Residential Development, Fortfield Road, Terenure

Basement Impact Assessment

222102-PUNCH-XX-XX-RP-C-0011

December 2024

Document Control

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1 Baseline Characteristics of the Project

1.1 Introduction

PUNCH Consulting Engineers (PUNCH) has been commissioned by 1 Celbridge West Land Limited, to carry out a desk study and specific/procure ground investigations for a site located at Fortfield Road, Terenure, Dublin 6.

This report also forms part of a Basement Impact Assessment (BIA), which has been carried out in accordance with Appendix 9 of the Dublin City Development Plan 2022 – 2028 "Basement Development Guidance" in support of the planning application. Please refer to Table F- 1 and Table F- 2 within Appendix F of this report which includes a summary checklist for how this BIA report addresses the various requirements set out in Dublin City Councils (DCC) guidance documentation.

1.2 Proposed Development

The development will comprise a Large-Scale Residential Development (LRD) on a site at Fortfield Road, Terenure of 284 no. units delivering 19 no. houses and 265 no. apartments made up of studios; 1 beds; 2 beds; 3 beds; and 4 beds. The development will also provide community, cultural and arts space and a creche. Communal internal space for residents will also be delivered. Provision of car, cycle and motorbike parking will be provided in the development, including at basement and surface level. Vehicular/pedestrian/cyclist access will be from Fortfield Road. Proposed upgrade works to the surrounding road network is also included. All associated site development works, open space, services provision, ESB substations, plant areas, waste management areas, landscaping (both public and communal) and boundary treatments.

1.3 Purpose of Work

The principal technical objectives of the work carried out were as follows:

1. to check the history of the site with respect to previous contaminative uses;
2. to determine the ground conditions and their engineering properties;
3. to provide advice and information with respect to the design of suitable foundations and retaining walls;
4. to assess the impact of the proposed basement on the local hydrogeology, hydrology and stability of the surrounding natural and build environment;
5. to provide an indication of the degree of soil contamination present; and
6. to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.4 Opinion Feedback and External Audit

This document has been further informed by the LRD Opinion Meeting of 29th May, followed by receipt of the DCC Written Opinion on 24th June. An independent audit was subsequently undertaken on the Basement Impact Assessment (Rev C01) by Cundall on behalf of Dublin City Council.

This document has been updated to address items raised by Cundall in the BIA Audit. Please refer to Appendix H for the BIA Auditor's Report.

1.5 Scope of Work

In order to meet the above objectives, a desk study was carried out, followed by a ground investigation. The desk study comprised:

1. a review of historical Ordnance Survey (OS) maps and environmental searches sourced from the Geological Survey of Ireland (GIS) database;
2. a review of readily available geology maps from the Geological Survey of Ireland (GIS) database;
3. a walkover survey of the site carried out in conjunction with the fieldwork.

In light of this desk study an intrusive ground investigation was carried out by ISGL Limited. Refer to Appendix D for details.

The scope of the work undertaken for this project included the following:

1. Visit project site to observe existing conditions.
2. Carry out 6 No. Boreholes, using light cable techniques. Rotary techniques were then employed at all 6 No. locations as discussed in point No. 3 below.
3. Carry out 6 No. Rotary Core Boreholes to a maximum of 14.0m BGL or, 4m into rock.
4. Carry out 4 No. trial pits to permit close examination and sampling of upper soils.
5. Carry out 4 No. infiltration tests to assess suitability of sub-soils for soakaway purposes.
6. Geotechnical & Environmental Laboratory testing
7. Report with recommendations

Note: Please refer to Appendix C for the relevant exploratory hole location plans.

1.5.1 Basement Impact Assessment

The work carried out includes a hydrological and hydrogeological assessment and ground movement assessment. These assessments form part of the BIA procedure specified in Appendix 9 of the Dublin City Development Plan 2022 – 2028 "Basement Development Guidance". The aim of the work is to provide information on surface water, groundwater and land stability and in particular to assess whether the development will affect neighbouring properties or groundwater movements and whether any identified impacts can be appropriately mitigated by the design of the development.

1.5.2 Qualifications

The assessments have been prepared by Paul Casey, Director at PUNCH Consulting Engineers (BEng CEng MIEI), with 16 years' experience. As Lead Engineer for the BIA, Paul has compiled the inputs from the relevant third parties, e.g. GSI, GII, etc.

The surface water and flooding assessment has been carried out by Marie-Claire Daly, Technical Director at PUNCH Consulting Engineers (BEng, CEng, HDip, PGDipCL, MIEI) with more than 11 years consultancy experience in surface water drainage schemes and hydrology / hydraulic modelling.

The flooding assessment has been carried out by Clare Shannon, Senior Engineer at PUNCH Consulting Engineers (BEng, MIEI) with more than 10 years consultancy experience in flood risk assessment, surface water drainage schemes and hydrology / hydraulic modelling.

1.5.3 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigations. The results of the work should be viewed in the context of the range of data sources consulted. Any comments made on the basis of information obtained from the client or other

third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by PUNCH.

1.6 Site Description

The site is a brownfield site of approximately 4.56 hectares in area and is located within Dublin City Council's (DCC) remit, and currently consists of former playing fields and an open artificial drainage pond.

The site is bounded to the west by Fortfield Road and to the east by Lakelands Park. The site also adjoins Terenure College to the south, Terenure College Rugby Football Club to the northeast and the rear of residential dwellings on Greenlea Road to the north.

Figure 1-1 indicates the location of the subject lands. The site may be additionally located by National Grid Reference 313399 (E), 229777 (N). The extent of the basement perimeter relative to the site boundary is also shown.

Figure 1-1: Site Location.

1.6.1 Neighbouring Structures

A search has been carried out of the DCC Planning Portal for planning applications that relate to the construction of basements. This has been supplemented by site walkovers of adjacent publicly accessible properties to verify the presence of basements.

The search findings are highlighted in Figure 1-2.

1. Bushy Pk House Apartment Block(s). Existing development with basement.
2. The Courtyard Apartment Block(s). Existing development with basement.
3. The Cresent Apartment Block(s). Existing development with basement.

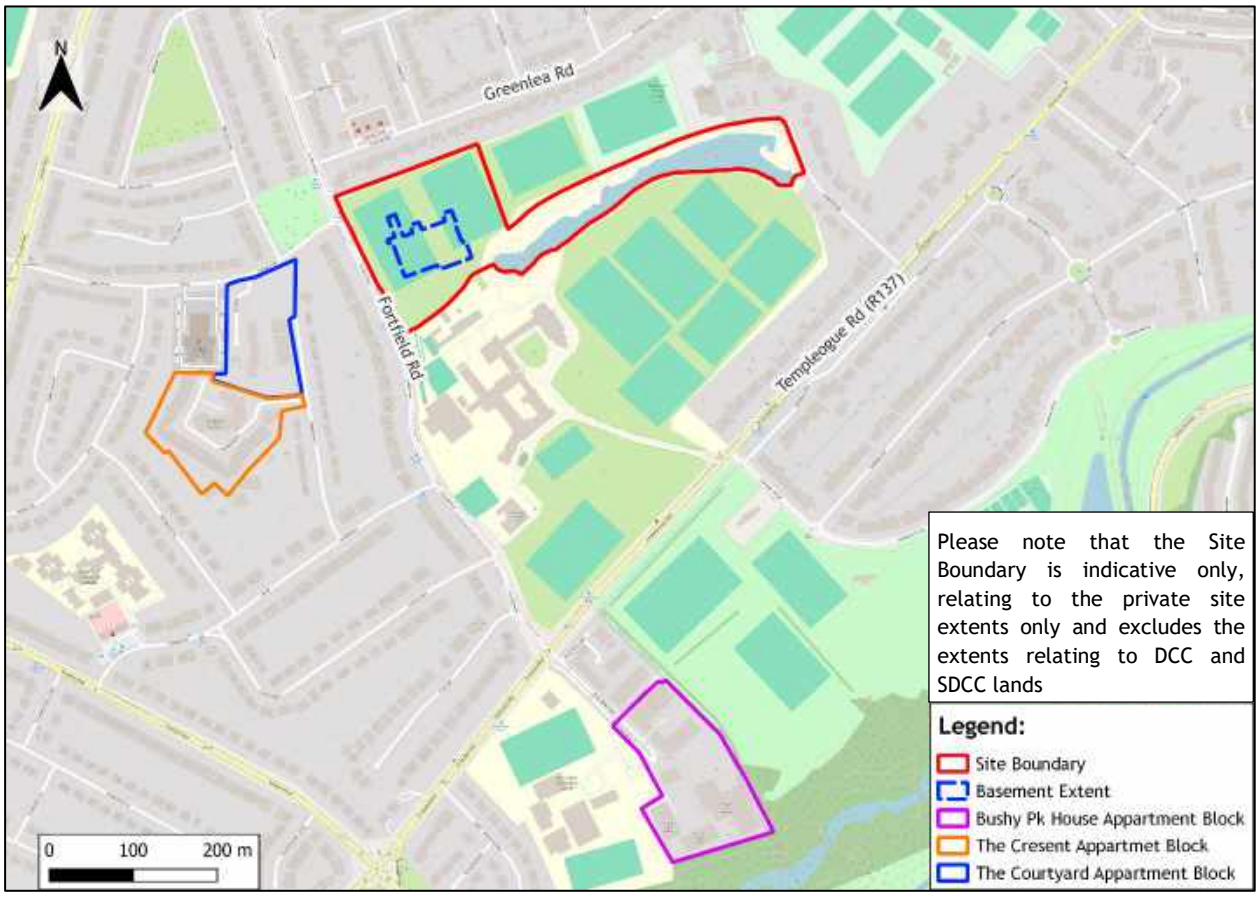


Figure 1-2: Nearby Structures incorporating Basements.

1.7 Site History

The history of the site and surrounding area has been researched by reference to archive historical maps and Ordnance Survey (OS) maps sourced from the GeoHive database.

The historic mapping 1837-1842 indicates a lack of any residential developments on site. The site was predominantly a greenfield site. The historic mapping from 188-1913 also indicates a lack of any residential developments on site. Please refer to Figure 1-3 and Figure 1-4.

The current iteration of development on site, comprises of a brownfield, consisting of former sports pitches, as shown in Figure 1-5.

Please refer to Appendix B for full size historical mapping.

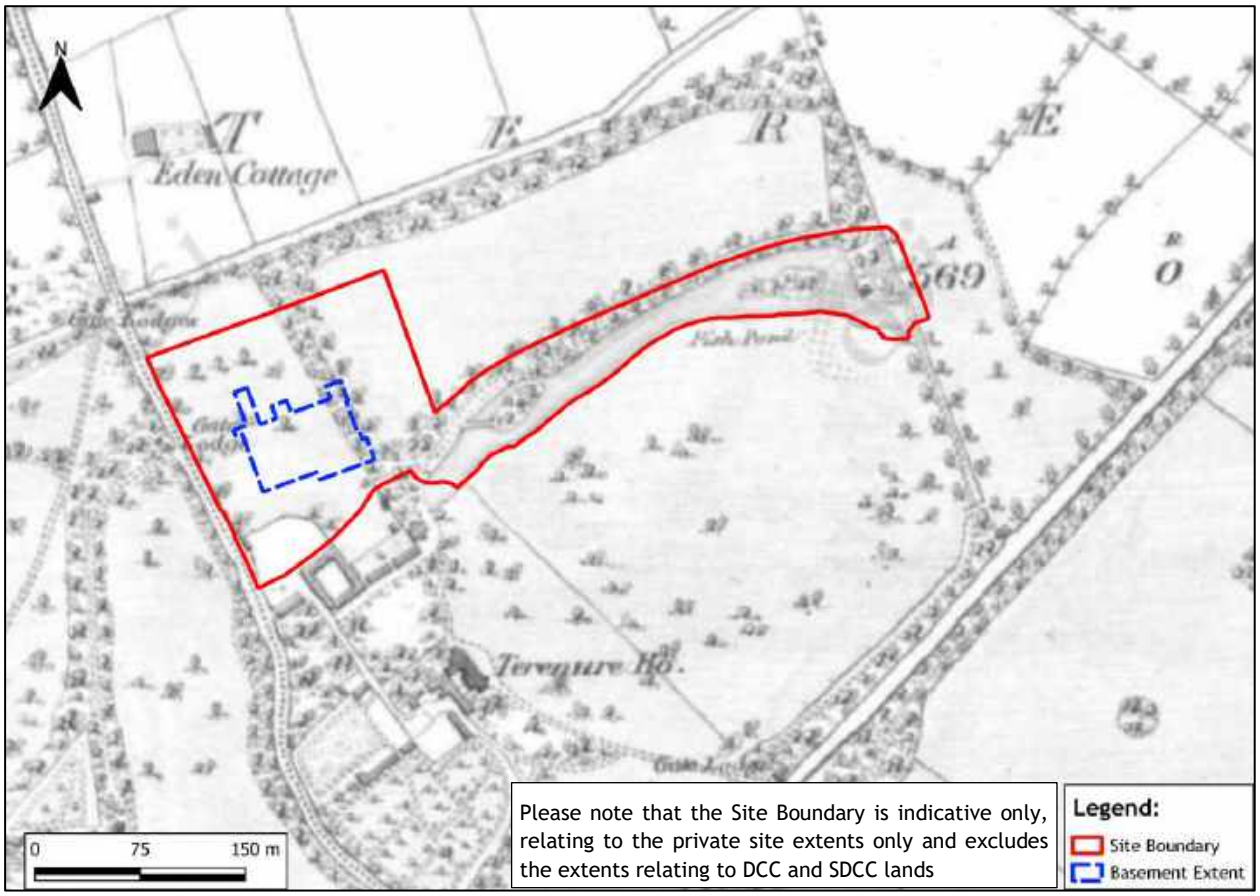


Figure 1-3: GeoHive Map 1837 - 1842.

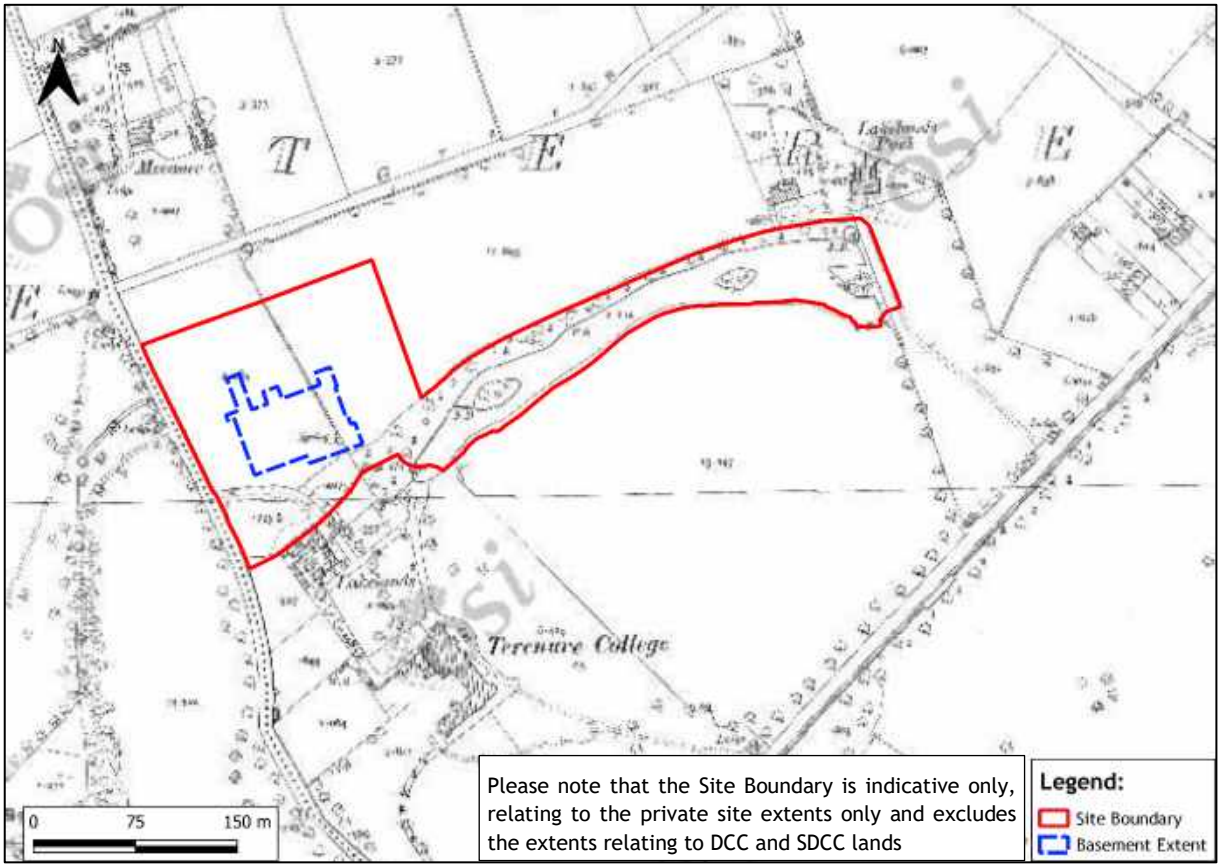


Figure 1-4: GeoHive Map 1888 - 1913.

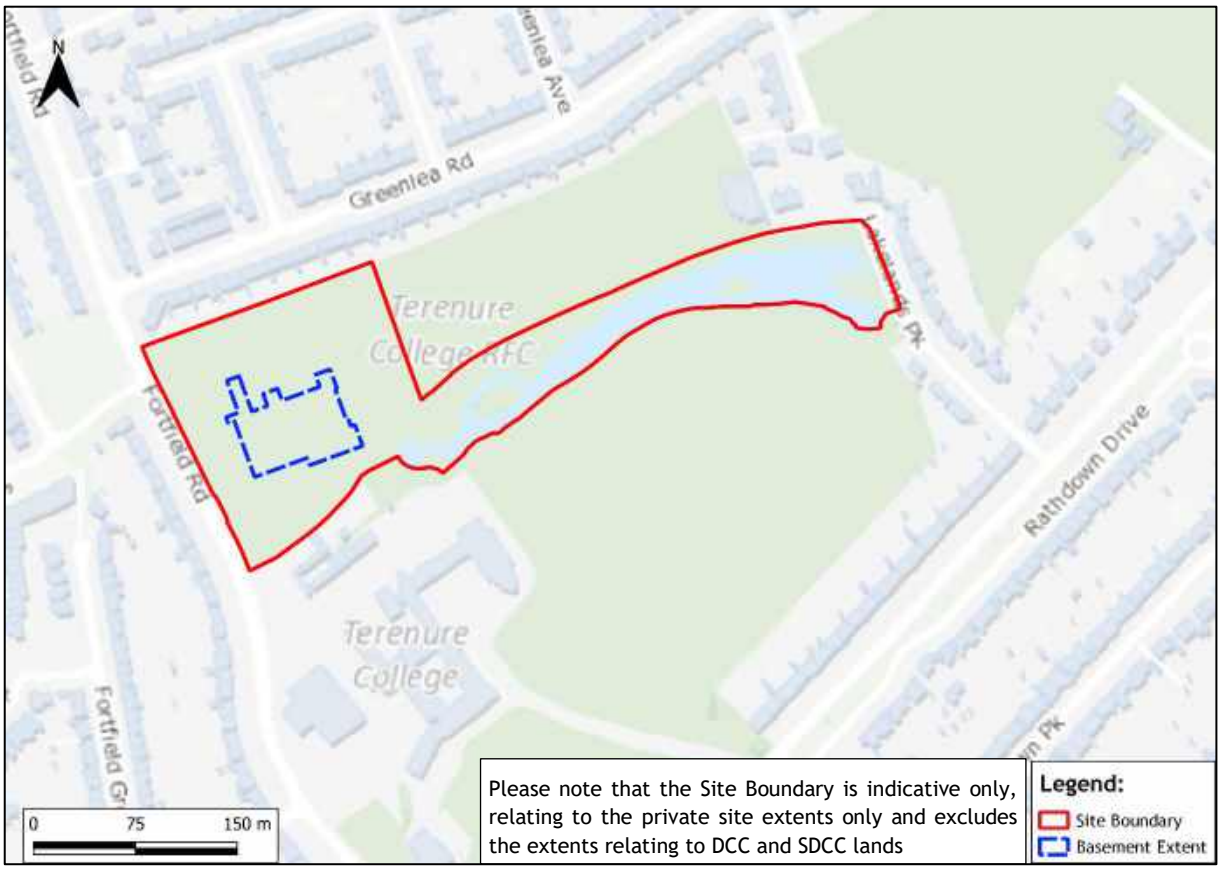


Figure 1-5: GeoHive Map 2024.

1.8 Geology

The Geological Survey Ireland (GSI) Spatial Resources database shows that the entire site is located on underlying bedrock of 'Visean limestone & calcerous shale'. Figure 1-6 below displays a bedrock map for the proposed development site. GSI database does not indicate the presence of any Karst features on site, however it should be noted karst is a risk in limestone areas.

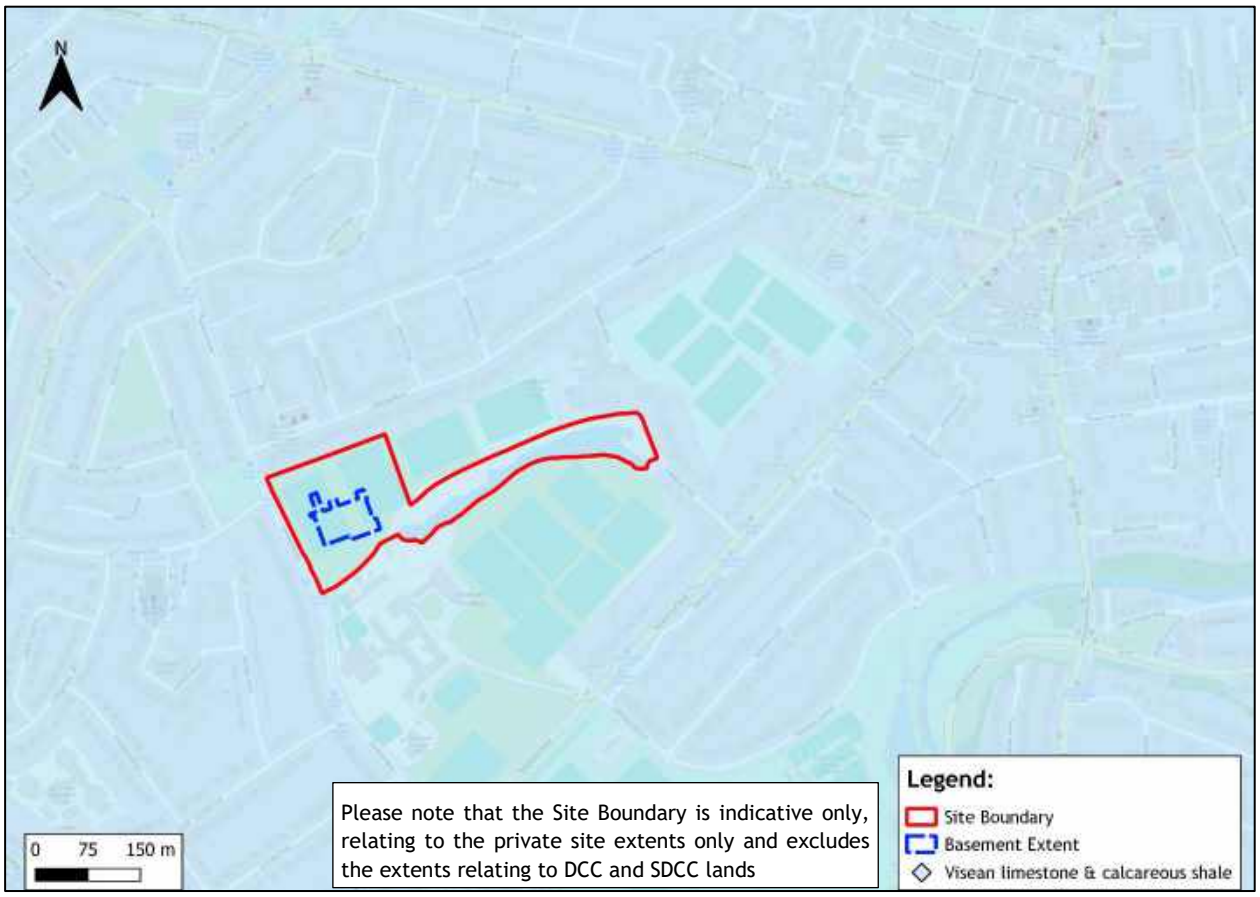


Figure 1-6: GSI Bedrock Map.

The Teagasc soils are mostly 'Till derived chiefly from limestone' for the majority of the site. It is noted that surrounding areas of the site comprise of 'made ground'. Please refer to Figure 1-7.

Figure 1-7: Teagasc Soils.

Published geological mapping obtained from the Geological Survey of Ireland (GSI) database indicate the superficial deposits underlying the site comprise of tills derived from limestone as shown Figure 1-8. This deposit is underlain by dark limestone and shales of the Lucan Formation.

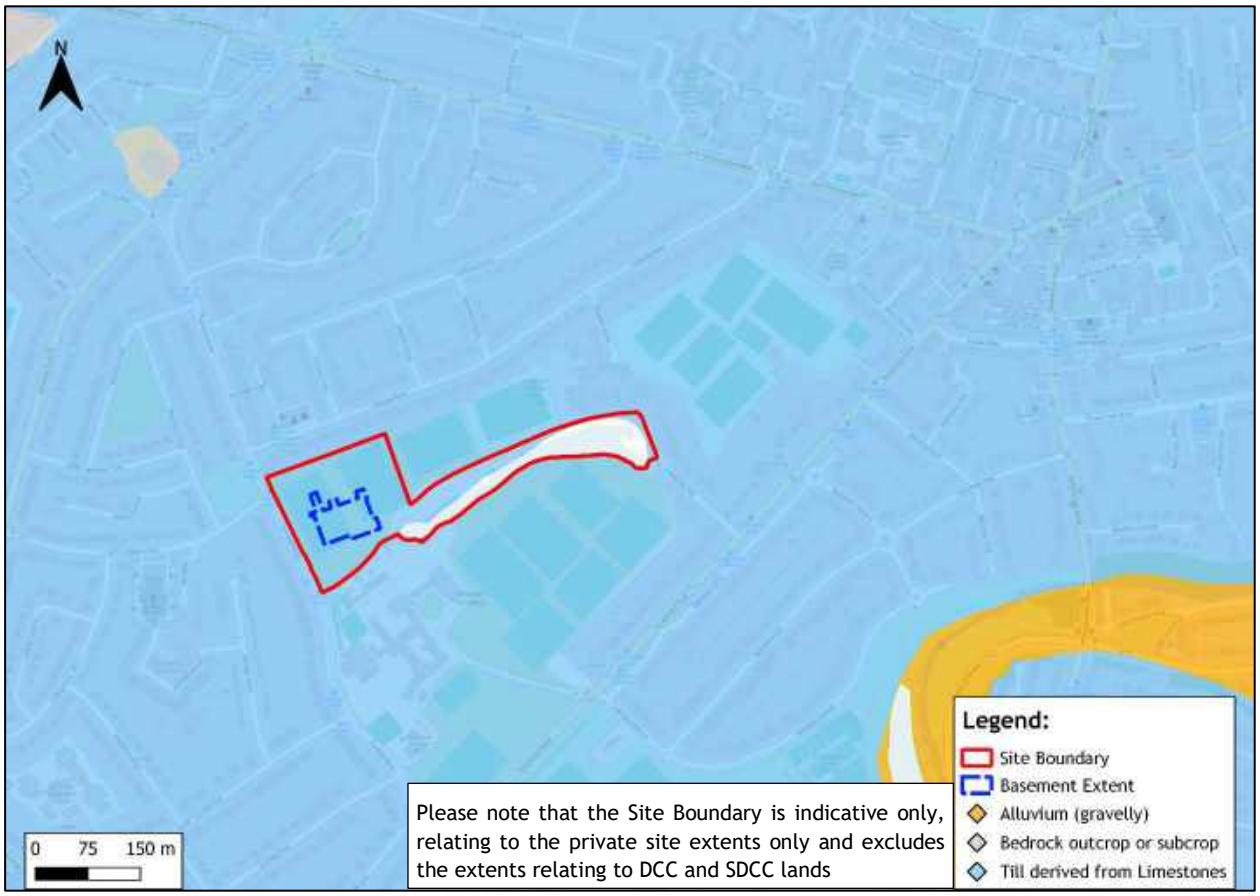


Figure 1-8: Quaternary Sediments.

A search of the GSI records has identified records of a number of site investigations that were completed on or within the immediate vicinity of the site including one located at Dodder Bridge roughly 760m south of the site (GSI Report: 1015). Please note this was the closest site investigation, that had borehole logs information readily available to view online. Its location relative to the proposed development site is shown in Figure 1-9. This historic site investigation is included in Appendix D. The boreholes indicate similar stratification with topsoil extending from ground level to depths of 0.75m overlying overburden to depths of 19m, overlying rock (carboniferous limestone/ calciferous sandstone) to depths of 25m.

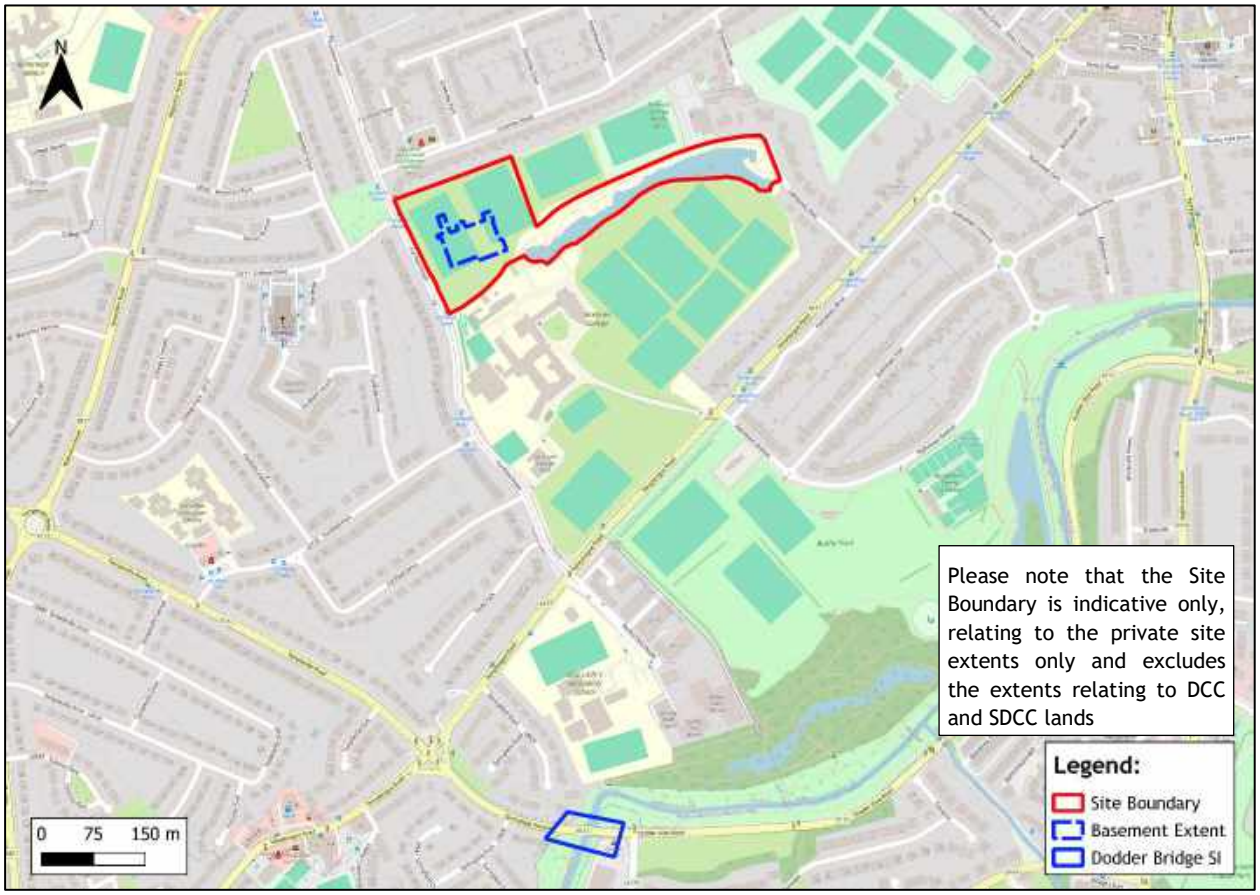


Figure 1-9: Proposed developments location in relation to adjacent SI sites.

1.9 Hydology & Hydrogeology

1.9.1 Existing Hydrogeological Environment

The existing hydrological environment is characterised primarily by the presence of an open drainage pond located on the site. According to the drainage records the pond is fed from an existing off-take on the River Poddle, known as Lakelands Overflow, which is located at Wainsfort Manor to the west of the subject site. The overflow is piped underground via a 1230mm x 1230mm concrete box culvert for a distance of 1.4km before discharging into the pond. The pond discharges to the River Dodder located to the southeast of the subject site via a 1450mm x 1480mm concrete box culvert (note as Terenure College Stream on EPA mapping). The existing hydrogeological arrangement is shown in Figure 1-10.

Figure 1-10: Existing Hydrogeological Environment.

1.9.2 Groundwater

GSI data shows that much of the site is located over an area of low groundwater vulnerability. It is noted that the entire area surrounding the proposed development site located over an area of low groundwater vulnerability. Please refer to Figure 1-11. The site is also not located within a Groundwater Source Protection Zone.

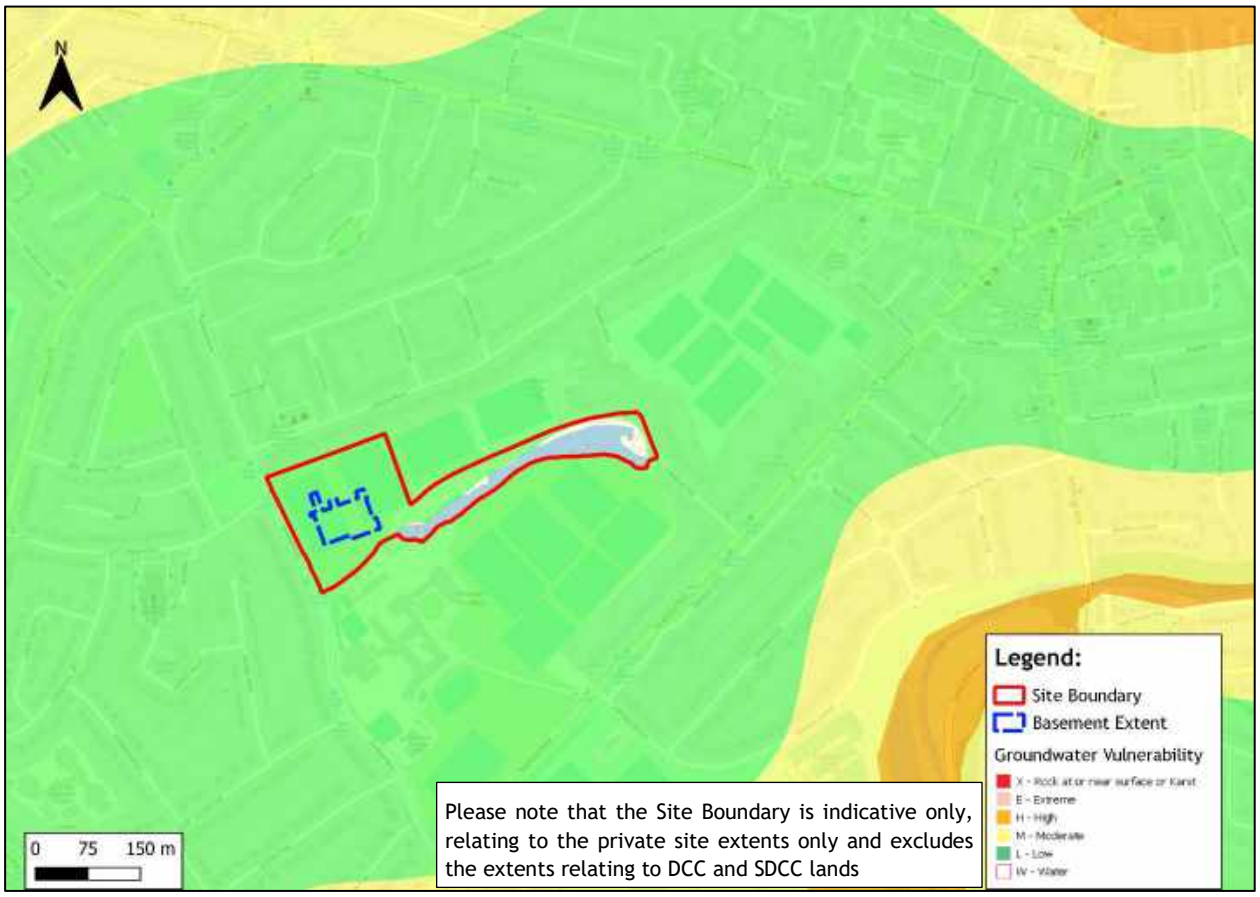


Figure 1-11: National Vulnerability Map.

The subsoils (Quaternary Sediments) at the site location comprise of tills derived from limestone as shown in Figure 1-8. The subsoil permeability is identified as 'Low', with an Average Groundwater Recharge rate of 31 mm/year. There is locally important bedrock aquifer which is moderately productive only in local zones. Please refer to Figure 1-12.

Figure 1-12: Groundwater Resources (Aquifers).

2 Site Investigation and Geotechnical Analysis

2.1 Scoping Assessment

The "Basement Development Guidance" specified in Appendix 9 of the Dublin City Development Plan 2022 – 2028 Document states that any development proposal that includes a basement should be scoped to determine/identify significant issues which should be addressed as part of the BIA.

The principal concerns relating to the excavation of new basements are presented in Section 3.0 of DCC "Basement Development Guidance". There is potential for impacts during both the construction phase and the long-term/steady state phase of the project. Installation of temporary works may also result in temporary impacts. Each of these impacts are considered and accounted for in this BIA submission. Basement constructions impacts can be summarised under the following headings:

1. Groundwater flow
2. Land stability and ground movement
3. Surface water flow and flooding
4. Cumulative effects
5. Construction stage impacts (incl. temporary works)

2.1.1 Groundwater Scoping Assessment

See below a summary of key points relating to groundwater as it relates to the proposed development:

i. The site is located directly above an aquifer. However, this locally important bedrock aquifer is only moderately productive and restricted to local zones.
ii. The proposed basement will extend beneath the water table surface.
iii. The site is not located within 100m of a well or potential spring line.
iv. The site is located within 100m of open drainage pond as discussed in Section 1.9.1 of this report.
v. The proposed development (including basement construction) will result in an increase of hard surfaced/paved areas. The existing site consists of brownfield site at present, consisting of former sports pitches. As part of the development proposals, SuDS measures are to be implemented as outlined in the Engineering Planning Report – refer to original planning application documentation. SuDS measures include extensive green roofs, permeable paving, bioretention areas and intensive landscaped areas.

2.1.2 Stability Scoping Assessment

See below a summary of key points relating to groundwater as it relates to the proposed development:

i. The existing site does not include any significant slopes, natural or manmade. The site is relatively flat throughout its extents.
ii. There are no proposals as part of the development to introduce any re-profiling or introduction of slopes within the site.
iii. No trees are to be felled as a result of the proposed basement construction.
iv. The site is located directly above an aquifer. However, this locally important bedrock aquifer is only moderately productive and restricted to local zones.
v. The proposed basement will extend beneath the water table surface.
vi. The site is not located within 100m of a well or potential spring line.
vii. The site is located within 100m of open drainage pond as discussed in Section 1.9.1 of this report.
viii. The site is bounded to the west by Fortfield Road and to the east by Lakelands Park. The site also adjoins Terenure College to the south, Terenure College Rugby Football Club to the northeast and the rear of residential dwellings on Greenlea Road to the north.

2.1.3 Surface Water Flow and Flooding

See below a summary of key points relating to groundwater as it relates to the proposed development:

i. The site contains Flood Zone A and B extents as illustrated in DCC's Strategic Flood Risk Assessment (SFRA). However, Section 2.24 of the OPW's "The Planning System and Flood Risk Management Guidelines" states that *"..flood zones are determined on the basis of the probability of river and coastal flooding only.."*. This point is echoed in Section 1.4.1 of the DCC Development Plan 2022-2028 SFRA report. As pluvial flooding should not be used in the designation of flood zones, and in the absence of any identifiable fluvial or coastal flood risk to the site, it is concluded that the proposed development site is wholly located in Flood Zone C.
To alleviate concerns relating to pluvial flooding at the site, the associated pluvial flow paths and flood volumes were examined. A proposal has been developed, in direct consultation with DCC, to address the pluvial flooding on Fortfield Road, which includes the provision of a detention basin within the proposed development site boundary.
Refer to the Site-Specific Flood Risk Assessment included in the planning application documentation for details and illustration.

ii. The proposed development (including basement construction) will result in an increase of hard surfaced/paved areas. The existing site consists of brownfield, consisting of former sports pitches. As part of the development proposals, SuDS measures are to be implemented as outlined in the Engineering Planning Report – refer to original planning application documentation. SuDS measures include extensive green roofs, permeable paving, bioretention areas and intensive landscaped areas.

iii. The discharge of surface water from the development will be improved through the application of SuDS measures including attenuation of discharge from the site as detailed in the Engineering Planning Report and Engineering Drawings.

2.1.4 Cumulative Effects Scoping Assessment

See below a summary of key points relating to groundwater as it relates to the proposed development:

i. As outlined in Section 1.6.1, the proposed substructure elements at Fortfield Road, Terenure, Dublin 6 do not have a cumulative impact on basements extents of surrounding structures.

2.1.5 Construction Stage Impacts Scoping Assessment

See below a summary of key points relating to groundwater as it relates to the proposed development:

i. Temporary works consisting of installation of a piled secant wall is required.
ii. Impacts of bulk excavations on adjacent structures to be assessed.
iii. Outline Construction Management Plan has been prepared for this planning application.

2.2 Scoping and Site Investigations

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential impacts are assessed for each of the identified potential impact factors.

2.2.1 Potential Impacts

The following potential impacts have been identified by the scoping process and are shown in Table 2-1.

Table 2-1: Potential Impacts.

Potential Impact	Consequence
The site is located directly above an aquifer	The construction of subterranean structures may place the groundwater and surrounding environment at undue risk.
The proposed basement will extend beneath the water table surface.	Potential impacts on surrounding groundwater levels and flows.
The site is bounded to the west by Fortfield Road and to the east by Lakelands Park. The site also adjoins Terenure College to the south, Terenure College Rugby Football Club to the northeast and the rear of residential dwellings on Greenlea Road to the north.	Excavation of a subterranean structure may result in structural damage to the road/ footway or foundations associated with Terenure College/ residential dwellings on Greenlea Road.

These potential impacts in Table 2-1 have been investigated through the available site investigation data outlined in the IGSL Geotechnical Report included as Appendix D.

2.3 Exploratory Work

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

1. Visit project site to observe existing conditions.
2. Carry out 6 No. Boreholes, using light cable techniques. Rotary techniques were then employed at all 6 No. locations as discussed in point No. 3 below.
3. Carry out 6 No. Rotary Core Boreholes to a maximum of 14.0m BGL or, 4m into rock.
4. Carry out 4 No. trial pits to permit close examination and sampling of upper soils.
5. Carry out 4 No. infiltration tests to assess suitability of sub-soils for soakaway purposes.
6. Geotechnical & Environmental Laboratory testing
7. Report with recommendations

Please refer to Appendix D for a copy of Geotechnical Report.

2.3.1 Standards

The ground investigation works for the site were carried out by IGSL in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This was 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 meantime, 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

2.3.2 Reporting

Recommendations made and opinions expressed in the Geotechnical 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.

The Geotechnical Report was prepared for PUNCH Consulting Engineers and the information should not be used without prior written permission. The recommendations developed in the Geotechnical 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.

2.3.3 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 (Er). A calibration certificate is available upon request. The Er is defined as the ratio of the actual energy Emeas (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (Etheor) 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).

2.3.4 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.

2.3.5 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.

2.3.6 Retention of Samples

Samples were retained for a period of 60 days following approval of the final factual report.

2.4 Ground Conditions

2.4.1 Boreholes

Boreholes were constructed in the locations indicated on the site plan enclosed in Appendix 8 of the Geotechnical Report, while the descriptions and depths of the various soils encountered are shown on the boring records enclosed in Appendix 1 of the Geotechnical Report. Also shown on these records are the depths at which samples were recovered, the results of in-situ Standard Penetration Tests, and the groundwater conditions observed during the course of boring operations. The ground conditions are summarised in Table 2-2.

Table 2-2: Summary of the Ground Conditions.

Location	Soft/ firm brown sandy gravelly clay	Stiff dark brown gravelly clay	Dark grey - black sandy clayey gravel	Stiff/ very stiff black sandy gravelly clay
BH01	0.00 to 2.50	2.50 to 3.60	3.60 to 6.10	
BH02	0.00 to 1.50	1.50 to 3.50		3.50 to 4.20
BH03	0.00 to 2.50	2.50 to 5.90		
BH04	0.00 to 2.50	2.50 to 4.20		4.20 to 5.80
BH05	0.00 to 2.50	2.50 to 3.80		3.80 to 5.30
BH06	0.00 to 1.50	1.50 to 4.50		4.50 to 6.40

All six boreholes encountered brown sandy gravelly clay in a soft or soft to firm condition, present to depths ranging from 1.5 metres (BH02 and BH06) to 2.5 metres (remaining boreholes). In all locations these deposits were underlain by stiff dark brown sandy gravelly clay. While BH03 was terminated in this material at a depth of 5.9 metres, BH04, BH05 and BH06 recorded a transition to black sandy gravelly clay in a stiff to very stiff condition. In BH01, the black deposits were coarser, classifying as sandy clayey gravel.

While a slow ingress of water was observed at a depth of 3.6 metres in BH05, all other holes remained dry.

Please refer to Appendix C for borehole locations, and Appendix D for borehole logs.

2.4.2 Rotary Drilling and Coring

Rotary techniques were employed at each borehole location to ascertain the depth, composition and condition of bedrock. Open hole "Symmetrix" drilling techniques were used to penetrate the overburden soils, identifying the soil type from the flush returns. On the first indications of bedrock, coring techniques were employed.

The records include a detailed description of the bedrock including the rock structure, strength, and degree of weathering. In accordance with BS 5930: 2015, the records include the total core recovery (TCR), solid core recovery (SCR) and the rock quality designation (RQD). Also shown graphically is the fracture spacing.

Standard Penetration Tests (SPTs) were undertaken within overburden and also within completely weathered bedrock.

The bedrock was identified as dark grey medium strong to very strong fine grained, medium to thinly bedded Limestone. Total core recovery was 100% while solid core recovery was variable. At the end of drilling, water was present in the coreholes at depths ranging from 2.9 metres to 8.2 metres. However, the depths presented in Table 2-3 do not represent the standing water levels. The standpipe readings in Table 2-4 provide a more accurate indication of the groundwater profile.

Table 2-3: Summary of the Rotary Drilling and Coring.

Location	Depth of open hole drilling	Weathered Rock	Rock Coring	Standpipe (SP)	Ground water depth (m bgl)
RC01	11.00		11.0 to 14.5	SP	2.90
RC02	8.00	7.8 to 8.0	8.0 to 11.0	SP	3.20
RC03	7.50	7.2 to 7.5	7.5 to 12.5		5.20
RC04	7.50	7.1 to 7.5	7.5 to 13.5		3.20
RC05	9.00	8.55 to 9.00	9.0 to 14.0	SP	8.20
RC06	9.00	8.70 to 9.0	9.0 to 14.0	SP	3.80

Table 2-4: Groundwater results.

Standpipe	Standpipe Depth	Depth to water (m bgl)	
	(m bgl)	27/04/2022	09/05/2022
BH/RC 01	14.5	1.7	1.9
BH/RC02	8.0	2.1	2.1
BH/RC05	9.0	1.3	1.2
BH/RC06	14.0	2.2	2.0

2.4.3 Trial Pits

Trial pits were excavated in four locations to facilitate close examination of the upper soils. The trial pit records are enclosed in Appendix 3 of the Geotechnical Report.

While the soils encountered in the trial pits were described as sandy gravelly clays, there were notable variations in the soil condition.

TP01 encountered brown sandy gravelly clay in a soft to firm condition to a depth of 1.1 metres where it became firm. The soil was described as firm to stiff from 2.4 metres to the excavated depth of 3.0 metres.

TP02 encountered firm grey-brown sandy gravelly clay from 0.7 metres to 2.4 metres where the soil condition was described as stiff to very stiff.

The condition of the soil in TP03 was described as firm to a depth of 1.5 metres where it became firm to stiff. The condition of the soil in TP04 was described as firm to a depth of 2.0 metres. Water ingress below this depth resulted in water-softened spoil, belying its true in-situ condition, which was through to be firm / stiff. Water ingress at 2.0 and 2.8 metres resulted in instability of the pit sides.

2.4.4 Infiltration Test

The infiltration tests were performed in accordance with BRE Digest 365 ‘Soakaway Design’.

To obtain a measure of the infiltration rate of the sub-soils, water was poured into the test pit, and records were taken of the fall in water level against time. This procedure was repeated twice more to ensure saturation of the sub-soils. Normally the results for the final stage of testing, following the saturation periods, are used for soakaway design purposes. The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second.

In tests SA01 and SA03 there was no measurable fall in water level over the test period of 60 minutes.

In tests SA02 and SA04 very slow infiltration rates were recorded.

2.5 Laboratory Testing (Geotechnical)

2.5.1 Particle Size Distribution

Grading curves were obtained for selected samples. The results show that the samples were well-graded, with fines values ranging from 6% to 34%. For practical reasons cobbles and boulders were omitted from the test specimens.

2.5.2 Index Properties

The results of plastic and liquid limit tests were used to classify the sub-soils. The majority of results fell within the CL zone of the plasticity chart.

2.5.3 Chemical Analysis

The results of chemical testing showed low concentrations of soluble sulphates.

2.6 Rock Testing

2.6.1 Uniaxial Compression Test

Uniaxial compression tests were performed on intact lengths of rock, in accordance with ASTM standards. The specimens are prepared as right circular cylinders with a length to diameter ratio of 2.0 to 2.5, and the ends are saw cut and ground to eliminate irregularities. The load is applied through a hydraulic ram and the compressive strength is defined as the load at failure divided by the cross-sectional area.

The specimens recorded UCS values of 60MPa to 89MPa, classifying the rock strength as strong.

2.6.2 Point Load Test

The Point Load Index Test provides a rapid, and accurate, strength index from rock fragments unlike the Uniaxial Compression test (UCS) which requires careful preparation of intact lengths of core. The test specimen is compressed between two cones loaded from a hydraulic hand pump. The core fails due to the tensile forces over the diametral area between the points. The strength at failure is expressed as the point load index Is. For purposes of comparison the Is values are corrected to give the equivalent strength for a 50 mm diameter specimen. This is the Is50 value. From research by several workers relationships have been formulated, relating the Is values to UCS.

The results of the point load tests were mostly in the range 3 to 6 MPA, equating to UCS values ranging from 60 to 120 MPa, thereby classifying the rock strength as strong to very strong.

2.7 Laboratory Testing (Environmental)

Environmental testing was scheduled on selected soil samples in order to screen for inherent contamination and to assess their suitability for disposal to an inert landfill.

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.

2.8 Waste Disposal

Under the European Waste Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste classification is a staged process, and this investigation represents the preliminary sampling exercise of that process. Please refer to the 'Waste Characterisation Assessment' which is included in Appendix E of this BIA report for details relating to the initial site investigations.

Once the extent and location of the waste that is to be removed has been defined, further sampling and testing may be necessary. The results from this ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site.

In accordance with cradle to grave responsibilities, the Contractor will be responsible for all waste arisings from the time the waste is generated until it reaches its final destination point. This includes its method of treatment/disposal. The Waste Management Acts 1996 (as amended), give effect to the polluter pays principle effectively stating that the waste producer may be liable for any pollution incidents arising from the management of their waste. There is therefore an onus on the Contractor to ensure that all contractors managing waste on their behalf are legally compliant and technically competent and the waste itself is contained, handled, treated, and disposed of in accordance with all relevant regulatory requirements.

Please refer to the 'Outline Resource and Waste Management Plan' for further details on proposed waste disposal processes associated with the development.

2.9 Preliminary Risk Assessment

A Preliminary Risk Assessment has been undertaken by PUNCH Consulting Engineers to determine a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment has been carried out on the basis of a source-pathway-receptor approach.

2.9.1 Source

The desk study findings indicate that the site does not have a pronounced contaminative history as a result of historic land use.

Previous site investigations in the area have included laboratory of disturbed soil samples recovered from boreholes. As part of Glover Site Investigations Limited (GSI Report: 1015) for the Dodder Bridge as discussed in Section 1.8, chemical analysis was undertaken on soil samples from 1 No. of boreholes to

determine sulphate content and Ph. Results show a sulphate concentration of 6 SO_3 parts per 100,000 (Class 1) and a pH being near neutral with the value being 7.75. Given the contamination results obtained to date, the level of contamination is considered low. Please refer to Appendix D for this historical site investigation report.

Please note the results of the site specific site investigations outlined in Section 1.5 of this report have been reviewed/ included as part of this BIA document.

2.9.2 Receptor

The future occupants of the site will represent relatively high sensitivity receptors. Buried services are likely to come into contact with any contaminants present within the soils through which they pass, and site workers are likely to come into contact with any contaminants present during construction works.

2.9.3 Pathway

Within the site, end users will be isolated from direct contact with any contaminants present by the extent of the proposed new buildings and areas surrounding hard surfacing, thus no potential contaminant exposure pathways will exist with respect to end users.

There will be a potential for contaminants to move onto or off the site horizontally, although these pathways are already in existence. A pathway for ground workers to come into contact with any contamination will exist during construction work and services will come into contact with any contamination within the soils in which they are laid.

There is thus considered to be a low potential for a contaminant pathway to be present between any potential contaminant source and a target for the particular contaminant.

2.9.4 Preliminary Risk Appraisal

On the basis of the above, it is considered that there is only a low risk of there being a significant contaminant linkage at this site, which would result in a requirement for major remediation work. Furthermore, as there is no evidence of filled ground within the vicinity of the site and no landfill sites, there is not considered to be a significant potential for hazardous soil gas to be present on or migrating towards the site.

2.10 Site Specific Risk Assessment

A Waste Characterisation Assessment for the proposed development was undertaken by O'Callaghan Moran & Associates. 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 included in Appendix 11 of the Waste Characterisation Assessment which is included in Appendix E of this BIA report. Results are summarised in Table 2-5.

Table 2-5: Waste Classification.

Sample No.	Depth	Classification	LoW Code
BH01	1.0	Non-Hazardous	17 05 04
BH03	1.0	Non-Hazardous	17 05 04
BH04	2.0	Non-Hazardous	17 05 04
BH05	2.0	Non-Hazardous	17 05 04
BH06	1.0	Non-Hazardous	17 05 04
TP01	0.70	Non-Hazardous	17 05 04
TP02	1.0	Non-Hazardous	17 05 04
TP03	0.80	Non-Hazardous	17 05 04
TP04	0.50	Non-Hazardous	17 05 04

Asbestos was not detected in any of the samples tested.

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*).

Any unforeseen contamination could pose a risk to site workers during the ground works, as addressed below. Appropriate testing of bulk excavation material will be undertaken by the Contractor in accordance with the requisite legislation to ensure appropriate classification and disposal of arising offsite.

2.10.1 End Users

End users will be effectively isolated from any potential contamination as they will be separate from sources within the extent of the proposed structures and hardstanding.

2.10.2 Protection of Site Workers

Site workers should be made aware of the potential contamination and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by the HSA and CIRIA12 and the requirements of the Local Authority.

A watching brief should be maintained during the site works and if any suspicious soil is encountered, it should be inspected by a suitably qualified engineer and further testing carried out if required.

2.11 Effects of Sulphates

An assessment of the Aggressive Chemical Environment for Concrete (ACEC) was undertaken through reference to the Building Research Establishment (BRE) Special Digest 1 (2017).

As noted by BRE Special Digest 1, sulphates in the soil and groundwater are the chemical agents most likely to attack concrete. The extent to which sulphates affect concrete is linked to their concentrations, the type of ground, the presence of groundwater, the type of concrete and the form of construction in which concrete is used.

BRE Special Digest 1 identifies four different categories of site which require specific procedures for investigation for aggressive ground conditions:

1. Sites not subjected to previous industrial development and not perceived as containing pyrite;
2. Sites not subjected to previous industrial development and perceived as containing pyrite;
3. Brownfield sites not perceived as containing pyrite;
4. Brownfield sites perceived as containing pyrite.

The results of Sulphate and pH testing showed very low Sulphate (maximum of 0.047 g/l SO_4 and near-neutral pH levels (8.8 to 9.20). Please refer to Appendix D for a copy of Geotechnical Report.

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.

3 Impact Assessment

3.1 Design Basis Report

This section of the report provides an interpretation of the findings detailed in Section 2, in the form of a ground model, and then provides advice and recommendations with respect to foundation options and contamination issues.

3.1.1 Introduction

The development will comprise a Large-Scale Residential Development (LRD) on a site at Fortfield Road, Terenure of 284 no. units delivering 19 no. houses and 265 no. apartments made up of studios; 1 beds; 2 beds; 3 beds; and 4 beds. Provision of car, cycle and motorbike parking will be provided throughout the development, including at basement and surface level. The basement will extend to a depth of 44.80m OD (formation level). Existing ground levels on site for where the basement is positioned are approximately 47.50m OD, meaning the basement will have a depth between 2.70m below existing ground levels.

An extract of the architects proposed basement plan is shown in Figure 3-1. Please refer to Appendix A for full size architectural plans for both ground and basement level.

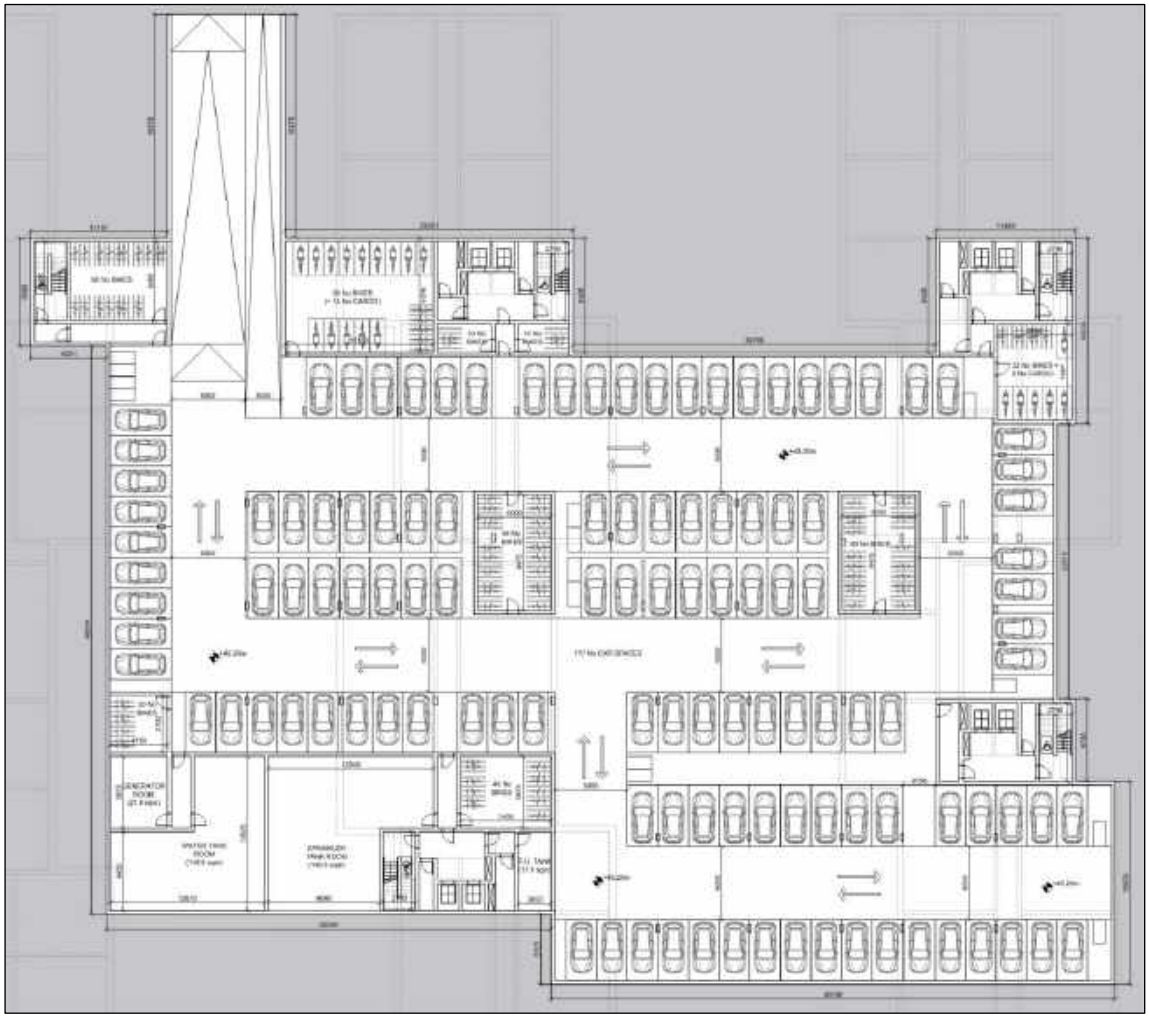


Figure 3-1: Proposed Basement Plan.

The anticipated loads to be applied to the new foundations will generally result in bearing pressures of between 250 kN/m^2 and 300 kN/m^2.

3.1.2 Ground Model

The ground conditions encountered during the investigation are summarised below with reference to in-situ and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs within the Geotechnical Report which is included in Appendix D of this BIA report.

The sequence of strata encountered within each piece of field work that was undertaken during the investigation are summarised below:

Trial Pits:

1. While the soils encountered in the trial pits were described as sandy gravelly clays, there were notable variations in the soil condition.
2. TP01 encountered brown sandy gravelly clay in a soft to firm condition to a depth of 1.1 metres where it became firm. The soil was described as firm to stiff from 2.4 metres to the excavated depth of 3.0 metres.
3. TP02 encountered firm grey-brown sandy gravelly clay from 0.7 metres to 2.4 metres where the soil condition was described as stiff to very stiff.
4. The condition of the soil in TP03 was described as firm to a depth of 1.5 metres where it became firm to stiff. The condition of the soil in TP04 was described as firm to a depth of 2.0 metres. Water ingress below this depth resulted in water-softened spoil, belying its true in-situ condition, which was through to be firm / stiff. Water ingress at 2.0 and 2.8 metres resulted in instability of the pit sides.

Boreholes:

1. All six boreholes encountered brown sandy gravelly clay in a soft or soft to firm condition, present to depths ranging from 1.5 metres (BH02 and BH06) to 2.5 metres (remaining boreholes). In all locations these deposits were underlain by stiff dark brown sandy gravelly clay. While BH03 was terminated in this material at a depth of 5.9 metres, BH04, BH05 and BH06 recorded a transition to black sandy gravelly clay in a stiff to very stiff condition. In BH01, the black deposits were coarser, classifying as sandy clayey gravel.

Rotary Coring and Drilling:

1. Rotary techniques were employed at each borehole location to ascertain the depth, composition and condition of bedrock. Open hole “Symmetrix” drilling techniques were used to penetrate the overburden soils, identifying the soil type from the flush returns. On the first indications of bedrock, coring techniques were employed.
2. The bedrock was identified as dark grey medium strong to very strong fine grained, medium to thinly bedded Limestone. Total core recovery was 100% while solid core recovery was variable.

3.1.3 Advice and Recommendations

The basement’s footprint within the overall site extents allows for the basement to be constructed from an open excavation, i.e. no requirement for piled walls. During construction, groundwater control by way of a sump and pump should be utilised through out to keep any excavations dry. Permission from local authorities must be sought before discharging back into the sewer system any groundwater that is pumped from the site.

Formation level for the proposed development is proposed to be within the stiff dark brown sandy gravelly clay layer that should provide a suitable bearing stratum for foundations excavated from basement level.

3.1.4 Basement Excavation

3.1.4.1 Basement Construction

The construction of the basement will involve the excavation of the basement footprint and immediate surrounds to enable construction of an RC foundation slab with thickenings coinciding with column locations. The building will be formed on piles or pad foundations. The basement perimeter wall will consist of RC construction. To allow the basement wall construction, a battered excavation will be provided around the full perimeter of the proposed basement carefully considering all associated site constraints. The spoil generated from the basement construction will be recycled and re-used (in accordance with the Outline Construction & Demolition Waste Management Plan) and, where necessary, disposed at an appropriate licensed land fill site. The concrete operations associated with the basement structure will require concrete deliveries to site.

The groundwater level recorded by the site investigation testing indicates a variance in groundwater levels throughout the site (1.2m-2.2m below ground level). To prevent any potential risk of groundwater intrusion into the lower structure the basement car park will be constructed as a water-tight box, the proposed grade for the basement is Grade 2, as per BS 8102:2022. The proposed structural integrity of the basement and its ability to prevent groundwater intrusion into the site is deemed sufficient to mitigate the potential risk to acceptable limits. The concrete works will involve concrete deliveries to site and adequate wash-down and wheel wash facilities must be provided for the concrete wagons.

Basement construction will be carried out in accordance with EPA Guidance on Best Practice Guidelines for the preparation of resource & waste management plans for construction & demolition projects.

3.1.4.2 Permanent RC (Reinforcement Concrete) Basement Walls

The permanent basement walls will consist of 300mm reinforced concrete elements, which will resist the horizontal surcharge from soil and ground water. The basement will be further protected from water ingress by the installation of hydrophilic strips at all construction joints within the reinforced concrete wall and slabs.

3.1.4.3 Basement Heave

The 2.70m deep excavations to form the proposed basement extension will result in an unloading of approximately 60 kN/m² to 80 kN/m². Any issues of elastic heave and long-term swelling are not expected but this will be considered further at detailed design stage.

3.1.5 Pad Foundations

The load bearing elements will be supported by an arrangement of reinforced concrete pad footings. These pad footings will be constructed integral with the basement slab. This form of construction will result in a full monolithic basement structure.

3.1.6 Basement Floor Slabs

Following the excavation of the single level basement, and in order to accommodate the anticipated heave, the slab will be suitably reinforced to cope with these movements. A 400mm thick reinforced concrete basement floor slab is proposed.

3.1.7 Shallow Excavations

It is considered that shallow excavations for foundations and services that extend through the made ground should remain generally stable in the short term, although some instability may occur. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary

lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

Significant inflows of groundwater into shallow excavations (<2.0m) are not generally anticipated, although seepages may be encountered from localised perched water tables within the made ground or underlying clay layers, particularly in the vicinity of existing foundations, although such inflows should be suitably controlled by sump pumping.

3.2 General

This section of the report evaluates the direct and indirect implications of the proposed basement construction, based on the findings of the previous screening and scoping, site investigation and ground movement assessment.

The screening/scoping, outlined in Section 2.1, identified a number of potential impacts. The desk study and ground investigation information has been used below to review the potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

3.2.1 Potential Impacts

Table 5-1 below summarises the potential impacts – taking the potential impacts identified at Scoping Stage (Table 2-1) and further developing/informing them with the additional information that is now available from the ground investigation in consideration of each impact.

Table 3-1: Potential Impacts.

Potential Impact	Site Investigation Conclusions
The site is located directly above an aquifer	Standpipes were installed at 4 no. locations (BH/RC 01, BH/RC 02, BH/RC 05, and BH/RC 06). Groundwater depths was noted during the investigation as shown in Section 2.4.2 and Table 2-4 in this BIA. There are no anticipated impacts on the aquifer from the development.
The proposed basement will extend beneath the water table surface	Refer to Section 2.4.2 and Table 2-4 in this BIA for details of groundwater SI results. Groundwater monitoring of the 4 no. standpipe installations recorded water levels ranging between 1.2 – 2.2m BGL. These depths are representative of measurements recorded on two separate occasions: 27-04-2022, and 09-05-2022.
Founding depth for the proposed development (basement) will be deeper relative to neighbours	Assumptions informed by industry norms will be applied to the type and depth of foundations of neighbouring sensitive structures to inform the Damage Impact Assessment. The basement extents are located a clear distance from any neighbouring structures and no adverse impacts are anticipated. Refer to Section 3.4.3 for further detail and illustration.

The site is bounded to the west by Fortfield Road and to the east by Lakelands Park. The site also adjoins Terenure College to the south, Terenure College Rugby Football Club to the northeast and the rear of residential dwellings on Greenlea Road to the north.	The investigation has not indicated any specific problems, such as weak of unstable ground that would make working in close proximity of public infrastructure/ developments problematic at this site. As can be seen in Figure 1-11-1 and Figure 1-2 the basement extent is not located directly adjacent to these public infrastructure/ developments. Refer to Section 3.4.3 for further detail and illustration.

The results of the site investigation have therefore been used below to review the remaining potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

3.3 Groundwater Flow

It is known that the groundwater within the Dublin City Centre area flows in a general eastward direction and either contributes to the various rivers flowing within the Dublin area or discharges directly to the sea at Dublin Bay. Figure 3-2 below illustrates the general direction of groundwater flow via groundwater contours, in this west to east direction, with respect to the location of the site. The groundwater contours indicate a north easterly groundwater flow direction.

The closest available groundwater contour to the south-west of the site is approximately 30m from the site and is noted as +50m OD. To the north of the site, the groundwater contour at approximately 940m from the site, close to Kimmage, is noted as +40.0m OD. The site is located closer to the +50m OD contour. The groundwater monitoring on site will be reviewed and compared with the published contour information. The general hydraulic gradient across this part of Dublin is approximately 0.01 (or 10m fall in groundwater level over 1km).

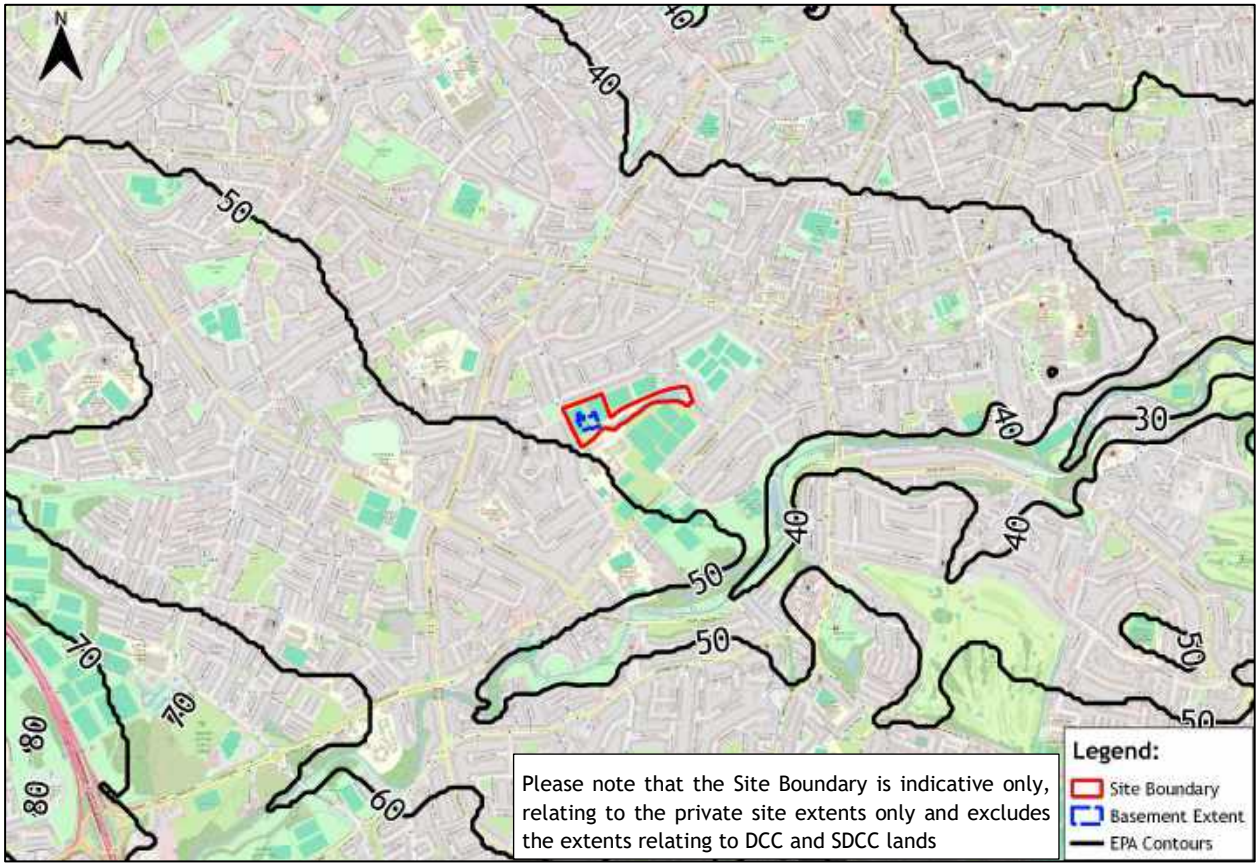


Figure 3-2: Groundwater Contours (GSI/EPA Online Database).

3.3.1 Cumulative Basement Effects on Hydrology

The cumulative effect of several underground developments in a given street could potentially differ from the impact of the initial single basement. It is therefore appropriate to consider the layout and proximity of existing basements in the vicinity with respect to the hydrogeology.

A search has been carried out of the DCC Planning Portal and SHD planning database for planning applications that relate to the construction of basements. The search findings in Section 1.6.1 of this BIA report. It is noted that no new basement structures are being proposed in the vicinity of the development, however some existing structures are present.

Figure 3-3 is a schematic of a homogeneous aquifer with isotropic hydrogeological properties as provided in Appendix 9 of the Dublin City Development Plan 2022 – 2028 "Basement Development Guidance". In relation to this project site, it is considered that Scenario B1 is most relevant and illustrates the illustrates the principle of groundwater flow around a single basement structure.

The diversion of flow paths around the basement structure would be expected to lead to a marginal increase in groundwater levels upstream, and a similar reduction in groundwater levels downstream. The increase is a function of the width and depth of the basement and the permeability of the underlying soils.

The proposed development at Fortfield Road is not considered to have an impact on existing basement structures such as, The Courtyard Apartment Block(s) (existing development with basement) or The Cresent Apartment Block(s) (existing development with basement). This is due to them not being in the immediate vicinity of the proposed development site at Fortfield Road. It is therefore considered that that Scenario B1 illustrating the principle of groundwater flow around a single basement structure is relevant.

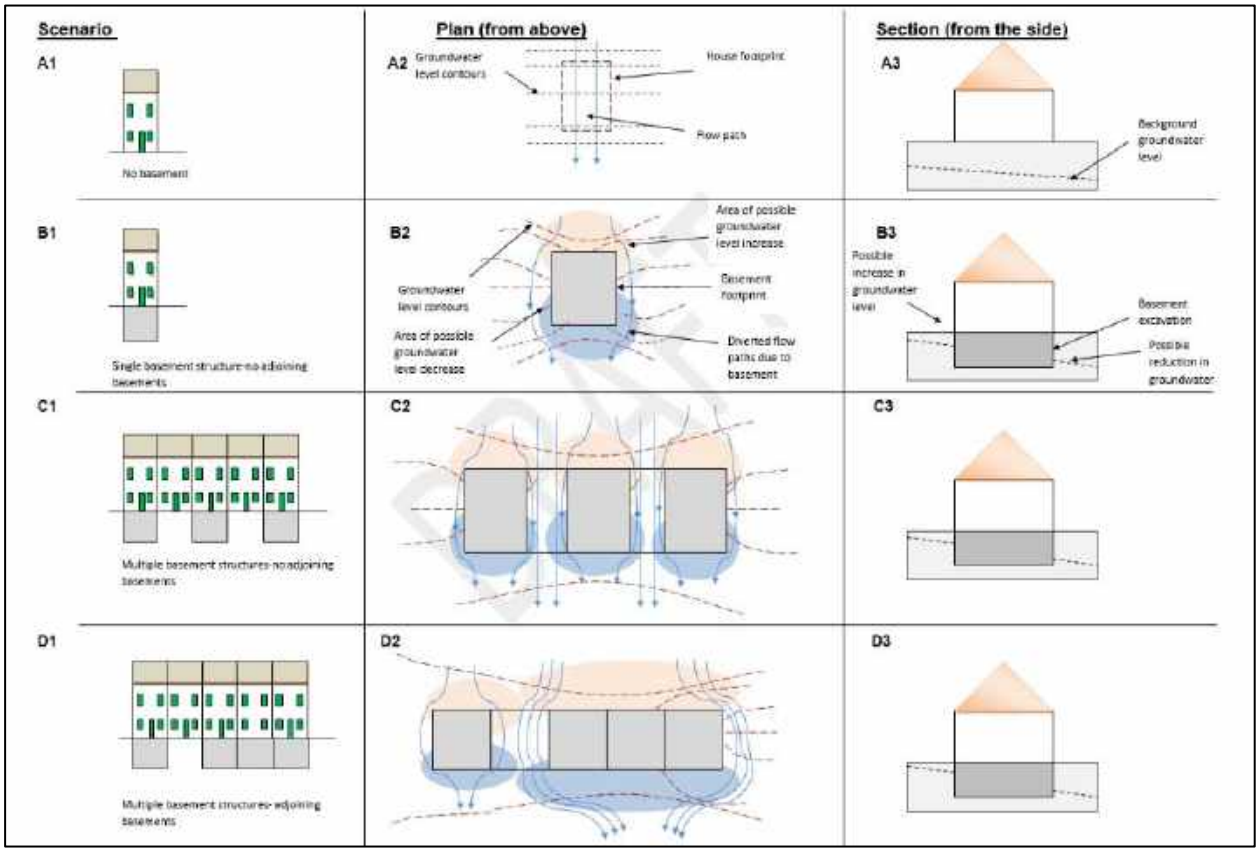


Figure 3-3: Cumulative Effects of Basement Construction on Hydrogeology (ref: Appendix 9 of the Dublin City Development Plan 2022 – 2028 "Basement Development Guidance")

3.3.2 Hydrology and Impact Assessment

A useful guide to assess the impact on Hydrogeology due to construction is presented in the National Roads Authority (NRA), now TII, guidance document entitled "Environmental Assessment for National Roads Schemes – Guidelines for Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Roads Schemes". The aim of the document is to provide guidance on the assessment of geological, hydrological and hydrogeological impacts during the planning and design of national road schemes in Ireland. It specifically outlines the approach to be adopted in the consideration and treatment of geology, hydrology and hydrogeology. This document can be applied to building sites, such that the likely impacts of the proposed basement construction are assessed, and potential mitigation measures recommended if required.

Significance ratings relating to the impact of construction on the hydrogeology in the vicinity of a development are outlined in this section. The importance of the site may be rated using the criteria outlined in Box 4.3 of the document (extracted and shown in Table 3-2).

Using Table 3-2 and considering the geology and hydrogeology of the site presented earlier, it is considered that the importance of the project site is 'medium' to 'low'. Given the proximity of the site to the tidal River Liffey and Dublin Bay, it is unlikely that the aquifers underlying the site will be used for potable supply, as the main supply of potable water in the Dublin area is taken from the nearby Wicklow Mountains.

Box 5.3 of the NRA document (extracted and shown in Table 3-3) may be used to rate the magnitude of the impact of the development on the hydrogeological condition of the site. As shown in the groundwater modelling, the rise and fall in levels is considered nominal due to the basement construction with groundwater flow paths not significantly affected. In addition, the groundwater flow through the site is thought to be an approximate north-east direction (based on the groundwater contours) and there are apparently no wells to the east of the site. As such the magnitude of the importance of the development on the hydrogeology condition is considered to be 'Negligible' (i.e. results in an impact on the attribute but of insufficient magnitude to affect either use or integrity).

Table 3-2: Criteria for Rating Site Attributes – Estimation of Importance of Hydrogeological Attributes.

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	• Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	• Regionally Important Aquifer with multiple wellfields. • Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status. • Regionally important potable water source supplying >2500 homes. • Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	• Regionally Important Aquifer. • Groundwater provides large proportion of baseflow to local rivers. • Locally important potable water source supplying >1000 homes. • Outer source protection area for regionally important water source. • Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	• Locally Important Aquifer. • Potable water source supplying >50 homes. • Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	• Poor Bedrock Aquifer. • Potable water source supplying < 50 homes.

Note: Highlighted 'Medium' to 'Low' importance rating as it applies to the Fortfield Road LRD.

Table 3-3: Criteria for Rating Site Importance – Estimation of Magnitude of Impact on Hydrogeology Attribute.

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	• Removal of large proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. • Potential high risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	• Removal of moderate proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. • Potential medium risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	• Removal of small proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. • Potential low risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Calculated risk of serious pollution incident.

Note: Highlighted 'Negligible' magnitude of impact rating as it applies to the Fortfield Road LRD.

Combining the two ratings for the site resulting using Box 5.4 of the NRA documents (see Table 3-4 below), the significant environmental impact of the installation of the basement on the site is rated as 'Imperceptible'. The NRA describe this as 'an impact capable of measurement but without noticeable consequences'.

Table 3-4: Rating of Significant Environmental Impact.

		Magnitude of Impact			
		Negligible	Small	Moderate	Large
Importance of Attribute	Extremely High	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
	High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe / Significant
	Medium	Imperceptible	Slight	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

Note: Highlighted 'Imperceptible' Significant Environmental Impact rating as it applies to the Fortfield Road LRD.

3.3.3 Groundwater Detailed Design Considerations

3.3.3.1 Groundwater Control & Temporary Dewatering

During excavation and construction, groundwater control by way of a sump and pump should be utilised throughout to keep the excavations dry. Permission from DCC will be sought before discharging back into the sewer system any groundwater that is pumped from the site.

The extent of any such impact on groundwater levels outside the excavations will primarily depend on the amount of groundwater abstracted from the excavation. Minimising the quantity of groundwater pumped from the excavation will limit any potential lowering of groundwater levels away from the construction site. Due to the low permeability Clay, groundwater ingress into the excavation will be limited and therefore groundwater extraction is considered to be nominal.

In the permanent condition, the basement substructure will provide permanent waterproofing to the development.

3.3.3.2 Design Groundwater Level

The results of the site-specific site investigation outlined in Section 1.5 have been reviewed and included as part of the BIA document.

Details of groundwater help inform the conditions applicable to the temporary works design.

For the permanent works design and permanent groundwater retention, it would be prudent to assume a groundwater level equal to existing ground level. This is to account fluctuations associated with groundwater levels, including, for example the effects of dewatering and re-charge, possible flooding, seasonal effects or the failure of drainage systems.

3.3.3.3 Temporary & Permanent Buoyancy (Uplift)

The temporary and permanent buoyancy of the excavation shall be addressed at detailed design. For the temporary condition buoyancy will be controlled by groundwater pumping and the presence of the rock stratum below the excavation.

A detailed assessment the maximum uplift will be completed prior to construction stage taking into account variations in excavation levels and ground conditions.

In the permanent condition, the basement slab shall be structurally designed for all buoyancy pressures and the effects of heave (if relevant).

3.4 Land Stability and Ground Movement

This section of the report comprises an analysis of the ground movements arising from the proposed basement and foundation scheme discussed in Section 3.1 based on the information obtained from the investigations presented in this BIA report.

3.4.1 Introduction

The sides of an excavation will move to some extent regardless of how they are supported. The movement will typically be both horizontal and vertical and will be influenced by the engineering properties of the ground, groundwater level and flow, the efficiency of the various support systems employed, and the efficiency or stiffness of any support structures used.

The development will include a single level of basement. The proposed basement will accommodate parking, plantroom, and water tanks. The basement will extend to a depth ranging between 2.70m below existing ground levels.

The construction of the basement will involve the excavation of the basement footprint and immediate surrounds to enable construction of an RC foundation slab with thickenings coinciding with column locations. The building will be formed on piles or pad foundations. The basement perimeter wall will consist of RC construction. To allow the basement wall construction, a battered excavation will be provided around the full perimeter of the proposed basement carefully considering all associated site constraints.

The permanent works basement structure will comprise of reinforced concrete (Typically 300mm thick slab and wall). The permanent basement walls will resist the horizontal pressures from ground water in the permanent condition and provide permanent required waterproofing to the basement, with external waterproofing details installed where required. The retaining wall will also be designed to support all soil and surcharge pressures in the permanent condition.

Reinforced concrete will be also used for the floor slabs. The load bearing foundation elements will be supported by an arrangement of reinforced concrete pad footings. These pad footings will be constructed integral with the basement slab. This form of construction will result in a full monolithic basement structure. It is anticipated that the floor slabs, which will act as permanent props, will be constructed with the basement slab level first with the subsequent transfer slab installed at Ground Floor level.

3.4.2 Construction Sequence

The following sequence of operations has been derived to enable analysis of the ground movements around the basement, both during and after construction, and is based on drawings provided by the Architect and C&S Engineer.

The proposal is to construct the basement with an open excavation with battered slopes. The slope of battered soil will be dictated and designed by the soil stability properties as noted in the results of the site investigation testing. A typical section of the proposed basement construction is shown in Figure 3-4 below.

The construction sequence is expected to follow a traditional sequence of:

1. Excavate to the proposed formation level of the basement (c. 2.70 BGL) with allowance for working space and battered excavation slopes.
2. Construct the permanent works basement substructure in the following sequence:
    a) Construct basement floor slab, including thickenings and pad foundations
    b) Construct RC perimeter walls and associated thickenings
    c) Construct ground floor/podium slab level
3. Backfill excavation to rear of perimeter basement walls

Essentially the sequence may be considered as three groups of activities, the first comprising the short-term 'open cut' bulk excavation, the second consisting of the installation of the basement structure permanent works and the third represents the backfilling of the open excavation.

The detail of the permanent structure will be developed by PUNCH Consulting Engineers and an agreed methodology developed with the chosen contractor(s) once appointed.

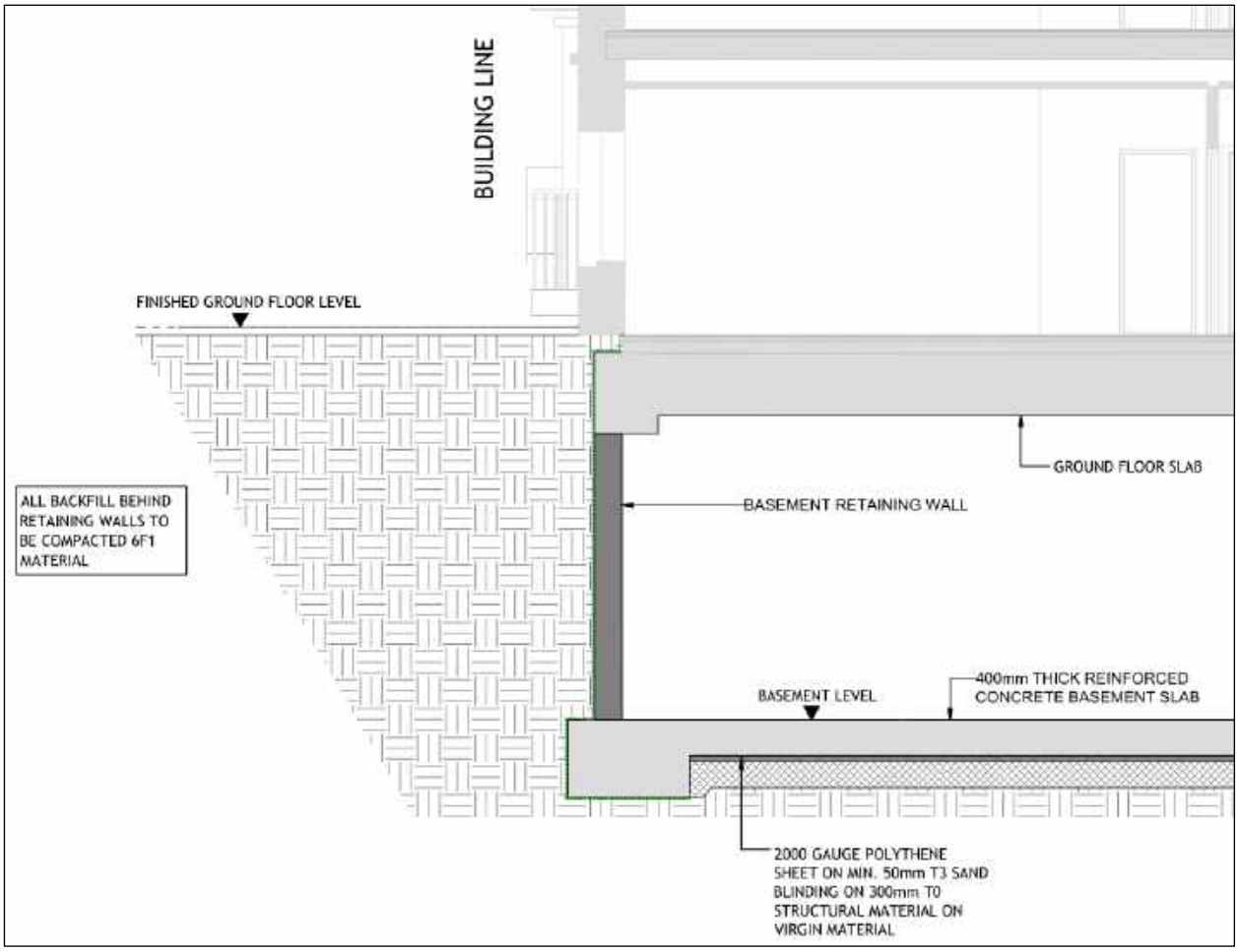


Figure 3-4: Proposed Basement Section

3.4.3 Temporary Support to Basement Perimeter Walls

No additional support will be required to the proposed perimeter wall systems. The basement walls will be designed with no requirement for propping or installation of ground anchors.

3.4.4 Zone of Influence

The construction of the proposed basement will consist of an 'open cut' bulk excavation with no requirement for temporary supports. The Zone of Influence is dictated by the Angle of Response of the excavated material. For the purposes of the BIA, we have considered Angle of Repose of 45 degrees and 30 degrees for the 'stiff sandy gravely clay' as described in the Site Investigations Report prepared by IGSL Limited – refer to Appendix D.

The 'Zone of Influence' associated with this excavation does not extend to any existing structures or adjacent properties. In fact, the 'Zone of Influence'- whether indicated by a 45 or 30 degree angle of repose - has a large offset to the site boundaries as illustrated in PUNCH Drawings 222102-PUNCH-XX-XX-DR-C-0130 and 222102-PUNCH-XX-XX-DR-C-0131. Refer to Appendix G for drawings.

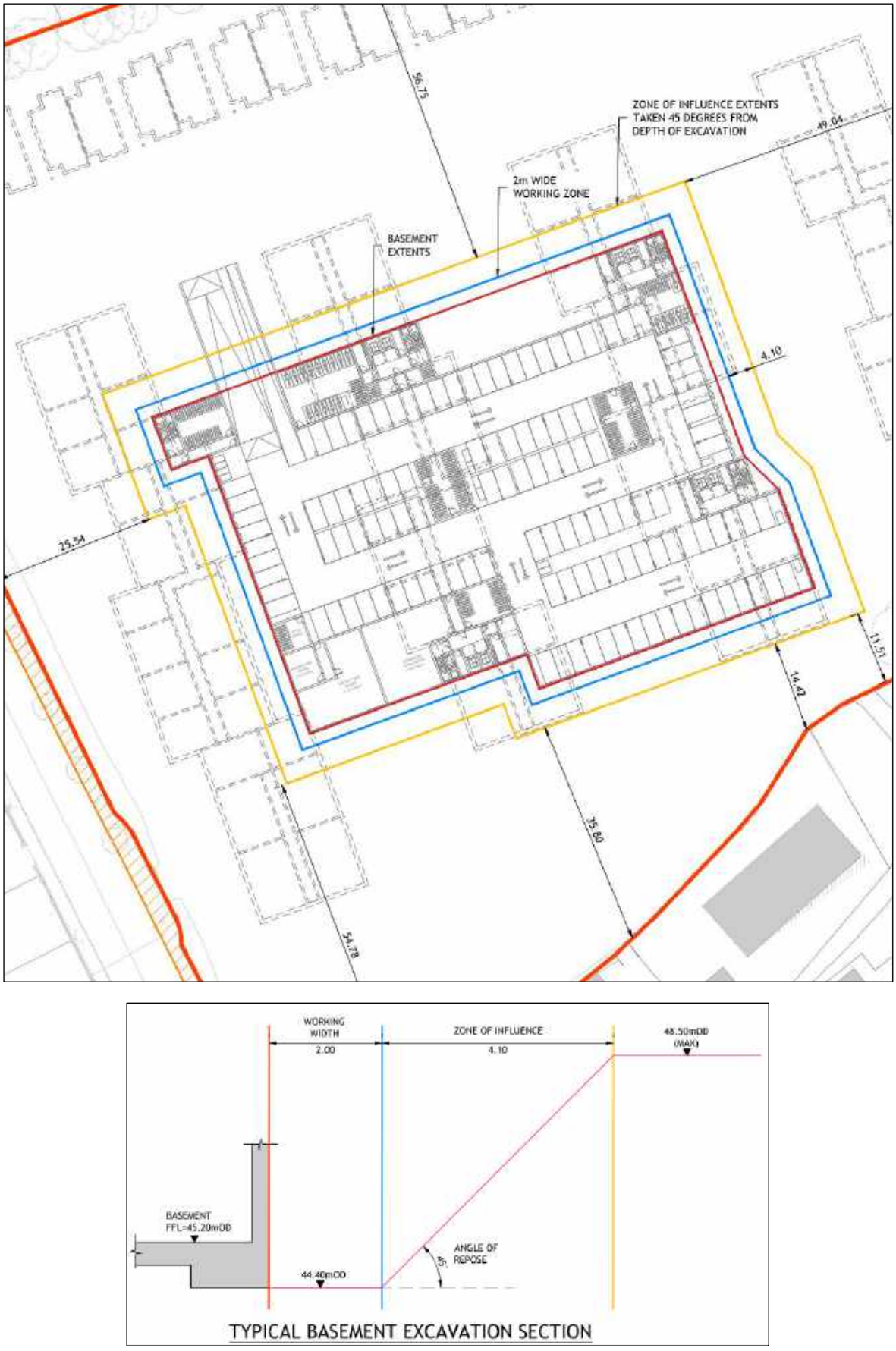
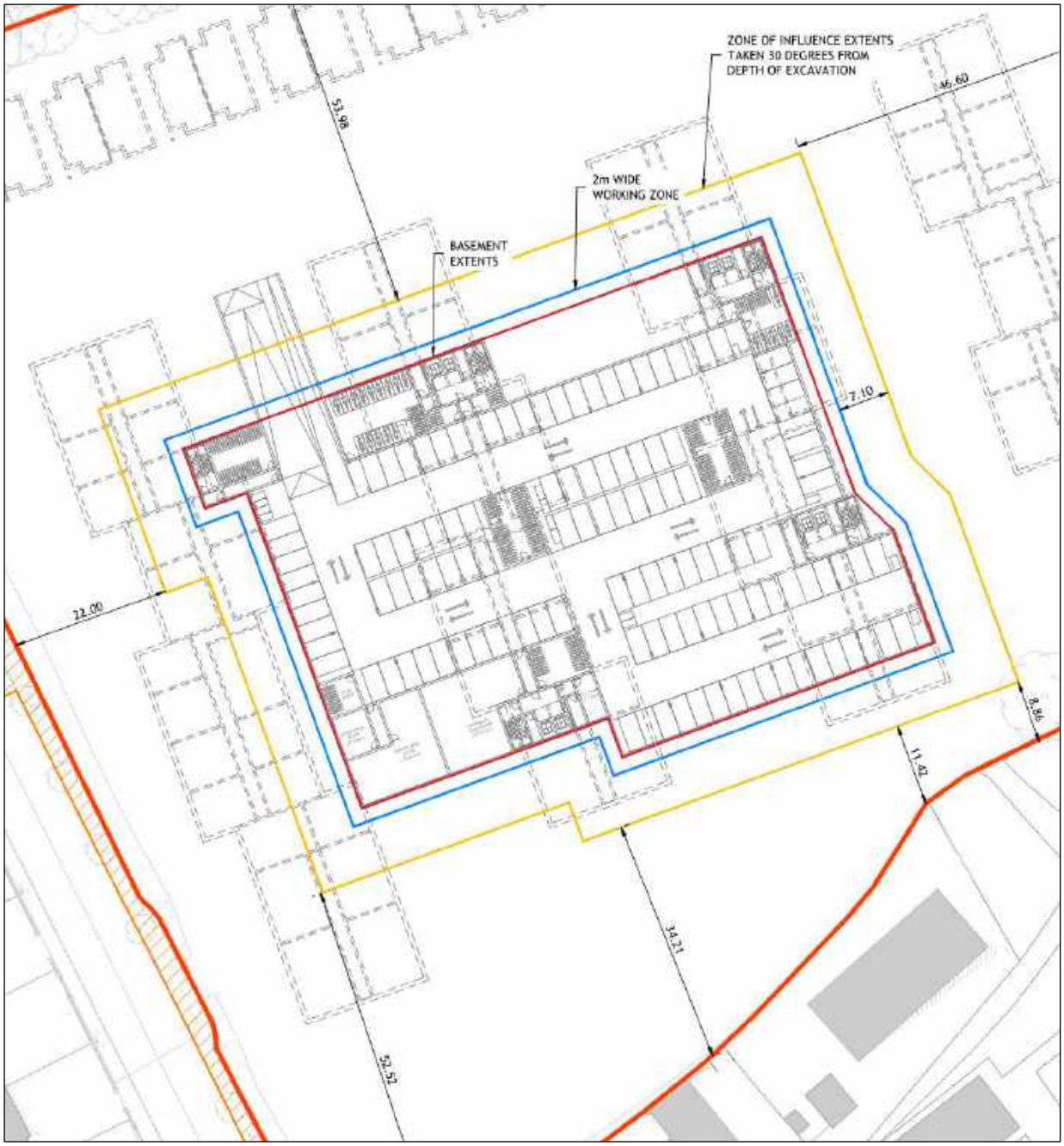


Figure 3-5: Extracts from PUNCH Drawing 222102-PUNCH-XX-XX-DR-C-0130 illustrating Zone of Influence in Plan and Typical Section (Angle of Repose = 45 degrees)



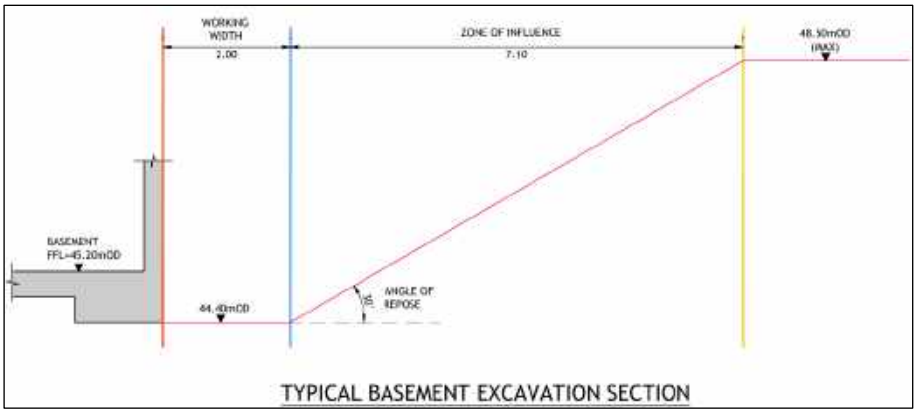


Figure 3-6: Extracts from PUNCH Drawing 222102-PUNCH-XX-XX-DR-C-0131 illustrating Zone of Influence in Plan and Typical Section (Angle of Repose = 30 degrees)

3.4.5 Permanent Works

When the final excavation depth has been reached the permanent works will be formed which, which will comprise 300mm thick reinforced concrete walls. The proposed basement will be defined as Grade 2 in accordance with definitions of BS 8102: 2022 'Code of practice for the protection of below ground structures against water from the ground'.

Reinforced concrete will be used for the basement floor slab. It is anticipated that the floor slabs, which will act as permanent props, will be constructed basement slab level first with the subsequent transfer and podium slabs installed at Ground Floor level.

3.4.6 Basement Construction

It is assumed that the above measures and assumed sequence of works are considered in the eventual design and construction of the proposed works.

Detailed method statements and calculations for any enabling and temporary works will need to be prepared by the Contractor. PUNCH will need to ensure that adequate supervision and monitoring is provided throughout the works particularly during the excavation and demolition stages.

To this end, PUNCH will have an on-going role during the works on site to ensure that the works are being carried out generally in accordance with our design and specification.

Access onto the site will be from Fortfield Road and must be coordinated in a sensible manner to minimise disruption to the adjoining residents and the traffic the public roads.

Stage 1: Site set-up

- Erect a fully enclosed hoarding/fencing (full details to be determined by the contractor) along the site boundaries along Fortfield Road (west), along Lakelands Park (east), along Terenure College (south), along Terenure College Rugby Football Club (northeast), and along residential dwellings on Greenlea Road (north).
- The services within the site should be identified and isolated as necessary. All below ground obstructions should also be removed to allow the works to progress.
- Monitoring points should be installed to all neighbouring structures and infrastructure and a base reading should be taken prior to any demolition, excavation or construction works starting on the site.

Stage 2: Bulk excavation

- Continue excavating once the capping beam and the concrete piles have reached the necessary concrete strengths as per their respective detailed design. Excavate down to the required basement formation level with strict excavation control so the formation level is not exceeded.
- The removal of material as a result of the bulk excavation must be removed from site in accordance with the Waste Management Plan.
- Necessary monitoring will be completed during the basement excavation at suitable frequencies to be determined by the Contractor.

Stage 3: Excavate/Construct Substructure Foundations

- Local excavations and construction of pad foundations within the basement extents.

Stage 4: Construct Basement Slab

- Following the completion of the bulk excavations and localised substructure works, concrete blinding is to be placed as required prior to the placement of basement slab reinforcement as per the detailed design and RC details.

- The RC ground bearing basement slab is to be cast using the required concrete as per the detailed design, ensuring required waterproofing details are provided.
- When the slab is sufficiently cured the basement slab will act as a permanent prop to the perimeter retaining walls.

Stage 5: Construct Basement Perimeter Walls

- The basement perimeter walls will be constructed with standard two-sided formwork, which will be temporarily propped off the basement slab.
- The required waterproofing details will be provided on the perimeter wall, as well as within the perimeter basement wall at construction joints.

Stage 6: Construct Ground Floor/Podium Slab

- The ground floor and podium slabs will be constructed from RC elements. The construction of same will require temporary propping off the basement slab.

Stage 7: Backfill Excavation

- Upon adequate completion of the ground floor slab, the backfilling of the external areas of excavated basement will commence.
- The backfilling will be undertaken by installation of appropriately graded and compacted stone with required landscaping/finishes installed thereafter.

3.4.7 Damage Impact Assessment

A Damage Impact Assessment of the neighbouring structures will be completed based on the classifications given in Table of 6.4 of CIRIA report C760 (formally C580) and informed by the results of on-going site investigations.

These classifications, which have been extracted and shown in Table 3-5 below, are based on method of damage assessment outlined by Burland et al (1977), Boscardin and Cording (1989) and Burland (2001).

Table 3-5: Table 6.4 of CIRIA C760: Classification of visible damage to walls (after Burland et al, 1977, Boscardin and Cording, 1989, and Burland, 2001).

Category of damage	Description of typical damage (ease of repair is underlined)	Approximate crack width (mm)	Limiting tensile strain, ε_{lim} (%)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible	<0.1	0.0 to 0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection	<1	0.05 to 0.075
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	<5	0.075 to 0.15

3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable lining. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired	5 to 15 or a number of cracks >3	0.15 to 0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Services pipes disrupted	15 to 25, but also depends on number of cracks	>0.3
5 Very severe	This requires a major repair, involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	Usually >25, but depends on numbers of cracks	

Note: Highlighted 'Negligible' classification of typical damage as it applies to the Fortfield Road LRD.

The description of typical damage anticipated to neighbouring property is rated as 'Negligible'. The basement extents and the associated zone of influence are effectively remote from all boundary structures as illustrated in PUNCH Drawings 222102-PUNCH-XX-XX-DR-C-0130 and 222102-PUNCH-XX-XX-DR-C-0131 and as described in Section 3.4.4 above.

For context, the distance from the zone of influence extents (assuming the more onerous 30 degree angle of response) to the site boundaries is as follows:

- Distance to rear of footpath on Fortfield Road = 22.0m
- Distance to northern boundary wall = 53.98m
- Distance to eastern boundary wall = 46.60m
- Distance to southern boundary wall = 11.42m

3.4.8 Monitoring of Ground Movements

The predictions of ground movements at planning stage are considered preliminary and are subject to the detailed design solutions implemented at construction stage (i.e. rigidity of wall, quality of construction and installation techniques, groundwater control measures, finalized bearing pressures from permanent works etc.).

As outlined in Section 3.4.3 the construction of the proposed basement will consist of an 'open cut' bulk excavation with no requirement for temporary supports. The 'Zone of Influence' associated with this excavation does not extend to any existing structures or adjacent properties. In fact, the 'Zone of Influence' has a large offset to the site boundaries as illustrated in PUNCH Drawings 222102-PUNCH-XX-XX-DR-C-0130 and 222102-PUNCH-XX-XX-DR-C-0131.

Given the distance of the basement's Zone of Influence and existing structures, specifically the boundary wall along the site's southern and northern boundaries, ground movement modelling has not been undertaken as the risk of ground movement is considered negligible.

Similarly, the anticipated Category of Damage is 0 'Negligible' as the Zone of Influence is remote from any existing structures.

It is recommended that condition surveys of adjacent existing structures should be carried out before and after the proposed works. The precise monitoring strategy will be developed at a later stage, and it will be subject to discussions and agreements with the owners of the adjacent properties and structures.

At a minimum, Tell-Tale monitors will be placed in agreed locations on any pre-existing cracks to monitor movement in the boundary structures. Tell-Tales consist of two plates which overlap for part of their length. One plate is calibrated in millimetres and the overlapping plat is transparent and marked with a hairline cursor. As the crack width opens or closes, one plate moves relative to the other and the relationship of the cursor to the scale represents the amount of movement occurring. Movement of 0.1mm can be recorded on such monitors. Tell-Tale monitoring will be recorded by the Main contractor on a periodic basis and issued for review during the site clearance, excavation and basement construction phases.

Contingency measures will be implemented if movements of the adjacent structures exceed predefined trigger levels as noted above. Both contingency measures and trigger levels will need to be developed within a future monitoring specification for the works. Any breaches will be reported to DCC's Environment and Transportation Department by the Contractor.

3.4.9 Monitoring of Vibration

There are two varieties of criteria for vibration: 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).

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, piling is typically tolerated at vibration levels up to 5mm/s. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night.

Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard BS 7385 -2:1993: Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration, and;
- British Standard BS 5228-2:2009: Code of practice for noise and vibration control on construction and open sites

We would recommend that vibration from construction activities be limited to the values set out in the guidance documents above. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution.

To ensure that there is no structural damage to nearby structures due to the ground borne vibrations generated by the rock breaking works, the Control and Mitigation Measures that will be implemented on this site during the rock excavation works include:

i. The specification of vibration limits experienced on the nearby structures due to the basement excavation and construction works
ii. Preparation of a traffic light alerting system (red, orange, green) with a trigger action plan developed should these limits be exceeded.

iii. Continuous vibration monitoring of the existing southern boundary wall shall be carried out. The monitored structures shall be at representative locations along its length at 3 no. locations. Monitoring shall be carried out by an independent specialist monitoring company.

iv. The allowable transient vibration during the works (in terms of peak particle velocity in mm/s) at the closest foundation of any building structure will be limited to the values set out in the table below.

Table 3-6: Table B.2 BS5228-2:2009 Transient vibration guide values for cosmetic damage

Line (see Figure B.1)	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
2	Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

NOTE 1 Values referred to are at the base of the building.

NOTE 2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

v. The vibrations shall be continuously monitored at the site boundary and shall be reviewed on a daily basis by an independent instrumentation specialist to ensure that the trigger limits have not been exceeded. A daily report shall be submitted by the specialist to the Contractor summarising the results. A traffic light alerting system and a trigger action plan shall be development and immediately implemented should the vibration limits exceed the specified tolerances. If the vibration limits are exceeded the Contractor shall cease the works and shall review and modify the excavation methodology, equipment and techniques employed to formulate an excavation method that would produce lower vibrations that are within the vibration limits at the structures. Monitoring of vibrations readings will be done remotely, i.e. no physical access to the structures is expected to be required except for initial installation and final removal of the monitoring equipment.

vi. The above control measures shall be included in the Contract Specification.

Any breaches of vibration limits will be reported to DCC's Environment and Transportation Department by the Contractor.

3.5 Surface Flow and Flooding

The site is not indicated as being at risk from fluvial or coastal flooding. There is a pluvial flood risk, but the proposed stormwater network augmentation included in the development will fully mitigate this pre-existing pluvial flooding. Please refer to the PUNCH Report "Site-Specific Flood Risk Assessment" included in the original planning application documentation. Following a review of CFRAM mapping, and the hydraulic modelling of the pond, and on the basis of pluvial flood mitigation measures being implemented, PUNCH Consulting Engineers concluded that that the proposed residential dwellings will be located in Flood Zone C following the implementation of flood mitigation measures as part of the wider development works to address and mitigate the existing pluvial flood risk. Refer to the Site-Specific Flood Risk Assessment included in the planning application documentation for details and illustration.

Table 3-7 provides the evidence used to answer the surface water flow and flooding screening/scoping potential impacts.

Table 3-7: Responses to Surface Water Flow and Flooding Potential Impacts.

Ref.	Potential Impact	Evidence
i.	Is the site located in flood prone lands?	The site contains Flood Zone A and B extents as illustrated in DCC's Strategic Flood Risk Assessment (SFRA). However, Section 2.24 of the OPW's "The Planning System and Flood Risk Management Guidelines" states that "..flood zones are determined on the basis of the probability of river and coastal flooding only..". This point is echoed in Section 1.4.1 of the DCC Development Plan 2022-2028 SFRA report. As pluvial flooding should not be used in the designation of flood zones, and in the absence of any identifiable fluvial or coastal flood risk to the site, it is concluded that the proposed development site is wholly located in Flood Zone C. To alleviate concerns relating to pluvial flooding at the site, the associated pluvial flow paths and flood volumes were examined. A proposal has been developed, in direct consultation with DCC, to address the pluvial flooding on Fortfield Road, which includes the provision of a detention basin within the proposed development site boundary. Refer to the Site-Specific Flood Risk Assessment included in the planning application documentation.
ii.	Will the proposed development result in a change in the proportion of hard surface/paved area?	The proposed development (including basement construction) will result in an increase of hard surfaced/paved areas. The existing site consists of brownfield, consisting of former sports pitches. As part

Ref.	Potential Impact	Evidence
		of the development proposals, SuDS measures are to be implemented as outlined in the Engineering Planning Report – refer to original planning application documentation. SuDS measures include extensive green roofs, permeable paving, bioretention areas and intensive landscaped areas.
iii.	Will the proposed development result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	The discharge of surface water from the development will be improved through the application of SuDS measures including attenuation of discharge from the site to a rate of 9.2l/s as detailed in the Engineering Planning Report and Engineering Drawings.

3.6 Cumulative Effects

Table 3-8 provides the evidence used to answer the cumulative screening/scoping potential impacts.

Table 3-8: Responses to Cumulative Potential Impacts.

Ref	Potential Impact	Evidence
i.	Is there a cumulative risk associated with introducing a new basement structure in the locality?	As outlined in Section 1.5.11.6.1, there are no basement structures in the immediate vicinity of the site that would introduce a cumulative impact.

3.7 Construction Related Impacts

Table 3-9 provides the evidence used to answer the construction stage screening/scoping potential impacts.

Table 3-9: Responses to Construction Stage Potential Impacts.

Ref	Potential Impact	Evidence
i.	Description of any required temporary works to be provided.	Temporary works consisting of installation of a piled secant wall is required. No ground anchors outside of the site footprint are proposed.
ii.	Impacts of bulk excavations on adjacent structures to be assessed.	The resulting impacts will be assessed through a detailed ground movement assessment, including a Damage Impact Assessment of neighbouring sensitive structures.

Ref	Potential Impact	Evidence
iii.	Appropriate method statements/management plans illustrating consideration of good management and mitigation of construction impacts associated with basement construction.	An 'Outline Construction Management Plan' has been prepared for this planning application. Refer to these documents for details of: • Provision for phasing of the works • Provision for site management, safety, and supervision. • A method statement detailing the proposed method of ensuring the safety and stability of neighbouring properties and land throughout the construction phase. • Provision to monitor movement of structures and land. • Provision to monitor groundwater levels and alerts to be raised as required. • Appropriate mitigation measures to be detailed if these limits are reached or exceeded e.g. to prevent occurrence of ground movement. • Proposed site working hours. • Management of noise, vibration and dust.

3.8 Temporary Works

No temporary works (i.e. no ground anchors or props are required) are required to facilitate the construction of the proposed basement as the construction of the basement will consist of an open-excavation wholly within the private site extents.

3.9 Heritage and Biodiversity Impacts

According to Dublin City Council there are 2 no. existing protected structures (Catholic Church of Saint Pius X, College Drive and Terenure College, Dublin 6W) are located between approx. 225m and 125m from the development site. Therefore, heritage impacts arising from the proposed basement construction are not relevant given the remote relative locations.

The development site is currently brownfield, consisting of former sports pitches with a limited biodiversity value. Please refer to the Ecological Impact Assessment report prepared by Altemar - included in the planning submission – for details of biodiversity impacts associated with the proposed development.

3.10 Land Use

The basement is integral to the proposed residential development by providing the required car, cycle parking provision and plant to serve the residential apartment complex. The intended use of the basement is therefore appropriate and in the interests of the proper planning and sustainable development of the area. The environmental sustainability of the proposal has been considered as outlined in the environmental assessments included in the planning submission.

4 Outline Basement Construction Management Plan

4.1.1 Overview

The sides of an excavation will move to some extent regardless of how they are supported. The movement will typically be both horizontal and vertical and will be influenced by the engineering properties of the ground, groundwater level and flow, the efficiency of the various support systems employed, and the efficiency or stiffness of any support structures used.

The development will include a single level of basement. The proposed basement will accommodate parking, plantroom, and water tanks. The basement will extend to a depth ranging between 2.70m below existing ground levels.

The construction of the basement will involve the excavation of the basement footprint and immediate surrounds to enable construction of an RC foundation slab with thickenings coinciding with column locations. The building will be formed on piles or pad foundations. The basement perimeter wall will consist of RC construction. To allow the basement wall construction, a battered excavation will be provided around the full perimeter of the proposed basement carefully considering all associated site constraints.

The permanent works basement structure will comprise of reinforced concrete (Typically 300mm thick slab and wall). The permanent basement walls will resist the horizontal pressures from ground water in the permanent condition and provide permanent required waterproofing to the basement, with external waterproofing details installed where required. The retaining wall will also be designed to support all soil and surcharge pressures in the permanent condition.

Reinforced concrete will be also used for the floor slabs. The load bearing foundation elements will be supported by an arrangement of reinforced concrete pad footings. These pad footings will be constructed integral with the basement slab. This form of construction will result in a full monolithic basement structure. It is anticipated that the floor slabs, which will act as permanent props, will be constructed with the basement slab level first with the subsequent transfer slab installed at Ground Floor level.

4.1.2 Construction Sequence

The following sequence of operations has been derived to enable analysis of the ground movements around the basement, both during and after construction, and is based on drawings provided by the Architect and C&S Engineer.

The proposal is to construct the basement with an open excavation with battered slopes. The slope of battered soil will be dictated and designed by the soil stability properties as noted in the results of the site investigation testing. A typical section of the proposed basement construction is shown in Figure 4-1 below.

The construction sequence is expected to follow a traditional sequence of:

1. Excavate to the proposed formation level of the basement (c. 2.70 BGL) with allowance for working space and battered excavation slopes.
2. Construct the permanent works basement substructure in the following sequence:
    a) Construct basement floor slab, including thickenings and pad foundations
    b) Construct RC perimeter walls and associated thickenings
    c) Construct ground floor/podium slab level
3. Backfill excavation to rear of perimeter basement walls

Essentially the sequence may be considered as three groups of activities, the first comprising the short-term ‘open cut’ bulk excavation, the second consisting of the installation of the basement structure permanent works and the third represents the backfilling of the open excavation.

The detail of the permanent structure will be developed by PUNCH Consulting Engineers and an agreed methodology developed with the chosen contractor(s) once appointed.

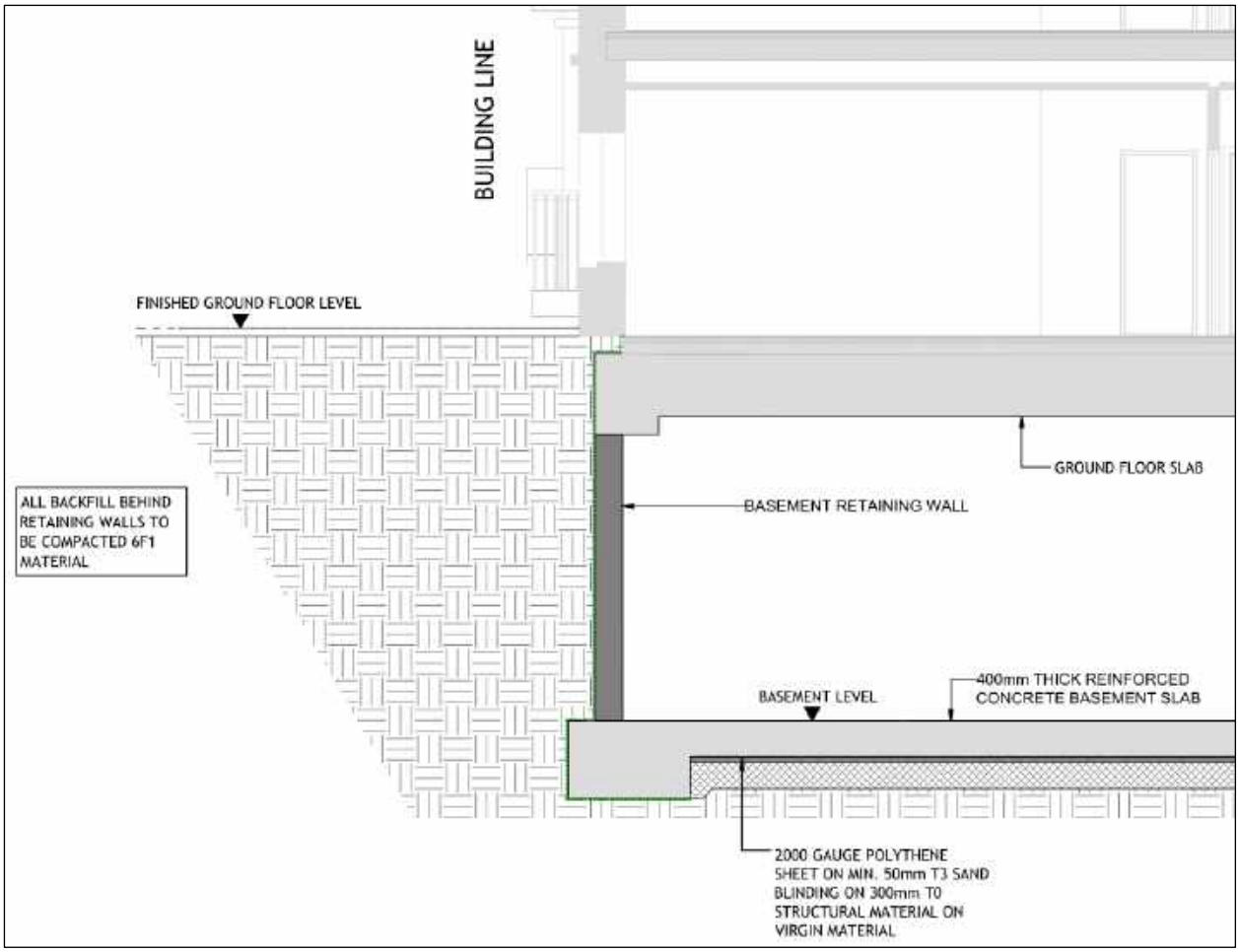


Figure 4-1: Proposed Basement Section

4.1.3 Temporary Support to Basement Perimeter Walls

No additional support will be required to the proposed perimeter wall systems. The pile walls will be designed with no requirement for propping or installation of ground anchors.

4.1.4 Permanent Works

When the final excavation depth has been reached the permanent works will be formed which, which will comprise 300mm thick reinforced concrete walls. The proposed basement will be defined as Grade 2 in accordance with definitions of BS 8102: 2022 'Code of practice for the protection of below ground structures against water from the ground'.

Reinforced concrete will be used for the basement floor slab. It is anticipated that the floor slabs, which will act as permanent props, will be constructed basement slab level first with the subsequent transfer and podium slabs installed at Ground Floor level.

4.1.5 Basement Construction

It is assumed that the above measures and assumed sequence of works are considered in the eventual design and construction of the proposed works.

Detailed method statements and calculations for any enabling and temporary works will need to be prepared by the Contractor. Adequate supervision and monitoring by the Contractor and independent monitoring specialist is required throughout the works particularly during the excavation and demolition stages.

To this end, PUNCH will have an on-going role during the works on site to ensure that the works are being carried out generally in accordance with our design and specification.

Access onto the site will be from Fortfield Road and must be coordinated in a sensible manner to minimise disruption to the adjoining residents and the traffic the public roads.

Stage 1: Site set-up

- Erect a fully enclosed hoarding/fencing (full details to be determined by the contractor) along the site boundaries along Fortfield Road (west), along Lakelands Park (east), along Terenure College (south), along Terenure College Rugby Football Club (northeast), and along residential dwellings on Greenlea Road (north).
- The services within the site should be identified and isolated as necessary. All below ground obstructions should also be removed to allow the works to progress.
- Monitoring points should be installed to all boundary structures and a base reading should be taken prior to any demolition, excavation or construction works starting on the site.

Stage 2: Bulk excavation

- Continue excavating once the capping beam and the concrete piles have reached the necessary concrete strengths as per their respective detailed design. Excavate down to the required basement formation level with strict excavation control so the formation level is not exceeded.
- The removal of material as a result of the bulk excavation must be removed from site in accordance with the Contractor's approved Waste Management Plan.
- Necessary monitoring will be completed during the basement excavation at suitable frequencies to be determined by the Contractor.

Stage 3: Excavate/Construct Substructure Foundations

- Local excavations and construction of pad foundations within the basement extents.

Stage 4: Construct Basement Slab

- Following the completion of the bulk excavations and localised substructure works, concrete blinding is to be placed as required prior to the placement of basement slab reinforcement as per the detailed design and RC details.
- The RC ground bearing basement slab is to be cast using the required concrete as per the detailed design, ensuring required waterproofing details are provided.
- When the slab is sufficiently cured the basement slab will act as a permanent prop to the perimeter retaining walls.

Stage 5: Construct Basement Perimeter Walls

- The basement perimeter walls will be constructed with standard two-sided formwork, which will be temporarily propped off the basement slab.
- The required waterproofing details will be provided on the perimeter wall, as well as within the perimeter basement wall at construction joints.

Stage 6: Construct Ground Floor/Podium Slab

- The ground floor and podium slabs will be constructed from RC elements. The construction of same will require temporary propping off the basement slab.

Stage 7: Backfill Excavation

- Upon adequate completion of the ground floor slab, the backfilling of the external areas of excavated basement will commence.
- The backfilling will be undertaken by installation of appropriately graded and compacted stone with required landscaping/finishes installed thereafter.

5 Impact Assessment and Mitigation

5.1 BIA Conclusion

A Basement Impact Assessment has been carried out following the policy information and guidance published by Dublin City Council (Appendix 9 of the Dublin City Development Plan 2022 – 2028 "Basement Development Guidance").

It is concluded that the proposed development is unlikely to result in any specific groundwater flow issues, land or slope stability issues, surface water flow /flooding issues, cumulative effect issues or construction related issues that cannot be mitigated by the proper implementation of appropriate mitigation measures and best practise in the design and construction of the proposed basement.

5.2 Non-Technical Summary of Evidence

This section provides a short summary of the evidence acquired and used to form the conclusions made within the BIA.

5.2.1 Screening

Table 5-1 provides the evidence used to answer the groundwater screening/scoping potential impacts.

Table 5-1: Responses to Groundwater Potential Impacts.

Ref.	Potential Impact	Site Investigation Conclusions
i	The site is located directly above an aquifer	Dark grey medium strong to very strong fine grained, medium to thinly bedded Limestone bedrock underlies the overburden on site and forms the main groundwater aquifer in the area. The GSI bedrock aquifer map of the area as shown in the figure below classifies the limestone bedrock as a Locally Important Aquifer – Bedrock which is Moderately Productive in Local Zones.
ii	The proposed basement will extend beneath the water table surface.	As outlined in Section 1.6.1, there are no basement structures in the immediate vicinity of the site that would introduce a cumulative impact.
iii	Is the site within 100m of a watercourse, well or potential spring line?	The site is located within 100m of open drainage pond. Although this body of water, being a manmade structure is not hydraulically linked to the local groundwater regime. The activities on site will not encounter the underlying bedrock, as such it is envisaged that there will be no impact on the underlying groundwater.

Table 5-2 provides the evidence used to answer the stability screening/ scoping potential impacts.

Table 5-2: Responses to Stability Potential Impacts.

Ref.	Potential Impact	Evidence
i.	Does the site include steep slopes, natural or manmade?	The existing site does not include any significant slopes, natural or manmade. The site is relatively flat throughout its extents.
ii.	Does the development propose to introduce any significant reprofiling of the site?	There are no proposals as part of the development to introduce any re-profiling or introduction of slopes within the site on a permanent basis. To allow the basement construction, a temporary battered excavation will be provided around the full perimeter of the proposed basement carefully considering all associated site constraints.
iii.	Will any tress be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained.	No trees are to be felled as a result of the proposed basement construction. There are no tree protection zones associated with the proposed basement extents.
iv.	The site is located directly above an aquifer.	Dark grey medium strong to very strong fine grained, medium to thinly bedded Limestone bedrock underlies the overburden on site and forms the main groundwater aquifer in the area. The GSI bedrock aquifer map of the area as shown in Figure 1-12 classifies the limestone bedrock as a Locally Important Aquifer – Bedrock which is Moderately Productive in Local Zones
v.	The proposed basement will extend beneath the water table surface.	As outlined in Section 1.6.1, there are no basement structures in the immediate vicinity of the site that would introduce a cumulative impact
vi.	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties	Founding depth for the proposed development (basement) will be approximately 2.70 m BGL and will be deeper relative to neighbouring properties. As outlined in Section 3.4.4, the 'Zone of Influence' associated with the basement excavation does not extend to any existing structures or adjacent properties. The 'Zone of Influence'- whether indicated by a 45 or 30 degree angle of repose - has a large

Ref.	Potential Impact	Evidence
		offset to the site boundaries meaning that any differential depth of foundations relative to neighbouring properties does not represent an impact given the offset distances.
vii.	Is the site within 100m of a watercourse, well or potential spring line?	The site is located within 100m of open drainage pond. However, this body of water is a man-made structure and is not hydraulically linked to the local groundwater regime. The activities on site will not encounter the underlying bedrock, as such it is envisaged that there will be no impact on the underlying groundwater.
viii.	The site is bounded to the west by Fortfield Road and to the east by Lakelands Park. The site also adjoins Terenure College to the south, Terenure College Rugby Football Club to the northeast and the rear of residential dwellings on Greenlea Road to the north.	The investigation has not indicated any specific problems, such as weak of unstable ground that would make working in close proximity of public infrastructure/ developments problematic at this site. As can be seen in Figure 1-1 the basement extent is not located directly adjacent to these public infrastructure/ developments.

5.2.2 Scoping and Site Investigations

The questions in the screening stage that there were answered 'yes', were taken forward to a scoping stage and the potential impacts discussed in Sections 3 of this BIA report.

It is noted that site specific site investigations informed the Basement Impact Assessment.

Ground investigations have been carried out, which has allowed an assessment of the potential impacts of the basement development on the various receptors identified from the screening and scoping stages. Principally the investigation aimed to establish the ground conditions, including the groundwater level and the engineering properties of the underlying soils to enable suitable design of the basement development.

The findings of the site investigations are discussed in Section 2 of this BIA report.

5.2.3 Impact Assessment

Section 5 of this report summarises whether, on the basis of the findings of the investigation, the potential impacts still need to be given consideration and identifies ongoing risks that will require suitable engineering mitigation. Section 5 of this report also provides recommendations for the design of the proposed development.

It is concluded that the proposed development is unlikely to result in any specific groundwater flow issues, land or slope stability issues, surface water flow /flooding issues, cumulative effect issues or

construction related issues that cannot be mitigated by the proper implementation of appropriate mitigation measures and best practise in the design and construction of the proposed basement.

5.3 Outstanding Risks and Issues

This section of the report aims to highlight areas where further work is required where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive but covers the principal areas where additional work may be required.

The ground generally consists of topsoil at the surface. The subsurface is composed of soft to firm sandy slightly gravelly SILT/CLAY to circa 1.00 mbgl. This is underlain by firm to stiff, sandy gravelly CLAY/SILT to between 3.40-3.80 mbgl. The subsurface is composed of stiff to very stiff, sandy gravelly CLAY below 3.80 mbgl. This was then underlain by dark grey medium strong to very strong fine grained, medium to thinly bedded Limestone. It is noted that variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the ground conditions based on the discrete points at which the ground was sampled, but the ground conditions should be subject to review as the work proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

The investigation has not identified the presence of contamination. However, the appointed Contractor will be responsible for all waste arisings from the time the waste is generated until it reaches its final destination point. This includes its method of treatment/disposal. The Contractor has responsibility to ensure that all contractors managing waste on their behalf are legally compliant and technically competent and the waste itself is contained, handled, treated and disposed of in accordance with all relevant regulatory requirements.

As with any site, there is a potential for further areas of contamination to be present within parts of the site not covered by the investigation it is recommended that a watching brief is maintained during any groundworks for the proposed new foundations and that if any suspicious soils are encountered that they are inspected by a waste contamination specialist and further assessment may be required.

The detailed design proposals should be developed with due regard to this Basement Impact Assessment. Once the detailed design proposals have been finalised, they should be reviewed to check adherence to the principles outlined in this BIA. If any deviation is required, this should be identified and identified by the nominated Contractor and presented to DCC's Environment and Transportation Department for discussion and agreement as part of the required post-planning engagements.

These outstanding risks (inherent in any construction activity) should be drawn to the attention of prospective contractors and further investigation will be required (e.g. more detailed contamination testing grid for the excavated basement volume) or sufficient contingency should be provided to cover the outstanding risks.

6 Non-Technical Summary

This non-technical summary is provided in addition to Section 5.2 above.

1. The site is a brownfield site of approximately 4.56 hectares in area and is located at Fortfield Road, Terenure, Dublin 6W, and currently consists of playing fields and an open artificial drainage pond.
2. The site is bounded to the west by Fortfield Road and to the east by Lakelands Park. The site also adjoins Terenure College to the south, Terenure College Rugby Football Club to the northeast and the rear of residential dwellings on Greenlea Road to the north.
3. The construction of the basement will involve the excavation of the basement footprint and immediate surrounds to enable construction of an RC foundation slab with thickenings coinciding with column locations. The building will be formed on piles or pad foundations. The basement perimeter wall will consist of RC construction. This wall provides a waterproof seal around the basement and cuts off the groundwater within the basement in the general area.
4. To allow the basement wall construction, a battered excavation will be provided around the full perimeter of the proposed basement carefully considering all associated site constraints.
5. The 'Zone of Influence' associated with this excavation does not extend to any existing structures or adjacent properties. In fact, the 'Zone of Influence'- whether indicated by a 45 or 30 degree angle of repose - has a large offset to the site boundaries as illustrated in PUNCH Drawings 222102-PUNCH-XX-XX-DR-C-0130 and 222102-PUNCH-XX-XX-DR-C-0131.
6. The basement construction removes local contamination and therefore does not place the groundwater at undue risk but removes that potential risk by excavation of any contaminated material within the basement and below ground water level.
7. A full range of monitoring shall be put in place within a Construction Management Plan which shall be submitted in full to Dublin City Council by the appointed contractor prior to the works commencing.

Appendix A Architect Layouts

a) **Ground Floor Plan**
b) **Basement Plan**

a. Ground Floor Plan

01 PROPOSED SITE PLAN - GROUND FLOOR
1:500@A1

LEGEND

- 1 / PP-01 — DRAWING NUMBER / SHEET REFERENCE
- +00.00m — SPOT ELEVATION
- FFL — FINISH FLOOR LEVEL
- SITE BOUNDARY
- ROAD WORKS WITHIN COUNCIL OWNERSHIP
- ROAD WORKS WITHIN SDCC ADMINISTRATIVE AREA. SUBJECT TO SEPARATE PLANNING APPLICATION
- DUAL ASPECT APARTMENT
- STUDIO
- 1 BED APARTMENT
- 2 BED APARTMENT
- 3 BED APARTMENT
- RESIDENTS AMENITY AREA
- ART&CULTURE SPACE

KEY PLAN

- FOR DETAILS OF EXTERNAL WORKS REFER TO XXX
- FOR DETAILS OF LANDSCAPING REFER TO XXX
- FOR DETAILS OF EXTERNAL FINISHES AND MATERIALS REFER TO XXX
- FOR DETAILS OF EXTERNAL LIGHTING REFER TO XXX
- FOR DETAILS OF DRAINAGE REFER TO ENGINEER'S DRAINAGE DRAWING

PLANNING STAGE

Notes :

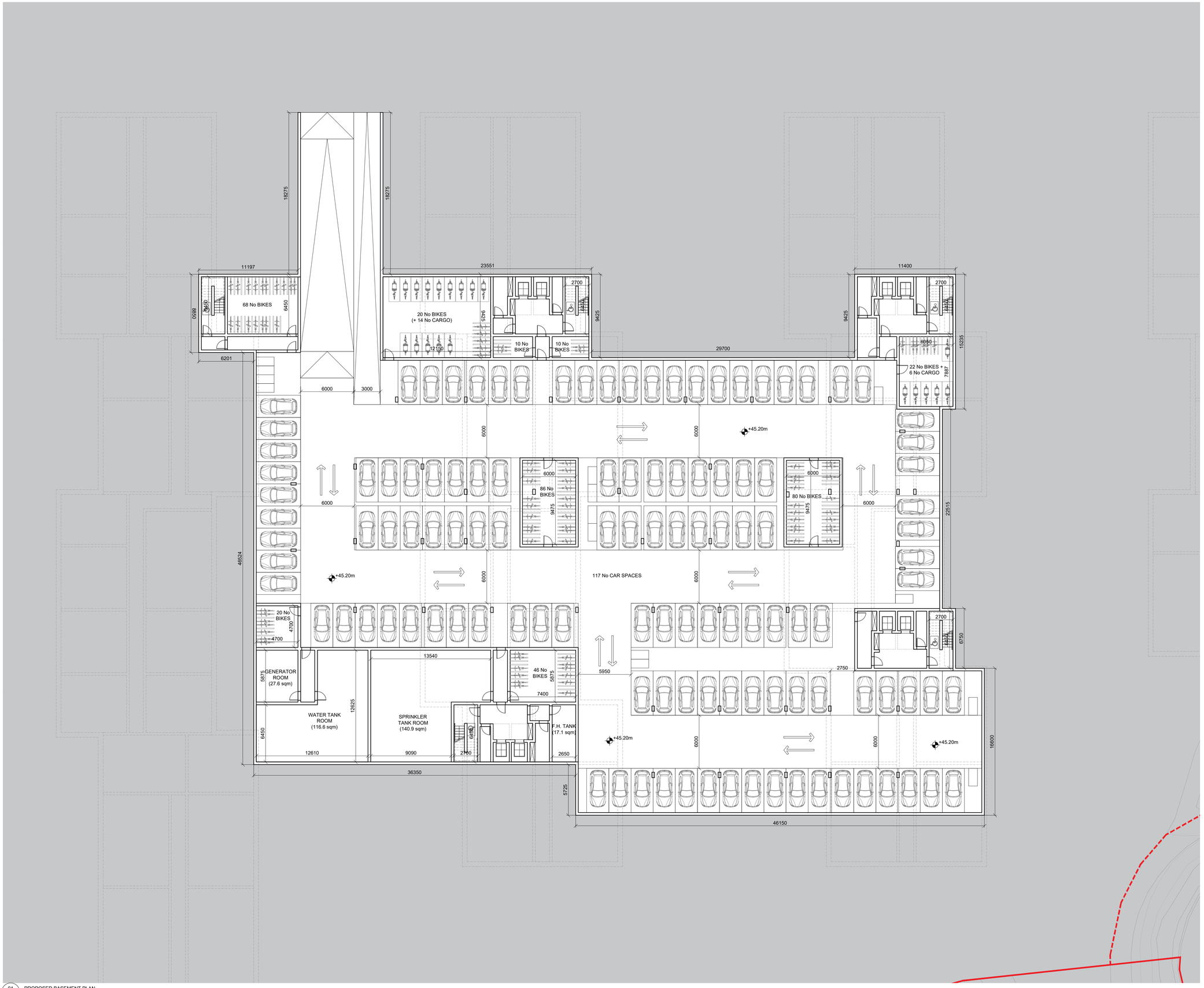
- ALL LEVELS (IN METERS) RELATE TO ORDONANCE DATUM.
- DIMENSIONS IN MILLIMETERS. FIGURED DIMENSIONS ONLY TO BE USED. DO NOT SCALE FROM DRAWING.
- ALL DIMENSIONS TO BE CHECKED ON SITE WITH THE ARCHITECT TO BE NOTIFIED OF ANY DISCREPANCIES.
- DRAWINGS FOR PLANNING PURPOSES ONLY. NOT TO BE USED FOR CONSTRUCTION.
- ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BUILDING REGULATION.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT STRUCTURAL ENGINEERS AND M&E ENGINEERS DRAWING AND SPECIFICATIONS.

Revision	Date	Description

Drawing Title : PROPOSED SITE PLAN - GROUND FLOOR		Rev.: -	Drawing No.: PP-101
Date : 09.08.2024	Scale : 1:500@A1	Drawn by : FS	Checked by : ML
Project Title : FORTFIELD ROAD, TERENURE, D6W			Job No. : 2202

URBAN AGENCY
29-31 William Street South, D02 EF22 Ireland
T: 01 672 5907
E: dublin@urban-agency.com

b. Basement Plan



01 PROPOSED BASEMENT PLAN
1:200@A1

LEGEND

1 / PP-01 — DRAWING NUMBER / SHEET REFERENCE

+00.00m — SPOT ELEVATION

FFL — FINISH FLOOR LEVEL

SITE BOUNDARY

ROAD WORKS WITHIN COUNCIL OWNERSHIP

ROAD WORKS WITHIN SDCC ADMINISTRATIVE AREA. SUBJECT TO SEPARATE PLANNING APPLICATION

KEY PLAN

- FOR DETAILS OF EXTERNAL WORKS REFER TO XXX
- FOR DETAILS OF LANDSCAPING REFER TO XXX
- FOR DETAILS OF EXTERNAL FINISHES AND MATERIALS REFER TO XXX
- FOR DETAILS OF EXTERNAL LIGHTING REFER TO XXX
- FOR DETAILS OF DRAINAGE REFER TO ENGINEER'S DRAINAGE DRAWING

PLANNING STAGE

Notes :

- ALL LEVELS (IN METERS) RELATE TO ORDONANCE DATUM.
- DIMENSIONS IN MILLIMETERS. FIGURED DIMENSIONS ONLY TO BE USED. DO NOT SCALE FROM DRAWING.
- ALL DIMENSIONS TO BE CHECKED ON SITE WITH THE ARCHITECT TO BE NOTIFIED OF ANY DISCREPANCIES.
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- ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BUILDING REGULATION.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT STRUCTURAL ENGINEERS AND M&E ENGINEERS DRAWING AND SPECIFICATIONS.

Revision	Date	Description

Drawing Title : PROPOSED BASEMENT PLAN		Rev.: -	Drawing No.: PP-200
Date : 28-08-2024	Scale : 1:200@A1	Drawn by : FS	Checked by : ML
Project Title : FORTFIELD ROAD, TERENURE, D6W			Job No. : 2202

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Appendix B Historical Mapping

Appendix C Site investigations (SI) Exploratory Hole Location Plans

ExpertGPS

24013 Fortfield Road, Terenure

25 0 25 50 75 100 125 150 175 200 225 250 m

Scale: 1 : 1400.

MN 1°58'

Appendix D Site Investigations (SI)

a) **Historical SI adjacent to the Proposed Development Site**
b) **SI Report for the Proposed Development Site**

a. Historical SI adjacent to the Proposed Development Site

DODDER BRIDGE, TEMPLEOGUE

SITE INVESTIGATION

Report No. 1015

Box No. 48

Investigation ID. 63089 – 63094 (6)

DODDER BRIDGE, TEMPLEOGUE

SITE INVESTIGATION

AUTHORITY:

On the instructions of De Leuw, Chadwick and O heocha, Consulting Engineers, a site investigation was carried out at the location of a proposed bridge across the Dodder River. This bridge is to carry the extension of Springfield Avenue across the river at Templeogue, Dublin.

SCOPE:

The investigation was to include the sinking of boreholes, the taking of soil, rock and ground-water samples, the carrying out of insitu and laboratory soil mechanics tests and the preparation of a report on the sub-soil conditions with respect to the foundations of the proposed bridge.

FIELD WORK:

Six boreholes were sunk at the locations shown on the plan.

Work on the site commenced at borehole 6 where the shell and auger rig was used. Two attempts were made to sink casing but in each case it was knowed badly off the vertical by boulders in the gravel layer. The gravel layer was then penetrated by hand digging and inserting the casing and backfilling round the casing when boulder clay was reached. Boring continued using the shell and auger rig until rock was encountered when the rotary diamond drill

In borehole 5 and 7 the rotary diamond drill was used from the surface.

In borehole 3 the shell and auger rig was used from the surface, the diamond drill being used when rock was encountered.

Disturbed jar samples of the soil strata were obtained as well as representative undisturbed samples of the cohesive soil.

The borehole logs show the strata encountered, the samples taken, the core recovery in the diamond drilling and the levels at which ground-water was encountered, if any.

LABORATORY WORK:

On the receipt of the disturbed jar samples at the laboratory, the samples were accurately described and where applicable the moisture contents were measured. These moisture contents are given on the appropriate borehole logs.

Undrained triaxial tests were carried out on the four undisturbed samples at cell pressures of 5, 15 and 30 lbs per square inch. Consolidation tests were also carried out on samples cut from two of these undisturbed samples at equivalent loadings of $\frac{1}{4}$, $\frac{1}{2}$, 1, 2 and 4 tons per square foot. The data obtained from the triaxial and consolidation tests is given on the test summary sheet.

The sample of ground-water taken from borehole 1 was analysed and found to have a pH of 7.75 and a soluble sulphate content of 6 parts per 100,000.

DISCUSSION:

The site is underlain at relatively shallow depths by rock. This rock is composed of carboniferous limestone and calciferous sandstone. These two rocks appear in layers over the site. It

Rock was encountered at the following depths:

B.H. No.	O.D. of ground	Depth to rock	O.D. rock surface	Type of rock at upper surface.
1	152	7.0 feet	145	Carboniferous limestone
3	151	9.0 "	142	Calciferous sandstone
4	154	6.0 "	148	Carboniferous limestone
5	142	0 "	142	Carboniferous limestone
6	157	20.0 "	137	Calciferous sandstone
7	157	16.0 "	141	Calciferous sandstone

At borehole 5 in the river the rock was showing at ground surface.

At boreholes 1, 3, 6 and 7 the rock was overlain by a stiff boulder clay which was a friable brown clayey sandy silt containing some gravel. This was overlain to the surface in boreholes 1, 3, 6 and 7 by compact sandy gravel containing boulders. This gravel immediately overlay the rock in borehole 4.

On the Springfield Avenue side of the river the abutment will be founded on carboniferous limestone which was found at elevations of 145 and 148 at boreholes 1 and 4 respectively. A pier in the river at borehole 5 will also be on carboniferous limestone.

The stiff boulder clay found in boreholes 3, 6 and 7 has an allowable bearing capacity in excess of 4 tons per square foot.

If an abutment 90 feet long by 10 feet wide and loaded to 1.5 tons per square foot is founded along the line of boreholes 3, 6 and 7 at an elevation of 149 then the calculated settlement at borehole 3 would be 0.36 inches, at borehole 7 it would be 0.64 inches and at borehole 6 it would be 0.43 inches. The time for completion of 90% settlement in each case would be some 2 months.

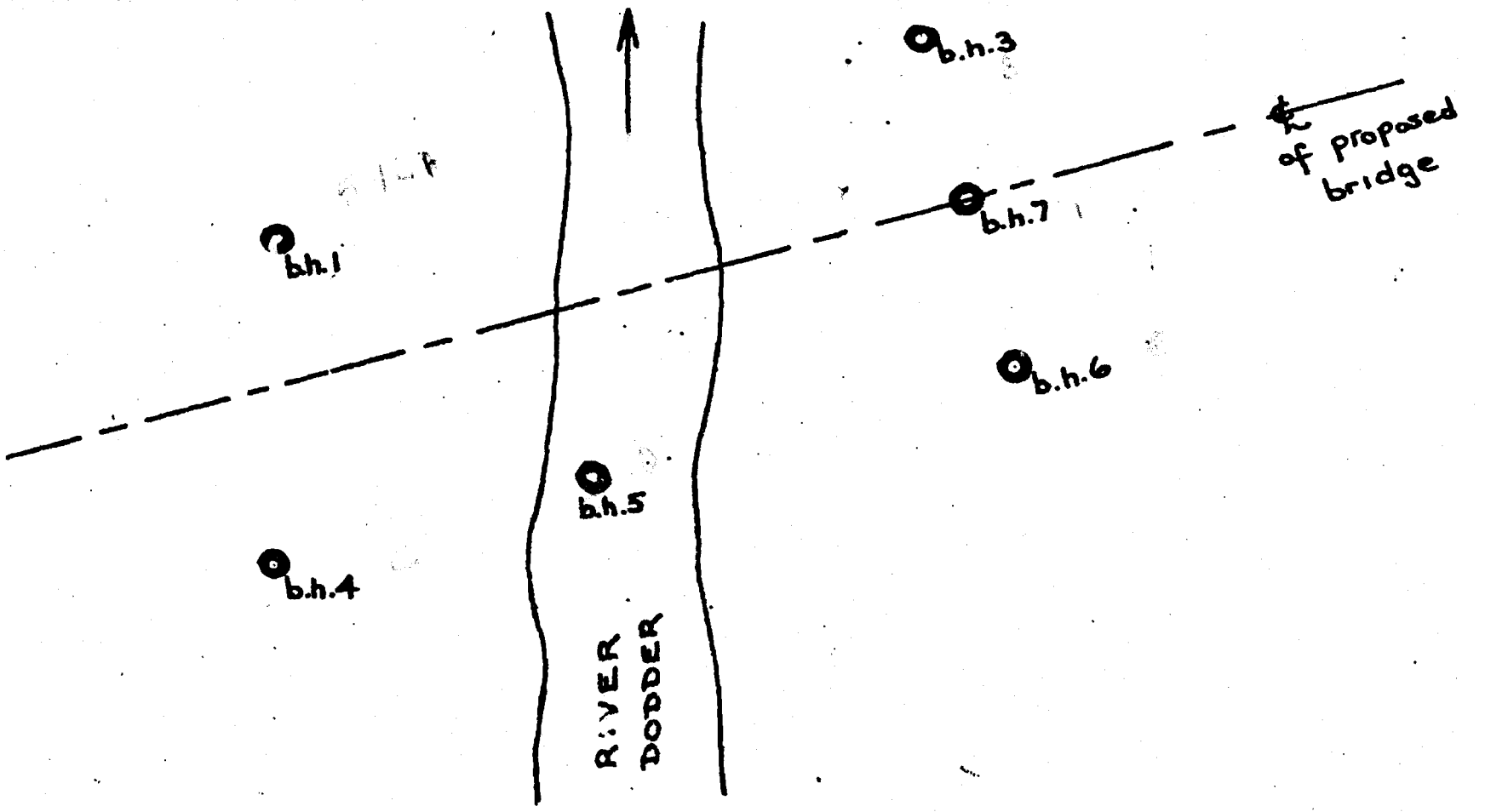
It would therefore seem to be reasonable that the abutment at boreholes 3, 6 and 7 be founded in the boulder clay.

No special precautions need be taken to protect buried concrete from chemical attack.

Respectfully submitted
for and on behalf of

GLOVER SITE INVESTIGATIONS LTD.

H. R. CAMERON,
B.Sc.,P.Eng.,M.I.C.E.,M.Inst.H.E.



PROPOSED DODDER BRIDGE

LOCATION OF BOREHOLES

Scale 1:500

GLOVER SITE INVESTIGATIONS LTD.

SUMMARY OF TEST RESULTS

Job: DE LEUW, CHADWICK AND O hEOCHA **Site:** DODDER BRIDGE, TEMPLEOGUE **Sheet No.** 1

Bore No.	DEPTH	DESCRIPTION	TRIAXIAL COMPRESSION TEST						CONSOLIDATION TEST		
			Lateral Pressure (p. s. i.)	Compression strength (p. s. i.)	Density (lbs./ft. 3)	% Moisture Content	Cohesion p.s. ft.	Angle of Friction (degrees)	Pressure Range (tons/ft. 2)	Coefficient of Consolidation (ft. 2/yr.)	Coefficient of Compressibility (ft. 2/ton)
3	3.0	Stiff friable brown clayey sandy [illegible] with some gravel	5	60.1							
			15	75.4	141	10	2550	23			
			30	92.4							
3	7.5	Stiff friable brown clayey sandy [illegible] with some gravel	5	55.2					0 - 0.25	142	0.0087
									0.25 - 0.5	149	0.0073
			15	63.7	140	9	2600	19	0.5 - 1.0	137	0.0064
									1.0 - 2.0	131	0.0052
			30	78.4					2.0 - 4.0	126	0.0041
6	10.5	Stiff friable brown clayey sandy [illegible] with some gravel	5	60.1							
			15	74.8	142	10	2400	25			
			30	94.6							
6	17.5	Stiff friable brown clayey sandy [illegible] with some gravel	5	68.0					0 - 0.25	127	0.0076
									0.25 - 0.5	132	0.0069
			15	85.4	141	9	2700	26	0.5 - 1.0	125	0.0055
									1.0 - 2.0	119	0.0042
			30	108.2					2.0 - 4.0	117	0.0032

63080

GLOVER SITE INVESTIGATIONS LIMITED

CONTRACT NAME DODDER BRIDGE, TEMPLEOGUE REPORT NO.

CLIENT DE LEUW, CHADWICK, O hEOCHA ADDRESS B

BOREHOLE NO. 3 LOCATION As Plan

BOREHOLE DIA 8" and NX WATER STRUCK None

METHOD OF BORING Shell & Auger and Diamond Drill STANDING WATER LEVEL .....

GROUND LEVEL 151 approx. .....

REMARKS: Overcoming obstructions in boulders 2½ hours. 10½ hours rock drilling. Total obstruction time 13 hours

Description of Strata	Depth	Disturbed Samples	m/c (%)	* W.L.	Daily Progress	U Cores, Vanes and S.P.T. Tests
SANDY GRAVEL	1.0	J1.0				
Very stiff friable brown clayey sandy SILT with gravel and boulders		J4.5	10			U(3.0)
	9.0'	J9.0	9			U(7.5)
CALCIFEROUS SANDSTONE	11.0'					CORE RECOVERY 80%
WEATHERED CALCIFEROUS SANDSTONE	19.0'					10%
CALCIFEROUS SANDSTONE	21.0'					75%
CARBONIFEROUS LIMESTONE						90%
END OF B.H.	29.0'	DOWN				

NOTE: 1—J. indicates Jar Sample 5—V. indicates Vane Test.

63089

GLOVER SITE INVESTIGATIONS LIMITED

CONTRACT NAME DODDER BRIDGE, TEMPLEOGUE REPORT NO. ~~63089~~ A

CLIENT DE LEUW, CHADWICK, O hEOCHA ADDRESS

BOREHOLE NO. 1 LOCATION As Plan

BOREHOLE DIA ..... WATER STRUCK 4.5' down

METHOD OF BORING Hand dug & Diamond Drill STANDING WATER LEVEL 2.0' down

GROUND LEVEL 152 approx.

REMARKS: Hand dug Pit to rock as could not penetrate boulders with boring rig. Took 8½ hours as gravel kept falling in. 7½ hours drilling rock. Total obstruction time 16 hours.

Description of Strata	Depth	Disturbed Samples	m/c (%)	* W.L.	Daily Progress	U Cores, Vanes and S.P.T. Tests
TOPSOIL	0.75					
Compact grey sandy well graded GRAVEL with boulders	5.0'	J3.0				
Stiff mottled light grey/brown clayey sandy SILT with some gravel	7.0'	J7.0	11			
Carboniferous Limestone with some veins of quartz and containing some seams of calciferous sandstone						CORE RECOVERY 80%
END OF B.H.	17.0'	DOWN				

NOTE: 1—J. indicates Jar Sample 5—V. indicates Vane Test.

63091

GLOVER SITE INVESTIGATIONS LIMITED

CONTRACT NAME DODDER BRIDGE, TEMPLEOGUE REPORT NO. C

CLIENT DE LEUW, CHADWICK, O hEOCHA ADDRESS

BOREHOLE NO. 4 LOCATION As Plan

BOREHOLE DIA NX WATER STRUCK

METHOD OF BORING Hand dug and Diamond Drill STANDING WATER LEVEL

GROUND LEVEL 154 approx.

REMARKS: Hand dug Pit to Rock as could not penetrate Boulders with Boring Rig.
Time 4½ hours. 2½ hours Rock Drilling.
Total obstruction time 7 hours.

Description of Strata	Depth	Disturbed Samples	m/c (%)	* W.L.	Daily Progress	U Cores, Vanes and S.P.T. Tests
Compact sandy GRAVEL with boulders		J3.0				
	6.0					
						CORE RECOVERY
CARBONIFEROUS LIMESTONE						80%
END OF B.H.		8.5' DOWN				

GLOVER SITE INVESTIGATIONS LIMITED 63094

CONTRACT NAME DODDER BRIDGE, TEMPLEOGUE REPORT NO.

CLIENT DE LEUW, CHADWICK, O hEOCHA ADDRESS F

BOREHOLE NO. 7 LOCATION As Plan

BOREHOLE DIA NX WATER STRUCK None

METHOD OF BORING Diamond Drill STANDING WATER LEVEL .....

GROUND LEVEL 157 approx. .....

REMARKS : Diamond Drill used from surface. Total time using drill 9½ hours.

Description of Strata	Depth	Disturbed Samples	m/c (%)	* W.L.	Daily Progress	U Cores, Vanes and S.P.T. Tests
Compact sandy GRAVEL with boulders (150)	7.5					
Stiff friable brown clayey sandy SILT with some gravel (141)	16.0					
CALCIFEROUS SANDSTONE						CORE RECOVERY 70%
END OF B.H.	20.0'	DOWN				

NOTE: 1—J. indicates Jar Sample

2—B indicates Bulk Sample

3—W. indicates Water Sample

5—V. indicates Vane Test.

6—N. indicates Number of blow per ft. penetration in the Standard penetration Test

GLOVER SITE INVESTIGATIONS LIMITED

63093

CONTRACT NAME DODDER BRIDGE, TEMPLEOGUE REPORT NO.

CLIENT DE LEUW, CHADWICK, O hEOCHA ADDRESS 6

BOREHOLE NO. 6 LOCATION As Plan

BOREHOLE DIA 8" and NX WATER STRUCK None

METHOD OF BORING Hand Dug, Shell and Auger, Diamond Drill STANDING WATER LEVEL

GROUND LEVEL 157 approx.

REMARKS: Three attempts to get this Borehole through gravel. Boulders knocked casing off line. Hand dug through gravel. Rock Drill from 20 feet. Total obstruction time 27 hours.

Description of Strata	Depth	Disturbed Samples	m/c (%)	W.L.	Daily Progress	U Cores, Vanes and S.P.T. Tests
Fine Brown SAND	2.0	J2.0				
Compact sandy GRAVEL with boulders	7.0	J7.0				
Stiff friable brown clayey sandy SILT with some gravel		J12.0	10			U(10.5)
						U(17.5)
	19.0	J19.0	9			
CALCIFEROUS SANDSTONE						CORE RECOVERY 15%
END OF B.H.		25.0'	DOWN			

NOTE: 1—J. indicates Jar Sample

2—B indicates Bulk Sample

3—W. indicates Water Sample

5—V. indicates Vane Test.

6—N. indicates Number of blow per ft. penetration in the Standard pene-

GLOVER SITE INVESTIGATIONS LIMITED

63092

CONTRACT NAME DODDER BRIDGE, TEMPLEOGUE REPORT NO.

CLIENT DE LEUW, CHADWICK, O hEOCHA ADDRESS D

BOREHOLE NO. 5 LOCATION As Plan

BOREHOLE DIA NX WATER STRUCK In River

METHOD OF BORING STANDING WATER LEVEL

GROUND LEVEL 142 approx.

REMARKS : Time drilling Rock 11 hours.

Description of Strata	Depth	Disturbed Samples	m/c (%)	* W.L.	Daily Progress	U Cores, Vanes and S.P.T. Tests
						CORE RECOVERY
CARBONIFEROUS LIMESTONE						90%
END OF B.H.	10.0'		DOWN			

NOTE: 1—J. indicates Jar Sample

2—B indicates Bulk Sample

5—V. indicates Vane Test.

6—N. indicates Number of blow per ft. penetration in the Standard pene-

b. SI Report for the Proposed Development Site

IGSL Limited

Punch Consulting Engineers

Fortfield Road, Terenure

Geotechnical Report

Report No. 24013

May 2022

Report

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Project: Fortfield Road, Terenure

Project No. 24013

Revision	**Date**	**Title**		
Rev 0	31/05/2022	Ground Investigation Report		
	Copies	Document Format	Prepared By	Reviewed By
		PDF	Brian Green Chartered Engineer	David Green Chartered Engineer
	To	Punch Consulting Engineers		
Revision	**Date**	**Title**		
Rev 1				
	Copies	Document Format	Prepared By	Reviewed By
			David Green Chartered Engineer	Brian Green Chartered Engineer
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			

TABLE OF CONTENTS

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 meantime, 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 Punch Consulting Engineers 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.

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

It is proposed to develop a site in Fortfield Road, Terenure. The site lies to the rear of existing houses in Greenlea Road.

An investigation of ground conditions was undertaken to ascertain the soil stratification and condition.

Fieldwork for this investigation entailed the following:

- Boreholes were constructed in 6 locations, using light cable tool techniques.
- Rotary techniques were employed at each borehole location to ascertain the presence, depth, composition and condition of bedrock to the scheduled depths.
- Trial pits were excavated in 4 locations to permit close examination and sampling of the upper soils.
- Infiltration tests were performed in 4 locations to assess the suitability of the sub-soils for soakaway purposes

This report presents an assessment of the ground conditions with respect to the proposed development.

2.0 Ground Conditions

2.1 Boreholes

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

Location	Soft/firm brown sandy gravelly clay	Stiff dark brown sandy gravelly clay	Dense grey - black sandy clayey gravel	Stiff/very stiff black sandy gravelly clay
BH01	0.00 to 2.50	2.50 to 3.60	3.60 to 6.10	
BH02	0.00 to 1.50	1.50 to 3.50		3.50 to 4.20
BH03	0.00 to 2.50	2.50 to 5.90		
BH04	0.00 to 2.50	2.50 to 4.20		4.20 to 5.80
BH05	0.00 to 2.50	2.50 to 3.80		3.80 to 5.30
BH06	0.00 to 1.50	1.50 to 4.50		4.50 to 6.40

Table 1

All six boreholes encountered brown sandy gravelly clay in a soft or soft to firm condition, present to depths ranging from 1.5 metres (BH02 and BH06) to 2.5 metres (remaining boreholes). In all locations these deposits were underlain by stiff dark brown sandy gravelly clay. While BH03 was terminated in this material at a depth of 5.9 metres, BH04, BH05 and BH06 recorded a transition to black sandy gravelly clay in a stiff to very stiff condition. In BH01, the black deposits were coarser, classifying as sandy clayey gravel.

While a slow ingress of water was observed at a depth of 3.6 metres in BH05, all other holes remained dry.

2.2 Rotary Drilling and Coring

Rotary techniques were employed at each borehole location to ascertain the depth, composition and condition of bedrock. Open hole "Symmetrix" drilling techniques were used to penetrate the overburden soils, identifying the soil type from the flush returns. On the first indications of bedrock, coring techniques were employed.

The records include a detailed description of the bedrock including the rock structure, strength, and degree of weathering. In accordance with BS 5930: 2015, the records include the total core recovery (TCR), solid core recovery (SCR) and the rock quality designation (RQD). Also shown graphically is the fracture spacing.

Standard Penetration Tests (SPTs) were undertaken within overburden and also within completely weathered bedrock.

The bedrock was identified as dark grey medium strong to very strong fine grained, medium to thinly bedded Limestone. Total core recovery was 100% while solid core recovery was variable. At the end of drilling, water was present in the coreholes at depths ranging from 2.9 metres to 8.2 metres. However, these depths do not represent the standing water levels. The standpipe readings in Table 3 provide a more accurate indication of the groundwater profile.

Location	Depth of open hole drilling	Weathered Rock	Rock Coring	Standpipe (SP)	Ground water depth (m bgl)
RC01	11.00		11.0 to 14.5	SP	2.90
RC02	8.00	7.8 to 8.0	8.0 to 11.0	SP	3.20
RC03	7.50	7.2 to 7.5	7.5 to 12.5		5.20
RC04	7.50	7.1 to 7.5	7.5 to 13.5		3.20
RC05	9.00	8.55 to 9.00	9.0 to 14.0	SP	8.20
RC06	9.00	8.70 to 9.0	9.0 to 14.0	SP	3.80

Table 2

Standpipe	Standpipe Depth	Depth to water (m bgl)	
	(m bgl)	27/04/2022	09/05/2022
BH/RC 01	14.5	1.7	1.9
BH/RC02	8.0	2.1	2.1
BH/RC05	9.0	1.3	1.2
BH/RC06	14.0	2.2	2.0

Table 3

2.3 Trial Pits

Trial pits were excavated in four locations to facilitate close examination of the upper soils. The trial pit records are enclosed in Appendix 3.

While the soils encountered in the trial pits were described as sandy gravelly clays, there were notable variations in the soil condition.

TP01 encountered brown sandy gravelly clay in a soft to firm condition to a depth of 1.1 metres where it became firm. The soil was described as firm to stiff from 2.4 metres to the excavated depth of 3.0 metres.

TP02 encountered firm grey-brown sandy gravelly clay from 0.7 metres to 2.4 metres where the soil condition was described as stiff to very stiff.

The condition of the soil in TP03 was described as firm to a depth of 1.5 metres where it became firm to stiff. The condition of the soil in TP04 was described as firm to a depth of 2.0 metres. Water ingress below this depth resulted in water-softened spoil, belying its true in-situ condition, which was through to be firm / stiff. Water ingress at 2.0 and 2.8 metres resulted in instability of the pit sides.

2.4 Infiltration Test

The infiltration tests were 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, and records taken of the fall in water level against time. This procedure is repeated twice more to ensure saturation of the sub-soils. Normally the results for the final stage of testing, following the saturation periods, are used for soakaway design purposes. The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second.

In tests SA01 and SA03 there was no measurable fall in water level over the test period of 60 minutes.

In tests SA02 and SA04 very slow infiltration rates were recorded

3.0 Laboratory Testing (Geotechnical)

3.1 Particle Size Distributions

Grading curves were obtained for selected samples. The results show that the samples were well-graded, with fines values ranging from 6% to 34%. For practical reasons cobbles and boulders were omitted from the test specimens.

3.2 Index Properties

The results of plastic and liquid limit tests were used to classify the sub-soils. The majority of results fell within the CL zone of the plasticity chart.

3.3 Chemical analysis

The results of chemical testing showed low concentrations of soluble sulphates.

3.4 Rock Testing

3.4.1 Uniaxial Compression Tests

Uniaxial compression tests were performed on intact lengths of rock, in accordance with ASTM standards. The specimens are prepared as right circular cylinders with a length to diameter ratio of 2.0 to 2.5, and the ends are saw cut and ground to eliminate irregularities. The load is applied through a hydraulic ram and the compressive strength is defined as the load at failure divided by the cross-sectional area.

The specimens recorded UCS values of 60MPa to 89MPa, classifying the rock strength as strong.

3.4.2 Point Load Tests

The Point Load Index Test provides a rapid, and accurate, strength index from rock fragments unlike the Uniaxial Compression test (UCS) which requires careful preparation of intact lengths of core. The test specimen is compressed between two cones loaded from a hydraulic hand pump. The core fails due to the tensile forces over the diametral area between the points. The strength at failure is expressed as the point load index Is. For purposes of comparison the Is values are corrected to give the equivalent strength for a 50 mm diameter specimen. This is the I_{s50} value. From research by several workers relationships have been formulated, relating the Is values to UCS.

The results of the point load tests were mostly in the range 3 to 6 MPA, equating to UCS values ranging from 60 to 120 MPa, thereby classifying the rock strength as strong to very strong.

4.0 Laboratory Testing (Environmental)

Environmental testing was scheduled on selected soil samples in order to screen for inherent contamination and to assess their suitability for disposal to an inert landfill.

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.

5.0 Discussion

The investigation revealed layers of sandy gravelly clay which have the appearance of glacial till. The stiff to very stiff black deposits in which some of the boreholes were terminated are typical of basal till, known locally as Black Boulder Clay. The overlying material has a dark brown coloration, indicative of weathering. The near-surface soils have been subjected to more intense weathering, resulting in a significant loss of strength.

By the use of rotary drilling and coring techniques, intact limestone bedrock was encountered at depths ranging from 7.5 metres to 11.0 metres.

5.1 Structural Foundations

The borehole findings suggest that the heavily weathered soils are present to depths ranging from 1.5 metres to 2.5 metres. The variable condition, and limited bearing resistance of these deposits is also reflected in the trial pit findings.

These factors would tend to preclude the use of the upper soils for founding purposes.

The underlying stiff dark brown gravelly clay is relatively incompressible, and will support foundation pressures of approximately 150 kN/m^2. However, the depth to these deposits will necessitate the use of trench fill techniques to anticipated depths of between 1.5 and 2.5 m BGL. Monitoring of excavations will be important to ensure that the stiff gravelly clay is reached. A major consideration will be the effect of groundwater ingress on trench stability (see Section 5.2).

While the very stiff black gravelly clay will support pressures of 200kN/m2 to 250kN/m^2, the depth to this material would tend to preclude direct construction of foundations.

To obtain a more accurate resistance profile consideration can be given to dynamic probing when the exact location of each structure has been established. In addition, trial excavations would be beneficial in assessing the practicality of using trench-fill techniques.

Where excavation to the depth of competent soil is deemed impractical or uneconomical, the alternative is to found the structure on piles, supported by the stiff gravelly clay or underlying bedrock.

Where piles are taken to bedrock, the designers should be cognisant of the variations in bedrock condition and structure.

5.2 Groundwater and Trench Stability

While temporary excavations within gravelly clay soils could be expected to remain stable in the short-term, any water ingress is likely to cause some instability (as evident in trial pit TP04).

Provision should therefore be made for trench control measures as required. The initial standpipe readings as shown in Table 3 indicate that the depth to water can rise to 1.2 metres below existing ground level.

It is strongly recommended that regular monitoring of standpipes remains ongoing until construction commences. Readings should also be taken after periods of heavy rainfall to determine the effect of prolonged precipitation on the groundwater table.

5.3 Infiltration

The field tests showed no fall, or little fall, in water level. It is likely, therefore, that design of a soakaway system will be impractical. It will, therefore, be necessary to discharge storm water to an existing surface water system, using attenuation techniques to regulate the flow.

5.4 Chemical Attack on Buried Concrete

The results of Sulphate and pH testing showed very low Sulphate (maximum of 0.047 g/l $SO_4$and near-neutral pH levels (8.8 to 9.20).

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.

5.5 Disposal of Excavated Soils to Landfill

The results of the RILTA Suite have been used by O'Callaghan Moran to carry out a full Waste Characterisation Assessment (WCA) of any soils destined for landfill. This assessment determines whether or not the soils are hazardous in advance of being dispatched to landfill.

The WCA also provides recommendations as to the appropriate waste receptors (landfills) for the tested soils.

Appendix 1 Borehole Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,282.32 E 729,796.37 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.46	**BOREHOLE DEPTH (m)**	6.10
		DATE COMMENCED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		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	Soft to firm dark brown sandy SILT/CLAY with occasional fine gravel									
1					AA175560	B	1.00		N = 11 (2, 3, 3, 2, 3, 3)	
2					AA175561	B	2.00		N = 7 (3, 3, 2, 2, 1, 2)	
			44.96	2.50						
	Stiff dark brown sandy gravelly CLAY									
3					AA175562	B	3.00		N = 16 (4, 4, 3, 4, 5, 4)	
			43.86	3.60						
	Medium dense to dense grey/black fine to coarse sandy silty/clayey GRAVEL									
4					AA175563	B	4.00		N = 30 (4, 5, 5, 7, 8, 10)	
5					AA175564	B	5.00		N = 28 (5, 6, 6, 6, 7, 9)	
			41.36	6.10					N = 50/150 mm (7, 8, 17, 33)	
6	Obstruction End of Borehole at 6.10 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.5	4.8	1	
6	6.1	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH02**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,311.17 E 729,739.05 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	48.11	**BOREHOLE DEPTH (m)**	4.20
		DATE COMMENCED	13/04/2022
		DATE COMPLETED	13/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		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	Soft dark brown sandy SILT/CLAY		47.31	0.80						
1	Firm dark brown/grey sandy SILT/CLAY with occasional gravel		46.61	1.50	AA175549	B	1.00		N = 10 (2, 2, 3, 2, 3, 2)	
2	Stiff dark brown/grey sandy gravelly CLAY				AA175550	B	2.00		N = 31 (4, 6, 6, 8, 8, 9)	
3			44.61	3.50	AA175551	B	3.00		N = 33 (5, 6, 6, 7, 9, 11)	
4	Stiff to very stiff black sandy gravelly silty CLAY with occasional cobbles and small boulders		43.91	4.20	AA175552	B	4.00		N = 50/150 mm (10, 15, 24, 26)	
5	Obstruction End of Borehole at 4.20 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.2	2.6	1	
4	4.2	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH03**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,341.17 E 729,824.72 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.26	**BOREHOLE DEPTH (m)**	4.00
		DATE COMMENCED	13/04/2022
		DATE COMPLETED	13/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
		BORED BY	W.Cahill
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Soft dark brown sandy SILT/CLAY with occasional gravel									
1					AA175553	B	1.00		N = 6 (1, 2, 1, 2, 2, 1)	
2					AA175554	B	2.00		N = 7 (2, 2, 1, 2, 2, 2)	
			44.76	2.50						
	Stiff to very stiff dark brown sandy silty gravelly CLAY with occasional cobbles and small boulders									
3					AA175555	B	3.00		N = 35 (4, 9, 11, 11, 1, 12)	
4					AA175556	B	4.00		N = 50/150 mm (22, 3, 39, 11)	
5					AA175557	B	5.00		N = 33 (8, 7, 6, 7, 10, 10)	
			41.36	5.90						
6	Obstruction End of Borehole at 4.00 m								N = 52/75 mm (25, 52)	
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.8	4	1	
5.7	5.9	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH04**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,379.39 E 729,771.58 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.71	**BOREHOLE DEPTH (m)**	5.80
		DATE COMMENCED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		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	Dark brown sandy SILT/CLAY		47.21	0.50						
1	Soft light brown sandy SILT/CLAY with occasional gravel				AA175565	B	1.00		N = 7 (2, 2, 2, 1, 2, 2)	
2					AA175566	B	2.00		N = 7 (1, 2, 2, 1, 2, 2)	
			45.21	2.50						
3	Stiff dark brown sandy gravelly silty CLAY with occasional cobbles				AA175567	B	3.00		N = 20 (3, 4, 4, 5, 5, 6)	
4					AA175568	B	4.00		N = 49 (8, 10, 10, 11, 13, 15)	
			43.51	4.20						
5	Stiff to very stiff black very gravelly sandy CLAY with some cobbles and occasional small boulders				AA175569	B	5.00		N = 50/150 mm (10, 17, 23, 27)	
			41.91	5.80						
6	Obstruction End of Borehole at 5.80 m								N = 250/75 mm (25, 250)	
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.4	4.8	1	
5.6	5.8	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH05**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,395.71 E 729,859.58 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.05	**BOREHOLE DEPTH (m)**	5.30
		DATE COMMENCED	19/04/2022
		DATE COMPLETED	19/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		46.85	0.20						
	Mottled brown sandy SILT/CLAY with occasional gravel		46.25	0.80						
1	Soft to firm dark brown sandy SILT/CLAY with some gravel and occasional cobbles				AA175570	B	1.00		N = 5 (2, 2, 1, 1, 2, 1)	
2					AA175571	B	2.00		N = 10 (2, 2, 3, 2, 2, 3)	
			44.55	2.50						
	Stiff dark brown sandy gravelly silty CLAY with occasional cobbles									
3					AA175572	B	3.00		N = 19 (3, 3, 4, 4, 5, 6)	
			43.25	3.80						
4	Very stiff grey/black sandy very gravelly CLAY with some cobbles and occasional small bouldersa				AA175573	B	4.00		N = 44/75 mm (23, 2, 44)	
5					AA175574	B	5.00		N = 40 (5, 6, 8, 11, 9, 12)	
			41.75	5.30						
	Obstruction End of Borehole at 5.30 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.9	4.1	1	
5.2	5.3	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.60	3.60	3.90	3.00	20	Slow

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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH06**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,413.31 E 729,808.88 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.49	**BOREHOLE DEPTH (m)**	6.40
		DATE COMMENCED	19/04/2022
		DATE COMPLETED	19/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		47.19	0.30						
	Light brown sandy SILT/CLAY with occasional fine gravel		46.79	0.70						
1	Firm dark brown sandy SILT/CLAY with some gravel and occasional cobbles		45.99	1.50	AA171709	B	1.00		N = 12 (2, 2, 3, 2, 3, 4)	
2	Stiff dark brown sandy gravelly silty CLAY with occasional cobbles				AA171710	B	2.00		N = 24 (4, 3, 5, 6, 6, 7)	
3			44.09	3.40	AA171711	B	3.00		N = 32 (8, 7, 5, 8, 10, 9)	
4	Stiff to very stiff dark brown sandy silty gravelly CLAY with occasional cobbles		42.99	4.50	AA171712	B	4.00		N = 40 (10, 14, 11, 11, 8, 10)	
5	Very stiff to hard grey/black sandy gravelly CLAY with some cobbles and occasional small boulders				AA171713	B	5.00		N = 75 (10, 17, 18, 21, 11, 25)	
6			41.09	6.40	AA171714	B	6.00		N = 75/225 mm (16, 17, 32, 18, 25)	
	Obstruction End of Borehole at 6.40 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.6	3.8	0.5	
4.3	4.5	1	
6.2	6.4	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

Appendix 2 Rotary Corehole Records

RC01 Box 1 of 2 – 11.00-14.00m

RC01 Box 2 of 2 – 14.00-14.50m

RC02 Box 1 of 1 – 8.00-11.00m

RC03 Box 1 of 2 – 7.50-10.50m

RC03 Box 2 of 2 – 10.50-12.50m

RC04 Box 1 of 2 – 7.50-10.50m

RC04 Box 2 of 2 – 10.50-13.50m

RC05 Box 1 of 2 – 9.00-12.00m

RC05 Box 2 of 2 – 12.00-14.00m

RC06 Box 1 of 2 – 9.00-12.00m

RC06 Box 2 of 2 – 12.00-14.00m

Appendix 3 Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	713,307.94 E 729,845.19 N
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	47.18
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
		0.30	46.88						
Soft to firm, brown, slightly sandy slightly gravelly CLAY					AA163096	B	0.70		
1.0									
Firm greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		1.10	46.08						
					AA163097	B	1.70		
2.0				1 (Seepage)					
		2.40	44.78						
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and low boulders content					AA163098	B	2.70		
3.0		3.00	44.18						
End of Trial Pit at 3.00m									
4.0									

Groundwater Conditions
Seepage flow at 2.1m

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**TRIAL PIT NO.**	**TP02**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	713,364.94 E 729,870.23 N
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	46.97
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Soft to firm, brown, slightly sandu slightly gravelly CLAY		0.40	46.57						
Firm, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		0.70	46.27		AA163099	B	1.00		
1.0									
2.0					AA163100	B	2.00		
Stiff to very stiff, grey, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		2.40	44.57						
3.0 End of Trial Pit at 3.00m		3.00	43.97		AA173101	B	3.00		
4.0									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	713,385.67 E 729,826.60 N
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	47.28
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL		0.30	46.98						
Firm, brown, slightly sandy slightly gravelly CLAY		0.50	46.78						
Firm greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles content					AA173103	B	0.80		
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		1.50	45.78		AA173104	B	1.80		
TP terminated due to many big boulders End of Trial Pit at 2.40m		2.40	44.88						

0.0 1.0 2.0 3.0 4.0

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks
TP terminated at 2.4m due to big boulders

IGSL TP LOG 24101.GPJ IGSL.GDT 1/6/22

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Firm, brown, slightly sandy slightly gravelly CLAY		0.30			AA173106	B	0.50		
Firm, greyish brown, slightly sandy very gravelly CLAY with high subangular cobbles low boulders and sandy gravel lenses content		0.70			AA173107	B	1.50		
1.0									
2.0 Firm to stiff greyish brown, sandy very gravelly CLAY with high subangular to subrounded cobbles and medium boulders content		2.00		1 (Seepage)	AA173108	B	2.50		
				2 (Slow)					
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Seepage flow at 2.0m; slow water flow at 2.8m

Stability
TP unstable from 2.0m

General Remarks

Appendix 4 Infiltration Test Results

Soakaway Design f -value from field tests

IGSL

Contract: Fortfield Road, terenure, Dublin Contract No.

Test No. SA1

Engineer PUNCH

Date: 14/04/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	
0.30	0.80	Soft to firm, brown, slightly sandy slightly gravelly CLAY	
0.80	1.50	Firm to stiff, greyish brown, slightly sandy gravelly CLAY with some	DRY
		subangular cobbles	

Notes: Sample taken at 1.0m Ref.No AA163095

Field Data

Depth to Water (m)	Elapsed Time (min)
0.800	0.00
0.800	1.00
0.800	2.00
0.800	3.00
0.800	4.00
0.800	5.00
0.800	6.00
0.800	7.00
0.800	8.00
0.800	9.00
0.800	10.00
0.800	12.00
0.800	14.00
0.800	16.00
0.800	18.00
0.800	20.00
0.800	25.00
0.800	30.00
0.800	40.00
0.800	50.00
0.800	60.00

Field Test

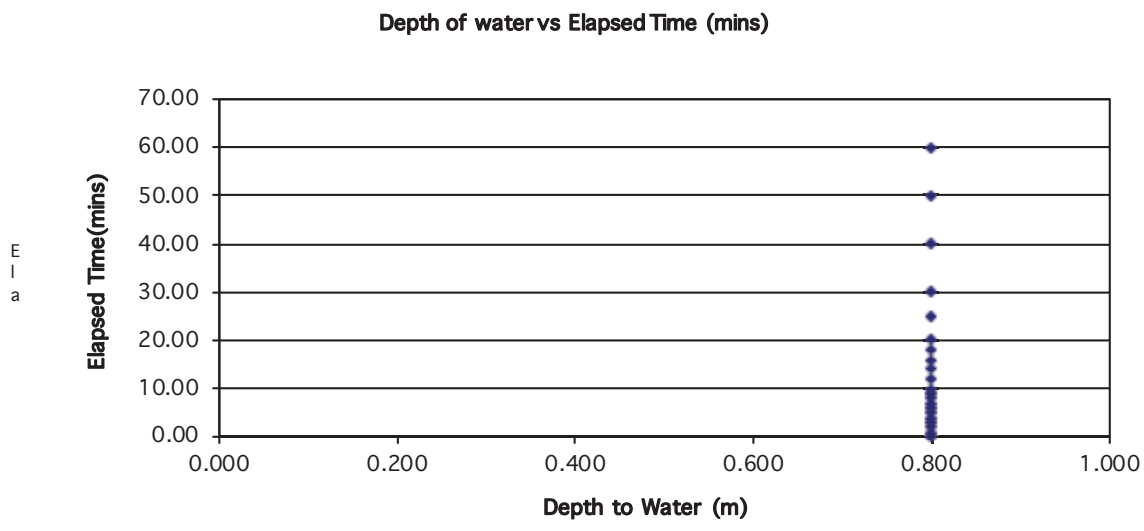
Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.80	m
Final depth to water =	0.80	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No Water Movement

Base area=	1	m2
*Av. side area of permeable stratum over test period=	3.5	m2
Total Exposed area =	4.5	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: Fortfield Road, terenure, Dublin Contract No.

Test No. SA2

Engineer PUNCH

Date: 14/04/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	Moderate water at 1.35m
0.30	0.70	Firm, brown, sandy gravelly CLAY	
0.70	1.50	Dense, grey, slightly clayey sandy fine to coarse GRAVEL (very wet)	

Notes: Sample taken at 1.0m Ref.No AA173102

Field Data

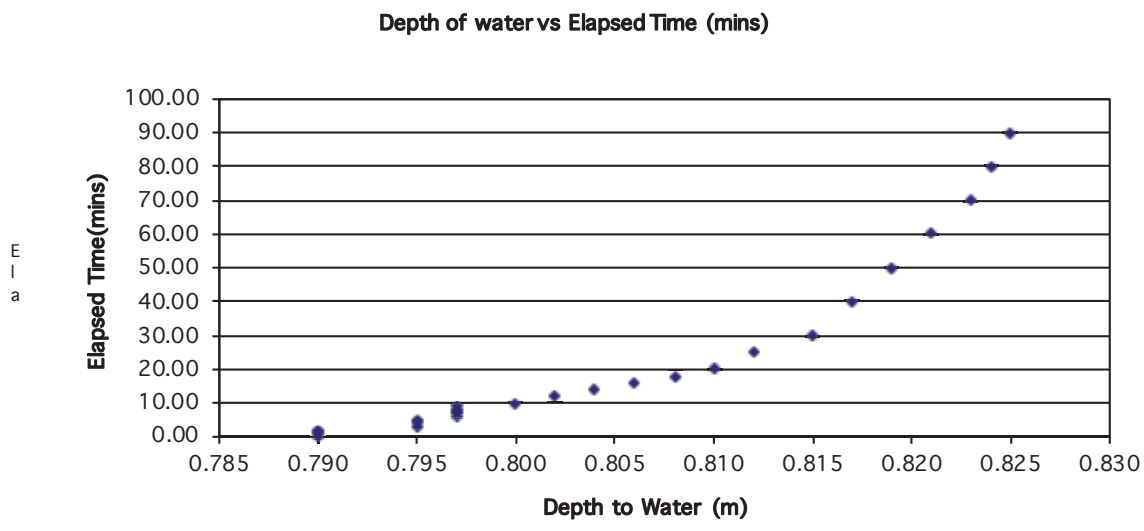
Depth to Water (m)	Elapsed Time (min)
0.790	0.00
0.790	1.00
0.790	2.00
0.795	3.00
0.795	4.00
0.795	5.00
0.797	6.00
0.797	7.00
0.797	8.00
0.797	9.00
0.800	10.00
0.802	12.00
0.804	14.00
0.806	16.00
0.808	18.00
0.810	20.00
0.812	25.00
0.815	30.00
0.817	40.00
0.819	50.00
0.821	60.00
0.823	70.00
0.824	80.00
0.825	90.00

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 =	0.825	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1	m2
*Av. side area of permeable stratum over test period=	3.4625	m2
Total Exposed area =	4.4625	m2

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

f= 8.7E-05 m/min or 1.45243E-06 m/sec



Soakaway Design f -value from field tests IGSL

Contract: Fortfield Road, terenure, Dublin Contract No.
Test No. SA3
Engineer PUNCH
Date: 14/04/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.25	TOPSOIL	
0.25	0.50	MADE GROUND (grey sandy gravelly clay, red brick pieces, cobbles)	
0.50	0.70	Firm, brown, slightly sandy slightly gravelly CLAY	Dry
0.70	1.50	Firm to stiff, greyish brown, slightly sandy gravelly CLAY with many	
		subangular cobbles	

Notes: Sample taken at 1.0m Ref.No AA173109

Field Data

Depth to Water (m)	Elapsed Time (min)
0.800	0.00
0.800	1.00
0.800	2.00
0.800	3.00
0.800	4.00
0.800	5.00
0.800	6.00
0.800	7.00
0.800	8.00
0.800	9.00
0.800	10.00
0.800	12.00
0.800	14.00
0.800	16.00
0.800	18.00
0.800	20.00
0.800	25.00
0.800	30.00
0.800	40.00
0.800	50.00
0.800	60.00

Field Test

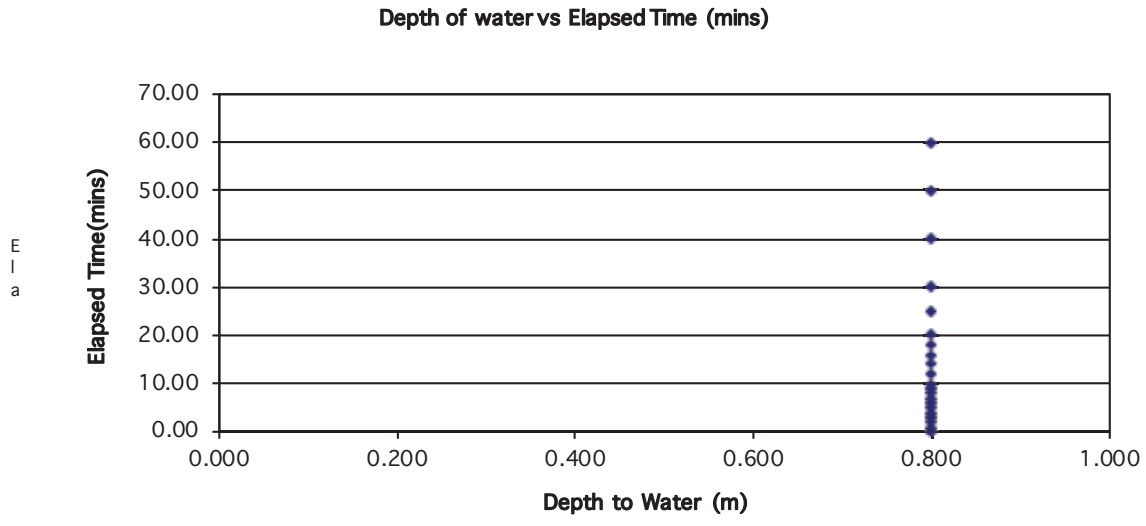
Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.80	m
Final depth to water =	0.80	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No Water movement

Base area=	1	m2
*Av. side area of permeable stratum over test period=	3.5	m2
Total Exposed area =	4.5	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: Fortfield Road, terenure, Dublin Contract No.

Test No. SA4

Engineer PUNCH

Date: 14/04/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.35	TOPSOIL	
0.35	0.50	Firm, brown, slightly sandy slightly gravelly CLAY	
0.50	0.80	Firm, greyish brown, sandy gravelly CLAY with occasional cobbles and	Dry
		sandy gravel lenses	
0.80	1.50	Fimr to stiff, greyish brown, sandy gravelly CLAY with cobbles	

Notes: Sample taken at 1.0m Ref.No AA173105

Field Data

Depth to Water (m)	Elapsed Time (min)
0.840	0.00
0.840	1.00
0.840	2.00
0.840	3.00
0.840	4.00
0.840	5.00
0.840	6.00
0.840	7.00
0.845	8.00
0.845	9.00
0.845	10.00
0.845	12.00
0.845	14.00
0.845	16.00
0.845	18.00
0.845	20.00
0.845	25.00
0.845	30.00
0.845	40.00
0.845	50.00
0.845	60.00

Field Test

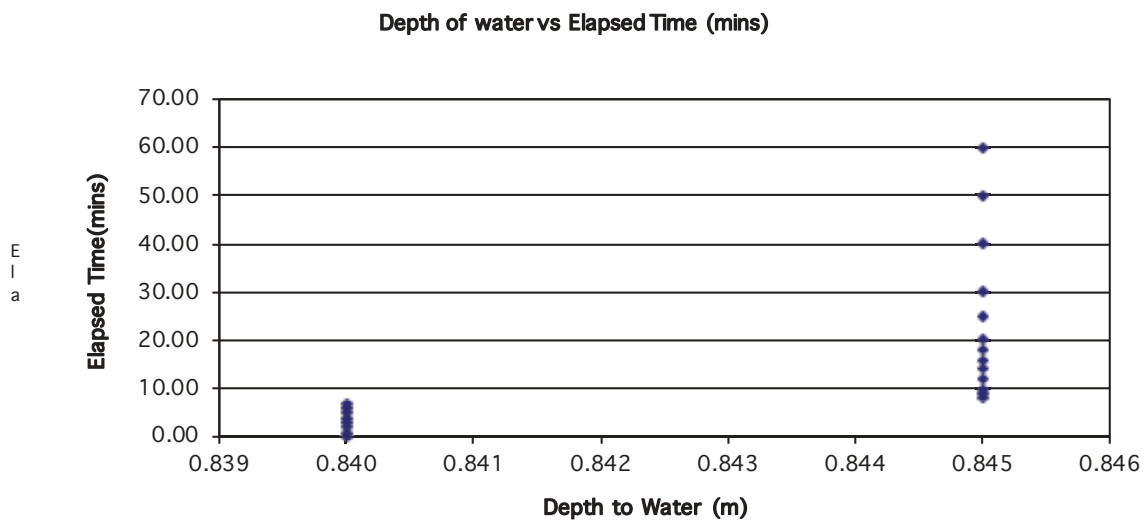
Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.84	m
Final depth to water =	0.845	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

Water movement stop at 0.845m

Base area=	1	m2
*Av. side area of permeable stratum over test period=	3.2875	m2
Total Exposed area =	4.2875	m2

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

f= 1.9E-05 m/min or 3.23939E-07 m/sec



Appendix 5 Ground Water Monitoring

Standpipe	Standpipe Depth	Depth to water (m bgl)	
	(m bgl)	27/04/2022	09/05/2022
BH/RC 01	14.5	1.7	1.9
BH/RC02	8.0	2.1	2.1
BH/RC05	9.0	1.3	1.2
BH/RC06	14.0	2.2	2.0

Appendix 6 Laboratory Test Results (Geotechnical)

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

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

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

Report No. **R133964** Contract No. 24013 Contract Name: Fortfield Road , Terenure , Dublin 6

Customer Punch C.E

Samples Received: 03/05/22 Date Tested: Various

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
BH01	AA175561	2.0	A22/2475	B	12	31	17	14	47	WS	4.4	C L	Brown sandy gravelly CLAY
BH01	AA175564	5.0	A22/2476	B	8.7		NP	NP		WS	4.4		Brown silty, sandy, GRAVEL
BH02	AA175551	3.0	A22/2477	B	12	30	16	14	45	WS	4.4	C L	Brown sandy gravelly CLAY
BH03	AA175554	2.0	A22/2479	B	12	37	18	19	46	WS	4.4	C I	Brown sandy gravelly CLAY
BH03	AA175556	4.0	A22/2480	B	8.1	31	17	14	38	WS	4.4	C L	Brown clayey, very sandy, GRAVEL with many cobbles
BH04	AA175567	3.0	A22/2481	B	12	34	16	18	73	WS	4.4	C L	Brown sandy gravelly CLAY
BH04	AA175569	5.0	A22/2482	B	13	36	16	20	55	WS	4.4	C I	Brown sandy gravelly CLAY
BH05	AA175572	3.0	A22/2483	B	14	34	15	19	49	WS	4.4	C L	Grey sandy gravelly CLAY
BH05	AA175574	5.0	A22/2484	B	11	31	14	17	55	WS	4.4	C L	Grey slightly sandy, gravelly, CLAY
BH06	AA171710	2.0	A22/2485	B	14	27	13	14	52	WS	4.4	C L	Brown sandy gravelly CLAY
BH06	AA171713	5.0	A22/2486	B	10	29	13	16	52	WS	4.4	C L	Grey slightly sandy, gravelly, CLAY with some cobbles
TP01	AA163098	2.7	A22/2487	B	11	31	14	17	53	WS	4.4	C L	Brown sandy gravelly CLAY
TP02	AA173101	3.0	A22/2488	B	9.4	29	15	14	58	WS	4.4	C L	Brown slightly sandy, gravelly, CLAY with some cobbles
TP04	AA173108	2.5	A22/2489	B	12	27	15	12	51	WS	4.4	C L	Brown sandy gravel 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
H Byrne	17/05/22	1 of 1

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	87	
28	77	
20	67	
14	59	
10	49	
6.3	38	
5	34	
3.35	29	
2	21	
1.18	14	SAND
0.6	9	
0.425	8	
0.3	7	
0.15	6	
0.063	6	SILT/CLAY

Contract No. 24013 Report No. R134012
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH01
Sample No.* AA175564 Lab. Sample No. A22/2476
Sample Type: B
Depth* (m) 5.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Brown silty, sandy, GRAVEL

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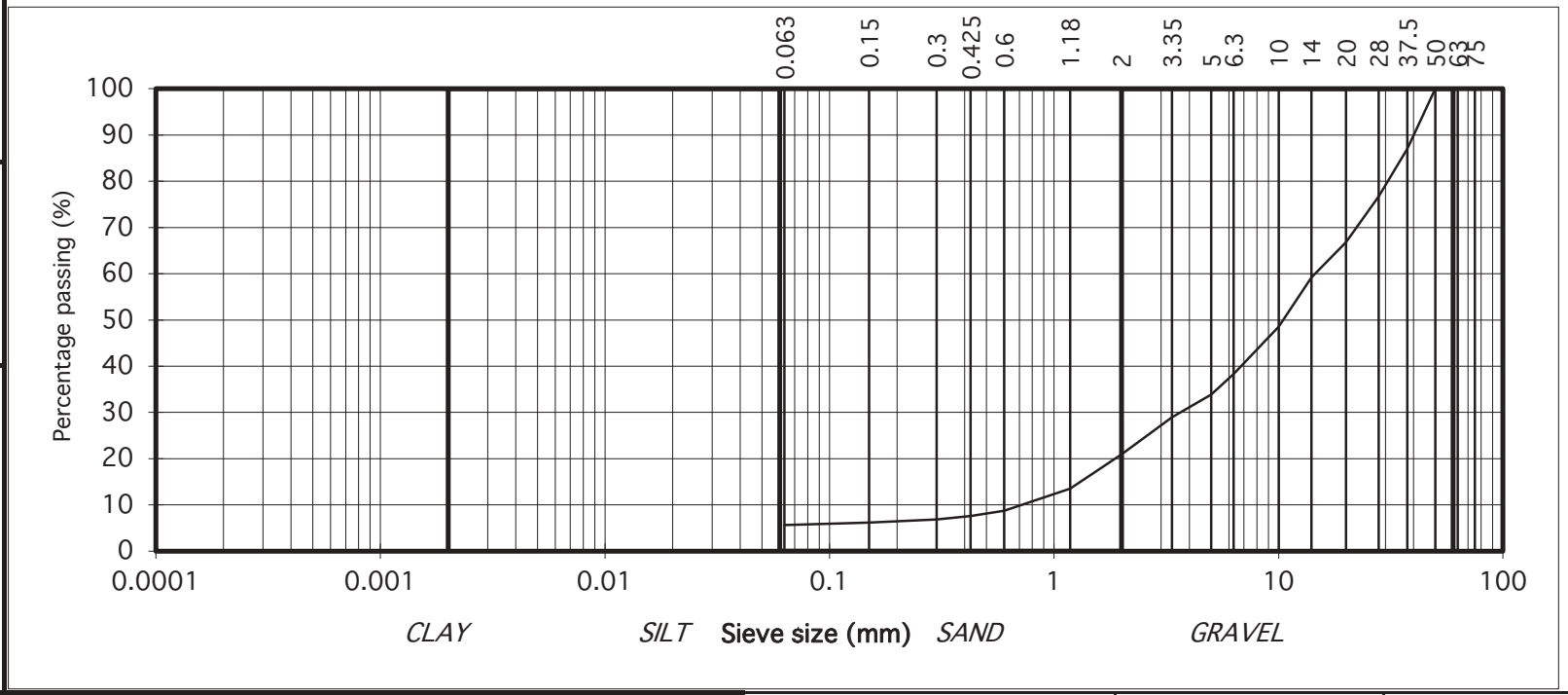

IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	18/05/22	1 of 1

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

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	84	
50	84	GRAVEL
37.5	84	
28	82	
20	77	
14	72	
10	66	
6.3	60	
5	58	
3.35	55	
2	50	
1.18	47	SAND
0.6	42	
0.425	40	
0.3	38	
0.15	34	
0.063	30	SILT/CLAY
0.037	25	
0.027	23	
0.017	20	
0.010	18	
0.007	15	
0.005	14	
0.002	11	

Contract No. 24013 Report No. R134013
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH02
Sample No.* AA175552 Lab. Sample No. A22/2478
Sample Type: B
Depth* (m) 4.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Brown slightly sandy, gravelly, SILT/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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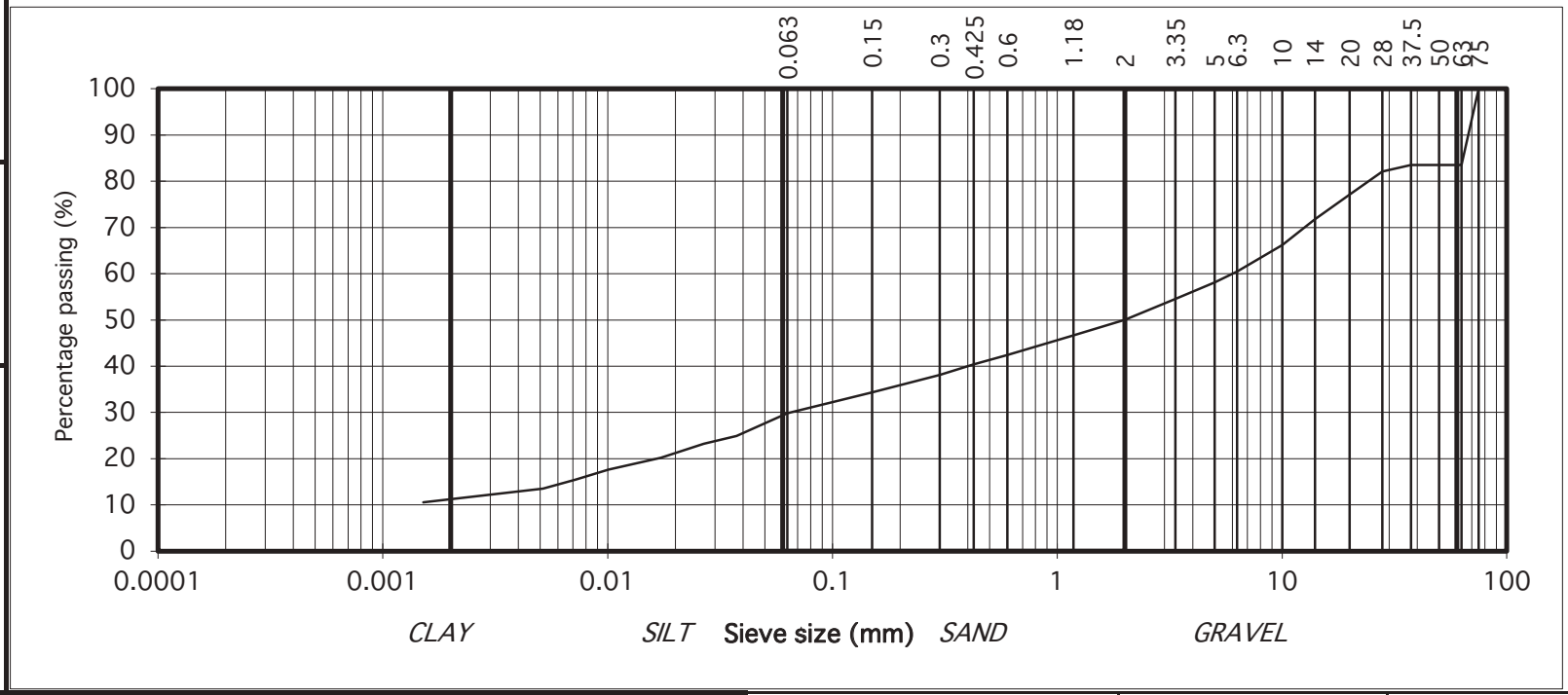

IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	18/05/22	1 of 1

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

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	77	COBBLES
63	77	
50	66	GRAVEL
37.5	60	
28	59	
20	58	
14	55	
10	53	
6.3	49	
5	47	
3.35	46	
2	42	
1.18	38	SAND
0.6	32	
0.425	30	
0.3	28	
0.15	24	
0.063	19	SILT/CLAY

Contract No. 24013 Report No. R134014
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH03
Sample No.* AA175556 Lab. Sample No. A22/2480
Sample Type: B
Depth* (m) 4.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Brown clayey, very sandy, GRAVEL with many cobbles

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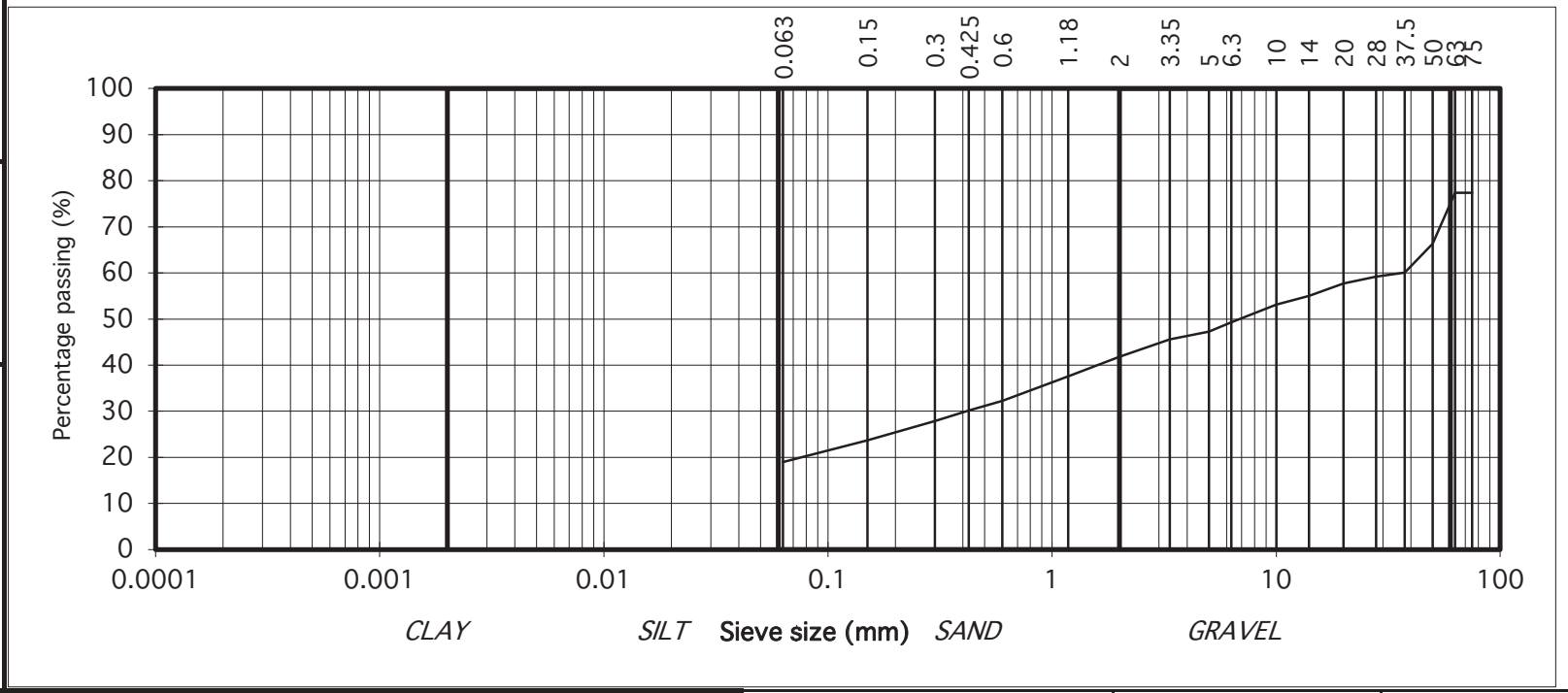

IGSL Ltd Materials Laboratory

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

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	87	GRAVEL
37.5	82	
28	75	
20	73	
14	68	
10	65	
6.3	61	
5	60	
3.35	56	
2	52	
1.18	49	SAND
0.6	44	
0.425	42	
0.3	40	
0.15	36	
0.063	33	SILT/CLAY
0.038	27	
0.027	24	
0.017	21	
0.010	18	
0.007	17	
0.005	15	
0.002	13	

Contract No. 24013 Report No. R134015
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH05
Sample No.* AA175574 Lab. Sample No. A22/2484
Sample Type: B
Depth* (m) 5.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Grey 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

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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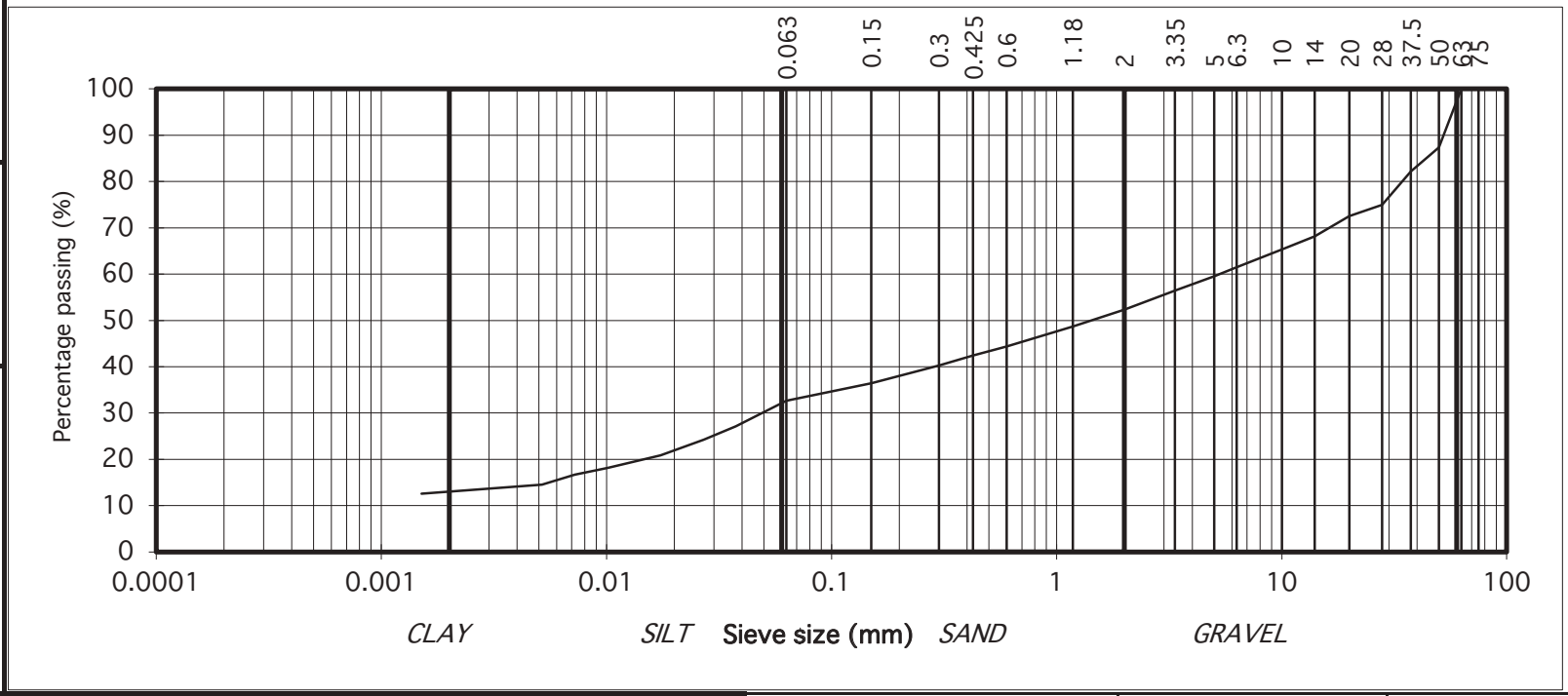

IGSL Ltd Materials Laboratory

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

TEST REPORT
Determination of Particle Size Distribution

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	84	
50	84	GRAVEL
37.5	76	
28	76	
20	73	
14	70	
10	67	
6.3	63	
5	61	
3.35	59	
2	54	
1.18	51	SAND
0.6	46	
0.425	44	
0.3	42	
0.15	38	
0.063	33	SILT/CLAY
0.037	30	
0.027	27	
0.017	23	
0.010	19	
0.007	16	
0.005	14	
0.002	10	

Contract No. 24013 Report No. R134016
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH06
Sample No.* AA171713 Lab. Sample No. A22/2486
Sample Type: B
Depth* (m) 5.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Grey 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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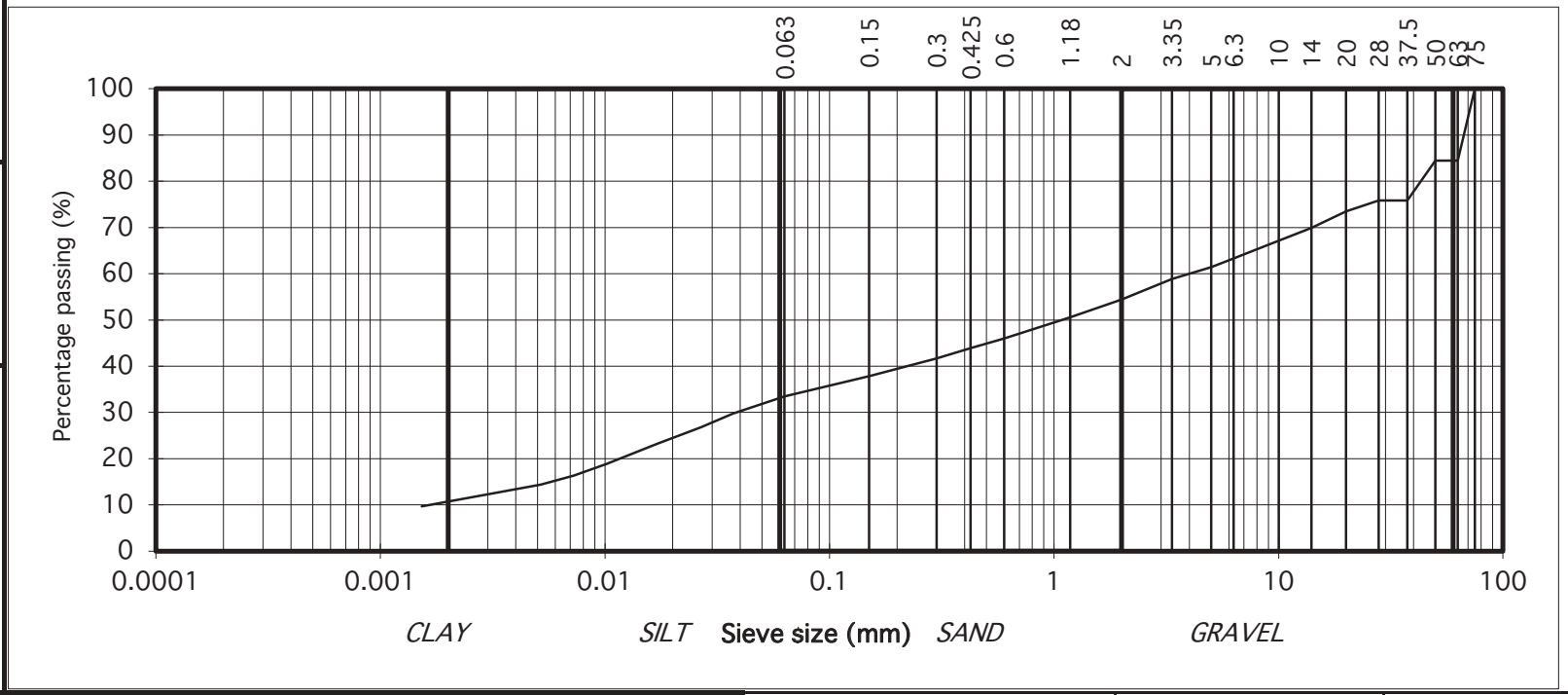

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Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

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

particle size	% passing	
75	100	COBBLES
63	87	
50	87	GRAVEL
37.5	82	
28	79	
20	75	
14	71	
10	67	
6.3	63	
5	61	
3.35	57	
2	53	
1.18	50	SAND
0.6	46	
0.425	44	
0.3	41	
0.15	37	
0.063	34	SILT/CLAY
0.037	30	
0.027	27	
0.017	24	
0.010	21	
0.007	18	
0.005	16	
0.002	12	

Contract No. 24013 Report No. R133965
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : TP02
Sample No.* AA173101 Lab. Sample No. A22/2488
Sample Type: B
Depth* (m) 3.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 03/05/2022
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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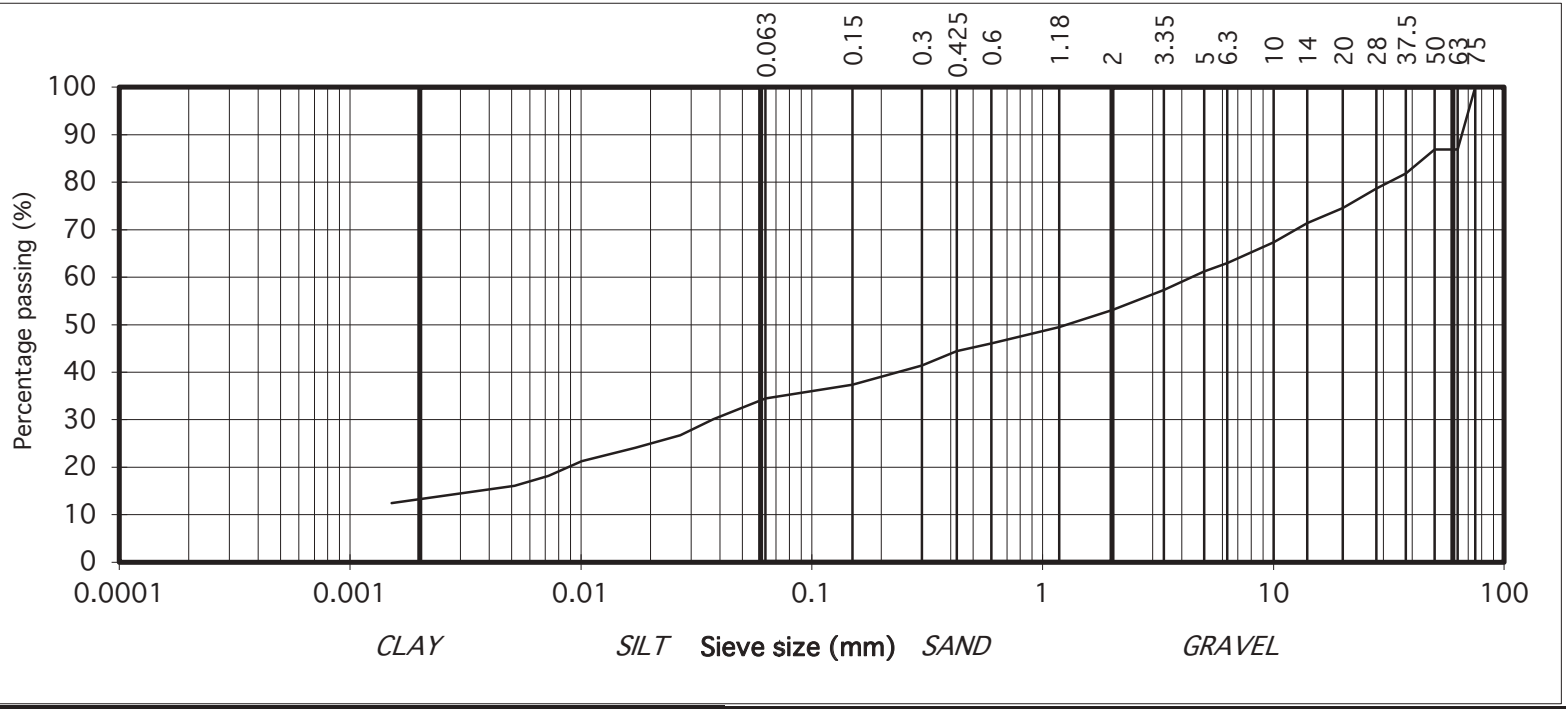

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Approved by:	Date:	Page no:
	18/05/22	1 of 1

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

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Fortfield Road, Terenure, Dublin 6
Contract no. 24013
Date of test: 06/05/2022

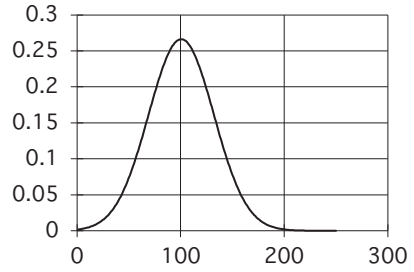
Sample Type: Core

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	11.10	78	30.0	1.222	4.93	6.02	120	d	//
	11.30	78	34.0	1.222	5.59	6.83	137	d	//
	11.90	78	28.0	1.222	4.60	5.62	112	d	//
	13.40	78	16.0	1.222	2.63	3.21	64	d	//
	14.10	78	10.0	1.222	1.64	2.01	40	d	//
RC02	8.30	78	21.0	1.222	3.45	4.22	84	d	//
	9.40	78	29.0	1.222	4.77	5.82	116	d	//
	9.55	78	24.0	1.222	3.94	4.82	96	d	//
	9.70	78	26.0	1.222	4.27	5.22	104	d	//
	9.90	78	30.0	1.222	4.93	6.02	120	d	//
RC03	8.00	78	8.0	1.222	1.31	1.61	32	d	//
	8.90	78	27.0	1.222	4.44	5.42	108	d	//
	9.30	78	30.0	1.222	4.93	6.02	120	d	//
	10.60	78	28.0	1.222	4.60	5.62	112	d	//
	11.90	78	29.0	1.222	4.77	5.82	116	d	//
RC04	8.40	78	24.0	1.222	3.94	4.82	96	d	//
	8.90	78	26.0	1.222	4.27	5.22	104	d	//
	9.40	78	28.0	1.222	4.60	5.62	112	d	//
	11.10	78	32.0	1.222	5.26	6.42	128	d	//
	11.20	78	36.0	1.222	5.92	7.23	145	d	//
	13.10	78	10.0	1.222	1.64	2.01	40	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	21	21
Minimum	1.61	32
Average	5.03	101
Maximum	7.23	145
Standard Dev.	1.57	31
Upper 95% Confidence Limit	8.11	162.28
Lower 95% Confidence Limit	1.94	38.88

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: Fortfield Road, Terenure, Dublin 6
Contract no. 24013
Date of test: 06/05/2022

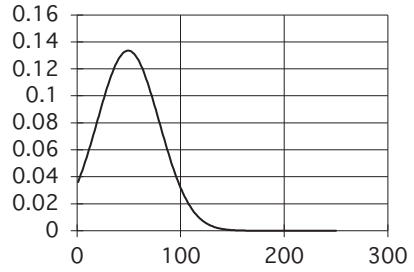
Sample Type: Core

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
RC05	9.90	78	23.0	1.222	3.78	4.62	92	d	//
	10.90	78	6.0	1.222	0.99	1.20	24	d	//
	11.40	78	14.0	1.222	2.30	2.81	56	d	//
	12.50	78	4.0	1.222	0.66	0.80	16	d	//
	12.60	78	4.0	1.222	0.66	0.80	16	d	//
RC06	9.70	78	21.0	1.222	3.45	4.22	84	d	//
	10.30	78	16.0	1.222	2.63	3.21	64	d	//
	12.20	78	19.0	1.222	3.12	3.81	76	d	//
	12.70	78	4.0	1.222	0.66	0.80	16	d	//
	13.30	78	12.0	1.222	1.97	2.41	48	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	10	10
Minimum	0.80	16
Average	2.47	49
Maximum	4.62	92
Standard Dev.	1.49	30
Upper 95% Confidence Limit	5.40	107.94
Lower 95% Confidence Limit	-0.46	-9.16

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

Uniaxial Compression Test Report Sheet | *I.G.S.L.*

Sample Identification

Contract Name:	Fortfield Road, Terenure, Dublin 6
Job Number:	24013
Hole No:	RC03
Depth (m):	11.40m

Sample Description

Colour:	Dark blueish grey
Grain size:	Fine-grained
Weathering Grade:	Fresh
Rock Type:	LIMESTONE

Weathering Grade Criteria

I. Fresh:	Unchanged from original state
II. Slightly weathered:	Slight discolouration, slight weakening
III. Moderately weathered:	Considerable weakening, penetrative discolouration
IV. Highly weathered:	Considerable weakening, penetrative discolouration, breaks in hand

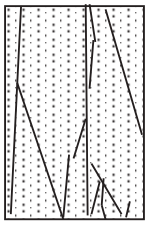
Sample Measurements

Length	204	
Diameter (Ø)	78.1	mm

Testing

Load Rate	4.3	kN/min
Load at Failure (P)	428	kN

Sketch of Failure Surfaces



Strength Calculations

Uniaxial Compressive Strength = $\frac{428000}{4788.19385}$

$= \frac{1000 \times P}{\prod \times (Ø/2)^2}$

= 89.34 (Mpa)

Bulk Density = 2.65 (Mg/m^3)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name:	Fortfield Road, Terenure, Dublin 6
Job Number:	24013
Hole No:	RC04
Depth (m):	12.40m

Sample Description

Colour:	Dark blueish grey
Grain size:	Fine-grained
Weathering Grade:	Fresh
Rock Type:	LIMESTONE

Weathering Grade Criteria

I. Fresh:	Unchanged from original state
II. Slightly weathered:	Slight discolouration, slight weakening
III. Moderately weathered:	Considerable weakening, penetrative discolouration
IV. Highly weathered:	Considerable weakening, penetrative discolouration, breaks in hand

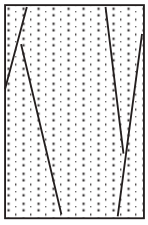
Sample Measurements

Length	199	
Diameter (Ø)	78	mm

Testing

Load Rate	4.3	kN/min
Load at Failure (P)	416	kN

Sketch of Failure Surfaces



Strength Calculations

Uniaxial Compressive Strength $= \dfrac{416000}{4775.94}$

$= \dfrac{1000 \times P}{\prod \times (Ø/2)^2}$

$=$ 87.06 (Mpa)

Bulk Density $=$ 2.66 (Mg/m^3)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name:	Fortfield Road, Terenure, Dublin 6
Job Number:	24013
Hole No:	RC05
Depth (m):	11.80m

Sample Description

Colour:	Pale blueish grey
Grain size:	Fine-grained
Weathering Grade:	Fresh
Rock Type:	LIMESTONE

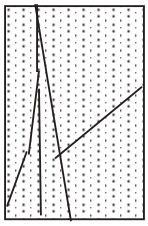
Weathering Grade Criteria

I. Fresh:	Unchanged from original state
II. Slightly weathered:	Slight discolouration, slight weakening
III. Moderately weathered:	Considerable weakening, penetrative discolouration
IV. Highly weathered:	Considerable weakening, penetrative discolouration, breaks in hand

Sample Measurements

Length	202	
Diameter (Ø)	78.1	mm

Sketch of Failure Surfaces



Testing

Load Rate	4.3	kN/min
Load at Failure (P)	289	kN

Strength Calculations

Uniaxial Compressive Strength $= \dfrac{289000}{4788.19385}$

$= \dfrac{1000 \times P}{\prod \times (Ø/2)^2}$

$=$ 60.33 (Mpa)

Bulk Density $=$ 2.64 (Mg/m^3)

Notes:

Appendix 7 Laboratory Test Results (Environmental)

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-16335-1
Initial Date of Issue:	11-May-2022
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	John Clancy
Project	24013 Fortfield Rd Terenure (Punch)

Quotation No.:	Q20-19951	**Date Received:**	04-May-2022
Order No.:		**Date Instructed:**	04-May-2022
No. of Samples:	7		
Turnaround (Wkdays):	7	**Results Due:**	12-May-2022
Date Approved:	11-May-2022		

Approved By:

Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**		22-16335	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951				**Chemtest Sample ID.:**		1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:				Client Sample Ref.:		AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
				Sample Location:		BH01	BH03	BH04	TP01	TP02	TP03	TP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		1.0	1.0	2.0	0.70	1.0	0.80	0.50
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**							
pH	U	1010	10:1		N/A	8.4	8.5	8.6	8.5	8.5	8.5	8.5
Ammonium	U	1220	10:1	mg/l	0.050	0.12	0.055	0.098	0.10	0.078	0.081	< 0.050
Ammonium	N	1220	10:1	mg/kg	0.10	1.4	0.64	1.2	1.2	0.92	0.95	0.57
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	0.12	0.12	< 0.01	0.12	0.13
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

Results - Soil

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:				Client Sample Ref.:	AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
				Sample Location:	BH01	BH03	BH04	TP01	TP02	TP03	TP04
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	1.0	2.0	0.70	1.0	0.80	0.50
				Asbestos Lab:	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
Moisture	N	2030	%	0.020	12	15	11	19	12	13	13
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] 0.44	[A] 1.9	[A] 0.43	[A] 23	[A] 0.65	[A] 3.8	[A] 2.0
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] 2.8	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] 1.7
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 12	[A] 4.2	[A] 13	[A] 2.4	[A] 16	[A] 9.4	[A] 4.7
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.016	[A] 0.026	[A] < 0.010	[A] 0.055	[A] 0.017	[A] 0.032	[A] 0.026
Arsenic	U	2455	mg/kg	0.5	9.8	7.3	9.3	22	9.4	9.5	7.0
Barium	U	2455	mg/kg	0	50	33	53	140	71	38	37
Cadmium	U	2455	mg/kg	0.10	1.6	0.55	1.6	2.4	1.5	1.4	0.58
Chromium	U	2455	mg/kg	0.5	14	12	16	25	13	13	15
Molybdenum	U	2455	mg/kg	0.5	2.5	0.8	2.7	3.7	2.7	2.2	0.9
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2455	mg/kg	0.50	25	10	25	26	25	21	11
Mercury	U	2455	mg/kg	0.05	0.06	0.06	0.05	0.09	0.05	0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	37	15	43	56	37	31	16
Lead	U	2455	mg/kg	0.50	15	15	17	26	14	15	12
Selenium	U	2455	mg/kg	0.25	1.3	0.97	1.5	2.4	1.5	1.2	1.1
Zinc	U	2455	mg/kg	0.50	64	51	79	95	72	69	50
Chromium (Trivalent)	N	2490	mg/kg	1.0	14	12	16	25	13	13	15
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
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

Results - Soil

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL					**Chemtest Job No.:**	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951					**Chemtest Sample ID.:**	1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:					Client Sample Ref.:	AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
					Sample Location:	BH01	BH03	BH04	TP01	TP02	TP03	TP04
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.0	1.0	2.0	0.70	1.0	0.80	0.50
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
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] 3.2	[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] 2.1	[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] < 0.010
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
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
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
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] < 0.010
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] < 0.010
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] < 0.20
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
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
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 - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421621						
Sample Ref:	AA175560						
Sample ID:							
Sample Location:	BH01						
Top Depth(m):	1.0						
Bottom Depth(m):							
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] 0.46	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	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		9.1	--	>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	0.0007	0.0065	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	0.0080	0.080	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	0.37	3.7	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	6.0	60	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: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421622						
Sample Ref:	AA175553						
Sample ID:							
Sample Location:	BH03						
Top Depth(m):	1.0						
Bottom Depth(m):							
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] 0.93	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		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.017	--	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	0.0064	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	0.0008	0.0078	0.5	10	70
Copper	1455	U	0.0021	0.021	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0031	0.031	0.5	10	30
Nickel	1455	U	0.0009	0.0089	0.4	10	40
Lead	1455	U	0.0006	0.0055	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	0.36	3.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.9	< 50	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: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421623						
Sample Ref:	AA175566						
Sample ID:							
Sample Location:	BH04						
Top Depth(m):	2.0						
Bottom Depth(m):							
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] 0.47	3	5	6
Loss On Ignition	2610	U	%	2.1	--	--	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		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0060	--	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	0.0052	0.5	10	70
Copper	1455	U	0.0007	0.0073	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.010	0.10	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	0.25	2.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.6	< 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.

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421624						
Sample Ref:	AA163096						
Sample ID:							
Sample Location:	TP01						
Top Depth(m):	0.70						
Bottom Depth(m):							
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] 0.85	3	5	6
Loss On Ignition	2610	U	%	3.8	--	--	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] < 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	0.0080	--	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	0.0053	0.5	10	70
Copper	1455	U	0.0011	0.012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0023	0.023	0.5	10	30
Nickel	1455	U	0.0005	0.0054	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	0.58	5.8	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	4.6	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	19

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421625						
Sample Ref:	AA163099				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP02						
Top Depth(m):	1.0						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.44	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	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		9.0	--	>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	< 0.0002	< 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	0.0006	0.0057	0.5	10	70
Copper	1455	U	0.0008	0.0082	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	0.35	3.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.8	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421626						
Sample Ref:	AA173103						
Sample ID:							
Sample Location:	TP03						
Top Depth(m):	0.80						
Bottom Depth(m):							
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] 0.54	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		8.8	--	>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	< 0.0002	< 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	0.0006	0.0056	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0064	0.064	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	0.36	3.6	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	6.0	60	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: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421627						
Sample Ref:	AA173106						
Sample ID:							
Sample Location:	TP04						
Top Depth(m):	0.50						
Bottom Depth(m):							
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] 0.74	3	5	6
Loss On Ignition	2610	U	%	3.1	--	--	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		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.019	--	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	0.0064	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	0.0009	0.0087	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	0.0026	0.026	0.5	10	30
Nickel	1455	U	0.0008	0.0085	0.4	10	40
Lead	1455	U	0.0005	0.0050	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	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.2	52	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.

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:
1421621	AA175560		BH01		A	Amber Glass 250ml
1421621	AA175560		BH01		A	Plastic Tub 500g
1421622	AA175553		BH03		A	Amber Glass 250ml
1421622	AA175553		BH03		A	Plastic Tub 500g
1421623	AA175566		BH04		A	Amber Glass 250ml
1421623	AA175566		BH04		A	Plastic Tub 500g
1421624	AA163096		TP01		A	Amber Glass 250ml
1421624	AA163096		TP01		A	Plastic Tub 500g
1421625	AA163099		TP02		A	Amber Glass 250ml
1421625	AA163099		TP02		A	Plastic Tub 500g
1421626	AA173103		TP03		A	Amber Glass 250ml
1421626	AA173103		TP03		A	Plastic Tub 500g
1421627	AA173106		TP04		A	Amber Glass 250ml
1421627	AA173106		TP04		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
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

Test Methods

SOP	Title	Parameters included	Method summary
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

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-17076-1
Initial Date of Issue:	18-May-2022
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	John Clancy
Project	24013 Fortfield Road Terenure (Punch)
Quotation No.:	Q20-19951
Order No.:	
No. of Samples:	6
Turnaround (Wkdays):	7
Date Approved:	18-May-2022
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	10-May-2022
Date Instructed:	10-May-2022
Results Due:	18-May-2022

Results - Leachate

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**		22-17076	22-17076
Quotation No.: Q20-19951				**Chemtest Sample ID.:**		1424873	1424874
				Client Sample ID.:		AA175571	AA171709
				Sample Location:		BH05	BH06
				Sample Type:		SOIL	SOIL
				Top Depth (m):		2.0	1.0
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
pH	U	1010	10:1		N/A	8.4	8.7
Ammonium	U	1220	10:1	mg/l	0.050	0.18	0.59
Ammonium	N	1220	10:1	mg/kg	0.10	2.1	7.5
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**	22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1424870	1424871	1424872	1424873	1424874	1424875
				Client Sample ID.:	AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
				Sample Location:	BH01	BH03	BH04	BH05	BH06	BH06
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	2.0	2.0	3.0	2.0	1.0	2.0
				Asbestos Lab:				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	
Moisture	N	2030	%	0.020	11	11	13	11	16	9.7
pH (2.5:1)	N	2010		4.0	[A] 8.8	[A] 9.4	[A] 9.0			[A] 9.2
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	[A] < 0.010	[A] < 0.010	[A] < 0.010			[A] < 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.012	[A] 0.047	[A] 0.022			[A] 0.013
Total Sulphur	U	2175	%	0.010	[A] 0.025	[A] 0.023	[A] 0.046			[A] 0.026
Sulphur (Elemental)	U	2180	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Chloride (Water Soluble)	U	2220	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] 0.014			[A] 0.023
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010			< 0.010
Cyanide (Total)	U	2300	mg/kg	0.50				[A] < 0.50	[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50				[A] 18	[A] 24	
Ammonium (Water Soluble)	U	2220	g/l	0.01	< 0.01	< 0.01	< 0.01			< 0.01
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] < 0.010	[A] 0.014	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Arsenic	U	2455	mg/kg	0.5				1.4	1.7	
Barium	U	2455	mg/kg	0				8	12	
Cadmium	U	2455	mg/kg	0.10				0.21	0.27	
Chromium	U	2455	mg/kg	0.5				1.9	1.9	
Molybdenum	U	2455	mg/kg	0.5				< 0.5	< 0.5	
Antimony	N	2455	mg/kg	2.0				< 2.0	< 2.0	
Copper	U	2455	mg/kg	0.50				3.2	3.4	
Mercury	U	2455	mg/kg	0.05				< 0.05	< 0.05	
Nickel	U	2455	mg/kg	0.50				4.2	5.5	
Lead	U	2455	mg/kg	0.50				2.9	2.3	
Selenium	U	2455	mg/kg	0.25				0.25	< 0.25	
Zinc	U	2455	mg/kg	0.50				11	9.1	
Chromium (Trivalent)	N	2490	mg/kg	1.0				1.9	1.9	
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	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**	22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1424870	1424871	1424872	1424873	1424874	1424875
				Client Sample ID.:	AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
				Sample Location:	BH01	BH03	BH04	BH05	BH06	BH06
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	2.0	2.0	3.0	2.0	1.0	2.0
				Asbestos Lab:				DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
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] < 1.0	[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] < 5.0	[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0				[A] < 10	[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] < 0.010	[A] < 0.010	
Anthracene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Pyrene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[a]anthracene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Chrysene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[b]fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[k]fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[a]pyrene	N	2800	mg/kg	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	
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] < 0.20	[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	
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	

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL			**Chemtest Job No.:**		22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951			**Chemtest Sample ID.:**		1424870	1424871	1424872	1424873	1424874	1424875
			Client Sample ID.:		AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
			Sample Location:		BH01	BH03	BH04	BH05	BH06	BH06
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		2.0	2.0	3.0	2.0	1.0	2.0
			Asbestos Lab:					DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
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: 24013 Fortfield Road Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17076						
Chemtest Sample ID:	1424873						
Sample Ref:							
Sample ID:	AA175571						
Sample Location:	BH05						
Top Depth(m):	2.0						
Bottom Depth(m):							
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] 0.33	3	5	6
Loss On Ignition	2610	U	%	5.6	--	--	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		8.8	--	>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	0.0012	0.013	0.5	10	70
Copper	1455	U	0.0010	0.0095	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0079	0.079	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	0.004	0.036	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.24	2.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.9	99	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: 24013 Fortfield Road Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17076						
Chemtest Sample ID:	1424874						
Sample Ref:							
Sample ID:	AA171709						
Sample Location:	BH06						
Top Depth(m):	1.0						
Bottom Depth(m):							
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] 0.42	3	5	6
Loss On Ignition	2610	U	%	2.9	--	--	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	< 0.0002	< 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	0.0007	0.0069	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0077	0.077	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	0.41	4.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.5	65	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:
1424870		AA175561	BH01		A	Amber Glass 250ml
1424870		AA175561	BH01		A	Plastic Tub 500g
1424871		AA175554	BH03		A	Amber Glass 250ml
1424871		AA175554	BH03		A	Plastic Tub 500g
1424872		AA175567	BH04		A	Amber Glass 250ml
1424872		AA175567	BH04		A	Plastic Tub 500g
1424873		AA175571	BH05		A	Amber Glass 250ml
1424873		AA175571	BH05		A	Plastic Tub 500g
1424874		AA171709	BH06		A	Amber Glass 250ml
1424874		AA171709	BH06		A	Plastic Tub 500g
1424875		AA171710	BH06		A	Amber Glass 250ml
1424875		AA171710	BH06		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 measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
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.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Test Methods

SOP	Title	Parameters included	Method summary
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 Site Plan

ExpertGPS

24013 Fortfield Road, Terenure

25 0 25 50 75 100 125 150 175 200 225 250 m

Scale: 1 : 1400.

MN 1°58'

Appendix E Waste Characterisation Assessment

Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89

T: 021 434 5366
E:admin@ocallaghanmoran.com
www.ocallaghanmoran.com

Waste Characterisation Assessment

Fortfield Road,

Terenure,

Dublin 6

Prepared For: -

IGSL Limited
Unit F
M7 Business Park
Naas
County Kildare

Prepared By: -

O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

May 2022

Project	Waste Characterisation: Fortfield Road, Terenure, Dublin 6			
Client	IGSL Limited			
Report No	Date	Status	Prepared By	Reviewed By
220012001	23/05/2022	Final	Austin Hynes PGeo 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 collected from four (4 No.) trial pits and five (5 No.) cable percussion boreholes installed at a site at Fortfield Road, Terenure, Dublin 6.

1.1 Methodology

IGSL provided a description of the ground conditions and collected samples of the soils from the borehole and 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 April 2022 and included the collection of nine composite samples from four (4 No.) trial pits and five (5 No.) cable percussion boreholes. The locations are shown on Figure 2.1. The trial pit and borehole logs are in Appendix 1.

The logs indicate the subsurface is composed of Natural Ground. There is topsoil at the surface of all locations. The subsurface is composed of soft to firm sandy slightly gravelly SILT/CLAY to circa 1.00 mbgl. This is underlain by firm to stiff, sandy gravelly CLAY/SILT to between 3.40-3.80 mbgl. The subsurface is composed of stiff to very stiff, sandy gravelly CLAY below 3.80 mbgl.

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

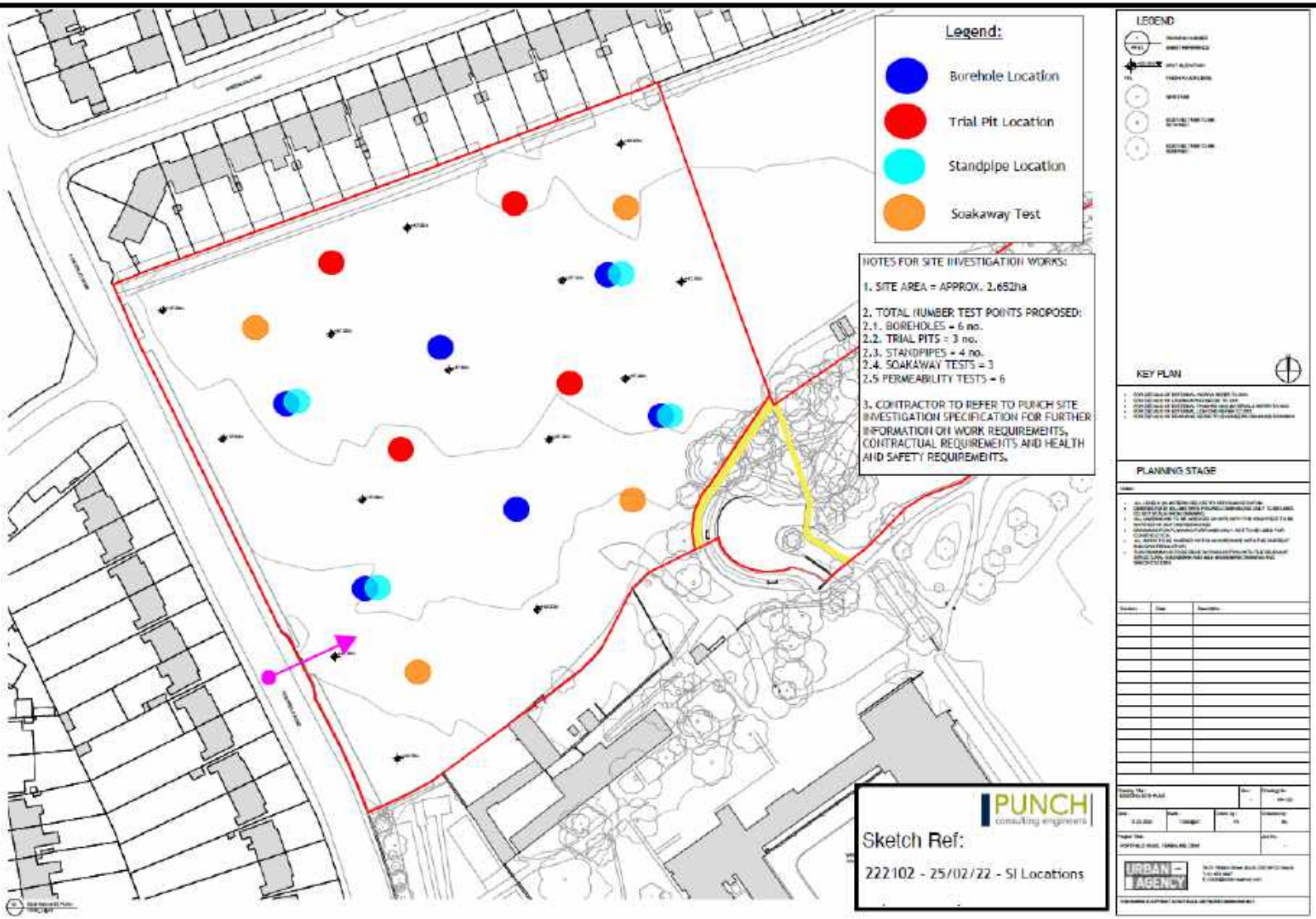
whether waste is non-hazardous or hazardous and has been approved for use in Ireland by the Environmental Protection Agency. The full Waste Classification Report is in Appendix 3 and the results are summarised in Table 2.1.

Table 2.1 Waste Classification

Sample No.	Depth	Classification	LoW Code
BH01	1.0	Non-Hazardous	17 05 04
BH03	1.0	Non-Hazardous	17 05 04
BH04	2.0	Non-Hazardous	17 05 04
BH05	2.0	Non-Hazardous	17 05 04
BH06	1.0	Non-Hazardous	17 05 04
TP01	0.70	Non-Hazardous	17 05 04
TP02	1.0	Non-Hazardous	17 05 04
TP03	0.80	Non-Hazardous	17 05 04
TP04	0.50	Non-Hazardous	17 05 04

Asbestos was not detected in any of the samples tested.

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*).



O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
Email: info@ocallaghanmoran.com

Title:

Figure 2.1 Sample Location Plan

Legend

Client:

IGSL Limited

2.3 Waste Acceptance Criteria

The results of the WAC testing are presented in Table 2.2, 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.

All samples meet the inert WAC.

Table 2.2 WAC Results

Parameter	Unit	BH01	BH03	BH04	BH05	BH06	TP01	TP02	TP03	TP04	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	**m**	**1.0**	**1.0**	**2.0**	**2.0**	**1.0**	**0.70**	**1.0**	**0.80**	**0.50**				
Antimony	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.18	0.7	5
Arsenic	mg/kg	< 0.0002	0.0064	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0064	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	0.0065	0.0078	0.0052	0.013	0.0069	0.0053	0.0057	0.0056	0.0087	0.5	0.5	10	70
Copper	mg/kg	0.010	0.021	0.0073	0.0095	0.011	0.012	0.0082	0.011	0.017	2	2	50	100
Lead	mg/kg	< 0.0005	0.0055	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0050	0.5	0.5	10	50
Molybdenum	mg/kg	0.080	0.031	0.10	0.079	0.077	0.023	0.052	0.064	0.026	0.5	1.5	10	30
Nickel	mg/kg	0.0052	0.0089	< 0.0005	< 0.0005	< 0.0005	0.0054	< 0.0005	< 0.0005	0.0085	0.4	0.4	10	40
Selenium	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 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	0.036	< 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	< 0.00005	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	3.7	3.6	2.5	2.4	4.1	5.8	3.5	3.6	4.7	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	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1000*	3,000	20000*	50,000
DOC **	mg/kg	60	< 50	< 50	99	65	< 50	< 50	60	52	500	500	800	1,000
pH	pH units	9.1	8.8	8.9	8.8	8.6	8.6	9.0	8.8	8.8	NE	NE	NE	NE
TDS ***	mg/kg	710	580	580	580	580	710	580	650	780	4,000	12,000	60,000	100,000
TOC	%	0.46	0.93	0.47	0.33	0.42	0.85	0.44	0.54	0.74	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	0.0032	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	0.0021	< 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	< 0.20	< 0.20	< 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

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

All samples meet the soil recovery criteria.

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 2.5.

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

All samples meet the soil recovery 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 material is suitable for removal to a soil recovery facility.

Table 2.5 Waste Management Options

Sample No.	Depth	Classification	LoW Code	Category
BH01	1.0	Non-Hazardous	17 05 04	A
BH03	1.0	Non-Hazardous	17 05 04	A
BH04	2.0	Non-Hazardous	17 05 04	A
BH05	2.0	Non-Hazardous	17 05 04	A
BH06	1.0	Non-Hazardous	17 05 04	A
TP01	0.70	Non-Hazardous	17 05 04	A
TP02	1.0	Non-Hazardous	17 05 04	A
TP03	0.80	Non-Hazardous	17 05 04	A
TP04	0.50	Non-Hazardous	17 05 04	A

A	Suitable for Soil Recovery

3 CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

3.1.1 *Waste Classification*

Asbestos was not detected in any of the samples tested.

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.

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

Trial Pit and Borehole Logs

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT Fortfield Road , Terenure , Dublin 6

BOREHOLE NO. **BH01**
SHEET Sheet 1 of 1

CO-ORDINATES
GROUND LEVEL (mOD)

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 6.10

DATE COMMENCED 14/04/2022
DATE COMPLETED 14/04/2022

CLIENT Lioncor
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
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	Firm dark brown sandy SILT/CLAY with occasional fine gravel			0.80						
1	Soft to firm light brown sandy SILT/CLAY with some gravel				AA175560	B	1.00		N = 11 (2, 3, 3, 2, 3, 3)	
2					AA175561	B	2.00		N = 7 (3, 3, 2, 2, 1, 2)	
3				3.60	AA175562	B	3.00		N = 16 (4, 4, 3, 4, 5, 4)	
4	Medium dense to dense grey fine to carse sandy silty/clayey GRAVEL				AA175563	B	4.00		N = 30 (4, 5, 5, 7, 8, 10)	
5					AA175564	B	5.00		N = 28 (5, 6, 6, 6, 7, 9)	
6	Obstruction End of Borehole at 6.10 m			6.10					N = 50/150 mm (7, 8, 17, 33)	
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.50	4.80	1	
6.00	6.10	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT Fortfield Road , Terenure , Dublin 6

BOREHOLE NO. **BH02**
SHEET Sheet 1 of 1

CO-ORDINATES
GROUND LEVEL (mOD)

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

DATE COMMENCED 13/04/2022
DATE COMPLETED 13/04/2022

CLIENT Lioncor
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
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	Soft dark brown sandy SILT/CLAY			0.80						
1	Firm to stiff dark brown/grey sandy SILT/CLAY with occasional gravel				AA175549	B	1.00		N = 10 (2, 2, 3, 2, 3, 2)	
2					AA175550	B	2.00		N = 31 (4, 6, 6, 8, 8, 9)	
3				3.50	AA175551	B	3.00		N = 33 (5, 6, 6, 7, 9, 11)	
4	Stiff to very stiff black sandy gravelly silty CLAY with occasional cobbles and small boulders			4.20	AA175552	B	4.00		N = 50/150 mm (10, 15, 24, 26)	
5	Obstruction End of Borehole at 4.20 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.20	2.60	1	
4.00	4.20	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road , Terenure , Dublin 6	**BOREHOLE NO.**	**BH03**
		SHEET	Sheet 1 of 1
CO-ORDINATES		**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)		**BOREHOLE DEPTH (m)**	4.00
		DATE COMMENCED	13/04/2022
		DATE COMPLETED	13/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		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	Soft dark brown sandy SILT/CLAY with occasional gravel									
1					AA175553	B	1.00		N = 6 (1, 2, 1, 2, 2, 1)	
				1.60						
2	Stiff to very stiff dark brown sandy silty gravelly CLAY with occasional cobbles and small boulders				AA175554	B	2.00		N = 7 (2, 2, 1, 2, 2, 2)	
3					AA175555	B	3.00		N = 35 (4, 9, 11, 11, 1, 12)	
4					AA175556	B	4.00		N = 50/150 mm (22, 3, 39, 11)	
5					AA175557	B	5.00		N = 33 (8, 7, 6, 7, 10, 10)	
				5.90						
6	Obstruction End of Borehole at 4.00 m								N = 52/75 mm (25, 52)	
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.80	4.00	1	
5.70	5.90	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT Fortfield Road , Terenure , Dublin 6

BOREHOLE NO. **BH04**
SHEET Sheet 1 of 1

CO-ORDINATES

GROUND LEVEL (mOD)

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 5.80

DATE COMMENCED 14/04/2022
DATE COMPLETED 14/04/2022

CLIENT Lioncor
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
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	Dark brown sandy SILT/CLAY			0.50						
	Soft light brown sandy SILT/CLAY with occasional gravel			0.90						
1	Firm to stiff dark brown sandy gravelly silty CLAY with occasional cobbles				AA175565	B	1.00		N = 7 (2, 2, 2, 1, 2, 2)	
2					AA175566	B	2.00		N = 7 (1, 2, 2, 1, 2, 2)	
3					AA175567	B	3.00		N = 20 (3, 4, 4, 5, 5, 6)	
4				4.20	AA175568	B	4.00		N = 49 (8, 10, 10, 11, 13, 15)	
	Stiff to very stiff light brown very gravelly sandy CLAY with some cobbles and occasional small boulders									
5					AA175569	B	5.00		N = 50/150 mm (10, 17, 23, 27)	
				5.80					N = 250/75 mm (25, 250)	
6	Obstruction End of Borehole at 5.80 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.40	4.80	1	
5.60	5.80	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT Fortfield Road , Terenure , Dublin 6

BOREHOLE NO. **BH05**
SHEET Sheet 1 of 1

CO-ORDINATES
GROUND LEVEL (mOD)

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

DATE COMMENCED 19/04/2022
DATE COMPLETED 19/04/2022

CLIENT Lioncor
ENGINEER Punch C.E

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.20						
	Mottled brown sandy SILT/CLAY with occasional gravel			0.80						
1	Soft to firm dark brown sandy SILT/CLAY with some gravel and occasional cobbles				AA175570	B	1.00		N = 5 (2, 2, 1, 1, 2, 1)	
2					AA175571	B	2.00		N = 10 (2, 2, 3, 2, 2, 3)	
3				3.80	AA175572	B	3.00		N = 19 (3, 3, 4, 4, 5, 6)	
4	Very stiff grey/black sandy very gravelly CLAY with some cobbles and occasional small bouldersa				AA175573	B	4.00		N = 44/75 mm (23, 2, 44)	
5				5.30	AA175574	B	5.00		N = 40 (5, 6, 8, 11, 9, 12)	
6	Obstruction End of Borehole at 5.30 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.90	4.10	1	
5.20	5.30	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.60	3.60	3.90	3.00	20	Slow

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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

IGSL BH LOG 24013.GPJ IGSL.GDT 21/4/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road , Terenure , Dublin 6	**BOREHOLE NO.**	**BH06**
		SHEET	Sheet 1 of 1
CO-ORDINATES	**RIG TYPE** Dando 2000	**DATE COMMENCED**	19/04/2022
	BOREHOLE DIAMETER (mm) 200	**DATE COMPLETED**	19/04/2022
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 6.40		
CLIENT Lioncor	**SPT HAMMER REF. NO.**	**BORED BY**	W.Cahill
ENGINEER Punch C.E	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.30						
	Light brown sandy SILT/CLAY with occasional fine gravel			0.70						
1	Firm to stiff dark brown sandy SILT/CLAY with some gravel and occasional cobbles				AA171709	B	1.00		N = 12 (2, 2, 3, 2, 3, 4)	
2					AA171710	B	2.00		N = 24 (4, 3, 5, 6, 6, 7)	
3				3.40	AA171711	B	3.00		N = 32 (8, 7, 5, 8, 10, 9)	
	Stiff to very stiff dark brown sandy silty gravelly CLAY with occasional cobbles									
4				4.50	AA171712	B	4.00		N = 40 (10, 14, 11, 11, 8, 10)	
	Very stiff to hard grey/black sandy gravelly CLAY with some cobbles and occasional small boulders									
5					AA171713	B	5.00		N = 75 (10, 17, 18, 21, 11, 25)	
6					AA171714	B	6.00		N = 75/225 mm (16, 17, 32, 18, 25)	
				6.40						
	Obstruction End of Borehole at 6.40 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.60	3.80	0.5	
4.30	4.50	1	
6.20	6.40	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 Dafe Working Area . CAT scanned location and hand dug inspection pit were 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

IGSL BH LOG 24013.GPJ IGSL.GDT 21/4/22

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT Fortfield Road , Terenure , Dublin 6

TRIAL PIT NO. **TP01**
SHEET Sheet 1 of 1

LOGGED BY I.Reder

CO-ORDINATES

DATE STARTED 14/04/2022
DATE COMPLETED 14/04/2022

CLIENT Lioncor
ENGINEER Punch C.E

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 TOPSOIL		0.30							
Firm, brown, slightly sandy slightly gravelly CLAY		0.50							
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles content					AA163096	B	0.70		
1.0 Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		1.10							
					AA163097	B	1.70		
2.0 Soft to firm, greyish brown, sandy gravelly CLAY with high subangular cobbles content		2.10		1 (Seepage)					
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and low boulders content		2.40			AA163098	B	2.70		
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Seepage flow at 2.1m

Stability
TP stable

General Remarks

IGSL TP LOG 24013.GPJ IGSL.GDT 26/4/22

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road , Terenure , Dublin 6	**TRIAL PIT NO.**	**TP02**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Soft to firm, brown, slightly sandu slightly gravelly CLAY		0.40							
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		0.70			AA163099	B	1.00		
1.0									
2.0					AA163100	B	2.00		
Stoff to very stiff, grey, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		2.40							
3.0 End of Trial Pit at 3.00m		3.00			AA173101	B	3.00		
4.0									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

IGSL TP LOG 24013.GPJ IGSL.GDT 26/4/22

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road , Terenure , Dublin 6	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
		0.30							
Firm, brown, slightly sandy slightly gravelly CLAY		0.50							
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles content					AA173103	B	0.80		
1.0									
		1.50							
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content					AA173104	B	1.80		
2.0									
		2.40							
TP terminated due to many big boulders End of Trial Pit at 2.40m									
3.0									
4.0									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks
TP terminated at 2.4m due to big boulders

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road , Terenure , Dublin 6	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Firm, brown, slightly sandy slightly gravelly CLAY		0.30			AA173106	B	0.50		
Firm, greyish brown, slightly sandy very gravelly CLAY with high subangular cobbles low boulders and sandy gravel lenses content		0.70			AA173107	B	1.50		
1.0									
2.0 Soft to firm, greyish brown, sandy very gravelly CLAY with high subangular to subrounded cobbles and medium boulders content		2.00		1 (Seepage)	AA173108	B	2.50		
				2 (Slow)					
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Seepage flow at 2.0m; slow water flow at 2.8m

Stability
TP unstable from 2.0m

General Remarks

Appendix 2

Laboratory Report

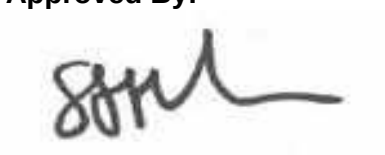
eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-16335-1
Initial Date of Issue:	11-May-2022
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	John Clancy
Project	24013 Fortfield Rd Terenure (Punch)

Quotation No.:	Q20-19951	**Date Received:**	04-May-2022
Order No.:		**Date Instructed:**	04-May-2022
No. of Samples:	7		
Turnaround (Wkdays):	7	**Results Due:**	12-May-2022
Date Approved:	11-May-2022		

Approved By:



Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**		22-16335	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951				**Chemtest Sample ID.:**		1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:				Client Sample Ref.:		AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
				Sample Location:		BH01	BH03	BH04	TP01	TP02	TP03	TP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		1.0	1.0	2.0	0.70	1.0	0.80	0.50
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**							
pH	U	1010	10:1		N/A	8.4	8.5	8.6	8.5	8.5	8.5	8.5
Ammonium	U	1220	10:1	mg/l	0.050	0.12	0.055	0.098	0.10	0.078	0.081	< 0.050
Ammonium	N	1220	10:1	mg/kg	0.10	1.4	0.64	1.2	1.2	0.92	0.95	0.57
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	0.12	0.12	< 0.01	0.12	0.13
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

Results - Soil

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL			**Chemtest Job No.:**		22-16335	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951			**Chemtest Sample ID.:**		1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:			Client Sample Ref.:		AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
			Sample Location:		BH01	BH03	BH04	TP01	TP02	TP03	TP04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.0	1.0	2.0	0.70	1.0	0.80	0.50
			Asbestos Lab:		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
Moisture	N	2030	%	0.020	12	15	11	19	12	13	13
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] 0.44	[A] 1.9	[A] 0.43	[A] 23	[A] 0.65	[A] 3.8	[A] 2.0
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] 2.8	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] 1.7
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 12	[A] 4.2	[A] 13	[A] 2.4	[A] 16	[A] 9.4	[A] 4.7
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.016	[A] 0.026	[A] < 0.010	[A] 0.055	[A] 0.017	[A] 0.032	[A] 0.026
Arsenic	U	2455	mg/kg	0.5	9.8	7.3	9.3	22	9.4	9.5	7.0
Barium	U	2455	mg/kg	0	50	33	53	140	71	38	37
Cadmium	U	2455	mg/kg	0.10	1.6	0.55	1.6	2.4	1.5	1.4	0.58
Chromium	U	2455	mg/kg	0.5	14	12	16	25	13	13	15
Molybdenum	U	2455	mg/kg	0.5	2.5	0.8	2.7	3.7	2.7	2.2	0.9
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2455	mg/kg	0.50	25	10	25	26	25	21	11
Mercury	U	2455	mg/kg	0.05	0.06	0.06	0.05	0.09	0.05	0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	37	15	43	56	37	31	16
Lead	U	2455	mg/kg	0.50	15	15	17	26	14	15	12
Selenium	U	2455	mg/kg	0.25	1.3	0.97	1.5	2.4	1.5	1.2	1.1
Zinc	U	2455	mg/kg	0.50	64	51	79	95	72	69	50
Chromium (Trivalent)	N	2490	mg/kg	1.0	14	12	16	25	13	13	15
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
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

Results - Soil

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL					**Chemtest Job No.:**	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951					**Chemtest Sample ID.:**	1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:					Client Sample Ref.:	AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
					Sample Location:	BH01	BH03	BH04	TP01	TP02	TP03	TP04
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.0	1.0	2.0	0.70	1.0	0.80	0.50
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
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] 3.2	[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] 2.1	[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] < 0.010
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
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
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
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] < 0.010
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] < 0.010
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] < 0.20
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
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
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 - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421621						
Sample Ref:	AA175560						
Sample ID:							
Sample Location:	BH01						
Top Depth(m):	1.0						
Bottom Depth(m):							
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] 0.46	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	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		9.1	--	>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	0.0007	0.0065	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	0.0080	0.080	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	0.37	3.7	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	6.0	60	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: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421622						
Sample Ref:	AA175553						
Sample ID:							
Sample Location:	BH03						
Top Depth(m):	1.0						
Bottom Depth(m):							
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] 0.93	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		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.017	--	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	0.0064	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	0.0008	0.0078	0.5	10	70
Copper	1455	U	0.0021	0.021	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0031	0.031	0.5	10	30
Nickel	1455	U	0.0009	0.0089	0.4	10	40
Lead	1455	U	0.0006	0.0055	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	0.36	3.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.9	< 50	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: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421623						
Sample Ref:	AA175566						
Sample ID:							
Sample Location:	BH04						
Top Depth(m):	2.0						
Bottom Depth(m):							
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] 0.47	3	5	6
Loss On Ignition	2610	U	%	2.1	--	--	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		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0060	--	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	0.0052	0.5	10	70
Copper	1455	U	0.0007	0.0073	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.010	0.10	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	0.25	2.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.6	< 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.

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421624						
Sample Ref:	AA163096						
Sample ID:							
Sample Location:	TP01						
Top Depth(m):	0.70						
Bottom Depth(m):							
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] 0.85	3	5	6
Loss On Ignition	2610	U	%	3.8	--	--	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] < 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	0.0080	--	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	0.0053	0.5	10	70
Copper	1455	U	0.0011	0.012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0023	0.023	0.5	10	30
Nickel	1455	U	0.0005	0.0054	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	0.58	5.8	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	4.6	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	19

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421625						
Sample Ref:	AA163099						
Sample ID:							
Sample Location:	TP02						
Top Depth(m):	1.0						
Bottom Depth(m):							
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] 0.44	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	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		9.0	--	>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	< 0.0002	< 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	0.0006	0.0057	0.5	10	70
Copper	1455	U	0.0008	0.0082	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	0.35	3.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.8	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421626						
Sample Ref:	AA173103						
Sample ID:							
Sample Location:	TP03						
Top Depth(m):	0.80						
Bottom Depth(m):							
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] 0.54	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		8.8	--	>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	< 0.0002	< 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	0.0006	0.0056	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0064	0.064	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	0.36	3.6	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	6.0	60	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: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421627						
Sample Ref:	AA173106						
Sample ID:							
Sample Location:	TP04						
Top Depth(m):	0.50						
Bottom Depth(m):							
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] 0.74	3	5	6
Loss On Ignition	2610	U	%	3.1	--	--	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		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.019	--	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	0.0064	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	0.0009	0.0087	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	0.0026	0.026	0.5	10	30
Nickel	1455	U	0.0008	0.0085	0.4	10	40
Lead	1455	U	0.0005	0.0050	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	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.2	52	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.

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:
1421621	AA175560		BH01		A	Amber Glass 250ml
1421621	AA175560		BH01		A	Plastic Tub 500g
1421622	AA175553		BH03		A	Amber Glass 250ml
1421622	AA175553		BH03		A	Plastic Tub 500g
1421623	AA175566		BH04		A	Amber Glass 250ml
1421623	AA175566		BH04		A	Plastic Tub 500g
1421624	AA163096		TP01		A	Amber Glass 250ml
1421624	AA163096		TP01		A	Plastic Tub 500g
1421625	AA163099		TP02		A	Amber Glass 250ml
1421625	AA163099		TP02		A	Plastic Tub 500g
1421626	AA173103		TP03		A	Amber Glass 250ml
1421626	AA173103		TP03		A	Plastic Tub 500g
1421627	AA173106		TP04		A	Amber Glass 250ml
1421627	AA173106		TP04		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
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

Test Methods

SOP	Title	Parameters included	Method summary
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

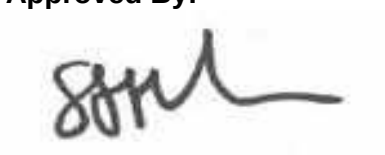
If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-17076-1		
Initial Date of Issue:	18-May-2022		
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	John Clancy		
Project	24013 Fortfield Road Terenure (Punch)		
Quotation No.:	Q20-19951	**Date Received:**	10-May-2022
Order No.:		**Date Instructed:**	10-May-2022
No. of Samples:	6		
Turnaround (Wkdays):	7	**Results Due:**	18-May-2022
Date Approved:	18-May-2022		

Approved By:



Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**		22-17076	22-17076
Quotation No.: Q20-19951				**Chemtest Sample ID.:**		1424873	1424874
				Client Sample ID.:		AA175571	AA171709
				Sample Location:		BH05	BH06
				Sample Type:		SOIL	SOIL
				Top Depth (m):		2.0	1.0
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
pH	U	1010	10:1		N/A	8.4	8.7
Ammonium	U	1220	10:1	mg/l	0.050	0.18	0.59
Ammonium	N	1220	10:1	mg/kg	0.10	2.1	7.5
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL			**Chemtest Job No.:**		22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951			**Chemtest Sample ID.:**		1424870	1424871	1424872	1424873	1424874	1424875
			Client Sample ID.:		AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
			Sample Location:		BH01	BH03	BH04	BH05	BH06	BH06
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		2.0	2.0	3.0	2.0	1.0	2.0
			Asbestos Lab:					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	
Moisture	N	2030	%	0.020	11	11	13	11	16	9.7
pH (2.5:1)	N	2010		4.0	[A] 8.8	[A] 9.4	[A] 9.0			[A] 9.2
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	[A] < 0.010	[A] < 0.010	[A] < 0.010			[A] < 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.012	[A] 0.047	[A] 0.022			[A] 0.013
Total Sulphur	U	2175	%	0.010	[A] 0.025	[A] 0.023	[A] 0.046			[A] 0.026
Sulphur (Elemental)	U	2180	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Chloride (Water Soluble)	U	2220	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] 0.014			[A] 0.023
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010			< 0.010
Cyanide (Total)	U	2300	mg/kg	0.50				[A] < 0.50	[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50				[A] 18	[A] 24	
Ammonium (Water Soluble)	U	2220	g/l	0.01	< 0.01	< 0.01	< 0.01			< 0.01
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] < 0.010	[A] 0.014	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Arsenic	U	2455	mg/kg	0.5				1.4	1.7	
Barium	U	2455	mg/kg	0				8	12	
Cadmium	U	2455	mg/kg	0.10				0.21	0.27	
Chromium	U	2455	mg/kg	0.5				1.9	1.9	
Molybdenum	U	2455	mg/kg	0.5				< 0.5	< 0.5	
Antimony	N	2455	mg/kg	2.0				< 2.0	< 2.0	
Copper	U	2455	mg/kg	0.50				3.2	3.4	
Mercury	U	2455	mg/kg	0.05				< 0.05	< 0.05	
Nickel	U	2455	mg/kg	0.50				4.2	5.5	
Lead	U	2455	mg/kg	0.50				2.9	2.3	
Selenium	U	2455	mg/kg	0.25				0.25	< 0.25	
Zinc	U	2455	mg/kg	0.50				11	9.1	
Chromium (Trivalent)	N	2490	mg/kg	1.0				1.9	1.9	
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	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL			**Chemtest Job No.:**		22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951			**Chemtest Sample ID.:**		1424870	1424871	1424872	1424873	1424874	1424875
			Client Sample ID.:		AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
			Sample Location:		BH01	BH03	BH04	BH05	BH06	BH06
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		2.0	2.0	3.0	2.0	1.0	2.0
			Asbestos Lab:					DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
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] < 1.0	[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] < 5.0	[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0				[A] < 10	[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] < 0.010	[A] < 0.010	
Anthracene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Pyrene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[a]anthracene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Chrysene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[b]fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[k]fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[a]pyrene	N	2800	mg/kg	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	
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] < 0.20	[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	
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	

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**	22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1424870	1424871	1424872	1424873	1424874	1424875
				Client Sample ID.:	AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
				Sample Location:	BH01	BH03	BH04	BH05	BH06	BH06
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	2.0	2.0	3.0	2.0	1.0	2.0
				Asbestos Lab:				DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
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: 24013 Fortfield Road Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17076						
Chemtest Sample ID:	1424873						
Sample Ref:							
Sample ID:	AA175571						
Sample Location:	BH05						
Top Depth(m):	2.0						
Bottom Depth(m):							
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] 0.33	3	5	6
Loss On Ignition	2610	U	%	5.6	--	--	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		8.8	--	>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	0.0012	0.013	0.5	10	70
Copper	1455	U	0.0010	0.0095	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0079	0.079	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	0.004	0.036	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.24	2.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.9	99	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: 24013 Fortfield Road Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17076						
Chemtest Sample ID:	1424874						
Sample Ref:							
Sample ID:	AA171709						
Sample Location:	BH06						
Top Depth(m):	1.0						
Bottom Depth(m):							
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] 0.42	3	5	6
Loss On Ignition	2610	U	%	2.9	--	--	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	< 0.0002	< 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	0.0007	0.0069	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0077	0.077	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	0.41	4.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.5	65	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:
1424870		AA175561	BH01		A	Amber Glass 250ml
1424870		AA175561	BH01		A	Plastic Tub 500g
1424871		AA175554	BH03		A	Amber Glass 250ml
1424871		AA175554	BH03		A	Plastic Tub 500g
1424872		AA175567	BH04		A	Amber Glass 250ml
1424872		AA175567	BH04		A	Plastic Tub 500g
1424873		AA175571	BH05		A	Amber Glass 250ml
1424873		AA175571	BH05		A	Plastic Tub 500g
1424874		AA171709	BH06		A	Amber Glass 250ml
1424874		AA171709	BH06		A	Plastic Tub 500g
1424875		AA171710	BH06		A	Amber Glass 250ml
1424875		AA171710	BH06		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 measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
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.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Test Methods

SOP	Title	Parameters included	Method summary
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.

9PO0T-9R4XH-6DEF3

Job name

22-001-20 Fortfield Terenure

Description/Comments

Project

22-001-20

Site

Fortfield Terenure

Classified by

Name:
Austin Hynes
Date:
19 May 2022 13:55 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	1.0	Non Hazardous		2
2	BH03	1.0	Non Hazardous		5
3	BH04	2.0	Non Hazardous		8
4	BH05	2.0	Non Hazardous		11
5	BH06	1.0	Non Hazardous		14
6	TP01	0.70	Non Hazardous		17
7	TP02	1.0	Non Hazardous		20
8	TP03	0.80	Non Hazardous		23
9	TP04	0.50	Non Hazardous		26

Related documents

#	Name	Description
1	OCM Waste Stream Updated 2021	waste stream template used to create this Job

Report

Created by: Austin Hynes

Created date: 19 May 2022 13:55 GMT

Classification of sample: BH01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH01
Sample Depth:
1.0 m
Moisture content:
12%
(dry weight 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% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		9.8 mg/kg	1.32	11.553 mg/kg	0.00116 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		0.44 mg/kg	3.22	1.265 mg/kg	0.000126 %	✓	
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.6 mg/kg	1.142	1.632 mg/kg	0.000163 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		14 mg/kg	1.462	18.269 mg/kg	0.00183 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		25 mg/kg	1.126	25.131 mg/kg	0.00251 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	15 mg/kg	1.56	20.89 mg/kg	0.00134 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.06 mg/kg	1.353	0.0725 mg/kg	0.00000725 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.5 mg/kg	1.5	3.349 mg/kg	0.000335 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		37 mg/kg	2.976	98.323 mg/kg	0.00983 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1.3 mg/kg	2.554	2.964 mg/kg	0.000296 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		64 mg/kg	2.774	158.523 mg/kg	0.0159 %	✓	
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
		EU 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				0.0053	mg/kg		0.0047	mg/kg	0.000000473 %	✓	
		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:	0.0349 %		

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:

xylene: (conc.: 4.73e-07%)

Classification of sample: BH03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH03
Sample Depth:
1.0 m
Moisture content:
15%
(dry weight 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: 15% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		7.3 mg/kg	1.32	8.381 mg/kg	0.000838 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		1.9 mg/kg	3.22	5.32 mg/kg	0.000532 %	✓	
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.55 mg/kg	1.142	0.546 mg/kg	0.0000546 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		12 mg/kg	1.462	15.251 mg/kg	0.00153 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		10 mg/kg	1.126	9.79 mg/kg	0.000979 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	15 mg/kg	1.56	20.345 mg/kg	0.0013 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.06 mg/kg	1.353	0.0706 mg/kg	0.00000706 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		0.8 mg/kg	1.5	1.044 mg/kg	0.000104 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		15 mg/kg	2.976	38.821 mg/kg	0.00388 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.97 mg/kg	2.554	2.154 mg/kg	0.000215 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		51 mg/kg	2.774	123.027 mg/kg	0.0123 %	✓	
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
		EU 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:	0.0232 %		

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:
BH04
Sample Depth:
2.0 m
Moisture content:
11%
(dry weight 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: 11% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		9.3 mg/kg	1.32	11.062 mg/kg	0.00111 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		0.43 mg/kg	3.22	1.247 mg/kg	0.000125 %	✓	
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.6 mg/kg	1.142	1.647 mg/kg	0.000165 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16 mg/kg	1.462	21.067 mg/kg	0.00211 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		25 mg/kg	1.126	25.358 mg/kg	0.00254 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	17 mg/kg	1.56	23.889 mg/kg	0.00153 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.05 mg/kg	1.353	0.061 mg/kg	0.0000061 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.7 mg/kg	1.5	3.649 mg/kg	0.000365 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		43 mg/kg	2.976	115.297 mg/kg	0.0115 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1.5 mg/kg	2.554	3.451 mg/kg	0.000345 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		79 mg/kg	2.774	197.439 mg/kg	0.0197 %	✓	
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
		EU 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:	0.041 %		

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:
2.0 m
Moisture content:
11%
(dry weight 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: 11% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		1.4 mg/kg	1.32	1.665 mg/kg	0.000167 %	✓	
3	boron { diboron trioxide }	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		0.21 mg/kg	1.142	0.216 mg/kg	0.0000216 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		1.9 mg/kg	1.462	2.502 mg/kg	0.00025 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		3.2 mg/kg	1.126	3.246 mg/kg	0.000325 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	2.9 mg/kg	1.56	4.075 mg/kg	0.000261 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		<0.5 mg/kg	1.5	<0.75 mg/kg	<0.000075 %		<**LOD**
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		4.2 mg/kg	2.976	11.262 mg/kg	0.00113 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.25 mg/kg	2.554	0.575 mg/kg	0.0000575 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		11 mg/kg	2.774	27.492 mg/kg	0.00275 %	✓	
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	EU 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:	0.00664 %		

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:
BH06
Sample Depth:
1.0 m
Moisture content:
16%
(dry weight 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: 16% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		1.7 mg/kg	1.32	1.935 mg/kg	0.000193 %	✓	
3	boron { diboron trioxide }	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		0.27 mg/kg	1.142	0.266 mg/kg	0.0000266 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		1.9 mg/kg	1.462	2.394 mg/kg	0.000239 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<LOD
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		3.4 mg/kg	1.126	3.3 mg/kg	0.00033 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	2.3 mg/kg	1.56	3.093 mg/kg	0.000198 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		<0.5 mg/kg	1.5	<0.75 mg/kg	<0.000075 %		<LOD
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		5.5 mg/kg	2.976	14.112 mg/kg	0.00141 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.25 mg/kg	2.554	<0.638 mg/kg	<0.0000638 %		<LOD
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		9.1 mg/kg	2.774	21.763 mg/kg	0.00218 %	✓	
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
		EU 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:	0.00632 %		

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:
TP01
Sample Depth:
0.70 m
Moisture content:
19%
(dry weight 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: 19% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		22 mg/kg	1.32	24.409 mg/kg	0.00244 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		23 mg/kg	3.22	62.233 mg/kg	0.00622 %	✓	
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.4 mg/kg	1.142	2.304 mg/kg	0.00023 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		25 mg/kg	1.462	30.705 mg/kg	0.00307 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		26 mg/kg	1.126	24.599 mg/kg	0.00246 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	26 mg/kg	1.56	34.08 mg/kg	0.00218 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.09 mg/kg	1.353	0.102 mg/kg	0.0000102 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.7 mg/kg	1.5	4.664 mg/kg	0.000466 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		56 mg/kg	2.976	140.06 mg/kg	0.014 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		2.4 mg/kg	2.554	5.151 mg/kg	0.000515 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		95 mg/kg	2.774	221.465 mg/kg	0.0221 %	✓	
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
		EU 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:	0.0552 %		

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:
TP02
Sample Depth:
1.0 m
Moisture content:
12%
(dry weight 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% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		9.4 mg/kg	1.32	11.081 mg/kg	0.00111 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		0.65 mg/kg	3.22	1.869 mg/kg	0.000187 %	✓	
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.5 mg/kg	1.142	1.53 mg/kg	0.000153 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		13 mg/kg	1.462	16.964 mg/kg	0.0017 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		25 mg/kg	1.126	25.131 mg/kg	0.00251 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	14 mg/kg	1.56	19.498 mg/kg	0.00125 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.05 mg/kg	1.353	0.0604 mg/kg	0.00000604 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.7 mg/kg	1.5	3.617 mg/kg	0.000362 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		37 mg/kg	2.976	98.323 mg/kg	0.00983 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1.5 mg/kg	2.554	3.42 mg/kg	0.000342 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		72 mg/kg	2.774	178.338 mg/kg	0.0178 %	✓	
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
		EU 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:	0.0368 %		

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:
TP03
Sample Depth:
0.80 m
Moisture content:
13%
(dry weight 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% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		9.5 mg/kg	1.32	11.1 mg/kg	0.00111 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		3.8 mg/kg	3.22	10.828 mg/kg	0.00108 %	✓	
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.4 mg/kg	1.142	1.415 mg/kg	0.000142 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		13 mg/kg	1.462	16.814 mg/kg	0.00168 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		21 mg/kg	1.126	20.924 mg/kg	0.00209 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	15 mg/kg	1.56	20.706 mg/kg	0.00133 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.05 mg/kg	1.353	0.0599 mg/kg	0.00000599 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.2 mg/kg	1.5	2.921 mg/kg	0.000292 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		31 mg/kg	2.976	81.65 mg/kg	0.00816 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1.2 mg/kg	2.554	2.712 mg/kg	0.000271 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		69 mg/kg	2.774	169.395 mg/kg	0.0169 %	✓	
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
		EU 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:	0.0346 %		

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:
TP04
Sample Depth:
0.50 m
Moisture content:
13%
(dry weight 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% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU 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		7 mg/kg	1.32	8.179 mg/kg	0.000818 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		2 mg/kg	3.22	5.699 mg/kg	0.00057 %	✓	
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.58 mg/kg	1.142	0.586 mg/kg	0.0000586 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15 mg/kg	1.462	19.401 mg/kg	0.00194 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		11 mg/kg	1.126	10.96 mg/kg	0.0011 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	12 mg/kg	1.56	16.564 mg/kg	0.00106 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		0.9 mg/kg	1.5	1.195 mg/kg	0.000119 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		16 mg/kg	2.976	42.142 mg/kg	0.00421 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1.1 mg/kg	2.554	2.486 mg/kg	0.000249 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		50 mg/kg	2.774	122.75 mg/kg	0.0123 %	✓	
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
		EU 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:	0.0239 %		

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 EU 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)

EU CLP index number: 601-023-00-4
Description/Comments:
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

EU CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
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)

EU 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.
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 (edit as required)

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 (edit as required)

boron {diboron trioxide}

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 (edit as required)

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. (edit as required) 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 (edit as required)

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 (edit as required)

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

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. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

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: EU WM3 1st Edition v1.1.NI using the EU LoW
HazWasteOnline Classification Engine Version: 2022.103.5089.9622 (13 Apr 2022)
HazWasteOnline Database: 2022.103.5089.9622 (13 Apr 2022)

This classification utilises the following guidance and legislation:
WM3 v1.1.NI - Waste Classification - 1st Edition v1.1.NI - Jan 2021
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 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
17th ATP - Regulation (EU) 2021/849 of 11 March 2021

Appendix F Compliance of BIA report with Appendix 9 of the Dublin City Development Plan 2022 – 2028 "Basement Development Guidance".

Table F- 1: Dublin City Development Plan Appendix 9 BIA Component Parts reflected in this submitted BIA (222102-PUNCH-XX-XX-RP-C-0200)

DCC Development Plan 2022-2028 Appendix 9, BIA Component Parts	Location in this submitted BIA
1. Baseline Characteristics of the Project	Section 1
2. Site Investigation and Geotechnical Analysis	Sections 2, Appendix D and Appendix E
3. Impact Assessment	
a) General	Section 3.2
b) Groundwater Flow	Section 3.3
c) Land Stability and Ground Movement	Sections 3.4
d) Surface Flow and Flooding	Section 3.5 Refer to 'Site Specific Flood Risk Assessment'
e) Cumulative Effects	Section 3.6
f) Construction Related Impacts	Sections 3.7 Refer to 'Outline Construction Management Plan' and 'Outline Resource & Waste Management Plan'
g) Temporary Works	Section 3.8
h) Heritage and Biodiversity Impacts	Section 3.9 Refer to 'Planning Report', 'Biodiversity Management Plan', 'Ecological Impact Assessment', 'Natura Impact Statement' and 'Archaeology Assessment'
i) Land Use	Section 3.10
4. Construction Management Plan	Section 4 Refer to 'Outline Construction Management Plan' and 'Outline Resource & Waste Management Plan'
5. Impact Assessment and Mitigation	Section 5
6. Non-Technical Summary	Section 6

Table F- 2: Dublin City Development Plan Appendix 9 BIA 'Submission Checklist' reflected in this submitted BIA (222102-PUNCH-XX-XX-RP-C-0200)

	Item	Yes/ No
1	Description of proposed development	Yes – Section 1.2
2	Plan showing boundary of development including any land required temporarily during construction	Yes – Appendix A Please also refer to 'Outline Construction Management Plan' included in the planning submission
3	Plan, maps and photographs to show the location of basement relative to surrounding structures	Yes – Appendix A, Figure 1-21-1 and 1-2
4	Plans, maps and or photographs to show topography of surrounding area with any nearby watercourses/waterbodies including consideration of the relevant maps on the SFRA (Vol 7)	Yes – Appendix A. Please also refer to 'Site Specific Flood Risk Assessment' and Architectural Drawings for flood risk and topographic details
5	Plans and sections to show foundation details of adjacent structures (reference to pre-condition reports)	Not applicable as the basement extents are remote from many other existing structures
6	Plans and sections to show layout and dimensions of proposed basement and all proposed foundation details	Yes – Appendix A and Section 4
7	Modelling evaluation of baseline groundwater levels and flows	Yes – Section 2.4
8	Modelling and evaluation of groundwater levels and flows during construction and following construction of basement	Yes - Section 3.3
9	Programme of enabling works and construction and restoration	Yes – refer to Section 4 and the 'Outline Construction Management Plan' included in the planning submission
10	Identification of potential risks to land stability (including surrounding structures and infrastructure and groundwater flooding)	Yes – Sections 2.1, 3 and 5.2. Refer also to Section 3.4.4 and Drawings 222102-PUNCH-XX-XX-DR-C-0130 and 0131 for illustration.
11	Assessment of potential risks on neighbouring properties and surface groundwater	Yes – Sections 3.2-3.10

	Item	Yes/ No
		Refer also to 'Site Specific Flood Risk Assessment' and 'Engineering Planning Report' regarding surface water and flooding. Please also refer to Sections 3.3 to 3.9 for assessment of the various potential risks on neighbouring properties. These sections demonstrated that risk is adequately mitigated to an acceptable level.
12	Identification of significant adverse impacts	Yes – Sections 2.1, 3 and 5. A Damage Impact Assessment is outlined in Section 3.4.7.
13	Ground Investigation Report and Conceptual Site Model including: • Desktop study • Exploratory hole record • Results from monitoring the local groundwater regime • Confirmation of baseline conditions Factual site investigation report	Yes – Section 2, Appendix C, Appendix D and Appendix E
14	Ground Movement Assessment	Yes – Section 3.4. Please note that ground movement modelling has not been undertaken as it is clearly identified that surrounding sites are not within the zone of influence. A Damage Impact Assessment is outlined in Section 3.4.7.
15	Plans, drawings, reports to show extent of affected area	Yes- Appendix A. Refer also to Section 3.4.4 and Drawings 222102-PUNCH-XX-XX-DR-C-0130 and 0131 for illustration of the basement excavation extents and associated Zone of Influence.

	Item	Yes/ No
16	Construction Sequence Methodology (CSM) referring to site investigation and containing basement, floor and roof plan, sections, sequence of construction and temporary works	Yes – Section 4 and the 'Outline Construction Management Plan' included in the planning submission
17	Proposals for monitoring during and post construction (groundwater movement and levels, ground movement, vibration with comparisons to baseline) – limits to be advised in BIA and monitored. Any breaches should be reported to DCC's Environment and Transportation Department	Yes – Refer to Sections 3.4.8 and 3.4.9. Also, Sections 3.7 and 5 and the 'Outline Construction Management Plan' and the 'Outline Resource & Waste Management Plan' included in the planning submission
18	Consideration of potential impacts to protected structures, conservation areas and archaeology where relevant	Yes – Section 3.9
19	Consideration of potential impacts to biodiversity and amenity	Yes – Section 3.9 and the 'Ecological Impact Assessment' included in the planning submission
20	Construction Management Plan	Yes – refer to Section 4 and the 'Outline Construction Management Plan' included in the planning submission
21	Impact assessment and specific mitigation measures to reduce or offset significant adverse impacts with comparisons to baseline study	Yes – Sections 3 and 5. Refer also to Section 3.4.4 and Drawings 222102-PUNCH-XX-XX-DR-C-0130 and 0131 for illustration of the basement excavation extents and associated Zone of Influence.
22	Provision for monitoring post construction (post-condition surveys, groundwater levels/flows etc.)	Yes – Refer to Sections 3.4.8 and 3.4.9. Also, Sections 3.7 and 5 and the 'Outline Construction Management Plan' and the 'Outline Resource & Waste Management Plan' included in the planning submission
23	Non-technical summary of full report	Yes – Sections 5.2 and 6

Appendix G Basement Excavation – Zone of Influence Extents

LEGEND

AREA WITHIN SOUTH DUBLIN COUNTY COUNCIL OWNERSHIP

AREA WITHIN DUBLIN CITY COUNCIL OWNERSHIP

PRIVATE SITE EXTENTS

56.75

49.04

ZONE OF INFLUENCE EXTENTS TAKEN 45 DEGREES FROM DEPTH OF EXCAVATION

2m WIDE WORKING ZONE

BASEMENT EXTENTS

4.10

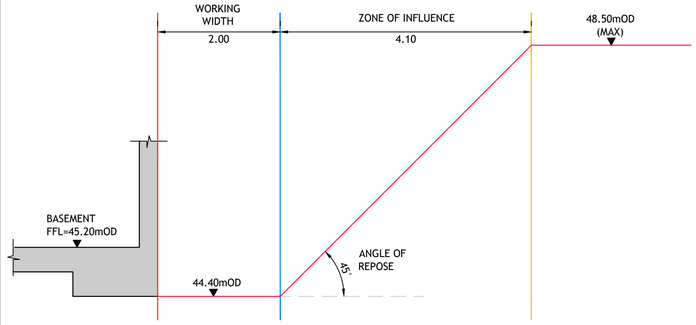
25.54

11.51

14.42

35.80

54.78



TYPICAL BASEMENT EXCAVATION SECTION

SCALE 1:50

Rev	Amendment	By	Date	Rev	Amendment	By	Date
C01	STAGE 3 LRD SUBMISSION	DAP	2024-08-19				
C02	STAGE 3 LRD SUBMISSION	DAP	2024-10-29				
C03	STAGE 3 LRD SUBMISSION	DAP	2024-12-06				

Client: 1 Celbridge West Land Limited

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Project: FORTHFIELD ROAD, TERENURE, DUBLIN 6W				
Title: BASEMENT EXCAVATION - ZONE OF INFLUENCE EXTENTS (ANGLE OF REPOSE 45 DEGREES)				
Drawn: D. PERYSINAKI	Date drawn: FEBRUARY 2024	Technician Check: PJ. MULCAHY	Engineer Check: MC.DALY	Approved: P. CASEY
Project No: 222102	Model Ref: 222102-PUNCH-XX-XX-M2-C-0130-0131		Drawing Status: A0	
Scale @ A1: 1:500	Document No: 222102-PUNCH-XX-XX-DR-C-0130			Revision No: C03

LEGEND

AREA WITHIN SOUTH DUBLIN COUNTY COUNCIL OWNERSHIP

AREA WITHIN DUBLIN CITY COUNCIL OWNERSHIP

PRIVATE SITE EXTENTS

ZONE OF INFLUENCE EXTENTS TAKEN 30 DEGREES FROM DEPTH OF EXCAVATION

2m WIDE WORKING ZONE

BASEMENT EXTENTS

53.98

46.60

7.10

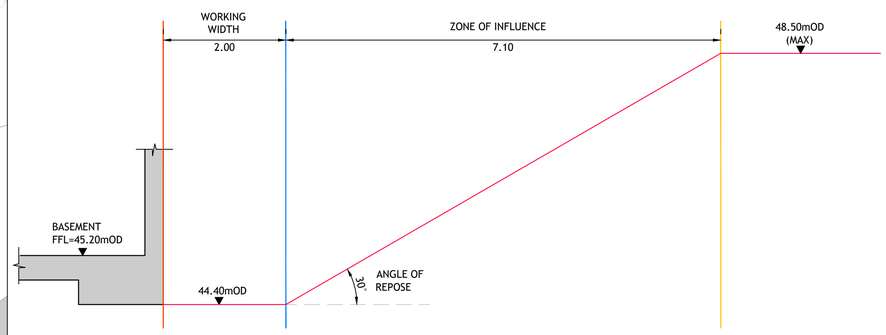
22.00

8.86

11.42

34.21

52.52



TYPICAL BASEMENT EXCAVATION SECTION

SCALE 1:50

BUILDING INFORMATION MODELLING (BIM) I.S. EN ISO 19650-2:2018 NSAI Certified

Rev	Amendment	By	Date	Rev	Amendment	By	Date
C01	STAGE 3 LRD SUBMISSION	DAP	2024-08-19				
C02	STAGE 3 LRD SUBMISSION	DAP	2024-10-29				
C03	STAGE 3 LRD SUBMISSION	DAP	2024-12-06				

Client: 1 Celbridge West Land Limited

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t +353 1 271 2200 | w punchconsulting.com

Project: FORTHFIELD ROAD, TERENURE, DUBLIN 6W

Title: BASEMENT EXCAVATION - ZONE OF INFLUENCE EXTENTS (ANGLE OF REPOSE 30 DEGREES)

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
D. PERYSINAKI	FEBRUARY 2024	PJ. MULCAHY	MC.DALY	P. CASEY

Project No:	Model Ref:	Drawing Status:
222102	222102-PUNCH-XX-XX-M2-C-0130-0131	A0

Scale @ A1:	Document No:	Revision No:
1:500	222102-PUNCH-XX-XX-DR-C-0131	C03

Appendix H BIA Auditor's Report

CUNDALL

Auditor's Report – Fortfield Road, Terenure

Project	DCC Planning Ref.	Date
Basement Impact Assessment	LRD6058/24	19/07/2024

Purpose of report	Client	Authorised by
BIA Auditor Report	Dublin City Council	Gary Kellett

Information and Context

The main information reviewed as part of this audit is as follows:

- Punch Consulting Engineers, March 2024, Residential Development, Fortfield Road, Terenure. Engineering Planning Report. Report number 222102-PUNCH-XX-XX-RP-C-0002. REV C02.
- Punch Consulting Engineers, March 2024, Residential Development, Fortfield Road, Terenure. Site Specific Flood Risk Assessment. Report number 222102-PUNCH-XX-XX-RP-C-0003. REV C02.
- Punch Consulting Engineers, March 2024, Residential Development, Fortfield Road, Terenure. Outline Construction Management Plan. Report number 222102-PUNCH-XX-XX-RP-C-0006. REV C01.
- Punch Consulting Engineers, March 2024, Residential Development, Fortfield Road, Terenure. Basement Impact Assessment. Report number 222102-PUNCH-XX-XX-RP-C-0011. REV C01.

The policy documents reviewed as part of this audit are as follows:

- Dublin City Council, Dublin City Development Plan 2022 – 2028 Volume 2 Appendices.

Review of the Adequacy of BIA

	Item	Comment / Justification
1	Description of proposed development.	**Adequate** – Presented as Section 1.2 of the BIA.
2	Plan showing boundary of development including any land required temporarily during construction.	**Adequate** – Presented as Figure 1-1. Further information is provided in the Outline Construction Management Plan.
3	Plan, maps and photographs to show the location of basement relative to surrounding structures.	**Adequate** – Presented as Figures 1-1 and 1-2 and within Appendix A.
4	Plans, maps and or photographs to show topography of surrounding area with any nearby watercourses/waterbodies including consideration of the relevant maps on the SFRA (Vol 7).	**Adequate** – Presented as Figure 1-10. Further detail provided in 'Site Specific Flood Risk Assessment'. The topography of the site (or spot levels) is not indicated in either report although an outline description is provided.
5	Plans and sections to show foundation details of adjacent structures (reference to pre-condition reports).	**Adequate** – No section drawings or foundation details have been presented. However, plan information of buildings and basement is presented in Figure 1-2.

	Item	Comment / Justification
6	Plans and sections to show layout and dimensions of proposed basement and all proposed foundation details.	**Adequate** – Basement plan included in Appendix A. Figure 4-1 presents the proposed basement section, however foundation details have not been provided. This is acceptable during the pre-planning phase, but further information is expectedfor the planning submission.
7	Modelling evaluation of baseline groundwater levels and flows.	**Adequate** – Available information pertaining to groundwater flow is reviewed in Section 3.3. Results from two rounds of groundwater monitoring in four exploratory holes is included in Table 2-4.
8	Modelling and evaluation of groundwater levels and flows during construction and following construction of basement.	**Adequate** – Based on the information available, the groundwater levels have been considered in Section 3.3.1 of the BIA.
9	Programme of enabling works and construction and restoration.	**Adequate** – Basement construction and programme presented as Section 3.4. Additional information is provided in the Outline Construction Management Plan.
10	Identification of potential risks to land stability (including surrounding structures and infrastructure and groundwater flooding.	**Inadequate** –Section 3.4 discusses land stability and ground movement. The basement shall be constructed by an open battered excavation and retaining wall. However, no proposed slope gradients are provided to confirm that these will not impact surrounding land/structures.
11	Assessment of potential risks on neighbouring properties and surface groundwater.	**Inadequate** – The implementation of SuDS is discussed in Table 3-6 and further discussed in the Engineering Planning Report. Further information on surface water is supplied within the Site-Specific Flood Risk Assessment. A Damage Impact Assessment is to be produced (Section 3.4.6) for the neighbouring structures and monitoring of ground movements at a later stage. This should be part of the Basement Impact Assessment.
12	Identification of significant adverse impacts.	**Inadequate** – Potential impacts have been presented within Table 2-1, and Table 3-1 presents conclusions based on the outcome of the site investigation. However, as noted above a Damage Impact Assessment has not been carried out.
13	Ground Investigation Report and Conceptual Site Model including: ▪ Desktop study ▪ Exploratory hole record ▪ Results from monitoring the local groundwater regime ▪ Confirmation of baseline conditions ▪ Factual site investigation report	**Adequate** – A conceptual site model has not been provided for the site however a risk assessment is included as Section 2.9 and 2.10 which concludes that the site is generally at “low risk” of contamination. ▪ A desk top study is included as Section 1.0. ▪ Ground conditions are discussed in Section 2.4 and exploratory hole logs are included as Appendices C and D ▪ Groundwater monitoring results are presented in Table 2-4. ▪ Baseline site conditions are discussed within Section 1. Groundwater monitoring provides baseline information relating to existing levels.

	Item	Comment / Justification
		▪ The factual site investigation report is included as Appendix D
14	Ground Movement Assessment. Appropriate modelling used in reaching the BIA assumptions including anticipated structural damage categorised according to the Burland Scale, and conclusions (mindful that Auditor shall use professional judgement in respect of calculations in the audit material and are not routinely required to carry out any detailed calculations or checking of specific figures).	**Inadequate** – Ground movement modelling and a structural damage assessment have been considered (Sections 3.4.6 and 3.4.7), however have not yet been undertaken. The report recommends that both be detailed at a later stage – this will be required for planning submission.
15	Plans, drawings, reports to show extent of affected area.	**Inadequate** – No ground movement modelling has been undertaken. There is no mention to the anticipated zone of influence of the proposed development in the preliminary BIA. This information is required for the planning submission.
16	Construction Sequence Methodology referring to site investigation and containing basement, floor and roof plan, sections, sequence of construction and temporary works.	**Adequate** – Section 4.0 presents the basement construction methodology. The Outline Construction Management Plan is included in the planning submission. As noted above further information on the geometry of temporary ground slopes should be provided.
17	Proposals for monitoring during and post construction (groundwater movement and levels, ground movement, vibration with comparisons to baseline) – limits to be advised in BIA and monitored. Any breaches should be reported to DCC's Environment and Transportation Department.	**Inadequate** – Groundwater monitoring is recommended during and after construction in Section 3.4.5 and discussed in Section 3.4.7. Proposed ground movement monitoring is provided however lacks detail. The report states that this will be developed within a future monitoring specification for the works. For the planning submission, it is necessary to present the monitoring methodology, define trigger limits, and outline contingency measures.
18	Consideration of potential impacts to protected structures, conservation areas and archaeology where relevant.	**Adequate** – No areas of conservation or protected structures have been identified within the BIA (Section 3.9).
19	Consideration of potential impacts to biodiversity and amenity.	**Inadequate** – Section 3.9 does not consider the environmental impact of the development to the site. Furthermore, the site is characterised as both a brownfield and greenfield site in different sections of the report. Reference should be made to the Ecology Letter included within part of the package prior to planning submission.
20	Construction Management Plan.	**Adequate** – A Construction Management Plan has been prepared in line with the BIA (Section 4.0) Further information is provided within the Outline Construction Management Plan report.
21	Impact assessment and specific mitigation measures to reduce or offset significant adverse impacts with comparisons to baseline study.	**Inadequate** – Reasoning as to why neighbouring properties are not considered should be justified within the report.

	Item	Comment / Justification
22	Provision for monitoring post construction (post-condition surveys, groundwater levels/flows etc.).	**Inadequate** – Groundwater monitoring is recommended during and after construction in Section 3.4.5 and discussed in Section 3.4.7. Proposed ground movement monitoring is provided however lacks detail. The report states that this will be developed within a future monitoring specification for the works. For the planning submission, it is necessary to present the monitoring methodology, define trigger limits, and outline contingency measures.
23	Non-technical summary of full report.	**Inadequate** – A non-technical summary is included in Section 5.2 and 6.0. The text appears to include information that is not related to the site.
24	Identification of relevant cumulative impacts on land stability and local ground and surface water conditions arising from the basement development.	**Adequate** – Section 2 states that no cumulative impact on basement extents to surrounding structures are anticipated.
25	Provision of documents compatible with one another and supportive of the assessments, findings and conclusions of all BIA components.	**Adequate** – A Construction Management Plan has been prepared in line with the BIA and a site-specific flood risk assessment is referenced within the BIA.
26	Sufficiency of ground investigation to determine the conceptual ground model.	**Adequate** – Borehole logs (including location and elevation) are provided. Geotechnical laboratory tests were performed to assess the engineering properties of the soil layers (Appendix D). Groundwater monitoring was undertaken at four locations across the site. This should provide sufficient information to determine the conceptual ground model.
27	Identification of proposed additional ground investigation to verify assumptions made in the BIA.	**Inadequate** – Section 5.3 identifies outstanding risks and issues. The report identifies that no further ground investigation is required however suggests that the findings of the ground movement analysis and damage assessment be revisited once detail design proposals have been finalised.
28	Assessment and consideration of the condition of neighbouring above and below ground structures.	**Inadequate** – the condition of the neighbouring structures has not been considered in the BIA. If they are outside the zone of influence of the basement construction, this should be explicitly stated within the report and the author should provide their reasoning for this.

Particular Concerns

Issue	Concern Raised	Response to Concern	Final Auditor conclusion/ recommendation with supporting reasons

Request for Further Information

Further Information required?	Y	N
The BIA author should complement the preliminary report using the guidance given in this auditor's report comments. The BIA report for the planning submission should state clearly that neighbouring structures are not within the zone of influence and justify their reasoning for this.		
An adequate ground movement assessment must be undertaken unless it is clearly identified that surrounding sites are not within the zone of influence. The provision for monitoring during and post-construction, and mitigation measures to reduce or offset significant adverse impacts, should be presented.		
Additional information on the proposed foundations, earth retaining structures, and temporary ground slopes should also be presented.		
The report should include consideration of potential impacts to biodiversity and amenity or refer specifically to relevant separate reports.		

Proposed Planning Conditions

Final Summary of BIA Audit Recommendations and Conclusions

The overall approach of the BIA is considered adequate and in line with BIA Policy. However, further information is required, specifically for a ground movement assessment and monitoring proposals. The author could justify their reasoning for not considering adjacent structures which will resolve many of the issues highlighted by the auditor above. Recommendations for further works have been provided.