Horganlynch
Consulting Engineers

Proposed Student Accommodation

Prussia Street

Dublin 7

- Basement Impact Assessment

Horganlynch
Consulting Engineers

Document Control Sheet

Project Number:	KC12		
Project Name:	Proposed Student Accommodation, Prussia Street, Dublin 7		
Client:	Lyonshall Ltd.		
Document Title:	Basement Impact Assessment		
Document Reference:	KC12-RP-HLCE-CE-0004	Current Revision:	0

Issue History

Rev.	Date	By	Chk	Description
0	15.02.2024	PB	NF	Issued for Planning

Review

Prepared By:	Pat Brady Niall FitzGerald
Date:	15th Februray 2024
Other Contributors:	
Checked by:	Niall FitzGerald

Horganlynch
Consulting Engineers

Table of Contents

1.0 Executive Summery

1.1 OVERVIEW

Lyonshall Development Ltd. intend to apply for planning permission for the development of a Student Accommodation Facility at Prussia Street, Dublin 7.

Horganlynch have been appointed by Lyonshall to provide the necessary Engineering design and Consultancy services in respect to the proposed development.

The development will see the demolition of the existing industrial buildings on the site and the construction of 2 no. apartment blocks complete with 373 no. Student bedspaces and associated services. The development is also to include basement accommodation within the footprint of one of the apartment blocks and it is this basement that is the subject of this basement impact assessment.

1.2 PURPOSE OF THE REPORT

The purpose of the Basement Impact Assessment, as is defined in the Basement Development Guidance of Dublin City Council, is to identify potential impacts, short and long term; to inform whether a proposed basement is acceptable; and to identify whether appropriate mitigating measures can be incorporated.

On the following sections site location, project potential impacts and measures will be described.
This Basement Impact Assessment has been undertaken in line with Dublin City Council's Basement Development Guidance, the assessment aims to identify and evaluate the potential short and long-term impacts of proposed basement. It assesses the acceptability of the proposed basement on this site and identifies possible appropriate mitigating measures which may be incorporated.

This BIA was conducted to evaluate how constructing a basement in the proposed development would affect the current water conditions both during and after construction.

The following sections cover site location, potential project impacts, and associated measures.

2.0 SITE DESCRIPTION

2.1 SITE LOCATION

The propose student accommodation development is to be located on the site of the former IDA Centre at the west side of Prussia Street , Dublin 7 close to the main TU Dublin Grangegorman campus site.

The site is bounded to the east by Prussia Street (incl. terraced housing), to the north by a Drumalee Road Residential development, to the south by a Presbytery site and to the west by the public road serving Drumalee Court. - see figure 1 below.

Figure 1 *Development Site at Prussia Street, Dublin 7*

2.2 SITE TOPOGRAPHY

The existing site has a number of now disused former industrial and office building structures around the site.

The site itself generally falls approximately 3.5m from the north west to south west corner of the site.

Figure 2 below shows the site topographic survey plan with some of the principle spot levels and contours noted. The high point of the site is noted at +28.87 OD at the north west corner boundary. The low point of the site is to the south west at the main site entrance from Prussia Street which is a circa +25.0m OD.

The main entrance road within the site runs east west and is relatively level rising only circa 1.2m over a distance of 80m from +25.0m OD at the Prussia Street entrance to +26.12m OD at the western end of the road.

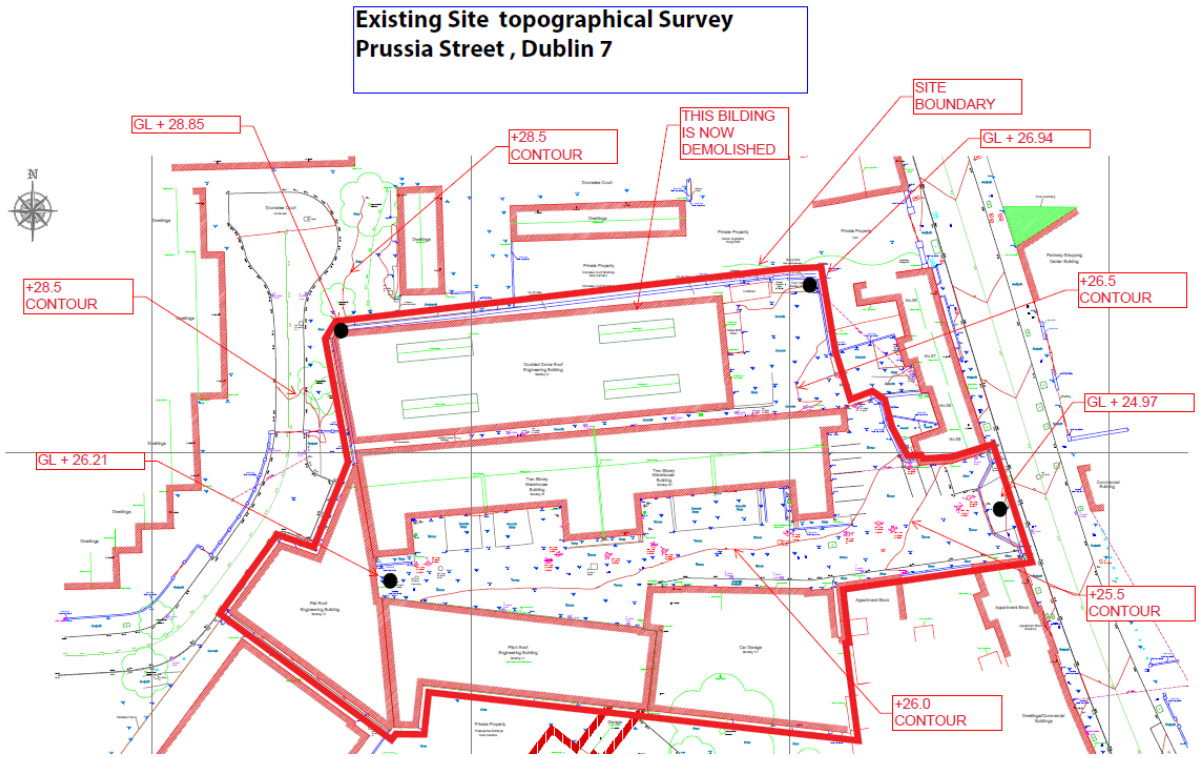


Figure 2 *Existing Site Topographic Survey plan with ground levels indicated*

2.3 EXISTING GROUND CONDITIONS – SITE INVISTIGATION

In April 2023 a geotechnical site investigation was carried out at the site. This investigation comprised of the following:

- 2 no. trial pits
- 4 no. percussion boreholes
- 4 no. rotary core follow on boreholes
- Installation of 1 no. ground water monitoring well
- Geotechnical & environmental laboratory testing

A report on the findings of the above was prepared and issued and a copy of same is appended to Appendix A of this report.

In summary, the SI found as follows:

- Ground conditions:

The sequence of strata was relatively consistent across the site and generally comprised as follows:

Made ground (0.6m-1.00m)

Cohesive deposits (sandy gravely clay to depths of 2.35m – 2.5m over stiff/very firm clay to depths of 14m)

Residual bedrock (at depths of 14m-18.5m)

Bedrock (at depths of circa 18m)

- Ground water:

  No ground water was noted during the percussion borehole drilling. Ground water monitoring noted ground water at a depth of 2.36m BLG.

Based on the above findings, it would appear that rock will not be encountered during excavation for the basement and ground water will only impact on the final 1m-1.5m of the basement excavation.

2.4 GEOLOGICAL AND HYDROGEOLOGICAL SETTING

From the (GSI) Geological Society of Ireland maps the bedrock underlying the

site is part of the Luncan Formation and made up of dark limestone and shale.

The lithological description comprises fossiliferous, pale to dark grey, bedded marine limestones and thin shales and pale yellow to grey grainstones. Calcareous grits, sandstones and siltstones occur locally at the base.

Residual bedrock was encountered in the rotary core boreholes between 14m & 18.5m depth with solid bed rock at circa 18m below ground level. The site investigation boreholes which were undertaken by GII, had a maximum exploration depth of 23.5mbgl.

Figure 3 below shows an extract from the GSI geotechnical map which show records of a number of boreholes undertaken on adjoining sites to this proposed development site at Prussia Street.

These boreholes were taken to depths of between 5 and 10mblg with no rock met.

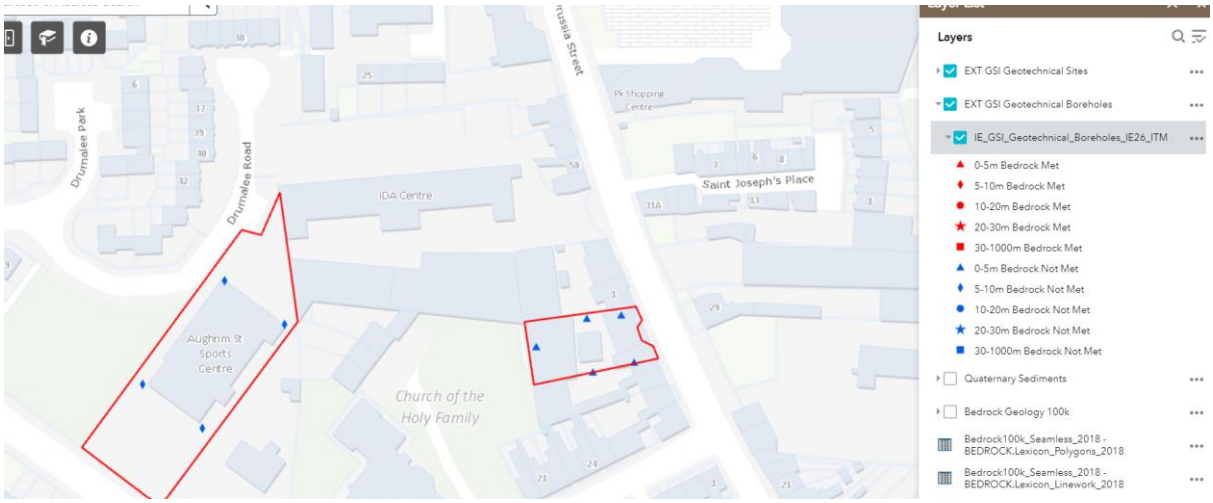


Figure 3 Extract for GSI Maps showing boreholes on adjacent site

The GSI also classifies the principal aquifer types in Ireland as:

- Lk: Locally Important Aquifer – Karstifie
- Ll: Locally Important Aquifer - Bedrock which is Moderately Productive only in
- Local Zones
- Lm: Locally Important Aquifer - Bedrock which is Generally Moderately
- Productive
- Pl: Poor Aquifer - Bedrock which is Generally Unproductive except for Local
- Zones
- Pu: Poor Aquifer - Bedrock which is Generally Unproductive
- Rkd: Regionally Important Aquifer (karstified diffuse)
- From the GSI map the bedrock aquifer beneath the subject site as a 'Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones'.

- The GSI also classifies the groundwater vulnerability, which represents the intrinsic
- geological and hydrological characteristics that determine the ease with which
- groundwater may be contaminated generally by human activities.
- The GSI aquifer vulnerability class in the region of the site is presented as low as indicated in he map extract in figure 4 below.

From the GSI map the bedrock aquifer beneath the subject site as a 'Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones'.

The GSI also classifies the groundwater vulnerability, which represents the intrinsic geological and hydrological characteristics that determine the ease with which groundwater may be contaminated generally by human activities.

The GSI aquifer vulnerability classifies the bedrock aquifer in the region of the subject site as having mainly 'Low' vulnerability which indicates a general overburden depth potential

greater than 10m, indicating that the aquifer is naturally well protected by low permeability tills.

See the GSI ground water vulnerability classification map extract in figure 4 below.

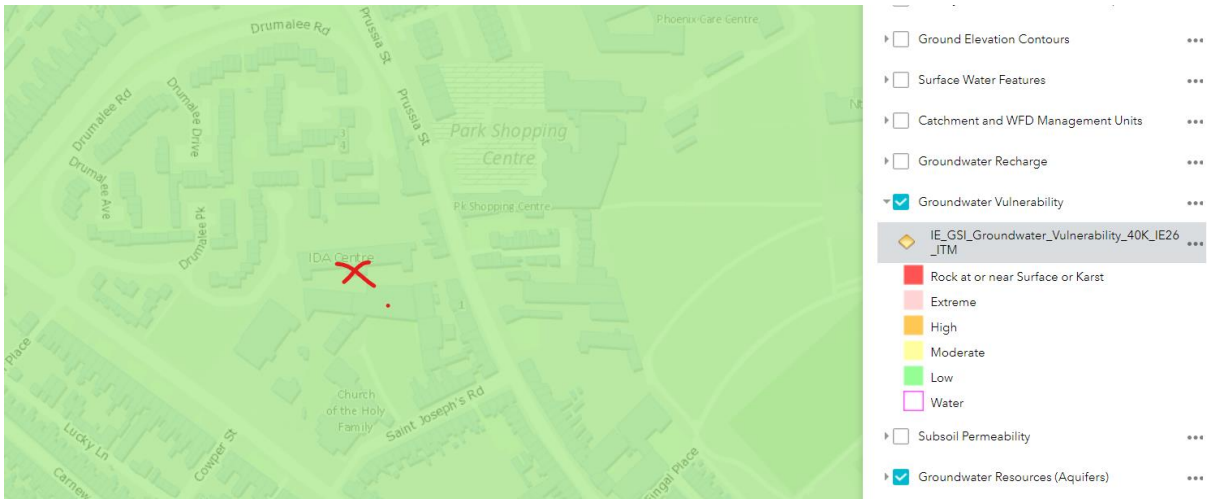


Figure 4 Extract for GSI Maps indicating the Ground Water Vulnerability of the site as low

The quaternary sediments in the area of the subject site indicates the principal subsoil type in the area comprises Limestone till Carboniferous (TLs, i.e. Till derived from limestones) .

2.5 HYDROLOGICAL SETTING

As seen from the extract of the EPA map in figure 5 below , the site is located on the hydrometric area of the Liffey and Dublin bay (09) and the Tolka River sub-catchment.

According to the EPA maps, the site is located on the hydrometric area of the Liffey and Dublin Bay (09) and the Tolka River sub-catchment.

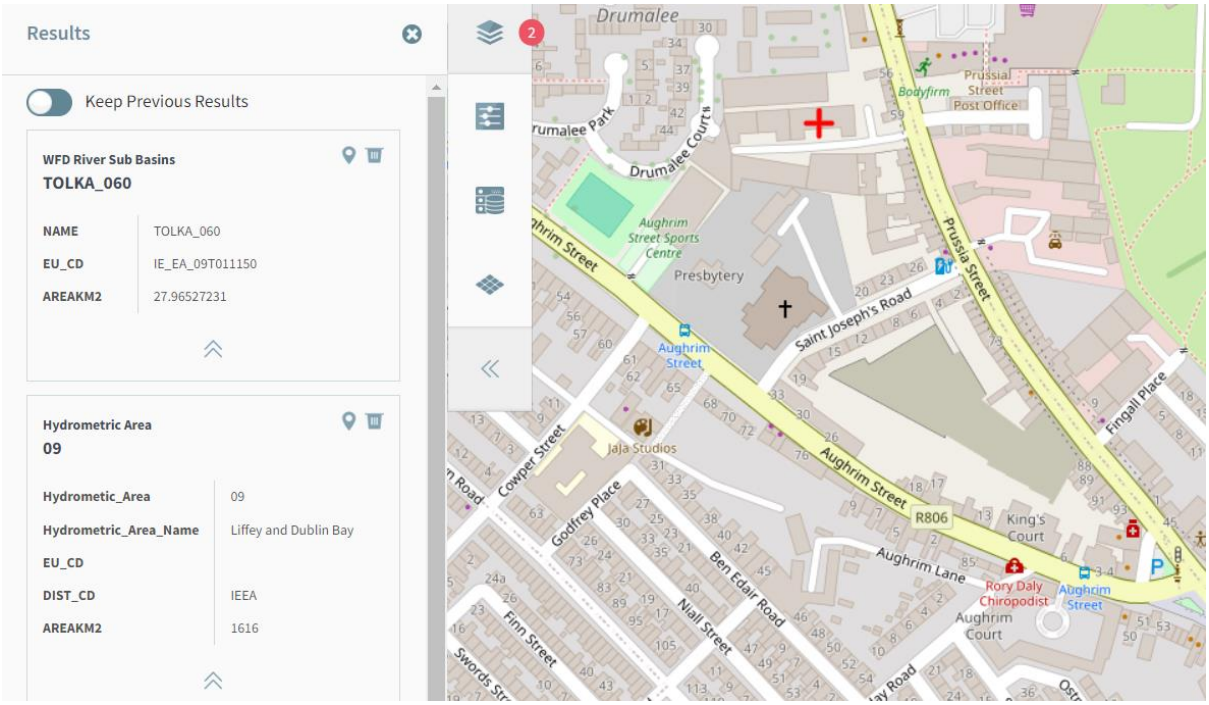


Figure 5 Extract for EPA Maps indicating the site hydrometric area as Liffey and Dublin Bay

There are no open watercourses at the site or in the immediate vicinity of the site.

The nearest watercourse to the site is the Liffey River c. 1 Km to the south of the site. Although the site lies within the Tolka River sub-catchment; the Tolka River is located c.3 Km to the north east. The Dublin Bay coastal waterbody is the nearest water receptor and is located c. 9 Km southeast of the proposed development site.

From a site specific flood Risk Assessment of the proposed site it has been determines that the there is no risk of fluvial, coastal or groundwater flooding as the proposed development falls within a fluvial and coastal Flood Zone C.

3.0 DESCRIPTION OF THE PROPOSED REDEVELOPMENT

As stated the proposed development is to be constructed on the site of the former IDA Centre at the west side of Prussia Street.

The site is located west of Prussia street in close proximity to the pedestrian access to the TU Campus at Grangegorman.

The site is bounded to the east by Prussia Street (incl. terraced housing), to the north by a Drumalee Road Residential development, to the south by a Presbytery site and to the west by the public road serving Drumalee Court.

The scope of the development is to comprise of the following:

The demolition of the existing structures on the site, and the construction of a large-scale residential development consisting of a Student Accommodation scheme with 373 no. student bedspaces, a café and all other ancillary site development works. The proposed development consists of 2 no. apartment blocks ranging in height from 4 to 5 storeys and a terrace of 6 no. studio units and all ancillary development works.

The building sub structure will generally comprise concrete raft slabs, strips and pad foundations constructed at various levels either on engineered fill or founded in the stiff clay sub strata. There will be reinforced concrete retaining walls to below ground and basement structures.

The buildings 4 & 5 story super structure will constructed utilizing a light gauge steel modular build system complete with composite metal deck and concrete floors. There will be some discrete hot rolled structural steel beam and column sections introduced with in the light gauge steel framing to facilitate load transfer within the super structure where vertical structures are unaligned. The vertical stair and lift cores will be constructed in reinforced concrete to provide the necessary lateral restraint and load transfer to the building structure.

The external façade will generally be brick and stone cladding supported back to the main structural frame.

The development is to include a single storey basement, which will comprise of the following accommodation:

- Courtyard
- Gym
- Study room & student lounge
- Games room
- Laundry room
- Cinema, plant rooms
- Open courtyard

See Figure 6 & 7 – Proposed Ground Floor Plan & Basement Plan

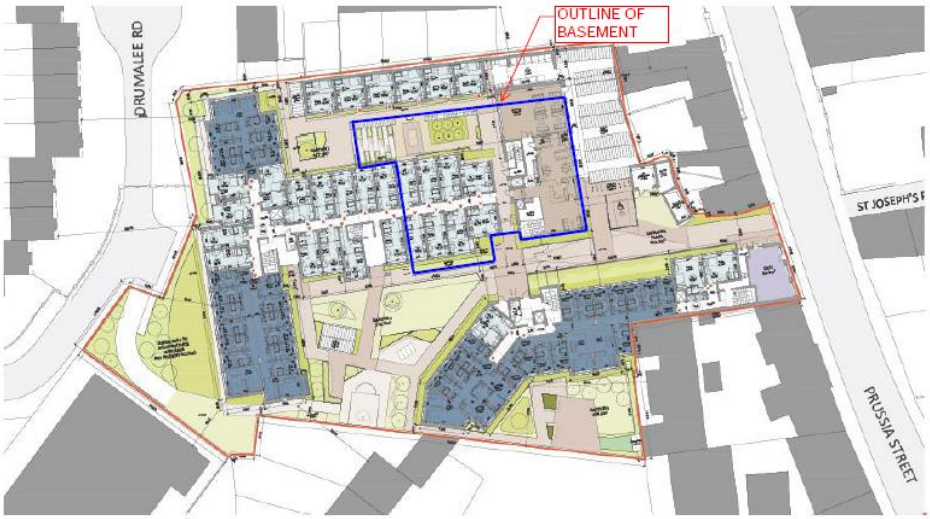


Figure 6 – Proposed Ground Floor Plan

Figure 7 – Proposed Basement Plan

The location of this basement is such that the minimum distance of the basement to a boundary and adjoining building is as follows:

- 6m to the northern boundary
- 10m to the closest adjoining building to the east

3.1 STRUCTURAL DESIGN OF PROPOSED DEVELOPEMNT

The building sub structure will generally comprise concrete raft slabs, strips and pad foundations constructed at various levels either on engineered fill or founded in the stiff clay sub strata. There will be reinforced concrete retaining walls to below ground and basement structures.

The buildings 4 & 5 story super structure will be constructed utilizing a light gauge steel modular build system complete with composite metal deck and concrete floors. There will be some discrete hot rolled structural steel beam and column sections introduced with in the light gauge steel framing to facilitate load transfer within the super structure where vertical structures are unaligned. The vertical stair and lift cores will be constructed in reinforced concrete to provide the necessary lateral restraint and load transfer to the building structure.

The external façade will generally be brick and stone cladding supported back to the main structural frame.

3.2 BASEMENT CONSTRUCTION

The proposed basement will be single storey construction and will measure circa 31.5m x 25.55m in plan. The basement level will be circa 4m-4.5m below the existing ground level at the northern boundary. Figure 8 below shows the proposed basement construction plan.

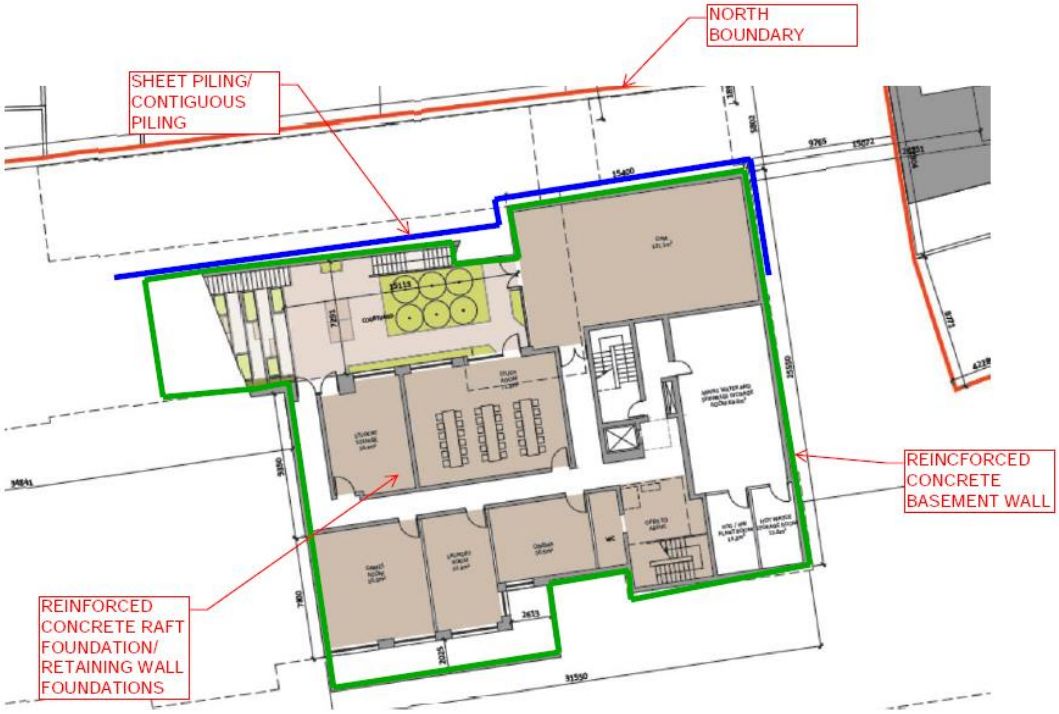


Figure 8 : Basement Construction Plan

Generally, the depth and location of the basement is such that conventional construction methods will be adopted for the build, this being excavating and the battering back the excavation to a safe working slope without impacting/undermining the adjoining sites or properties. However, at the northern side of the basement retention measures such as embedded cantilever sheet piling/contiguous piling will be installed to allow the basement to be excavation while protecting the site to the north.

The proposed structure of the basement will comprise of reinforced concrete basement slab and wall construction, both detailed and designed to the appropriate grade to cater for the proposed use of the basement.

Figure 9 & figure 10 below show the typical cross section details through the basement construction from both the open battered excavation and the retained piled excavation situation respectively.

Geotechnical Site investigation results indicate that the basement structure will be founded in the very stiff grey cohesive deposits. The basement floor level will be at circa +22.00m OD and the substructure will be a 400-450mm thick raft slab structure.

From the ground water monitoring undertaken at the SI stage ground water was noted in borehole 3 at -2.35m below ground level, this is circa 1.85m above the proposed basement floor level. Given this record water level localised dewatering will be required to facilitate the excavation and installation of the basement.

From the soil type and condition identified in the site investigation the excavation should be battered back to the open excavation areas at a batter of 2:1 Horz/vert in the upper made ground and cohesive deposits and at a 1:1 H/V batter in the stiff cohesive deposits.

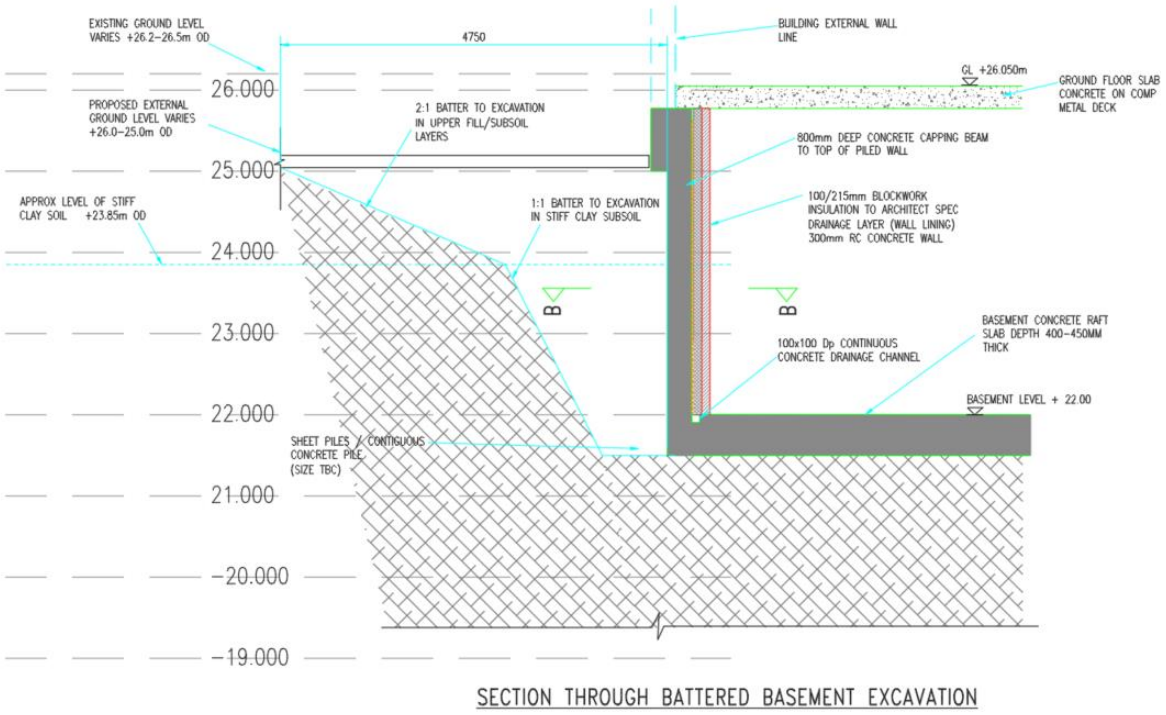


Figure 9 : Typical Section through Basement Construction at open batter excavation

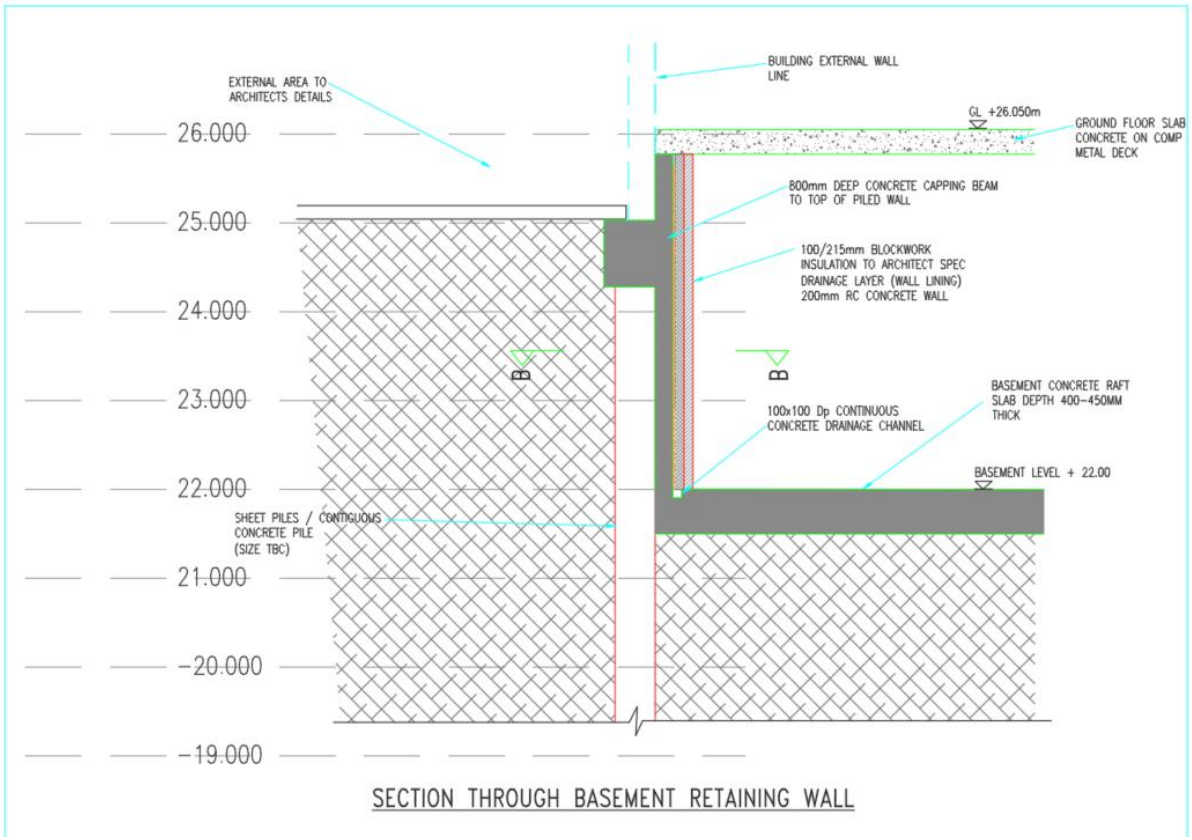


Figure 10 : Typical Section through Basement Construction at retained pile excavation

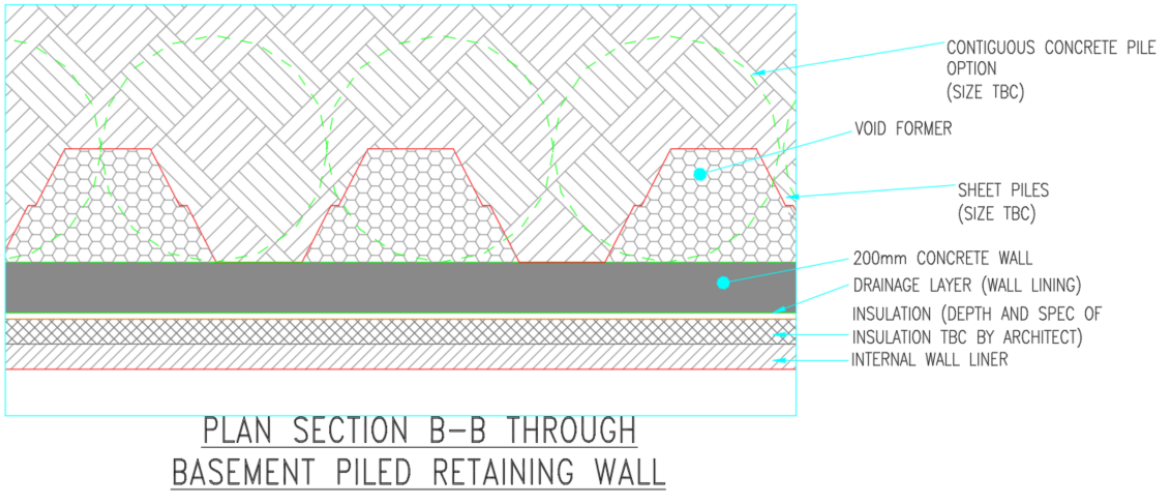


Figure 11 : Typical plan Sections through retained piled Basement Wall Construction

3.3 CONSTRUCTION WORK PROGRAMME

The following is an outline of the proposed basement construction sequence:

- Demolition of the existing site buildings and site clearance.

The existing buildings and ancillary site structures and features will be demolished and site cleared as necessary under a detailed demolition and site clearance scope of works package which will be completed by the appointed contractor in accordance with the relevant standards and guidelines.

- Basement construction:

A full site investigation has been and will be supplemented as required with further SI once the site is cleared and prior to construction commencing. A specialist ground works contractor will be appointed to carry out the excavation and any rock breaking works that may be required. It Is noted from the SI bed rock will not be encountered but some boulders may be encountered. The appointed specialist contractor will carry out a full risk assessment prior to the commencement of work.

The works will include the necessary ground works, piling and excavations. The basement site area at ground formation level will be hardcored prior to the installation of the sheet/contiguous embedded pile retaining wall to the north and west of the basement footprint.

Material will be taken away at regular intervals in order to reduce the amount of material that will be stored on site. Excavated material will be reused on site where possible subject to the WAC analysis.

As excavation progresses sump pumps will be used to remove water to settlement tanks, treating it before discharging it into either local sump pits on the site remote from the basement excavation or the local drainage network.

The basement raft slab will be prepared , reinforcement installed and concrete placed on a tanking membrane and sealed at the formation level after excavation. A basement tanking system and water bars will be applied at construction joints.
The typical construction process involves grading, casting mass concrete blinding, applying waterproof tanking material, installing reinforcement, and pouring concrete for the foundation raft. Large concrete volumes will be pumped using mobile or static concrete pumps.

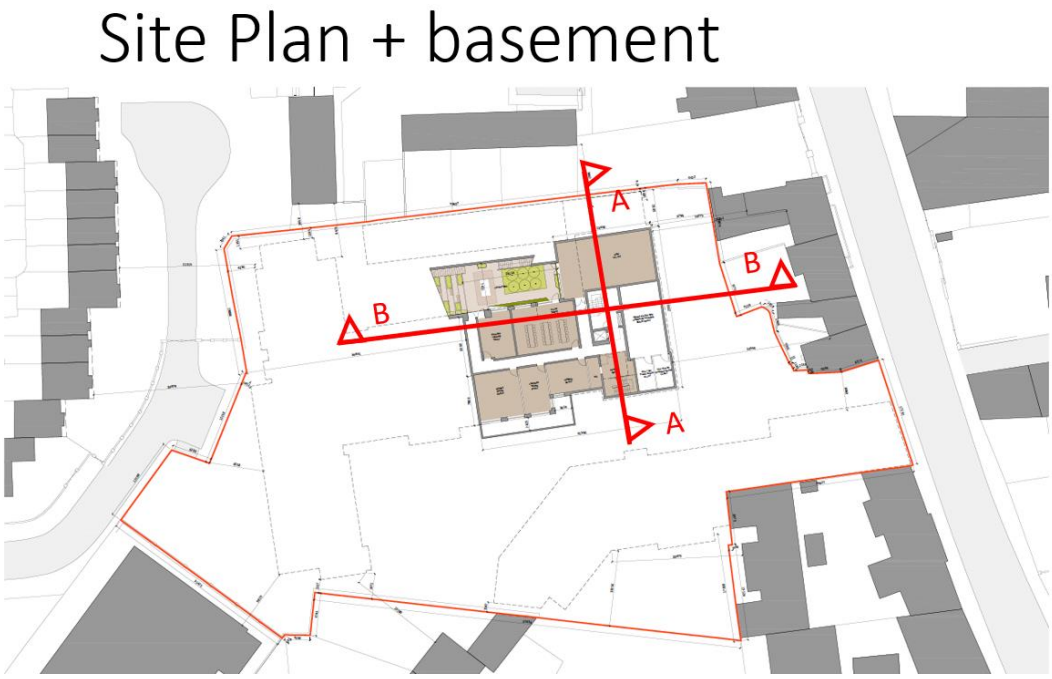
The walls to the basement will be formed from the basement slab kicker level, reinforcement fixed in place and the wall shuttering erected and propped. Shuttering will be

two sided to the open excavation sides and single sided where the walls are cast against the embedded piles. External waterproofing will be applied to the exposed walls or pre applied to the pile walls before concrete is cast against same.

On completion of the walls and tanking and following installation of protection and land drains to same, the perimeter of the open basement excavation will be back filled with appropriate permeable granular back fill material.

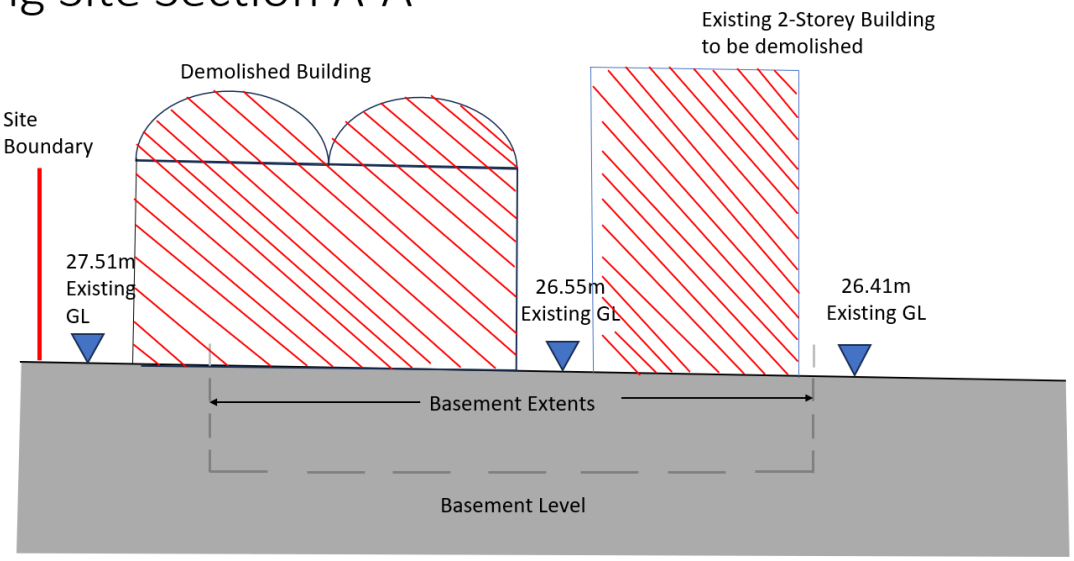
4.0 CONCEPTUAL SITE MODEL

The following conceptual cross sections illustrates the post building demolition/site clearance conditions and the proposed basement construction and operation phases of the development as below.

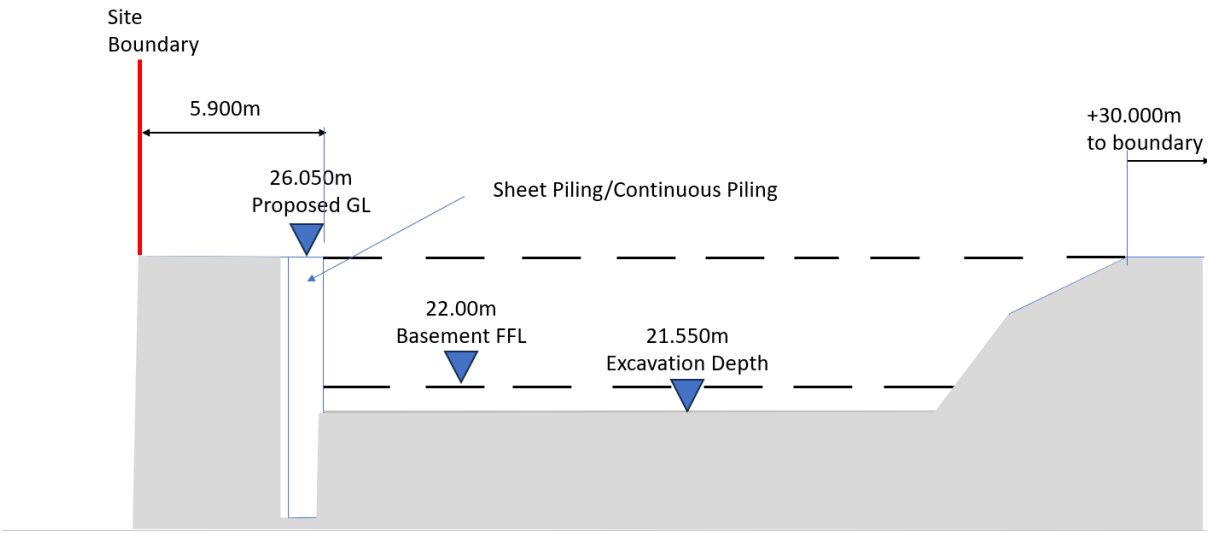


Horganlynch
Consulting Engineers

Existing Site Section A-A

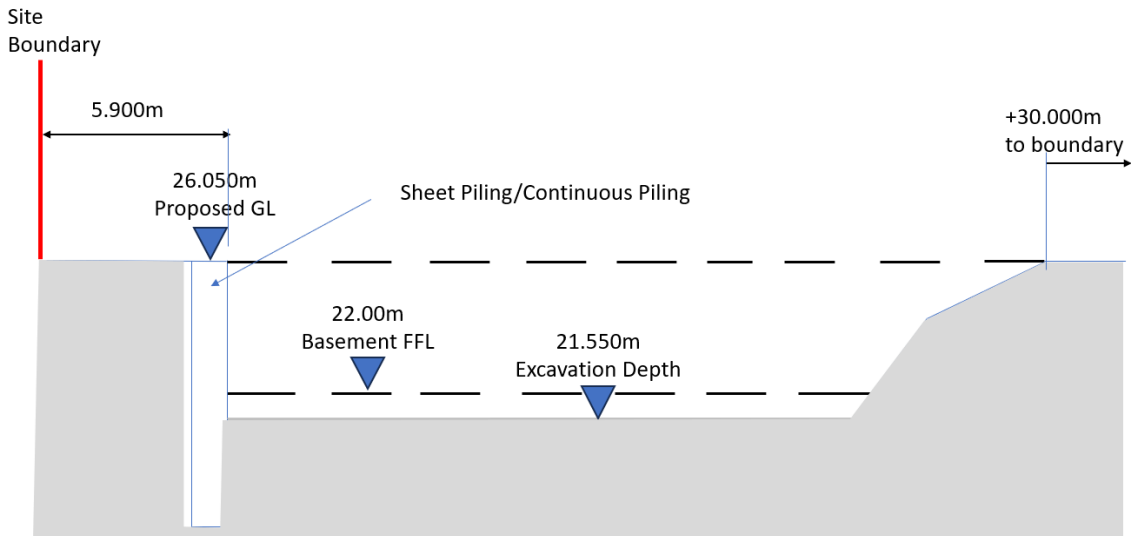


Proposed Site Excavation Section A-A

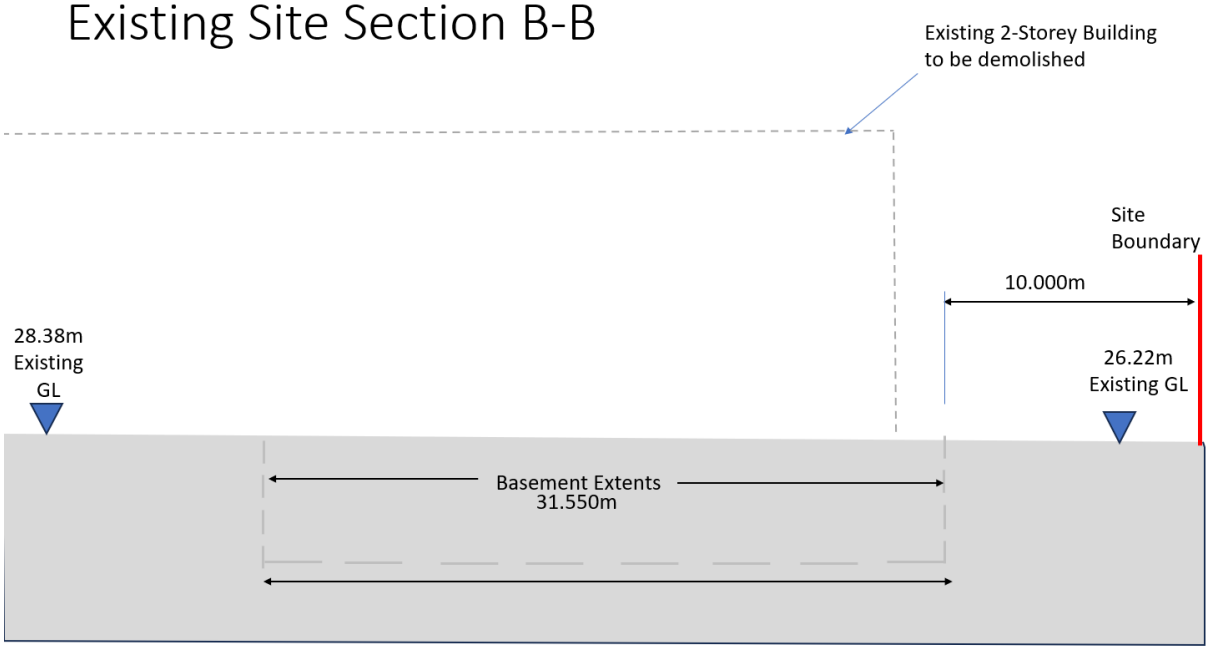


Horganlynch
Consulting Engineers

Proposed Site Excavation Section A-A

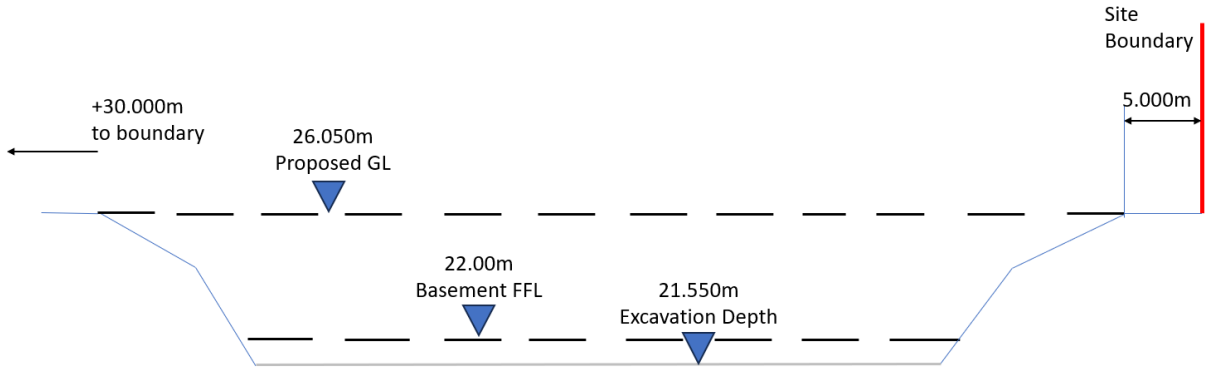


Existing Site Section B-B

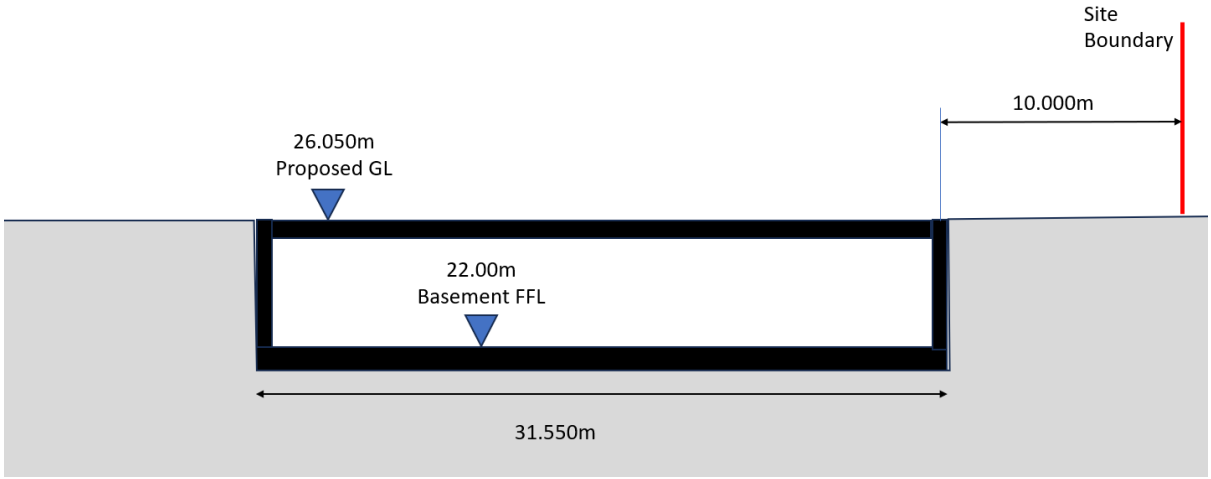


Horganlynch
Consulting Engineers

Proposed Site Excavation Section B-B



Proposed Basement Section B-B



5.0 POTENTIAL IMPACTS

There is no expected long-term impact on groundwater levels around the proposed site development as a result of the installation of a basement and embedded pile wall.

The basement does not intersect bedrock and no continuous perched water table was encountered during site investigations. The excavation will likely require collection of groundwater inflows and any collected rainwater.

Local shallow groundwater within overburden (Made ground and cohesive deposits over low permeability sandy gravelly Clay) will be intercepted by the basement retaining walls but following basement construction groundwater will migrate around the structure with no overall change in the groundwater and surface water regime.

As stated above, the proposed development will not result in any changes in the local groundwater and surface regime. The regional water table within bedrock will not be affected by the basement construction.

During construction, a very localised impact may occur during early stages of excavation and piling works until the embedded piles are in place. Once these are installed into the low permeability clay (made ground and cohesive deposits), there would be limited inflows into the excavation area from perched ground water and rainwater which will be controlled with pumped sumps.

The proposed basement construction, which would involve c. 4.5m deep excavations, has the potential to cause minor ground movements inside and outside the excavated area as a

result of changes in vertical load on the ground. The surrounding properties are at a significant distance from the basement location and as such the construction sequence outlined before will control any potential movement to within acceptable limits.

The subject site is not directly hydrogeologically connected to Dublin Bay through the Dublin aquifer via a source-pathway-receptor as vertical migration to the underlying limestone bedrock is minimized because of the thick overburden clay soils present at the site, categorizing it as having 'Low' vulnerability. This thickness of overburden provides a high level of protection for the aquifer from any potential sources. Consequently, natural attenuation within the overburden reduces the likelihood of off-site migration, and no significant impact on the aquifer's status is anticipated.

6.0 POTENTIAL CONTROL MEASURES

The design will incorporate standard construction measures to safeguard water quality, including the following:

- Localized pumping of surface runoff from excavations during and after heavy rainfall to keep trenches relatively dry. Minor ingress of groundwater and collected rainfall will be pumped out during construction, with low expected groundwater inflow.
- On-site pre-treatment and silt reduction measures, such as silt fencing, settlement measures, and hydrocarbon interceptors. Silt traps and an oil interceptor (if needed) will be employed based on monitoring results, ensuring no discharge of silt or contaminated water. Rigorous monitoring will confirm water quality compliance for discharge.
- To prevent material spillages affecting subsurface strata, oils, solvents, and paints used during construction will be stored in temporary bunded areas.
- Whenever possible, ready-mixed concrete will be delivered by truck, with a prior risk assessment for wet concrete work. Measures will be in place to prevent the discharge of alkaline wastewaters or contaminated stormwater into the subsoil. Wash down of concrete transport vehicles will occur offsite.
- Groundwater level monitoring before basement construction, along with vibration and noise monitoring during excavation and wall construction, will complement the aforementioned measures.

7.0 CONTINUOUS SITE INVESTIGATION

Site investigations are to be carried out at several stages, including pre-construction phase and during construction.

7.1 PRE-CONSTRUCTION STAGE

A site ground investigation was carried out in by Ground Investigations Ireland (GII) in April 2023.
As set out in section 3.1 of this report the SI included 2no.trial holes, 4No. percussion bore holes, 4No. rotary core follow on boreholes and the installation of 1No. ground water monitoring well.

- Ground conditions

From the site investigation information and interpretation of the geotechnical properties of the ground, as set out in section 3.2 of this report, it has been determined that the excavation of the basement area should be undertaken after the installation of the embedded pile retain wall to the north and west of the basement dig and that the other excavations can be safely undertaken with open cut excavation with a batter of 2H:1V or 1H:1V .

- Ground Water Monitoring

No groundwater was noted during the percussion borehole drilling.
Groundwater was recorded in the monitoring well BH-03 at 2.36m below ground level.

7.2 CONSTRUCTION STAGE

Based on groundwater monitoring results of the preliminary GI, it is considered that ground water will be present with in lower 1.85m of the basement dig, this will be to be controlled and removed with the use of sump pumps sumps during construction works.
Due to the potential for minor ground movements during excavation works, at locations where movements are of critical importance, appropriate instrumentation will be installed and the wall and ground movements monitored accordingly.
Based on groundwater monitoring on site to date it is considered that there is a moderate to low risk of inflow during construction works. However, (2no.) groundwater monitoring wells are being recommended to be installed outside of the basement footprint with water level data collection will be undertaken before during and after construction.

8.0 CONCLUSIONS

The planned basement will not cause lasting changes to water levels in the surrounding soil layers or to the underlying aquifer and will have no impact on the current water body status. The excavation work will not influence the water table in the bedrock. Any temporary lowering of the water table in the clayey deposits, done to aid excavation, is anticipated to be minimal and will only have a temporary local impact.

The basement will need to be fully waterproofed to ensure no groundwater enters the finished basement. Site investigation has not identified any significant water bearing gravels within the basement footprint. However, if water bearing gravels are encountered then the design should facilitate discharge around the basement structure.
Management of any collected rainwater and any groundwater seepage during basement excavations will be pumped to existing sewers (following appropriate treatment) in agreement with the regulatory authority.

To prevent groundwater from entering the completed basement, it is essential to thoroughly waterproof it. The site investigation did not reveal any substantial water-bearing gravels beneath the planned basement area. However, given the anticipated level of water as seen in the monitoring well at 2.36m below ground level it is recommended that the design will allow for proper drainage around the basement structure.

The implementation of a embedded pile retaining wall along the north and west side of the basement excavation and the open cut excavation to the recommended safe slope batters will ensure there are no concerns regarding slope stability and horizontal movement will be limited to acceptable limits by careful detailed design.

Overall, the impact on the environment as a result of the proposed basement development in the area will be neutral and will have no perceptible long term effects provided mitigation measures above described are implemented.

Horganlynch
Consulting Engineers

Appendix A - Geotechnical Site Investigation Report

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

Ground Investigations Ireland

Prussia Street

Horganlynch Consulting Engineers

Ground Investigation Report

May 2023

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

DOCUMENT CONTROL SHEET

Project Title	Prussia Street
Engineer	Horganlynch Consulting Engineers
Project No	12680-03-23
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	B Sexton	J Cashen	C Finnerty	Dublin	15 May 2023

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

CONTENTS

APPENDICES

1.0 Preamble

On the instructions of Horgan Lynch Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd. in April 2023 at the site of the proposed student housing development in Prussia Street, Dublin 7.

2.0 Overview

2.1. Background

It is proposed to construct a new student housing development with associated services and access pavements at the proposed site. The site is currently brownfield. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

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:

- Visit project site to observe existing conditions
- Carry out 2 No. Foundation Inspection Pits to determine existing foundation details
- Carry out 4 No. Light Percussion boreholes to a maximum depth of 3.40m BGL
- Carry out 4 No. Rotary Core Follow On Boreholes to a maximum depth of 23.50m BGL
- Installation of 1 No. Groundwater monitoring well
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Foundation Pits

The foundation inspection pits were excavated at the locations shown in the exploratory hole location plan in Appendix 1. The exposed foundations were logged and sketched prior to backfilling and reinstatement. It was not possible to progress the foundation pit FP01 to expose the foundation due to the presence of several services at the location of FP01. The logs and sketches are provided in Appendix 2 of this Report.

3.3. Percussion Boreholes

The percussion boreholes were carried out at the locations shown in the location plan in Appendix 1 using a Tecop S. A. SPT Tec 10 percussion drilling rig. The percussion sampling consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 63.5kg weight falling a height of 760mm. Upon completion of the 1m sample, the tube is withdrawn and the plastic liner removed and sealed for logging and sub sampling by a Geotechnical Engineer/Engineering Geologist. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging. Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a weight of 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The light percussion with rotary borehole follow on logs are provided in Appendix 3 of this Report.

3.4. Rotary Boreholes

The rotary coring was carried out by a track mounted T47S Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the ground surface or alternatively, where noted on the individual borehole log, from the base of the borehole where a temporary liner was installed to facilitate follow-on rotary coring.

The T47S Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the "overshoot" recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids.

It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The light percussion with rotary borehole follow on logs are provided in Appendix 3 of this Report.

3.5. Surveying

The exploratory hole locations have been recorded using a KQ GEO Technologies KQ-M8 System which records the coordinates and elevation of the locations to ITM or Irish National Grid as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.6. Groundwater/Gas Monitoring Installations

Groundwater and or Gas Monitoring Installation were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm uPVC/HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.7. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Environmental & Chemical testing as required by the specification, including the Rilta Suite, pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK. The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.
Rock strength testing including Point Load (Is_{50}) and Unconfined Compressive Strength (UCS) testing was carried out in the Construction Materials Testing Laboratories (CMTL) in Portlaoise, County Laois.
The results of the laboratory testing are included in Appendix 4 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were relatively consistent across the site and generally comprised;

- Made Ground
- Cohesive Deposits
- Residual Bedrock
- Bedrock

MADE GROUND: Made Ground deposits were encountered at all exploratory hole locations and ranged in depth for 0.60m to 1.00m BGL. These made ground deposits were described generally as *sandy clayey fine to coarse subangular Gravel or slightly sandy slightly gravelly Clay with occasional subangular to subrounded cobbles and occasional fragments of anthropogenic material including red brick, coal, mortar, ceramic, concrete and metal.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground and were described typically as *brown slightly sandy slightly gravelly CLAY* to a depth of 2.35m to 2.50m BGL. These deposits were underlain by *dark grey slightly sandy gravelly CLAY*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was stiff or very stiff below 2.00m BGL at all locations. These deposits had occasional, some or many cobble and boulder content, where noted on the exploratory hole logs.

RESIDUAL BEDROCK: At BH-03, residual bedrock was encountered from 14.95m to 18.50m BGL. It was described as an *extremely weak black MUDSTONE / very stiff black silty CLAY with rock fragments*, based on the condition of the recovered material. Pyrite growth was also noted within the recovered material.

COMPETENT BEDROCK: At BH-03, competent bedrock was recorded at 18.50m BGL. It was described as a *weak to strong thinly laminated dark grey fine grained argillaceous LIMESTONE.* This is typical of the Lucan Formation, which is noted on the Geological Survey of Ireland's (GSI) geological mapping of the site. The degree of weathering ranged from fresh to slightly weathered. Calcite veins were also noted with the rock mass. The total core recovery is good, typically 100%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth at BH-03.

4.2. Groundwater

No groundwater was noted during the percussion borehole drilling. It should also be noted that water strikes were not able to be identified during the rotary core drilling as water is added as part of the drilling process. Groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors. For this reason, a standpipe was installed in BH-03. The groundwater monitoring is included in Appendix 5 of this Report.

4.3. Laboratory Testing

4.3.1. Chemical Laboratory Testing

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

4.3.2. Environmental Laboratory Testing

A number of samples were analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as *hazardous* or *non-hazardous*. The suite also allows for the assessment of the sampled material in terms of suitability for placement at licenced landfills (inert, stable non-reactive, hazardous etc.). The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.
The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.
As part of the suite a leachate is generated from the solid sample which is analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS).
While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present or the previous site use or location indicate a risk of environmental variation. The waste classification report is included under the cover of a separate report by Ground Investigations Ireland.

4.3.3. Rock Laboratory Testing

The rock testing data were not available at the time of writing this report.

The results from the completed laboratory testing are included in Appendix 4 of this report.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

An allowable bearing capacity of 250 kN/m^2 is recommended for conventional strip or pad foundations on the very stiff dark grey cohesive deposits at a depth of 2.50m BGL. The possibility for variation in the depth of the made ground or brown cohesive deposits in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

A ground bearing floor slab is recommended to be based on the firm or firm to stiff cohesive deposits with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014+A1:2016 and/or NRA SRW CL808 Type E granular stone fill. Where the depth of Made Ground/Soft deposits exceeds 0.9m then suspended floor slabs should be considered.

The pH and sulphate testing completed on samples recovered from the exploratory holes indicates the pH results are near neutral and the sulphate results are low, when compared to the guideline values from BRE Special Digest 1:2005. No special precautions are required for concrete foundations to prevent sulphate attack. The samples tested were below the limits of DS1 in the BRE Special Digest 1:2005.

5.3. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry. Excavations in the Made Ground or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.

Any waste material to be removed off site should be disposed of to a suitably licenced landfill. The environmental testing completed during the ground investigation is reported under the cover of a separate GII Waste Classification Report.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable

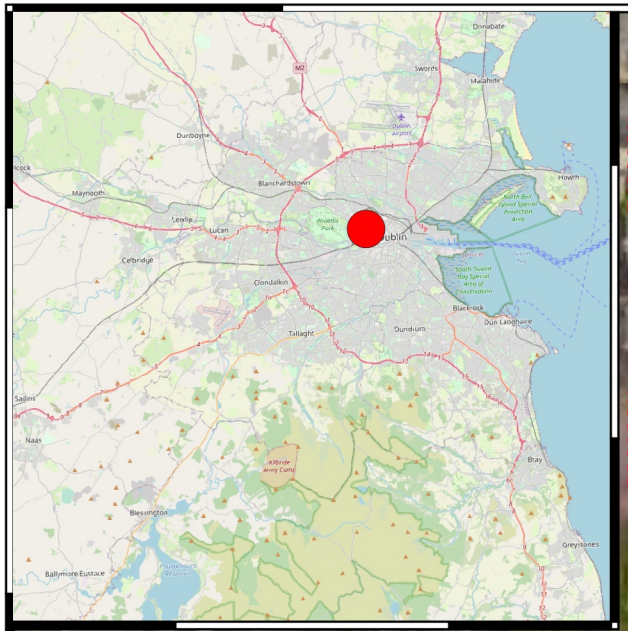
settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan

713840E 713880E 713920E 713960E

735360N
735320N
735280N
735240N

740000N
720000N
700000E
720000E



Site Location
Indicative Site Boundary
Borehole
Foundation Pit

Client:

Horganlynch

Project Code:
12680-0-23

Project Title:
Prussia Street

Drawing Title:
Figure 1 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 5 10 15 20 25 30 m

Drawn By:	Date:
BS	10/05/2023

APPENDIX 2 – Foundation Inspection Pit Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Trial Pit Number** FP-01
Machine : 3.5T tracked excavator **Method :** Trial Pit	**Dimensions** 1.00m x 1.35m x 0.40m (L x W x D)	**Ground Level (mOD)**	**Client**	**Job Number** 12680-03-23
	Location	**Dates** 14/04/2023	**Engineer** HorganLynch	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Grey subangular to subbrounded fine to coarse Gravel		
					(0.30)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with many fragments of plastic, ceramic and metal Obstruction: Encountered ESB Warning Board		
					0.40	Complete at 0.40m		

Plan

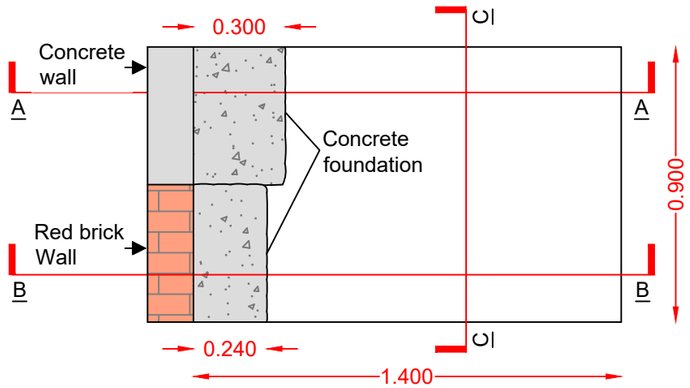
Remarks

No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP	12680-03-23.FP-01

FP-02

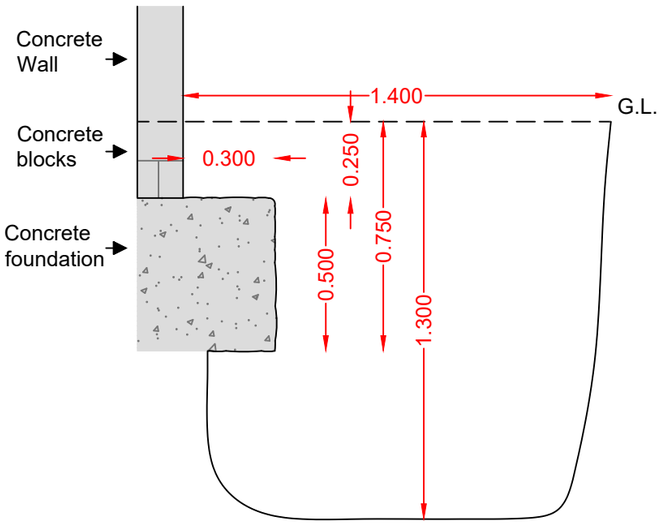
PLAN VIEW



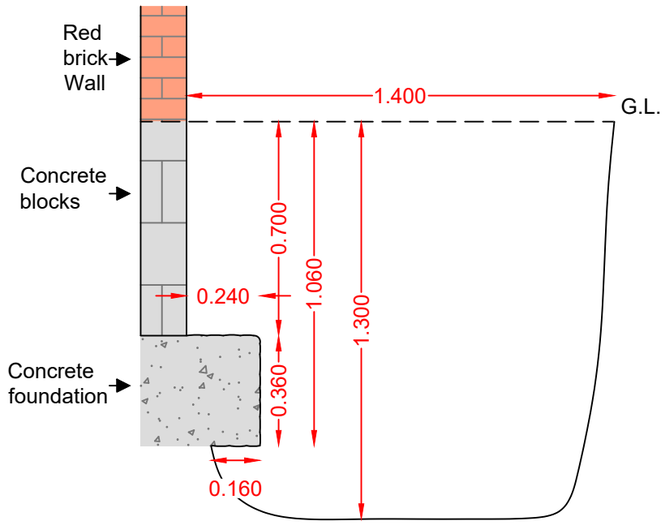
FOUNDATION PIT LOG

0.00 - 0.10	Pea GRAVEL.
0.10 - 0.25	CONCRETE.
0.25 - 1.30	MADE GROUND: Brown slightly clayey Gravel CLAY with many fragments of red brick, tarmacadam, plastic, concrete, ceramic and metal.

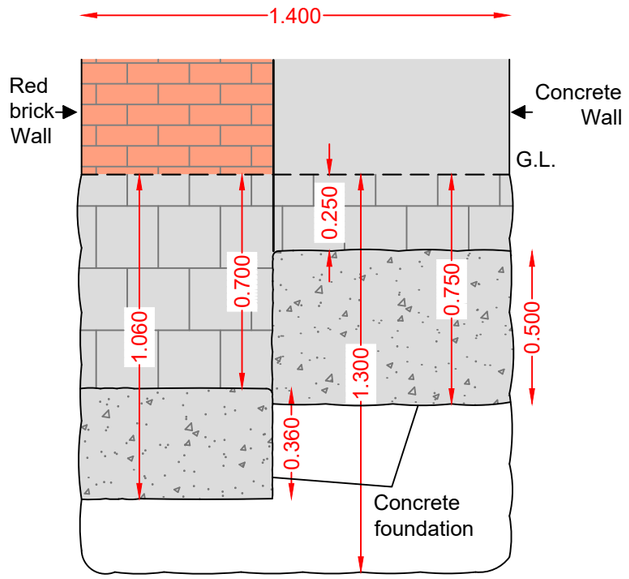
SECTION A-A



SECTION B-B



SECTION C-C



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinestown House
Hazelhatch Road,
Newcastle,
County Dublin

Tel: +353-(0)1 6015175/6 Fax: +353-(0)1 6015173
Email: info@gii.e Web: www.gii.e

PROJECT:	12680-03-23 - Prussia Street
DRAWING No.:	FP-02
DATE:	14/04/2023
CLIENT:	Horgan Lynch
SCALE:	NTS

Version:	Date:	Drawn By:	Checked By:
1	04/05/2023	J.S.	C.M.

Prussia Street – Foundation Pit Photographs

FP-01

FP-01

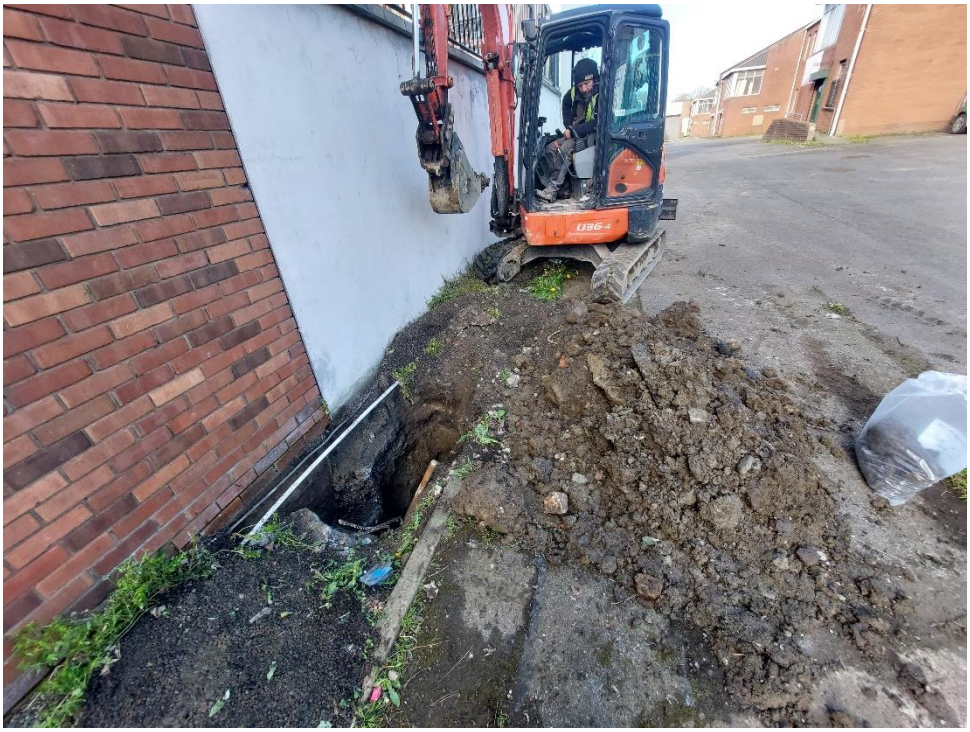
Prussia Street – Foundation Pit Photographs

FP-02

FP-02

Prussia Street – Foundation Pit Photographs

FP-02



FP-02

Prussia Street – Foundation Pit Photographs

FP-02

FP-02

Prussia Street – Foundation Pit Photographs

FP-02

APPENDIX 3 – Borehole Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-01
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion drilling with rotary follow-on	**Casing Diameter** 88mm cased to 2.00m 96mm cased to 15.00m	**Ground Level (mOD)** 27.26	**Client**	**Job Number** 12680-03-23
	Location (dGPS) 713896.1 E 735310.1 N	**Dates** 05/04/2023-25/04/2023	**Engineer** HorganLynch	**Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.25 0.00-0.70 0.25-0.70					B ES B	27.01	(0.25) 0.25	MADE GROUND: Brown clayey very gravelly fine to coarse Sand with occasional fragments of red brick and mortar		
							(0.45)	MADE GROUND: Dark brown slightly sandy slightly gravelly organic Clay with rare fragments of brick, mortar and coal		
0.70-2.50 0.70-2.50 1.00-1.45					2,2/2,3,3,3 B ES SPT(C) N=11	26.56 26.26	0.70 (0.30) 1.00	Brown slightly sandy slightly gravelly CLAY Firm brown slightly sandy slightly gravelly CLAY		
							(1.00)			
2.00-2.45					5,4/5,8,11,13 SPT(C) N=37	25.26	2.00	Very stiff brown slightly sandy slightly gravelly CLAY		
							(0.50)			
2.50 2.50-2.50	53				25/50 SPT(C) 25*/0 50/0	24.76	2.50	Very stiff dark grey slightly sandy gravelly CLAY with occasional cobbles		
4.00 4.00-4.45	66				4,6/8,7,8,9 SPT(C) N=32					
5.50 5.50-5.95	83				6,8/6,7,9,9 SPT(C) N=31					
							(9.00)			
7.00 7.00-7.45	93				8,7/9,10,12,13 SPT(C) N=44					
8.50 8.50-8.88	100				9,10/15,25,10 SPT(C) 50/225					
10.00										

Remarks
GL to 1.00m BGL - Recovery 95%
1.00m to 2.00m BGL - Recovery 90%
2.00m to 2.50m BGL - Recovery 100%
Rotary follow on from 2.50m BGL
Complete at 15.00m BGL
Borehole backfilled upon completion

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-01

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-01
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion drilling with rotary follow-on	**Casing Diameter** 88mm cased to 2.00m 96mm cased to 15.00m	**Ground Level (mOD)** 27.26	**Client**	**Job Number** 12680-03-23
	Location (dGPS) 713896.1 E 735310.1 N	**Dates** 05/04/2023-25/04/2023	**Engineer** HorganLynch	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.45	53				8,10/9,12,14,15 SPT(C) N=50					
11.50 11.50-11.95	40				9,11/13,15,16,6 SPT(C) N=50	15.76	11.50	Recovery consists of dark grey slightly sandy gravelly Clay. Driller notes Boulder Clay (Very Stiff)		
13.00 13.00-13.30	33				12,14/25,25 SPT(C) 50/150		(3.50)			
14.50 14.50-14.73	40				16,25/50 SPT(C) 50/75					
15.00						12.26	15.00	Complete at 15.00m		

Remarks

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-01

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-02
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion drilling & Rotary follow on	**Casing Diameter** 88mm cased to 2.00m 68mm cased to 3.00m 96mm cased to 14.50m	**Ground Level (mOD)** 26.58	**Client**
	Location 713948.7 E 735310.3 N	**Dates** 05/04/2023-24/04/2023	**Engineer** HorganLynch
			Job Number 12680-03-23 **Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.60 0.00-0.60					B ES	26.38	(0.20) 0.20 (0.40)	MADE GROUND: Brownish grey slightly clayey very sandy subangular to subrounded fine to coarse Gravel with occasional fragments of concrete		
0.60-2.35 0.60-2.35 1.00-1.45					B ES 0,1/2,3,4,4 SPT(C) N=13	25.98 25.58	0.60 (0.40) 1.00	MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare fragments of brick, mortar, ceramic, coal and shells Brown slightly sandy slightly gravelly CLAY Firm brown slightly sandy slightly gravelly CLAY		
2.00-2.45					3,3/5,8,8,9 SPT(C) N=30	24.58	(1.00) 2.00 (0.35)	Very stiff brown slightly sandy slightly gravelly CLAY		
2.35-3.00 2.35-3.00					B ES	24.23	2.35	Very stiff dark grey slightly sandy slightly gravelly CLAY		
3.00 3.00-3.00	60				25/50 SPT(C) 25*/0 50/0		(1.65)			
4.00 4.00-4.45	67				4,7/8,8,9,10 SPT(C) N=35	22.58	4.00	Very stiff dark grey slightly sandy gravelly CLAY with occasional cobbles		
5.50 5.50-5.95	80				6,9/8,10,9,11 SPT(C) N=38					
7.00 7.00-7.45	100				7,8/10,9,11,12 SPT(C) N=42					
8.50 8.50-8.95	67				9,8/10,9,11,13 SPT(C) N=43		(10.50)			
10.00										

Remarks
GL to 1.00m BGL - Recovery 90%
1.00m to 2.00m BGL - Recovery 85%
2.00m to 3.00m BGL - Recovery 100%
Rotary follow on from 3.00m BGL
Complete at 14.50m BGL
Borehole backfilled upon completion

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-02

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-02
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion drilling & Rotary follow on	**Casing Diameter** 88mm cased to 2.00m 68mm cased to 3.00m 96mm cased to 14.50m	**Ground Level (mOD)** 26.58	**Client**
	Location 713948.7 E 735310.3 N	**Dates** 05/04/2023-24/04/2023	**Engineer** HorganLynch
			Job Number 12680-03-23 **Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.45	33				7,6/8,11,25,6 SPT(C) N=50					
11.50 11.50-11.95	67				8,9/8,10,11,13 SPT(C) N=42					
13.00 13.00-13.38	73				9,6/7,13,30 SPT(C) 50/225					
14.50						12.08	14.50	Complete at 14.50m		

Remarks

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-02

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-03
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion Drilling & Rotary follow on	**Casing Diameter** 88mm cased to 2.00m 68mm cased to 2.90m 96mm cased to 23.50m	**Ground Level (mOD)** 26.28	**Client**
	Location 713902.9 E 735285.3 N	**Dates** 05/04/2023-21/04/2023	**Engineer** HorganLynch
			Job Number 12680-03-23 **Sheet** 1/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-0.65					B						
0.00-0.65					ES		(0.65)	MADE GROUND: Brownish grey slightly clayey very sandy angular to subangular fine to coarse Gravel with rare fragments of metal and brick			
						25.63	0.65				
0.65-1.00					B			MADE GROUND: Dark brown slightly sandy gravelly organic Clay with rare fragments of brick			
0.65-1.00					ES		(0.35)				
					1,1/1,2,2,2	25.28	1.00				
1.00-1.45					SPT(C) N=7			Soft to firm brown mottled grey slightly sandy slightly gravelly CLAY (strong hydrocarbon odour)			
1.00-2.50					B						
1.00-2.50					ES		(1.00)				
								Granular lens at 1.85m to 1.90m BGL			
					1,2/3,3,4,8	24.28	2.00				
2.00-2.45					SPT(C) N=18			Stiff brown slightly sandy slightly gravelly CLAY (strong hydrocarbon odour)			
							(0.50)				
						23.78	2.50				
2.50-2.90					B			Stiff dark grey slightly sandy slightly gravelly CLAY			
2.50-2.90					ES		(0.40)				
2.90					25/50	23.38	2.90				
2.90-2.90					SPT(C) 25*/0 50/0			Recovery consists of dark grey slightly sandy gravelly Clay with occasional cobbles. Driller notes Boulder Clay (Very Stiff)			
	33										
4.00					6,8/9,8,10,11						
4.00-4.45					SPT(C) N=38						
	27										
5.50					6,7/7,9,10,15						
5.50-5.95					SPT(C) N=41						
	20										
7.00					8,7/9,12,14,15						
7.00-7.45					SPT(C) N=50						
	33										
8.50					5,6/8,9,12,13						
8.50-8.95					SPT(C) N=42						
							(12.05)				
	7										
10.00											

Remarks
GL to 1.00m BGL - Recovery 90%
1.00m to 2.00m BGL - Recovery 80%
2.00m to 2.90m BGL - Recovery 90%
Rotary follow on from 2.90m BGL
Complete at 23.50m BGL
50mm Standpipe installed in borehole upon completion, slotted from 23.50m BGL to 1.00m BGL, plain from 1.00m BGL to ground level, with bentonite seal and flush cover.

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-03

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-03
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion Drilling & Rotary follow on	**Casing Diameter** 88mm cased to 2.00m 68mm cased to 2.90m 96mm cased to 23.50m	**Ground Level (mOD)** 26.28	**Client**
	Location 713902.9 E 735285.3 N	**Dates** 05/04/2023-21/04/2023	**Engineer** HorganLynch
			Job Number 12680-03-23 **Sheet** 2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.00-10.45	7				4,6/7,10,9,11 SPT(C) N=37						
11.50 11.50-11.95	20				6,7/9,8,9,12 SPT(C) N=38						
13.00 13.00-13.45	67				4,6/7,10,11,13 SPT(C) N=41						
14.50 14.50-14.65					25,25/50 SPT(C) 50/0						
14.95	100	33	0	20		11.33	14.95	Very stiff black silty CLAY with rock fragments / Extremely weak black calcareous MUDSTONE. Distinctly weathered to residual with pyrite growth. 14.95m-16.00m BGL: Two fracture sets - F1: Very close to close, 30-50 degree, planar smooth with clay infill. F2: Closely spaced, 60-80 degree, planar smooth with clay infill.			
16.00	87	0	0	NI			(3.55)	16.00m-18.50m BGL: Mostly non intact			
17.50	100	33	23								
18.50						7.78	18.50	Weak to strong thinly laminated dark grey fine grained argillaceous LIMESTONE with occasional calcite veins. Fresh to moderately weathered			
19.00	100	57	47								

Remarks

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-03

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-03
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion Drilling & Rotary follow on	**Casing Diameter** 88mm cased to 2.00m 68mm cased to 2.90m 96mm cased to 23.50m	**Ground Level (mOD)** 26.28	**Client**
	Location 713902.9 E 735285.3 N	**Dates** 05/04/2023-21/04/2023	**Engineer** HorganLynch
			Job Number 12680-03-23
			Sheet 3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				10							
20.50	100	73	47				(5.00)	18.50m-23.50m BGL: Two fracture sets - F1: Very close to closely spaced, 20-40 degree, undulating rough with clay smearing. F2: Close to medium spaced, 60-80 degree, undulating rough with clay smearing.			
22.00	100	77	67	5							
23.50						2.78	23.50	Complete at 23.50m			

Remarks

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-03

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-04
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion drilling & Rotary follow on	**Casing Diameter** 88mm cased to 2.00m 68mm cased to 3.40m 96mm cased to 15.00m	**Ground Level (mOD)** 25.97	**Client**
	Location 713951.9 E 735284.1 N	**Dates** 05/04/2023-19/04/2023	**Engineer** HorganLynch
			Job Number 12680-03-23 **Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.70 0.00-0.70					B ES		(0.90)	MADE GROUND: Black clayey sandy subangular to subrounded fine to coarse Gravel with rare ceramic fragments		
0.70-2.40 0.70-2.40 1.00-1.45					2,2/2,3,3,3 B ES SPT(C) N=11	25.07 24.97	0.90 1.00 (1.00)	Brown slightly sandy slightly gravelly CLAY Firm brown slightly sandy slightly gravelly CLAY		
2.00-2.45					3,2/2,3,3,7 SPT(C) N=15	23.97	2.00 (0.40)	Stiff brown slightly sandy slightly gravelly CLAY		
2.40-3.30 2.40-3.30					B ES	23.57	2.40 (0.60)	Stiff dark grey slightly sandy slightly gravelly CLAY		
3.00-3.38					7,8/12,16,20,2 SPT(C) 50/230	22.97	3.00 (0.40)	Very stiff dark grey slightly sandy slightly gravelly CLAY		
3.40 3.40-3.40	100				25/50 SPT(C) 25*/0 50/0	22.57	3.40	Very stiff dark grey slightly sandy gravelly CLAY with occasional cobbles		
4.00 4.00-4.45	47				11,10/14,15,16,5 SPT(C) N=50					
5.50 5.50-5.73	67				4,25/50 SPT(C) 50/75		(5.10)			
7.00 7.00-7.30	80				11,15/25,25 SPT(C) 50/150					
8.50 8.50-8.95	23				8,7/9,8,10,11 SPT(C) N=38	17.47	8.50	Recovery consists of dark grey clayey sandy coarse Gravel with occasional cobbles. Driller notes Boulder Clay with sand (Very Stiff)		
10.00										

Remarks
GL to 1.00m BGL - Recovery 70%
1.00m to 2.00m BGL - Recovery 85%
2.00m to 3.00m BGL - Recovery 90%
3.00m to 3.40m BGL - Recovery 70%
Rotary follow on from 3.40m BGL
Complete at 15.00m BGL
Borehole backfilled upon completion

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-04

Ground Investigations Ireland Ltd
www.gii.ie

Site Prussia Street			**Borehole Number** BH-04
Machine : Tecop S. A. & Beretta T47S **Flush :** Water **Core Dia :** 63.5 mm **Method :** Percussion drilling & Rotary follow on	**Casing Diameter** 88mm cased to 2.00m 68mm cased to 3.40m 96mm cased to 15.00m	**Ground Level (mOD)** 25.97	**Client**
	Location 713951.9 E 735284.1 N	**Dates** 05/04/2023-19/04/2023	**Engineer** HorganLynch
			Job Number 12680-03-23 **Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.30	20				9,12/25,25 SPT(C) 50/150					
11.50 11.50-11.95	23				7,9/8,12,13,15 SPT(C) N=48		(6.50)			
13.00 13.00-13.45	20				8,9/7,11,10,13 SPT(C) N=41					
14.50 14.50-14.95	40				5,7/9,10,12,15 SPT(C) N=46					
15.00						10.97	15.00	Complete at 15.00m		

Remarks

Scale (approx)	Logged By
1:50	S.B & A.B

Figure No. 12680-03-23.BH-04

Prussia Street
Rotary Core Photographs

BH01

BH01

Prussia Street
Rotary Core Photographs

BH01

Prussia Street
Rotary Core Photographs

BH02

BH02

Prussia Street
Rotary Core Photographs

BH02

Prussia Street
Rotary Core Photographs

BH03

BH03

Prussia Street
Rotary Core Photographs

BH03

BH03

Prussia Street
Rotary Core Photographs

BH03

Prussia Street
Rotary Core Photographs

BH04

BH04

Prussia Street
Rotary Core Photographs

BH04

APPENDIX 4 – Laboratory Reports

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	James Cashen
Date :	27th April, 2023
Your reference :	12680-03-23
Our reference :	Test Report 23/5826 Batch 1
Location :	Prussia Street
Date samples received :	14th April, 2023
Status :	Final Report
Issue :	1

Nine samples were received for analysis on 14th April, 2023 of which nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Liza Klebe
Project Co-ordinator

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 3rd Floor Davidson Building, 5 Southampton Street, London WC2E 7HA
Company Registration No: 11371415

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36		LOD/LOR	Units	Method No.
Sample ID	BH-01	BH-01	BH-02	BH-02	BH-02	BH-03	BH-03	BH-03	BH-03				
Depth	0.00-0.70	0.70-2.50	0.00-0.60	0.60-2.35	2.35-3.00	0.00-0.60	0.60-1.00	1.00-2.50	2.50-2.90				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023				
Antimony	7	3	3	1	2	1	4	2	2		<1	mg/kg	TM30/PM15
Arsenic #	36.6	13.1	19.9	8.4	8.7	16.5	24.5	12.8	10.5		<0.5	mg/kg	TM30/PM15
Barium #	130	80	112	40	36	87	159	67	212		<1	mg/kg	TM30/PM15
Cadmium #	1.5	2.7	1.7	1.1	2.3	0.4	3.2	1.9	2.5		<0.1	mg/kg	TM30/PM15
Chromium #	50.5	26.1	43.6	20.1	19.7	57.9	90.9	28.0	34.2		<0.5	mg/kg	TM30/PM15
Copper #	95	38	76	24	29	38	84	36	30		<1	mg/kg	TM30/PM15
Lead #	190	24	128	19	16	35	153	21	15		<5	mg/kg	TM30/PM15
Mercury #	1.0	<0.1	0.4	<0.1	<0.1	<0.1	0.6	<0.1	<0.1		<0.1	mg/kg	TM30/PM15
Molybdenum #	6.9	4.7	5.1	2.3	3.8	2.6	8.3	4.7	4.9		<0.1	mg/kg	TM30/PM15
Nickel #	78.4	48.9	48.3	22.8	34.4	31.4	64.0	41.8	40.2		<0.7	mg/kg	TM30/PM15
Selenium #	2	1	1	<1	3	1	3	2	3		<1	mg/kg	TM30/PM15
Zinc #	181	110	177	393	62	108	182	83	91		<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.09	<0.04	<0.04	<0.04	<0.04	<0.04	0.19	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.08	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.92	<0.03	0.20	<0.03	0.19	0.07	0.36	<0.03	0.07		<0.03	mg/kg	TM4/PM8
Anthracene #	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.15	<0.03	0.08	<0.03	0.11	0.06	0.18	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Pyrene #	0.15	<0.03	0.08	<0.03	0.11	0.06	0.16	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.19	<0.06	0.09	<0.06	0.07	<0.06	0.13	<0.06	<0.06		<0.06	mg/kg	TM4/PM8
Chrysene #	0.25	<0.02	0.09	<0.02	0.12	0.06	0.15	<0.02	0.05		<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.22	<0.07	0.13	<0.07	0.10	0.08	0.19	<0.07	<0.07		<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.13	<0.04	0.07	<0.04	<0.04	0.04	0.10	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.06	<0.04	0.05	<0.04	<0.04	<0.04	0.08	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.15	<0.04	0.06	<0.04	<0.04	<0.04	0.11	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.26	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
PAH 6 Total #	0.71	<0.22	0.39	<0.22	<0.22	<0.22	0.66	<0.22	<0.22		<0.22	mg/kg	TM4/PM8
PAH 17 Total	2.42	<0.64	0.85	<0.64	0.70	<0.64	1.99	<0.64	<0.64		<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.16	<0.05	0.09	<0.05	0.07	0.06	0.14	<0.05	<0.05		<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.06	<0.02	0.04	<0.02	0.03	0.02	0.05	<0.02	<0.02		<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	123	102	96	93	95	96	96	92	91		<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	<30	<30	<30	<30	466	<30		<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36		LOD/LOR	Units	Method No.
Sample ID	BH-01	BH-01	BH-02	BH-02	BH-02	BH-03	BH-03	BH-03	BH-03				
Depth	0.00-0.70	0.70-2.50	0.00-0.60	0.60-2.35	2.35-3.00	0.00-0.60	0.60-1.00	1.00-2.50	2.50-2.90				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023				
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3.9	<0.2		<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)#	<4	<4	<4	<4	<4	<4	<4	76	<4		<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	<7	<7	<7	<7	<7	<7	281	<7		<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	<7	<7	<7	<7	<7	<7	<7	105	<7		<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26	<26	<26	<26	<26	<26	466	<26		<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	445	<10		<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	19	<10		<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)#	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)#	<4	<4	<4	<4	<4	<4	13	34	<4		<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)#	<7	<7	<7	<7	<7	<7	37	194	<7		<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)#	<7	<7	<7	<7	<7	<7	15	59	<7		<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	<26	<26	<26	65	287	<26		<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<52	<52	<52	<52	<52	65	753	<52		<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)#	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10	<10	<10	<10	<10	65	284	<10		<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	mg/kg	TM5/PM8/PM16
MTBE#	<5 SV	<5	<5	<5	<5 SV	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
Benzene#	<5 SV	<5	<5	<5	<5 SV	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
Toluene#	<5 SV	<5	<5	<5	<5 SV	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
Ethylbenzene#	<5 SV	<5	<5	<5	<5 SV	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
m/p-Xylene#	<5 SV	<5	<5	<5	<5 SV	7	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
o-Xylene#	<5 SV	<5	<5	<5	<5 SV	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
PCB 28#	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 52#	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 101#	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 118#	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 138#	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 153#	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 180#	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	<35	<35	<35	<35	<35	<35	<35	<35		<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36		LOD/LOR	Units	Method No.
Sample ID	BH-01	BH-01	BH-02	BH-02	BH-02	BH-03	BH-03	BH-03	BH-03				
Depth	0.00-0.70	0.70-2.50	0.00-0.60	0.60-2.35	2.35-3.00	0.00-0.60	0.60-1.00	1.00-2.50	2.50-2.90				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023				
Natural Moisture Content	27.1	22.0	2.7	23.7	6.2	10.6	61.4	20.4	8.9		<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	21.3	18.1	2.7	19.2	5.8	9.6	38.0	17.0	8.1		<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<3.0 AA	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	-	0.0506	-	0.0101	0.0482	-	-	0.0343	-		<0.0015	g/l	TM38/PM20
Chromium III	50.5	26.1	43.6	20.1	19.7	57.9	90.9	28.0	34.2		<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	16.36	0.38	1.93	0.40	0.71	0.69	5.88	0.48	0.56		<0.02	%	TM21/PM24
pH #	8.00	8.52	8.71	8.71	8.72	8.82	8.02	7.98	8.79		<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1159	0.0991	0.1208	0.1052	0.0977	0.0996	0.0949	0.1457	0.1002			kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09			kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36		LOD/LOR	Units	Method No.
Sample ID	BH-01	BH-01	BH-02	BH-02	BH-02	BH-03	BH-03	BH-03	BH-03				
Depth	0.00-0.70	0.70-2.50	0.00-0.60	0.60-2.35	2.35-3.00	0.00-0.60	0.60-1.00	1.00-2.50	2.50-2.90				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023				
Dissolved Antimony #	0.059	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002		<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	0.59	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02		<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	0.0178	<0.0025	0.0161	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025		<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	0.178	<0.025	0.161	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025		<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	0.007	<0.003	<0.003	0.009	<0.003	<0.003	0.041	0.042		<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	0.07	<0.03	<0.03	0.09	<0.03	<0.03	0.41	0.42		<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015		<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015		<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007		<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.004	0.016	0.006	0.015	0.021	0.005	0.014	0.022	0.043		<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.04	0.16	0.06	0.15	0.21	0.05	0.14	0.22	0.43		<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	0.018	<0.003	<0.003	<0.003	<0.003		<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	0.18	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	0.00007	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	0.0007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	0.3	0.3	1.3	2.1	0.5	0.3		<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	3	3	13	21	5	3		<3	mg/kg	TM173/PM0
Sulphate as SO4 #	56.2	12.2	5.4	1.0	12.4	4.1	4.5	7.5	3.3		<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	562	122	54	10	124	41	45	75	33		<5	mg/kg	TM38/PM0
Chloride #	<0.3	<0.3	0.5	0.3	4.4	0.5	0.6	0.8	0.5		<0.3	mg/l	TM38/PM0
Chloride #	<3	<3	5	3	44	5	6	8	5		<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	2	<2	<2	<2	<2	<2	2	3	<2		<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	<20	<20	<20	<20	20	30	<20		<20	mg/kg	TM60/PM0
pH	7.72	7.98	8.18	8.24	7.90	8.14	8.17	8.29	7.99		<0.01	pH units	TM73/PM0
Total Dissolved Solids #	151	69	93	64	62	62	80	117	47		<35	mg/l	TM20/PM0
Total Dissolved Solids #	1510	690	930	640	620	620	800	1170	470		<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36		Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	BH-01	BH-01	BH-02	BH-02	BH-02	BH-03	BH-03	BH-03	BH-03							
Depth	0.00-0.70	0.70-2.50	0.00-0.60	0.60-2.35	2.35-3.00	0.00-0.60	0.60-1.00	1.00-2.50	2.50-2.90							
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023	12/04/2023							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1	1	1	1							
Date of Receipt	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023							
Solid Waste Analysis																
Total Organic Carbon #	16.36	0.38	1.93	0.40	0.71	0.69	5.88	0.48	0.56		3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025 SV	<0.025	<0.025	<0.025	<0.025 SV	<0.025	<0.025	<0.025	<0.025 SV		6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035		1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30	466	<30		500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	0.71	<0.22	0.39	<0.22	<0.22	<0.22	0.66	<0.22	<0.22		-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	2.42	<0.64	0.85	<0.64	0.70	<0.64	1.99	<0.64	<0.64		100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	0.178	<0.025	0.161	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025		0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	0.07	<0.03	<0.03	0.09	<0.03	<0.03	0.41	0.42		20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015		0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	0.0007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.04	0.16	0.06	0.15	0.21	0.05	0.14	0.22	0.43		0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	0.59	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02		0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	0.18	<0.03	<0.03	<0.03	<0.03		0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	1510	690	930	640	620	620	800	1170	470		4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	<20	<20	<20	<20	<20	20	30	<20		500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	77.7	91.3	74.6	85.7	91.8	89.9	94.7	61.7	89.6		-	-	-	<0.1	%	NONE/PM4
Moisture Content 105C (% Dry Weight)	28.7	9.6	34.0	16.7	9.0	11.3	5.6	62.0	11.6		-	-	-	<0.1	%	PM4/PM0
pH #	8.00	8.52	8.71	8.71	8.72	8.82	8.02	7.98	8.79		-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3	3	3	13	21	5	3		10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	562	122	54	10	124	41	45	75	33		1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	<3	5	3	44	5	6	8	5		800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland

Reference: 12680-03-23

Location: Prussia Street

Contact: James Cashen

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
23/5826	1	BH-01	0.00-0.70	1-4	No interpretation possible
23/5826	1	BH-01	0.70-2.50	5-8	No interpretation possible
23/5826	1	BH-02	0.00-0.60	9-12	No interpretation possible
23/5826	1	BH-02	0.60-2.35	13-16	No interpretation possible
23/5826	1	BH-02	2.35-3.00	17-20	No interpretation possible
23/5826	1	BH-03	0.00-0.60	21-24	No interpretation possible
23/5826	1	BH-03	0.60-1.00	25-28	Trace of possible degraded diesel
23/5826	1	BH-03	1.00-2.50	29-32	Degraded diesel & Possible PAH's
23/5826	1	BH-03	2.50-2.90	33-36	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/5826	1	BH-01	0.00-0.70	4	Catherine Coles	26/04/2023	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	26/04/2023	**Asbestos Fibres**	NAD
					Catherine Coles	26/04/2023	**Asbestos ACM**	NAD
					Catherine Coles	26/04/2023	**Asbestos Type**	NAD
23/5826	1	BH-01	0.70-2.50	8	Charlotte Taylor	26/04/2023	**General Description (Bulk Analysis)**	brown soil/stones
					Charlotte Taylor	26/04/2023	**Asbestos Fibres**	NAD
					Charlotte Taylor	26/04/2023	**Asbestos ACM**	NAD
					Charlotte Taylor	26/04/2023	**Asbestos Type**	NAD
23/5826	1	BH-02	0.00-0.60	12	Charlotte Taylor	26/04/2023	**General Description (Bulk Analysis)**	brown soil/stones
					Charlotte Taylor	26/04/2023	**Asbestos Fibres**	NAD
					Charlotte Taylor	26/04/2023	**Asbestos ACM**	NAD
					Charlotte Taylor	26/04/2023	**Asbestos Type**	NAD
23/5826	1	BH-02	0.60-2.35	16	Simon Postlewhite	26/04/2023	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	26/04/2023	**Asbestos Fibres**	NAD
					Simon Postlewhite	26/04/2023	**Asbestos ACM**	NAD
					Simon Postlewhite	26/04/2023	**Asbestos Type**	NAD
23/5826	1	BH-02	2.35-3.00	20	Charlotte Taylor	26/04/2023	**General Description (Bulk Analysis)**	brown soil/stones
					Charlotte Taylor	26/04/2023	**Asbestos Fibres**	NAD
					Charlotte Taylor	26/04/2023	**Asbestos ACM**	NAD
					Charlotte Taylor	26/04/2023	**Asbestos Type**	NAD
23/5826	1	BH-03	0.00-0.60	24	Simon Postlewhite	26/04/2023	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	26/04/2023	**Asbestos Fibres**	NAD
					Simon Postlewhite	26/04/2023	**Asbestos ACM**	NAD
					Simon Postlewhite	26/04/2023	**Asbestos Type**	NAD
23/5826	1	BH-03	0.60-1.00	28	Catherine Coles	26/04/2023	**General Description (Bulk Analysis)**	dark brown soil,stones
					Catherine Coles	26/04/2023	**Asbestos Fibres**	NAD
					Catherine Coles	26/04/2023	**Asbestos ACM**	NAD
					Catherine Coles	26/04/2023	**Asbestos Type**	NAD
23/5826	1	BH-03	1.00-2.50	32	Catherine Coles	26/04/2023	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	26/04/2023	**Asbestos Fibres**	NAD
					Catherine Coles	26/04/2023	**Asbestos ACM**	NAD
					Catherine Coles	26/04/2023	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/5826	1	BH-03	2.50-2.90	36	Simon Postlewhite	26/04/2023	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	26/04/2023	**Asbestos Fibres**	NAD
					Simon Postlewhite	26/04/2023	**Asbestos ACM**	NAD
					Simon Postlewhite	26/04/2023	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 23/5826						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/5826

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/5826

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes

EMT Job No: 23/5826

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes

EMT Job No: 23/5826

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	James Cashen
Date :	27th April, 2023
Your reference :	12680-03-23
Our reference :	Test Report 23/5826 Batch 2
Location :	Prussia Street
Date samples received :	17th April, 2023
Status :	Final Report
Issue :	1

Three samples were received for analysis on 17th April, 2023 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Bruce Leslie
Project Manager

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 3rd Floor Davidson Building, 5 Southampton Street, London WC2E 7HA
Company Registration No: 11371415

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	37-40	41-44	45-48									
Sample ID	BH-04	BH-04	BH-04									
Depth	0.00-0.90	0.90-2.40	2.40-3.30									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	12/04/2023	12/04/2023	12/04/2023									
Sample Type	Soil	Soil	Soil									
Batch Number	2	2	2									
Date of Receipt	17/04/2023	17/04/2023	17/04/2023									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Antimony	3	2	2								<1	mg/kg	TM30/PM15
Arsenic #	35.5	8.7	11.9								<0.5	mg/kg	TM30/PM15
Barium #	95	57	77								<1	mg/kg	TM30/PM15
Cadmium #	0.6	1.4	2.2								<0.1	mg/kg	TM30/PM15
Chromium #	36.2	58.9	28.4								<0.5	mg/kg	TM30/PM15
Copper #	42	26	33								<1	mg/kg	TM30/PM15
Lead #	200	13	17								<5	mg/kg	TM30/PM15
Mercury #	0.5	<0.1	<0.1								<0.1	mg/kg	TM30/PM15
Molybdenum #	4.0	5.0	5.1								<0.1	mg/kg	TM30/PM15
Nickel #	33.9	40.8	44.8								<0.7	mg/kg	TM30/PM15
Selenium #	1	<1	4								<1	mg/kg	TM30/PM15
Zinc #	88	73	98								<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.06	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.29	<0.03	0.07								<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.18	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Pyrene #	0.17	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.17	<0.06	<0.06								<0.06	mg/kg	TM4/PM8
Chrysene #	0.17	<0.02	0.06								<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.27	<0.07	<0.07								<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.14	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.08	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.10	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
PAH 6 Total #	0.77	<0.22	<0.22								<0.22	mg/kg	TM4/PM8
PAH 17 Total	1.63	<0.64	<0.64								<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.19	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.08	<0.02	<0.02								<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1								<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	92	179 SV	92								<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30								<30	mg/kg	TM5/PM8/PM16

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	37-40	41-44	45-48									
Sample ID	BH-04	BH-04	BH-04									
Depth	0.00-0.90	0.90-2.40	2.40-3.30									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	12/04/2023	12/04/2023	12/04/2023									
Sample Type	Soil	Soil	Soil									
Batch Number	2	2	2									
Date of Receipt	17/04/2023	17/04/2023	17/04/2023									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.1 SV	<0.1	<0.1 SV								<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.1 SV	<0.1	<0.1 SV								<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1 SV	<0.1	<0.1 SV								<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)#	<4	<4	<4								<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26	<26								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1 SV	<0.1	<0.1 SV								<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)#	<0.1 SV	<0.1	<0.1 SV								<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.1 SV	<0.1	<0.1 SV								<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.1 SV	<0.1	<0.1 SV								<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)#	<4	<4	<4								<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)#	22	<7	<7								<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)#	126	<7	<7								<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	24	<7	<7								<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	172	<26	<26								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	172	<52	<52								<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)#	<0.1 SV	<0.1	<0.1 SV								<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	149	<10	<10								<10	mg/kg	TM5/PM8/PM16
MTBE#	<5 SV	<5	<5 SV								<5	ug/kg	TM36/PM12
Benzene#	<5 SV	<5	<5 SV								<5	ug/kg	TM36/PM12
Toluene#	<5 SV	<5	<5 SV								<5	ug/kg	TM36/PM12
Ethylbenzene#	<5 SV	<5	<5 SV								<5	ug/kg	TM36/PM12
m/p-Xylene#	<5 SV	<5	<5 SV								<5	ug/kg	TM36/PM12
o-Xylene#	<5 SV	<5	<5 SV								<5	ug/kg	TM36/PM12
PCB 28#	<5	<5 SV	<5								<5	ug/kg	TM17/PM8
PCB 52#	<5	<5 SV	<5								<5	ug/kg	TM17/PM8
PCB 101#	<5	<5 SV	<5								<5	ug/kg	TM17/PM8
PCB 118#	<5	<5 SV	<5								<5	ug/kg	TM17/PM8
PCB 138#	<5	<5 SV	<5								<5	ug/kg	TM17/PM8
PCB 153#	<5	<5 SV	<5								<5	ug/kg	TM17/PM8
PCB 180#	<5	<5 SV	<5								<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	<35 SV	<35								<35	ug/kg	TM17/PM8

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	37-40	41-44	45-48									
Sample ID	BH-04	BH-04	BH-04									
Depth	0.00-0.90	0.90-2.40	2.40-3.30									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	12/04/2023	12/04/2023	12/04/2023									
Sample Type	Soil	Soil	Soil									
Batch Number	2	2	2									
Date of Receipt	17/04/2023	17/04/2023	17/04/2023									

Please see attached notes for all abbreviations and acronyms

				LOD/LOR	Units	Method No.
Natural Moisture Content	15.6	14.4	10.2	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	13.5	12.6	9.3	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	-	-	0.0489	<0.0015	g/l	TM38/PM20
Chromium III	36.2	58.9	28.4	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	2.78	0.28	0.75	<0.02	%	TM21/PM24
pH #	8.08	8.49	8.59	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1122	0.1041	0.0976		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09		kg	NONE/PM17

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	37-40	41-44	45-48								LOD/LOR	Units	Method No.
Sample ID	BH-04	BH-04	BH-04										
Depth	0.00-0.90	0.90-2.40	2.40-3.30										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	12/04/2023	12/04/2023	12/04/2023										
Sample Type	Soil	Soil	Soil										
Batch Number	2	2	2										
Date of Receipt	17/04/2023	17/04/2023	17/04/2023										
Dissolved Antimony #	0.005	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	0.05	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	0.0072	<0.0025	<0.0025								<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	0.072	<0.025	<0.025								<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.008	<0.003	0.013								<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.08	<0.03	0.13								<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005								<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005								<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015								<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015								<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	0.015								<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	0.15								<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005								<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.039	0.011	0.038								<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.39	0.11	0.38								<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	0.022								<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	0.22								<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	0.00002	<0.00001	<0.00001								<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	0.0002	<0.0001	<0.0001								<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1								<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	0.3								<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3								<3	mg/kg	TM173/PM0
Sulphate as SO4 #	21.3	8.4	26.1								<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	213	84	261								<5	mg/kg	TM38/PM0
Chloride #	0.7	<0.3	9.2								<0.3	mg/l	TM38/PM0
Chloride #	7	<3	92								<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	3	<2	<2								<2	mg/l	TM60/PM0
Dissolved Organic Carbon	30	<20	<20								<20	mg/kg	TM60/PM0
pH	8.27	8.01	8.05								<0.01	pH units	TM73/PM0
Total Dissolved Solids #	102	54	88								<35	mg/l	TM20/PM0
Total Dissolved Solids #	1020	540	880								<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen
EMT Job No: 23/5826

Report : **EN12457_2**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	37-40	41-44	45-48													
Sample ID	BH-04	BH-04	BH-04													
Depth	0.00-0.90	0.90-2.40	2.40-3.30													
COC No / misc																
Containers	V J T	V J T	V J T													
Sample Date	12/04/2023	12/04/2023	12/04/2023													
Sample Type	Soil	Soil	Soil													
Batch Number	2	2	2													
Date of Receipt	17/04/2023	17/04/2023	17/04/2023													
Solid Waste Analysis											Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Total Organic Carbon #	2.78	0.28	0.75								3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025 SV	<0.025	<0.025 SV								6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035 SV	<0.035								1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30								500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	0.77	<0.22	<0.22								-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	1.63	<0.64	<0.64								100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	0.072	<0.025	<0.025								0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.08	<0.03	0.13								20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005								0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015								0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	0.15								2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	0.0002	<0.0001	<0.0001								0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.39	0.11	0.38								0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02								0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05								0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	0.05	<0.02	<0.02								0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	0.22								0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	<0.03								4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	1020	540	880								4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	30	<20	<20								500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	79.9	86.9	92.2								-	-	-	<0.1	%	NONE/PM4
Moisture Content 105C (% Dry Weight)	25.1	15.1	8.4								-	-	-	<0.1	%	PM4/PM0
pH #	8.08	8.49	8.59								-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1								1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3								10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	213	84	261								1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	7	<3	92								800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
23/5826	2	BH-04	0.00-0.90	37-40	Trace of naturally occurring compounds
23/5826	2	BH-04	0.90-2.40	41-44	No interpretation possible
23/5826	2	BH-04	2.40-3.30	45-48	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/5826	2	BH-04	0.00-0.90	40	Simon Postlewhite	27/04/2023	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	27/04/2023	**Asbestos Fibres**	NAD
					Simon Postlewhite	27/04/2023	**Asbestos ACM**	NAD
					Simon Postlewhite	27/04/2023	**Asbestos Type**	NAD
23/5826	2	BH-04	0.90-2.40	44	Simon Postlewhite	27/04/2023	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	27/04/2023	**Asbestos Fibres**	NAD
					Simon Postlewhite	27/04/2023	**Asbestos ACM**	NAD
					Simon Postlewhite	27/04/2023	**Asbestos Type**	NAD
23/5826	2	BH-04	2.40-3.30	48	Simon Postlewhite	27/04/2023	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	27/04/2023	**Asbestos Fibres**	NAD
					Simon Postlewhite	27/04/2023	**Asbestos ACM**	NAD
					Simon Postlewhite	27/04/2023	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 12680-03-23
Location: Prussia Street
Contact: James Cashen

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 23/5826						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/5826

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/5826

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes

EMT Job No: 23/5826

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes

EMT Job No: 23/5826

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

APPENDIX 5 – Groundwater Monitoring

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

GROUNDWATER MONITORING

Prussia Street

BOREHOLE	DATE	TIME	GROUNDWATER (m BGL)	Comments
BH-03	16/05/2023	8.32am	2.36m	