	3.3	< 50	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.

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:
1302545	AA165810		BH01		A	Amber Glass 250ml
1302545	AA165810		BH01		A	Plastic Tub 500g
1302546	AA165812		BH02		A	Amber Glass 250ml
1302546	AA165812		BH02		A	Plastic Tub 500g
1302547	AA165813		BH02		A	Amber Glass 250ml
1302547	AA165813		BH02		A	Plastic Tub 500g
1302548	AA165818		BH03		A	Amber Glass 250ml
1302548	AA165818		BH03		A	Plastic Tub 500g
1302549	AA165815		BH04		A	Amber Glass 250ml
1302549	AA165815		BH04		A	Plastic Tub 500g
1302550	AA165816		BH04		A	Amber Glass 250ml
1302550	AA165816		BH04		A	Plastic Tub 500g
1302551	AA165820		BH05		A	Amber Glass 250ml
1302551	AA165820		BH05		A	Plastic Tub 500g
1302552	AA165822		BH06		A	Amber Glass 250ml
1302552	AA165822		BH06		A	Plastic Tub 500g
1302553	AA165831		BH09B		A	Amber Glass 250ml
1302553	AA165831		BH09B		A	Plastic Tub 500g
1302554	AA165835		BH10		A	Amber Glass 250ml
1302554	AA165835		BH10		A	Plastic Tub 500g
1302555	AA165836		BH10		A	Amber Glass 250ml
1302555	AA165836		BH10		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters 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	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
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.

Test Methods

SOP	Title	Parameters included	Method summary
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
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 C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

UKAS
TESTING
2183

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Email: info@chemtest.com

Amended Report

Report No.:	21-36473-2		
Initial Date of Issue:	01-Nov-2021	**Date of Re-Issue:**	10-Nov-2021
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	Darren Keogh		
Project	23606 Parkwest Dublin (Cronin Sutton)		
Quotation No.:	Q20-19951	**Date Received:**	20-Oct-2021
Order No.:		**Date Instructed:**	20-Oct-2021
No. of Samples:	23		
Turnaround (Wkdays):	16	**Results Due:**	10-Nov-2021
Date Approved:	10-Nov-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Leachate

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL					**Chemtest Job No.:**	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951					**Chemtest Sample ID.:**	1302004	1302005	1302006	1302008	1302009	1302010	1302011	1302012	1302013	1302014	1302015
Order No.:					Client Sample Ref.:	AA150651	AA150653	AA150669	AA150666	AA150657	AA150660	AA150672	AA150689	AA150674	AA150686	AA150678
					Sample Location:	TP01	TP02	TP03	TP04	TP05	TP14	TP06	TP07	TP08	TP09	TP10
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	0.50	0.70	0.60	0.80	0.50	0.50	0.50	0.50	0.50	0.70
					Bottom Depth (m):	0.50	0.50	0.70	0.60	0.80	0.50	0.50	0.50	0.50	0.50	0.70
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**											
pH	U	1010	10:1		N/A	8.5	8.4	8.5	8.2	8.5	8.2	8.2	8.4	8.4	8.2	8.2
Ammonium	U	1220	10:1	mg/l	0.050	< 0.050	0.073	< 0.050	0.075	0.050	0.066	0.076	0.060	< 0.050	< 0.050	0.056
Ammonium	N	1220	10:1	mg/kg	0.10	0.52	0.82	0.45	0.82	0.58	0.72	0.83	0.68	0.38	0.41	0.62
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	< 0.01	0.12	< 0.01	0.15	< 0.01	0.13	< 0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Leachate

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**					21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**					1302016	1302018	1302019	1302020	1302021	1302022	1302025	1302026
Order No.:	Client Sample Ref.:					AA150679	AA150682	AA150683	AA150695	AA150692	AA150663	AA165825	AA165828
	Sample Location:					TP10	TP11	TP11	TP12	TP13	TP15	BH07	BH08
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					1.60	0.50	1.50	0.50	0.50	0.80	1.00	1.00
	Bottom Depth (m):					1.60	0.50	1.50	0.50	0.50	0.80	1.00	1.00
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**								
pH	U	1010	10:1		N/A	8.4	8.2	8.3	8.3	8.5	8.4	8.6	8.3
Ammonium	U	1220	10:1	mg/l	0.050	< 0.050	0.061	0.056	< 0.050	0.059	< 0.050	< 0.050	< 0.050
Ammonium	N	1220	10:1	mg/kg	0.10	0.45	0.67	0.62	0.47	0.69	0.39	0.50	0.55
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302004	1302005	1302006	1302007	1302008	1302009	1302010	1302011	1302012
Order No.:	Client Sample Ref.:				AA150651	AA150653	AA150669	AA150670	AA150666	AA150657	AA150660	AA150672	AA150689
	Sample Location:				TP01	TP02	TP03	TP03	TP04	TP05	TP14	TP06	TP07
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-		-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	6.5	7.7	10	23	14	8.0	9.9	12	10
pH (2.5:1)	N	2010		4.0				[A] 8.8					
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40		[A] 0.53	[A] < 0.40	[A] 1.1	[A] 0.57	[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010				[A] < 0.010					
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010				[A] < 0.010					
Total Sulphur	U	2175	%	0.010				[A] 0.029					
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 4.8	[A] 110	[A] 1.4		[A] 3.4	[A] < 1.0	[A] 220	[A] 1.3	[A] 1.4
Chloride (Water Soluble)	U	2220	g/l	0.010				[A] < 0.010					
Nitrate (Water Soluble)	N	2220	g/l	0.010				< 0.010					
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	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 7.3	[A] 4.9	[A] 20		[A] 5.1	[A] 5.2	[A] 2.9	[A] 4.1	[A] 6.1
Ammonium (Water Soluble)	U	2220	g/l	0.01				< 0.01					
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.026	[A] 0.025	[A] 0.027	[A] 0.027	[A] 0.054	[A] 0.028	[A] 0.037	[A] 0.036	[A] 0.037
Arsenic	U	2450	mg/kg	1.0	4.3	2.7	24		40	22	10	10	30
Barium	U	2450	mg/kg	10	20	23	49		52	45	71	70	56
Cadmium	U	2450	mg/kg	0.10	< 0.10	< 0.10	2.9		1.2	2.8	2.5	1.8	1.4
Chromium	U	2450	mg/kg	1.0	15	31	17		80	14	18	17	20
Molybdenum	U	2450	mg/kg	2.0	< 2.0	< 2.0	4.3		2.1	3.6	2.4	2.3	2.7
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	11	12	43		66	36	43	36	49
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	0.12
Nickel	U	2450	mg/kg	0.50	7.8	21	49		56	43	43	31	33
Lead	U	2450	mg/kg	0.50	5.9	8.9	22		36	21	23	30	49
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	0.43		0.31	0.30	0.43	0.52	0.50
Zinc	U	2450	mg/kg	0.50	18	38	87		100	77	210	88	240
Chromium (Trivalent)	N	2490	mg/kg	1.0	15	31	17		80	14	18	17	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 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	[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	[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	[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	[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	[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	[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] 9.9	[A] 3.3

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1302004	1302005	1302006	1302007	1302008	1302009	1302010	1302011	1302012
Order No.:				Client Sample Ref.:	AA150651	AA150653	AA150669	AA150670	AA150666	AA150657	AA150660	AA150672	AA150689
				Sample Location:	TP01	TP02	TP03	TP03	TP04	TP05	TP14	TP06	TP07
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
				Bottom Depth (m):	0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
				Asbestos Lab:	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
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	[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] 9.9	[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	[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	[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	[A] < 1.0
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	[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	[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	[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] 240	[A] 460
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	[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] 240	[A] 460
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10		[A] < 10	[A] < 10	[A] < 10	[A] 250	[A] 460
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	[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	[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	[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	[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	[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	[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.066	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.017	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.044	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Fluorene	N	2800	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	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] 0.065	[A] < 0.010	[A] < 0.010		[A] 0.080	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] 0.049	[A] < 0.010	[A] < 0.010		[A] 0.038	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] 0.058	[A] 0.079	[A] < 0.010		[A] 0.13	[A] < 0.010	[A] < 0.010	[A] 0.11	[A] 0.14
Pyrene	N	2800	mg/kg	0.010	[A] 0.049	[A] 0.089	[A] < 0.010		[A] 0.16	[A] < 0.010	[A] < 0.010	[A] 0.12	[A] 0.17
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.086	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.11	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.10	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.062	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.090	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.049	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.037	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.073	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Coronene	N	2800	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	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] 0.22	[A] < 0.20	[A] < 0.20		[A] 1.1	[A] < 0.20	[A] < 0.20	[A] 0.23	[A] 0.31
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302004	1302005	1302006	1302007	1302008	1302009	1302010	1302011	1302012
Order No.:	Client Sample Ref.:				AA150651	AA150653	AA150669	AA150670	AA150666	AA150657	AA150660	AA150672	AA150689
	Sample Location:				TP01	TP02	TP03	TP03	TP04	TP05	TP14	TP06	TP07
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.50	0.60	0.80	0.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302013	1302014	1302015	1302016	1302017	1302018	1302019	1302020	1302021
Order No.:	Client Sample Ref.:				AA150674	AA150686	AA150678	AA150679	AA150680	AA150682	AA150683	AA150695	AA150692
	Sample Location:				TP08	TP09	TP10	TP10	TP10	TP11	TP11	TP12	TP13
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-	-		-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	11	12	8.4	11	9.4	13	15	12	8.3
pH (2.5:1)	N	2010		4.0					[A] 9.0				
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40		[A] 0.76	[A] 0.61	[A] < 0.40	[A] 0.72
Magnesium (Water Soluble)	N	2120	g/l	0.010					[A] < 0.010				
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010					[A] < 0.010				
Total Sulphur	U	2175	%	0.010					[A] 0.025				
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] 1.7	[A] 2.0	[A] 1.0		[A] 2.3	[A] 5.3	[A] 1.1	[A] 1.2
Chloride (Water Soluble)	U	2220	g/l	0.010					[A] < 0.010				
Nitrate (Water Soluble)	N	2220	g/l	0.010					< 0.010				
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	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 5.3	[A] 9.9	[A] 10	[A] 6.9		[A] 6.6	[A] 7.3	[A] 6.4	[A] 12
Ammonium (Water Soluble)	U	2220	g/l	0.01					< 0.01				
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.042	[A] 0.048	[A] 0.040	[A] 0.043	[A] 0.023	[A] 0.079	[A] 0.062	[A] 0.034	[A] 0.033
Arsenic	U	2450	mg/kg	1.0	19	16	20	28		38	20	11	33
Barium	U	2450	mg/kg	10	67	71	65	87		100	120	52	64
Cadmium	U	2450	mg/kg	0.10	2.7	1.7	2.1	3.3		2.3	1.4	1.4	3.2
Chromium	U	2450	mg/kg	1.0	20	18	22	25		31	18	14	20
Molybdenum	U	2450	mg/kg	2.0	3.7	3.7	4.1	4.5		3.9	2.9	< 2.0	5.3
Antimony	N	2450	mg/kg	2.0	2.0	2.3	2.0	2.6		2.9	2.3	< 2.0	2.2
Copper	U	2450	mg/kg	0.50	65	39	60	52		66	49	69	45
Mercury	U	2450	mg/kg	0.10	0.10	0.16	0.13	0.15		0.32	0.39	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	52	38	55	59		54	37	29	57
Lead	U	2450	mg/kg	0.50	28	55	46	41		110	130	49	34
Selenium	U	2450	mg/kg	0.20	0.45	0.76	0.85	0.50		0.82	0.60	0.36	0.97
Zinc	U	2450	mg/kg	0.50	100	87	94	130		180	140	84	120
Chromium (Trivalent)	N	2490	mg/kg	1.0	20	18	22	25		31	18	14	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10	13	< 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	[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	[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	[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	[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	[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	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] 13	[A] < 1.0		[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302013	1302014	1302015	1302016	1302017	1302018	1302019	1302020	1302021
Order No.:	Client Sample Ref.:				AA150674	AA150686	AA150678	AA150679	AA150680	AA150682	AA150683	AA150695	AA150692
	Sample Location:				TP08	TP09	TP10	TP10	TP10	TP11	TP11	TP12	TP13
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
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	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] 13	[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	[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	[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	[A] < 1.0
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	[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	[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	[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] 200	[A] 190	[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	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] 200	[A] 190	[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] 200	[A] 210	[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	[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	[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	[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	[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	[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	[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.10		[A] 0.095	[A] 0.14	[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] 0.038	[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.041		[A] 0.050	[A] 0.062	[A] < 0.010	[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.042		[A] 0.045	[A] 0.048	[A] < 0.010	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] 0.083	[A] < 0.010	[A] 0.13		[A] 0.31	[A] 0.39	[A] < 0.010	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] 0.031	[A] < 0.010	[A] 0.032		[A] 0.048	[A] 0.087	[A] < 0.010	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] 0.14	[A] 0.061	[A] 0.10		[A] 0.37	[A] 0.67	[A] 0.11	[A] 0.045
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] 0.14	[A] 0.070	[A] 0.10		[A] 0.34	[A] 0.62	[A] 0.10	[A] 0.037
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.063		[A] 0.19	[A] 0.32	[A] 0.060	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.057		[A] 0.20	[A] 0.40	[A] 0.080	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.054		[A] 0.25	[A] 0.50	[A] < 0.010	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.038		[A] 0.075	[A] 0.19	[A] < 0.010	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.040		[A] 0.18	[A] 0.36	[A] < 0.010	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.12	[A] 0.24	[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.069	[A] 0.081	[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] 0.15	[A] 0.28	[A] < 0.010	[A] < 0.010
Coronene	N	2800	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	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20	[A] 0.39	[A] < 0.20	[A] 0.80		[A] 2.5	[A] 4.4	[A] 0.35	[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302013	1302014	1302015	1302016	1302017	1302018	1302019	1302020	1302021
Order No.:	Client Sample Ref.:				AA150674	AA150686	AA150678	AA150679	AA150680	AA150682	AA150683	AA150695	AA150692
	Sample Location:				TP08	TP09	TP10	TP10	TP10	TP11	TP11	TP12	TP13
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Bottom Depth (m):				0.50	0.50	0.70	1.60	2.50	0.50	1.50	0.50	0.50
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL	**Chemtest Job No.:**				21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951	**Chemtest Sample ID.:**				1302022	1302023	1302024	1302025	1302026
Order No.:	Client Sample Ref.:				AA150663	AA150664	AA165823	AA165825	AA165828
	Sample Location:				TP15	TP15	BH06	BH07	BH08
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.80	1.50	2.00	1.00	1.00
	Bottom Depth (m):				0.80	1.50	2.00	1.00	1.00
	Asbestos Lab:				DURHAM			DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-			-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected			No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	10	14	15	8.1	16
pH (2.5:1)	N	2010		4.0		[A] 8.9	[A] 8.9		
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40			[A] < 0.40	[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010	[A] < 0.010		
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010	[A] < 0.010		
Total Sulphur	U	2175	%	0.010		[A] 0.044	[A] 0.020		
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] < 0.010	[A] < 0.010		
Nitrate (Water Soluble)	N	2220	g/l	0.010		< 0.010	< 0.010		
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] 20			[A] 15	[A] 12
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01	< 0.01		
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.034	[A] 0.025	[A] 0.027	[A] 0.028	[A] 0.020
Arsenic	U	2450	mg/kg	1.0	27			30	13
Barium	U	2450	mg/kg	10	90			63	58
Cadmium	U	2450	mg/kg	0.10	2.5			2.6	1.2
Chromium	U	2450	mg/kg	1.0	17			16	19
Molybdenum	U	2450	mg/kg	2.0	4.0			4.6	2.3
Antimony	N	2450	mg/kg	2.0	2.0			< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	36			36	32
Mercury	U	2450	mg/kg	0.10	< 0.10			< 0.10	0.13
Nickel	U	2450	mg/kg	0.50	62			47	35
Lead	U	2450	mg/kg	0.50	27			23	31
Selenium	U	2450	mg/kg	0.20	< 0.20			< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	67			110	220
Chromium (Trivalent)	N	2490	mg/kg	1.0	17			16	19
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50			< 0.50	< 0.50
Mineral Oil (TPH Calculation)	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

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1302022	1302023	1302024	1302025	1302026
Order No.:				Client Sample Ref.:	AA150663	AA150664	AA165823	AA165825	AA165828
				Sample Location:	TP15	TP15	BH06	BH07	BH08
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.80	1.50	2.00	1.00	1.00
				Bottom Depth (m):	0.80	1.50	2.00	1.00	1.00
				Asbestos Lab:	DURHAM			DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
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
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	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] 0.062
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] 0.045
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20			[A] < 0.20	[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010

Results - Soil

Project: 23606 Parkwest Dublin (Cronin Sutton)

Client: IGSL				**Chemtest Job No.:**	21-36473	21-36473	21-36473	21-36473	21-36473
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1302022	1302023	1302024	1302025	1302026
Order No.:				Client Sample Ref.:	AA150663	AA150664	AA165823	AA165825	AA165828
				Sample Location:	TP15	TP15	BH06	BH07	BH08
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.80	1.50	2.00	1.00	1.00
				Bottom Depth (m):	0.80	1.50	2.00	1.00	1.00
				Asbestos Lab:	DURHAM			DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10			< 0.10	< 0.10

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36473
Chemtest Sample ID: 1302004
Sample Ref: AA150651
Sample ID:
Sample Location: TP01
Top Depth(m): 0.50
Bottom Depth(m): 0.50
Sampling Date:

					Landfilll 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	%	1.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.22	100	--	--
pH	2010	U		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0070	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0005	0.0050	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0032	0.032	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.29	2.9	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	11	110	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.5

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302005						
Sample Ref:	AA150653						
Sample ID:							
Sample Location:	TP02						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.40	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	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.015	--	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	1455	U	0.0008	0.0081	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0013	0.013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0049	0.049	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.60	6.0	10	150	500
Sulphate	1220	U	1.6	16	1000	20000	50000
Total Dissolved Solids	1020	N	72	720	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 (%)	7.7

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302006						
Sample Ref:	AA150669				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP03						
Top Depth(m):	0.70						
Bottom Depth(m):	0.70						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.30	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	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0007	0.0070	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0094	0.094	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.35	3.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	55	550	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	15	150	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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: 23606 Parkwest Dublin (Cronin Sutton)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-36473						
Chemtest Sample ID:	1302008						
Sample Ref:	AA150666						
Sample ID:							
Sample Location:	TP04						
Top Depth(m):	0.60						
Bottom Depth(m):	0.60						
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] 1.0	3	5	6
Loss On Ignition	2610	U	%	3.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 1.1	100	--	--
pH	2010	U		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.012	--	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	1455	U	0.0007	0.0069	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0057	0.5	10	70
Copper	1455	U	0.0032	0.032	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0060	0.060	0.5	10	30
Nickel	1455	U	0.0021	0.021	0.4	10	40
Lead	1455	U	0.0007	0.0073	0.5	10	50
Antimony	1455	U	0.0005	0.0054	0.06	0.7	5
Selenium	1455	U	0.0006	0.0056	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.37	3.7	10	150	500
Sulphate	1220	U	22	220	1000	20000	50000
Total Dissolved Solids	1020	N	100	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	43	430	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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302009						
Sample Ref:	AA150657				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP05						
Top Depth(m):	0.80						
Bottom Depth(m):	0.80						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.40	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	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0007	0.0067	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0039	0.039	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	57	570	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	12	120	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.0

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302010						
Sample Ref:	AA150660				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP14						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.82	3	5	6
Loss On Ignition	2610	U	%	4.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	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	1455	U	0.0003	0.0028	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0015	0.015	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0022	0.022	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.40	4.0	10	150	500
Sulphate	1220	U	2.3	23	1000	20000	50000
Total Dissolved Solids	1020	N	91	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.9	89	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.9

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302011						
Sample Ref:	AA150672				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP06						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 1.4	3	5	6
Loss On Ignition	2610	U	%	4.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 250	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.23	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	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	1455	U	0.0002	0.0024	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0023	0.023	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0040	0.040	0.5	10	30
Nickel	1455	U	0.0018	0.018	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.41	4.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	35	350	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-36473						
Chemtest Sample ID:	1302012						
Sample Ref:	AA150689						
Sample ID:							
Sample Location:	TP07						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 1.1	3	5	6
Loss On Ignition	2610	U	%	3.4	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 460	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.31	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.010	--	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	1455	U	0.0022	0.022	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0027	0.027	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0049	0.049	0.5	10	30
Nickel	1455	U	0.0008	0.0084	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0008	0.0075	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.44	4.4	10	150	500
Sulphate	1220	U	5.3	53	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	48	480	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302013						
Sample Ref:	AA150674				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP08						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.70	3	5	6
Loss On Ignition	2610	U	%	3.4	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0017	0.017	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0021	0.021	0.5	10	30
Nickel	1455	U	0.0007	0.0069	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.012	0.12	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.38	3.8	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	24	240	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landflll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302014						
Sample Ref:	AA150686				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP09						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 1.5	3	5	6
Loss On Ignition	2610	U	%	4.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 200	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.39	100	--	--
pH	2010	U		8.4	--	>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	1455	U	0.0003	0.0025	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0022	0.022	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0057	0.057	0.5	10	30
Nickel	1455	U	0.0008	0.0078	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.34	3.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	39	390	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36473
Chemtest Sample ID: 1302015
Sample Ref: AA150678
Sample ID:
Sample Location: TP10
Top Depth(m): 0.70
Bottom Depth(m): 0.70
Sampling Date:

Determinand	**SOP**	**Accred.**	**Units**		**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.90	3	5	6
Loss On Ignition	2610	U	%	3.4	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 210	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.062	--	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	1455	U	0.0003	0.0031	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0010	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0067	0.067	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0006	0.0056	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.32	3.2	10	150	500
Sulphate	1220	U	8.5	85	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	15	150	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.4

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No: 21-36473
Chemtest Sample ID: 1302016
Sample Ref: AA150679
Sample ID:
Sample Location: TP10
Top Depth(m): 1.60
Bottom Depth(m): 1.60
Sampling Date:

					Landflll Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.70	3	5	6
Loss On Ignition	2610	U	%	3.2	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.80	100	--	--
pH	2010	U		8.5	--	>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	1455	U	0.0003	0.0032	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0010	0.010	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0028	0.028	0.5	10	30
Nickel	1455	U	0.0006	0.0063	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0005	0.0051	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.34	3.4	10	150	500
Sulphate	1220	U	3.7	37	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	21	210	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302018						
Sample Ref:	AA150682				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP11						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 2.3	3	5	6
Loss On Ignition	2610	U	%	6.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 2.5	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	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	1455	U	0.0010	0.0098	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0037	0.037	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0039	0.039	0.5	10	30
Nickel	1455	U	0.0010	0.0099	0.4	10	40
Lead	1455	U	0.0005	0.0051	0.5	10	50
Antimony	1455	U	0.0010	0.010	0.06	0.7	5
Selenium	1455	U	0.0005	0.0051	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.39	3.9	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	29	290	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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302019						
Sample Ref:	AA150683						
Sample ID:							
Sample Location:	TP11						
Top Depth(m):	1.50				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Bottom Depth(m):	1.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 3.9	3	5	6
Loss On Ignition	2610	U	%	6.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 4.4	100	--	--
pH	2010	U		8.3	--	>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	1455	U	0.0017	0.017	0.5	2	25
Barium	1455	U	0.006	0.063	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0030	0.031	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0090	0.090	0.5	10	30
Nickel	1455	U	0.0008	0.0082	0.4	10	40
Lead	1455	U	0.0009	0.0090	0.5	10	50
Antimony	1455	U	0.0010	0.010	0.06	0.7	5
Selenium	1455	U	0.0007	0.0065	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.41	4.1	10	150	500
Sulphate	1220	U	4.6	46	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	38	380	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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landflll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302020						
Sample Ref:	AA150695				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP12						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 1.0	3	5	6
Loss On Ignition	2610	U	%	4.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.35	100	--	--
pH	2010	U		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.020	--	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	1455	U	0.0006	0.0063	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0040	0.041	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0075	0.075	0.5	10	30
Nickel	1455	U	0.0008	0.0078	0.4	10	40
Lead	1455	U	0.0011	0.011	0.5	10	50
Antimony	1455	U	0.0075	0.075	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.42	4.2	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	39	390	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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302021						
Sample Ref:	AA150692				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP13						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.50	3	5	6
Loss On Ignition	2610	U	%	2.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.013	--	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	1455	U	0.0004	0.0041	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0014	0.015	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0054	0.054	0.5	10	30
Nickel	1455	U	0.0005	0.0052	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	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	1.1	11	1000	20000	50000
Total Dissolved Solids	1020	N	64	640	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	25	250	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.3

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.

Results - Single Stage WAC

Project: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473
Chemtest Sample ID:	1302022
Sample Ref:	AA150663
Sample ID:	
Sample Location:	TP15
Top Depth(m):	0.80
Bottom Depth(m):	0.80
Sampling Date:	

Determinand	**SOP**	**Accred.**	**Units**		**Landfilll Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.40	3	5	6
Loss On Ignition	2610	U	%	3.2	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.014	--	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	1455	U	0.0003	0.0026	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0013	0.013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0025	0.025	0.5	10	30
Nickel	1455	U	0.0010	0.010	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.60	6.0	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	62	620	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	37	370	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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: 23606 Parkwest Dublin (Cronin Sutton)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-36473						
Chemtest Sample ID:	1302025						
Sample Ref:	AA165825						
Sample ID:							
Sample Location:	BH07						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
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] 0.40	3	5	6
Loss On Ignition	2610	U	%	2.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0070	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0006	0.0059	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0052	0.052	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.34	3.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	51	510	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 (%)	8.1

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: 23606 Parkwest Dublin (Cronin Sutton)

Chemtest Job No:	21-36473				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1302026						
Sample Ref:	AA165828				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	BH08						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.40	3	5	6
Loss On Ignition	2610	U	%	3.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	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	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0009	0.0091	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0027	0.027	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.47	4.7	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	9.6	96	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.

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:
1302004	AA150651		TP01		A	Amber Glass 250ml
1302004	AA150651		TP01		A	Plastic Tub 500g
1302005	AA150653		TP02		A	Amber Glass 250ml
1302005	AA150653		TP02		A	Plastic Tub 500g
1302006	AA150669		TP03		A	Amber Glass 250ml
1302006	AA150669		TP03		A	Plastic Tub 500g
1302007	AA150670		TP03		A	Amber Glass 250ml
1302007	AA150670		TP03		A	Plastic Tub 500g
1302008	AA150666		TP04		A	Amber Glass 250ml
1302008	AA150666		TP04		A	Plastic Tub 500g
1302009	AA150657		TP05		A	Amber Glass 250ml
1302009	AA150657		TP05		A	Plastic Tub 500g
1302010	AA150660		TP14		A	Amber Glass 250ml
1302010	AA150660		TP14		A	Plastic Tub 500g
1302011	AA150672		TP06		A	Amber Glass 250ml
1302011	AA150672		TP06		A	Plastic Tub 500g
1302012	AA150689		TP07		A	Amber Glass 250ml
1302012	AA150689		TP07		A	Plastic Tub 500g
1302013	AA150674		TP08		A	Amber Glass 250ml
1302013	AA150674		TP08		A	Plastic Tub 500g
1302014	AA150686		TP09		A	Amber Glass 250ml
1302014	AA150686		TP09		A	Plastic Tub 500g

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:
1302015	AA150678		TP10		A	Amber Glass 250ml
1302015	AA150678		TP10		A	Plastic Tub 500g
1302016	AA150679		TP10		A	Amber Glass 250ml
1302016	AA150679		TP10		A	Plastic Tub 500g
1302017	AA150680		TP10		A	Amber Glass 250ml
1302017	AA150680		TP10		A	Plastic Tub 500g
1302018	AA150682		TP11		A	Amber Glass 250ml
1302018	AA150682		TP11		A	Plastic Tub 500g
1302019	AA150683		TP11		A	Amber Glass 250ml
1302019	AA150683		TP11		A	Plastic Tub 500g
1302020	AA150695		TP12		A	Amber Glass 250ml
1302020	AA150695		TP12		A	Plastic Tub 500g
1302021	AA150692		TP13		A	Amber Glass 250ml
1302021	AA150692		TP13		A	Plastic Tub 500g
1302022	AA150663		TP15		A	Amber Glass 250ml
1302022	AA150663		TP15		A	Plastic Tub 500g
1302023	AA150664		TP15		A	Amber Glass 250ml
1302023	AA150664		TP15		A	Plastic Tub 500g
1302024	AA165823		BH06		A	Amber Glass 250ml
1302024	AA165823		BH06		A	Plastic Tub 500g
1302025	AA165825		BH07		A	Amber Glass 250ml
1302025	AA165825		BH07		A	Plastic Tub 500g

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:
1302026	AA165828		BH08		A	Amber Glass 250ml
1302026	AA165828		BH08		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters 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	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
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.

Test Methods

SOP	Title	Parameters included	Method summary
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
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 C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix 3

Waste Classification Report

environmental management for business

HazWasteOnline™

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

ZF7JC-2PVKU-LJ10Q

Job name

21-001-36 Parkwest

Description/Comments

Project

21-001-36

Site

Parkwest

Classified by

Name:
Austin Hynes
Date:
11 Nov 2021 17:20 GMT
Telephone:
+353 (0)21 4345366

Company:
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park,
Model Farm Road
Cork

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:	-
Course	**Date**
Hazardous Waste Classification	-

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	BH01	1.00	Non Hazardous		3
2	BH02	1.00	Non Hazardous		6
3	BH03	1.00	Non Hazardous		9
4	BH04	1.00	Non Hazardous		12
5	BH05	1.00	Non Hazardous		15
6	BH06	1.00	Non Hazardous		18
7	BH07	1.00	Non Hazardous		21
8	BH08	1.00	Non Hazardous		24
9	BH09B	1.00	Non Hazardous		27
10	BH10	1.00	Non Hazardous		30
11	BH10[2]	2.00	Non Hazardous		33
12	TP01	0.50	Non Hazardous		36
13	TP02	0.50	Non Hazardous		39
14	TP03	0.70	Non Hazardous		42
15	TP04	0.60	Non Hazardous		45
16	TP05	0.80	Non Hazardous		48
17	TP14	0.50	Non Hazardous		51
18	TP06	0.50	Non Hazardous		54
19	TP07	0.50	Non Hazardous		57
20	TP08	0.50	Non Hazardous		60
21	TP09	0.50	Non Hazardous		63
22	TP10	0.70	Non Hazardous		66
23	TP10[2]	1.60	Non Hazardous		69
24	TP11	0.50	Non Hazardous		72
25	TP11[2]	1.50	Non Hazardous		75
26	TP12	0.50	Non Hazardous		78
27	TP13	0.50	Non Hazardous		81
28	TP15	0.80	Non Hazardous		84

Related documents

#	Name	Description
1	O'Callaghan Moran Waste Stream	waste stream template used to create this Job

Report

Created by: Austin Hynes

Created date: 11 Nov 2021 17:20 GMT

Classification of sample: BH01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	**BH01**	LoW Code:	
Sample Depth:	**1.00 m**	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	**9.9%** (no correction)	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9.9% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2.1	mg/kg	1.197	2.514	mg/kg	0.000251 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		19	mg/kg	1.32	25.086	mg/kg	0.00251 %		
3	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.6	mg/kg	1.142	2.97	mg/kg	0.000297 %		
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
6	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		40	mg/kg	1.126	45.036	mg/kg	0.0045 %		
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	23	mg/kg	1.56	35.876	mg/kg	0.0023 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		4.3	mg/kg	1.5	6.451	mg/kg	0.000645 %		
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		54	mg/kg	2.976	160.718	mg/kg	0.0161 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.56	mg/kg	1.405	0.787	mg/kg	0.0000787 %		
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		92	mg/kg	2.774	255.221	mg/kg	0.0255 %		
14	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				1.3	mg/kg	1.884	2.449	mg/kg	0.000245 %		
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
28	●	pyrene		204-927-3	129-00-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
											Total:	0.0562 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:		
BH02	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)	
Sample Depth:			
1.00 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)	
Moisture content:			
9% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 9% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2.4	mg/kg	1.197	2.873	mg/kg	0.000287 %		
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		33	mg/kg	1.32	43.571	mg/kg	0.00436 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.6	mg/kg	1.142	2.97	mg/kg	0.000297 %		
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15	mg/kg	1.462	21.923	mg/kg	0.00219 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		45	mg/kg	1.126	50.665	mg/kg	0.00507 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	25	mg/kg	1.56	38.995	mg/kg	0.0025 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		4.6	mg/kg	1.5	6.901	mg/kg	0.00069 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		46	mg/kg	2.976	136.908	mg/kg	0.0137 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		<LOD
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		79	mg/kg	2.774	219.158	mg/kg	0.0219 %		
14		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				1.5	mg/kg	1.884	2.826	mg/kg	0.000283 %		
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
28	●	pyrene		204-927-3	129-00-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
											Total:	0.0526 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚗	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
BH03		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
11% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				21	mg/kg	1.32	27.727	mg/kg	0.00277 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				1.5	mg/kg	1.142	1.713	mg/kg	0.000171 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				10	mg/kg	1.462	14.616	mg/kg	0.00146 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				27	mg/kg	1.126	30.399	mg/kg	0.00304 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	17	mg/kg	1.56	26.517	mg/kg	0.0017 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				3.7	mg/kg	1.5	5.551	mg/kg	0.000555 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				29	mg/kg	2.976	86.312	mg/kg	0.00863 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.47	mg/kg	1.405	0.66	mg/kg	0.000066 %		
		034-002-00-8											
13		zinc { zinc chromate }				45	mg/kg	2.774	124.837	mg/kg	0.0125 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				2 mg/kg	1.884	3.768 mg/kg	0.000377 %		
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
28	●	pyrene		204-927-3	129-00-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
									Total:	0.0328 %		

Key

🟨	User supplied data
▒	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH04

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
BH04		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
8.9% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 8.9% No Moisture Correction applied (MC)

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2	mg/kg	1.197	2.394	mg/kg	0.000239 %		
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		28	mg/kg	1.32	36.969	mg/kg	0.0037 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.8	mg/kg	1.142	3.199	mg/kg	0.00032 %		
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		13	mg/kg	1.462	19	mg/kg	0.0019 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		59	mg/kg	1.126	66.427	mg/kg	0.00664 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	25	mg/kg	1.56	38.995	mg/kg	0.0025 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		5.5	mg/kg	1.5	8.251	mg/kg	0.000825 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		53	mg/kg	2.976	157.742	mg/kg	0.0158 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.26	mg/kg	1.405	0.365	mg/kg	0.0000365 %		
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		77	mg/kg	2.774	213.609	mg/kg	0.0214 %		
14	●	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		benzene 601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
17		toluene 601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene 601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
19		xylene 601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex } 006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
21		naphthalene 601-052-00-2	202-049-5	91-20-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene	205-917-1	208-96-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
23	●	acenaphthene	201-469-6	83-32-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
24	●	fluorene	201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
25	●	phenanthrene	201-581-5	85-01-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
26	●	anthracene	204-371-1	120-12-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
27	●	fluoranthene	205-912-4	206-44-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
28	●	pyrene	204-927-3	129-00-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
29		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
30		chrysene 601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene	205-883-8	191-24-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
37		phenol 604-001-00-2	203-632-7	108-95-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB 602-039-00-4	215-648-1	1336-36-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
										Total:	0.0547 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH05

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH05
Sample Depth:
1.00 m
Moisture content:
12%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number								
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		15	mg/kg	1.32	19.805	mg/kg	0.00198 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.79	mg/kg	1.142	0.902	mg/kg	0.0000902 %		
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		6.7	mg/kg	1.462	9.792	mg/kg	0.000979 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		17	mg/kg	1.126	19.14	mg/kg	0.00191 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	8.9	mg/kg	1.56	13.882	mg/kg	0.00089 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.1	mg/kg	1.5	4.651	mg/kg	0.000465 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		27	mg/kg	2.976	80.359	mg/kg	0.00804 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		<LOD
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		23	mg/kg	2.774	63.805	mg/kg	0.00638 %		
14		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
28	●	pyrene		204-927-3	129-00-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
									Total:	0.0224 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH06

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
BH06		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
11% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	antimony { antimony trioxide }				2	mg/kg	1.197	2.394	mg/kg	0.000239 %		
	051-005-00-X	215-175-0	1309-64-4									
2	arsenic { arsenic trioxide }				24	mg/kg	1.32	31.688	mg/kg	0.00317 %		
	033-003-00-0	215-481-4	1327-53-3									
3	boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
	005-008-00-8	215-125-8	1303-86-2									
4	cadmium { cadmium oxide }				2.4	mg/kg	1.142	2.742	mg/kg	0.000274 %		
	048-002-00-0	215-146-2	1306-19-0									
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				26	mg/kg	1.462	38	mg/kg	0.0038 %		
		215-160-9	1308-38-9									
6	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
7	copper { dicopper oxide; copper (I) oxide }				46	mg/kg	1.126	51.791	mg/kg	0.00518 %		
	029-002-00-X	215-270-7	1317-39-1									
8	lead { lead chromate }			1	37	mg/kg	1.56	57.713	mg/kg	0.0037 %		
	082-004-00-2	231-846-0	7758-97-6									
9	mercury { mercury dichloride }				0.11	mg/kg	1.353	0.149	mg/kg	0.0000149 %		
	080-010-00-X	231-299-8	7487-94-7									
10	molybdenum { molybdenum(VI) oxide }				4	mg/kg	1.5	6.001	mg/kg	0.0006 %		
	042-001-00-9	215-204-7	1313-27-5									
11	nickel { nickel chromate }				51	mg/kg	2.976	151.79	mg/kg	0.0152 %		
	028-035-00-7	238-766-5	14721-18-7									
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.32	mg/kg	1.405	0.45	mg/kg	0.000045 %		
	034-002-00-8											
13	zinc { zinc chromate }				92	mg/kg	2.774	255.221	mg/kg	0.0255 %		
	024-007-00-3	236-878-9	13530-65-9									
14	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
			TPH									
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				1.7 mg/kg	1.884	3.203 mg/kg	0.00032 %		
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		0.04 mg/kg		0.04 mg/kg	0.000004 %		
28	●	pyrene		204-927-3	129-00-0		0.04 mg/kg		0.04 mg/kg	0.000004 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
									Total:	0.0593 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH07

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
BH07		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
8.1% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 8.1% No Moisture Correction applied (MC)

#	Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
	051-005-00-X	215-175-0	1309-64-4									
2	arsenic { arsenic trioxide }				30	mg/kg	1.32	39.61	mg/kg	0.00396 %		
	033-003-00-0	215-481-4	1327-53-3									
3	boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
	005-008-00-8	215-125-8	1303-86-2									
4	cadmium { cadmium oxide }				2.6	mg/kg	1.142	2.97	mg/kg	0.000297 %		
	048-002-00-0	215-146-2	1306-19-0									
5	chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
		215-160-9	1308-38-9									
6	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
7	copper { dicopper oxide; copper (I) oxide }				36	mg/kg	1.126	40.532	mg/kg	0.00405 %		
	029-002-00-X	215-270-7	1317-39-1									
8	lead { lead chromate }			1	23	mg/kg	1.56	35.876	mg/kg	0.0023 %		
	082-004-00-2	231-846-0	7758-97-6									
9	mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
10	molybdenum { molybdenum(VI) oxide }				4.6	mg/kg	1.5	6.901	mg/kg	0.00069 %		
	042-001-00-9	215-204-7	1313-27-5									
11	nickel { nickel chromate }				47	mg/kg	2.976	139.884	mg/kg	0.014 %		
	028-035-00-7	238-766-5	14721-18-7									
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		<LOD
	034-002-00-8											
13	zinc { zinc chromate }				110	mg/kg	2.774	305.156	mg/kg	0.0305 %		
	024-007-00-3	236-878-9	13530-65-9									
14	● TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
			TPH									
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
28	●	pyrene		204-927-3	129-00-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
									Total:	0.0598 %		

Key

🟨	User supplied data
▒	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH08

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
BH08		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
16% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 16% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		**<LOD**
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				13	mg/kg	1.32	17.164	mg/kg	0.00172 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		**<LOD**
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				1.2	mg/kg	1.142	1.371	mg/kg	0.000137 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				19	mg/kg	1.462	27.77	mg/kg	0.00278 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				32	mg/kg	1.126	36.028	mg/kg	0.0036 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	31	mg/kg	1.56	48.354	mg/kg	0.0031 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				0.13	mg/kg	1.353	0.176	mg/kg	0.0000176 %		
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				2.3	mg/kg	1.5	3.45	mg/kg	0.000345 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				35	mg/kg	2.976	104.169	mg/kg	0.0104 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		**<LOD**
		034-002-00-8											
13		zinc { zinc chromate }				220	mg/kg	2.774	610.312	mg/kg	0.061 %		
		024-007-00-3	236-878-9	13530-65-9									
14		TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		**<LOD**
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
18	●	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
21		naphthalene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
22	●	acenaphthylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8									
23	●	acenaphthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-469-6	83-32-9									
24	●	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
25	●	phenanthrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-581-5	85-01-8									
26	●	anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-371-1	120-12-7									
27	●	fluoranthene				0.062	mg/kg		0.062	mg/kg	0.0000062 %		
			205-912-4	206-44-0									
28	●	pyrene				0.045	mg/kg		0.045	mg/kg	0.0000045 %		
			204-927-3	129-00-0									
29		benzo[a]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
34	●	indeno[123-cd]pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
36	●	benzo[ghi]perylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-883-8	191-24-2									
37		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38	●	polychlorobiphenyls; PCB				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0848 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH09B

✓ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
BH09B		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
17% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 17% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		3.8	mg/kg	1.197	4.549	mg/kg	0.000455 %		
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		14	mg/kg	1.32	18.485	mg/kg	0.00185 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.5	mg/kg	1.142	2.856	mg/kg	0.000286 %		
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		64	mg/kg	1.126	72.057	mg/kg	0.00721 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	35	mg/kg	1.56	54.594	mg/kg	0.0035 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.15	mg/kg	1.353	0.203	mg/kg	0.0000203 %		
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		4	mg/kg	1.5	6.001	mg/kg	0.0006 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		50	mg/kg	2.976	148.813	mg/kg	0.0149 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.63	mg/kg	1.405	0.885	mg/kg	0.0000885 %		
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		96	mg/kg	2.774	266.318	mg/kg	0.0266 %		
14	●	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand				CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number							
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				1.7 mg/kg	1.884	3.203 mg/kg	0.00032 %		
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		0.15 mg/kg		0.15 mg/kg	0.000015 %		
26	●	anthracene		204-371-1	120-12-7		0.039 mg/kg		0.039 mg/kg	0.0000039 %		
27	●	fluoranthene		205-912-4	206-44-0		0.23 mg/kg		0.23 mg/kg	0.000023 %		
28	●	pyrene		204-927-3	129-00-0		0.22 mg/kg		0.22 mg/kg	0.000022 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.12 mg/kg		0.12 mg/kg	0.000012 %		
30		chrysene	601-048-00-0	205-923-4	218-01-9		0.13 mg/kg		0.13 mg/kg	0.000013 %		
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
									Total:	0.0598 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH10

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
BH10		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
12% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		17	mg/kg	1.32	22.446	mg/kg	0.00224 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.96	mg/kg	1.142	1.097	mg/kg	0.00011 %		
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		34	mg/kg	1.126	38.28	mg/kg	0.00383 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	29	mg/kg	1.56	45.235	mg/kg	0.0029 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		<2	mg/kg	1.5	<3	mg/kg	<0.0003 %		<LOD
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		25	mg/kg	2.976	74.407	mg/kg	0.00744 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.29	mg/kg	1.405	0.407	mg/kg	0.0000407 %		
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		64	mg/kg	2.774	177.545	mg/kg	0.0178 %		
14		TPH (C6 to C40) petroleum group			TPH		260	mg/kg		260	mg/kg	0.026 %		
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				1.7	mg/kg	1.884	3.203	mg/kg	0.00032 %		
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		0.16	mg/kg		0.16	mg/kg	0.000016 %		
26	●	anthracene		204-371-1	120-12-7		0.026	mg/kg		0.026	mg/kg	0.0000026 %		
27	●	fluoranthene		205-912-4	206-44-0		0.16	mg/kg		0.16	mg/kg	0.000016 %		
28	●	pyrene		204-927-3	129-00-0		0.18	mg/kg		0.18	mg/kg	0.000018 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.11	mg/kg		0.11	mg/kg	0.000011 %		
30		chrysene	601-048-00-0	205-923-4	218-01-9		0.16	mg/kg		0.16	mg/kg	0.000016 %		
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.15	mg/kg		0.15	mg/kg	0.000015 %		
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.061	mg/kg		0.061	mg/kg	0.0000061 %		
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.15	mg/kg		0.15	mg/kg	0.000015 %		
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
											Total:	0.0639 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚗	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"
Force this Hazardous property to non hazardous because Can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.026%)

Classification of sample: BH10[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
BH10[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
2.00 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
11% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2.6	mg/kg	1.197	3.112	mg/kg	0.000311 %		
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		24	mg/kg	1.32	31.688	mg/kg	0.00317 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.5	mg/kg	1.142	2.856	mg/kg	0.000286 %		
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		50	mg/kg	1.126	56.294	mg/kg	0.00563 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	27	mg/kg	1.56	42.115	mg/kg	0.0027 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		4.2	mg/kg	1.5	6.301	mg/kg	0.00063 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		46	mg/kg	2.976	136.908	mg/kg	0.0137 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.22	mg/kg	1.405	0.309	mg/kg	0.0000309 %		
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		78	mg/kg	2.774	216.383	mg/kg	0.0216 %		
14	●	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				1.5 mg/kg	1.884	2.826 mg/kg	0.000283 %		
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
28	●	pyrene		204-927-3	129-00-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
									Total:	0.052 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP01		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
6.5% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 6.5% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		4.3	mg/kg	1.32	5.677	mg/kg	0.000568 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.1	mg/kg	1.142	<0.114	mg/kg	<0.0000114 %		<LOD
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15	mg/kg	1.462	21.923	mg/kg	0.00219 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		11	mg/kg	1.126	12.385	mg/kg	0.00124 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	5.9	mg/kg	1.56	9.203	mg/kg	0.00059 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		<2	mg/kg	1.5	<3	mg/kg	<0.0003 %		<LOD
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		7.8	mg/kg	2.976	23.215	mg/kg	0.00232 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		<LOD
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		18	mg/kg	2.774	49.935	mg/kg	0.00499 %		
14		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
16		benzene									
		601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene									
		601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene									
		601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene									
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }									
		006-007-00-5				0.5 mg/kg	1.884	0.942 mg/kg	0.0000942 %		
21		naphthalene									
		601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene									
			205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene									
			201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene									
			201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene									
			201-581-5	85-01-8		0.065 mg/kg		0.065 mg/kg	0.0000065 %		
26	●	anthracene									
			204-371-1	120-12-7		0.049 mg/kg		0.049 mg/kg	0.0000049 %		
27	●	fluoranthene									
			205-912-4	206-44-0		0.058 mg/kg		0.058 mg/kg	0.0000058 %		
28	●	pyrene									
			204-927-3	129-00-0		0.049 mg/kg		0.049 mg/kg	0.0000049 %		
29		benzo[a]anthracene									
		601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
30		chrysene									
		601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene									
		601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene									
		601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene									
		601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene									
			205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene									
		601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene									
			205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol									
		604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB									
		602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
								Total:	0.0139 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚗	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP02		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
7.7% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 7.7% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<**LOD**
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				2.7	mg/kg	1.32	3.565	mg/kg	0.000356 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<**LOD**
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				<0.1	mg/kg	1.142	<0.114	mg/kg	<0.0000114 %		<**LOD**
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				31	mg/kg	1.462	45.308	mg/kg	0.00453 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<**LOD**
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				12	mg/kg	1.126	13.511	mg/kg	0.00135 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	8.9	mg/kg	1.56	13.882	mg/kg	0.00089 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<**LOD**
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				<2	mg/kg	1.5	<3	mg/kg	<0.0003 %		<**LOD**
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				21	mg/kg	2.976	62.502	mg/kg	0.00625 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		<**LOD**
		034-002-00-8											
13		zinc { zinc chromate }				38	mg/kg	2.774	105.418	mg/kg	0.0105 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<**LOD**
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		0.079 mg/kg		0.079 mg/kg	0.0000079 %		
28	●	pyrene		204-927-3	129-00-0		0.089 mg/kg		0.089 mg/kg	0.0000089 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
									Total:	0.0259 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP03		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.70 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
10% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 10% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				24	mg/kg	1.32	31.688	mg/kg	0.00317 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				2.9	mg/kg	1.142	3.313	mg/kg	0.000331 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				43	mg/kg	1.126	48.413	mg/kg	0.00484 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	22	mg/kg	1.56	34.316	mg/kg	0.0022 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				4.3	mg/kg	1.5	6.451	mg/kg	0.000645 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				49	mg/kg	2.976	145.837	mg/kg	0.0146 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.43	mg/kg	1.405	0.604	mg/kg	0.0000604 %		
		034-002-00-8											
13		zinc { zinc chromate }				87	mg/kg	2.774	241.351	mg/kg	0.0241 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
16		benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2							
17		toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3							
18	●	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4							
19		xylene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
		006-007-00-5									
21		naphthalene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-052-00-2	202-049-5	91-20-3							
22	●	acenaphthylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8							
23	●	acenaphthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			201-469-6	83-32-9							
24	●	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7							
25	●	phenanthrene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			201-581-5	85-01-8							
26	●	anthracene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			204-371-1	120-12-7							
27	●	fluoranthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			205-912-4	206-44-0							
28	●	pyrene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			204-927-3	129-00-0							
29		benzo[a]anthracene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-033-00-9	200-280-6	56-55-3							
30		chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9							
31		benzo[b]fluoranthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-034-00-4	205-911-9	205-99-2							
32		benzo[k]fluoranthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-036-00-5	205-916-6	207-08-9							
33		benzo[a]pyrene; benzo[def]chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-032-00-3	200-028-5	50-32-8							
34	●	indeno[123-cd]pyrene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			205-893-2	193-39-5							
35		dibenz[a,h]anthracene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-041-00-2	200-181-8	53-70-3							
36	●	benzo[ghi]perylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			205-883-8	191-24-2							
37		phenol				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2							
38	●	polychlorobiphenyls; PCB				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3							
								Total:	0.054 %		

Key

🟨	User supplied data
▒	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP04

✓ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP04		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.60 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
14% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 14% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		40	mg/kg	1.32	52.813	mg/kg	0.00528 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		0.53	mg/kg	3.22	1.707	mg/kg	0.000171 %		
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.2	mg/kg	1.142	1.371	mg/kg	0.000137 %		
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		80	mg/kg	1.462	116.924	mg/kg	0.0117 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		66	mg/kg	1.126	74.309	mg/kg	0.00743 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	36	mg/kg	1.56	56.153	mg/kg	0.0036 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.1	mg/kg	1.5	3.15	mg/kg	0.000315 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		56	mg/kg	2.976	166.671	mg/kg	0.0167 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.31	mg/kg	1.405	0.436	mg/kg	0.0000436 %		
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		100	mg/kg	2.774	277.415	mg/kg	0.0277 %		
14	●	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
16		benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2							
17		toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3							
18	●	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4							
19		xylene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
		006-007-00-5									
21		naphthalene				0.066 mg/kg		0.066 mg/kg	0.0000066 %		
		601-052-00-2	202-049-5	91-20-3							
22	●	acenaphthylene				0.017 mg/kg		0.017 mg/kg	0.0000017 %		
			205-917-1	208-96-8							
23	●	acenaphthene				0.044 mg/kg		0.044 mg/kg	0.0000044 %		
			201-469-6	83-32-9							
24	●	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7							
25	●	phenanthrene				0.08 mg/kg		0.08 mg/kg	0.000008 %		
			201-581-5	85-01-8							
26	●	anthracene				0.038 mg/kg		0.038 mg/kg	0.0000038 %		
			204-371-1	120-12-7							
27	●	fluoranthene				0.13 mg/kg		0.13 mg/kg	0.000013 %		
			205-912-4	206-44-0							
28	●	pyrene				0.16 mg/kg		0.16 mg/kg	0.000016 %		
			204-927-3	129-00-0							
29		benzo[a]anthracene				0.086 mg/kg		0.086 mg/kg	0.0000086 %		
		601-033-00-9	200-280-6	56-55-3							
30		chrysene				0.11 mg/kg		0.11 mg/kg	0.000011 %		
		601-048-00-0	205-923-4	218-01-9							
31		benzo[b]fluoranthene				0.1 mg/kg		0.1 mg/kg	0.00001 %		
		601-034-00-4	205-911-9	205-99-2							
32		benzo[k]fluoranthene				0.062 mg/kg		0.062 mg/kg	0.0000062 %		
		601-036-00-5	205-916-6	207-08-9							
33		benzo[a]pyrene; benzo[def]chrysene				0.09 mg/kg		0.09 mg/kg	0.000009 %		
		601-032-00-3	200-028-5	50-32-8							
34	●	indeno[123-cd]pyrene				0.049 mg/kg		0.049 mg/kg	0.0000049 %		
			205-893-2	193-39-5							
35		dibenz[a,h]anthracene				0.037 mg/kg		0.037 mg/kg	0.0000037 %		
		601-041-00-2	200-181-8	53-70-3							
36	●	benzo[ghi]perylene				0.073 mg/kg		0.073 mg/kg	0.0000073 %		
			205-883-8	191-24-2							
37		phenol				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2							
38	●	polychlorobiphenyls; PCB				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3							
								Total:	0.0746 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP05

✓ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP05		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.80 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
8% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 8% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				22	mg/kg	1.32	29.047	mg/kg	0.0029 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				2.8	mg/kg	1.142	3.199	mg/kg	0.00032 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				14	mg/kg	1.462	20.462	mg/kg	0.00205 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				36	mg/kg	1.126	40.532	mg/kg	0.00405 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	21	mg/kg	1.56	32.756	mg/kg	0.0021 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				3.6	mg/kg	1.5	5.401	mg/kg	0.00054 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				43	mg/kg	2.976	127.979	mg/kg	0.0128 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.3	mg/kg	1.405	0.422	mg/kg	0.0000422 %		
		034-002-00-8											
13		zinc { zinc chromate }				77	mg/kg	2.774	213.609	mg/kg	0.0214 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
18	●	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
21		naphthalene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
22	●	acenaphthylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8									
23	●	acenaphthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-469-6	83-32-9									
24	●	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
25	●	phenanthrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-581-5	85-01-8									
26	●	anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-371-1	120-12-7									
27	●	fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-912-4	206-44-0									
28	●	pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-927-3	129-00-0									
29		benzo[a]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
34	●	indeno[123-cd]pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
36	●	benzo[ghi]perylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-883-8	191-24-2									
37		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38	●	polychlorobiphenyls; PCB				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0478 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP14

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP14		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
9.9% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 9.9% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<**LOD**
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				10	mg/kg	1.32	13.203	mg/kg	0.00132 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				1.1	mg/kg	3.22	3.542	mg/kg	0.000354 %		
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				2.5	mg/kg	1.142	2.856	mg/kg	0.000286 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<**LOD**
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				43	mg/kg	1.126	48.413	mg/kg	0.00484 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	23	mg/kg	1.56	35.876	mg/kg	0.0023 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<**LOD**
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				2.4	mg/kg	1.5	3.6	mg/kg	0.00036 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				43	mg/kg	2.976	127.979	mg/kg	0.0128 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.43	mg/kg	1.405	0.604	mg/kg	0.0000604 %		
		034-002-00-8											
13		zinc { zinc chromate }				210	mg/kg	2.774	582.571	mg/kg	0.0583 %		
		024-007-00-3	236-878-9	13530-65-9									
14		TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<**LOD**
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
28	●	pyrene		204-927-3	129-00-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
											Total:	0.0847 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP06

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP06		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
12% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		**<LOD**
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		10	mg/kg	1.32	13.203	mg/kg	0.00132 %		
3	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		0.57	mg/kg	3.22	1.835	mg/kg	0.000184 %		
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.8	mg/kg	1.142	2.056	mg/kg	0.000206 %		
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
6	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		**<LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		36	mg/kg	1.126	40.532	mg/kg	0.00405 %		
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	30	mg/kg	1.56	46.794	mg/kg	0.003 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		**<LOD**
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.3	mg/kg	1.5	3.45	mg/kg	0.000345 %		
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		31	mg/kg	2.976	92.264	mg/kg	0.00923 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.52	mg/kg	1.405	0.731	mg/kg	0.0000731 %		
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		88	mg/kg	2.774	244.125	mg/kg	0.0244 %		
14	TPH (C6 to C40) petroleum group			TPH		250	mg/kg		250	mg/kg	0.025 %		
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**

#		Determinand			CLP Note	**User entered data**	Conv. Factor	Compound conc.	**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
16		benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2							
17		toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3							
18	●	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4							
19		xylene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
		006-007-00-5									
21		naphthalene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-052-00-2	202-049-5	91-20-3							
22	●	acenaphthylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8							
23	●	acenaphthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			201-469-6	83-32-9							
24	●	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7							
25	●	phenanthrene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			201-581-5	85-01-8							
26	●	anthracene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			204-371-1	120-12-7							
27	●	fluoranthene				0.11 mg/kg		0.11 mg/kg	0.000011 %		
			205-912-4	206-44-0							
28	●	pyrene				0.12 mg/kg		0.12 mg/kg	0.000012 %		
			204-927-3	129-00-0							
29		benzo[a]anthracene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-033-00-9	200-280-6	56-55-3							
30		chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9							
31		benzo[b]fluoranthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-034-00-4	205-911-9	205-99-2							
32		benzo[k]fluoranthene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-036-00-5	205-916-6	207-08-9							
33		benzo[a]pyrene; benzo[def]chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-032-00-3	200-028-5	50-32-8							
34	●	indeno[123-cd]pyrene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			205-893-2	193-39-5							
35		dibenz[a,h]anthracene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		601-041-00-2	200-181-8	53-70-3							
36	●	benzo[ghi]perylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
			205-883-8	191-24-2							
37		phenol				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2							
38	●	polychlorobiphenyls; PCB				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3							
								Total:	0.0708 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚗	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.025%)

Classification of sample: TP07

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP07		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
10% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 10% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**	Conv. Factor	Compound conc.	**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
1		antimony { antimony trioxide }				<2 mg/kg	1.197	<2.394 mg/kg	<0.000239 %		<LOD
		051-005-00-X	215-175-0	1309-64-4							
2		arsenic { arsenic trioxide }				30 mg/kg	1.32	39.61 mg/kg	0.00396 %		
		033-003-00-0	215-481-4	1327-53-3							
3		boron { diboron trioxide; boric oxide }				<0.4 mg/kg	3.22	<1.288 mg/kg	<0.000129 %		<LOD
		005-008-00-8	215-125-8	1303-86-2							
4		cadmium { cadmium oxide }				1.4 mg/kg	1.142	1.599 mg/kg	0.00016 %		
		048-002-00-0	215-146-2	1306-19-0							
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				20 mg/kg	1.462	29.231 mg/kg	0.00292 %		
			215-160-9	1308-38-9							
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0							
7		copper { dicopper oxide; copper (I) oxide }				49 mg/kg	1.126	55.169 mg/kg	0.00552 %		
		029-002-00-X	215-270-7	1317-39-1							
8		lead { lead chromate }			1	49 mg/kg	1.56	76.431 mg/kg	0.0049 %		
		082-004-00-2	231-846-0	7758-97-6							
9		mercury { mercury dichloride }				0.12 mg/kg	1.353	0.162 mg/kg	0.0000162 %		
		080-010-00-X	231-299-8	7487-94-7							
10		molybdenum { molybdenum(VI) oxide }				2.7 mg/kg	1.5	4.051 mg/kg	0.000405 %		
		042-001-00-9	215-204-7	1313-27-5							
11		nickel { nickel chromate }				33 mg/kg	2.976	98.217 mg/kg	0.00982 %		
		028-035-00-7	238-766-5	14721-18-7							
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.5 mg/kg	1.405	0.703 mg/kg	0.0000703 %		
		034-002-00-8									
13		zinc { zinc chromate }				240 mg/kg	2.774	665.795 mg/kg	0.0666 %		
		024-007-00-3	236-878-9	13530-65-9							
14	●	TPH (C6 to C40) petroleum group				460 mg/kg		460 mg/kg	0.046 %		
				TPH							
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4							

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		0.14 mg/kg		0.14 mg/kg	0.000014 %		
28	●	pyrene		204-927-3	129-00-0		0.17 mg/kg		0.17 mg/kg	0.000017 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
									Total:	0.141 %		

Key

🟨	User supplied data
▒	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"
Force this Hazardous property to non hazardous because Can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.046%)

Classification of sample: TP08

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP08		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
11% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	antimony { antimony trioxide }				2	mg/kg	1.197	2.394	mg/kg	0.000239 %		
	051-005-00-X	215-175-0	1309-64-4									
2	arsenic { arsenic trioxide }				19	mg/kg	1.32	25.086	mg/kg	0.00251 %		
	033-003-00-0	215-481-4	1327-53-3									
3	boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
	005-008-00-8	215-125-8	1303-86-2									
4	cadmium { cadmium oxide }				2.7	mg/kg	1.142	3.084	mg/kg	0.000308 %		
	048-002-00-0	215-146-2	1306-19-0									
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				20	mg/kg	1.462	29.231	mg/kg	0.00292 %		
		215-160-9	1308-38-9									
6	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
7	copper { dicopper oxide; copper (I) oxide }				65	mg/kg	1.126	73.183	mg/kg	0.00732 %		
	029-002-00-X	215-270-7	1317-39-1									
8	lead { lead chromate }			1	28	mg/kg	1.56	43.675	mg/kg	0.0028 %		
	082-004-00-2	231-846-0	7758-97-6									
9	mercury { mercury dichloride }				0.1	mg/kg	1.353	0.135	mg/kg	0.0000135 %		
	080-010-00-X	231-299-8	7487-94-7									
10	molybdenum { molybdenum(VI) oxide }				3.7	mg/kg	1.5	5.551	mg/kg	0.000555 %		
	042-001-00-9	215-204-7	1313-27-5									
11	nickel { nickel chromate }				52	mg/kg	2.976	154.766	mg/kg	0.0155 %		
	028-035-00-7	238-766-5	14721-18-7									
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.45	mg/kg	1.405	0.632	mg/kg	0.0000632 %		
	034-002-00-8											
13	zinc { zinc chromate }				100	mg/kg	2.774	277.415	mg/kg	0.0277 %		
	024-007-00-3	236-878-9	13530-65-9									
14	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
			TPH									
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
28	●	pyrene		204-927-3	129-00-0		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
											Total:	0.0613 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP09

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP09		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
12% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number								
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2.3	mg/kg	1.197	2.753	mg/kg	0.000275 %		
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		16	mg/kg	1.32	21.125	mg/kg	0.00211 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.7	mg/kg	1.142	1.942	mg/kg	0.000194 %		
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		39	mg/kg	1.126	43.91	mg/kg	0.00439 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	55	mg/kg	1.56	85.79	mg/kg	0.0055 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.16	mg/kg	1.353	0.217	mg/kg	0.0000217 %		
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.7	mg/kg	1.5	5.551	mg/kg	0.000555 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		38	mg/kg	2.976	113.098	mg/kg	0.0113 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.76	mg/kg	1.405	1.068	mg/kg	0.000107 %		
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		87	mg/kg	2.774	241.351	mg/kg	0.0241 %		
14		TPH (C6 to C40) petroleum group			TPH		200	mg/kg		200	mg/kg	0.02 %		
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		0.083 mg/kg		0.083 mg/kg	0.0000083 %		
26	●	anthracene		204-371-1	120-12-7		0.031 mg/kg		0.031 mg/kg	0.0000031 %		
27	●	fluoranthene		205-912-4	206-44-0		0.14 mg/kg		0.14 mg/kg	0.000014 %		
28	●	pyrene		204-927-3	129-00-0		0.14 mg/kg		0.14 mg/kg	0.000014 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
									Total:	0.0716 %		

Key	
🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"
Force this Hazardous property to non hazardous because Can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.02%)

Classification of sample: TP10

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:	
TP10	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.70 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:		
8.4% (no correction)		

Hazard properties

None identified

Determinands

Moisture content: 8.4% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				2	mg/kg	1.197	2.394	mg/kg	0.000239 %		
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				20	mg/kg	1.32	26.407	mg/kg	0.00264 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		**<LOD**
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				2.1	mg/kg	1.142	2.399	mg/kg	0.00024 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				22	mg/kg	1.462	32.154	mg/kg	0.00322 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				60	mg/kg	1.126	67.553	mg/kg	0.00676 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	46	mg/kg	1.56	71.751	mg/kg	0.0046 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				0.13	mg/kg	1.353	0.176	mg/kg	0.0000176 %		
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				4.1	mg/kg	1.5	6.151	mg/kg	0.000615 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				55	mg/kg	2.976	163.695	mg/kg	0.0164 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.85	mg/kg	1.405	1.194	mg/kg	0.000119 %		
		034-002-00-8											
13		zinc { zinc chromate }				94	mg/kg	2.774	260.77	mg/kg	0.0261 %		
		024-007-00-3	236-878-9	13530-65-9									
14		TPH (C6 to C40) petroleum group				210	mg/kg		210	mg/kg	0.021 %		
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		0.061 mg/kg		0.061 mg/kg	0.0000061 %		
28	●	pyrene		204-927-3	129-00-0		0.07 mg/kg		0.07 mg/kg	0.000007 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
									Total:	0.0822 %		

Key

🟨	User supplied data
▒	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"
Force this Hazardous property to non hazardous because Can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.021%)

Classification of sample: TP10[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP10[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.60 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
11% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				2.6	mg/kg	1.197	3.112	mg/kg	0.000311 %		
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				28	mg/kg	1.32	36.969	mg/kg	0.0037 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				3.3	mg/kg	1.142	3.77	mg/kg	0.000377 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				25	mg/kg	1.462	36.539	mg/kg	0.00365 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				52	mg/kg	1.126	58.546	mg/kg	0.00585 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	41	mg/kg	1.56	63.952	mg/kg	0.0041 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				0.15	mg/kg	1.353	0.203	mg/kg	0.0000203 %		
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				4.5	mg/kg	1.5	6.751	mg/kg	0.000675 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				59	mg/kg	2.976	175.6	mg/kg	0.0176 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.5	mg/kg	1.405	0.703	mg/kg	0.0000703 %		
		034-002-00-8											
13		zinc { zinc chromate }				130	mg/kg	2.774	360.639	mg/kg	0.0361 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		0.1 mg/kg		0.1 mg/kg	0.00001 %		
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		0.041 mg/kg		0.041 mg/kg	0.0000041 %		
24	●	fluorene		201-695-5	86-73-7		0.042 mg/kg		0.042 mg/kg	0.0000042 %		
25	●	phenanthrene		201-581-5	85-01-8		0.13 mg/kg		0.13 mg/kg	0.000013 %		
26	●	anthracene		204-371-1	120-12-7		0.032 mg/kg		0.032 mg/kg	0.0000032 %		
27	●	fluoranthene		205-912-4	206-44-0		0.1 mg/kg		0.1 mg/kg	0.00001 %		
28	●	pyrene		204-927-3	129-00-0		0.1 mg/kg		0.1 mg/kg	0.00001 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.063 mg/kg		0.063 mg/kg	0.0000063 %		
30		chrysene	601-048-00-0	205-923-4	218-01-9		0.057 mg/kg		0.057 mg/kg	0.0000057 %		
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.054 mg/kg		0.054 mg/kg	0.0000054 %		
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.038 mg/kg		0.038 mg/kg	0.0000038 %		
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.04 mg/kg		0.04 mg/kg	0.000004 %		
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
									Total:	0.0738 %		

Key

🟨	User supplied data
▒	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP11

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP11
Sample Depth:
0.50 m
Moisture content:
13%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2.9	mg/kg	1.197	3.472	mg/kg	0.000347 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		38	mg/kg	1.32	50.172	mg/kg	0.00502 %		
3	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		0.76	mg/kg	3.22	2.447	mg/kg	0.000245 %		
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.3	mg/kg	1.142	2.627	mg/kg	0.000263 %		
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		31	mg/kg	1.462	45.308	mg/kg	0.00453 %		
6	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		66	mg/kg	1.126	74.309	mg/kg	0.00743 %		
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	110	mg/kg	1.56	171.58	mg/kg	0.011 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.32	mg/kg	1.353	0.433	mg/kg	0.0000433 %		
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.9	mg/kg	1.5	5.851	mg/kg	0.000585 %		
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		54	mg/kg	2.976	160.718	mg/kg	0.0161 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.82	mg/kg	1.405	1.152	mg/kg	0.000115 %		
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		180	mg/kg	2.774	499.346	mg/kg	0.0499 %		
14	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
18	●	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
21		naphthalene				0.095	mg/kg		0.095	mg/kg	0.0000095 %		
		601-052-00-2	202-049-5	91-20-3									
22	●	acenaphthylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8									
23	●	acenaphthene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			201-469-6	83-32-9									
24	●	fluorene				0.045	mg/kg		0.045	mg/kg	0.0000045 %		
			201-695-5	86-73-7									
25	●	phenanthrene				0.31	mg/kg		0.31	mg/kg	0.000031 %		
			201-581-5	85-01-8									
26	●	anthracene				0.048	mg/kg		0.048	mg/kg	0.0000048 %		
			204-371-1	120-12-7									
27	●	fluoranthene				0.37	mg/kg		0.37	mg/kg	0.000037 %		
			205-912-4	206-44-0									
28	●	pyrene				0.34	mg/kg		0.34	mg/kg	0.000034 %		
			204-927-3	129-00-0									
29		benzo[a]anthracene				0.19	mg/kg		0.19	mg/kg	0.000019 %		
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				0.2	mg/kg		0.2	mg/kg	0.00002 %		
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				0.25	mg/kg		0.25	mg/kg	0.000025 %		
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				0.075	mg/kg		0.075	mg/kg	0.0000075 %		
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				0.18	mg/kg		0.18	mg/kg	0.000018 %		
		601-032-00-3	200-028-5	50-32-8									
34	●	indeno[123-cd]pyrene				0.12	mg/kg		0.12	mg/kg	0.000012 %		
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				0.069	mg/kg		0.069	mg/kg	0.0000069 %		
		601-041-00-2	200-181-8	53-70-3									
36	●	benzo[ghi]perylene				0.15	mg/kg		0.15	mg/kg	0.000015 %		
			205-883-8	191-24-2									
37		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38	●	polychlorobiphenyls; PCB				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.097 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
🟢	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP11[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	**TP11[2]**	LoW Code:	
Sample Depth:	**1.50 m**	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	**15%** (no correction)	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide } 051-005-00-X	215-175-0	1309-64-4		2.3	mg/kg	1.197	2.753	mg/kg	0.000275 %		
2		arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		20	mg/kg	1.32	26.407	mg/kg	0.00264 %		
3		boron { diboron trioxide; boric oxide } 005-008-00-8	215-125-8	1303-86-2		0.61	mg/kg	3.22	1.964	mg/kg	0.000196 %		
4		cadmium { cadmium oxide } 048-002-00-0	215-146-2	1306-19-0		1.4	mg/kg	1.142	1.599	mg/kg	0.00016 %		
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }	215-160-9	1308-38-9		18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		**<LOD**
7		copper { dicopper oxide; copper (I) oxide } 029-002-00-X	215-270-7	1317-39-1		49	mg/kg	1.126	55.169	mg/kg	0.00552 %		
8		lead { lead chromate } 082-004-00-2	231-846-0	7758-97-6	1	130	mg/kg	1.56	202.776	mg/kg	0.013 %		
9		mercury { mercury dichloride } 080-010-00-X	231-299-8	7487-94-7		0.39	mg/kg	1.353	0.528	mg/kg	0.0000528 %		
10		molybdenum { molybdenum(VI) oxide } 042-001-00-9	215-204-7	1313-27-5		2.9	mg/kg	1.5	4.351	mg/kg	0.000435 %		
11		nickel { nickel chromate } 028-035-00-7	238-766-5	14721-18-7		37	mg/kg	2.976	110.122	mg/kg	0.011 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8				0.6	mg/kg	1.405	0.843	mg/kg	0.0000843 %		
13		zinc { zinc chromate } 024-007-00-3	236-878-9	13530-65-9		140	mg/kg	2.774	388.381	mg/kg	0.0388 %		
14	●	TPH (C6 to C40) petroleum group		TPH		<10	mg/kg		<10	mg/kg	<0.001 %		**<LOD**
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane 603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
16		benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2							
17		toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3							
18	●	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4							
19		xylene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
		006-007-00-5									
21		naphthalene				0.14 mg/kg		0.14 mg/kg	0.000014 %		
		601-052-00-2	202-049-5	91-20-3							
22	●	acenaphthylene				0.038 mg/kg		0.038 mg/kg	0.0000038 %		
			205-917-1	208-96-8							
23	●	acenaphthene				0.062 mg/kg		0.062 mg/kg	0.0000062 %		
			201-469-6	83-32-9							
24	●	fluorene				0.048 mg/kg		0.048 mg/kg	0.0000048 %		
			201-695-5	86-73-7							
25	●	phenanthrene				0.39 mg/kg		0.39 mg/kg	0.000039 %		
			201-581-5	85-01-8							
26	●	anthracene				0.087 mg/kg		0.087 mg/kg	0.0000087 %		
			204-371-1	120-12-7							
27	●	fluoranthene				0.67 mg/kg		0.67 mg/kg	0.000067 %		
			205-912-4	206-44-0							
28	●	pyrene				0.62 mg/kg		0.62 mg/kg	0.000062 %		
			204-927-3	129-00-0							
29		benzo[a]anthracene				0.32 mg/kg		0.32 mg/kg	0.000032 %		
		601-033-00-9	200-280-6	56-55-3							
30		chrysene				0.4 mg/kg		0.4 mg/kg	0.00004 %		
		601-048-00-0	205-923-4	218-01-9							
31		benzo[b]fluoranthene				0.5 mg/kg		0.5 mg/kg	0.00005 %		
		601-034-00-4	205-911-9	205-99-2							
32		benzo[k]fluoranthene				0.19 mg/kg		0.19 mg/kg	0.000019 %		
		601-036-00-5	205-916-6	207-08-9							
33		benzo[a]pyrene; benzo[def]chrysene				0.36 mg/kg		0.36 mg/kg	0.000036 %		
		601-032-00-3	200-028-5	50-32-8							
34	●	indeno[123-cd]pyrene				0.24 mg/kg		0.24 mg/kg	0.000024 %		
			205-893-2	193-39-5							
35		dibenz[a,h]anthracene				0.081 mg/kg		0.081 mg/kg	0.0000081 %		
		601-041-00-2	200-181-8	53-70-3							
36	●	benzo[ghi]perylene				0.28 mg/kg		0.28 mg/kg	0.000028 %		
			205-883-8	191-24-2							
37		phenol				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2							
38	●	polychlorobiphenyls; PCB				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3							
								Total:	0.0765 %		

Key

🟨	User supplied data
▒	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP12

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP12		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
12% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**	Conv. Factor	Compound conc.	**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
1		antimony { antimony trioxide }				<2 mg/kg	1.197	<2.394 mg/kg	<0.000239 %		**<LOD**
		051-005-00-X	215-175-0	1309-64-4							
2		arsenic { arsenic trioxide }				11 mg/kg	1.32	14.524 mg/kg	0.00145 %		
		033-003-00-0	215-481-4	1327-53-3							
3		boron { diboron trioxide; boric oxide }				<0.4 mg/kg	3.22	<1.288 mg/kg	<0.000129 %		**<LOD**
		005-008-00-8	215-125-8	1303-86-2							
4		cadmium { cadmium oxide }				1.4 mg/kg	1.142	1.599 mg/kg	0.00016 %		
		048-002-00-0	215-146-2	1306-19-0							
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				14 mg/kg	1.462	20.462 mg/kg	0.00205 %		
			215-160-9	1308-38-9							
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0							
7		copper { dicopper oxide; copper (I) oxide }				69 mg/kg	1.126	77.686 mg/kg	0.00777 %		
		029-002-00-X	215-270-7	1317-39-1							
8		lead { lead chromate }			1	49 mg/kg	1.56	76.431 mg/kg	0.0049 %		
		082-004-00-2	231-846-0	7758-97-6							
9		mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		**<LOD**
		080-010-00-X	231-299-8	7487-94-7							
10		molybdenum { molybdenum(VI) oxide }				<2 mg/kg	1.5	<3 mg/kg	<0.0003 %		**<LOD**
		042-001-00-9	215-204-7	1313-27-5							
11		nickel { nickel chromate }				29 mg/kg	2.976	86.312 mg/kg	0.00863 %		
		028-035-00-7	238-766-5	14721-18-7							
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.36 mg/kg	1.405	0.506 mg/kg	0.0000506 %		
		034-002-00-8									
13		zinc { zinc chromate }				84 mg/kg	2.774	233.028 mg/kg	0.0233 %		
		024-007-00-3	236-878-9	13530-65-9							
14	●	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		**<LOD**
				TPH							
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		603-181-00-X	216-653-1	1634-04-4							

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		0.11 mg/kg		0.11 mg/kg	0.000011 %		
28	●	pyrene		204-927-3	129-00-0		0.1 mg/kg		0.1 mg/kg	0.00001 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.06 mg/kg		0.06 mg/kg	0.000006 %		
30		chrysene	601-048-00-0	205-923-4	218-01-9		0.08 mg/kg		0.08 mg/kg	0.000008 %		
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
									Total:	0.0502 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP13

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP13		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
8.3% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 8.3% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2.2 mg/kg	1.197	2.634 mg/kg	0.000263 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		33 mg/kg	1.32	43.571 mg/kg	0.00436 %		
3	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		0.72 mg/kg	3.22	2.318 mg/kg	0.000232 %		
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		3.2 mg/kg	1.142	3.655 mg/kg	0.000366 %		
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		20 mg/kg	1.462	29.231 mg/kg	0.00292 %		
6	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5 mg/kg	1.923	<0.962 mg/kg	<0.0000962 %		<LOD
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		45 mg/kg	1.126	50.665 mg/kg	0.00507 %		
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	34 mg/kg	1.56	53.034 mg/kg	0.0034 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		5.3 mg/kg	1.5	7.951 mg/kg	0.000795 %		
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		57 mg/kg	2.976	169.647 mg/kg	0.017 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.97 mg/kg	1.405	1.363 mg/kg	0.000136 %		
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		120 mg/kg	2.774	332.898 mg/kg	0.0333 %		
14	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		0.045 mg/kg		0.045 mg/kg	0.0000045 %		
28	●	pyrene		204-927-3	129-00-0		0.037 mg/kg		0.037 mg/kg	0.0000037 %		
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
									Total:	0.069 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP15

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP15		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.80 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
10% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 10% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				2	mg/kg	1.197	2.394	mg/kg	0.000239 %		
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				27	mg/kg	1.32	35.649	mg/kg	0.00356 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				2.5	mg/kg	1.142	2.856	mg/kg	0.000286 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				36	mg/kg	1.126	40.532	mg/kg	0.00405 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	27	mg/kg	1.56	42.115	mg/kg	0.0027 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				4	mg/kg	1.5	6.001	mg/kg	0.0006 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				62	mg/kg	2.976	184.528	mg/kg	0.0185 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		<LOD
		034-002-00-8											
13		zinc { zinc chromate }				67	mg/kg	2.774	185.868	mg/kg	0.0186 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									

#		Determinand				CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number							
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
28	●	pyrene		204-927-3	129-00-0		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
									Total:	0.0524 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

● **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

● **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

● **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

● **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

● **polychlorobiphenyls; PCB** (EC Number: 215-648-1, CAS Number: 1336-36-3)

CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s):
29 Sep 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2021.293.4891.9295 (20 Oct 2021)
HazWasteOnline Database: 2021.293.4891.9295 (20 Oct 2021)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2019 - UK: 2019 No. 720 of 27th March 2019
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

Appendix 4

Excavation Plans

O'Callaghan Moran & Associates
environmental management for business
www.ocallaghanmoran.com

O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366

Email: info@ocallaghanmoran.com

Title:

Dig Plan 0.00-1.50m

Client:

IGSL Limited

Legend

🟩 -A Meets Soil Recovery Criteria

🟦 -B-1 Meets Inert WAC

🟪 -B-2 Meets Inert WAC Increased Limits

O'Callaghan Moran & Associates
environmental management for business
www.ocallaghanmoran.com

O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366

Email: info@ocallaghanmoran.com

Title:

Dig Plan 1.50-2.00m

Legend

🟩 -A Meets Soil Recovery Criteria

🟦 -B-1 Meets Inert WAC

🟪 -B-2 Meets Inert WAC Increased Limits

This drawing is the property of O'Callaghan Moran & Associates and shall not be used, reproduced or disclosed to anyone without the prior written permission of O'Callaghan Moran & Associates and shall be returned upon request.

Client:

IGSL Limited

APPENDIX 11A – TRAFFIC SURVEY REPORT

Ireland

9 City Gate,
Lower Bridge Street,
Dublin 8

Tel: 01 633 4725
Fax: 01 633 4562

CS CONSULTING
PARK WEST
TRAFFIC SURVEY

SURVEY REPORT
FEBRUARY 2019

PROJECT NO.	9706
CHECKED	P. MURRAY
DATE	20/02/2019
CONTACT	A.CHAMBERS
REVISION	

Registered Office:
9 City Gate, Lower Bridge Street,,
Dublin 8
Company Reg. No. 444096
VAT Reg. No. IE 9664307L

Email: enquiries@nationwidedatacollection.ie
Website: www.nationwidedatacollection.ie

CONTENTS

INTRODUCTION

Nationwide Data Collection (NDC) was instructed by CS Consulting to undertake junction turning counts in Park West, Co. Dublin.

General location plans are given in Diagrams 9706-01 & 9706-02.

JUNCTION TURNING COUNTS

Junction turning counts were undertaken at the following sites:

Site No.	Location.	Day / Date
1	Cloverhill Road / Pamlerstown Way / Park West Avenue	Wednesday 13th February 2019
2	Park West Avenue(N) / Park West Avenue(S) / Cedar Brook Way	
3	Park West Avenue(N) / Park West Avenue(S) / Access Road	
4	Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)	
5	Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)	
6	Park West Avenue / R134(W) / Oak Road / R134(E)	
7	L1014(N) / Park West Avenue / L1014(S)	

All sites were surveyed using telescopically mounted video cameras from which the information was subsequently extracted. Details of the observed movements are given in Diagrams 9706-01 & 9706-02.

The survey was carried out with survey hours of 07:00 to 19:00. All information was collected in 15 minute intervals and has been tabulated with both hourly and period totals.

Vehicles were classified into the following categories:

- Cars and Taxis (**CAR**)
- Light Goods Vehicles (**LGV**),
- Other Goods Vehicles - type 1 (**OGV1**),
- Other Goods Vehicles - type 2 (**OGV2**),
- Buses (**PSV**).

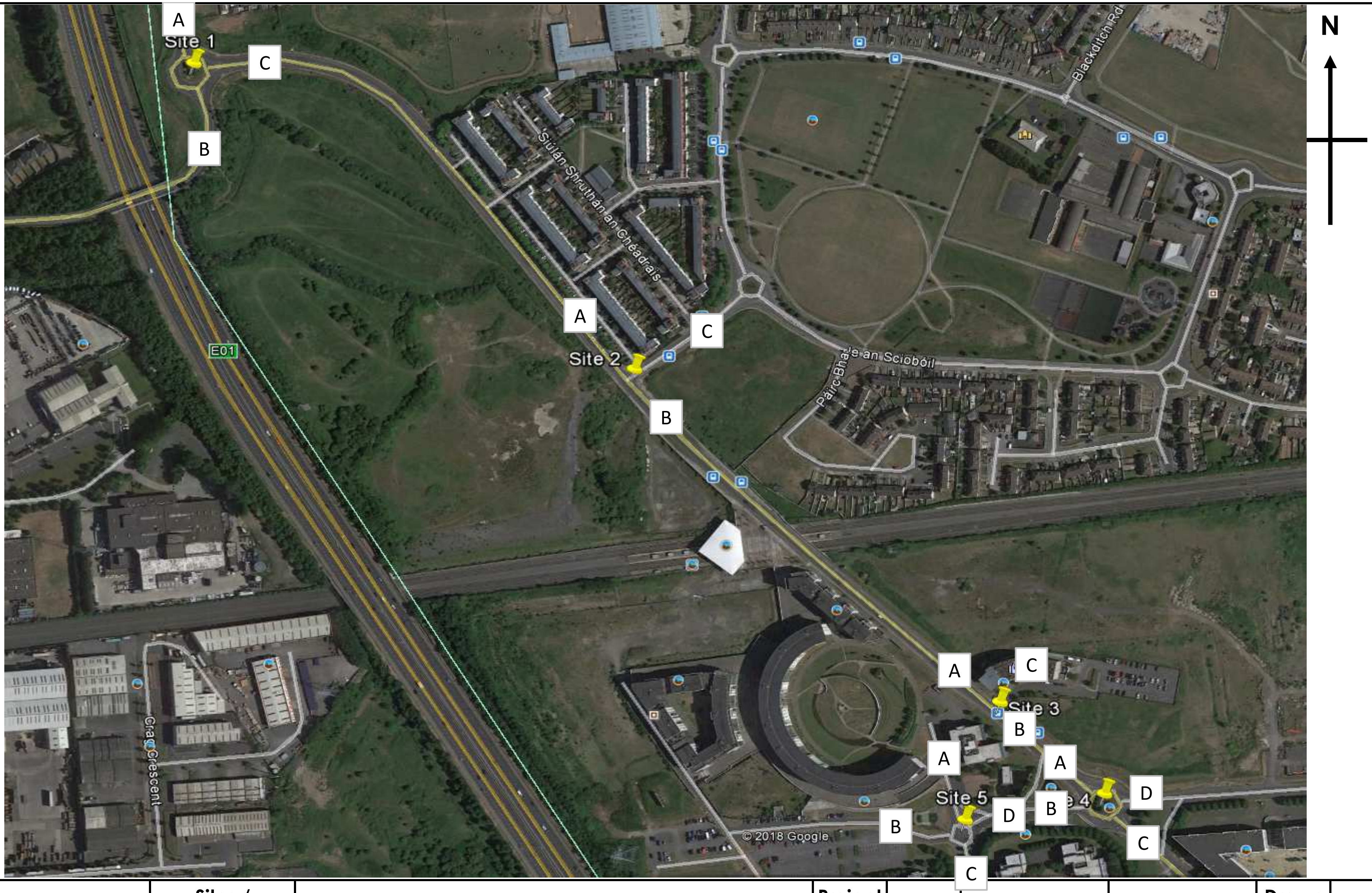
A detailed description of the vehicles included in each category is provided in Appendix A.

SITE REPORT

Weather	Clear and dry.
Accidents	None.
Roadworks	None.
Queues	Not required.
Pedestrians	Not required.
General Site Notes.	No additional notes.

APPENDIX A

VEHICLE CATEGORIES

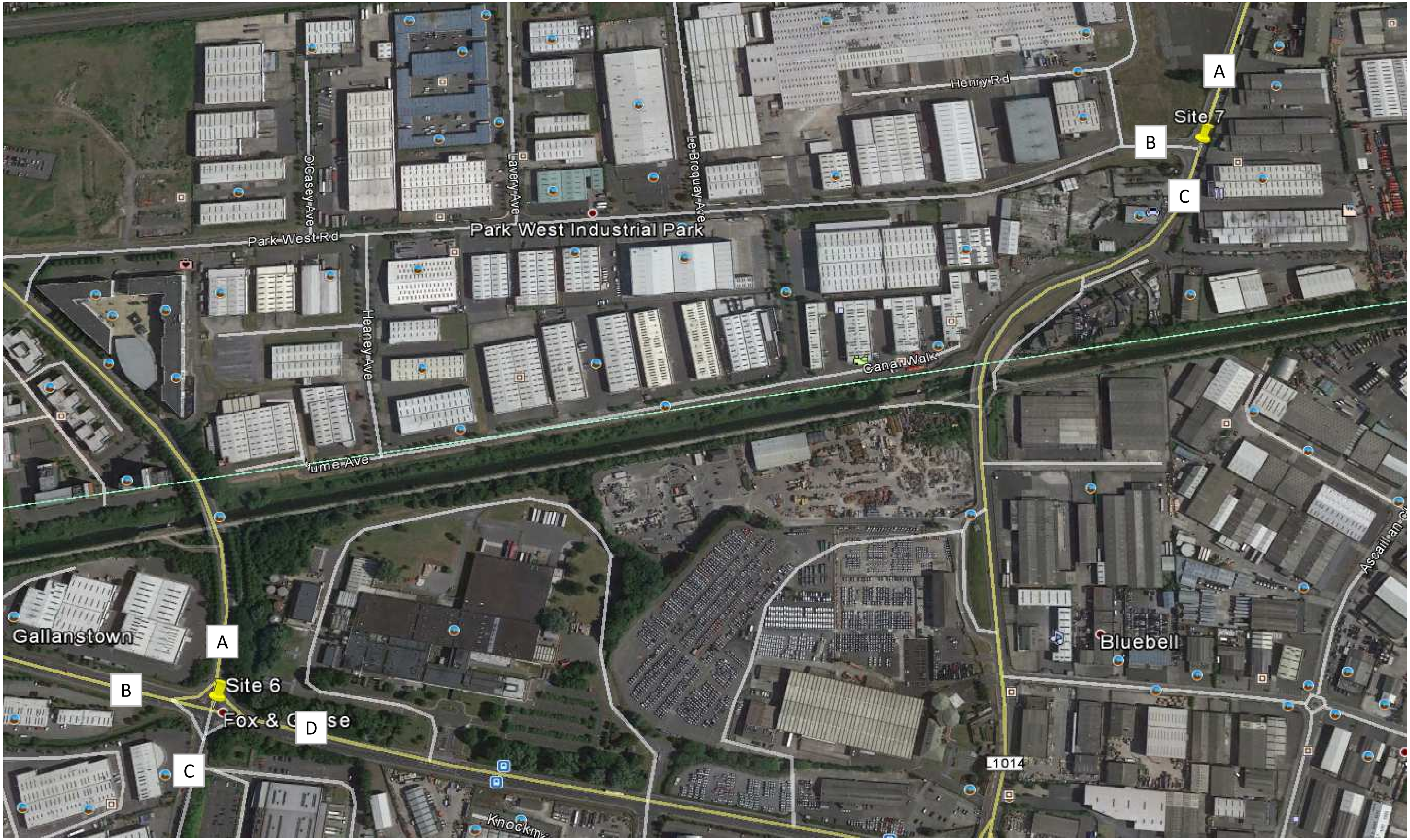


NDC
NATIONWIDE DATA COLLECTION

Sites / Location: 1 to 5 / Park West
Project No: 9706
Diagram No: 9706-01
Drawn By: AC

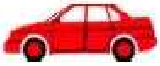
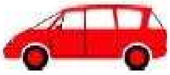
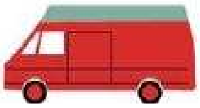
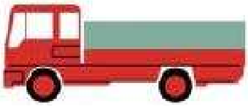
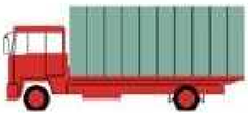
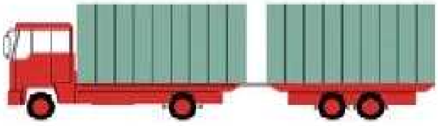
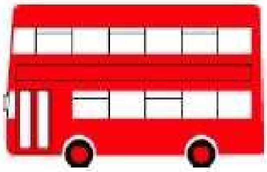
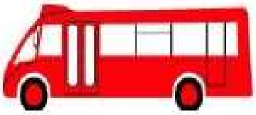
Survey Date: Wednesday 13th February 2019
Project Name: PARK WEST

Survey Times: 07:00 to 19:00
Diagram Title: General Location Plan



NDC NATIONWIDE DATA COLLECTION	**Sites / Location:**	6 & 7 / Park West	**Project No:**	9706	**Diagram No:**	9706-02	**Drawn By:**	AC
	Survey Date:	Wednesday 13th February 2019	**Project Name:**	PARK WEST				
	Survey Times:	07:00 to 19:00	**Diagram Title:**	General Location Plan				

COBA VEHICLE CATEGORIES

CAR	 SALOON  ESTATE  PEOPLE CARRIER  CAR TOWING CARAVAN / TRAILER
LIGHT GOODS VEHICLE (LGV)	 VAN  <3.5 TONNES – single rear tyres  PICK-UP
OTHER GOODS VEHICLE (OGV1)	 > 3.5 TONNES – twin rear tyres  2-AXLES RIGID  2-AXLES RIGID  3 AXLES-RIGID
OTHER GOODS VEHICLE (OGV2)	 4 OR MORE AXLES RIGID  3-AXLES ARTIC  4 OR MORE AXLES ARTIC  OTHER GOODS VEHICLE WITH TRAILER
BUSES & COACHES (PSV)	 DOUBLE DECK BUS  SINGLE DECK BUS OR COACH

COBA VEHICLE CATEGORIES

Definition of Categories

The various components of traffic have different characteristics in terms of operating costs, growth and occupancy. The most common categories into which the traffic is split in COBA; these are defined as:

Cars (CARS)

Including taxis, estate cars, ‘people carriers’ and other passenger vehicles (for example, minibuses and camper vans) with a gross vehicle weight of less than 3.5 tonnes, normally ones which can accommodate not more than 15 seats. Three-wheeled cars, motor invalid carriages, Land Rovers, Range Rovers and Jeeps and smaller ambulances are included. Cars towing caravans or trailers are counted as one vehicle unless included as a separate class.

Light Goods Vehicles (LGV)

Includes all goods vehicles up to 3.5 tonnes gross vehicle weight (goods vehicles over 3.5 tonnes have sideguards fitted between axles), including those towing a trailer or caravan. This includes all car delivery vans and those of the next larger carrying capacity such as transit vans. Included here are small pickup vans, three-wheeled goods vehicles, milk floats and pedestrian controlled motor vehicles. Most of this group is delivery vans of one type or another.

Other Goods Vehicles (OGV 1)

Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles Includes larger ambulances, tractors (without trailers), road rollers for tarmac pressing, box vans and similar large vans. A two or three axle motor tractive unit without a trailer is also included.

Other Goods Vehicles (OGV 2)

This category includes all rigid vehicles with four or more axles and all articulated vehicles. Also included in this class are OGV1 goods vehicles towing a caravan or trailer.

Buses and Coaches (PSV)

Includes all public service vehicles and works buses with a gross vehicle weight of 3.5 tonnes or more, usually vehicles with more than 16 seats.

Site No. 1
Location Cloverhill Road / Pamlerstown Way / Park West Avenue
Date Wednesday 13 February 2019

Time	A to C - Cloverhill Road to Park West Avenue					Veh. Total	A to B - Cloverhill Road to Pamlerstown Way					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	58	15	1	0	0	74	16	5	1	1	0	23
07:15	95	12	0	1	0	108	32	4	1	0	0	37
07:30	107	10	1	0	0	118	34	8	3	1	0	46
07:45	123	13	1	0	1	138	45	5	0	0	0	50
Hour	383	50	3	1	1	438	127	22	5	2	0	156
08:00	127	18	2	2	0	149	41	9	2	1	0	53
08:15	93	14	2	0	0	109	23	4	3	0	0	30
08:30	99	16	1	0	0	116	31	2	1	1	0	35
08:45	124	11	2	0	0	137	46	7	2	0	0	55
Hour	443	59	7	2	0	511	141	22	8	2	0	173
09:00	94	12	6	2	0	114	36	7	1	0	0	44
09:15	84	4	2	1	0	91	21	9	1	0	0	31
09:30	61	15	2	2	0	80	27	4	3	1	0	35
09:45	45	14	2	1	0	62	23	4	0	1	0	28
Hour	284	45	12	6	0	347	107	24	5	2	0	138
10:00	41	9	2	0	0	52	26	5	1	0	1	33
10:15	50	13	3	1	0	67	25	7	2	0	0	34
10:30	43	10	1	1	0	55	17	8	1	1	0	27
10:45	34	6	5	0	0	45	22	7	1	1	0	31
Hour	168	38	11	2	0	219	90	27	5	2	1	125
11:00	34	8	2	3	0	47	30	10	1	1	0	42
11:15	30	9	2	1	0	42	26	7	1	2	0	36
11:30	42	8	3	0	0	53	22	8	2	0	0	32
11:45	40	6	4	0	0	50	35	6	1	2	0	44
Hour	146	31	11	4	0	192	113	31	5	5	0	154
12:00	34	2	0	0	1	37	41	5	1	0	1	48
12:15	33	11	3	0	0	47	32	7	0	0	0	39
12:30	39	5	1	0	0	45	35	9	2	1	0	47
12:45	48	8	1	0	0	57	36	7	4	0	0	47
Hour	154	26	5	0	1	186	144	28	7	1	1	181
13:00	40	11	1	1	0	53	37	2	0	1	0	40
13:15	53	9	2	0	0	64	29	7	0	1	0	37
13:30	48	8	2	1	0	59	37	6	2	2	0	47
13:45	66	14	4	0	0	84	40	10	2	0	0	52
Hour	207	42	9	2	0	260	143	25	4	4	0	176
14:00	69	14	2	2	0	87	37	6	3	3	0	49
14:15	51	10	1	0	0	62	36	4	1	2	0	43
14:30	40	7	3	0	0	50	24	11	1	1	1	38
14:45	46	13	2	1	0	62	32	5	3	3	0	43
Hour	206	44	8	3	0	261	129	26	8	9	1	173
15:00	33	10	5	0	0	48	23	9	0	1	0	33
15:15	44	11	3	0	2	60	27	1	2	0	0	30
15:30	38	8	1	0	0	47	29	5	3	0	0	37
15:45	65	10	1	1	0	77	51	5	3	0	0	59
Hour	180	39	10	1	2	232	130	20	8	1	0	159
16:00	41	5	1	0	0	47	40	5	1	1	0	47
16:15	53	5	1	1	0	60	40	14	1	0	0	55
16:30	44	10	0	1	0	55	41	4	0	1	0	46
16:45	48	9	0	0	0	57	63	3	2	0	0	68
Hour	186	29	2	2	0	219	184	26	4	2	0	216
17:00	40	5	3	1	0	49	32	1	0	0	0	33
17:15	40	2	1	0	0	43	26	1	2	0	0	29
17:30	29	1	0	1	0	31	22	3	0	0	0	25
17:45	35	5	0	0	0	40	21	2	0	0	0	23
Hour	144	13	4	2	0	163	101	7	2	0	0	110
18:00	31	8	0	0	0	39	15	4	1	0	0	20
18:15	36	3	0	1	0	40	24	9	0	0	0	33
18:30	37	1	0	0	0	38	28	2	0	0	0	30
18:45	45	1	0	0	0	46	31	2	0	0	0	33
Hour	149	13	0	1	0	163	98	17	1	0	0	116
Total	2650	429	82	26	4	3191	1507	275	62	30	3	1877

Site No. 1
Location Cloverhill Road / Pamlerstown Way / Park West Avenue
Date Wednesday 13 February 2019

Time	A to A - Cloverhill Road to Cloverhill Road					Veh. Total	B to A - Pamlerstown Way to Cloverhill Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	0	0	0	0	0	0	31	2	2	2	0	37
07:15	0	0	0	0	0	0	44	4	0	0	0	48
07:30	0	0	0	0	0	0	51	10	0	1	0	62
07:45	0	0	0	0	0	0	35	10	0	0	0	45
Hour	0	0	0	0	0	0	161	26	2	3	0	192
08:00	0	0	0	0	0	0	32	6	0	1	0	39
08:15	0	0	0	0	0	0	36	7	0	1	1	45
08:30	0	0	0	0	0	0	25	9	2	2	0	38
08:45	1	0	0	0	0	1	27	3	1	1	0	32
Hour	1	0	0	0	0	1	120	25	3	5	1	154
09:00	0	0	0	0	0	0	30	6	1	0	0	37
09:15	0	0	0	0	0	0	29	5	0	0	0	34
09:30	0	0	0	0	0	0	33	4	1	0	0	38
09:45	0	0	0	0	0	0	24	7	2	0	0	33
Hour	0	0	0	0	0	0	116	22	4	0	0	142
10:00	0	0	0	0	0	0	44	7	1	1	0	53
10:15	1	0	0	0	0	1	39	5	4	0	1	49
10:30	0	0	0	0	0	0	23	4	3	1	0	31
10:45	0	0	0	0	0	0	33	4	3	2	0	42
Hour	1	0	0	0	0	1	139	20	11	4	1	175
11:00	0	0	0	0	0	0	19	2	1	1	0	23
11:15	0	0	0	0	0	0	25	7	1	0	0	33
11:30	0	0	0	0	0	0	24	5	0	0	0	29
11:45	0	0	0	0	0	0	27	8	3	1	0	39
Hour	0	0	0	0	0	0	95	22	5	2	0	124
12:00	0	0	0	0	0	0	25	5	1	2	0	33
12:15	0	0	0	0	0	0	21	4	2	0	0	27
12:30	0	0	0	0	0	0	17	4	1	1	0	23
12:45	1	0	0	0	0	1	24	5	1	0	0	30
Hour	1	0	0	0	0	1	87	18	5	3	0	113
13:00	1	0	0	0	0	1	30	7	2	1	0	40
13:15	0	0	0	0	0	0	35	4	3	0	0	42
13:30	0	0	0	0	0	0	26	5	4	1	0	36
13:45	0	0	0	0	0	0	25	6	0	0	0	31
Hour	1	0	0	0	0	1	116	22	9	2	0	149
14:00	0	0	0	0	0	0	34	5	1	2	0	42
14:15	0	0	0	0	0	0	27	9	1	2	0	39
14:30	0	0	0	0	0	0	20	4	1	2	0	27
14:45	0	0	0	0	0	0	35	3	2	0	0	40
Hour	0	0	0	0	0	0	116	21	5	6	0	148
15:00	0	0	0	0	0	0	32	5	0	0	0	37
15:15	0	0	0	0	0	0	27	6	0	1	0	34
15:30	0	0	0	0	0	0	31	4	2	2	0	39
15:45	0	0	0	0	0	0	23	8	0	0	0	31
Hour	0	0	0	0	0	0	113	23	2	3	0	141
16:00	0	0	0	0	0	0	29	4	1	1	0	35
16:15	1	0	0	0	0	1	18	5	0	0	0	23
16:30	0	0	0	0	0	0	26	4	0	0	0	30
16:45	0	0	0	0	0	0	13	3	2	2	0	20
Hour	1	0	0	0	0	1	86	16	3	3	0	108
17:00	0	0	0	0	0	0	22	3	0	0	0	25
17:15	0	0	0	0	0	0	22	1	0	0	0	23
17:30	0	0	0	0	0	0	25	0	0	0	0	25
17:45	0	0	0	0	0	0	13	1	0	0	0	14
Hour	0	0	0	0	0	0	82	5	0	0	0	87
18:00	1	0	0	0	0	1	13	4	0	0	0	17
18:15	0	0	0	0	0	0	26	2	0	0	0	28
18:30	0	0	0	0	0	0	21	4	0	0	0	25
18:45	0	0	0	0	0	0	26	3	0	0	0	29
Hour	1	0	0	0	0	1	86	13	0	0	0	99
Total	6	0	0	0	0	6	1317	233	49	31	2	1632

Site No. 1
Location Cloverhill Road / Pamlerstown Way / Park West Avenue
Date Wednesday 13 February 2019

Time	B to C - Pamlerstown Way to Park West Avenue					Veh. Total	B to B - Pamlerstown Way to Pamlerstown Way					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	21	4	0	0	0	25	0	0	0	0	0	0
07:15	23	6	0	1	0	30	0	0	0	0	0	0
07:30	41	8	0	0	0	49	0	0	0	0	0	0
07:45	51	6	1	0	0	58	0	0	0	0	0	0
Hour	136	24	1	1	0	162	0	0	0	0	0	0
08:00	76	6	0	0	0	82	0	0	0	0	0	0
08:15	63	9	0	0	0	72	0	0	0	0	0	0
08:30	86	11	2	1	0	100	0	0	0	0	0	0
08:45	48	5	3	1	1	58	0	0	1	0	0	1
Hour	273	31	5	2	1	312	0	0	1	0	0	1
09:00	34	8	1	0	0	43	0	0	0	0	0	0
09:15	30	13	2	0	0	45	0	0	0	0	0	0
09:30	25	8	2	0	0	35	0	0	0	0	0	0
09:45	31	3	1	1	0	36	0	0	0	0	0	0
Hour	120	32	6	1	0	159	0	0	0	0	0	0
10:00	21	3	0	0	0	24	0	0	0	0	0	0
10:15	16	2	2	0	0	20	0	0	0	0	0	0
10:30	24	5	1	1	0	31	0	0	0	0	0	0
10:45	7	3	3	0	0	13	0	0	0	0	0	0
Hour	68	13	6	1	0	88	0	0	0	0	0	0
11:00	19	4	0	0	0	23	0	0	0	0	0	0
11:15	10	6	1	0	0	17	0	1	0	0	0	1
11:30	9	10	3	0	0	22	0	0	0	0	0	0
11:45	17	3	1	2	0	23	0	0	0	0	0	0
Hour	55	23	5	2	0	85	0	1	0	0	0	1
12:00	21	5	1	0	0	27	0	0	0	0	0	0
12:15	4	3	1	0	0	8	1	0	0	0	0	1
12:30	19	4	0	0	0	23	1	0	0	0	0	1
12:45	23	3	1	0	0	27	1	0	0	0	0	1
Hour	67	15	3	0	0	85	3	0	0	0	0	3
13:00	26	7	1	0	1	35	0	0	0	0	0	0
13:15	25	0	1	0	0	26	0	0	0	0	0	0
13:30	15	3	2	0	0	20	0	0	0	0	0	0
13:45	25	5	1	0	1	32	0	0	0	0	0	0
Hour	91	15	5	0	2	113	0	0	0	0	0	0
14:00	30	9	3	0	1	43	1	0	0	0	0	1
14:15	23	4	4	0	0	31	1	0	0	0	0	1
14:30	26	9	0	0	0	35	0	0	0	0	0	0
14:45	17	6	1	1	0	25	0	0	0	0	0	0
Hour	96	28	8	1	1	134	2	0	0	0	0	2
15:00	22	5	3	0	0	30	0	0	0	0	0	0
15:15	20	2	1	0	0	23	1	0	0	0	0	1
15:30	15	6	2	1	0	24	0	0	0	0	0	0
15:45	20	6	3	0	0	29	0	0	0	0	0	0
Hour	77	19	9	1	0	106	1	0	0	0	0	1
16:00	12	5	1	1	0	19	0	0	0	0	0	0
16:15	24	7	2	0	1	34	0	0	0	0	0	0
16:30	23	4	1	0	0	28	0	0	0	0	0	0
16:45	40	7	0	0	0	47	0	0	0	0	0	0
Hour	99	23	4	1	1	128	0	0	0	0	0	0
17:00	52	6	1	0	0	59	1	0	0	0	0	1
17:15	32	3	0	1	0	36	0	0	0	0	0	0
17:30	29	5	0	0	0	34	0	0	0	0	0	0
17:45	28	9	0	0	0	37	0	0	0	0	0	0
Hour	141	23	1	1	0	166	1	0	0	0	0	1
18:00	35	0	1	0	0	36	0	0	0	0	0	0
18:15	28	4	0	0	0	32	0	0	0	0	0	0
18:30	29	3	0	0	0	32	0	0	0	0	0	0
18:45	14	4	0	0	0	18	0	0	0	0	0	0
Hour	106	11	1	0	0	118	0	0	0	0	0	0
Total	1329	257	54	11	5	1656	7	1	1	0	0	9

Site No. 1
Location Cloverhill Road / Pamlerstown Way / Park West Avenue
Date Wednesday 13 February 2019

Time	C to B - Park West Avenue to Pamlerstown Way					Veh. Total	C to A - Park West Avenue to Cloverhill Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	9	1	0	0	0	10	14	1	1	1	0	17
07:15	7	2	0	0	0	9	21	5	0	1	0	27
07:30	19	8	0	1	0	28	21	3	1	0	0	25
07:45	26	5	0	1	0	32	22	5	1	1	0	29
Hour	61	16	0	2	0	79	78	14	3	3	0	98
08:00	22	2	1	0	0	25	29	4	2	0	0	35
08:15	36	3	3	0	0	42	22	3	0	0	0	25
08:30	26	4	0	0	1	31	14	3	2	1	0	20
08:45	23	4	0	0	1	28	20	8	0	1	0	29
Hour	107	13	4	0	2	126	85	18	4	2	0	109
09:00	25	2	2	1	1	31	27	4	0	0	0	31
09:15	23	2	2	0	0	27	28	4	1	0	0	33
09:30	7	6	1	1	0	15	30	8	4	0	0	42
09:45	15	3	1	2	0	21	42	6	5	1	0	54
Hour	70	13	6	4	1	94	127	22	10	1	0	160
10:00	12	7	1	1	0	21	21	9	3	1	0	34
10:15	24	12	2	0	0	38	42	12	2	1	0	57
10:30	20	6	2	0	0	28	24	10	3	1	0	38
10:45	11	4	1	0	0	16	37	14	1	1	0	53
Hour	67	29	6	1	0	103	124	45	9	4	0	182
11:00	12	3	1	0	0	16	37	14	1	1	0	53
11:15	13	6	1	0	0	20	30	9	3	0	0	42
11:30	15	8	2	0	0	25	30	4	2	2	0	38
11:45	15	4	4	0	1	24	34	3	4	0	0	41
Hour	55	21	8	0	1	85	131	30	10	3	0	174
12:00	14	8	1	1	0	24	44	8	3	2	0	57
12:15	21	5	0	0	0	26	53	8	1	0	0	62
12:30	17	3	1	0	0	21	46	14	1	0	0	61
12:45	16	5	0	1	0	22	57	9	3	2	0	71
Hour	68	21	2	2	0	93	200	39	8	4	0	251
13:00	22	4	3	1	0	30	62	6	3	1	0	72
13:15	14	3	0	0	0	17	48	6	1	0	0	55
13:30	27	4	0	0	0	31	42	4	1	0	0	47
13:45	17	4	2	0	0	23	47	6	0	0	0	53
Hour	80	15	5	1	0	101	199	22	5	1	0	227
14:00	19	9	1	1	0	30	40	8	4	0	0	52
14:15	16	7	5	0	0	28	45	5	3	0	0	53
14:30	21	9	4	0	1	35	37	11	2	3	0	53
14:45	29	10	2	2	0	43	43	8	3	1	0	55
Hour	85	35	12	3	1	136	165	32	12	4	0	213
15:00	20	2	1	1	0	24	53	9	2	2	0	66
15:15	13	2	2	0	0	17	46	8	3	0	0	57
15:30	25	4	1	0	0	30	37	14	0	1	0	52
15:45	24	6	1	0	0	31	47	9	2	0	0	58
Hour	82	14	5	1	0	102	183	40	7	3	0	233
16:00	38	9	1	0	0	48	83	9	0	1	0	93
16:15	58	12	1	0	0	71	55	12	1	0	0	68
16:30	55	10	2	1	0	68	68	10	0	1	0	79
16:45	52	12	1	0	0	65	57	9	1	1	0	68
Hour	203	43	5	1	0	252	263	40	2	3	0	308
17:00	78	11	1	0	0	90	81	6	0	0	0	87
17:15	77	5	1	1	0	84	62	8	0	0	0	70
17:30	75	6	0	0	0	81	94	2	2	0	0	98
17:45	63	9	1	0	0	73	59	6	2	0	0	67
Hour	293	31	3	1	0	328	296	22	4	0	0	322
18:00	62	3	1	0	0	66	55	3	0	0	0	58
18:15	39	2	1	0	0	42	51	4	0	0	0	55
18:30	41	7	0	1	0	49	66	2	0	1	0	69
18:45	38	3	0	0	0	41	48	3	1	1	0	53
Hour	180	15	2	1	0	198	220	12	1	2	0	235
Total	1351	266	58	17	5	1697	2071	336	75	30	0	2512

Site No. 1
Location Cloverhill Road / Pamlerstown Way / Park West Avenue
Date Wednesday 13 February 2019

Time	C to C - Park West Avenue to Park West Avenue					Veh. Total
	Car	LGV	OGV1	OGV2	PSV	
07:00	0	0	0	0	0	0
07:15	0	0	0	0	0	0
07:30	0	0	0	0	0	0
07:45	0	0	0	0	0	0
Hour	0	0	0	0	0	0
08:00	0	0	0	0	0	0
08:15	0	0	0	0	0	0
08:30	1	0	0	0	0	1
08:45	0	0	0	0	0	0
Hour	1	0	0	0	0	1
09:00	0	0	0	0	0	0
09:15	0	0	0	0	0	0
09:30	0	0	0	0	0	0
09:45	0	1	0	0	0	1
Hour	0	1	0	0	0	1
10:00	1	0	0	0	0	1
10:15	0	0	0	0	0	0
10:30	0	0	0	0	0	0
10:45	0	0	0	0	0	0
Hour	1	0	0	0	0	1
11:00	0	0	0	0	0	0
11:15	0	0	0	0	0	0
11:30	0	0	0	0	0	0
11:45	0	0	0	0	0	0
Hour	0	0	0	0	0	0
12:00	0	0	0	0	0	0
12:15	1	0	0	0	0	1
12:30	0	0	0	0	0	0
12:45	0	0	0	0	0	0
Hour	1	0	0	0	0	1
13:00	0	0	0	0	0	0
13:15	0	0	0	0	0	0
13:30	1	0	0	0	0	1
13:45	0	0	0	0	0	0
Hour	1	0	0	0	0	1
14:00	0	0	0	0	0	0
14:15	0	0	0	0	0	0
14:30	0	0	0	0	0	0
14:45	0	0	0	0	0	0
Hour	0	0	0	0	0	0
15:00	1	0	0	0	0	1
15:15	1	0	0	0	0	1
15:30	0	0	0	0	0	0
15:45	0	0	0	0	0	0
Hour	2	0	0	0	0	2
16:00	0	0	0	0	0	0
16:15	0	0	0	0	0	0
16:30	0	0	0	0	0	0
16:45	0	0	0	0	0	0
Hour	0	0	0	0	0	0
17:00	0	0	0	0	0	0
17:15	3	0	0	0	0	3
17:30	0	0	0	0	0	0
17:45	4	0	0	0	0	4
Hour	7	0	0	0	0	7
18:00	4	1	0	0	0	5
18:15	2	0	0	0	0	2
18:30	0	0	0	0	0	0
18:45	0	0	0	0	0	0
Hour	6	1	0	0	0	7
Total	19	2	0	0	0	21

Site No. 1
Location Cloverhill Road / Pamlerstown Way / Park West Avenue
Date Wednesday 13 February 2019

Time	To Arm A - Cloverhill Road					Veh. Total	From Arm A - Cloverhill Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	45	3	3	3	0	54	74	20	2	1	0	97
07:15	65	9	0	1	0	75	127	16	1	1	0	145
07:30	72	13	1	1	0	87	141	18	4	1	0	164
07:45	57	15	1	1	0	74	168	18	1	0	1	188
Hour	239	40	5	6	0	290	510	72	8	3	1	594
08:00	61	10	2	1	0	74	168	27	4	3	0	202
08:15	58	10	0	1	1	70	116	18	5	0	0	139
08:30	39	12	4	3	0	58	130	18	2	1	0	151
08:45	48	11	1	2	0	62	171	18	4	0	0	193
Hour	206	43	7	7	1	264	585	81	15	4	0	685
09:00	57	10	1	0	0	68	130	19	7	2	0	158
09:15	57	9	1	0	0	67	105	13	3	1	0	122
09:30	63	12	5	0	0	80	88	19	5	3	0	115
09:45	66	13	7	1	0	87	68	18	2	2	0	90
Hour	243	44	14	1	0	302	391	69	17	8	0	485
10:00	65	16	4	2	0	87	67	14	3	0	1	85
10:15	82	17	6	1	1	107	76	20	5	1	0	102
10:30	47	14	6	2	0	69	60	18	2	2	0	82
10:45	70	18	4	3	0	95	56	13	6	1	0	76
Hour	264	65	20	8	1	358	259	65	16	4	1	345
11:00	56	16	2	2	0	76	64	18	3	4	0	89
11:15	55	16	4	0	0	75	56	16	3	3	0	78
11:30	54	9	2	2	0	67	64	16	5	0	0	85
11:45	61	11	7	1	0	80	75	12	5	2	0	94
Hour	226	52	15	5	0	298	259	62	16	9	0	346
12:00	69	13	4	4	0	90	75	7	1	0	2	85
12:15	74	12	3	0	0	89	65	18	3	0	0	86
12:30	63	18	2	1	0	84	74	14	3	1	0	92
12:45	82	14	4	2	0	102	85	15	5	0	0	105
Hour	288	57	13	7	0	365	299	54	12	1	2	368
13:00	93	13	5	2	0	113	78	13	1	2	0	94
13:15	83	10	4	0	0	97	82	16	2	1	0	101
13:30	68	9	5	1	0	83	85	14	4	3	0	106
13:45	72	12	0	0	0	84	106	24	6	0	0	136
Hour	316	44	14	3	0	377	351	67	13	6	0	437
14:00	74	13	5	2	0	94	106	20	5	5	0	136
14:15	72	14	4	2	0	92	87	14	2	2	0	105
14:30	57	15	3	5	0	80	64	18	4	1	1	88
14:45	78	11	5	1	0	95	78	18	5	4	0	105
Hour	281	53	17	10	0	361	335	70	16	12	1	434
15:00	85	14	2	2	0	103	56	19	5	1	0	81
15:15	73	14	3	1	0	91	71	12	5	0	2	90
15:30	68	18	2	3	0	91	67	13	4	0	0	84
15:45	70	17	2	0	0	89	116	15	4	1	0	136
Hour	296	63	9	6	0	374	310	59	18	2	2	391
16:00	112	13	1	2	0	128	81	10	2	1	0	94
16:15	74	17	1	0	0	92	94	19	2	1	0	116
16:30	94	14	0	1	0	109	85	14	0	2	0	101
16:45	70	12	3	3	0	88	111	12	2	0	0	125
Hour	350	56	5	6	0	417	371	55	6	4	0	436
17:00	103	9	0	0	0	112	72	6	3	1	0	82
17:15	84	9	0	0	0	93	66	3	3	0	0	72
17:30	119	2	2	0	0	123	51	4	0	1	0	56
17:45	72	7	2	0	0	81	56	7	0	0	0	63
Hour	378	27	4	0	0	409	245	20	6	2	0	273
18:00	69	7	0	0	0	76	47	12	1	0	0	60
18:15	77	6	0	0	0	83	60	12	0	1	0	73
18:30	87	6	0	1	0	94	65	3	0	0	0	68
18:45	74	6	1	1	0	82	76	3	0	0	0	79
Hour	307	25	1	2	0	335	248	30	1	1	0	280
Total	3394	569	124	61	2	4150	4163	704	144	56	7	5074

Site No. 1
Location Cloverhill Road / Pamlerstown Way / Park West Avenue
Date Wednesday 13 February 2019

Time	To Arm B - Pamlerstown Way					Veh. Total	From Arm B - Pamlerstown Way					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	25	6	1	1	0	33	52	6	2	2	0	62
07:15	39	6	1	0	0	46	67	10	0	1	0	78
07:30	53	16	3	2	0	74	92	18	0	1	0	111
07:45	71	10	0	1	0	82	86	16	1	0	0	103
Hour	188	38	5	4	0	235	297	50	3	4	0	354
08:00	63	11	3	1	0	78	108	12	0	1	0	121
08:15	59	7	6	0	0	72	99	16	0	1	1	117
08:30	57	6	1	1	1	66	111	20	4	3	0	138
08:45	69	11	3	0	1	84	75	8	5	2	1	91
Hour	248	35	13	2	2	300	393	56	9	7	2	467
09:00	61	9	3	1	1	75	64	14	2	0	0	80
09:15	44	11	3	0	0	58	59	18	2	0	0	79
09:30	34	10	4	2	0	50	58	12	3	0	0	73
09:45	38	7	1	3	0	49	55	10	3	1	0	69
Hour	177	37	11	6	1	232	236	54	10	1	0	301
10:00	38	12	2	1	1	54	65	10	1	1	0	77
10:15	49	19	4	0	0	72	55	7	6	0	1	69
10:30	37	14	3	1	0	55	47	9	4	2	0	62
10:45	33	11	2	1	0	47	40	7	6	2	0	55
Hour	157	56	11	3	1	228	207	33	17	5	1	263
11:00	42	13	2	1	0	58	38	6	1	1	0	46
11:15	39	14	2	2	0	57	35	14	2	0	0	51
11:30	37	16	4	0	0	57	33	15	3	0	0	51
11:45	50	10	5	2	1	68	44	11	4	3	0	62
Hour	168	53	13	5	1	240	150	46	10	4	0	210
12:00	55	13	2	1	1	72	46	10	2	2	0	60
12:15	54	12	0	0	0	66	26	7	3	0	0	36
12:30	53	12	3	1	0	69	37	8	1	1	0	47
12:45	53	12	4	1	0	70	48	8	2	0	0	58
Hour	215	49	9	3	1	277	157	33	8	3	0	201
13:00	59	6	3	2	0	70	56	14	3	1	1	75
13:15	43	10	0	1	0	54	60	4	4	0	0	68
13:30	64	10	2	2	0	78	41	8	6	1	0	56
13:45	57	14	4	0	0	75	50	11	1	0	1	63
Hour	223	40	9	5	0	277	207	37	14	2	2	262
14:00	57	15	4	4	0	80	65	14	4	2	1	86
14:15	53	11	6	2	0	72	51	13	5	2	0	71
14:30	45	20	5	1	2	73	46	13	1	2	0	62
14:45	61	15	5	5	0	86	52	9	3	1	0	65
Hour	216	61	20	12	2	311	214	49	13	7	1	284
15:00	43	11	1	2	0	57	54	10	3	0	0	67
15:15	41	3	4	0	0	48	48	8	1	1	0	58
15:30	54	9	4	0	0	67	46	10	4	3	0	63
15:45	75	11	4	0	0	90	43	14	3	0	0	60
Hour	213	34	13	2	0	262	191	42	11	4	0	248
16:00	78	14	2	1	0	95	41	9	2	2	0	54
16:15	98	26	2	0	0	126	42	12	2	0	1	57
16:30	96	14	2	2	0	114	49	8	1	0	0	58
16:45	115	15	3	0	0	133	53	10	2	2	0	67
Hour	387	69	9	3	0	468	185	39	7	4	1	236
17:00	111	12	1	0	0	124	75	9	1	0	0	85
17:15	103	6	3	1	0	113	54	4	0	1	0	59
17:30	97	9	0	0	0	106	54	5	0	0	0	59
17:45	84	11	1	0	0	96	41	10	0	0	0	51
Hour	395	38	5	1	0	439	224	28	1	1	0	254
18:00	77	7	2	0	0	86	48	4	1	0	0	53
18:15	63	11	1	0	0	75	54	6	0	0	0	60
18:30	69	9	0	1	0	79	50	7	0	0	0	57
18:45	69	5	0	0	0	74	40	7	0	0	0	47
Hour	278	32	3	1	0	314	192	24	1	0	0	217
Total	2865	542	121	47	8	3583	2653	491	104	42	7	3297

Site No. 1
Location Cloverhill Road / Pamlerstown Way / Park West Avenue
Date Wednesday 13 February 2019

Time	To Arm C - Park West Avenue					Veh. Total	From Arm C - Park West Avenue					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	79	19	1	0	0	99	23	2	1	1	0	27
07:15	118	18	0	2	0	138	28	7	0	1	0	36
07:30	148	18	1	0	0	167	40	11	1	1	0	53
07:45	174	19	2	0	1	196	48	10	1	2	0	61
Hour	519	74	4	2	1	600	139	30	3	5	0	177
08:00	203	24	2	2	0	231	51	6	3	0	0	60
08:15	156	23	2	0	0	181	58	6	3	0	0	67
08:30	186	27	3	1	0	217	41	7	2	1	1	52
08:45	172	16	5	1	1	195	43	12	0	1	1	57
Hour	717	90	12	4	1	824	193	31	8	2	2	236
09:00	128	20	7	2	0	157	52	6	2	1	1	62
09:15	114	17	4	1	0	136	51	6	3	0	0	60
09:30	86	23	4	2	0	115	37	14	5	1	0	57
09:45	76	18	3	2	0	99	57	10	6	3	0	76
Hour	404	78	18	7	0	507	197	36	16	5	1	255
10:00	63	12	2	0	0	77	34	16	4	2	0	56
10:15	66	15	5	1	0	87	66	24	4	1	0	95
10:30	67	15	2	2	0	86	44	16	5	1	0	66
10:45	41	9	8	0	0	58	48	18	2	1	0	69
Hour	237	51	17	3	0	308	192	74	15	5	0	286
11:00	53	12	2	3	0	70	49	17	2	1	0	69
11:15	40	15	3	1	0	59	43	15	4	0	0	62
11:30	51	18	6	0	0	75	45	12	4	2	0	63
11:45	57	9	5	2	0	73	49	7	8	0	1	65
Hour	201	54	16	6	0	277	186	51	18	3	1	259
12:00	55	7	1	0	1	64	58	16	4	3	0	81
12:15	38	14	4	0	0	56	75	13	1	0	0	89
12:30	58	9	1	0	0	68	63	17	2	0	0	82
12:45	71	11	2	0	0	84	73	14	3	3	0	93
Hour	222	41	8	0	1	272	269	60	10	6	0	345
13:00	66	18	2	1	1	88	84	10	6	2	0	102
13:15	78	9	3	0	0	90	62	9	1	0	0	72
13:30	64	11	4	1	0	80	70	8	1	0	0	79
13:45	91	19	5	0	1	116	64	10	2	0	0	76
Hour	299	57	14	2	2	374	280	37	10	2	0	329
14:00	99	23	5	2	1	130	59	17	5	1	0	82
14:15	74	14	5	0	0	93	61	12	8	0	0	81
14:30	66	16	3	0	0	85	58	20	6	3	1	88
14:45	63	19	3	2	0	87	72	18	5	3	0	98
Hour	302	72	16	4	1	395	250	67	24	7	1	349
15:00	56	15	8	0	0	79	74	11	3	3	0	91
15:15	65	13	4	0	2	84	60	10	5	0	0	75
15:30	53	14	3	1	0	71	62	18	1	1	0	82
15:45	85	16	4	1	0	106	71	15	3	0	0	89
Hour	259	58	19	2	2	340	267	54	12	4	0	337
16:00	53	10	2	1	0	66	121	18	1	1	0	141
16:15	77	12	3	1	1	94	113	24	2	0	0	139
16:30	67	14	1	1	0	83	123	20	2	2	0	147
16:45	88	16	0	0	0	104	109	21	2	1	0	133
Hour	285	52	6	3	1	347	466	83	7	4	0	560
17:00	92	11	4	1	0	108	159	17	1	0	0	177
17:15	75	5	1	1	0	82	142	13	1	1	0	157
17:30	58	6	0	1	0	65	169	8	2	0	0	179
17:45	67	14	0	0	0	81	126	15	3	0	0	144
Hour	292	36	5	3	0	336	596	53	7	1	0	657
18:00	70	9	1	0	0	80	121	7	1	0	0	129
18:15	66	7	0	1	0	74	92	6	1	0	0	99
18:30	66	4	0	0	0	70	107	9	0	2	0	118
18:45	59	5	0	0	0	64	86	6	1	1	0	94
Hour	261	25	1	1	0	288	406	28	3	3	0	440
Total	3998	688	136	37	9	4868	3441	604	133	47	5	4230

Site No. 2
Location Park West Avenue(N) / Park West Avenue(S) / Cedar Brook Way
Date Wednesday 13 February 2019

Time	A to C - Park West Avenue(N) to Cedar Brook Way					Veh. Total	A to B - Park West Avenue(N) to Park West Avenue(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	5	2	0	0	0	7	69	14	0	0	0	83
07:15	4	0	0	0	0	4	103	19	1	2	0	125
07:30	5	0	0	0	0	5	131	15	1	0	0	147
07:45	1	1	0	0	0	2	162	17	2	0	1	182
Hour	15	3	0	0	0	18	465	65	4	2	1	537
08:00	2	0	0	0	0	2	162	21	1	2	0	186
08:15	1	1	0	0	0	2	147	19	3	0	0	169
08:30	4	0	0	0	0	4	154	27	3	1	0	185
08:45	3	1	0	0	0	4	140	17	4	0	0	161
Hour	10	2	0	0	0	12	603	84	11	3	0	701
09:00	2	1	0	0	0	3	138	16	9	3	1	167
09:15	5	2	0	0	0	7	104	17	4	1	0	126
09:30	5	1	0	0	0	6	74	20	3	2	0	99
09:45	4	2	0	0	0	6	67	19	3	2	0	91
Hour	16	6	0	0	0	22	383	72	19	8	1	483
10:00	4	0	0	0	0	4	52	10	2	0	0	64
10:15	8	0	0	0	0	8	53	16	4	1	0	74
10:30	4	0	0	0	0	4	50	14	2	2	0	68
10:45	4	0	1	0	0	5	32	10	7	0	0	49
Hour	20	0	1	0	0	21	187	50	15	3	0	255
11:00	4	1	0	0	0	5	39	14	2	2	0	57
11:15	3	1	1	0	0	5	31	14	3	2	0	50
11:30	2	0	0	0	0	2	44	17	4	0	0	65
11:45	10	1	0	1	0	12	39	9	5	1	0	54
Hour	19	3	1	1	0	24	153	54	14	5	0	226
12:00	7	1	0	0	0	8	34	6	1	0	1	42
12:15	1	0	0	0	0	1	32	12	4	0	0	48
12:30	11	3	0	0	0	14	45	8	1	0	0	54
12:45	3	1	0	0	0	4	61	6	3	0	0	70
Hour	22	5	0	0	0	27	172	32	9	0	1	214
13:00	9	3	1	0	1	14	35	15	2	1	0	53
13:15	6	0	0	0	0	6	63	7	3	0	0	73
13:30	4	2	0	0	0	6	54	11	3	1	0	69
13:45	4	1	0	0	0	5	74	15	7	0	1	97
Hour	23	6	1	0	1	31	226	48	15	2	1	292
14:00	5	2	0	0	0	7	89	21	5	2	1	118
14:15	4	3	0	0	0	7	53	13	5	0	0	71
14:30	8	2	0	0	0	10	46	15	3	0	0	64
14:45	7	2	0	0	0	9	43	15	3	3	0	64
Hour	24	9	0	0	0	33	231	64	16	5	1	317
15:00	6	1	0	0	0	7	43	11	8	0	0	62
15:15	8	1	0	0	0	9	48	9	6	0	2	65
15:30	4	3	0	0	0	7	36	9	4	1	0	50
15:45	9	2	0	0	0	11	59	11	4	0	0	74
Hour	27	7	0	0	0	34	186	40	22	1	2	251
16:00	10	0	0	0	0	10	37	10	2	2	0	51
16:15	15	1	1	0	0	17	49	10	2	1	0	62
16:30	15	4	0	0	0	19	33	8	1	1	0	43
16:45	7	4	0	0	0	11	59	12	0	0	0	71
Hour	47	9	1	0	0	57	178	40	5	4	0	227
17:00	13	2	0	0	0	15	52	7	3	1	0	63
17:15	12	1	0	0	0	13	50	3	1	1	0	55
17:30	14	1	0	0	0	15	35	2	0	1	0	38
17:45	13	6	0	0	0	19	43	7	0	0	0	50
Hour	52	10	0	0	0	62	180	19	4	3	0	206
18:00	9	1	0	0	0	10	39	2	0	0	0	41
18:15	13	3	0	1	0	17	42	2	1	0	0	45
18:30	7	1	0	0	0	8	31	4	0	0	0	35
18:45	16	1	0	0	0	17	30	5	0	0	0	35
Hour	45	6	0	1	0	52	142	13	1	0	0	156
Total	320	66	4	2	1	393	3106	581	135	36	7	3865

Site No.	2
Location	Park West Avenue(N) / Park West Avenue(S) / Cedar Brook Way
Date	Wednesday 13 February 2019

Time	B to A - Park West Avenue(S) to Park West Avenue(N)					Veh. Total	B to C - Park West Avenue(S) to Cedar Brook Way					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	15	1	1	1	0	18	7	0	0	0	0	7
07:15	22	5	0	1	0	28	6	1	0	0	1	8
07:30	25	7	1	1	0	34	10	3	0	0	1	14
07:45	26	6	1	2	0	35	12	1	0	0	0	13
Hour	88	19	3	5	0	115	35	5	0	0	2	42
08:00	35	4	3	0	0	42	17	3	0	0	1	21
08:15	37	4	3	0	0	44	20	1	0	0	0	21
08:30	20	6	2	1	0	29	20	3	0	0	1	24
08:45	29	11	0	1	0	41	30	3	0	0	0	33
Hour	121	25	8	2	0	156	87	10	0	0	2	99
09:00	24	3	2	1	1	31	17	2	0	0	1	20
09:15	36	8	3	0	0	47	10	1	0	0	0	11
09:30	30	12	6	1	0	49	16	2	0	0	1	19
09:45	43	8	6	3	0	60	13	2	0	0	0	15
Hour	133	31	17	5	1	187	56	7	0	0	2	65
10:00	29	17	4	2	0	52	16	2	0	0	1	19
10:15	30	5	4	1	0	40	13	3	0	0	0	16
10:30	35	14	5	0	0	54	11	2	0	0	1	14
10:45	33	17	1	1	0	52	9	3	0	0	0	12
Hour	127	53	14	4	0	198	49	10	0	0	2	61
11:00	40	10	3	1	0	54	14	0	1	0	1	16
11:15	37	11	3	0	0	51	15	2	1	0	0	18
11:30	35	12	5	2	0	54	7	3	0	0	1	11
11:45	34	8	9	0	1	52	16	4	0	0	0	20
Hour	146	41	20	3	1	211	52	9	2	0	2	65
12:00	44	13	3	3	0	63	8	2	0	0	1	11
12:15	66	11	1	0	0	78	13	1	0	0	0	14
12:30	59	14	4	0	0	77	18	6	0	0	1	25
12:45	59	10	1	3	0	73	9	2	0	0	0	11
Hour	228	48	9	6	0	291	48	11	0	0	2	61
13:00	69	10	6	2	0	87	21	6	0	0	0	27
13:15	57	5	1	0	0	63	15	2	1	1	0	19
13:30	52	8	1	0	0	61	25	1	1	0	1	28
13:45	47	10	4	0	0	61	8	3	0	0	0	11
Hour	225	33	12	2	0	272	69	12	2	1	1	85
14:00	49	14	5	1	0	69	23	3	0	0	1	27
14:15	43	11	8	0	0	62	10	3	0	0	0	13
14:30	48	18	6	4	1	77	26	2	0	0	1	29
14:45	49	11	6	2	0	68	20	4	1	0	0	25
Hour	189	54	25	7	1	276	79	12	1	0	2	94
15:00	56	10	2	2	0	70	19	1	0	0	0	20
15:15	42	9	5	0	0	56	15	2	0	0	0	17
15:30	47	16	2	1	0	66	20	3	0	0	1	24
15:45	57	13	2	0	0	72	27	4	1	0	0	32
Hour	202	48	11	3	0	264	81	10	1	0	1	93
16:00	108	15	3	1	0	127	28	6	0	0	1	35
16:15	94	22	1	0	0	117	28	11	0	0	0	39
16:30	109	15	2	1	0	127	43	7	2	0	1	53
16:45	83	14	3	1	0	101	42	7	1	0	1	51
Hour	394	66	9	3	0	472	141	31	3	0	3	178
17:00	138	18	0	0	0	156	71	4	2	0	0	77
17:15	128	10	1	1	0	140	48	3	1	0	1	53
17:30	138	5	2	0	0	145	38	5	0	0	0	43
17:45	101	13	3	0	0	117	42	6	0	0	1	49
Hour	505	46	6	1	0	558	199	18	3	0	2	222
18:00	102	7	0	0	0	109	33	5	0	0	1	39
18:15	74	6	0	0	0	80	27	5	0	0	0	32
18:30	84	8	0	2	0	94	16	0	0	0	0	16
18:45	58	4	1	0	0	63	28	1	0	0	2	31
Hour	318	25	1	2	0	346	104	11	0	0	3	118
Total	2676	489	135	43	3	3346	1000	146	12	1	24	1183

Site No. 2
Location Park West Avenue(N) / Park West Avenue(S) / Cedar Brook Way
Date Wednesday 13 February 2019

Time	C to B - Cedar Brook Way to Park West Avenue(S)					Veh. Total	C to A - Cedar Brook Way to Park West Avenue(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	8	3	0	0	0	11	2	1	0	0	0	3
07:15	14	7	1	0	0	22	2	0	0	0	0	2
07:30	27	4	0	0	1	32	6	3	0	0	0	9
07:45	29	6	1	0	0	36	7	1	0	0	0	8
Hour	78	20	2	0	1	101	17	5	0	0	0	22
08:00	24	5	1	0	1	31	9	0	0	0	0	9
08:15	30	6	1	0	1	38	7	2	0	0	0	9
08:30	44	5	0	0	1	50	10	1	0	0	0	11
08:45	44	3	0	0	1	48	8	2	0	0	1	11
Hour	142	19	2	0	4	167	34	5	0	0	1	40
09:00	37	5	0	0	0	42	6	0	0	0	0	6
09:15	14	2	0	0	1	17	7	0	0	0	0	7
09:30	14	0	0	0	0	14	4	0	0	0	0	4
09:45	23	0	0	0	2	25	5	0	0	0	0	5
Hour	88	7	0	0	3	98	22	0	0	0	0	22
10:00	11	3	0	0	0	14	2	1	0	0	0	3
10:15	11	0	0	0	0	11	2	1	1	0	0	4
10:30	7	0	0	0	0	7	8	1	1	0	0	10
10:45	9	2	0	0	1	12	4	0	0	0	0	4
Hour	38	5	0	0	1	44	16	3	2	0	0	21
11:00	10	4	0	0	0	14	4	0	0	0	0	4
11:15	10	2	0	0	1	13	4	1	1	0	0	6
11:30	13	4	0	0	0	17	4	0	0	0	0	4
11:45	20	5	0	0	0	25	5	1	1	0	0	7
Hour	53	15	0	0	1	69	17	2	2	0	0	21
12:00	17	1	0	0	0	18	8	1	0	0	0	9
12:15	17	2	1	0	1	21	7	1	1	0	0	9
12:30	12	3	0	0	0	15	5	1	0	0	0	6
12:45	16	1	0	0	1	18	2	2	0	0	0	4
Hour	62	7	1	0	2	72	22	5	1	0	0	28
13:00	20	2	2	0	1	25	6	0	0	0	0	6
13:15	15	7	0	0	1	23	5	3	0	0	0	8
13:30	30	2	0	0	0	32	5	0	0	0	0	5
13:45	20	5	1	0	0	26	5	1	0	0	0	6
Hour	85	16	3	0	2	106	21	4	0	0	0	25
14:00	19	4	0	0	1	24	4	0	0	0	0	4
14:15	11	2	0	0	1	14	5	2	0	0	0	7
14:30	17	1	0	0	0	18	4	2	1	0	0	7
14:45	10	5	0	0	1	16	8	4	0	0	0	12
Hour	57	12	0	0	3	72	21	8	1	0	0	30
15:00	15	1	0	0	0	16	5	1	0	0	0	6
15:15	11	2	0	0	0	13	12	0	0	0	0	12
15:30	27	0	0	0	1	28	13	0	1	0	0	14
15:45	38	5	0	0	1	44	11	2	0	0	0	13
Hour	91	8	0	0	2	101	41	3	1	0	0	45
16:00	10	6	1	0	1	18	3	1	0	0	0	4
16:15	9	2	0	0	1	12	11	0	0	0	0	11
16:30	17	2	1	0	0	20	6	2	0	1	0	9
16:45	15	2	0	0	0	17	12	4	0	0	0	16
Hour	51	12	2	0	2	67	32	7	0	1	0	40
17:00	21	2	1	0	1	25	12	1	0	0	0	13
17:15	10	1	1	0	0	12	13	0	0	0	0	13
17:30	20	1	0	0	1	22	24	2	0	0	0	26
17:45	10	1	0	0	1	12	13	2	0	0	0	15
Hour	61	5	2	0	3	71	62	5	0	0	0	67
18:00	17	2	0	0	0	19	10	0	0	0	0	10
18:15	18	5	0	0	1	24	9	2	0	0	0	11
18:30	10	2	0	0	2	14	14	2	0	0	0	16
18:45	18	0	0	0	0	18	8	2	0	1	0	11
Hour	63	9	0	0	3	75	41	6	0	1	0	48
Total	869	135	12	0	27	1043	346	53	7	2	1	409

Site No. 2
Location Park West Avenue(N) / Park West Avenue(S) / Cedar Brook Way
Date Wednesday 13 February 2019

Time	To Arm A - Park West Avenue(N)					Veh. Total	From Arm A - Park West Avenue(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	17	2	1	1	0	21	74	16	0	0	0	90
07:15	24	5	0	1	0	30	107	19	1	2	0	129
07:30	31	10	1	1	0	43	136	15	1	0	0	152
07:45	33	7	1	2	0	43	163	18	2	0	1	184
Hour	105	24	3	5	0	137	480	68	4	2	1	555
08:00	44	4	3	0	0	51	164	21	1	2	0	188
08:15	44	6	3	0	0	53	148	20	3	0	0	171
08:30	30	7	2	1	0	40	158	27	3	1	0	189
08:45	37	13	0	1	1	52	143	18	4	0	0	165
Hour	155	30	8	2	1	196	613	86	11	3	0	713
09:00	30	3	2	1	1	37	140	17	9	3	1	170
09:15	43	8	3	0	0	54	109	19	4	1	0	133
09:30	34	12	6	1	0	53	79	21	3	2	0	105
09:45	48	8	6	3	0	65	71	21	3	2	0	97
Hour	155	31	17	5	1	209	399	78	19	8	1	505
10:00	31	18	4	2	0	55	56	10	2	0	0	68
10:15	32	6	5	1	0	44	61	16	4	1	0	82
10:30	43	15	6	0	0	64	54	14	2	2	0	72
10:45	37	17	1	1	0	56	36	10	8	0	0	54
Hour	143	56	16	4	0	219	207	50	16	3	0	276
11:00	44	10	3	1	0	58	43	15	2	2	0	62
11:15	41	12	4	0	0	57	34	15	4	2	0	55
11:30	39	12	5	2	0	58	46	17	4	0	0	67
11:45	39	9	10	0	1	59	49	10	5	2	0	66
Hour	163	43	22	3	1	232	172	57	15	6	0	250
12:00	52	14	3	3	0	72	41	7	1	0	1	50
12:15	73	12	2	0	0	87	33	12	4	0	0	49
12:30	64	15	4	0	0	83	56	11	1	0	0	68
12:45	61	12	1	3	0	77	64	7	3	0	0	74
Hour	250	53	10	6	0	319	194	37	9	0	1	241
13:00	75	10	6	2	0	93	44	18	3	1	1	67
13:15	62	8	1	0	0	71	69	7	3	0	0	79
13:30	57	8	1	0	0	66	58	13	3	1	0	75
13:45	52	11	4	0	0	67	78	16	7	0	1	102
Hour	246	37	12	2	0	297	249	54	16	2	2	323
14:00	53	14	5	1	0	73	94	23	5	2	1	125
14:15	48	13	8	0	0	69	57	16	5	0	0	78
14:30	52	20	7	4	1	84	54	17	3	0	0	74
14:45	57	15	6	2	0	80	50	17	3	3	0	73
Hour	210	62	26	7	1	306	255	73	16	5	1	350
15:00	61	11	2	2	0	76	49	12	8	0	0	69
15:15	54	9	5	0	0	68	56	10	6	0	2	74
15:30	60	16	3	1	0	80	40	12	4	1	0	57
15:45	68	15	2	0	0	85	68	13	4	0	0	85
Hour	243	51	12	3	0	309	213	47	22	1	2	285
16:00	111	16	3	1	0	131	47	10	2	2	0	61
16:15	105	22	1	0	0	128	64	11	3	1	0	79
16:30	115	17	2	2	0	136	48	12	1	1	0	62
16:45	95	18	3	1	0	117	66	16	0	0	0	82
Hour	426	73	9	4	0	512	225	49	6	4	0	284
17:00	150	19	0	0	0	169	65	9	3	1	0	78
17:15	141	10	1	1	0	153	62	4	1	1	0	68
17:30	162	7	2	0	0	171	49	3	0	1	0	53
17:45	114	15	3	0	0	132	56	13	0	0	0	69
Hour	567	51	6	1	0	625	232	29	4	3	0	268
18:00	112	7	0	0	0	119	48	3	0	0	0	51
18:15	83	8	0	0	0	91	55	5	1	1	0	62
18:30	98	10	0	2	0	110	38	5	0	0	0	43
18:45	66	6	1	1	0	74	46	6	0	0	0	52
Hour	359	31	1	3	0	394	187	19	1	1	0	208
Total	3022	542	142	45	4	3755	3426	647	139	38	8	4258

Site No.	2
Location	Park West Avenue(N) / Park West Avenue(S) / Cedar Brook Way
Date	Wednesday 13 February 2019

Time	To Arm B - Park West Avenue(S)					Veh. Total	From Arm B - Park West Avenue(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	77	17	0	0	0	94	22	1	1	1	0	25
07:15	117	26	2	2	0	147	28	6	0	1	1	36
07:30	158	19	1	0	1	179	35	10	1	1	1	48
07:45	191	23	3	0	1	218	38	7	1	2	0	48
Hour	543	85	6	2	2	638	123	24	3	5	2	157
08:00	186	26	2	2	1	217	52	7	3	0	1	63
08:15	177	25	4	0	1	207	57	5	3	0	0	65
08:30	198	32	3	1	1	235	40	9	2	1	1	53
08:45	184	20	4	0	1	209	59	14	0	1	0	74
Hour	745	103	13	3	4	868	208	35	8	2	2	255
09:00	175	21	9	3	1	209	41	5	2	1	2	51
09:15	118	19	4	1	1	143	46	9	3	0	0	58
09:30	88	20	3	2	0	113	46	14	6	1	1	68
09:45	90	19	3	2	2	116	56	10	6	3	0	75
Hour	471	79	19	8	4	581	189	38	17	5	3	252
10:00	63	13	2	0	0	78	45	19	4	2	1	71
10:15	64	16	4	1	0	85	43	8	4	1	0	56
10:30	57	14	2	2	0	75	46	16	5	0	1	68
10:45	41	12	7	0	1	61	42	20	1	1	0	64
Hour	225	55	15	3	1	299	176	63	14	4	2	259
11:00	49	18	2	2	0	71	54	10	4	1	1	70
11:15	41	16	3	2	1	63	52	13	4	0	0	69
11:30	57	21	4	0	0	82	42	15	5	2	1	65
11:45	59	14	5	1	0	79	50	12	9	0	1	72
Hour	206	69	14	5	1	295	198	50	22	3	3	276
12:00	51	7	1	0	1	60	52	15	3	3	1	74
12:15	49	14	5	0	1	69	79	12	1	0	0	92
12:30	57	11	1	0	0	69	77	20	4	0	1	102
12:45	77	7	3	0	1	88	68	12	1	3	0	84
Hour	234	39	10	0	3	286	276	59	9	6	2	352
13:00	55	17	4	1	1	78	90	16	6	2	0	114
13:15	78	14	3	0	1	96	72	7	2	1	0	82
13:30	84	13	3	1	0	101	77	9	2	0	1	89
13:45	94	20	8	0	1	123	55	13	4	0	0	72
Hour	311	64	18	2	3	398	294	45	14	3	1	357
14:00	108	25	5	2	2	142	72	17	5	1	1	96
14:15	64	15	5	0	1	85	53	14	8	0	0	75
14:30	63	16	3	0	0	82	74	20	6	4	2	106
14:45	53	20	3	3	1	80	69	15	7	2	0	93
Hour	288	76	16	5	4	389	268	66	26	7	3	370
15:00	58	12	8	0	0	78	75	11	2	2	0	90
15:15	59	11	6	0	2	78	57	11	5	0	0	73
15:30	63	9	4	1	1	78	67	19	2	1	1	90
15:45	97	16	4	0	1	118	84	17	3	0	0	104
Hour	277	48	22	1	4	352	283	58	12	3	1	357
16:00	47	16	3	2	1	69	136	21	3	1	1	162
16:15	58	12	2	1	1	74	122	33	1	0	0	156
16:30	50	10	2	1	0	63	152	22	4	1	1	180
16:45	74	14	0	0	0	88	125	21	4	1	1	152
Hour	229	52	7	4	2	294	535	97	12	3	3	650
17:00	73	9	4	1	1	88	209	22	2	0	0	233
17:15	60	4	2	1	0	67	176	13	2	1	1	193
17:30	55	3	0	1	1	60	176	10	2	0	0	188
17:45	53	8	0	0	1	62	143	19	3	0	1	166
Hour	241	24	6	3	3	277	704	64	9	1	2	780
18:00	56	4	0	0	0	60	135	12	0	0	1	148
18:15	60	7	1	0	1	69	101	11	0	0	0	112
18:30	41	6	0	0	2	49	100	8	0	2	0	110
18:45	48	5	0	0	0	53	86	5	1	0	2	94
Hour	205	22	1	0	3	231	422	36	1	2	3	464
Total	3975	716	147	36	34	4908	3676	635	147	44	27	4529

Site No. 2
Location Park West Avenue(N) / Park West Avenue(S) / Cedar Brook Way
Date Wednesday 13 February 2019

Time	To Arm C - Cedar Brook Way					Veh. Total	From Arm C - Cedar Brook Way					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	12	2	0	0	0	14	10	4	0	0	0	14
07:15	10	1	0	0	1	12	16	7	1	0	0	24
07:30	15	3	0	0	1	19	33	7	0	0	1	41
07:45	13	2	0	0	0	15	36	7	1	0	0	44
Hour	50	8	0	0	2	60	95	25	2	0	1	123
08:00	19	3	0	0	1	23	33	5	1	0	1	40
08:15	21	2	0	0	0	23	37	8	1	0	1	47
08:30	24	3	0	0	1	28	54	6	0	0	1	61
08:45	33	4	0	0	0	37	52	5	0	0	2	59
Hour	97	12	0	0	2	111	176	24	2	0	5	207
09:00	19	3	0	0	1	23	43	5	0	0	0	48
09:15	15	3	0	0	0	18	21	2	0	0	1	24
09:30	21	3	0	0	1	25	18	0	0	0	0	18
09:45	17	4	0	0	0	21	28	0	0	0	2	30
Hour	72	13	0	0	2	87	110	7	0	0	3	120
10:00	20	2	0	0	1	23	13	4	0	0	0	17
10:15	21	3	0	0	0	24	13	1	1	0	0	15
10:30	15	2	0	0	1	18	15	1	1	0	0	17
10:45	13	3	1	0	0	17	13	2	0	0	1	16
Hour	69	10	1	0	2	82	54	8	2	0	1	65
11:00	18	1	1	0	1	21	14	4	0	0	0	18
11:15	18	3	2	0	0	23	14	3	1	0	1	19
11:30	9	3	0	0	1	13	17	4	0	0	0	21
11:45	26	5	0	1	0	32	25	6	1	0	0	32
Hour	71	12	3	1	2	89	70	17	2	0	1	90
12:00	15	3	0	0	1	19	25	2	0	0	0	27
12:15	14	1	0	0	0	15	24	3	2	0	1	30
12:30	29	9	0	0	1	39	17	4	0	0	0	21
12:45	12	3	0	0	0	15	18	3	0	0	1	22
Hour	70	16	0	0	2	88	84	12	2	0	2	100
13:00	30	9	1	0	1	41	26	2	2	0	1	31
13:15	21	2	1	1	0	25	20	10	0	0	1	31
13:30	29	3	1	0	1	34	35	2	0	0	0	37
13:45	12	4	0	0	0	16	25	6	1	0	0	32
Hour	92	18	3	1	2	116	106	20	3	0	2	131
14:00	28	5	0	0	1	34	23	4	0	0	1	28
14:15	14	6	0	0	0	20	16	4	0	0	1	21
14:30	34	4	0	0	1	39	21	3	1	0	0	25
14:45	27	6	1	0	0	34	18	9	0	0	1	28
Hour	103	21	1	0	2	127	78	20	1	0	3	102
15:00	25	2	0	0	0	27	20	2	0	0	0	22
15:15	23	3	0	0	0	26	23	2	0	0	0	25
15:30	24	6	0	0	1	31	40	0	1	0	1	42
15:45	36	6	1	0	0	43	49	7	0	0	1	57
Hour	108	17	1	0	1	127	132	11	1	0	2	146
16:00	38	6	0	0	1	45	13	7	1	0	1	22
16:15	43	12	1	0	0	56	20	2	0	0	1	23
16:30	58	11	2	0	1	72	23	4	1	1	0	29
16:45	49	11	1	0	1	62	27	6	0	0	0	33
Hour	188	40	4	0	3	235	83	19	2	1	2	107
17:00	84	6	2	0	0	92	33	3	1	0	1	38
17:15	60	4	1	0	1	66	23	1	1	0	0	25
17:30	52	6	0	0	0	58	44	3	0	0	1	48
17:45	55	12	0	0	1	68	23	3	0	0	1	27
Hour	251	28	3	0	2	284	123	10	2	0	3	138
18:00	42	6	0	0	1	49	27	2	0	0	0	29
18:15	40	8	0	1	0	49	27	7	0	0	1	35
18:30	23	1	0	0	0	24	24	4	0	0	2	30
18:45	44	2	0	0	2	48	26	2	0	1	0	29
Hour	149	17	0	1	3	170	104	15	0	1	3	123
Total	1320	212	16	3	25	1576	1215	188	19	2	28	1452

Site No. 3
Location Park West Avenue(N) / Park West Avenue(S) / Access Road
Date Wednesday 13 February 2019

Time	A to C - Park West Avenue(N) to Access Road					Veh. Total	A to B - Park West Avenue(N) to Park West Avenue(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	1	0	0	0	0	1	80	17	0	0	0	97
07:15	2	0	0	0	0	2	117	25	2	2	0	146
07:30	0	0	0	0	0	0	159	18	1	0	1	179
07:45	0	0	0	0	0	0	188	19	3	0	1	211
Hour	3	0	0	0	0	3	544	79	6	2	2	633
08:00	4	1	0	0	0	5	184	25	2	2	1	214
08:15	0	0	0	0	0	0	176	25	4	0	1	206
08:30	1	0	0	0	0	1	199	29	4	1	1	234
08:45	0	0	0	0	0	0	182	21	4	0	1	208
Hour	5	1	0	0	0	6	741	100	14	3	4	862
09:00	0	0	0	0	0	0	179	22	8	3	1	213
09:15	0	0	0	0	0	0	119	18	4	1	1	143
09:30	1	0	0	0	0	1	91	22	2	2	0	117
09:45	0	0	0	0	0	0	90	19	2	2	2	115
Hour	1	0	0	0	0	1	479	81	16	8	4	588
10:00	0	0	0	0	0	0	69	12	4	0	0	85
10:15	1	0	1	0	0	2	63	15	3	0	0	81
10:30	0	0	0	0	0	0	57	14	2	3	0	76
10:45	1	0	0	0	0	1	39	11	6	0	1	57
Hour	2	0	1	0	0	3	228	52	15	3	1	299
11:00	1	0	0	0	0	1	49	17	3	2	0	71
11:15	1	1	0	0	0	2	44	16	4	2	1	67
11:30	1	1	0	0	0	2	52	20	2	0	0	74
11:45	1	0	0	0	0	1	60	14	7	1	0	82
Hour	4	2	0	0	0	6	205	67	16	5	1	294
12:00	1	0	0	0	0	1	50	7	1	0	1	59
12:15	0	0	0	0	0	0	51	15	5	0	1	72
12:30	0	0	0	0	0	0	58	10	1	0	0	69
12:45	3	0	0	0	0	3	72	9	3	0	1	85
Hour	4	0	0	0	0	4	231	41	10	0	3	285
13:00	0	0	0	0	0	0	58	16	4	1	1	80
13:15	0	0	0	0	0	0	76	14	3	0	1	94
13:30	1	0	0	0	0	1	86	10	3	1	0	100
13:45	1	0	0	0	0	1	96	20	7	0	1	124
Hour	2	0	0	0	0	2	316	60	17	2	3	398
14:00	0	0	0	0	0	0	111	22	6	2	2	143
14:15	0	0	0	0	0	0	68	14	4	0	1	87
14:30	0	0	0	0	0	0	65	16	4	0	0	85
14:45	0	0	0	0	0	0	55	19	3	3	1	81
Hour	0	0	0	0	0	0	299	71	17	5	4	396
15:00	1	0	0	0	0	1	59	13	6	0	0	78
15:15	0	0	0	0	0	0	59	12	7	0	2	80
15:30	0	0	0	0	0	0	66	9	4	1	1	81
15:45	0	0	0	0	0	0	96	13	4	0	1	114
Hour	1	0	0	0	0	1	280	47	21	1	4	353
16:00	1	1	0	0	0	2	47	15	3	2	1	68
16:15	0	0	0	0	0	0	60	13	2	1	0	76
16:30	0	0	0	0	0	0	52	11	2	1	1	67
16:45	0	0	0	0	0	0	74	14	0	0	0	88
Hour	1	1	0	0	0	2	233	53	7	4	2	299
17:00	0	0	0	0	0	0	75	7	4	1	1	88
17:15	1	0	0	0	0	1	57	5	2	1	0	65
17:30	1	0	0	0	0	1	53	3	0	1	1	58
17:45	1	1	0	0	0	2	52	5	0	0	1	58
Hour	3	1	0	0	0	4	237	20	6	3	3	269
18:00	1	1	0	0	0	2	59	3	0	0	0	62
18:15	1	0	0	0	0	1	61	7	1	0	1	70
18:30	0	0	0	0	0	0	44	6	0	0	2	52
18:45	2	1	0	0	0	3	46	4	0	0	0	50
Hour	4	2	0	0	0	6	210	20	1	0	3	234
Total	30	7	1	0	0	38	4003	691	146	36	34	4910

Site No. 3
Location Park West Avenue(N) / Park West Avenue(S) / Access Road
Date Wednesday 13 February 2019

Time	B to A - Park West Avenue(S) to Park West Avenue(N)					Veh. Total	B to C - Park West Avenue(S) to Access Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	21	2	1	1	0	25	1	0	0	0	0	1
07:15	29	5	0	1	1	36	0	0	0	0	0	0
07:30	39	8	2	1	1	51	1	0	0	0	0	1
07:45	32	7	1	2	0	42	1	0	0	0	0	1
Hour	121	22	4	5	2	154	3	0	0	0	0	3
08:00	49	7	3	0	1	60	6	0	0	0	0	6
08:15	55	3	3	0	1	62	1	0	0	0	0	1
08:30	46	7	3	1	0	57	4	1	0	0	0	5
08:45	52	13	0	1	0	66	0	1	0	0	0	1
Hour	202	30	9	2	2	245	11	2	0	0	0	13
09:00	45	4	2	1	2	54	1	0	0	0	0	1
09:15	44	9	3	0	0	56	0	1	0	0	0	1
09:30	45	13	9	1	1	69	1	1	0	0	0	2
09:45	54	15	2	3	1	75	0	0	0	0	0	0
Hour	188	41	16	5	4	254	2	2	0	0	0	4
10:00	48	17	4	2	0	71	1	0	0	0	0	1
10:15	40	5	4	2	1	52	1	0	0	0	0	1
10:30	49	17	4	0	0	70	1	1	0	0	0	2
10:45	47	17	1	1	0	66	1	0	0	0	0	1
Hour	184	56	13	5	1	259	4	1	0	0	0	5
11:00	49	9	3	1	1	63	2	0	0	0	0	2
11:15	51	15	6	0	0	72	2	0	0	0	0	2
11:30	42	15	4	2	1	64	3	0	0	0	0	3
11:45	50	13	9	0	2	74	0	1	0	0	0	1
Hour	192	52	22	3	4	273	7	1	0	0	0	8
12:00	52	15	3	3	0	73	0	0	0	0	0	0
12:15	78	14	1	0	1	94	4	0	0	0	0	4
12:30	74	17	4	0	0	95	1	0	0	0	0	1
12:45	67	12	1	3	0	83	3	1	0	0	0	4
Hour	271	58	9	6	1	345	8	1	0	0	0	9
13:00	94	15	6	2	1	118	6	0	0	0	0	6
13:15	72	8	2	0	0	82	0	0	0	0	1	1
13:30	74	7	3	0	1	85	1	0	0	0	0	1
13:45	54	14	4	0	0	72	4	0	0	0	0	4
Hour	294	44	15	2	2	357	11	0	0	0	1	12
14:00	73	15	3	1	1	93	4	0	0	0	0	4
14:15	58	14	9	0	0	81	0	0	0	0	0	0
14:30	78	20	7	4	2	111	2	1	0	0	0	3
14:45	67	16	4	2	0	89	0	0	0	0	0	0
Hour	276	65	23	7	3	374	6	1	0	0	0	7
15:00	69	11	2	2	0	84	0	1	0	0	0	1
15:15	62	10	5	1	0	78	2	0	0	0	0	2
15:30	65	19	2	0	1	87	1	0	0	0	0	1
15:45	91	17	4	0	0	112	3	1	0	0	0	4
Hour	287	57	13	3	1	361	6	2	0	0	0	8
16:00	129	21	1	1	1	153	5	1	0	0	0	6
16:15	128	36	1	1	0	166	1	0	0	0	0	1
16:30	143	20	4	0	1	168	2	0	0	0	0	2
16:45	143	22	4	1	1	171	0	2	0	0	0	2
Hour	543	99	10	3	3	658	8	3	0	0	0	11
17:00	205	21	2	0	1	229	0	0	0	0	0	0
17:15	170	9	2	1	0	182	2	0	0	0	0	2
17:30	186	14	2	0	0	202	1	4	2	0	0	7
17:45	140	15	3	0	1	159	1	3	0	0	0	4
Hour	701	59	9	1	2	772	4	7	2	0	0	13
18:00	135	11	0	0	1	147	6	2	0	0	0	8
18:15	106	4	0	0	0	110	5	4	1	0	0	10
18:30	105	4	1	2	0	112	5	3	0	0	0	8
18:45	94	1	0	0	1	96	5	0	0	0	0	5
Hour	440	20	1	2	2	465	21	9	1	0	0	31
Total	3699	603	144	44	27	4517	91	29	3	0	1	124

Site No. 3
Location Park West Avenue(N) / Park West Avenue(S) / Access Road
Date Wednesday 13 February 2019

Time	C to B - Access Road to Park West Avenue(S)					Veh. Total	C to A - Access Road to Park West Avenue(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	3	3	3	0	0	9	1	0	0	0	0	1
07:15	4	3	0	0	0	7	1	0	0	0	0	1
07:30	5	1	0	0	0	6	0	0	0	0	0	0
07:45	2	1	0	0	0	3	1	1	0	0	0	2
Hour	14	8	3	0	0	25	3	1	0	0	0	4
08:00	4	3	0	0	0	7	8	0	0	0	0	8
08:15	3	0	0	0	0	3	1	0	0	0	0	1
08:30	4	1	0	0	0	5	0	0	0	0	0	0
08:45	2	0	0	0	0	2	0	0	0	0	0	0
Hour	13	4	0	0	0	17	9	0	0	0	0	9
09:00	1	1	0	0	0	2	1	0	0	0	0	1
09:15	1	1	0	0	0	2	0	0	0	0	0	0
09:30	3	1	0	0	0	4	1	0	0	0	0	1
09:45	1	1	0	0	0	2	0	0	0	0	0	0
Hour	6	4	0	0	0	10	2	0	0	0	0	2
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	1	0	1	0	0	2	0	0	0	0	0	0
10:30	2	1	0	0	0	3	0	1	0	0	0	1
10:45	0	0	0	0	0	0	0	2	0	0	0	2
Hour	3	1	1	0	0	5	0	3	0	0	0	3
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	1	1	0	0	0	2	0	0	0	0	0	0
11:30	3	0	0	0	0	3	0	0	0	0	0	0
11:45	0	1	0	0	0	1	0	0	0	0	0	0
Hour	4	2	0	0	0	6	0	0	0	0	0	0
12:00	1	1	0	0	0	2	2	0	0	0	0	2
12:15	4	0	0	0	0	4	2	0	0	0	0	2
12:30	2	2	0	0	0	4	0	0	0	0	0	0
12:45	2	0	0	0	0	2	3	0	0	0	0	3
Hour	9	3	0	0	0	12	7	0	0	0	0	7
13:00	2	0	0	0	0	2	0	0	0	0	0	0
13:15	1	0	0	0	1	2	0	0	0	0	0	0
13:30	3	0	0	0	0	3	0	0	0	0	0	0
13:45	2	0	0	0	0	2	1	0	0	0	0	1
Hour	8	0	0	0	1	9	1	0	0	0	0	1
14:00	5	0	0	0	0	5	0	0	0	0	0	0
14:15	1	0	0	0	0	1	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
14:45	3	0	0	0	0	3	1	0	0	0	0	1
Hour	9	0	0	0	0	9	1	0	0	0	0	1
15:00	2	0	0	0	0	2	1	0	0	0	0	1
15:15	2	0	0	0	0	2	0	0	0	0	0	0
15:30	0	1	0	0	0	1	0	0	0	0	0	0
15:45	6	0	0	0	0	6	2	0	0	0	0	2
Hour	10	1	0	0	0	11	3	0	0	0	0	3
16:00	4	0	0	0	0	4	1	0	0	0	0	1
16:15	3	2	0	0	0	5	2	0	0	0	0	2
16:30	3	0	0	0	0	3	1	0	0	0	0	1
16:45	3	0	0	0	0	3	0	0	0	0	0	0
Hour	13	2	0	0	0	15	4	0	0	0	0	4
17:00	0	0	0	0	0	0	2	0	0	0	0	2
17:15	1	0	0	0	0	1	1	0	0	0	0	1
17:30	0	0	0	0	0	0	1	0	0	0	0	1
17:45	1	0	0	0	0	1	0	0	0	0	0	0
Hour	2	0	0	0	0	2	4	0	0	0	0	4
18:00	2	0	0	0	0	2	1	0	0	0	0	1
18:15	2	1	0	0	0	3	0	0	0	0	0	0
18:30	1	0	0	0	0	1	0	1	0	0	0	1
18:45	3	0	0	0	0	3	0	0	0	0	0	0
Hour	8	1	0	0	0	9	1	1	0	0	0	2
Total	99	26	4	0	1	130	35	5	0	0	0	40

Site No. 3
Location Park West Avenue(N) / Park West Avenue(S) / Access Road
Date Wednesday 13 February 2019

Time	To Arm A - Park West Avenue(N)					Veh. Total	From Arm A - Park West Avenue(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	22	2	1	1	0	26	81	17	0	0	0	98
07:15	30	5	0	1	1	37	119	25	2	2	0	148
07:30	39	8	2	1	1	51	159	18	1	0	1	179
07:45	33	8	1	2	0	44	188	19	3	0	1	211
Hour	124	23	4	5	2	158	547	79	6	2	2	636
08:00	57	7	3	0	1	68	188	26	2	2	1	219
08:15	56	3	3	0	1	63	176	25	4	0	1	206
08:30	46	7	3	1	0	57	200	29	4	1	1	235
08:45	52	13	0	1	0	66	182	21	4	0	1	208
Hour	211	30	9	2	2	254	746	101	14	3	4	868
09:00	46	4	2	1	2	55	179	22	8	3	1	213
09:15	44	9	3	0	0	56	119	18	4	1	1	143
09:30	46	13	9	1	1	70	92	22	2	2	0	118
09:45	54	15	2	3	1	75	90	19	2	2	2	115
Hour	190	41	16	5	4	256	480	81	16	8	4	589
10:00	48	17	4	2	0	71	69	12	4	0	0	85
10:15	40	5	4	2	1	52	64	15	4	0	0	83
10:30	49	18	4	0	0	71	57	14	2	3	0	76
10:45	47	19	1	1	0	68	40	11	6	0	1	58
Hour	184	59	13	5	1	262	230	52	16	3	1	302
11:00	49	9	3	1	1	63	50	17	3	2	0	72
11:15	51	15	6	0	0	72	45	17	4	2	1	69
11:30	42	15	4	2	1	64	53	21	2	0	0	76
11:45	50	13	9	0	2	74	61	14	7	1	0	83
Hour	192	52	22	3	4	273	209	69	16	5	1	300
12:00	54	15	3	3	0	75	51	7	1	0	1	60
12:15	80	14	1	0	1	96	51	15	5	0	1	72
12:30	74	17	4	0	0	95	58	10	1	0	0	69
12:45	70	12	1	3	0	86	75	9	3	0	1	88
Hour	278	58	9	6	1	352	235	41	10	0	3	289
13:00	94	15	6	2	1	118	58	16	4	1	1	80
13:15	72	8	2	0	0	82	76	14	3	0	1	94
13:30	74	7	3	0	1	85	87	10	3	1	0	101
13:45	55	14	4	0	0	73	97	20	7	0	1	125
Hour	295	44	15	2	2	358	318	60	17	2	3	400
14:00	73	15	3	1	1	93	111	22	6	2	2	143
14:15	58	14	9	0	0	81	68	14	4	0	1	87
14:30	78	20	7	4	2	111	65	16	4	0	0	85
14:45	68	16	4	2	0	90	55	19	3	3	1	81
Hour	277	65	23	7	3	375	299	71	17	5	4	396
15:00	70	11	2	2	0	85	60	13	6	0	0	79
15:15	62	10	5	1	0	78	59	12	7	0	2	80
15:30	65	19	2	0	1	87	66	9	4	1	1	81
15:45	93	17	4	0	0	114	96	13	4	0	1	114
Hour	290	57	13	3	1	364	281	47	21	1	4	354
16:00	130	21	1	1	1	154	48	16	3	2	1	70
16:15	130	36	1	1	0	168	60	13	2	1	0	76
16:30	144	20	4	0	1	169	52	11	2	1	1	67
16:45	143	22	4	1	1	171	74	14	0	0	0	88
Hour	547	99	10	3	3	662	234	54	7	4	2	301
17:00	207	21	2	0	1	231	75	7	4	1	1	88
17:15	171	9	2	1	0	183	58	5	2	1	0	66
17:30	187	14	2	0	0	203	54	3	0	1	1	59
17:45	140	15	3	0	1	159	53	6	0	0	1	60
Hour	705	59	9	1	2	776	240	21	6	3	3	273
18:00	136	11	0	0	1	148	60	4	0	0	0	64
18:15	106	4	0	0	0	110	62	7	1	0	1	71
18:30	105	5	1	2	0	113	44	6	0	0	2	52
18:45	94	1	0	0	1	96	48	5	0	0	0	53
Hour	441	21	1	2	2	467	214	22	1	0	3	240
Total	3734	608	144	44	27	4557	4033	698	147	36	34	4948

Site No. 3
Location Park West Avenue(N) / Park West Avenue(S) / Access Road
Date Wednesday 13 February 2019

Time	To Arm B - Park West Avenue(S)					Veh. Total	From Arm B - Park West Avenue(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	83	20	3	0	0	106	22	2	1	1	0	26
07:15	121	28	2	2	0	153	29	5	0	1	1	36
07:30	164	19	1	0	1	185	40	8	2	1	1	52
07:45	190	20	3	0	1	214	33	7	1	2	0	43
Hour	558	87	9	2	2	658	124	22	4	5	2	157
08:00	188	28	2	2	1	221	55	7	3	0	1	66
08:15	179	25	4	0	1	209	56	3	3	0	1	63
08:30	203	30	4	1	1	239	50	8	3	1	0	62
08:45	184	21	4	0	1	210	52	14	0	1	0	67
Hour	754	104	14	3	4	879	213	32	9	2	2	258
09:00	180	23	8	3	1	215	46	4	2	1	2	55
09:15	120	19	4	1	1	145	44	10	3	0	0	57
09:30	94	23	2	2	0	121	46	14	9	1	1	71
09:45	91	20	2	2	2	117	54	15	2	3	1	75
Hour	485	85	16	8	4	598	190	43	16	5	4	258
10:00	69	12	4	0	0	85	49	17	4	2	0	72
10:15	64	15	4	0	0	83	41	5	4	2	1	53
10:30	59	15	2	3	0	79	50	18	4	0	0	72
10:45	39	11	6	0	1	57	48	17	1	1	0	67
Hour	231	53	16	3	1	304	188	57	13	5	1	264
11:00	49	17	3	2	0	71	51	9	3	1	1	65
11:15	45	17	4	2	1	69	53	15	6	0	0	74
11:30	55	20	2	0	0	77	45	15	4	2	1	67
11:45	60	15	7	1	0	83	50	14	9	0	2	75
Hour	209	69	16	5	1	300	199	53	22	3	4	281
12:00	51	8	1	0	1	61	52	15	3	3	0	73
12:15	55	15	5	0	1	76	82	14	1	0	1	98
12:30	60	12	1	0	0	73	75	17	4	0	0	96
12:45	74	9	3	0	1	87	70	13	1	3	0	87
Hour	240	44	10	0	3	297	279	59	9	6	1	354
13:00	60	16	4	1	1	82	100	15	6	2	1	124
13:15	77	14	3	0	2	96	72	8	2	0	1	83
13:30	89	10	3	1	0	103	75	7	3	0	1	86
13:45	98	20	7	0	1	126	58	14	4	0	0	76
Hour	324	60	17	2	4	407	305	44	15	2	3	369
14:00	116	22	6	2	2	148	77	15	3	1	1	97
14:15	69	14	4	0	1	88	58	14	9	0	0	81
14:30	65	16	4	0	0	85	80	21	7	4	2	114
14:45	58	19	3	3	1	84	67	16	4	2	0	89
Hour	308	71	17	5	4	405	282	66	23	7	3	381
15:00	61	13	6	0	0	80	69	12	2	2	0	85
15:15	61	12	7	0	2	82	64	10	5	1	0	80
15:30	66	10	4	1	1	82	66	19	2	0	1	88
15:45	102	13	4	0	1	120	94	18	4	0	0	116
Hour	290	48	21	1	4	364	293	59	13	3	1	369
16:00	51	15	3	2	1	72	134	22	1	1	1	159
16:15	63	15	2	1	0	81	129	36	1	1	0	167
16:30	55	11	2	1	1	70	145	20	4	0	1	170
16:45	77	14	0	0	0	91	143	24	4	1	1	173
Hour	246	55	7	4	2	314	551	102	10	3	3	669
17:00	75	7	4	1	1	88	205	21	2	0	1	229
17:15	58	5	2	1	0	66	172	9	2	1	0	184
17:30	53	3	0	1	1	58	187	18	4	0	0	209
17:45	53	5	0	0	1	59	141	18	3	0	1	163
Hour	239	20	6	3	3	271	705	66	11	1	2	785
18:00	61	3	0	0	0	64	141	13	0	0	1	155
18:15	63	8	1	0	1	73	111	8	1	0	0	120
18:30	45	6	0	0	2	53	110	7	1	2	0	120
18:45	49	4	0	0	0	53	99	1	0	0	1	101
Hour	218	21	1	0	3	243	461	29	2	2	2	496
Total	4102	717	150	36	35	5040	3790	632	147	44	28	4641

Site No. 3
Location Park West Avenue(N) / Park West Avenue(S) / Access Road
Date Wednesday 13 February 2019

Time	To Arm C - Access Road					Veh. Total	From Arm C - Access Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	2	0	0	0	0	2	4	3	3	0	0	10
07:15	2	0	0	0	0	2	5	3	0	0	0	8
07:30	1	0	0	0	0	1	5	1	0	0	0	6
07:45	1	0	0	0	0	1	3	2	0	0	0	5
Hour	6	0	0	0	0	6	17	9	3	0	0	29
08:00	10	1	0	0	0	11	12	3	0	0	0	15
08:15	1	0	0	0	0	1	4	0	0	0	0	4
08:30	5	1	0	0	0	6	4	1	0	0	0	5
08:45	0	1	0	0	0	1	2	0	0	0	0	2
Hour	16	3	0	0	0	19	22	4	0	0	0	26
09:00	1	0	0	0	0	1	2	1	0	0	0	3
09:15	0	1	0	0	0	1	1	1	0	0	0	2
09:30	2	1	0	0	0	3	4	1	0	0	0	5
09:45	0	0	0	0	0	0	1	1	0	0	0	2
Hour	3	2	0	0	0	5	8	4	0	0	0	12
10:00	1	0	0	0	0	1	0	0	0	0	0	0
10:15	2	0	1	0	0	3	1	0	1	0	0	2
10:30	1	1	0	0	0	2	2	2	0	0	0	4
10:45	2	0	0	0	0	2	0	2	0	0	0	2
Hour	6	1	1	0	0	8	3	4	1	0	0	8
11:00	3	0	0	0	0	3	0	0	0	0	0	0
11:15	3	1	0	0	0	4	1	1	0	0	0	2
11:30	4	1	0	0	0	5	3	0	0	0	0	3
11:45	1	1	0	0	0	2	0	1	0	0	0	1
Hour	11	3	0	0	0	14	4	2	0	0	0	6
12:00	1	0	0	0	0	1	3	1	0	0	0	4
12:15	4	0	0	0	0	4	6	0	0	0	0	6
12:30	1	0	0	0	0	1	2	2	0	0	0	4
12:45	6	1	0	0	0	7	5	0	0	0	0	5
Hour	12	1	0	0	0	13	16	3	0	0	0	19
13:00	6	0	0	0	0	6	2	0	0	0	0	2
13:15	0	0	0	0	1	1	1	0	0	0	1	2
13:30	2	0	0	0	0	2	3	0	0	0	0	3
13:45	5	0	0	0	0	5	3	0	0	0	0	3
Hour	13	0	0	0	1	14	9	0	0	0	1	10
14:00	4	0	0	0	0	4	5	0	0	0	0	5
14:15	0	0	0	0	0	0	1	0	0	0	0	1
14:30	2	1	0	0	0	3	0	0	0	0	0	0
14:45	0	0	0	0	0	0	4	0	0	0	0	4
Hour	6	1	0	0	0	7	10	0	0	0	0	10
15:00	1	1	0	0	0	2	3	0	0	0	0	3
15:15	2	0	0	0	0	2	2	0	0	0	0	2
15:30	1	0	0	0	0	1	0	1	0	0	0	1
15:45	3	1	0	0	0	4	8	0	0	0	0	8
Hour	7	2	0	0	0	9	13	1	0	0	0	14
16:00	6	2	0	0	0	8	5	0	0	0	0	5
16:15	1	0	0	0	0	1	5	2	0	0	0	7
16:30	2	0	0	0	0	2	4	0	0	0	0	4
16:45	0	2	0	0	0	2	3	0	0	0	0	3
Hour	9	4	0	0	0	13	17	2	0	0	0	19
17:00	0	0	0	0	0	0	2	0	0	0	0	2
17:15	3	0	0	0	0	3	2	0	0	0	0	2
17:30	2	4	2	0	0	8	1	0	0	0	0	1
17:45	2	4	0	0	0	6	1	0	0	0	0	1
Hour	7	8	2	0	0	17	6	0	0	0	0	6
18:00	7	3	0	0	0	10	3	0	0	0	0	3
18:15	6	4	1	0	0	11	2	1	0	0	0	3
18:30	5	3	0	0	0	8	1	1	0	0	0	2
18:45	7	1	0	0	0	8	3	0	0	0	0	3
Hour	25	11	1	0	0	37	9	2	0	0	0	11
Total	121	36	4	0	1	162	134	31	4	0	1	170

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	A to D - Park West Avenue(N) to Park West Avenue(E)					Veh. Total	A to C - Park West Avenue(N) to Park West Avenue(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	20	5	1	0	0	26	43	14	2	0	0	59
07:15	40	8	3	1	0	52	52	18	0	0	0	70
07:30	62	7	1	0	0	70	60	10	0	0	0	70
07:45	76	14	2	0	1	93	66	10	1	0	0	77
Hour	198	34	7	1	1	241	221	52	3	0	0	276
08:00	66	12	0	2	0	80	76	17	2	0	0	95
08:15	60	15	1	0	0	76	75	10	3	0	0	88
08:30	91	15	3	1	1	111	72	16	1	0	0	89
08:45	68	14	2	0	0	84	62	4	2	0	0	68
Hour	285	56	6	3	1	351	285	47	8	0	0	340
09:00	65	12	5	3	1	86	49	9	3	0	0	61
09:15	47	11	3	0	0	61	49	7	2	0	0	58
09:30	27	16	1	2	0	46	43	4	1	1	0	49
09:45	34	10	3	1	0	48	39	7	0	1	0	47
Hour	173	49	12	6	1	241	180	27	6	2	0	215
10:00	30	6	2	0	1	39	24	6	2	0	0	32
10:15	27	11	2	0	0	40	30	4	2	0	0	36
10:30	20	11	1	2	0	34	24	3	1	1	0	29
10:45	12	7	1	0	0	20	26	3	4	0	0	33
Hour	89	35	6	2	1	133	104	16	9	1	0	130
11:00	14	6	2	2	0	24	24	8	2	0	0	34
11:15	20	6	3	2	0	31	21	11	0	0	0	32
11:30	19	8	2	0	0	29	31	11	0	0	0	42
11:45	24	5	4	1	0	34	32	9	3	1	0	45
Hour	77	25	11	5	0	118	108	39	5	1	0	153
12:00	17	5	0	0	0	22	29	4	1	0	1	35
12:15	18	8	2	0	0	28	28	7	3	0	0	38
12:30	16	4	0	0	0	20	37	8	1	0	0	46
12:45	24	4	1	0	0	29	38	4	2	0	0	44
Hour	75	21	3	0	0	99	132	23	7	0	1	163
13:00	21	5	0	0	0	26	35	9	4	1	1	50
13:15	30	8	2	0	0	40	30	7	0	0	1	38
13:30	24	3	1	1	0	29	51	8	2	0	0	61
13:45	34	5	3	0	0	42	57	15	3	0	1	76
Hour	109	21	6	1	0	137	173	39	9	1	3	225
14:00	31	10	5	1	0	47	68	8	1	1	1	79
14:15	19	6	2	0	0	27	40	5	0	0	0	45
14:30	14	10	4	0	0	28	41	6	1	0	0	48
14:45	10	8	3	2	1	24	40	11	0	1	0	52
Hour	74	34	14	3	1	126	189	30	2	2	1	224
15:00	21	7	4	0	0	32	37	7	2	0	0	46
15:15	25	6	4	0	0	35	30	4	4	0	2	40
15:30	10	4	3	1	0	18	50	5	1	0	0	56
15:45	32	7	3	0	0	42	59	5	0	0	0	64
Hour	88	24	14	1	0	127	176	21	7	0	2	206
16:00	16	7	1	2	0	26	29	7	2	0	0	38
16:15	30	8	1	1	0	40	23	7	1	0	0	31
16:30	17	5	2	1	0	25	31	6	0	0	0	37
16:45	27	5	0	0	0	32	43	8	0	0	0	51
Hour	90	25	4	4	0	123	126	28	3	0	0	157
17:00	31	6	3	1	0	41	32	2	1	0	0	35
17:15	24	2	1	1	0	28	25	3	1	0	0	29
17:30	16	1	0	1	0	18	31	2	0	0	0	33
17:45	14	4	0	0	0	18	33	3	0	0	0	36
Hour	85	13	4	3	0	105	121	10	2	0	0	133
18:00	16	1	0	0	0	17	33	1	0	0	0	34
18:15	10	2	1	0	1	14	40	4	0	0	0	44
18:30	20	1	0	0	1	22	16	3	0	0	0	19
18:45	12	1	0	0	0	13	31	1	0	0	0	32
Hour	58	5	1	0	2	66	120	9	0	0	0	129
Total	1401	342	88	29	7	1867	1935	341	61	7	7	2351

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	A to B - Park West Avenue(N) to Park West Avenue(W)					Veh. Total	A to A - Park West Avenue(N) to Park West Avenue(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	22	1	0	0	0	23	0	0	0	0	0	0
07:15	29	0	0	0	0	29	2	0	0	0	0	2
07:30	43	0	0	0	0	43	0	0	0	0	1	1
07:45	45	1	0	0	0	46	1	0	0	0	0	1
Hour	139	2	0	0	0	141	3	0	0	0	1	4
08:00	49	1	0	0	0	50	0	0	0	0	1	1
08:15	42	1	0	0	0	43	1	0	0	0	1	2
08:30	41	0	0	0	0	41	2	0	0	0	0	2
08:45	50	3	0	0	0	53	0	0	0	0	0	0
Hour	182	5	0	0	0	187	3	0	0	0	2	5
09:00	68	2	0	0	0	70	0	0	0	0	1	1
09:15	30	1	0	0	0	31	0	0	0	0	0	0
09:30	23	4	0	0	0	27	0	0	0	0	1	1
09:45	19	3	0	0	0	22	0	0	0	0	1	1
Hour	140	10	0	0	0	150	0	0	0	0	3	3
10:00	13	1	0	0	0	14	0	0	0	0	0	0
10:15	5	1	0	0	0	6	0	0	0	0	0	0
10:30	13	1	0	0	0	14	0	0	0	0	0	0
10:45	5	0	0	0	0	5	0	0	0	0	0	0
Hour	36	3	0	0	0	39	0	0	0	0	0	0
11:00	7	2	0	0	0	9	0	0	0	0	1	1
11:15	5	0	1	0	0	6	0	0	0	0	0	0
11:30	4	0	0	0	0	4	2	0	0	0	1	3
11:45	4	2	0	0	0	6	0	0	0	0	0	0
Hour	20	4	1	0	0	25	2	0	0	0	2	4
12:00	4	0	0	0	0	4	0	0	0	0	0	0
12:15	6	1	0	0	0	7	0	0	0	0	1	1
12:30	11	0	0	0	0	11	0	0	0	0	0	0
12:45	8	0	0	0	0	8	0	0	0	0	0	0
Hour	29	1	0	0	0	30	0	0	0	0	1	1
13:00	5	2	0	0	0	7	0	0	0	0	1	1
13:15	16	0	0	0	0	16	0	0	0	0	0	0
13:30	15	0	0	0	0	15	0	0	0	0	1	1
13:45	10	0	0	0	0	10	0	0	1	0	0	1
Hour	46	2	0	0	0	48	0	0	1	0	2	3
14:00	16	3	0	0	0	19	2	0	0	0	1	3
14:15	10	0	0	0	0	10	0	0	0	0	0	0
14:30	10	3	0	0	0	13	0	0	0	0	1	1
14:45	7	0	0	0	0	7	1	0	0	0	0	1
Hour	43	6	0	0	0	49	3	0	0	0	2	5
15:00	6	0	0	0	0	6	0	0	0	0	0	0
15:15	5	1	0	0	0	6	0	0	0	0	0	0
15:30	6	0	0	0	0	6	0	0	0	0	1	1
15:45	8	2	1	0	0	11	0	0	0	0	0	0
Hour	25	3	1	0	0	29	0	0	0	0	1	1
16:00	9	1	0	0	0	10	0	0	0	0	1	1
16:15	9	1	0	0	0	10	0	0	0	0	0	0
16:30	7	0	0	0	0	7	0	0	0	0	1	1
16:45	4	2	0	0	0	6	0	0	0	0	1	1
Hour	29	4	0	0	0	33	0	0	0	0	3	3
17:00	9	0	0	0	0	9	1	0	0	0	1	2
17:15	10	0	0	0	0	10	1	0	0	0	0	1
17:30	7	0	0	0	0	7	0	0	0	0	0	0
17:45	5	0	0	0	0	5	0	0	0	0	1	1
Hour	31	0	0	0	0	31	2	0	0	0	2	4
18:00	10	1	0	0	0	11	1	0	0	0	1	2
18:15	14	1	0	0	0	15	0	0	0	0	0	0
18:30	7	0	0	0	0	7	0	0	0	0	0	0
18:45	6	2	0	0	0	8	0	0	0	0	1	1
Hour	37	4	0	0	0	41	1	0	0	0	2	3
Total	757	44	2	0	0	803	14	0	1	0	21	36

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	B to A - Park West Avenue(W) to Park West Avenue(N)					Veh. Total	B to D - Park West Avenue(W) to Park West Avenue(E)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	5	0	0	0	0	5	3	0	0	0	0	3
07:15	4	0	0	0	0	4	7	1	0	0	0	8
07:30	10	1	0	0	0	11	9	1	0	0	0	10
07:45	3	2	0	0	0	5	11	2	0	0	0	13
Hour	22	3	0	0	0	25	30	4	0	0	0	34
08:00	11	0	0	0	0	11	14	2	0	0	0	16
08:15	14	0	0	0	0	14	6	5	0	0	0	11
08:30	12	1	0	0	0	13	10	2	0	0	0	12
08:45	18	0	0	0	0	18	8	2	0	0	0	10
Hour	55	1	0	0	0	56	38	11	0	0	0	49
09:00	7	0	0	0	0	7	12	0	0	0	0	12
09:15	7	0	0	0	0	7	6	5	0	0	0	11
09:30	4	1	0	0	0	5	5	2	0	0	0	7
09:45	8	0	0	0	0	8	2	1	0	0	0	3
Hour	26	1	0	0	0	27	25	8	0	0	0	33
10:00	5	0	0	0	0	5	7	4	1	0	0	12
10:15	3	0	0	0	0	3	1	3	0	0	0	4
10:30	7	0	0	0	0	7	4	1	0	0	0	5
10:45	3	1	0	0	0	4	3	3	0	0	0	6
Hour	18	1	0	0	0	19	15	11	1	0	0	27
11:00	5	0	0	0	0	5	9	2	0	0	0	11
11:15	6	1	0	0	0	7	2	1	0	0	0	3
11:30	5	1	0	0	0	6	2	2	2	0	0	6
11:45	6	0	1	0	0	7	5	3	1	0	0	9
Hour	22	2	1	0	0	25	18	8	3	0	0	29
12:00	11	0	0	0	0	11	14	1	0	0	0	15
12:15	18	0	0	0	0	18	9	3	0	0	0	12
12:30	15	1	0	0	0	16	6	3	0	0	0	9
12:45	16	0	0	0	0	16	12	1	0	0	0	13
Hour	60	1	0	0	0	61	41	8	0	0	0	49
13:00	11	0	0	0	0	11	6	2	0	1	0	9
13:15	13	0	0	0	0	13	4	2	0	0	0	6
13:30	15	0	0	0	0	15	6	2	0	0	0	8
13:45	6	0	0	0	0	6	7	0	1	0	0	8
Hour	45	0	0	0	0	45	23	6	1	1	0	31
14:00	11	1	0	0	0	12	6	2	0	0	0	8
14:15	9	1	0	0	0	10	3	2	0	0	0	5
14:30	11	1	0	0	0	12	8	0	0	0	0	8
14:45	4	1	0	0	0	5	3	1	0	1	0	5
Hour	35	4	0	0	0	39	20	5	0	1	0	26
15:00	5	2	0	0	0	7	13	2	1	0	0	16
15:15	6	3	0	0	0	9	7	2	0	0	0	9
15:30	15	1	0	0	0	16	14	0	0	0	0	14
15:45	28	0	0	0	0	28	10	4	0	0	0	14
Hour	54	6	0	0	0	60	44	8	1	0	0	53
16:00	42	1	0	0	0	43	21	3	0	0	0	24
16:15	31	0	0	0	0	31	23	1	0	0	0	24
16:30	41	1	1	0	0	43	29	3	0	0	0	32
16:45	33	1	0	0	0	34	36	1	0	0	0	37
Hour	147	3	1	0	0	151	109	8	0	0	0	117
17:00	41	0	1	0	0	42	35	1	0	0	0	36
17:15	45	0	0	0	0	45	38	2	0	0	0	40
17:30	36	0	0	0	0	36	25	1	0	0	0	26
17:45	28	0	0	0	0	28	32	0	0	0	0	32
Hour	150	0	1	0	0	151	130	4	0	0	0	134
18:00	41	1	0	0	0	42	16	0	0	0	0	16
18:15	19	0	0	0	0	19	15	1	0	0	0	16
18:30	20	1	0	0	0	21	14	0	0	0	0	14
18:45	14	0	0	0	0	14	5	0	0	0	0	5
Hour	94	2	0	0	0	96	50	1	0	0	0	51
Total	728	24	3	0	0	755	543	82	6	2	0	633

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	B to C - Park West Avenue(W) to Park West Avenue(S)					Veh. Total	B to B - Park West Avenue(W) to Park West Avenue(W)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	10	3	1	0	0	14	0	0	0	0	0	0
07:15	16	4	0	0	0	20	0	0	0	0	0	0
07:30	12	3	0	0	0	15	0	0	0	0	0	0
07:45	15	0	1	0	0	16	0	0	0	0	0	0
Hour	53	10	2	0	0	65	0	0	0	0	0	0
08:00	15	2	0	0	0	17	0	0	0	0	0	0
08:15	17	1	0	0	0	18	0	0	0	0	0	0
08:30	23	2	0	0	0	25	0	0	0	0	0	0
08:45	14	1	1	0	0	16	0	0	0	0	0	0
Hour	69	6	1	0	0	76	0	0	0	0	0	0
09:00	12	2	0	0	0	14	0	0	0	0	0	0
09:15	8	6	1	0	0	15	0	1	0	0	0	1
09:30	8	3	1	0	0	12	0	0	0	0	0	0
09:45	12	3	1	0	0	16	0	0	0	0	0	0
Hour	40	14	3	0	0	57	0	1	0	0	0	1
10:00	4	3	0	0	0	7	0	0	0	0	0	0
10:15	11	4	0	0	0	15	0	0	0	0	0	0
10:30	18	5	0	0	0	23	0	0	0	0	0	0
10:45	10	1	0	0	0	11	0	0	0	0	0	0
Hour	43	13	0	0	0	56	0	0	0	0	0	0
11:00	11	4	2	0	0	17	0	0	0	0	0	0
11:15	8	4	0	0	0	12	0	0	0	0	0	0
11:30	11	6	0	0	0	17	0	0	0	0	0	0
11:45	16	4	1	0	0	21	0	0	0	0	0	0
Hour	46	18	3	0	0	67	0	0	0	0	0	0
12:00	21	9	0	0	0	30	0	0	0	0	0	0
12:15	14	4	0	0	0	18	0	0	0	0	0	0
12:30	15	2	0	0	0	17	0	0	0	0	0	0
12:45	14	2	0	0	0	16	1	0	0	0	0	1
Hour	64	17	0	0	0	81	1	0	0	0	0	1
13:00	27	2	0	0	0	29	0	0	0	0	0	0
13:15	13	4	0	0	0	17	0	0	0	0	0	0
13:30	14	1	0	0	0	15	0	0	0	0	0	0
13:45	19	2	0	0	0	21	0	0	0	0	0	0
Hour	73	9	0	0	0	82	0	0	0	0	0	0
14:00	24	3	0	0	0	27	0	0	0	0	0	0
14:15	15	4	0	0	0	19	0	0	0	0	0	0
14:30	18	1	1	0	0	20	0	0	0	0	0	0
14:45	12	1	0	0	0	13	0	0	0	0	0	0
Hour	69	9	1	0	0	79	0	0	0	0	0	0
15:00	25	3	0	0	0	28	0	0	0	0	0	0
15:15	21	4	0	0	0	25	0	0	0	0	0	0
15:30	42	0	0	0	0	42	0	0	0	0	0	0
15:45	26	7	0	0	0	33	1	0	0	0	0	1
Hour	114	14	0	0	0	128	1	0	0	0	0	1
16:00	85	4	0	0	0	89	1	0	0	0	0	1
16:15	40	4	0	0	0	44	2	0	0	0	0	2
16:30	69	2	0	0	0	71	0	0	0	0	0	0
16:45	51	5	0	0	0	56	0	0	0	0	0	0
Hour	245	15	0	0	0	260	3	0	0	0	0	3
17:00	57	1	0	0	0	58	0	0	0	0	0	0
17:15	52	1	0	0	0	53	0	0	0	0	0	0
17:30	56	2	0	0	0	58	1	0	0	0	0	1
17:45	56	1	0	0	0	57	1	0	0	0	0	1
Hour	221	5	0	0	0	226	2	0	0	0	0	2
18:00	76	0	0	0	0	76	0	0	0	0	0	0
18:15	40	1	0	0	0	41	0	0	0	0	0	0
18:30	45	0	0	0	0	45	0	0	0	0	0	0
18:45	41	2	0	0	0	43	0	0	0	0	0	0
Hour	202	3	0	0	0	205	0	0	0	0	0	0
Total	1239	133	10	0	0	1382	7	1	0	0	0	8

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	C to B - Park West Avenue(S) to Park West Avenue(W)					Veh. Total	C to A - Park West Avenue(S) to Park West Avenue(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	38	2	0	0	0	40	16	0	1	1	0	18
07:15	41	3	0	0	0	44	20	4	0	0	0	24
07:30	62	1	0	0	0	63	24	5	0	0	0	29
07:45	83	4	1	0	0	88	21	5	0	0	0	26
Hour	224	10	1	0	0	235	81	14	1	1	0	97
08:00	61	4	0	0	0	65	32	6	2	0	0	40
08:15	70	3	0	0	0	73	33	2	2	0	0	37
08:30	82	2	1	0	0	85	25	4	2	0	0	31
08:45	83	1	0	0	0	84	24	10	0	0	0	34
Hour	296	10	1	0	0	307	114	22	6	0	0	142
09:00	87	4	0	0	0	91	27	4	0	0	0	31
09:15	56	5	1	0	0	62	26	5	0	0	0	31
09:30	44	1	1	0	0	46	29	4	2	0	0	35
09:45	37	1	0	0	0	38	26	7	1	0	0	34
Hour	224	11	2	0	0	237	108	20	3	0	0	131
10:00	19	4	0	0	0	23	25	6	1	0	0	32
10:15	20	8	0	0	0	28	23	4	1	1	0	29
10:30	15	4	0	0	0	19	26	8	0	0	0	34
10:45	17	2	0	0	0	19	36	10	1	0	0	47
Hour	71	18	0	0	0	89	110	28	3	1	0	142
11:00	15	6	1	0	0	22	34	3	2	1	0	40
11:15	8	3	3	0	0	14	31	7	3	0	0	41
11:30	11	4	0	0	0	15	25	2	2	0	0	29
11:45	12	5	0	0	0	17	22	6	5	0	0	33
Hour	46	18	4	0	0	68	112	18	12	1	0	143
12:00	11	2	0	0	0	13	19	4	0	2	0	25
12:15	11	3	0	0	0	14	40	5	1	0	0	46
12:30	15	4	0	0	0	19	36	6	0	0	0	42
12:45	22	1	0	0	0	23	29	7	0	1	0	37
Hour	59	10	0	0	0	69	124	22	1	3	0	150
13:00	16	2	0	0	0	18	40	11	0	0	0	51
13:15	12	4	0	0	0	16	33	4	0	0	1	38
13:30	18	3	0	0	0	21	39	6	1	0	0	46
13:45	20	4	1	0	0	25	34	10	2	0	0	46
Hour	66	13	1	0	0	80	146	31	3	0	1	181
14:00	21	3	0	0	0	24	36	7	0	0	0	43
14:15	15	3	1	0	0	19	25	5	4	0	0	34
14:30	13	3	0	0	0	16	48	11	3	1	0	63
14:45	12	2	0	1	0	15	42	6	1	0	0	49
Hour	61	11	1	1	0	74	151	29	8	1	0	189
15:00	15	2	0	0	0	17	42	5	0	1	0	48
15:15	8	3	0	0	0	11	34	6	0	1	0	41
15:30	15	4	0	0	0	19	31	9	0	0	0	40
15:45	17	0	0	0	0	17	40	10	2	0	0	52
Hour	55	9	0	0	0	64	147	30	2	2	0	181
16:00	12	2	0	0	0	14	35	10	1	1	0	47
16:15	13	3	0	0	0	16	49	20	1	1	0	71
16:30	4	5	0	0	0	9	45	6	3	0	0	54
16:45	8	1	0	0	0	9	54	11	0	1	0	66
Hour	37	11	0	0	0	48	183	47	5	3	0	238
17:00	18	1	1	0	0	20	52	6	1	0	0	59
17:15	14	1	0	0	0	15	51	3	1	0	0	55
17:30	13	1	0	0	0	14	60	11	4	0	0	75
17:45	24	0	0	0	0	24	54	8	0	0	0	62
Hour	69	3	1	0	0	73	217	28	6	0	0	251
18:00	17	3	0	0	0	20	39	6	0	0	0	45
18:15	11	1	0	0	0	12	67	7	1	0	0	75
18:30	18	0	0	0	0	18	43	4	0	0	0	47
18:45	11	0	0	0	0	11	46	1	0	0	1	48
Hour	57	4	0	0	0	61	195	18	1	0	1	215
Total	1265	128	11	1	0	1405	1688	307	51	12	2	2060

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	C to D - Park West Avenue(S) to Park West Avenue(E)					Veh. Total	C to C - Park West Avenue(S) to Park West Avenue(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	22	11	1	1	1	36	0	0	0	0	0	0
07:15	42	9	0	3	0	54	0	0	0	0	0	0
07:30	46	7	4	3	1	61	2	0	0	0	0	2
07:45	90	9	3	2	0	104	0	0	0	0	0	0
Hour	200	36	8	9	2	255	2	0	0	0	0	2
08:00	69	12	2	2	1	86	1	0	0	0	0	1
08:15	54	23	1	3	0	81	7	0	0	0	0	7
08:30	71	16	3	0	1	91	1	0	0	0	0	1
08:45	104	9	5	1	0	119	1	0	0	0	0	1
Hour	298	60	11	6	2	377	10	0	0	0	0	10
09:00	73	10	2	2	1	88	0	0	0	0	0	0
09:15	56	15	2	3	0	76	3	0	0	0	0	3
09:30	48	14	3	2	1	68	3	0	0	0	0	3
09:45	40	13	5	3	0	61	5	0	0	0	0	5
Hour	217	52	12	10	2	293	11	0	0	0	0	11
10:00	35	15	6	0	0	56	2	0	0	0	0	2
10:15	29	16	2	2	0	49	1	0	0	0	0	1
10:30	26	11	4	2	0	43	0	0	0	0	0	0
10:45	20	18	3	3	0	44	0	0	0	0	0	0
Hour	110	60	15	7	0	192	3	0	0	0	0	3
11:00	24	10	8	3	0	45	1	0	0	0	0	1
11:15	33	16	0	3	0	52	3	0	0	0	0	3
11:30	27	11	5	2	0	45	0	0	0	0	0	0
11:45	30	8	3	0	0	41	3	0	0	0	0	3
Hour	114	45	16	8	0	183	7	0	0	0	0	7
12:00	25	14	5	0	0	44	1	0	0	0	0	1
12:15	37	10	4	1	0	52	1	0	0	0	0	1
12:30	29	11	7	0	1	48	1	0	0	1	0	2
12:45	41	15	7	2	0	65	1	0	0	1	0	2
Hour	132	50	23	3	1	209	4	0	0	2	0	6
13:00	32	10	4	1	0	47	1	0	0	0	0	1
13:15	35	15	0	1	0	51	0	0	0	0	0	0
13:30	28	8	1	3	0	40	1	1	0	0	0	2
13:45	39	8	4	2	0	53	1	0	0	0	0	1
Hour	134	41	9	7	0	191	3	1	0	0	0	4
14:00	24	10	9	0	0	43	0	0	0	0	0	0
14:15	29	12	2	3	0	46	2	0	0	0	0	2
14:30	23	11	2	1	0	37	1	0	0	0	0	1
14:45	37	9	1	3	0	50	2	0	0	0	0	2
Hour	113	42	14	7	0	176	5	0	0	0	0	5
15:00	15	8	2	3	0	28	1	0	0	0	0	1
15:15	22	8	7	1	0	38	0	0	0	0	0	0
15:30	32	10	3	1	0	46	4	0	0	0	0	4
15:45	28	15	1	0	0	44	0	0	0	0	0	0
Hour	97	41	13	5	0	156	5	0	0	0	0	5
16:00	30	12	0	0	1	43	1	0	0	0	0	1
16:15	31	3	6	0	0	40	0	0	0	0	0	0
16:30	16	7	3	0	1	27	1	0	0	0	0	1
16:45	36	7	3	2	0	48	0	0	0	0	0	0
Hour	113	29	12	2	2	158	2	0	0	0	0	2
17:00	37	7	1	1	1	47	0	0	0	0	0	0
17:15	29	1	0	0	0	30	0	0	0	0	0	0
17:30	26	5	0	0	0	31	0	0	0	0	0	0
17:45	22	1	0	0	0	23	0	0	0	0	0	0
Hour	114	14	1	1	1	131	0	0	0	0	0	0
18:00	26	1	0	0	1	28	0	0	0	0	0	0
18:15	28	0	1	0	0	29	0	0	0	0	0	0
18:30	12	0	0	1	1	14	0	0	0	0	0	0
18:45	16	1	0	0	0	17	0	0	0	0	0	0
Hour	82	2	1	1	2	88	0	0	0	0	0	0
Total	1724	472	135	66	12	2409	52	1	0	2	0	55

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	D to C - Park West Avenue(E) to Park West Avenue(S)					Veh. Total	D to B - Park West Avenue(E) to Park West Avenue(W)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	6	2	0	0	0	8	13	0	0	0	0	13
07:15	8	0	3	0	0	11	9	2	0	0	0	11
07:30	14	4	4	0	0	22	14	0	1	0	0	15
07:45	7	7	1	1	0	16	21	1	0	0	0	22
Hour	35	13	8	1	0	57	57	3	1	0	0	61
08:00	21	4	3	2	1	31	29	1	0	0	0	30
08:15	19	7	3	1	0	30	17	1	0	0	0	18
08:30	18	10	5	3	1	37	19	1	0	0	0	20
08:45	34	5	3	0	0	42	23	1	0	0	0	24
Hour	92	26	14	6	2	140	88	4	0	0	0	92
09:00	20	12	0	2	0	34	25	1	1	0	0	27
09:15	15	12	2	1	0	30	13	0	0	0	0	13
09:30	15	13	2	1	0	31	4	1	0	0	0	5
09:45	19	11	2	1	1	34	12	2	0	0	0	14
Hour	69	48	6	5	1	129	54	4	1	0	0	59
10:00	18	10	1	2	0	31	5	3	0	0	0	8
10:15	18	14	2	0	0	34	4	3	0	0	0	7
10:30	22	9	3	3	0	37	5	2	0	0	0	7
10:45	21	16	4	0	0	41	4	1	0	0	0	5
Hour	79	49	10	5	0	143	18	9	0	0	0	27
11:00	31	8	7	3	0	49	7	0	1	0	0	8
11:15	22	5	2	1	0	30	4	4	0	0	0	8
11:30	38	13	3	0	0	54	1	3	0	0	0	4
11:45	26	12	7	2	0	47	7	6	0	0	0	13
Hour	117	38	19	6	0	180	19	13	1	0	0	33
12:00	37	19	2	2	0	60	6	1	0	0	0	7
12:15	33	18	1	1	0	53	7	1	0	1	0	9
12:30	35	13	3	2	0	53	7	0	0	0	0	7
12:45	45	16	5	0	0	66	7	4	0	0	0	11
Hour	150	66	11	5	0	232	27	6	0	1	0	34
13:00	49	9	3	2	0	63	7	1	0	0	0	8
13:15	33	7	4	1	0	45	4	1	0	0	0	5
13:30	33	9	3	0	0	45	15	1	1	0	0	17
13:45	31	9	2	0	0	42	7	1	0	0	0	8
Hour	146	34	12	3	0	195	33	4	1	0	0	38
14:00	38	14	2	1	0	55	10	1	0	0	0	11
14:15	26	11	3	2	0	42	3	2	0	0	0	5
14:30	38	7	4	0	0	49	8	4	0	0	0	12
14:45	31	9	6	1	0	47	3	3	0	0	0	6
Hour	133	41	15	4	0	193	24	10	0	0	0	34
15:00	26	11	4	1	0	42	1	3	0	0	0	4
15:15	43	11	7	2	0	63	5	1	0	0	0	6
15:30	51	17	3	2	0	73	3	1	0	0	0	4
15:45	42	14	1	2	0	59	8	3	0	0	0	11
Hour	162	53	15	7	0	237	17	8	0	0	0	25
16:00	84	20	1	1	0	106	12	1	0	0	0	13
16:15	44	20	2	1	1	68	4	1	1	0	0	6
16:30	62	15	1	0	0	78	11	1	0	0	0	12
16:45	49	18	2	0	0	69	5	2	0	0	0	7
Hour	239	73	6	2	1	321	32	5	1	0	0	38
17:00	55	11	1	0	0	67	6	0	0	0	0	6
17:15	34	6	1	0	0	41	8	1	0	0	0	9
17:30	58	6	1	0	0	65	9	0	0	0	0	9
17:45	40	6	1	0	0	47	13	1	0	0	0	14
Hour	187	29	4	0	0	220	36	2	0	0	0	38
18:00	53	5	0	0	0	58	10	0	0	0	0	10
18:15	42	5	1	0	1	49	3	0	0	0	0	3
18:30	30	2	0	0	0	32	3	0	0	0	0	3
18:45	27	1	0	0	0	28	7	1	0	0	0	8
Hour	152	13	1	0	1	167	23	1	0	0	0	24
Total	1561	483	121	44	5	2214	428	69	5	1	0	503

Site No.	4
Location	Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date	Wednesday 13 February 2019

Time	D to A - Park West Avenue(E) to Park West Avenue(N)					Veh. Total	D to D - Park West Avenue(E) to Park West Avenue(E)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	1	1	0	0	0	2	0	0	0	0	0	0
07:15	3	2	0	1	1	7	1	0	0	0	0	1
07:30	6	3	2	1	0	12	1	0	0	0	0	1
07:45	9	0	1	2	0	12	0	0	0	0	0	0
Hour	19	6	3	4	1	33	2	0	0	0	0	2
08:00	10	2	1	0	0	13	0	0	0	0	0	0
08:15	12	0	1	0	0	13	1	1	0	0	0	2
08:30	8	4	1	1	0	14	2	1	0	0	0	3
08:45	13	4	0	1	1	19	0	0	0	0	0	0
Hour	43	10	3	2	1	59	3	2	0	0	0	5
09:00	10	0	2	1	0	13	1	1	0	0	0	2
09:15	11	5	3	0	0	19	1	0	0	0	0	1
09:30	16	8	7	1	0	32	0	1	0	0	0	1
09:45	17	9	1	4	0	31	0	2	0	1	0	3
Hour	54	22	13	6	0	95	2	4	0	1	0	7
10:00	19	12	3	2	0	36	0	0	0	0	0	0
10:15	13	3	3	1	1	21	0	0	0	0	0	0
10:30	18	9	4	0	0	31	0	0	0	0	0	0
10:45	8	6	0	1	0	15	0	0	0	0	0	0
Hour	58	30	10	4	1	103	0	0	0	0	0	0
11:00	13	6	1	0	0	20	0	0	0	0	0	0
11:15	15	7	3	0	0	25	1	1	0	0	0	2
11:30	15	10	3	2	0	30	1	0	1	0	0	2
11:45	22	5	3	0	2	32	1	0	0	0	0	1
Hour	65	28	10	2	2	107	3	1	1	0	0	5
12:00	23	10	3	1	0	37	0	1	0	0	0	1
12:15	26	9	0	0	0	35	1	0	0	0	0	1
12:30	20	11	4	0	0	35	1	1	0	0	0	2
12:45	24	6	1	2	0	33	1	0	0	0	0	1
Hour	93	36	8	3	0	140	3	2	0	0	0	5
13:00	48	6	6	2	0	62	0	0	0	0	0	0
13:15	25	4	2	0	0	31	2	0	0	0	0	2
13:30	19	3	1	0	0	23	0	0	0	0	0	0
13:45	17	3	1	1	0	22	1	0	0	0	0	1
Hour	109	16	10	3	0	138	3	0	0	0	0	3
14:00	25	10	3	0	0	38	2	1	0	0	0	3
14:15	27	7	6	0	0	40	0	0	0	0	0	0
14:30	18	11	3	3	1	36	0	0	0	0	0	0
14:45	22	8	4	2	0	36	0	0	0	0	0	0
Hour	92	36	16	5	1	150	2	1	0	0	0	3
15:00	21	4	1	1	0	27	1	0	0	0	0	1
15:15	19	3	5	0	0	27	1	0	0	0	0	1
15:30	23	9	2	0	0	34	0	1	0	0	0	1
15:45	27	7	2	0	0	36	1	0	0	0	0	1
Hour	90	23	10	1	0	124	3	1	0	0	0	4
16:00	59	11	0	0	0	70	0	0	1	0	0	1
16:15	49	15	0	0	0	64	0	1	0	0	0	1
16:30	61	13	0	0	0	74	1	0	0	0	0	1
16:45	54	11	4	0	0	69	0	0	0	0	0	0
Hour	223	50	4	0	0	277	1	1	1	0	0	3
17:00	113	15	0	0	0	128	0	0	0	0	0	0
17:15	74	6	1	1	0	82	0	0	0	0	1	1
17:30	92	8	0	0	0	100	0	0	0	0	0	0
17:45	57	12	3	0	0	72	0	0	0	0	0	0
Hour	336	41	4	1	0	382	0	0	0	0	1	1
18:00	61	3	0	0	0	64	0	0	0	0	0	0
18:15	33	1	0	0	0	34	0	0	0	0	0	0
18:30	46	4	1	2	0	53	0	0	0	0	0	0
18:45	30	2	0	0	0	32	0	0	0	0	0	0
Hour	170	10	1	2	0	183	0	0	0	0	0	0
Total	1352	308	92	33	6	1791	22	12	2	1	1	38

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	To Arm A - Park West Avenue(N)					Veh. Total	From Arm A - Park West Avenue(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	22	1	1	1	0	25	85	20	3	0	0	108
07:15	29	6	0	1	1	37	123	26	3	1	0	153
07:30	40	9	2	1	1	53	165	17	1	0	1	184
07:45	34	7	1	2	0	44	188	25	3	0	1	217
Hour	125	23	4	5	2	159	561	88	10	1	2	662
08:00	53	8	3	0	1	65	191	30	2	2	1	226
08:15	60	2	3	0	1	66	178	26	4	0	1	209
08:30	47	9	3	1	0	60	206	31	4	1	1	243
08:45	55	14	0	1	1	71	180	21	4	0	0	205
Hour	215	33	9	2	3	262	755	108	14	3	3	883
09:00	44	4	2	1	1	52	182	23	8	3	2	218
09:15	44	10	3	0	0	57	126	19	5	0	0	150
09:30	49	13	9	1	1	73	93	24	2	3	1	123
09:45	51	16	2	4	1	74	92	20	3	2	1	118
Hour	188	43	16	6	3	256	493	86	18	8	4	609
10:00	49	18	4	2	0	73	67	13	4	0	1	85
10:15	39	7	4	2	1	53	62	16	4	0	0	82
10:30	51	17	4	0	0	72	57	15	2	3	0	77
10:45	47	17	1	1	0	66	43	10	5	0	0	58
Hour	186	59	13	5	1	264	229	54	15	3	1	302
11:00	52	9	3	1	1	66	45	16	4	2	1	68
11:15	52	15	6	0	0	73	46	17	4	2	0	69
11:30	47	13	5	2	1	68	56	19	2	0	1	78
11:45	50	11	9	0	2	72	60	16	7	2	0	85
Hour	201	48	23	3	4	279	207	68	17	6	2	300
12:00	53	14	3	3	0	73	50	9	1	0	1	61
12:15	84	14	1	0	1	100	52	16	5	0	1	74
12:30	71	18	4	0	0	93	64	12	1	0	0	77
12:45	69	13	1	3	0	86	70	8	3	0	0	81
Hour	277	59	9	6	1	352	236	45	10	0	2	293
13:00	99	17	6	2	1	125	61	16	4	1	2	84
13:15	71	8	2	0	1	82	76	15	2	0	1	94
13:30	73	9	2	0	1	85	90	11	3	1	1	106
13:45	57	13	4	1	0	75	101	20	7	0	1	129
Hour	300	47	14	3	3	367	328	62	16	2	5	413
14:00	74	18	3	0	1	96	117	21	6	2	2	148
14:15	61	13	10	0	0	84	69	11	2	0	0	82
14:30	77	23	6	4	2	112	65	19	5	0	1	90
14:45	69	15	5	2	0	91	58	19	3	3	1	84
Hour	281	69	24	6	3	383	309	70	16	5	4	404
15:00	68	11	1	2	0	82	64	14	6	0	0	84
15:15	59	12	5	1	0	77	60	11	8	0	2	81
15:30	69	19	2	0	1	91	66	9	4	1	1	81
15:45	95	17	4	0	0	116	99	14	4	0	0	117
Hour	291	59	12	3	1	366	289	48	22	1	3	363
16:00	136	22	1	1	1	161	54	15	3	2	1	75
16:15	129	35	1	1	0	166	62	16	2	1	0	81
16:30	147	20	4	0	1	172	55	11	2	1	1	70
16:45	141	23	4	1	1	170	74	15	0	0	1	90
Hour	553	100	10	3	3	669	245	57	7	4	3	316
17:00	207	21	2	0	1	231	73	8	4	1	1	87
17:15	171	9	2	1	0	183	60	5	2	1	0	68
17:30	188	19	4	0	0	211	54	3	0	1	0	58
17:45	139	20	3	0	1	163	52	7	0	0	1	60
Hour	705	69	11	1	2	788	239	23	6	3	2	273
18:00	142	10	0	0	1	153	60	3	0	0	1	64
18:15	119	8	1	0	0	128	64	7	1	0	1	73
18:30	109	9	1	2	0	121	43	4	0	0	1	48
18:45	90	3	0	0	2	95	49	4	0	0	1	54
Hour	460	30	2	2	3	497	216	18	1	0	4	239
Total	3782	639	147	45	29	4642	4107	727	152	36	35	5057

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	To Arm B - Park West Avenue(W)					Veh. Total	From Arm B - Park West Avenue(W)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	73	3	0	0	0	76	18	3	1	0	0	22
07:15	79	5	0	0	0	84	27	5	0	0	0	32
07:30	119	1	1	0	0	121	31	5	0	0	0	36
07:45	149	6	1	0	0	156	29	4	1	0	0	34
Hour	420	15	2	0	0	437	105	17	2	0	0	124
08:00	139	6	0	0	0	145	40	4	0	0	0	44
08:15	129	5	0	0	0	134	37	6	0	0	0	43
08:30	142	3	1	0	0	146	45	5	0	0	0	50
08:45	156	5	0	0	0	161	40	3	1	0	0	44
Hour	566	19	1	0	0	586	162	18	1	0	0	181
09:00	180	7	1	0	0	188	31	2	0	0	0	33
09:15	99	7	1	0	0	107	21	12	1	0	0	34
09:30	71	6	1	0	0	78	17	6	1	0	0	24
09:45	68	6	0	0	0	74	22	4	1	0	0	27
Hour	418	26	3	0	0	447	91	24	3	0	0	118
10:00	37	8	0	0	0	45	16	7	1	0	0	24
10:15	29	12	0	0	0	41	15	7	0	0	0	22
10:30	33	7	0	0	0	40	29	6	0	0	0	35
10:45	26	3	0	0	0	29	16	5	0	0	0	21
Hour	125	30	0	0	0	155	76	25	1	0	0	102
11:00	29	8	2	0	0	39	25	6	2	0	0	33
11:15	17	7	4	0	0	28	16	6	0	0	0	22
11:30	16	7	0	0	0	23	18	9	2	0	0	29
11:45	23	13	0	0	0	36	27	7	3	0	0	37
Hour	85	35	6	0	0	126	86	28	7	0	0	121
12:00	21	3	0	0	0	24	46	10	0	0	0	56
12:15	24	5	0	1	0	30	41	7	0	0	0	48
12:30	33	4	0	0	0	37	36	6	0	0	0	42
12:45	38	5	0	0	0	43	43	3	0	0	0	46
Hour	116	17	0	1	0	134	166	26	0	0	0	192
13:00	28	5	0	0	0	33	44	4	0	1	0	49
13:15	32	5	0	0	0	37	30	6	0	0	0	36
13:30	48	4	1	0	0	53	35	3	0	0	0	38
13:45	37	5	1	0	0	43	32	2	1	0	0	35
Hour	145	19	2	0	0	166	141	15	1	1	0	158
14:00	47	7	0	0	0	54	41	6	0	0	0	47
14:15	28	5	1	0	0	34	27	7	0	0	0	34
14:30	31	10	0	0	0	41	37	2	1	0	0	40
14:45	22	5	0	1	0	28	19	3	0	1	0	23
Hour	128	27	1	1	0	157	124	18	1	1	0	144
15:00	22	5	0	0	0	27	43	7	1	0	0	51
15:15	18	5	0	0	0	23	34	9	0	0	0	43
15:30	24	5	0	0	0	29	71	1	0	0	0	72
15:45	34	5	1	0	0	40	65	11	0	0	0	76
Hour	98	20	1	0	0	119	213	28	1	0	0	242
16:00	34	4	0	0	0	38	149	8	0	0	0	157
16:15	28	5	1	0	0	34	96	5	0	0	0	101
16:30	22	6	0	0	0	28	139	6	1	0	0	146
16:45	17	5	0	0	0	22	120	7	0	0	0	127
Hour	101	20	1	0	0	122	504	26	1	0	0	531
17:00	33	1	1	0	0	35	133	2	1	0	0	136
17:15	32	2	0	0	0	34	135	3	0	0	0	138
17:30	30	1	0	0	0	31	118	3	0	0	0	121
17:45	43	1	0	0	0	44	117	1	0	0	0	118
Hour	138	5	1	0	0	144	503	9	1	0	0	513
18:00	37	4	0	0	0	41	133	1	0	0	0	134
18:15	28	2	0	0	0	30	74	2	0	0	0	76
18:30	28	0	0	0	0	28	79	1	0	0	0	80
18:45	24	3	0	0	0	27	60	2	0	0	0	62
Hour	117	9	0	0	0	126	346	6	0	0	0	352
Total	2457	242	18	2	0	2719	2517	240	19	2	0	2778

Site No. 4
Location Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	To Arm C - Park West Avenue(S)					Veh. Total	From Arm C - Park West Avenue(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	59	19	3	0	0	81	76	13	2	2	1	94
07:15	76	22	3	0	0	101	103	16	0	3	0	122
07:30	88	17	4	0	0	109	134	13	4	3	1	155
07:45	88	17	3	1	0	109	194	18	4	2	0	218
Hour	311	75	13	1	0	400	507	60	10	10	2	589
08:00	113	23	5	2	1	144	163	22	4	2	1	192
08:15	118	18	6	1	0	143	164	28	3	3	0	198
08:30	114	28	6	3	1	152	179	22	6	0	1	208
08:45	111	10	6	0	0	127	212	20	5	1	0	238
Hour	456	79	23	6	2	566	718	92	18	6	2	836
09:00	81	23	3	2	0	109	187	18	2	2	1	210
09:15	75	25	5	1	0	106	141	25	3	3	0	172
09:30	69	20	4	2	0	95	124	19	6	2	1	152
09:45	75	21	3	2	1	102	108	21	6	3	0	138
Hour	300	89	15	7	1	412	560	83	17	10	2	672
10:00	48	19	3	2	0	72	81	25	7	0	0	113
10:15	60	22	4	0	0	86	73	28	3	3	0	107
10:30	64	17	4	4	0	89	67	23	4	2	0	96
10:45	57	20	8	0	0	85	73	30	4	3	0	110
Hour	229	78	19	6	0	332	294	106	18	8	0	426
11:00	67	20	11	3	0	101	74	19	11	4	0	108
11:15	54	20	2	1	0	77	75	26	6	3	0	110
11:30	80	30	3	0	0	113	63	17	7	2	0	89
11:45	77	25	11	3	0	116	67	19	8	0	0	94
Hour	278	95	27	7	0	407	279	81	32	9	0	401
12:00	88	32	3	2	1	126	56	20	5	2	0	83
12:15	76	29	4	1	0	110	89	18	5	1	0	113
12:30	88	23	4	3	0	118	81	21	7	1	1	111
12:45	98	22	7	1	0	128	93	23	7	4	0	127
Hour	350	106	18	7	1	482	319	82	24	8	1	434
13:00	112	20	7	3	1	143	89	23	4	1	0	117
13:15	76	18	4	1	1	100	80	23	0	1	1	105
13:30	99	19	5	0	0	123	86	18	2	3	0	109
13:45	108	26	5	0	1	140	94	22	7	2	0	125
Hour	395	83	21	4	3	506	349	86	13	7	1	456
14:00	130	25	3	2	1	161	81	20	9	0	0	110
14:15	83	20	3	2	0	108	71	20	7	3	0	101
14:30	98	14	6	0	0	118	85	25	5	2	0	117
14:45	85	21	6	2	0	114	93	17	2	4	0	116
Hour	396	80	18	6	1	501	330	82	23	9	0	444
15:00	89	21	6	1	0	117	73	15	2	4	0	94
15:15	94	19	11	2	2	128	64	17	7	2	0	90
15:30	147	22	4	2	0	175	82	23	3	1	0	109
15:45	127	26	1	2	0	156	85	25	3	0	0	113
Hour	457	88	22	7	2	576	304	80	15	7	0	406
16:00	199	31	3	1	0	234	78	24	1	1	1	105
16:15	107	31	3	1	1	143	93	26	7	1	0	127
16:30	163	23	1	0	0	187	66	18	6	0	1	91
16:45	143	31	2	0	0	176	98	19	3	3	0	123
Hour	612	116	9	2	1	740	335	87	17	5	2	446
17:00	144	14	2	0	0	160	107	14	3	1	1	126
17:15	111	10	2	0	0	123	94	5	1	0	0	100
17:30	145	10	1	0	0	156	99	17	4	0	0	120
17:45	129	10	1	0	0	140	100	9	0	0	0	109
Hour	529	44	6	0	0	579	400	45	8	1	1	455
18:00	162	6	0	0	0	168	82	10	0	0	1	93
18:15	122	10	1	0	1	134	106	8	2	0	0	116
18:30	91	5	0	0	0	96	73	4	0	1	1	79
18:45	99	4	0	0	0	103	73	2	0	0	1	76
Hour	474	25	1	0	1	501	334	24	2	1	3	364
Total	4787	958	192	53	12	6002	4729	908	197	81	14	5929

Site No.	4
Location	Park West Avenue(N) / Park West Avenue(W) / Park West Avenue(S) / Park West Avenue(E)
Date	Wednesday 13 February 2019

Time	To Arm D - Park West Avenue(E)					Veh. Total	From Arm D - Park West Avenue(E)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	45	16	2	1	1	65	20	3	0	0	0	23
07:15	90	18	3	4	0	115	21	4	3	1	1	30
07:30	118	15	5	3	1	142	35	7	7	1	0	50
07:45	177	25	5	2	1	210	37	8	2	3	0	50
Hour	430	74	15	10	3	532	113	22	12	5	1	153
08:00	149	26	2	4	1	182	60	7	4	2	1	74
08:15	121	44	2	3	0	170	49	9	4	1	0	63
08:30	174	34	6	1	2	217	47	16	6	4	1	74
08:45	180	25	7	1	0	213	70	10	3	1	1	85
Hour	624	129	17	9	3	782	226	42	17	8	3	296
09:00	151	23	7	5	2	188	56	14	3	3	0	76
09:15	110	31	5	3	0	149	40	17	5	1	0	63
09:30	80	33	4	4	1	122	35	23	9	2	0	69
09:45	76	26	8	5	0	115	48	24	3	6	1	82
Hour	417	113	24	17	3	574	179	78	20	12	1	290
10:00	72	25	9	0	1	107	42	25	4	4	0	75
10:15	57	30	4	2	0	93	35	20	5	1	1	62
10:30	50	23	5	4	0	82	45	20	7	3	0	75
10:45	35	28	4	3	0	70	33	23	4	1	0	61
Hour	214	106	22	9	1	352	155	88	20	9	1	273
11:00	47	18	10	5	0	80	51	14	9	3	0	77
11:15	56	24	3	5	0	88	42	17	5	1	0	65
11:30	49	21	10	2	0	82	55	26	7	2	0	90
11:45	60	16	8	1	0	85	56	23	10	2	2	93
Hour	212	79	31	13	0	335	204	80	31	8	2	325
12:00	56	21	5	0	0	82	66	31	5	3	0	105
12:15	65	21	6	1	0	93	67	28	1	2	0	98
12:30	52	19	7	0	1	79	63	25	7	2	0	97
12:45	78	20	8	2	0	108	77	26	6	2	0	111
Hour	251	81	26	3	1	362	273	110	19	9	0	411
13:00	59	17	4	2	0	82	104	16	9	4	0	133
13:15	71	25	2	1	0	99	64	12	6	1	0	83
13:30	58	13	2	4	0	77	67	13	5	0	0	85
13:45	81	13	8	2	0	104	56	13	3	1	0	73
Hour	269	68	16	9	0	362	291	54	23	6	0	374
14:00	63	23	14	1	0	101	75	26	5	1	0	107
14:15	51	20	4	3	0	78	56	20	9	2	0	87
14:30	45	21	6	1	0	73	64	22	7	3	1	97
14:45	50	18	4	6	1	79	56	20	10	3	0	89
Hour	209	82	28	11	1	331	251	88	31	9	1	380
15:00	50	17	7	3	0	77	49	18	5	2	0	74
15:15	55	16	11	1	0	83	68	15	12	2	0	97
15:30	56	15	6	2	0	79	77	28	5	2	0	112
15:45	71	26	4	0	0	101	78	24	3	2	0	107
Hour	232	74	28	6	0	340	272	85	25	8	0	390
16:00	67	22	2	2	1	94	155	32	2	1	0	190
16:15	84	13	7	1	0	105	97	37	3	1	1	139
16:30	63	15	5	1	1	85	135	29	1	0	0	165
16:45	99	13	3	2	0	117	108	31	6	0	0	145
Hour	313	63	17	6	2	401	495	129	12	2	1	639
17:00	103	14	4	2	1	124	174	26	1	0	0	201
17:15	91	5	1	1	1	99	116	13	2	1	1	133
17:30	67	7	0	1	0	75	159	14	1	0	0	174
17:45	68	5	0	0	0	73	110	19	4	0	0	133
Hour	329	31	5	4	2	371	559	72	8	1	1	641
18:00	58	2	0	0	1	61	124	8	0	0	0	132
18:15	53	3	2	0	1	59	78	6	1	0	1	86
18:30	46	1	0	1	2	50	79	6	1	2	0	88
18:45	33	2	0	0	0	35	64	4	0	0	0	68
Hour	190	8	2	1	4	205	345	24	2	2	1	374
Total	3690	908	231	98	20	4947	3363	872	220	79	12	4546

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	A to D - Yeats Way(N) to Park West Avenue(E)					Veh. Total	A to C - Yeats Way(N) to Yeats Way(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	4	0	0	0	0	4	0	0	0	0	0	0
07:15	11	2	0	0	0	13	0	0	0	0	0	0
07:30	10	2	0	0	0	12	0	0	0	0	0	0
07:45	9	0	0	0	0	9	1	0	0	0	0	1
Hour	34	4	0	0	0	38	1	0	0	0	0	1
08:00	17	1	0	0	0	18	1	0	0	0	0	1
08:15	17	2	0	0	0	19	0	0	0	0	0	0
08:30	18	1	0	0	0	19	0	0	0	0	0	0
08:45	15	0	0	0	0	15	2	0	0	0	0	2
Hour	67	4	0	0	0	71	3	0	0	0	0	3
09:00	11	0	0	0	0	11	0	0	0	0	0	0
09:15	5	2	0	0	0	7	0	0	0	0	0	0
09:30	3	1	0	0	0	4	1	0	0	0	0	1
09:45	5	0	0	0	0	5	0	0	0	0	0	0
Hour	24	3	0	0	0	27	1	0	0	0	0	1
10:00	4	2	0	0	0	6	0	0	0	0	0	0
10:15	5	1	0	0	0	6	0	0	0	0	0	0
10:30	8	1	0	0	0	9	1	0	0	0	0	1
10:45	5	2	0	0	0	7	1	0	0	0	0	1
Hour	22	6	0	0	0	28	2	0	0	0	0	2
11:00	5	0	0	0	0	5	0	0	0	0	0	0
11:15	3	1	0	0	0	4	0	0	0	0	0	0
11:30	2	0	1	0	0	3	0	0	0	0	0	0
11:45	5	4	1	0	0	10	0	1	0	0	0	1
Hour	15	5	2	0	0	22	0	1	0	0	0	1
12:00	7	0	0	0	0	7	0	0	0	0	0	0
12:15	5	2	0	0	0	7	0	0	0	0	0	0
12:30	8	1	0	0	0	9	0	0	0	0	0	0
12:45	5	0	0	0	0	5	1	0	0	0	0	1
Hour	25	3	0	0	0	28	1	0	0	0	0	1
13:00	9	1	0	0	0	10	0	1	0	0	0	1
13:15	7	0	0	0	0	7	0	0	0	0	0	0
13:30	9	0	0	0	0	9	1	0	0	0	0	1
13:45	5	0	0	0	0	5	0	1	0	0	0	1
Hour	30	1	0	0	0	31	1	2	0	0	0	3
14:00	8	1	0	0	0	9	1	1	0	0	0	2
14:15	6	1	0	0	0	7	0	0	0	0	0	0
14:30	4	0	0	0	0	4	2	0	0	0	0	2
14:45	1	0	0	0	0	1	0	1	0	0	0	1
Hour	19	2	0	0	0	21	3	2	0	0	0	5
15:00	6	2	0	0	0	8	0	0	0	0	0	0
15:15	5	2	0	0	0	7	0	0	0	0	0	0
15:30	7	0	0	0	0	7	0	0	0	0	0	0
15:45	9	3	0	0	0	12	0	1	0	0	0	1
Hour	27	7	0	0	0	34	0	1	0	0	0	1
16:00	9	2	0	0	0	11	0	0	0	0	0	0
16:15	6	1	0	0	0	7	0	1	0	0	0	1
16:30	5	1	0	0	0	6	0	0	0	0	0	0
16:45	8	1	0	0	0	9	0	0	0	0	0	0
Hour	28	5	0	0	0	33	0	1	0	0	0	1
17:00	8	0	0	0	0	8	0	0	0	0	0	0
17:15	8	1	0	0	0	9	1	0	0	0	0	1
17:30	5	0	0	0	0	5	0	0	0	0	0	0
17:45	11	0	0	0	0	11	0	0	0	0	0	0
Hour	32	1	0	0	0	33	1	0	0	0	0	1
18:00	9	0	0	0	0	9	0	0	0	0	0	0
18:15	2	0	0	0	0	2	1	0	0	0	0	1
18:30	23	0	0	0	0	23	0	0	0	0	0	0
18:45	13	1	0	0	0	14	0	0	0	0	0	0
Hour	47	1	0	0	0	48	1	0	0	0	0	1
Total	370	42	2	0	0	414	14	7	0	0	0	21

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	A to B - Yeats Way(N) to Park West Avenue(W)					Veh. Total	A to A - Yeats Way(N) to Yeats Way(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0
07:45	1	0	0	0	0	1	0	0	0	0	0	0
Hour	1	0	0	0	0	1	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0
08:45	1	0	0	0	0	1	0	0	0	0	0	0
Hour	1	0	0	0	0	1	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	1	0	0	0	1	0	0	0	0	0	0
Hour	0	1	0	0	0	1	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	1	0	0	0	1	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	1	0	0	0	1	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:15	1	0	0	0	0	1	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	1	0	0	0	0	1	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	2	0	0	0	5	0	0	0	0	0	0

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	B to A - Park West Avenue(W) to Yeats Way(N)					Veh. Total	B to D - Park West Avenue(W) to Park West Avenue(E)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	0	0	0	0	0	0	7	2	1	0	0	10
07:15	0	0	0	0	0	0	7	1	0	0	0	8
07:30	0	0	0	0	0	0	12	2	0	0	0	14
07:45	0	0	0	0	0	0	10	1	1	0	0	12
Hour	0	0	0	0	0	0	36	6	2	0	0	44
08:00	0	0	0	0	0	0	5	1	0	0	0	6
08:15	0	0	0	0	0	0	13	2	0	0	0	15
08:30	0	0	0	0	0	0	14	2	0	0	0	16
08:45	0	0	0	0	0	0	11	0	0	0	0	11
Hour	0	0	0	0	0	0	43	5	0	0	0	48
09:00	0	0	0	0	0	0	2	0	0	0	0	2
09:15	1	1	0	0	0	2	4	2	0	0	0	6
09:30	0	0	0	0	0	0	4	1	0	0	0	5
09:45	0	0	0	0	0	0	7	0	0	0	0	7
Hour	1	1	0	0	0	2	17	3	0	0	0	20
10:00	0	0	0	0	0	0	4	0	0	0	0	4
10:15	0	0	0	0	0	0	1	0	0	0	0	1
10:30	0	0	0	0	0	0	4	0	0	0	0	4
10:45	0	0	0	0	0	0	2	0	0	0	0	2
Hour	0	0	0	0	0	0	11	0	0	0	0	11
11:00	0	0	0	0	0	0	2	1	0	0	0	3
11:15	0	0	0	0	0	0	4	0	0	0	0	4
11:30	1	0	0	0	0	1	9	2	0	0	0	11
11:45	0	0	0	0	0	0	4	0	0	0	0	4
Hour	1	0	0	0	0	1	19	3	0	0	0	22
12:00	0	0	0	0	0	0	1	0	0	0	0	1
12:15	0	0	0	0	0	0	3	0	0	0	0	3
12:30	0	0	0	0	0	0	1	1	0	0	0	2
12:45	1	0	0	0	0	1	1	0	0	0	0	1
Hour	1	0	0	0	0	1	6	1	0	0	0	7
13:00	0	0	0	0	0	0	1	0	0	0	0	1
13:15	0	0	0	0	0	0	4	0	0	0	0	4
13:30	0	0	0	0	0	0	5	0	0	0	0	5
13:45	0	1	0	0	0	1	3	0	0	0	0	3
Hour	0	1	0	0	0	1	13	0	0	0	0	13
14:00	1	0	0	0	0	1	3	0	0	0	0	3
14:15	0	0	0	0	0	0	4	0	0	0	0	4
14:30	0	0	0	0	0	0	6	0	0	0	0	6
14:45	0	0	0	0	0	0	3	1	0	0	0	4
Hour	1	0	0	0	0	1	16	1	0	0	0	17
15:00	0	0	0	0	0	0	2	0	0	0	0	2
15:15	0	0	0	0	0	0	4	0	0	0	0	4
15:30	1	0	0	0	0	1	8	0	0	0	0	8
15:45	0	0	0	0	0	0	4	0	0	0	0	4
Hour	1	0	0	0	0	1	18	0	0	0	0	18
16:00	0	1	0	0	0	1	2	1	0	0	0	3
16:15	0	0	0	0	0	0	7	0	0	0	0	7
16:30	0	0	0	0	0	0	6	2	0	0	0	8
16:45	0	0	0	0	0	0	5	0	0	0	0	5
Hour	0	1	0	0	0	1	20	3	0	0	0	23
17:00	0	0	0	0	0	0	3	0	0	0	0	3
17:15	1	0	0	0	0	1	7	0	0	0	0	7
17:30	1	0	0	0	0	1	5	1	0	0	0	6
17:45	0	0	0	0	0	0	6	0	0	0	0	6
Hour	2	0	0	0	0	2	21	1	0	0	0	22
18:00	0	0	0	0	0	0	6	0	0	0	0	6
18:15	0	0	0	0	0	0	6	0	0	0	0	6
18:30	0	0	0	0	0	0	6	0	0	0	0	6
18:45	0	0	0	0	0	0	7	0	0	0	0	7
Hour	0	0	0	0	0	0	25	0	0	0	0	25
Total	7	3	0	0	0	10	245	23	2	0	0	270

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	B to C - Park West Avenue(W) to Yeats Way(S)					Veh. Total	B to B - Park West Avenue(W) to Park West Avenue(W)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	0	0	0	0	0	0	0	0	0	0	0	0
07:15	1	0	0	0	0	1	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0
07:45	1	0	0	0	0	1	0	0	0	0	0	0
Hour	2	0	0	0	0	2	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
09:00	1	0	0	0	0	1	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	1	0	0	0	0	1	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	1	0	0	0	0	1	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	1	0	0	0	0	1	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	1	0	0	0	1	0	0	0	0	0	0
Hour	0	1	0	0	0	1	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	1	0	0	0	1	0	0	0	0	0	0
12:30	0	0	0	1	0	1	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	1	0	1	0	2	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	1	0	0	0	1	0	0	0	0	0	0
Hour	0	1	0	0	0	1	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0
15:30	2	0	0	0	0	2	0	0	0	0	0	0
15:45	1	0	0	0	0	1	0	0	0	0	0	0
Hour	3	0	0	0	0	3	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:15	1	2	0	0	0	3	0	0	0	0	0	0
16:30	1	0	0	0	0	1	0	0	0	0	0	0
16:45	0	1	0	0	0	1	0	0	0	0	0	0
Hour	2	3	0	0	0	5	0	0	0	0	0	0
17:00	1	0	0	0	0	1	0	0	0	0	0	0
17:15	1	0	0	0	0	1	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	1	0	0	0	0	1
Hour	2	0	0	0	0	2	1	0	0	0	0	1
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0
18:45	3	0	0	0	0	3	0	0	0	0	0	0
Hour	3	0	0	0	0	3	0	0	0	0	0	0
Total	14	6	0	1	0	21	1	0	0	0	0	1

Site No.	5
Location	Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date	Wednesday 13 February 2019

Time	C to B - Yeats Way(S) to Park West Avenue(W)					Veh. Total	C to A - Yeats Way(S) to Yeats Way(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	0	0	0	0	0	0	0	1	0	0	0	1
07:15	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	0	1	0	0	0	1
08:00	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	1	1	0	0	0	2
08:30	0	0	0	0	0	0	0	0	0	0	0	0
08:45	1	0	0	0	0	1	2	0	0	0	0	2
Hour	1	0	0	0	0	1	3	1	0	0	0	4
09:00	0	0	0	0	0	0	1	0	0	0	0	1
09:15	0	1	0	0	0	1	0	0	0	0	0	0
09:30	1	0	0	0	0	1	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	1	1	0	0	0	2	1	0	0	0	0	1
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	1	1	0	0	0	2
10:30	0	0	0	0	0	0	2	0	0	0	0	2
10:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	3	1	0	0	0	4
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	1	0	0	1
11:45	0	0	0	0	0	0	1	2	0	0	0	3
Hour	0	0	0	0	0	0	1	2	1	0	0	4
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	1	0	0	0	0	1
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	1	0	0	0	0	1
13:00	0	0	0	0	0	0	2	0	0	0	0	2
13:15	1	0	0	0	0	1	1	0	0	0	0	1
13:30	0	0	0	0	0	0	1	0	0	0	0	1
13:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	1	0	0	0	0	1	4	0	0	0	0	4
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	1	0	0	0	0	1
14:30	0	0	0	0	0	0	1	0	0	0	0	1
14:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	0	0	0	0	0	0	2	0	0	0	0	2
15:00	0	0	0	0	0	0	0	1	0	0	0	1
15:15	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	2	0	0	0	0	2
15:45	0	0	0	0	0	0	0	1	0	0	0	1
Hour	0	0	0	0	0	0	2	2	0	0	0	4
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:15	1	0	0	0	0	1	1	0	0	0	0	1
16:30	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	1	0	0	0	0	1	1	0	0	0	0	1
17:00	0	1	0	0	0	1	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0
17:30	2	0	0	0	0	2	5	0	0	0	0	5
17:45	0	0	0	0	0	0	1	0	0	0	0	1
Hour	2	1	0	0	0	3	6	0	0	0	0	6
18:00	0	0	0	0	0	0	1	0	0	0	0	1
18:15	1	0	0	0	0	1	0	0	0	0	0	0
18:30	0	0	0	0	0	0	1	0	0	0	0	1
18:45	0	0	0	0	0	0	0	0	0	0	0	0
Hour	1	0	0	0	0	1	2	0	0	0	0	2
Total	7	2	0	0	0	9	26	7	1	0	0	34

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	C to D - Yeats Way(S) to Park West Avenue(E)					Veh. Total	C to C - Yeats Way(S) to Yeats Way(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	6	2	0	0	0	8	0	0	0	0	0	0
07:15	10	4	0	0	0	14	0	0	0	0	0	0
07:30	9	0	0	0	0	9	0	0	0	0	0	0
07:45	11	3	0	0	0	14	0	0	0	0	0	0
Hour	36	9	0	0	0	45	0	0	0	0	0	0
08:00	17	3	0	0	0	20	0	0	0	0	0	0
08:15	9	1	0	0	0	10	0	0	0	0	0	0
08:30	12	2	0	0	0	14	0	0	0	0	0	0
08:45	13	3	1	0	0	17	0	0	0	0	0	0
Hour	51	9	1	0	0	61	0	0	0	0	0	0
09:00	17	2	0	0	0	19	0	1	0	0	0	1
09:15	13	8	1	0	0	22	0	0	0	0	0	0
09:30	7	5	1	0	0	13	0	0	0	0	0	0
09:45	10	4	1	0	0	15	0	0	0	0	0	0
Hour	47	19	3	0	0	69	0	1	0	0	0	1
10:00	7	5	1	0	0	13	0	0	0	0	0	0
10:15	9	7	0	0	0	16	0	0	0	0	0	0
10:30	16	4	0	0	0	20	1	0	0	0	0	1
10:45	9	3	0	0	0	12	1	0	0	0	0	1
Hour	41	19	1	0	0	61	2	0	0	0	0	2
11:00	16	6	2	0	0	24	0	1	0	0	0	1
11:15	9	4	0	0	0	13	0	0	0	0	0	0
11:30	7	7	3	0	0	17	0	0	0	0	0	0
11:45	16	4	0	0	0	20	1	0	0	0	0	1
Hour	48	21	5	0	0	74	1	1	0	0	0	2
12:00	36	11	0	0	0	47	0	0	0	0	0	0
12:15	35	4	0	0	0	39	0	0	0	0	0	0
12:30	26	4	0	0	0	30	0	0	0	0	0	0
12:45	37	3	0	0	0	40	0	0	0	0	0	0
Hour	134	22	0	0	0	156	0	0	0	0	0	0
13:00	34	3	0	1	0	38	0	0	0	0	0	0
13:15	16	5	0	0	0	21	0	0	0	0	0	0
13:30	18	3	0	0	0	21	0	0	0	0	0	0
13:45	26	1	1	0	0	28	0	0	0	0	0	0
Hour	94	12	1	1	0	108	0	0	0	0	0	0
14:00	30	5	0	0	0	35	0	0	0	0	0	0
14:15	17	6	0	0	0	23	0	0	0	0	0	0
14:30	27	2	1	0	0	30	0	0	0	0	0	0
14:45	16	2	0	0	0	18	0	0	0	0	0	0
Hour	90	15	1	0	0	106	0	0	0	0	0	0
15:00	32	5	1	0	0	38	0	0	0	0	0	0
15:15	25	7	0	0	0	32	0	0	0	0	0	0
15:30	56	2	0	0	0	58	0	0	0	0	0	0
15:45	51	7	0	0	0	58	0	0	0	0	0	0
Hour	164	21	1	0	0	186	0	0	0	0	0	0
16:00	134	7	0	0	0	141	0	0	0	0	0	0
16:15	80	3	0	0	0	83	0	0	0	0	0	0
16:30	125	3	1	0	0	129	0	0	0	0	0	0
16:45	105	6	0	0	0	111	0	0	0	0	0	0
Hour	444	19	1	0	0	464	0	0	0	0	0	0
17:00	134	1	0	0	0	135	0	0	0	0	0	0
17:15	110	2	0	0	0	112	0	0	0	0	0	0
17:30	109	2	0	0	0	111	0	0	0	0	0	0
17:45	101	1	0	0	0	102	0	0	0	0	0	0
Hour	454	6	0	0	0	460	0	0	0	0	0	0
18:00	114	2	0	0	0	116	0	0	0	0	0	0
18:15	67	1	0	0	0	68	0	0	0	0	0	0
18:30	47	1	0	0	0	48	0	0	0	0	0	0
18:45	40	1	0	0	0	41	0	0	0	0	0	0
Hour	268	5	0	0	0	273	0	0	0	0	0	0
Total	1871	177	14	1	0	2063	3	2	0	0	0	5

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	D to C - Park West Avenue(E) to Yeats Way(S)					Veh. Total	D to B - Park West Avenue(E) to Park West Avenue(W)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	67	3	0	0	0	70	0	0	0	0	0	0
07:15	76	2	0	0	0	78	3	1	0	0	0	4
07:30	110	2	0	0	0	112	4	0	1	0	0	5
07:45	146	6	1	0	0	153	2	0	0	0	0	2
Hour	399	13	1	0	0	413	9	1	1	0	0	11
08:00	130	5	0	0	0	135	1	0	0	0	0	1
08:15	122	3	0	0	0	125	2	2	0	0	0	4
08:30	130	2	1	0	0	133	5	0	0	0	0	5
08:45	145	5	0	0	0	150	4	0	0	0	0	4
Hour	527	15	1	0	0	543	12	2	0	0	0	14
09:00	158	6	1	0	0	165	10	0	0	0	0	10
09:15	85	7	1	0	0	93	6	0	0	0	0	6
09:30	62	5	1	0	0	68	1	0	0	0	0	1
09:45	60	5	0	0	0	65	4	1	0	0	0	5
Hour	365	23	3	0	0	391	21	1	0	0	0	22
10:00	32	6	0	0	0	38	0	0	0	0	0	0
10:15	23	11	0	0	0	34	5	0	0	0	0	5
10:30	22	4	0	0	0	26	5	2	0	0	0	7
10:45	19	2	0	0	0	21	3	0	0	0	0	3
Hour	96	23	0	0	0	119	13	2	0	0	0	15
11:00	21	6	2	0	0	29	3	0	0	0	0	3
11:15	10	6	3	0	0	19	4	0	0	0	0	4
11:30	8	5	0	0	0	13	1	1	0	0	0	2
11:45	19	10	0	0	0	29	2	1	0	0	0	3
Hour	58	27	5	0	0	90	10	2	0	0	0	12
12:00	13	2	0	0	0	15	3	1	0	0	0	4
12:15	16	3	0	0	0	19	2	1	0	1	0	4
12:30	22	4	0	0	0	26	4	0	0	0	0	4
12:45	27	4	0	0	0	31	4	0	0	0	0	4
Hour	78	13	0	0	0	91	13	2	0	1	0	16
13:00	20	3	0	0	0	23	3	0	0	0	0	3
13:15	25	2	0	0	0	27	1	0	0	0	0	1
13:30	32	4	0	0	0	36	6	0	0	0	0	6
13:45	26	2	1	0	0	29	1	0	0	0	0	1
Hour	103	11	1	0	0	115	11	0	0	0	0	11
14:00	33	7	0	0	0	40	4	0	0	0	0	4
14:15	20	5	1	0	0	26	4	0	0	0	0	4
14:30	16	7	0	0	0	23	10	0	0	0	0	10
14:45	12	4	0	0	0	16	6	1	0	0	0	7
Hour	81	23	1	0	0	105	24	1	0	0	0	25
15:00	13	4	0	0	0	17	2	0	0	0	0	2
15:15	9	3	0	0	0	12	6	1	0	0	0	7
15:30	10	4	0	0	0	14	7	0	0	0	0	7
15:45	17	2	0	0	0	19	2	1	1	0	0	4
Hour	49	13	0	0	0	62	17	2	1	0	0	20
16:00	18	3	0	0	0	21	5	0	0	0	0	5
16:15	9	0	1	0	0	10	6	4	0	0	0	10
16:30	8	5	0	0	0	13	6	0	0	0	0	6
16:45	7	3	0	0	0	10	4	2	0	0	0	6
Hour	42	11	1	0	0	54	21	6	0	0	0	27
17:00	13	1	0	0	0	14	10	0	0	0	0	10
17:15	11	0	0	0	0	11	12	1	0	0	0	13
17:30	8	0	0	0	0	8	9	1	0	0	0	10
17:45	14	0	0	0	0	14	12	1	0	0	0	13
Hour	46	1	0	0	0	47	43	3	0	0	0	46
18:00	18	1	0	0	0	19	8	1	0	0	0	9
18:15	9	1	0	0	0	10	8	0	0	0	0	8
18:30	8	0	0	0	0	8	11	0	0	0	0	11
18:45	2	1	0	0	0	3	7	1	0	0	0	8
Hour	37	3	0	0	0	40	34	2	0	0	0	36
Total	1881	176	13	0	0	2070	228	24	2	1	0	255

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	D to A - Park West Avenue(E) to Yeats Way(N)					Veh. Total	D to D - Park West Avenue(E) to Park West Avenue(E)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	4	0	0	0	0	4	1	0	0	0	0	1
07:15	2	1	0	0	0	3	0	0	0	0	0	0
07:30	1	0	0	0	0	1	0	0	0	0	0	0
07:45	3	0	0	0	0	3	0	0	0	0	0	0
Hour	10	1	0	0	0	11	1	0	0	0	0	1
08:00	7	1	0	0	0	8	0	0	0	0	0	0
08:15	6	0	0	0	0	6	0	0	0	0	0	0
08:30	4	1	0	0	0	5	1	0	0	0	0	1
08:45	7	0	0	0	0	7	0	0	0	0	0	0
Hour	24	2	0	0	0	26	1	0	0	0	0	1
09:00	11	1	0	0	0	12	1	0	0	0	0	1
09:15	7	0	0	0	0	7	0	0	0	0	0	0
09:30	8	1	0	0	0	9	0	0	0	0	0	0
09:45	5	0	0	0	0	5	0	0	0	0	0	0
Hour	31	2	0	0	0	33	1	0	0	0	0	1
10:00	2	2	0	0	0	4	1	0	0	0	0	1
10:15	1	1	0	0	0	2	0	0	0	0	0	0
10:30	3	1	0	0	0	4	0	0	0	0	0	0
10:45	6	1	0	0	0	7	0	0	0	0	0	0
Hour	12	5	0	0	0	17	1	0	0	0	0	1
11:00	5	2	0	0	0	7	0	0	0	0	0	0
11:15	3	1	1	0	0	5	0	0	0	0	0	0
11:30	3	1	0	0	0	4	1	0	0	0	0	1
11:45	2	2	0	0	0	4	0	0	0	0	0	0
Hour	13	6	1	0	0	20	1	0	0	0	0	1
12:00	5	0	0	0	0	5	1	0	0	0	0	1
12:15	6	1	0	0	0	7	0	0	0	0	0	0
12:30	4	0	0	0	0	4	1	0	0	0	0	1
12:45	6	1	0	0	0	7	0	0	0	0	0	0
Hour	21	2	0	0	0	23	2	0	0	0	0	2
13:00	4	2	0	0	0	6	0	0	0	0	0	0
13:15	6	2	0	0	0	8	0	1	0	0	0	1
13:30	8	0	1	0	0	9	1	0	0	0	0	1
13:45	8	2	0	0	0	10	0	0	0	0	0	0
Hour	26	6	1	0	0	33	1	1	0	0	0	2
14:00	8	0	0	0	0	8	0	0	0	0	0	0
14:15	5	1	0	0	0	6	0	0	0	0	0	0
14:30	4	2	0	0	0	6	0	0	0	0	0	0
14:45	4	1	0	0	0	5	0	0	0	1	0	1
Hour	21	4	0	0	0	25	0	0	0	1	0	1
15:00	5	1	0	0	0	6	1	0	0	0	0	1
15:15	3	1	0	0	0	4	0	0	0	0	0	0
15:30	6	1	0	0	0	7	0	0	0	0	0	0
15:45	12	1	0	0	0	13	1	1	0	0	0	2
Hour	26	4	0	0	0	30	2	1	0	0	0	3
16:00	7	1	0	0	0	8	3	0	0	0	0	3
16:15	12	1	0	0	0	13	1	0	0	0	0	1
16:30	8	1	0	0	0	9	2	0	0	0	0	2
16:45	3	0	0	0	0	3	1	0	0	0	0	1
Hour	30	3	0	0	0	33	7	0	0	0	0	7
17:00	12	0	0	0	0	12	0	0	1	0	0	1
17:15	10	0	0	0	0	10	0	0	0	0	0	0
17:30	10	1	0	0	0	11	0	0	0	0	0	0
17:45	14	0	0	0	0	14	2	0	0	0	0	2
Hour	46	1	0	0	0	47	2	0	1	0	0	3
18:00	12	2	0	0	0	14	0	0	0	0	0	0
18:15	11	1	0	0	0	12	0	0	0	0	0	0
18:30	11	0	0	0	0	11	0	0	0	0	0	0
18:45	15	1	0	0	0	16	0	0	0	0	0	0
Hour	49	4	0	0	0	53	0	0	0	0	0	0
Total	309	40	2	0	0	351	19	2	1	1	0	23

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	To Arm A - Yeats Way(N)					Veh. Total	From Arm A - Yeats Way(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	4	1	0	0	0	5	4	0	0	0	0	4
07:15	2	1	0	0	0	3	11	2	0	0	0	13
07:30	1	0	0	0	0	1	10	2	0	0	0	12
07:45	3	0	0	0	0	3	11	0	0	0	0	11
Hour	10	2	0	0	0	12	36	4	0	0	0	40
08:00	7	1	0	0	0	8	18	1	0	0	0	19
08:15	7	1	0	0	0	8	17	2	0	0	0	19
08:30	4	1	0	0	0	5	18	1	0	0	0	19
08:45	9	0	0	0	0	9	18	0	0	0	0	18
Hour	27	3	0	0	0	30	71	4	0	0	0	75
09:00	12	1	0	0	0	13	11	0	0	0	0	11
09:15	8	1	0	0	0	9	5	2	0	0	0	7
09:30	8	1	0	0	0	9	4	1	0	0	0	5
09:45	5	0	0	0	0	5	5	0	0	0	0	5
Hour	33	3	0	0	0	36	25	3	0	0	0	28
10:00	2	2	0	0	0	4	4	2	0	0	0	6
10:15	2	2	0	0	0	4	5	1	0	0	0	6
10:30	5	1	0	0	0	6	9	1	0	0	0	10
10:45	6	1	0	0	0	7	6	3	0	0	0	9
Hour	15	6	0	0	0	21	24	7	0	0	0	31
11:00	5	2	0	0	0	7	5	0	0	0	0	5
11:15	3	1	1	0	0	5	3	1	0	0	0	4
11:30	4	1	1	0	0	6	2	0	1	0	0	3
11:45	3	4	0	0	0	7	5	5	1	0	0	11
Hour	15	8	2	0	0	25	15	6	2	0	0	23
12:00	5	0	0	0	0	5	7	0	0	0	0	7
12:15	7	1	0	0	0	8	5	2	0	0	0	7
12:30	4	0	0	0	0	4	8	1	0	0	0	9
12:45	7	1	0	0	0	8	6	0	0	0	0	6
Hour	23	2	0	0	0	25	26	3	0	0	0	29
13:00	6	2	0	0	0	8	9	3	0	0	0	12
13:15	7	2	0	0	0	9	7	0	0	0	0	7
13:30	9	0	1	0	0	10	10	0	0	0	0	10
13:45	8	3	0	0	0	11	5	1	0	0	0	6
Hour	30	7	1	0	0	38	31	4	0	0	0	35
14:00	9	0	0	0	0	9	9	2	0	0	0	11
14:15	6	1	0	0	0	7	6	1	0	0	0	7
14:30	5	2	0	0	0	7	6	0	0	0	0	6
14:45	4	1	0	0	0	5	1	1	0	0	0	2
Hour	24	4	0	0	0	28	22	4	0	0	0	26
15:00	5	2	0	0	0	7	6	2	0	0	0	8
15:15	3	1	0	0	0	4	5	2	0	0	0	7
15:30	9	1	0	0	0	10	7	0	0	0	0	7
15:45	12	2	0	0	0	14	9	4	0	0	0	13
Hour	29	6	0	0	0	35	27	8	0	0	0	35
16:00	7	2	0	0	0	9	9	2	0	0	0	11
16:15	13	1	0	0	0	14	7	2	0	0	0	9
16:30	8	1	0	0	0	9	5	1	0	0	0	6
16:45	3	0	0	0	0	3	8	1	0	0	0	9
Hour	31	4	0	0	0	35	29	6	0	0	0	35
17:00	12	0	0	0	0	12	8	0	0	0	0	8
17:15	11	0	0	0	0	11	9	1	0	0	0	10
17:30	16	1	0	0	0	17	5	0	0	0	0	5
17:45	15	0	0	0	0	15	11	0	0	0	0	11
Hour	54	1	0	0	0	55	33	1	0	0	0	34
18:00	13	2	0	0	0	15	9	0	0	0	0	9
18:15	11	1	0	0	0	12	3	0	0	0	0	3
18:30	12	0	0	0	0	12	23	0	0	0	0	23
18:45	15	1	0	0	0	16	13	1	0	0	0	14
Hour	51	4	0	0	0	55	48	1	0	0	0	49
Total	342	50	3	0	0	395	387	51	2	0	0	440

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	To Arm B - Park West Avenue(W)					Veh. Total	From Arm B - Park West Avenue(W)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	0	0	0	0	0	0	7	2	1	0	0	10
07:15	3	1	0	0	0	4	8	1	0	0	0	9
07:30	4	0	1	0	0	5	12	2	0	0	0	14
07:45	3	0	0	0	0	3	11	1	1	0	0	13
Hour	10	1	1	0	0	12	38	6	2	0	0	46
08:00	1	0	0	0	0	1	5	1	0	0	0	6
08:15	2	2	0	0	0	4	13	2	0	0	0	15
08:30	5	0	0	0	0	5	14	2	0	0	0	16
08:45	6	0	0	0	0	6	11	0	0	0	0	11
Hour	14	2	0	0	0	16	43	5	0	0	0	48
09:00	10	0	0	0	0	10	3	0	0	0	0	3
09:15	6	1	0	0	0	7	5	3	0	0	0	8
09:30	2	0	0	0	0	2	4	1	0	0	0	5
09:45	4	1	0	0	0	5	7	0	0	0	0	7
Hour	22	2	0	0	0	24	19	4	0	0	0	23
10:00	0	0	0	0	0	0	4	0	0	0	0	4
10:15	5	0	0	0	0	5	2	0	0	0	0	2
10:30	5	2	0	0	0	7	4	0	0	0	0	4
10:45	3	1	0	0	0	4	2	0	0	0	0	2
Hour	13	3	0	0	0	16	12	0	0	0	0	12
11:00	3	0	0	0	0	3	2	1	0	0	0	3
11:15	4	0	0	0	0	4	4	0	0	0	0	4
11:30	1	1	0	0	0	2	10	2	0	0	0	12
11:45	2	1	0	0	0	3	4	1	0	0	0	5
Hour	10	2	0	0	0	12	20	4	0	0	0	24
12:00	3	1	0	0	0	4	1	0	0	0	0	1
12:15	2	1	0	1	0	4	3	1	0	0	0	4
12:30	4	0	0	0	0	4	1	1	0	1	0	3
12:45	4	0	0	0	0	4	2	0	0	0	0	2
Hour	13	2	0	1	0	16	7	2	0	1	0	10
13:00	3	1	0	0	0	4	1	0	0	0	0	1
13:15	2	0	0	0	0	2	4	0	0	0	0	4
13:30	6	0	0	0	0	6	5	0	0	0	0	5
13:45	1	0	0	0	0	1	3	1	0	0	0	4
Hour	12	1	0	0	0	13	13	1	0	0	0	14
14:00	4	0	0	0	0	4	4	0	0	0	0	4
14:15	4	0	0	0	0	4	4	0	0	0	0	4
14:30	10	0	0	0	0	10	6	0	0	0	0	6
14:45	6	1	0	0	0	7	3	2	0	0	0	5
Hour	24	1	0	0	0	25	17	2	0	0	0	19
15:00	2	0	0	0	0	2	2	0	0	0	0	2
15:15	6	1	0	0	0	7	4	0	0	0	0	4
15:30	7	0	0	0	0	7	11	0	0	0	0	11
15:45	2	1	1	0	0	4	5	0	0	0	0	5
Hour	17	2	1	0	0	20	22	0	0	0	0	22
16:00	5	0	0	0	0	5	2	2	0	0	0	4
16:15	8	4	0	0	0	12	8	2	0	0	0	10
16:30	6	0	0	0	0	6	7	2	0	0	0	9
16:45	4	2	0	0	0	6	5	1	0	0	0	6
Hour	23	6	0	0	0	29	22	7	0	0	0	29
17:00	10	1	0	0	0	11	4	0	0	0	0	4
17:15	12	1	0	0	0	13	9	0	0	0	0	9
17:30	11	1	0	0	0	12	6	1	0	0	0	7
17:45	13	1	0	0	0	14	7	0	0	0	0	7
Hour	46	4	0	0	0	50	26	1	0	0	0	27
18:00	8	1	0	0	0	9	6	0	0	0	0	6
18:15	9	0	0	0	0	9	6	0	0	0	0	6
18:30	11	0	0	0	0	11	6	0	0	0	0	6
18:45	7	1	0	0	0	8	10	0	0	0	0	10
Hour	35	2	0	0	0	37	28	0	0	0	0	28
Total	239	28	2	1	0	270	267	32	2	1	0	302

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	To Arm C - Yeats Way(S)					Veh. Total	From Arm C - Yeats Way(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	67	3	0	0	0	70	6	3	0	0	0	9
07:15	77	2	0	0	0	79	10	4	0	0	0	14
07:30	110	2	0	0	0	112	9	0	0	0	0	9
07:45	148	6	1	0	0	155	11	3	0	0	0	14
Hour	402	13	1	0	0	416	36	10	0	0	0	46
08:00	131	5	0	0	0	136	17	3	0	0	0	20
08:15	122	3	0	0	0	125	10	2	0	0	0	12
08:30	130	2	1	0	0	133	12	2	0	0	0	14
08:45	147	5	0	0	0	152	16	3	1	0	0	20
Hour	530	15	1	0	0	546	55	10	1	0	0	66
09:00	159	7	1	0	0	167	18	3	0	0	0	21
09:15	85	7	1	0	0	93	13	9	1	0	0	23
09:30	63	5	1	0	0	69	8	5	1	0	0	14
09:45	60	5	0	0	0	65	10	4	1	0	0	15
Hour	367	24	3	0	0	394	49	21	3	0	0	73
10:00	32	6	0	0	0	38	7	5	1	0	0	13
10:15	24	11	0	0	0	35	10	8	0	0	0	18
10:30	24	4	0	0	0	28	19	4	0	0	0	23
10:45	21	2	0	0	0	23	10	3	0	0	0	13
Hour	101	23	0	0	0	124	46	20	1	0	0	67
11:00	21	7	2	0	0	30	16	7	2	0	0	25
11:15	10	6	3	0	0	19	9	4	0	0	0	13
11:30	8	5	0	0	0	13	7	7	4	0	0	18
11:45	20	12	0	0	0	32	18	6	0	0	0	24
Hour	59	30	5	0	0	94	50	24	6	0	0	80
12:00	13	2	0	0	0	15	36	11	0	0	0	47
12:15	16	4	0	0	0	20	36	4	0	0	0	40
12:30	22	4	0	1	0	27	26	4	0	0	0	30
12:45	28	4	0	0	0	32	37	3	0	0	0	40
Hour	79	14	0	1	0	94	135	22	0	0	0	157
13:00	20	4	0	0	0	24	36	3	0	1	0	40
13:15	25	2	0	0	0	27	18	5	0	0	0	23
13:30	33	4	0	0	0	37	19	3	0	0	0	22
13:45	26	3	1	0	0	30	26	1	1	0	0	28
Hour	104	13	1	0	0	118	99	12	1	1	0	113
14:00	34	8	0	0	0	42	30	5	0	0	0	35
14:15	20	5	1	0	0	26	18	6	0	0	0	24
14:30	18	7	0	0	0	25	28	2	1	0	0	31
14:45	12	6	0	0	0	18	16	2	0	0	0	18
Hour	84	26	1	0	0	111	92	15	1	0	0	108
15:00	13	4	0	0	0	17	32	6	1	0	0	39
15:15	9	3	0	0	0	12	25	7	0	0	0	32
15:30	12	4	0	0	0	16	58	2	0	0	0	60
15:45	18	3	0	0	0	21	51	8	0	0	0	59
Hour	52	14	0	0	0	66	166	23	1	0	0	190
16:00	18	3	0	0	0	21	134	7	0	0	0	141
16:15	10	3	1	0	0	14	82	3	0	0	0	85
16:30	9	5	0	0	0	14	125	3	1	0	0	129
16:45	7	4	0	0	0	11	105	6	0	0	0	111
Hour	44	15	1	0	0	60	446	19	1	0	0	466
17:00	14	1	0	0	0	15	134	2	0	0	0	136
17:15	13	0	0	0	0	13	110	2	0	0	0	112
17:30	8	0	0	0	0	8	116	2	0	0	0	118
17:45	14	0	0	0	0	14	102	1	0	0	0	103
Hour	49	1	0	0	0	50	462	7	0	0	0	469
18:00	18	1	0	0	0	19	115	2	0	0	0	117
18:15	10	1	0	0	0	11	68	1	0	0	0	69
18:30	8	0	0	0	0	8	48	1	0	0	0	49
18:45	5	1	0	0	0	6	40	1	0	0	0	41
Hour	41	3	0	0	0	44	271	5	0	0	0	276
Total	1912	191	13	1	0	2117	1907	188	15	1	0	2111

Site No. 5
Location Yeats Way(N) / Park West Avenue(W) / Yeats Way(S) / Park West Avenue(E)
Date Wednesday 13 February 2019

Time	To Arm D - Park West Avenue(E)					Veh. Total	From Arm D - Park West Avenue(E)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	18	4	1	0	0	23	72	3	0	0	0	75
07:15	28	7	0	0	0	35	81	4	0	0	0	85
07:30	31	4	0	0	0	35	115	2	1	0	0	118
07:45	30	4	1	0	0	35	151	6	1	0	0	158
Hour	107	19	2	0	0	128	419	15	2	0	0	436
08:00	39	5	0	0	0	44	138	6	0	0	0	144
08:15	39	5	0	0	0	44	130	5	0	0	0	135
08:30	45	5	0	0	0	50	140	3	1	0	0	144
08:45	39	3	1	0	0	43	156	5	0	0	0	161
Hour	162	18	1	0	0	181	564	19	1	0	0	584
09:00	31	2	0	0	0	33	180	7	1	0	0	188
09:15	22	12	1	0	0	35	98	7	1	0	0	106
09:30	14	7	1	0	0	22	71	6	1	0	0	78
09:45	22	4	1	0	0	27	69	6	0	0	0	75
Hour	89	25	3	0	0	117	418	26	3	0	0	447
10:00	16	7	1	0	0	24	35	8	0	0	0	43
10:15	15	8	0	0	0	23	29	12	0	0	0	41
10:30	28	5	0	0	0	33	30	7	0	0	0	37
10:45	16	5	0	0	0	21	28	3	0	0	0	31
Hour	75	25	1	0	0	101	122	30	0	0	0	152
11:00	23	7	2	0	0	32	29	8	2	0	0	39
11:15	16	5	0	0	0	21	17	7	4	0	0	28
11:30	19	9	4	0	0	32	13	7	0	0	0	20
11:45	25	8	1	0	0	34	23	13	0	0	0	36
Hour	83	29	7	0	0	119	82	35	6	0	0	123
12:00	45	11	0	0	0	56	22	3	0	0	0	25
12:15	43	6	0	0	0	49	24	5	0	1	0	30
12:30	36	6	0	0	0	42	31	4	0	0	0	35
12:45	43	3	0	0	0	46	37	5	0	0	0	42
Hour	167	26	0	0	0	193	114	17	0	1	0	132
13:00	44	4	0	1	0	49	27	5	0	0	0	32
13:15	27	6	0	0	0	33	32	5	0	0	0	37
13:30	33	3	0	0	0	36	47	4	1	0	0	52
13:45	34	1	1	0	0	36	35	4	1	0	0	40
Hour	138	14	1	1	0	154	141	18	2	0	0	161
14:00	41	6	0	0	0	47	45	7	0	0	0	52
14:15	27	7	0	0	0	34	29	6	1	0	0	36
14:30	37	2	1	0	0	40	30	9	0	0	0	39
14:45	20	3	0	1	0	24	22	6	0	1	0	29
Hour	125	18	1	1	0	145	126	28	1	1	0	156
15:00	41	7	1	0	0	49	21	5	0	0	0	26
15:15	34	9	0	0	0	43	18	5	0	0	0	23
15:30	71	2	0	0	0	73	23	5	0	0	0	28
15:45	65	11	0	0	0	76	32	5	1	0	0	38
Hour	211	29	1	0	0	241	94	20	1	0	0	115
16:00	148	10	0	0	0	158	33	4	0	0	0	37
16:15	94	4	0	0	0	98	28	5	1	0	0	34
16:30	138	6	1	0	0	145	24	6	0	0	0	30
16:45	119	7	0	0	0	126	15	5	0	0	0	20
Hour	499	27	1	0	0	527	100	20	1	0	0	121
17:00	145	1	1	0	0	147	35	1	1	0	0	37
17:15	125	3	0	0	0	128	33	1	0	0	0	34
17:30	119	3	0	0	0	122	27	2	0	0	0	29
17:45	120	1	0	0	0	121	42	1	0	0	0	43
Hour	509	8	1	0	0	518	137	5	1	0	0	143
18:00	129	2	0	0	0	131	38	4	0	0	0	42
18:15	75	1	0	0	0	76	28	2	0	0	0	30
18:30	76	1	0	0	0	77	30	0	0	0	0	30
18:45	60	2	0	0	0	62	24	3	0	0	0	27
Hour	340	6	0	0	0	346	120	9	0	0	0	129
Total	2505	244	19	2	0	2770	2437	242	18	2	0	2699

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	A to D - Park West Avenue to R134(E)					Veh. Total	A to C - Park West Avenue to Oak Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	36	10	4	0	0	50	15	4	0	0	0	19
07:15	40	14	3	0	0	57	11	4	1	0	0	16
07:30	42	9	2	0	0	53	24	5	2	0	0	31
07:45	50	9	1	0	0	60	19	3	0	0	0	22
Hour	168	42	10	0	0	220	69	16	3	0	0	88
08:00	48	11	1	1	0	61	20	3	1	0	0	24
08:15	66	9	4	0	0	79	20	7	1	0	0	28
08:30	55	10	2	3	0	70	15	3	2	0	0	20
08:45	50	3	3	0	0	56	16	3	0	0	0	19
Hour	219	33	10	4	0	266	71	16	4	0	0	91
09:00	29	9	1	1	0	40	16	6	0	1	0	23
09:15	24	6	3	1	0	34	15	5	1	0	0	21
09:30	28	9	2	2	0	41	14	4	2	0	0	20
09:45	32	7	0	3	0	42	10	6	1	0	0	17
Hour	113	31	6	7	0	157	55	21	4	1	0	81
10:00	21	8	2	2	0	33	3	3	1	0	0	7
10:15	28	8	1	0	0	37	9	7	1	0	0	17
10:30	31	7	2	3	0	43	4	3	1	1	0	9
10:45	20	6	1	0	0	27	7	6	2	0	0	15
Hour	100	29	6	5	0	140	23	19	5	1	0	48
11:00	31	13	1	1	0	46	4	5	3	0	0	12
11:15	17	11	1	1	0	30	4	6	0	0	0	10
11:30	34	17	0	0	0	51	10	8	2	0	0	20
11:45	34	9	3	0	0	46	4	5	3	0	0	12
Hour	116	50	5	2	0	173	22	24	8	0	0	54
12:00	31	10	2	2	0	45	8	2	0	0	0	10
12:15	26	8	3	1	1	39	8	5	3	0	0	16
12:30	32	8	1	2	0	43	10	4	2	1	0	17
12:45	17	6	1	0	0	24	18	9	1	0	0	28
Hour	106	32	7	5	1	151	44	20	6	1	0	71
13:00	40	9	1	0	0	50	6	4	3	3	0	16
13:15	38	9	1	0	0	48	13	1	2	0	0	16
13:30	34	10	2	0	0	46	15	3	2	0	0	20
13:45	39	8	2	0	2	51	9	3	2	0	0	14
Hour	151	36	6	0	2	195	43	11	9	3	0	66
14:00	54	9	1	0	0	64	26	6	1	0	0	33
14:15	49	5	1	1	0	56	12	1	2	1	0	16
14:30	44	6	3	1	0	54	15	1	0	0	0	16
14:45	29	12	1	0	0	42	5	2	3	2	0	12
Hour	176	32	6	2	0	216	58	10	6	3	0	77
15:00	36	6	3	1	0	46	4	3	0	0	0	7
15:15	34	11	4	0	2	51	7	3	4	2	0	16
15:30	54	6	2	0	0	62	3	4	1	0	0	8
15:45	55	8	1	1	0	65	6	8	0	0	0	14
Hour	179	31	10	2	2	224	20	18	5	2	0	45
16:00	67	6	1	0	0	74	6	3	2	0	0	11
16:15	38	12	0	0	0	50	5	4	0	1	0	10
16:30	64	8	0	0	0	72	8	2	1	0	0	11
16:45	59	4	1	0	0	64	9	2	0	0	0	11
Hour	228	30	2	0	0	260	28	11	3	1	0	43
17:00	48	3	0	0	0	51	2	3	0	0	0	5
17:15	60	4	1	0	0	65	3	1	1	0	0	5
17:30	67	3	0	0	0	70	5	0	0	0	0	5
17:45	55	2	0	0	0	57	5	0	0	0	0	5
Hour	230	12	1	0	0	243	15	4	1	0	0	20
18:00	70	0	0	0	0	70	7	0	0	0	0	7
18:15	70	5	1	0	0	76	5	4	0	0	0	9
18:30	52	3	0	0	0	55	1	0	0	0	0	1
18:45	49	5	0	0	0	54	1	0	0	0	0	1
Hour	241	13	1	0	0	255	14	4	0	0	0	18
Total	2027	371	70	27	5	2500	462	174	54	12	0	702

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	A to B - Park West Avenue to R134(W)					Veh. Total	B to A - R134(W) to Park West Avenue					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	10	5	0	0	0	15	34	4	0	1	0	39
07:15	14	3	0	0	0	17	50	9	1	0	0	60
07:30	23	5	0	0	0	28	68	6	2	1	0	77
07:45	26	4	2	0	0	32	106	11	2	1	0	120
Hour	73	17	2	0	0	92	258	30	5	3	0	296
08:00	36	9	3	1	1	50	89	12	2	0	0	103
08:15	32	2	3	0	0	37	88	20	1	3	0	112
08:30	38	12	4	1	0	55	105	15	3	0	0	123
08:45	42	4	3	0	1	50	121	11	0	0	0	132
Hour	148	27	13	2	2	192	403	58	6	3	0	470
09:00	45	10	1	0	0	56	123	14	0	0	0	137
09:15	26	12	1	0	0	39	67	14	2	0	0	83
09:30	32	7	1	0	0	40	60	5	2	1	0	68
09:45	29	8	2	0	1	40	48	10	2	1	0	61
Hour	132	37	5	0	1	175	298	43	6	2	0	349
10:00	25	7	1	0	0	33	38	9	1	0	0	48
10:15	21	8	1	1	0	31	32	10	1	1	0	44
10:30	24	5	1	0	0	30	27	9	1	0	0	37
10:45	29	8	5	0	0	42	27	11	2	0	0	40
Hour	99	28	8	1	0	136	124	39	5	1	0	169
11:00	35	6	6	1	0	48	31	3	3	2	0	39
11:15	29	4	2	1	0	36	34	13	1	2	0	50
11:30	34	7	3	0	0	44	30	5	0	0	0	35
11:45	35	12	1	3	0	51	29	7	2	0	0	38
Hour	133	29	12	5	0	179	124	28	6	4	0	162
12:00	50	17	2	0	0	69	25	7	0	0	0	32
12:15	41	11	1	0	0	53	45	5	1	0	0	51
12:30	46	12	2	0	0	60	36	6	2	0	0	44
12:45	49	8	5	1	0	63	43	5	1	1	0	50
Hour	186	48	10	1	0	245	149	23	4	1	0	177
13:00	72	11	3	0	1	87	34	5	1	0	0	40
13:15	38	12	1	1	0	52	36	6	0	1	0	43
13:30	44	6	1	0	0	51	51	6	1	1	0	59
13:45	39	10	0	0	0	49	40	2	3	0	0	45
Hour	193	39	5	1	1	239	161	19	5	2	0	187
14:00	65	12	1	1	1	80	34	8	3	0	0	45
14:15	36	11	1	1	0	49	29	11	2	2	0	44
14:30	35	8	2	0	0	45	41	6	0	1	0	48
14:45	46	6	2	0	0	54	46	8	0	0	0	54
Hour	182	37	6	2	1	228	150	33	5	3	0	191
15:00	53	11	1	0	0	65	31	6	1	0	0	38
15:15	54	6	5	0	0	65	30	5	3	1	0	39
15:30	70	10	1	2	0	83	40	6	0	0	0	46
15:45	78	8	0	1	0	87	40	6	1	0	0	47
Hour	255	35	7	3	0	300	141	23	5	1	0	170
16:00	92	15	1	1	0	109	37	7	1	0	0	45
16:15	81	13	2	0	1	97	40	10	2	0	0	52
16:30	98	12	2	0	0	112	33	10	2	0	0	45
16:45	77	21	1	0	0	99	50	5	0	1	0	56
Hour	348	61	6	1	1	417	160	32	5	1	0	198
17:00	74	11	1	0	0	86	50	6	0	1	0	57
17:15	78	8	1	0	0	87	54	3	0	0	0	57
17:30	102	10	1	0	0	113	44	6	0	0	0	50
17:45	91	8	0	0	0	99	50	3	0	0	0	53
Hour	345	37	3	0	0	385	198	18	0	1	0	217
18:00	78	4	1	0	0	83	34	5	0	0	0	39
18:15	75	5	0	0	0	80	47	5	1	0	0	53
18:30	51	3	0	0	0	54	31	0	0	0	0	31
18:45	48	2	0	0	0	50	33	1	0	0	1	35
Hour	252	14	1	0	0	267	145	11	1	0	1	158
Total	2346	409	78	16	6	2855	2311	357	53	22	1	2744

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	B to D - R134(W) to R134(E)					Veh. Total	B to C - R134(W) to Oak Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	118	27	2	3	1	151	9	0	0	0	0	9
07:15	125	23	4	2	1	155	13	4	1	0	0	18
07:30	96	16	6	0	1	119	31	2	0	0	0	33
07:45	120	20	2	2	0	144	32	8	3	0	0	43
Hour	459	86	14	7	3	569	85	14	4	0	0	103
08:00	94	18	2	1	3	118	21	11	2	0	0	34
08:15	97	11	4	3	2	117	33	6	1	0	0	40
08:30	99	16	2	0	1	118	38	11	1	0	0	50
08:45	103	19	7	1	0	130	51	4	0	0	0	55
Hour	393	64	15	5	6	483	143	32	4	0	0	179
09:00	102	9	4	1	1	117	38	9	0	0	0	47
09:15	80	18	2	2	2	104	17	9	4	1	0	31
09:30	74	16	7	1	2	100	15	5	0	0	0	20
09:45	72	17	6	2	0	97	18	10	0	2	0	30
Hour	328	60	19	6	5	418	88	33	4	3	0	128
10:00	59	13	5	3	3	83	17	4	0	0	0	21
10:15	54	16	3	3	1	77	10	6	0	0	0	16
10:30	51	16	6	2	0	75	9	1	0	0	0	10
10:45	69	13	6	2	2	92	9	2	3	1	1	16
Hour	233	58	20	10	6	327	45	13	3	1	1	63
11:00	45	14	3	0	1	63	13	3	3	0	0	19
11:15	56	18	5	0	1	80	10	4	2	0	0	16
11:30	56	11	8	0	1	76	8	3	1	1	0	13
11:45	49	12	4	1	1	67	9	7	1	0	1	18
Hour	206	55	20	1	4	286	40	17	7	1	1	66
12:00	47	15	4	0	1	67	5	4	2	0	1	12
12:15	48	15	1	1	2	67	14	8	3	0	0	25
12:30	63	13	4	0	3	83	16	1	2	0	0	19
12:45	51	9	2	0	0	62	10	4	2	0	0	16
Hour	209	52	11	1	6	279	45	17	9	0	1	72
13:00	52	14	3	0	1	70	13	5	2	0	0	20
13:15	68	16	6	0	1	91	17	6	0	0	0	23
13:30	47	9	3	2	1	62	14	3	1	0	0	18
13:45	87	21	2	2	4	116	21	5	0	0	0	26
Hour	254	60	14	4	7	339	65	19	3	0	0	87
14:00	58	10	9	4	2	83	22	8	1	0	0	31
14:15	53	9	3	0	1	66	21	3	0	0	0	24
14:30	74	15	3	0	1	93	16	6	3	0	0	25
14:45	59	12	8	1	0	80	14	2	0	0	0	16
Hour	244	46	23	5	4	322	73	19	4	0	0	96
15:00	55	18	5	0	1	79	8	3	2	0	0	13
15:15	54	17	5	2	1	79	5	2	0	0	0	7
15:30	63	10	3	2	1	79	10	5	0	0	0	15
15:45	60	5	3	3	0	71	9	4	1	0	0	14
Hour	232	50	16	7	3	308	32	14	3	0	0	49
16:00	54	18	6	0	1	79	4	1	0	0	0	5
16:15	55	9	1	1	1	67	12	1	3	0	0	16
16:30	62	7	2	0	2	73	8	2	0	0	0	10
16:45	61	11	3	0	0	75	9	1	0	0	0	10
Hour	232	45	12	1	4	294	33	5	3	0	0	41
17:00	57	7	1	1	1	67	4	1	0	0	0	5
17:15	51	7	0	0	1	59	7	1	1	0	0	9
17:30	43	7	2	1	1	54	7	0	0	0	0	7
17:45	48	3	0	0	0	51	4	1	0	0	0	5
Hour	199	24	3	2	3	231	22	3	1	0	0	26
18:00	55	8	2	0	1	66	13	0	0	0	0	13
18:15	44	4	0	1	1	50	11	0	0	0	0	11
18:30	56	3	0	0	1	60	3	0	0	0	0	3
18:45	80	4	0	0	1	85	3	1	0	0	0	4
Hour	235	19	2	1	4	261	30	1	0	0	0	31
Total	3224	619	169	50	55	4117	701	187	45	5	3	941

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	C to B - Oak Road to R134(W)					Veh. Total	C to A - Oak Road to Park West Avenue					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	6	0	1	0	0	7	6	5	1	0	0	12
07:15	2	8	2	0	0	12	10	2	0	0	0	12
07:30	4	2	4	0	0	10	14	1	1	0	0	16
07:45	4	2	2	0	0	8	19	2	0	0	0	21
Hour	16	12	9	0	0	37	49	10	2	0	0	61
08:00	9	7	1	0	0	17	16	4	1	1	0	22
08:15	6	5	1	2	0	14	5	4	2	0	0	11
08:30	7	7	4	0	0	18	11	3	3	0	0	17
08:45	13	4	5	0	0	22	7	4	0	0	0	11
Hour	35	23	11	2	0	71	39	15	6	1	0	61
09:00	16	17	0	0	0	33	14	3	1	1	0	19
09:15	13	8	3	2	0	26	7	5	1	2	0	15
09:30	13	14	2	0	0	29	13	5	3	0	0	21
09:45	21	13	4	0	0	38	20	2	4	2	0	28
Hour	63	52	9	2	0	126	54	15	9	5	0	83
10:00	17	11	1	2	0	31	11	7	5	0	0	23
10:15	9	9	1	0	1	20	5	3	1	0	0	9
10:30	13	8	5	2	0	28	6	3	2	1	0	12
10:45	15	11	0	1	0	27	5	7	0	2	0	14
Hour	54	39	7	5	1	106	27	20	8	3	0	58
11:00	16	8	2	1	1	28	11	5	5	1	0	22
11:15	21	5	3	0	0	29	4	5	3	0	0	12
11:30	22	18	2	1	0	43	5	5	3	1	0	14
11:45	15	16	5	1	0	37	5	3	5	0	0	13
Hour	74	47	12	3	1	137	25	18	16	2	0	61
12:00	16	11	4	0	0	31	13	6	0	0	0	19
12:15	22	14	3	0	0	39	7	4	2	0	0	13
12:30	22	13	6	1	0	42	11	4	1	1	0	17
12:45	28	11	5	0	0	44	13	6	2	1	0	22
Hour	88	49	18	1	0	156	44	20	5	2	0	71
13:00	42	15	5	2	0	64	12	10	1	0	0	23
13:15	27	5	3	0	0	35	10	4	0	0	0	14
13:30	28	9	7	1	0	45	11	2	0	0	0	13
13:45	17	7	3	0	0	27	14	9	1	2	0	26
Hour	114	36	18	3	0	171	47	25	2	2	0	76
14:00	30	9	1	0	0	40	13	1	3	0	0	17
14:15	29	11	4	0	0	44	12	6	1	0	0	19
14:30	24	10	1	1	0	36	15	2	2	2	0	21
14:45	39	11	4	0	0	54	10	4	2	1	0	17
Hour	122	41	10	1	0	174	50	13	8	3	0	74
15:00	39	10	4	0	0	53	9	5	1	3	0	18
15:15	17	11	4	1	0	33	9	2	0	0	0	11
15:30	25	9	3	0	0	37	8	3	1	1	0	13
15:45	28	9	3	1	0	41	7	8	1	0	0	16
Hour	109	39	14	2	0	164	33	18	3	4	0	58
16:00	49	14	2	0	0	65	14	6	1	1	0	22
16:15	59	16	2	0	0	77	14	6	4	1	0	25
16:30	69	11	0	0	0	80	9	4	1	1	0	15
16:45	84	13	4	0	0	101	25	6	1	0	0	32
Hour	261	54	8	0	0	323	62	22	7	3	0	94
17:00	105	12	1	0	0	118	15	2	1	0	0	18
17:15	78	18	0	1	0	97	18	0	0	0	0	18
17:30	95	12	0	0	0	107	23	3	0	0	0	26
17:45	68	8	0	1	0	77	17	1	0	0	0	18
Hour	346	50	1	2	0	399	73	6	1	0	0	80
18:00	43	11	3	0	0	57	12	1	0	0	0	13
18:15	48	11	0	0	0	59	10	3	0	0	0	13
18:30	28	7	1	0	0	36	4	0	0	1	0	5
18:45	16	1	1	0	0	18	8	0	0	0	0	8
Hour	135	30	5	0	0	170	34	4	0	1	0	39
Total	1417	472	122	21	2	2034	537	186	67	26	0	816

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	C to D - Oak Road to R134(E)					Veh. Total	D to C - R134(E) to Oak Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	2	2	4	1	0	9	9	1	2	1	0	13
07:15	3	1	4	2	0	10	14	6	0	0	0	20
07:30	4	4	3	0	0	11	14	5	0	0	0	19
07:45	6	3	2	0	0	11	12	3	2	0	0	17
Hour	15	10	13	3	0	41	49	15	4	1	0	69
08:00	5	5	1	2	0	13	8	5	2	0	0	15
08:15	3	2	3	0	0	8	17	2	2	0	0	21
08:30	7	7	1	0	0	15	18	5	0	0	0	23
08:45	5	5	1	1	0	12	14	3	0	1	0	18
Hour	20	19	6	3	0	48	57	15	4	1	0	77
09:00	9	5	2	1	0	17	12	10	3	1	0	26
09:15	8	6	4	1	0	19	14	2	0	1	0	17
09:30	7	16	0	3	0	26	8	6	1	1	0	16
09:45	12	9	2	1	0	24	13	8	0	1	0	22
Hour	36	36	8	6	0	86	47	26	4	4	0	81
10:00	12	3	3	2	0	20	11	6	2	0	0	19
10:15	5	6	2	1	0	14	8	7	0	0	0	15
10:30	8	7	5	1	0	21	9	6	1	3	0	19
10:45	13	10	2	1	0	26	10	6	2	1	0	19
Hour	38	26	12	5	0	81	38	25	5	4	0	72
11:00	12	4	6	4	0	26	4	2	1	0	0	7
11:15	14	9	1	0	0	24	11	8	1	2	0	22
11:30	11	4	6	0	0	21	11	8	1	1	0	21
11:45	8	5	4	2	0	19	5	7	2	0	0	14
Hour	45	22	17	6	0	90	31	25	5	3	0	64
12:00	16	15	0	0	0	31	9	9	3	1	0	22
12:15	15	10	3	2	0	30	13	4	2	0	0	19
12:30	11	11	3	1	0	26	14	4	2	2	0	22
12:45	15	7	5	2	0	29	13	1	0	1	0	15
Hour	57	43	11	5	0	116	49	18	7	4	0	78
13:00	18	5	2	3	0	28	11	3	0	1	0	15
13:15	16	4	1	3	0	24	10	3	2	3	0	18
13:30	22	7	4	2	0	35	19	5	1	1	0	26
13:45	13	4	0	5	1	23	4	5	1	1	0	11
Hour	69	20	7	13	1	110	44	16	4	6	0	70
14:00	9	4	3	3	0	19	10	5	3	0	0	18
14:15	13	6	3	0	0	22	14	4	1	0	0	19
14:30	15	9	1	3	0	28	5	5	1	0	0	11
14:45	14	8	1	2	0	25	5	6	0	0	0	11
Hour	51	27	8	8	0	94	34	20	5	0	0	59
15:00	16	3	6	2	1	28	9	6	1	0	0	16
15:15	11	7	6	1	0	25	7	4	1	0	0	12
15:30	15	8	4	1	0	28	4	4	1	0	0	9
15:45	16	8	3	1	1	29	8	2	2	0	0	12
Hour	58	26	19	5	2	110	28	16	5	0	0	49
16:00	14	9	1	1	0	25	5	5	0	0	0	10
16:15	15	0	0	1	0	16	2	1	0	0	0	3
16:30	15	2	2	2	0	21	7	2	1	0	0	10
16:45	16	2	0	1	0	19	7	0	0	0	0	7
Hour	60	13	3	5	0	81	21	8	1	0	0	30
17:00	21	5	1	2	0	29	2	2	0	0	0	4
17:15	10	2	0	0	0	12	2	1	0	0	0	3
17:30	10	1	1	0	0	12	1	1	0	0	0	2
17:45	14	1	1	1	0	17	3	2	0	0	0	5
Hour	55	9	3	3	0	70	8	6	0	0	0	14
18:00	20	2	2	0	0	24	8	5	0	0	0	13
18:15	20	5	0	1	0	26	12	3	1	0	0	16
18:30	28	6	3	1	0	38	6	1	2	1	0	10
18:45	6	2	0	0	0	8	2	1	1	0	0	4
Hour	74	15	5	2	0	96	28	10	4	1	0	43
Total	578	266	112	64	3	1023	434	200	48	24	0	706

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	D to B - R134(E) to R134(W)					Veh. Total	D to A - R134(E) to Park West Avenue					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	37	6	2	1	0	46	33	3	1	2	0	39
07:15	35	5	2	2	1	45	42	5	0	2	1	50
07:30	32	7	2	0	2	43	76	4	1	2	0	83
07:45	54	11	2	2	1	70	68	5	1	1	1	76
Hour	158	29	8	5	4	204	219	17	3	7	2	248
08:00	44	7	1	1	1	54	60	8	2	1	0	71
08:15	46	17	1	0	1	65	61	3	0	0	1	65
08:30	51	7	3	0	0	61	85	3	3	0	0	91
08:45	48	7	1	0	2	58	79	4	1	1	1	86
Hour	189	38	6	1	4	238	285	18	6	2	2	313
09:00	44	11	3	1	0	59	76	1	0	1	0	78
09:15	51	11	5	1	3	71	63	6	1	1	1	72
09:30	42	12	8	1	0	63	50	8	1	1	0	60
09:45	44	13	6	0	1	64	44	7	2	0	0	53
Hour	181	47	22	3	4	257	233	22	4	3	1	263
10:00	45	17	4	4	3	73	30	12	0	0	0	42
10:15	60	17	2	1	1	81	36	12	1	1	0	50
10:30	50	11	5	2	1	69	31	12	3	1	0	47
10:45	50	19	3	1	1	74	39	13	0	2	0	54
Hour	205	64	14	8	6	297	136	49	4	4	0	193
11:00	50	15	2	0	1	68	39	10	3	0	0	52
11:15	59	20	8	1	2	90	30	12	2	2	0	46
11:30	62	15	4	3	0	84	28	7	4	0	0	39
11:45	61	12	3	0	1	77	34	8	2	0	0	44
Hour	232	62	17	4	4	319	131	37	11	2	0	181
12:00	44	17	5	1	1	68	19	7	4	2	0	32
12:15	62	14	7	0	1	84	32	8	3	1	0	44
12:30	82	19	5	1	1	108	38	13	5	0	1	57
12:45	54	16	10	0	2	82	39	12	2	2	0	55
Hour	242	66	27	2	5	342	128	40	14	5	1	188
13:00	82	16	7	0	1	106	38	7	3	1	0	49
13:15	90	13	5	1	0	109	35	11	0	0	1	47
13:30	62	15	3	2	1	83	33	10	1	2	0	46
13:45	81	20	3	1	1	106	37	9	5	0	0	51
Hour	315	64	18	4	3	404	143	37	9	3	1	193
14:00	79	19	3	2	0	103	24	12	1	0	0	37
14:15	63	14	1	2	2	82	31	6	3	1	0	41
14:30	62	19	5	1	2	89	33	13	3	0	0	49
14:45	80	15	2	0	1	98	33	5	0	2	0	40
Hour	284	67	11	5	5	372	121	36	7	3	0	167
15:00	86	27	6	1	1	121	36	4	1	1	0	42
15:15	78	21	7	0	0	106	30	7	5	1	0	43
15:30	81	28	3	0	1	113	35	13	2	0	1	51
15:45	87	21	2	3	1	114	33	9	2	0	1	45
Hour	332	97	18	4	3	454	134	33	10	2	2	181
16:00	125	22	1	0	0	148	26	10	2	0	0	38
16:15	118	29	4	3	2	156	28	8	0	0	0	36
16:30	132	28	2	2	1	165	21	7	2	1	0	31
16:45	131	26	3	1	1	162	38	3	3	0	1	45
Hour	506	105	10	6	4	631	113	28	7	1	1	150
17:00	123	21	4	1	0	149	24	6	0	0	0	30
17:15	127	15	0	0	1	143	26	3	1	0	0	30
17:30	110	20	0	0	0	130	24	7	4	0	0	35
17:45	145	22	0	3	1	171	35	5	1	0	0	41
Hour	505	78	4	4	2	593	109	21	6	0	0	136
18:00	148	12	1	1	1	163	36	5	0	0	1	42
18:15	111	9	2	1	1	124	35	8	1	0	0	44
18:30	98	7	0	0	0	105	21	6	0	0	0	27
18:45	90	4	0	0	1	95	28	1	0	0	0	29
Hour	447	32	3	2	3	487	120	20	1	0	1	142
Total	3596	749	158	48	47	4598	1872	358	82	32	11	2355

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	To Arm A - Park West Avenue					Veh. Total	From Arm A - Park West Avenue					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	73	12	2	3	0	90	61	19	4	0	0	84
07:15	102	16	1	2	1	122	65	21	4	0	0	90
07:30	158	11	4	3	0	176	89	19	4	0	0	112
07:45	193	18	3	2	1	217	95	16	3	0	0	114
Hour	526	57	10	10	2	605	310	75	15	0	0	400
08:00	165	24	5	2	0	196	104	23	5	2	1	135
08:15	154	27	3	3	1	188	118	18	8	0	0	144
08:30	201	21	9	0	0	231	108	25	8	4	0	145
08:45	207	19	1	1	1	229	108	10	6	0	1	125
Hour	727	91	18	6	2	844	438	76	27	6	2	549
09:00	213	18	1	2	0	234	90	25	2	2	0	119
09:15	137	25	4	3	1	170	65	23	5	1	0	94
09:30	123	18	6	2	0	149	74	20	5	2	0	101
09:45	112	19	8	3	0	142	71	21	3	3	1	99
Hour	585	80	19	10	1	695	300	89	15	8	1	413
10:00	79	28	6	0	0	113	49	18	4	2	0	73
10:15	73	25	3	2	0	103	58	23	3	1	0	85
10:30	64	24	6	2	0	96	59	15	4	4	0	82
10:45	71	31	2	4	0	108	56	20	8	0	0	84
Hour	287	108	17	8	0	420	222	76	19	7	0	324
11:00	81	18	11	3	0	113	70	24	10	2	0	106
11:15	68	30	6	4	0	108	50	21	3	2	0	76
11:30	63	17	7	1	0	88	78	32	5	0	0	115
11:45	68	18	9	0	0	95	73	26	7	3	0	109
Hour	280	83	33	8	0	404	271	103	25	7	0	406
12:00	57	20	4	2	0	83	89	29	4	2	0	124
12:15	84	17	6	1	0	108	75	24	7	1	1	108
12:30	85	23	8	1	1	118	88	24	5	3	0	120
12:45	95	23	5	4	0	127	84	23	7	1	0	115
Hour	321	83	23	8	1	436	336	100	23	7	1	467
13:00	84	22	5	1	0	112	118	24	7	3	1	153
13:15	81	21	0	1	1	104	89	22	4	1	0	116
13:30	95	18	2	3	0	118	93	19	5	0	0	117
13:45	91	20	9	2	0	122	87	21	4	0	2	114
Hour	351	81	16	7	1	456	387	86	20	4	3	500
14:00	71	21	7	0	0	99	145	27	3	1	1	177
14:15	72	23	6	3	0	104	97	17	4	3	0	121
14:30	89	21	5	3	0	118	94	15	5	1	0	115
14:45	89	17	2	3	0	111	80	20	6	2	0	108
Hour	321	82	20	9	0	432	416	79	18	7	1	521
15:00	76	15	3	4	0	98	93	20	4	1	0	118
15:15	69	14	8	2	0	93	95	20	13	2	2	132
15:30	83	22	3	1	1	110	127	20	4	2	0	153
15:45	80	23	4	0	1	108	139	24	1	2	0	166
Hour	308	74	18	7	2	409	454	84	22	7	2	569
16:00	77	23	4	1	0	105	165	24	4	1	0	194
16:15	82	24	6	1	0	113	124	29	2	1	1	157
16:30	63	21	5	2	0	91	170	22	3	0	0	195
16:45	113	14	4	1	1	133	145	27	2	0	0	174
Hour	335	82	19	5	1	442	604	102	11	2	1	720
17:00	89	14	1	1	0	105	124	17	1	0	0	142
17:15	98	6	1	0	0	105	141	13	3	0	0	157
17:30	91	16	4	0	0	111	174	13	1	0	0	188
17:45	102	9	1	0	0	112	151	10	0	0	0	161
Hour	380	45	7	1	0	433	590	53	5	0	0	648
18:00	82	11	0	0	1	94	155	4	1	0	0	160
18:15	92	16	2	0	0	110	150	14	1	0	0	165
18:30	56	6	0	1	0	63	104	6	0	0	0	110
18:45	69	2	0	0	1	72	98	7	0	0	0	105
Hour	299	35	2	1	2	339	507	31	2	0	0	540
Total	4720	901	202	80	12	5915	4835	954	202	55	11	6057

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	To Arm B - R134(W)					Veh. Total	From Arm B - R134(W)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	53	11	3	1	0	68	161	31	2	4	1	199
07:15	51	16	4	2	1	74	188	36	6	2	1	233
07:30	59	14	6	0	2	81	195	24	8	1	1	229
07:45	84	17	6	2	1	110	258	39	7	3	0	307
Hour	247	58	19	5	4	333	802	130	23	10	3	968
08:00	89	23	5	2	2	121	204	41	6	1	3	255
08:15	84	24	5	2	1	116	218	37	6	6	2	269
08:30	96	26	11	1	0	134	242	42	6	0	1	291
08:45	103	15	9	0	3	130	275	34	7	1	0	317
Hour	372	88	30	5	6	501	939	154	25	8	6	1132
09:00	105	38	4	1	0	148	263	32	4	1	1	301
09:15	90	31	9	3	3	136	164	41	8	3	2	218
09:30	87	33	11	1	0	132	149	26	9	2	2	188
09:45	94	34	12	0	2	142	138	37	8	5	0	188
Hour	376	136	36	5	5	558	714	136	29	11	5	895
10:00	87	35	6	6	3	137	114	26	6	3	3	152
10:15	90	34	4	2	2	132	96	32	4	4	1	137
10:30	87	24	11	4	1	127	87	26	7	2	0	122
10:45	94	38	8	2	1	143	105	26	11	3	3	148
Hour	358	131	29	14	7	539	402	110	28	12	7	559
11:00	101	29	10	2	2	144	89	20	9	2	1	121
11:15	109	29	13	2	2	155	100	35	8	2	1	146
11:30	118	40	9	4	0	171	94	19	9	1	1	124
11:45	111	40	9	4	1	165	87	26	7	1	2	123
Hour	439	138	41	12	5	635	370	100	33	6	5	514
12:00	110	45	11	1	1	168	77	26	6	0	2	111
12:15	125	39	11	0	1	176	107	28	5	1	2	143
12:30	150	44	13	2	1	210	115	20	8	0	3	146
12:45	131	35	20	1	2	189	104	18	5	1	0	128
Hour	516	163	55	4	5	743	403	92	24	2	7	528
13:00	196	42	15	2	2	257	99	24	6	0	1	130
13:15	155	30	9	2	0	196	121	28	6	1	1	157
13:30	134	30	11	3	1	179	112	18	5	3	1	139
13:45	137	37	6	1	1	182	148	28	5	2	4	187
Hour	622	139	41	8	4	814	480	98	22	6	7	613
14:00	174	40	5	3	1	223	114	26	13	4	2	159
14:15	128	36	6	3	2	175	103	23	5	2	1	134
14:30	121	37	8	2	2	170	131	27	6	1	1	166
14:45	165	32	8	0	1	206	119	22	8	1	0	150
Hour	588	145	27	8	6	774	467	98	32	8	4	609
15:00	178	48	11	1	1	239	94	27	8	0	1	130
15:15	149	38	16	1	0	204	89	24	8	3	1	125
15:30	176	47	7	2	1	233	113	21	3	2	1	140
15:45	193	38	5	5	1	242	109	15	5	3	0	132
Hour	696	171	39	9	3	918	405	87	24	8	3	527
16:00	266	51	4	1	0	322	95	26	7	0	1	129
16:15	258	58	8	3	3	330	107	20	6	1	1	135
16:30	299	51	4	2	1	357	103	19	4	0	2	128
16:45	292	60	8	1	1	362	120	17	3	1	0	141
Hour	1115	220	24	7	5	1371	425	82	20	2	4	533
17:00	302	44	6	1	0	353	111	14	1	2	1	129
17:15	283	41	1	1	1	327	112	11	1	0	1	125
17:30	307	42	1	0	0	350	94	13	2	1	1	111
17:45	304	38	0	4	1	347	102	7	0	0	0	109
Hour	1196	165	8	6	2	1377	419	45	4	3	3	474
18:00	269	27	5	1	1	303	102	13	2	0	1	118
18:15	234	25	2	1	1	263	102	9	1	1	1	114
18:30	177	17	1	0	0	195	90	3	0	0	1	94
18:45	154	7	1	0	1	163	116	6	0	0	2	124
Hour	834	76	9	2	3	924	410	31	3	1	5	450
Total	7359	1630	358	85	55	9487	6236	1163	267	77	59	7802

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	To Arm C - Oak Road					Veh. Total	From Arm C - Oak Road					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	33	5	2	1	0	41	14	7	6	1	0	28
07:15	38	14	2	0	0	54	15	11	6	2	0	34
07:30	69	12	2	0	0	83	22	7	8	0	0	37
07:45	63	14	5	0	0	82	29	7	4	0	0	40
Hour	203	45	11	1	0	260	80	32	24	3	0	139
08:00	49	19	5	0	0	73	30	16	3	3	0	52
08:15	70	15	4	0	0	89	14	11	6	2	0	33
08:30	71	19	3	0	0	93	25	17	8	0	0	50
08:45	81	10	0	1	0	92	25	13	6	1	0	45
Hour	271	63	12	1	0	347	94	57	23	6	0	180
09:00	66	25	3	2	0	96	39	25	3	2	0	69
09:15	46	16	5	2	0	69	28	19	8	5	0	60
09:30	37	15	3	1	0	56	33	35	5	3	0	76
09:45	41	24	1	3	0	69	53	24	10	3	0	90
Hour	190	80	12	8	0	290	153	103	26	13	0	295
10:00	31	13	3	0	0	47	40	21	9	4	0	74
10:15	27	20	1	0	0	48	19	18	4	1	1	43
10:30	22	10	2	4	0	38	27	18	12	4	0	61
10:45	26	14	7	2	1	50	33	28	2	4	0	67
Hour	106	57	13	6	1	183	119	85	27	13	1	245
11:00	21	10	7	0	0	38	39	17	13	6	1	76
11:15	25	18	3	2	0	48	39	19	7	0	0	65
11:30	29	19	4	2	0	54	38	27	11	2	0	78
11:45	18	19	6	0	1	44	28	24	14	3	0	69
Hour	93	66	20	4	1	184	144	87	45	11	1	288
12:00	22	15	5	1	1	44	45	32	4	0	0	81
12:15	35	17	8	0	0	60	44	28	8	2	0	82
12:30	40	9	6	3	0	58	44	28	10	3	0	85
12:45	41	14	3	1	0	59	56	24	12	3	0	95
Hour	138	55	22	5	1	221	189	112	34	8	0	343
13:00	30	12	5	4	0	51	72	30	8	5	0	115
13:15	40	10	4	3	0	57	53	13	4	3	0	73
13:30	48	11	4	1	0	64	61	18	11	3	0	93
13:45	34	13	3	1	0	51	44	20	4	7	1	76
Hour	152	46	16	9	0	223	230	81	27	18	1	357
14:00	58	19	5	0	0	82	52	14	7	3	0	76
14:15	47	8	3	1	0	59	54	23	8	0	0	85
14:30	36	12	4	0	0	52	54	21	4	6	0	85
14:45	24	10	3	2	0	39	63	23	7	3	0	96
Hour	165	49	15	3	0	232	223	81	26	12	0	342
15:00	21	12	3	0	0	36	64	18	11	5	1	99
15:15	19	9	5	2	0	35	37	20	10	2	0	69
15:30	17	13	2	0	0	32	48	20	8	2	0	78
15:45	23	14	3	0	0	40	51	25	7	2	1	86
Hour	80	48	13	2	0	143	200	83	36	11	2	332
16:00	15	9	2	0	0	26	77	29	4	2	0	112
16:15	19	6	3	1	0	29	88	22	6	2	0	118
16:30	23	6	2	0	0	31	93	17	3	3	0	116
16:45	25	3	0	0	0	28	125	21	5	1	0	152
Hour	82	24	7	1	0	114	383	89	18	8	0	498
17:00	8	6	0	0	0	14	141	19	3	2	0	165
17:15	12	3	2	0	0	17	106	20	0	1	0	127
17:30	13	1	0	0	0	14	128	16	1	0	0	145
17:45	12	3	0	0	0	15	99	10	1	2	0	112
Hour	45	13	2	0	0	60	474	65	5	5	0	549
18:00	28	5	0	0	0	33	75	14	5	0	0	94
18:15	28	7	1	0	0	36	78	19	0	1	0	98
18:30	10	1	2	1	0	14	60	13	4	2	0	79
18:45	6	2	1	0	0	9	30	3	1	0	0	34
Hour	72	15	4	1	0	92	243	49	10	3	0	305
Total	1597	561	147	41	3	2349	2532	924	301	111	5	3873

Site No. 6
Location Park West Avenue / R134(W) / Oak Road / R134(E)
Date Wednesday 13 February 2019

Time	To Arm D - R134(E)					Veh. Total	From Arm D - R134(E)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	156	39	10	4	1	210	79	10	5	4	0	98
07:15	168	38	11	4	1	222	91	16	2	4	2	115
07:30	142	29	11	0	1	183	122	16	3	2	2	145
07:45	176	32	5	2	0	215	134	19	5	3	2	163
Hour	642	138	37	10	3	830	426	61	15	13	6	521
08:00	147	34	4	4	3	192	112	20	5	2	1	140
08:15	166	22	11	3	2	204	124	22	3	0	2	151
08:30	161	33	5	3	1	203	154	15	6	0	0	175
08:45	158	27	11	2	0	198	141	14	2	2	3	162
Hour	632	116	31	12	6	797	531	71	16	4	6	628
09:00	140	23	7	3	1	174	132	22	6	3	0	163
09:15	112	30	9	4	2	157	128	19	6	3	4	160
09:30	109	41	9	6	2	167	100	26	10	3	0	139
09:45	116	33	8	6	0	163	101	28	8	1	1	139
Hour	477	127	33	19	5	661	461	95	30	10	5	601
10:00	92	24	10	7	3	136	86	35	6	4	3	134
10:15	87	30	6	4	1	128	104	36	3	2	1	146
10:30	90	30	13	6	0	139	90	29	9	6	1	135
10:45	102	29	9	3	2	145	99	38	5	4	1	147
Hour	371	113	38	20	6	548	379	138	23	16	6	562
11:00	88	31	10	5	1	135	93	27	6	0	1	127
11:15	87	38	7	1	1	134	100	40	11	5	2	158
11:30	101	32	14	0	1	148	101	30	9	4	0	144
11:45	91	26	11	3	1	132	100	27	7	0	1	135
Hour	367	127	42	9	4	549	394	124	33	9	4	564
12:00	94	40	6	2	1	143	72	33	12	4	1	122
12:15	89	33	7	4	3	136	107	26	12	1	1	147
12:30	106	32	8	3	3	152	134	36	12	3	2	187
12:45	83	22	8	2	0	115	106	29	12	3	2	152
Hour	372	127	29	11	7	546	419	124	48	11	6	608
13:00	110	28	6	3	1	148	131	26	10	2	1	170
13:15	122	29	8	3	1	163	135	27	7	4	1	174
13:30	103	26	9	4	1	143	114	30	5	5	1	155
13:45	139	33	4	7	7	190	122	34	9	2	1	168
Hour	474	116	27	17	10	644	502	117	31	13	4	667
14:00	121	23	13	7	2	166	113	36	7	2	0	158
14:15	115	20	7	1	1	144	108	24	5	3	2	142
14:30	133	30	7	4	1	175	100	37	9	1	2	149
14:45	102	32	10	3	0	147	118	26	2	2	1	149
Hour	471	105	37	15	4	632	439	123	23	8	5	598
15:00	107	27	14	3	2	153	131	37	8	2	1	179
15:15	99	35	15	3	3	155	115	32	13	1	0	161
15:30	132	24	9	3	1	169	120	45	6	0	2	173
15:45	131	21	7	5	1	165	128	32	6	3	2	171
Hour	469	107	45	14	7	642	494	146	33	6	5	684
16:00	135	33	8	1	1	178	156	37	3	0	0	196
16:15	108	21	1	2	1	133	148	38	4	3	2	195
16:30	141	17	4	2	2	166	160	37	5	3	1	206
16:45	136	17	4	1	0	158	176	29	6	1	2	214
Hour	520	88	17	6	4	635	640	141	18	7	5	811
17:00	126	15	2	3	1	147	149	29	4	1	0	183
17:15	121	13	1	0	1	136	155	19	1	0	1	176
17:30	120	11	3	1	1	136	135	28	4	0	0	167
17:45	117	6	1	1	0	125	183	29	1	3	1	217
Hour	484	45	7	5	3	544	622	105	10	4	2	743
18:00	145	10	4	0	1	160	192	22	1	1	2	218
18:15	134	14	1	2	1	152	158	20	4	1	1	184
18:30	136	12	3	1	1	153	125	14	2	1	0	142
18:45	135	11	0	0	1	147	120	6	1	0	1	128
Hour	550	47	8	3	4	612	595	62	8	3	4	672
Total	5829	1256	351	141	63	7640	5902	1307	288	104	58	7659

Site No. 7
Location L1014(N) / Park West Avenue / L1014(S)
Date Wednesday 13 February 2019

Time	A to C - L1014(N) to L1014(S)					Veh. Total	A to B - L1014(N) to Park West Avenue					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	52	13	1	1	0	67	26	9	1	1	0	37
07:15	70	20	2	2	0	94	31	6	4	1	1	43
07:30	75	13	2	4	1	95	36	7	4	2	0	49
07:45	91	20	3	1	1	116	58	9	2	2	0	71
Hour	288	66	8	8	2	372	151	31	11	6	1	200
08:00	89	14	1	3	0	107	77	7	4	0	1	89
08:15	105	17	4	3	1	130	62	8	2	1	0	73
08:30	80	13	8	1	0	102	62	15	4	0	1	82
08:45	92	21	5	3	1	122	88	11	1	1	0	101
Hour	366	65	18	10	2	461	289	41	11	2	2	345
09:00	85	33	8	2	0	128	61	13	2	1	0	77
09:15	56	14	5	3	2	80	47	11	1	1	0	60
09:30	37	10	5	4	0	56	38	6	0	2	0	46
09:45	35	12	3	7	0	57	34	13	2	2	1	52
Hour	213	69	21	16	2	321	180	43	5	6	1	235
10:00	25	13	6	4	0	48	28	11	5	1	1	46
10:15	28	8	8	1	0	45	27	9	7	1	0	44
10:30	31	7	4	5	1	48	35	8	7	0	0	50
10:45	30	13	4	2	0	49	20	7	4	1	0	32
Hour	114	41	22	12	1	190	110	35	23	3	1	172
11:00	31	10	3	6	0	50	31	14	1	0	0	46
11:15	23	12	3	3	0	41	22	16	5	1	0	44
11:30	43	8	5	4	0	60	38	10	8	3	1	60
11:45	30	15	6	5	0	56	34	12	4	0	1	51
Hour	127	45	17	18	0	207	125	52	18	4	2	201
12:00	45	13	2	2	0	62	27	11	2	1	0	41
12:15	35	19	3	4	0	61	35	10	1	0	0	46
12:30	36	17	2	3	0	58	32	12	6	1	0	51
12:45	42	8	4	1	1	56	42	19	3	2	0	66
Hour	158	57	11	10	1	237	136	52	12	4	0	204
13:00	38	7	5	4	0	54	38	13	3	0	0	54
13:15	49	14	6	6	0	75	28	11	3	1	0	43
13:30	62	13	4	2	0	81	49	12	1	1	0	63
13:45	50	19	4	4	0	77	51	5	4	0	0	60
Hour	199	53	19	16	0	287	166	41	11	2	0	220
14:00	55	8	2	2	0	67	37	15	5	1	0	58
14:15	48	18	5	3	0	74	38	7	5	0	1	51
14:30	44	8	4	2	0	58	36	13	2	1	1	53
14:45	49	10	6	1	0	66	25	10	5	2	0	42
Hour	196	44	17	8	0	265	136	45	17	4	2	204
15:00	58	20	3	1	0	82	30	13	4	0	0	47
15:15	37	16	2	1	0	56	37	11	4	0	0	52
15:30	44	15	6	1	0	66	43	20	5	3	0	71
15:45	54	21	5	1	0	81	45	13	4	0	0	62
Hour	193	72	16	4	0	285	155	57	17	3	0	232
16:00	77	14	1	2	0	94	52	14	6	2	0	74
16:15	70	18	5	1	1	95	54	13	5	0	1	73
16:30	67	16	1	0	0	84	56	24	8	0	0	88
16:45	56	10	1	1	1	69	40	7	1	1	0	49
Hour	270	58	8	4	2	342	202	58	20	3	1	284
17:00	65	9	1	2	0	77	43	10	2	1	0	56
17:15	45	10	1	0	0	56	48	8	2	1	1	60
17:30	61	7	0	0	0	68	47	4	2	0	0	53
17:45	48	10	0	1	1	60	38	8	2	0	0	48
Hour	219	36	2	3	1	261	176	30	8	2	1	217
18:00	56	3	0	0	0	59	44	6	0	3	0	53
18:15	46	4	0	1	0	51	34	2	1	0	1	38
18:30	65	7	2	1	0	75	26	5	2	0	0	33
18:45	58	5	0	0	1	64	24	3	0	0	0	27
Hour	225	19	2	2	1	249	128	16	3	3	1	151
Total	2568	625	161	111	12	3477	1954	501	156	42	12	2665

Site No. 7
Location L1014(N) / Park West Avenue / L1014(S)
Date Wednesday 13 February 2019

Time	B to A - Park West Avenue to L1014(N)					Veh. Total	B to C - Park West Avenue to L1014(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	16	10	1	3	1	31	4	2	2	3	0	11
07:15	39	10	6	2	0	57	10	5	3	4	0	22
07:30	34	4	0	0	1	39	13	7	0	3	0	23
07:45	58	7	1	2	0	68	20	13	5	2	0	40
Hour	147	31	8	7	2	195	47	27	10	12	0	96
08:00	43	12	0	1	1	57	31	8	4	3	0	46
08:15	31	15	4	1	0	51	40	9	2	2	0	53
08:30	49	14	5	0	1	69	33	11	1	3	0	48
08:45	47	10	4	1	0	62	25	13	1	3	0	42
Hour	170	51	13	3	2	239	129	41	8	11	0	189
09:00	37	9	4	3	2	55	17	11	5	2	0	35
09:15	29	18	3	0	0	50	10	7	4	0	0	21
09:30	25	17	3	2	1	48	16	14	3	3	0	36
09:45	29	14	2	1	0	46	20	10	3	6	0	39
Hour	120	58	12	6	3	199	63	42	15	11	0	131
10:00	42	12	5	1	1	61	18	9	1	7	0	35
10:15	25	14	3	0	0	42	10	20	4	4	0	38
10:30	19	14	1	1	0	35	24	14	2	3	0	43
10:45	21	17	4	0	0	42	12	17	4	3	0	36
Hour	107	57	13	2	1	180	64	60	11	17	0	152
11:00	20	8	9	0	0	37	21	12	2	2	0	37
11:15	25	12	8	5	0	50	17	18	4	0	0	39
11:30	29	10	5	2	0	46	20	14	6	5	0	45
11:45	32	6	4	2	0	44	26	11	1	3	0	41
Hour	106	36	26	9	0	177	84	55	13	10	0	162
12:00	33	13	3	1	0	50	28	12	1	4	0	45
12:15	41	12	3	0	0	56	27	13	4	1	0	45
12:30	28	6	2	0	1	37	19	11	3	4	0	37
12:45	43	10	4	1	0	58	26	7	2	3	0	38
Hour	145	41	12	2	1	201	100	43	10	12	0	165
13:00	55	13	1	2	0	71	27	9	2	4	0	42
13:15	42	10	4	1	0	57	32	13	1	6	0	52
13:30	31	16	1	1	0	49	21	12	1	1	0	35
13:45	25	7	2	0	0	34	27	12	3	2	0	44
Hour	153	46	8	4	0	211	107	46	7	13	0	173
14:00	48	5	5	0	0	58	27	11	0	1	0	39
14:15	32	13	3	2	0	50	17	19	5	1	0	42
14:30	23	14	6	2	0	45	18	16	7	3	0	44
14:45	36	12	4	4	0	56	15	7	2	3	0	27
Hour	139	44	18	8	0	209	77	53	14	8	0	152
15:00	38	11	2	2	0	53	21	12	4	6	0	43
15:15	41	12	6	2	0	61	21	12	3	1	0	37
15:30	45	5	2	2	0	54	25	8	5	1	0	39
15:45	30	12	6	0	0	48	25	17	2	3	1	48
Hour	154	40	16	6	0	216	92	49	14	11	1	167
16:00	58	13	2	1	1	75	45	12	6	0	0	63
16:15	59	13	6	1	1	80	44	4	0	3	0	51
16:30	65	10	7	0	1	83	35	7	1	1	0	44
16:45	76	8	1	0	0	85	26	4	2	1	0	33
Hour	258	44	16	2	3	323	150	27	9	5	0	191
17:00	101	8	3	2	1	115	73	6	2	0	0	81
17:15	85	3	2	2	0	92	69	5	0	0	0	74
17:30	82	9	2	2	1	96	52	5	0	1	0	58
17:45	54	2	0	2	0	58	34	6	0	0	0	40
Hour	322	22	7	8	2	361	228	22	2	1	0	253
18:00	66	1	2	2	1	72	37	1	0	0	0	38
18:15	45	3	1	0	1	50	31	0	2	1	0	34
18:30	48	3	1	0	1	53	30	2	0	0	0	32
18:45	30	6	1	0	0	37	16	4	1	0	0	21
Hour	189	13	5	2	3	212	114	7	3	1	0	125
Total	2010	483	154	59	17	2723	1255	472	116	112	1	1956

Site No.	7
Location	L1014(N) / Park West Avenue / L1014(S)
Date	Wednesday 13 February 2019

Time	C to B - L1014(S) to Park West Avenue					Veh. Total	C to A - L1014(S) to L1014(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	20	2	0	0	0	22	23	5	1	2	1	32
07:15	20	4	2	0	0	26	21	6	3	2	1	33
07:30	17	7	2	0	0	26	20	7	2	3	0	32
07:45	18	3	2	2	0	25	12	5	2	3	0	22
Hour	75	16	6	2	0	99	76	23	8	10	2	119
08:00	25	6	1	2	0	34	35	6	4	3	0	48
08:15	20	5	2	3	0	30	26	10	5	2	0	43
08:30	29	12	3	2	0	46	27	8	6	2	0	43
08:45	33	5	2	5	1	46	25	10	3	3	0	41
Hour	107	28	8	12	1	156	113	34	18	10	0	175
09:00	27	7	4	4	0	42	23	12	3	3	0	41
09:15	21	8	1	8	0	38	33	5	4	5	0	47
09:30	23	11	5	1	0	40	26	15	6	4	2	53
09:45	18	18	5	4	0	45	38	9	0	4	0	51
Hour	89	44	15	17	0	165	120	41	13	16	2	192
10:00	19	6	3	2	0	30	34	10	6	4	1	55
10:15	19	10	5	2	0	36	30	12	2	6	0	50
10:30	18	11	4	1	0	34	35	15	3	5	0	58
10:45	12	12	3	4	0	31	36	6	3	1	0	46
Hour	68	39	15	9	0	131	135	43	14	16	1	209
11:00	9	10	3	4	0	26	37	12	7	1	0	57
11:15	18	7	7	6	0	38	36	16	4	5	0	61
11:30	22	10	5	2	0	39	27	12	3	6	0	48
11:45	26	15	1	1	1	44	24	8	3	3	0	38
Hour	75	42	16	13	1	147	124	48	17	15	0	204
12:00	21	15	1	3	0	40	38	16	5	2	0	61
12:15	15	15	2	5	0	37	36	17	2	3	0	58
12:30	18	8	4	3	0	33	47	16	3	3	2	71
12:45	23	14	6	4	0	47	29	14	3	1	0	47
Hour	77	52	13	15	0	157	150	63	13	9	2	237
13:00	28	8	5	4	2	47	61	14	4	4	0	83
13:15	19	9	3	0	0	31	49	12	3	3	0	67
13:30	29	11	6	3	0	49	42	9	1	2	0	54
13:45	16	8	2	2	0	28	40	17	3	4	0	64
Hour	92	36	16	9	2	155	192	52	11	13	0	268
14:00	25	11	4	2	0	42	37	12	6	2	0	57
14:15	20	12	3	2	0	37	37	15	3	5	0	60
14:30	19	19	5	3	0	46	50	16	4	0	0	70
14:45	12	5	9	3	0	29	44	14	6	0	0	64
Hour	76	47	21	10	0	154	168	57	19	7	0	251
15:00	17	6	5	1	0	29	37	14	5	4	0	60
15:15	16	11	6	2	0	35	45	7	6	2	0	60
15:30	14	15	3	2	0	34	38	11	8	2	0	59
15:45	13	11	2	1	0	27	47	15	3	2	0	67
Hour	60	43	16	6	0	125	167	47	22	10	0	246
16:00	13	5	2	3	0	23	58	14	6	0	0	78
16:15	15	8	2	0	0	25	65	17	2	0	0	84
16:30	28	9	1	1	0	39	68	15	3	2	1	89
16:45	13	9	1	1	0	24	60	19	3	1	0	83
Hour	69	31	6	5	0	111	251	65	14	3	1	334
17:00	29	6	0	1	0	36	91	12	1	1	0	105
17:15	32	5	2	2	0	41	90	12	3	1	0	106
17:30	34	7	0	1	0	42	88	17	2	1	0	108
17:45	28	6	4	1	0	39	79	14	2	0	0	95
Hour	123	24	6	5	0	158	348	55	8	3	0	414
18:00	16	2	1	3	0	22	82	7	1	0	0	90
18:15	13	3	1	0	0	17	63	7	4	0	0	74
18:30	9	3	1	0	0	13	57	7	0	2	0	66
18:45	11	1	0	0	0	12	46	8	0	0	1	55
Hour	49	9	3	3	0	64	248	29	5	2	1	285
Total	960	411	141	106	4	1622	2092	557	162	114	9	2934

Site No. 7
Location L1014(N) / Park West Avenue / L1014(S)
Date Wednesday 13 February 2019

Time	To Arm A - L1014(N)					Veh. Total	From Arm A - L1014(N)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	39	15	2	5	2	63	78	22	2	2	0	104
07:15	60	16	9	4	1	90	101	26	6	3	1	137
07:30	54	11	2	3	1	71	111	20	6	6	1	144
07:45	70	12	3	5	0	90	149	29	5	3	1	187
Hour	223	54	16	17	4	314	439	97	19	14	3	572
08:00	78	18	4	4	1	105	166	21	5	3	1	196
08:15	57	25	9	3	0	94	167	25	6	4	1	203
08:30	76	22	11	2	1	112	142	28	12	1	1	184
08:45	72	20	7	4	0	103	180	32	6	4	1	223
Hour	283	85	31	13	2	414	655	106	29	12	4	806
09:00	60	21	7	6	2	96	146	46	10	3	0	205
09:15	62	23	7	5	0	97	103	25	6	4	2	140
09:30	51	32	9	6	3	101	75	16	5	6	0	102
09:45	67	23	2	5	0	97	69	25	5	9	1	109
Hour	240	99	25	22	5	391	393	112	26	22	3	556
10:00	76	22	11	5	2	116	53	24	11	5	1	94
10:15	55	26	5	6	0	92	55	17	15	2	0	89
10:30	54	29	4	6	0	93	66	15	11	5	1	98
10:45	57	23	7	1	0	88	50	20	8	3	0	81
Hour	242	100	27	18	2	389	224	76	45	15	2	362
11:00	57	20	16	1	0	94	62	24	4	6	0	96
11:15	61	28	12	10	0	111	45	28	8	4	0	85
11:30	56	22	8	8	0	94	81	18	13	7	1	120
11:45	56	14	7	5	0	82	64	27	10	5	1	107
Hour	230	84	43	24	0	381	252	97	35	22	2	408
12:00	71	29	8	3	0	111	72	24	4	3	0	103
12:15	77	29	5	3	0	114	70	29	4	4	0	107
12:30	75	22	5	3	3	108	68	29	8	4	0	109
12:45	72	24	7	2	0	105	84	27	7	3	1	122
Hour	295	104	25	11	3	438	294	109	23	14	1	441
13:00	116	27	5	6	0	154	76	20	8	4	0	108
13:15	91	22	7	4	0	124	77	25	9	7	0	118
13:30	73	25	2	3	0	103	111	25	5	3	0	144
13:45	65	24	5	4	0	98	101	24	8	4	0	137
Hour	345	98	19	17	0	479	365	94	30	18	0	507
14:00	85	17	11	2	0	115	92	23	7	3	0	125
14:15	69	28	6	7	0	110	86	25	10	3	1	125
14:30	73	30	10	2	0	115	80	21	6	3	1	111
14:45	80	26	10	4	0	120	74	20	11	3	0	108
Hour	307	101	37	15	0	460	332	89	34	12	2	469
15:00	75	25	7	6	0	113	88	33	7	1	0	129
15:15	86	19	12	4	0	121	74	27	6	1	0	108
15:30	83	16	10	4	0	113	87	35	11	4	0	137
15:45	77	27	9	2	0	115	99	34	9	1	0	143
Hour	321	87	38	16	0	462	348	129	33	7	0	517
16:00	116	27	8	1	1	153	129	28	7	4	0	168
16:15	124	30	8	1	1	164	124	31	10	1	2	168
16:30	133	25	10	2	2	172	123	40	9	0	0	172
16:45	136	27	4	1	0	168	96	17	2	2	1	118
Hour	509	109	30	5	4	657	472	116	28	7	3	626
17:00	192	20	4	3	1	220	108	19	3	3	0	133
17:15	175	15	5	3	0	198	93	18	3	1	1	116
17:30	170	26	4	3	1	204	108	11	2	0	0	121
17:45	133	16	2	2	0	153	86	18	2	1	1	108
Hour	670	77	15	11	2	775	395	66	10	5	2	478
18:00	148	8	3	2	1	162	100	9	0	3	0	112
18:15	108	10	5	0	1	124	80	6	1	1	1	89
18:30	105	10	1	2	1	119	91	12	4	1	0	108
18:45	76	14	1	0	1	92	82	8	0	0	1	91
Hour	437	42	10	4	4	497	353	35	5	5	2	400
Total	4102	1040	316	173	26	5657	4522	1126	317	153	24	6142

Site No. 7
Location L1014(N) / Park West Avenue / L1014(S)
Date Wednesday 13 February 2019

Time	To Arm B - Park West Avenue					Veh. Total	From Arm B - Park West Avenue					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	46	11	1	1	0	59	20	12	3	6	1	42
07:15	51	10	6	1	1	69	49	15	9	6	0	79
07:30	53	14	6	2	0	75	47	11	0	3	1	62
07:45	76	12	4	4	0	96	78	20	6	4	0	108
Hour	226	47	17	8	1	299	194	58	18	19	2	291
08:00	102	13	5	2	1	123	74	20	4	4	1	103
08:15	82	13	4	4	0	103	71	24	6	3	0	104
08:30	91	27	7	2	1	128	82	25	6	3	1	117
08:45	121	16	3	6	1	147	72	23	5	4	0	104
Hour	396	69	19	14	3	501	299	92	21	14	2	428
09:00	88	20	6	5	0	119	54	20	9	5	2	90
09:15	68	19	2	9	0	98	39	25	7	0	0	71
09:30	61	17	5	3	0	86	41	31	6	5	1	84
09:45	52	31	7	6	1	97	49	24	5	7	0	85
Hour	269	87	20	23	1	400	183	100	27	17	3	330
10:00	47	17	8	3	1	76	60	21	6	8	1	96
10:15	46	19	12	3	0	80	35	34	7	4	0	80
10:30	53	19	11	1	0	84	43	28	3	4	0	78
10:45	32	19	7	5	0	63	33	34	8	3	0	78
Hour	178	74	38	12	1	303	171	117	24	19	1	332
11:00	40	24	4	4	0	72	41	20	11	2	0	74
11:15	40	23	12	7	0	82	42	30	12	5	0	89
11:30	60	20	13	5	1	99	49	24	11	7	0	91
11:45	60	27	5	1	2	95	58	17	5	5	0	85
Hour	200	94	34	17	3	348	190	91	39	19	0	339
12:00	48	26	3	4	0	81	61	25	4	5	0	95
12:15	50	25	3	5	0	83	68	25	7	1	0	101
12:30	50	20	10	4	0	84	47	17	5	4	1	74
12:45	65	33	9	6	0	113	69	17	6	4	0	96
Hour	213	104	25	19	0	361	245	84	22	14	1	366
13:00	66	21	8	4	2	101	82	22	3	6	0	113
13:15	47	20	6	1	0	74	74	23	5	7	0	109
13:30	78	23	7	4	0	112	52	28	2	2	0	84
13:45	67	13	6	2	0	88	52	19	5	2	0	78
Hour	258	77	27	11	2	375	260	92	15	17	0	384
14:00	62	26	9	3	0	100	75	16	5	1	0	97
14:15	58	19	8	2	1	88	49	32	8	3	0	92
14:30	55	32	7	4	1	99	41	30	13	5	0	89
14:45	37	15	14	5	0	71	51	19	6	7	0	83
Hour	212	92	38	14	2	358	216	97	32	16	0	361
15:00	47	19	9	1	0	76	59	23	6	8	0	96
15:15	53	22	10	2	0	87	62	24	9	3	0	98
15:30	57	35	8	5	0	105	70	13	7	3	0	93
15:45	58	24	6	1	0	89	55	29	8	3	1	96
Hour	215	100	33	9	0	357	246	89	30	17	1	383
16:00	65	19	8	5	0	97	103	25	8	1	1	138
16:15	69	21	7	0	1	98	103	17	6	4	1	131
16:30	84	33	9	1	0	127	100	17	8	1	1	127
16:45	53	16	2	2	0	73	102	12	3	1	0	118
Hour	271	89	26	8	1	395	408	71	25	7	3	514
17:00	72	16	2	2	0	92	174	14	5	2	1	196
17:15	80	13	4	3	1	101	154	8	2	2	0	166
17:30	81	11	2	1	0	95	134	14	2	3	1	154
17:45	66	14	6	1	0	87	88	8	0	2	0	98
Hour	299	54	14	7	1	375	550	44	9	9	2	614
18:00	60	8	1	6	0	75	103	2	2	2	1	110
18:15	47	5	2	0	1	55	76	3	3	1	1	84
18:30	35	8	3	0	0	46	78	5	1	0	1	85
18:45	35	4	0	0	0	39	46	10	2	0	0	58
Hour	177	25	6	6	1	215	303	20	8	3	3	337
Total	2914	912	297	148	16	4287	3265	955	270	171	18	4679

Site No. 7
Location L1014(N) / Park West Avenue / L1014(S)
Date Wednesday 13 February 2019

Time	To Arm C - L1014(S)					Veh. Total	From Arm C - L1014(S)					Veh. Total
	Car	LGV	OGV1	OGV2	PSV		Car	LGV	OGV1	OGV2	PSV	
07:00	56	15	3	4	0	78	43	7	1	2	1	54
07:15	80	25	5	6	0	116	41	10	5	2	1	59
07:30	88	20	2	7	1	118	37	14	4	3	0	58
07:45	111	33	8	3	1	156	30	8	4	5	0	47
Hour	335	93	18	20	2	468	151	39	14	12	2	218
08:00	120	22	5	6	0	153	60	12	5	5	0	82
08:15	145	26	6	5	1	183	46	15	7	5	0	73
08:30	113	24	9	4	0	150	56	20	9	4	0	89
08:45	117	34	6	6	1	164	58	15	5	8	1	87
Hour	495	106	26	21	2	650	220	62	26	22	1	331
09:00	102	44	13	4	0	163	50	19	7	7	0	83
09:15	66	21	9	3	2	101	54	13	5	13	0	85
09:30	53	24	8	7	0	92	49	26	11	5	2	93
09:45	55	22	6	13	0	96	56	27	5	8	0	96
Hour	276	111	36	27	2	452	209	85	28	33	2	357
10:00	43	22	7	11	0	83	53	16	9	6	1	85
10:15	38	28	12	5	0	83	49	22	7	8	0	86
10:30	55	21	6	8	1	91	53	26	7	6	0	92
10:45	42	30	8	5	0	85	48	18	6	5	0	77
Hour	178	101	33	29	1	342	203	82	29	25	1	340
11:00	52	22	5	8	0	87	46	22	10	5	0	83
11:15	40	30	7	3	0	80	54	23	11	11	0	99
11:30	63	22	11	9	0	105	49	22	8	8	0	87
11:45	56	26	7	8	0	97	50	23	4	4	1	82
Hour	211	100	30	28	0	369	199	90	33	28	1	351
12:00	73	25	3	6	0	107	59	31	6	5	0	101
12:15	62	32	7	5	0	106	51	32	4	8	0	95
12:30	55	28	5	7	0	95	65	24	7	6	2	104
12:45	68	15	6	4	1	94	52	28	9	5	0	94
Hour	258	100	21	22	1	402	227	115	26	24	2	394
13:00	65	16	7	8	0	96	89	22	9	8	2	130
13:15	81	27	7	12	0	127	68	21	6	3	0	98
13:30	83	25	5	3	0	116	71	20	7	5	0	103
13:45	77	31	7	6	0	121	56	25	5	6	0	92
Hour	306	99	26	29	0	460	284	88	27	22	2	423
14:00	82	19	2	3	0	106	62	23	10	4	0	99
14:15	65	37	10	4	0	116	57	27	6	7	0	97
14:30	62	24	11	5	0	102	69	35	9	3	0	116
14:45	64	17	8	4	0	93	56	19	15	3	0	93
Hour	273	97	31	16	0	417	244	104	40	17	0	405
15:00	79	32	7	7	0	125	54	20	10	5	0	89
15:15	58	28	5	2	0	93	61	18	12	4	0	95
15:30	69	23	11	2	0	105	52	26	11	4	0	93
15:45	79	38	7	4	1	129	60	26	5	3	0	94
Hour	285	121	30	15	1	452	227	90	38	16	0	371
16:00	122	26	7	2	0	157	71	19	8	3	0	101
16:15	114	22	5	4	1	146	80	25	4	0	0	109
16:30	102	23	2	1	0	128	96	24	4	3	1	128
16:45	82	14	3	2	1	102	73	28	4	2	0	107
Hour	420	85	17	9	2	533	320	96	20	8	1	445
17:00	138	15	3	2	0	158	120	18	1	2	0	141
17:15	114	15	1	0	0	130	122	17	5	3	0	147
17:30	113	12	0	1	0	126	122	24	2	2	0	150
17:45	82	16	0	1	1	100	107	20	6	1	0	134
Hour	447	58	4	4	1	514	471	79	14	8	0	572
18:00	93	4	0	0	0	97	98	9	2	3	0	112
18:15	77	4	2	2	0	85	76	10	5	0	0	91
18:30	95	9	2	1	0	107	66	10	1	2	0	79
18:45	74	9	1	0	1	85	57	9	0	0	1	67
Hour	339	26	5	3	1	374	297	38	8	5	1	349
Total	3823	1097	277	223	13	5433	3052	968	303	220	13	4556

APPENDIX 13A - SMR/ RMP SITES WITHIN THE SURROUNDING AREA

SMR NO.	DU017-083
RMP STATUS	Scheduled for inclusion
TOWNLAND	Gallanstown
PARISH	Ballyfermot
BARONY	Uppercross
I.T.M.	708083 732616
CLASSIFICATION	Burial ground
DIST. FROM DEVELOPMENT	c. 128m west
DESCRIPTION	Pre-development testing in 1999 revealed a very low mound which covered three east-west oriented skeletons (Purcell 2000, 83). The remains were those of two adult males and one adolescent aged 12-16 years. The site is thought to be an Early Christian burial mound.
REFERENCE	www.archaeology.ie/ SMR file

APPENDIX 13B - LEGISLATION PROTECTING THE ARCHAEOLIGICAL 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 the Department of 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.

Dublin City Development Plan 2016–2022

It is the Policy of Dublin City Council:

CHC9: To protect and preserve National Monuments.
1. To protect archaeological material in situ by ensuring that only minimal impact on archaeological layers is allowed, by way of the re-use of buildings, light buildings, foundation design or the omission of basements in the Zones of Archaeological Interest.
2. That where preservation in situ is not feasible, sites of archaeological interest shall be subject to ‘preservation by record’ according to best practice in advance of re-development.
3. That sites within Zones of Archaeological Interest will be subject to consultation with the City Archaeologist and archaeological assessment prior to a planning application being lodged.
4. That the National Monuments Service will be consulted in assessing proposals for development which relate to Monuments and Zones of Archaeological Interest.
5. To preserve known burial grounds and disused historic graveyards, where appropriate, to ensure that human remain are re-interred, except where otherwise agreed with the National Museum of Ireland.
6. That in evaluating proposals for development in the vicinity of the surviving sections of the city wall that due recognition be given to their national significance and their special character.

7. To have regard to the Shipwreck inventory maintained by the DAHG. Proposed developments that may have potential to impact on riverine, inter-tidal and sub-tidal environments shall be subject to an underwater archaeological assessment in advance of works.
8. To have regard to DAHG policy documents and guidelines relating to archaeology.

It is an Objective of Dublin City Council:

CHCO10:
1. To implement the archaeological actions of the Dublin City Heritage Plan 2002-6 in light of the Dublin City Heritage Plan Review 2012.
2. To prepare and implement conservation plans for National Monuments and Monuments in DCC care (City Walls, St Luke's Church, St James's Graveyard, St. Thomas's Abbey, St Canice's Graveyard etc).
3. To maintain, develop and promote the Dublin City Archaeological Archive (DCAA) at Pearse Street Library and Archives.
4. To ensure the public dissemination of the findings of licensed archaeological activity in Dublin through the Dublin County Archaeology GIS.
5. To develop a long-term management plan to promote the conservation, management and interpretation of archaeological sites and monuments and to identify areas for strategic research.
6. To have regard to the city's industrial heritage and Dublin City Industrial Heritage Record (DCIHR) in the preparation of Local Area Plans (LAPs) and the assessment of planning applications and to publish the DCIHR online. To review the DCIHR in accordance with Ministerial recommendations arising from the national Inventory of Architectural Heritage (NIAH) survey of Dublin City and in accordance with the Strategic Approach set out in Section 11.1.4 of this Chapter
7. To promote awareness of, and access to, the city's archaeological inheritance and foster high-quality public archaeology.
8. To promote archaeological best practice in Dublin city.
9. To promote the awareness of the international significance of Viking Dublin and to support post-excavation research into the Wood Quay excavations 1962-81.
10. To develop a strategy for the former Civic Museum collection and for other collections of civic interest and importance.
11. To investigate the potential for the erection of Columbarium Walls.
12. To support the implementation of the Kilmainham Mill Conservation Plan.
13. Dublin City Council will seek to work with Diageo to undertake a more comprehensive industrial heritage survey of the constituent historic buildings within the Guinness Brewery complex at Saint James's Gate.
14. To implement and promote The Dublin Principles (ICOMOS 2011) as guiding principles to assist in the documentation, protection, conservation and appreciation of industrial heritage as part of the heritage of Dublin and Ireland.
15. To continue to implement actions of the Saint Luke's Conservation Plan on the basis of funds available to conserve the monument, recover the graveyard, provide visitor access, improve visual amenity and secure an appropriate new use.

Park West - Cherry Orchard Local Area Plan (2019)

It is an objective of Dublin City Council:

H1 To protect and conserve the special character of all built heritage features both within the plan area as well as those within the immediate surrounding areas.

H2 To safeguard known National Monument sites and to agree strategies for the protection of potential future sites in conjunction with the City Archaeologist, with particular reference to Sites 6, 7 and 8.

H3 To protect the buildings, structures and features of industrial heritage within the Park West – Cherry Orchard LAP area along with their related artefacts and plant where appropriate.

H4 To undertake a feasibility appraisal for the former Gallanstown waterworks which features an underground brick arched reservoir and to explore and identify a compatible, sustainable and viable future use which will ensure the conservation of the built fabric and add to the amenity and vibrancy of the area.

APPENDIX 13C - IMPACT ASSESSMENT AND 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 14A – LANDSCAPE AND VISUAL IMPACT VERIFIED VIEWS

See separately bound A3 document containing Appendix 14A Landscape and Visual Impact Assessment Verified Views.