

Bringing Dublin Port To 2040

Environmental Impact Assessment Report

Appendix 8.2

Volume 3 Part 4







Third & Final Masterplan Project



3FM – DUBLIN PORT

Generic Quantitative Risk Assessment Report





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1 INTRODUCTION

RPS was appointed by Dublin Port Company to undertake a ground contamination risk assessment for the proposed 3FM Project. The 3FM Project will include the development of particular areas of Dublin Port lands on the Poolbeg Peninsula providing additional port capacity, infrastructure and facilities including an overall road network to entirely remove port traffic from public roads in the vicinity of Dublin Port.

1.1 Report objectives and scope

- Summarise the ground investigation works undertaken by Causeway Geotech Ltd from November 2022 to February 2023, and additional investigation undertaken between March 2024 and June 2024.
- Undertake a quantitative human health and waters risk assessment to ascertain if contamination linkages and unacceptable risks are present as a result of the current and historic land use.
- Undertake a ground gas risk assessment.
- Propose remedial measures to address any unacceptable risks.

1.2 Previous reports

This report makes reference to, and builds upon, the information contained within the following documents:

• Report titled 'Dublin Port: 3FM Preliminary Risk Assessment (Desk Study) Report' by RPS dated June 2024.



2 SITE DESCRIPTION

2.1 Introduction

As shown on Figure 2.1, the proposed 3FM Project is located in the Poolbeg area of the peninsula which extends into Dublin Bay just south of the mouth of the River Liffey, approximately 4km east of Dublin city centre.



Figure 2.1 Site Location

The Site is located within the southern lands of Dublin Port in Dublin city, and forms part of an active port. The existing site layout is shown on Figure 2.2.

The site is spread over a number of active sites under the ownership of Dublin Port Company and third parties including Dublin City Council, ESB, Irish Water and NORA.





Figure 2.2: Existing Site Layout (colour scheme – yellow owned by DPC, green owned by others)

2.1.1 Study Area

The site can be characterised by different areas of use, as well as public realm and active travel projects on the Poolbeg Peninsula. The focal point of the Poolbeg Peninsula are the various industrial and port related facilities. Other uses include walkways, recreational facilities and public open space. Protected structures within the peninsula include buildings such as Pigeon House Hotel and Pigeon House Power Station. There are also various national monuments including the Great South Wall.

Maritime Village – Poolbeg Yacht & Boat Club

The Poolbeg Yacht & Boat Club, Marina and Stella Maris Rowing Club comprise a key sporting and amenity centre which is in daily use by members of the clubs, visitors and the local community.

Area K - Marine Terminals Ltd (MTL) Lo Lo Terminal

MTL operate a Lo-Lo container freight terminal. The terminal contains rail mounted gantry (RMG) cranes and rubber tyred gantry (RTG) mobile cranes. Containers are stored up to six high within the terminal.

Area L

Area L is currently utilised by three DPC tenants;

- Irish Cement (cement and petroleum coke).
- Hammond Lane (scrap metal); and
- EcoCem (eco-cement production).

The quayside area, comprising Berth 46 and Berth 47, is shared between the three operators. Separate manifolds are set into the quayside to transfer molasses, vegetable oil and fuel to storage tanks from ships which also use these berths. Harbour Mobile Cranes and smaller mobile plant, including long reach excavators, serve the berths.

The landside area is being used for bulk storage of petroleum coke, cement and scrap metal, with warehouses and plant to process the metal and produce cement products.

Area O

The Port owned lands located on the southern side of the Poolbeg Peninsula comprise a brownfield / hardstand site which is currently being used for a range of activities including;

- Kilsaran Concrete Ltd plant which comprises a concrete batching plant and associated facilities.
- Bissett Engineering plant which is currently not operational; and
- Site compounds to facilitate engineering contractor's offices for works at Uisce Éireann's Ringsend WwTP in temporary site cabin facilities, with car parking, fencing and materials storage. Previously this was used as a construction compound for works at the Encyclis (formerly Covanta) Waste to Energy Facility.

Roadways and Footways

There are a number of roads and footways which lie within the application boundary of the 3FM Project.

The existing road network is primarily owned by DCC, with the exception of White Bank Road and the eastern portion of South Bank Road which are owned by DPC. The network serves the various commercial sites on the Poolbeg Peninsula, as well as providing public access to the amenity areas, notably to the Great South Wall where Dublin City Council maintain a public carpark.

A corridor for a roadway through DPC's northern lands lies within the application boundary of the 3FM Project, to connect a proposed bridge crossing of the River Liffey to Alexandra Road, thereby removing the majority of port related traffic from East Wall Road.



Sludge Jetty/Turning Circle

The sludge jetty was formerly used to load sewage sludge onto vessels for disposal at sea. This practice is now prohibited, and the sludge jetty is no longer used and has fallen into a state of disrepair.

The land adjacent to the sludge jetty where the turning circle will part encompass was previously infilled with construction and demolition waste under a Foreshore License authorisation.

Area N

Area N is located offshore adjacent to the ESB Poolbeg generating station and the NORA Poolbegg oil storage facility and the Great South Wall.



3 SUMMARY OF PRELIMINARY RISK ASSESSMENT

RPS was appointed by Dublin Port Company to undertake a Preliminary Risk Assessment (Desk Study) Report for the study area. The RPS report titled 'Dublin Port: 3FM Preliminary Risk Assessment (Desk Study) Report' by RPS dated June 2024 should be read in conjunction with this report. A summary of findings from the Preliminary Risk Assessment are provided below.

3.1 On site sources

3.1.1 Current Site Use

Current industrial usage such as operational activities within Plot L including a petcoke storage area operated by Irish Cement, Hammond Lane Metal Recycling (scrap metal dealer), Ecocem Ireland Plant (cement manufacturer) and a number of fuel tanks are considered to be potential sources of contamination.

3.1.2 Previous Land Use – Historical Development

The study area is located predominantly within areas of reclamation, formally the foreshore. Made ground was used to reclaim the land in the early 1970s, consisting of hydraulic fill material including sands, silts, clays and gravel, as well as some brick, glass and cinders.

Area O formally operated as a landfill known as the Irishtown Tip Head. The Irishtown Tip Head commenced operations in 1948 in Ringsend. The filling operations moved sequentially eastwards before its eventual capping in 1978. Municipal waste and construction and demolition waste material were deposited at the landfill which was not a fully engineered landfill in line with modern best practice and standards.

The area of land adjacent to the sludge jetty where the turning circle will part encompass was previously infilled with construction and demolition waste under a Foreshore License authorisation in the early 2000s.

Due to the previous history of reclamation and landfilling and the various heavy industrial uses that have been present over the decades on the peninsula, it is expected that there is a potential for ground contamination to be present.

3.2 Off site sources

3.2.1 Surrounding Land Use – Current

The surrounding land use comprises extensive industrial landuse in the surrounding port areas including significant fuel storage, power stations and sub-stations and these may have the potential for ground contamination

3.2.2 Surrounding Land Use – Historical

Historical potentially contaminating activities are present in the area surrounding the site including the old Poolbeg Power Station, former Fabrizia site and the former Irish Glass Bottle site.

3.3 Environmental setting

A desk study of published material held on Geological Survey Ireland Map Viewer was undertaken to provide an initial overview of ground conditions at the site. The following describes the findings of this preliminary research.

The solid geology underlying the site is anticipated to be underlain by the Lucan Formation.

The drift geology beneath the site is expected to principally reflect the depositional process of the last glaciation when an extensive ice sheet that extended into the Irish Sea covered the region. Typically, during the ice advance boulder clays were deposited sub-glacially as lodgement till over the eroded rock head surface, whilst moraine deposits were laid down at the glacier margins. Subsequently, with the progressive retreat of the ice sheet from the region, fluvio-glacial deposits (sand, gravel and silt) were laid down by melt waters discharging from the front of the glacier. Recent deposition prior to reclamation of the site principally reflects marine erosional and depositional processes, which have modified the glacial deposits.

According to the GSI map for groundwater vulnerability, the site is partially mapped, the areas that are mapped have a low groundwater vulnerability indicating that the natural groundwater is unlikely to be easily contaminated by human activities.

An assessment carried out under the Water Framework Directive (WFD) 2013-2018 groundwater body (EPA, 2022) has concluded that the groundwater within the bedrock aquifer is presently of 'Good Status'. Groundwater Risk looks at the current water quality and trends and is used to highlight waterbodies that are at risk of deteriorating or being at less than Good status in the future. The site is categorised as being under review. During consultation with the GSI GeoIndex web viewer, it was found that there were no groundwater wells and springs in a 500m radius of the site.

The River Liffey is the dominant surface water feature that runs through the centre of Dublin, flowing from west to east before discharging into the Irish Sea. The transitional water quality status for The River Liffey from 2018 to 2020 under the Water Framework Directive (WFD), is described as being good and unpolluted. The Dodder River flows into the River Liffey just west of Tom Clarke Bridge. The South Dublin Bay Special Protection Area (SPA) is present southeast of the site.

An Industrial Emission licence (IEL) is held by The Hammond Lane Metal Company Limited which is located within Area L. The licence (P1002-01) is categorised as 'recovery, or a mix of



recovery and disposal, of a non-hazardous waste'. An IEL is also held c.330m south at Synergen Power Limited.

One Integrated Pollution Control license (IPC) is also within 500m of the site, located c.340m southeast of the site at Becbay Limited the former Irish Glass Bottle factory site (since 1994), categorised as being previously industrial in nature before being surrendered to state control in 2009. The EPA monitored the clean-up of the industrial contaminants across this 25-acre site by the Becbay owners prior to it being surrendered; concluding all environmental pollutants linked to the manufacturing legacy were cleared.

Following a review of available information, the following potential pollutant linkages were identified within the Preliminary Risk Assessment;

Table 3-1 Preliminary conceptual site model

POTENTIAL SOURCES

Potential on-site sources:

- Made ground, reduced quality soils and groundwater
- Former Landfill Soil gas and volatile vapours
- Potential Asbestos Containing Materials (ACM)

Potential off-site sources:

Current and historical surrounding land uses

POTENTIAL PATHWAYS

Humans:

- Dermal (skin) contact with contaminated soil, fugitive dust and the absorption of any contaminants through the skin into the body
- Inhalation of fugitive soil dust, asbestos fibres, gases or vapours
- Ingestion of soil by hand to mouth activity

Environment:

- Subsurface infiltration, leaching from sub-soils and groundwater flow
- Vertical migration of shallow potentially contaminated groundwater
- Shallow groundwater or leachate migration in lateral direction
- Buildings:
- Inhalation of gases or vapours

POTENTIAL RECEPTORS

- Humans in form of future site users (commercial, and site workers during construction)
- Groundwater and River Liffey / South Dublin Bay Special Protection Area (SPA).
- Buildings and services



4 INTRUSIVE GROUND INVESTIGATION METHODOLOGY & OBJECTIVES

4.1 Methodology

The contamination assessment comprised several main elements, carried out in a two phased basis as described below:

4.1.1 Phase I - PRA

- Desk study (carried out by RPS)
- Site walkover (carried out by RPS)

The information gathered during the PRA (as detailed in the previous sections) was used to plan and focus the Phase II investigation. The Phase II investigation comprised the following:

4.1.2 Phase II - GQRA

- Ground investigation
- Chemical testing of soil samples
- Chemical testing of groundwater samples
- Ground borne gas survey

4.2 **Objectives for Investigation**

- To assess sub-soil and groundwater contamination and soil borne gas levels to enable a generic quantitative risk assessment (GQRA) to be undertaken to assess the potential risks to human health and environmental receptors.
- To summarise the findings of the chemical testing and based on the results; revise the Conceptual Model for the site.
- To provide sufficient evidence with regards to the sites suitability for the proposed end use.

4.3 Sampling Strategy

An intrusive geotechnical and geo-environmental ground investigation was undertaken at the site by Causeway Geotech Ltd between the 8th of November 2022 and the 10th of February 2023. The investigation was divided by land ownership into Dublin Port Company (DPC) lands and Dublin City Council (DCC) lands.



4.3.1 Dublin Port Company (DPC) Lands

The investigation undertaken on lands owned by DPC consisted of the following:

- Twenty boreholes
 - Five (5) light cable percussion boreholes
 - Five (5) boreholes by light cable percussion extended by rotary follow-on drilling
 - Ten (10) boreholes by dynamic (windowless) sampling
- The installation of thirteen (13) combined gas / shallow groundwater monitoring standpipes;
- Two (2) machine dug silt trenches
- Indirect CBR tests at two locations
- Four (4) road cores

The exploratory hole locations are shown in Appendix A. Details of the borehole logs, trial pit logs and monitoring installations are provided in the Causeway Geotech Ground Investigation Report in Appendix B.

A total of twenty (20) boreholes (BH101-BH103, BH105, BH110, BH112, BH116, BH117, BH119-BH131) were excavated to a maximum depth of 41.00m bgl by means of a CME-55 drill rig using a combination of hollow stem auger drilling, mud rotary drilling and percussion sampling techniques.

Light cable percussion boreholes

A total of five (5) boreholes (BH119, BH121, BH122, BH130, BH131) were each excavated to a depth of 6.0m bgl by using either a Dando 2000 or Dando 3000 light cable percussion boring rigs. All boreholes were terminated at scheduled depth or on encountering virtual refusal on obstructions.

Boreholes by combined percussion boring and rotary follow-on drilling

Five (5) boreholes (BH101, BH120 and BH123-BH125) were put down by a combination of light cable percussion boring and rotary follow-on drilling techniques using a Beretta T44 or Commachio 601 rotary drilling rig with core recovery in bedrock. Where the cable percussion boreholes refused rotary percussion methods were employed to advance the borehole to competent strata after which coring was carried out to completion. Symmetrix cased full-hole drilling was used, with SPTs carried out at standard intervals as required.

Dynamic sampled boreholes

Ten (10) boreholes (BH102-103, BH105, BH108-110, BH112, BH116-117 and BH126-128) were put down to completion by light percussion boring techniques using a Dando Terrier or Premier 110 dynamic sampling rig.



Standpipe installations

Combined gas / groundwater monitoring standpipes were installed in thirteen boreholes (BH102, BH103, BH105, BH112, BH120-BH128) per RPS instructions to target shallow groundwater and ground gas in the Made Ground strata. Groundwater monitoring standpipes were installed in boreholes BH120 and BH123 as per RPS instruction to target deeper groundwater within the underlying Sand strata. Each standpipe comprised a 50mm HDPE well casing and well screen sections with associated gravel filter pack, bentonite pellet seal, push fit base cap, geotextile filter sock, push fit gas bung, cement/bentonite grout seals and steel head cover.

Details of groundwater strikes, as encountered during boring operations, and presented on the exploratory hole logs together with details of the water levels as recorded upon completion of the boreholes.

Silt Trenches

Two (2) silt trenches (ST102 and ST104) were excavated by a combination of hand digging and mechanical excavation using a compact 3t tracked excavator fitted with a 600mm wide toothless bucket, to locate and identify buried services at the site.

Road Cores

Four (4) road cores (RC101-RC104) were carried out at locations to establish the pavement make-up. The road cores were taken using hand-held diamond coring equipment to facilitate the collection of representative soil samples for detailed geotechnical description.

DCP tests were conducted at two (2) locations (RC102 and RC104) using a Dynamic Cone Penetrometer. The DCP tests were undertaken in order that an assessment could be made of the strength of the soils present to a maximum depth of 1.0m bgl along the route of proposed roads and pavement areas.

4.3.2 Dublin City Council (DCC) Lands

The investigation undertaken on lands owned by DCC consisted of the following:

- Ten (10) boreholes
 - Six (6) light cable percussion boreholes
 - Three (3) boreholes by light cable percussion extended by rotary follow-on drilling
 - One (1) borehole by dynamic (windowless) sampling
- Two (2) machine dug silt trenches
- Indirect CBR tests at eighteen (18) locations
- Twenty (20) road cores



Details of the borehole logs, trial pit logs and monitoring installations are provided in the Causeway Geotech Ground Investigation Report in Appendix B.

Light cable percussion boreholes

Six (6) boreholes (BH208-BH208D and BH212) were excavated to a depth of 6.0m bgl by using either a Dando 2000 or Dando 3000 light cable percussion boring rigs. All boreholes were terminated at scheduled depth or on encountering virtual refusal on obstructions.

Boreholes by combined percussion boring and rotary follow-on drilling

Three (3) boreholes (BH215-BH217) were excavated by a combination of light cable percussion boring and rotary follow-on drilling techniques. In the case that cable percussion techniques had not been advanced in competent strata, rotary percussive methods were employed to advance the borehole to completion. Symmetrix cased full-hole drilling was used, with SPTs carried out at standard intervals as required.

Dynamic Sampled borehole

One borehole (BH203) was put down to completion by light percussion boring techniques using a Premier110 dynamic sampling rig.

Slit Trenches

Two (2) slit trenches (ST203 and ST204) were excavated by a combination of hand digging and mechanical excavation using a compact 3t tracked excavator fitted with a 600mm wide toothless bucket, to locate and identify buried services at the site.

Road Cores

A total of twenty (20) road cores were carried out at locations to establish the pavement makeup. The road cores were taken using hand-held diamond coring equipment to facilitate the collection of representative soil samples for detailed geotechnical description.

DCP tests were conducted at eighteen locations (RC202-RC207, RC209 and RC211-221) using a Dynamic Cone Penetrometer. The DCP tests were undertaken in order that an assessment could be made of the strength of the soils present to a maximum depth of 1.0m bgl along the route of proposed roads and pavement areas.

Boreholes were targeted to potential sources of contamination in the first instance based on historical building footprints identified in historical mapping, and then spread across the site taking the proposed development plan into account. The boreholes facilitated soil sampling, groundwater and ground gas monitoring and obtaining geotechnical information for design.



Table 4-1 Exploratory location rationale

Exploratory Hole	Rationale for location
Maritime Village	
BH102	Located within / along the maritime village. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.
BH103	Located within the area of MTL. To facilitate environmental soil, groundwater and ground gas sampling.
BH130	Located within the area of MTL. To facilitate design, aimed behind concrete caisson to confirm retained fill material.
BH131	Located within the area of MTL. Aimed to core through concrete hardstanding, into caisson, confirming gravel (or other) fill, level of caisson base and underlying strata.

Exploratory Hole	Rationale for location
Active Transport Ro	oute / Pathway
BH101	Located within the compound of Sea Truck Ferries. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.
BH105	Located within MTL. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.
BH110	Located along Pigeon House Road. Required for geotechnical information for road design. Required for geotechnical information for road design.
BH112	Located along South bank road / entrance to E D & F Man Liquid Products Ireland Limited. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.
BH116	Area known as 'John Noaln Transport.' To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.
BH117	Area known as 'John Noaln Transport.' To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.
BH208	To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.
ST101	Located within MTL. Geotechnical for road design/confirm existing road makeup/services.
ST102	Located along Pigeon House Road. Geotechnical for road design/confirm existing road makeup/services.
ST104	Area known as 'John Nolan Transport.' Geotechnical for road design/confirm existing road makeup/services.



Exploratory Hole	Rationale for location
Active Transport Ro	oute / Pathway
RC101	Loctaed on the north side of Dublin Port along Alexandra Road. Geotechnical for road design/confirm existing road makeup.
RC102	Located along South bank road. Geotechnical for road design/confirm existing road makeup.
RC103	Located along South bank road/Port park area. Geotechnical for road design/confirm existing road makeup.
RC104	Located along South bank road. Geotechnical for road design/confirm existing road makeup.
RC208	Located along Pigeon House Road.
RC209	Located along Pigeon House Road.
RC210	Located along Pigeon House Road.
RC211	Located along Pigeon House Road.
RC212	Located along Pigeon House Road.
RC215	Located along Pigeon House Road.
RC216	Geotechnical for road design/confirm existing road makeup/services.
RC217	Geotechnical for road design/confirm existing road makeup/services.
RC218	Adjacent Ringsend Wastewater Treatment Works.
RC219	Coastal path.
RC220	Coastal path.
RC221	Coastal path.

Exploratory Hole	Rationale for location
Area O	
BH119	Located within Murphy's Ringsend Offices. Required for geotechnical information for road design.
BH120	Located within Murphy's Ringsend Offices. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road and area O design.



Exploratory Hole	Rationale for location
Area O	
BH121	Former landfill area located in Pool Beg Construction. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for area O design.
BH122	Former landfill area. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for area O design.
BH123	Former landfill area. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for area O design.
BH124	Former landfill area. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for area O design.
BH125	Former landfill area. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for area O design.

Exploratory Hole	Rationale for location		
Port Park			
BH126	Former landfill area. To facilitate environmental soil, groundwater and ground gas sampling.		
BH126A	Former landfill area. To facilitate environmental soil, groundwater and ground gas sampling.		
BH127	Former landfill area currently occupied by Bissett Industrial contracting and D4 metal works. To facilitate environmental soil, groundwater and ground gas sampling.		
BH128	Former landfill area. To facilitate environmental soil, groundwater and ground gas sampling.		

Exploratory Hole	Rationale for location		
Shellybanks Ro	bad		
BH203	To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.		
ST203	Geotechnical for road design/confirm existing road makeup/services.		
ST204	Geotechnical for road design/confirm existing road makeup/services.		
RC202	Geotechnical for road design/confirm existing road makeup/services.		
RC203	Geotechnical for road design/confirm existing road makeup/services.		
RC204	Geotechnical for road design/confirm existing road makeup/services.		

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Exploratory Hole Shellybanks R	Rationale for location
RC205	Geotechnical for road design/confirm existing road makeup/services.
RC206	Geotechnical for road design/confirm existing road makeup/services.
RC208	Geotechnical for road design/confirm existing road makeup/services.

Exploratory Hole	Rationale for location
Area N	
BH212	Located adjacent NORA Poolbeg Oil Storage Terminal.

Exploratory Hole	Rationale for location
Turning Circle	
BH215	To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for turning circle design.
BH216	To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for turning circle design.
BH217	To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for turning circle design.



Location	Proposed Termination Depth (m)	Actual Terminati on Depth (m)	Observations/Problems Encountered	Installation Monitoring Details
BH101	30.0	30.0	Target strata reached, terminated in limestone bedrock	No installation
BH102	5.0	3.0	Terminated due to casing refusal at 2.50m	0.0-0.5m plain pipe 0.5-2.40m slotted pipe, to target made ground
BH103	5.0	4.0	Terminated due to borehole collapse	0.0-0.5 plain pipe 0.5-3.7m slotted pipe, to target made ground
BH105	5.0	2.50	Terminated due to sampler refusal	0.0-0.5 plain pipe 0.5-2.2m slotted pipe, to target made ground
BH110	5.0	4.00	Terminated due to borehole collapse from 4.00m to 3.50m	No installation
BH112	5.0	4.00	Terminated due to borehole collapse	0.0-0.5 plain pipe 0.5-3.4m slotted pipe, to target made ground
BH116	3.0	1.60	Location terminated by client	No installation
BH117	3.0	1.60	Terminated on refusal, four attempts to advance borehole	No installation
BH119	3.0	3.50	Terminated due to casing refusal	No installation
BH120	40.0 / Bedrock	40.50	Terminated at scheduled depth	0.0-6.5m plain pipe 6.5-20m slotted pipe, to target water in sands
BH121	40.0 / Bedrock	32.45	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-5.5m slotted pipe, to target made ground

Table 4-2 Exploratory hole summary DPC lands



Location	Proposed Termination Depth (m)	Actual Terminati on Depth (m)	Observations/Problems Encountered	Installation Monitoring Details
BH122	40.0 / Bedrock	23.50	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-5.0m slotted pipe, to target made ground
BH123	40.0 / Bedrock	41.00	Terminated at scheduled depth	0.0-4.5m plain pipe 4.5-6.5m slotted pipe, to target waters in sand strata
BH124	40.0 / Bedrock	40.00	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-1.5m slotted pipe, to target made ground
BH125	40.0 / Bedrock	36.5	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-5.0m slotted pipe, to target made ground
BH126	5.00	1.50	Terminated due to casing refusal	No installation
BH126A	5.00	1.50	Terminated due to casing refusal	0.0-0.5m plain pipe 0.5-1.0m slotted pipe, to target made ground
BH127	5.00	3.0	Terminated due to casing refusal	0.0-0.5m plain pipe 0.5-2.5m slotted pipe, to target made ground
BH128	5.00	2.60	Terminated due to casing refusal	0.0-0.5m plain pipe 0.5-2.1m slotted pipe, to target made ground
BH130	25.00	21.00	Terminated at scheduled depth	No installation
BH131	25.0	17.00	Terminated due to casing refusal	No installation



Location	Proposed Termination Depth (m)	Actual Terminati on Depth (m)	Observations/Problems Encountered	Installation Monitoring Details
BH203	5.00	0.60	Terminated due to services present	No installation
BH208	5.00	0.90	Terminated on concrete	No installation
BH208A	5.00	0.40	Terminated at refusal on boulders / possible bedrock	No installation
BH208B	5.00	0.80	Terminated at refusal on concrete	No installation
BH208C	5.00	0.80	Terminated at refusal on concrete	No installation
BH208D	5.00	0.15	Terminated at refusal on concrete	No installation
BH212	50.0 / Bedrock	10.20	Terminated at scheduled depth	No installation
BH215	40.0 / Bedrock	40.00	Terminated at scheduled depth	No installation
BH216	40.0 / Bedrock	40.50	Terminated at scheduled depth	No installation
BH217	40.0 / Bedrock	41.00	Terminated at scheduled depth	No installation

Table 4-3 Exploratory hole summary DCC/third party lands



4.4 Analytical strategy

Environmental soil samples were taken at regular intervals throughout the length of the excavation of each borehole. The protocol observed during the recovery of samples followed the guidance set out in BS 10175:2011 + A2:2017 The Code of Practice for the Investigation of Potentially Contaminated Sites.

A total of thirty-two (32) soil samples were sent to Chemtest for analysis. Samples were analysed for; Asbestos identification, moisture content, pH, Boron (hot water soluble), Sulphate (2:1 water soluble) as SO4, Total Sulphur, Sulphur (Elemental), Cyanide (total), Iron (total), Arsenic, Beryllium, Cadmium, Chromium (total), Copper, Mercury, Nickel, Lead, Selenium, Vanadium, Zinc, Chromium (hexavalent), Organic matter, Total Petroleum Hydrocarbons (TPH-CWG C5 – C35 aromatic-aliphatic split), speciated Polycyclic Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), speciated Poly Chlorinated Biphenyls (PCBs) and Phenols (speciated HPLC).

A total of five (5) soil samples were also analysed for Leachate Analysis. As per the EA Remedial Targets Methodology, the Level 1 screen examines the potential for contaminants to leach from soil to soil pore water.

Speciated TPH analysis was undertaken to provide a better understanding of the 'make up' of any hydrocarbon contamination in relation to the specific carbon banding, as suggested within the 'Total Petroleum Hydrocarbon Criteria Working Group' (TPH-CWG) literature and recommended by the Environment Agency document P5-080/TR3 'The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbon in Soil'.

Five (5) groundwater samples and three (3) surface water samples were collected and sent to Chemtest for a similar range of contaminants as listed above for the soil samples.

4.5 Observation of potential contaminants in soil and groundwater

The following olfactory evidence of contamination was noted by Causeway Geotech Ltd in a borehole log for a borehole located within Area O;

• BH126 at 0.40 – 1.50m bgl: Hydrocarbon odour within made ground

There is no further note of visual or olfactory evidence for remaining borehole and trial pit logs from the intrusive investigation.



4.6 **Problems encountered during investigation**

4.6.1 Access constraints

Despite engagement with stakeholders and port operators, access was refused to some of the proposed ground investigation locations for a number of reasons which are outlined in the table below. Later during the period of field monitoring works, access was not possible to a number of installed monitoring well and the locations affected are outlined in Section 6.3 of this report.

	Location ID	Stakeholder / land ownership or	Access Constraint
		operator	
BH104		Dublin Port Company / MTL	No safe location due to proximity to working crane.
BH106		Dublin Port Company / MTL	No safe utility service clearance in this area.
BH107		Dublin Port Company / MTL	No safe utility service clearance in this area.
BH108		Dublin Port Company / MTL	No safe utility service clearance in this area.
BH109		Dublin Port Company / MTL	No safe utility service clearance in this area.
BH111		Dublin Port Company / Rushfleet	No access from site operator.
BH113		Dublin Port Company	No safe utility service clearance from ESB Energy.
BH114		Dublin Port Company	No safe utility service clearance from ESB Energy.
BH115		Dublin Port Company / Rushfleet	No access from site operator.

Table 4-4 Ground investigation locations and access constraint issues

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	Location ID	Stakeholder / land ownership or	Access Constraint
		operator	
BH118		Dublin Port Company	No safe utility clearance from Gas Network's Ireland (GNI).
BH129		Dublin Port Company	ESB supervision required, could not attend site during the programme of the investigation.
BH132		Dublin Port Company / MTL	No safe utility service clearance in proposed area of quay.
TP101		Dublin Port Company	No safe utility clearance from ESB.
TP102		Dublin Port Company	No safe clearance area due to Japanese knotweed and utility services.
TP103		Dublin Port Company	ESB supervision required, could not attend site during the programme of the investigation.
ST101		Dublin Port Company / MTL	ESB supervision required, could not attend site during the programme of the investigation.
ST103		Dublin Port Company	Access constraints due to traffic management requirements.



	Location ID	Stakeholder / land ownership or	Access Constraint
		operator	
ST105		Dublin Port Company	ESB supervision required, could not attend site during the programme of the investigation.
ST106		Dublin Port Company	ESB supervision required, could not attend site during the programme of the investigation.
ST107		Dublin Port Company	ESB supervision required, could not attend site during the programme of the investigation.
ST108		Dublin Port Company / Ward & Burke	Access constraints due to live traffic area providing access / egress to various sites
ST109		Dublin Port Company / Hegarty ar Murphy	ndESB supervision required, could not attend site during the programme of the investigation.
BH201		Dublin City Council / Shellybanks Road	Proximity to ESB underground cable
BH202		Dublin City Council / Shellybanks Road	Proximity to ESB underground cable
BH204		Dublin City Council / Shellybanks Road	No access to Covanta site
BH205		Dublin City Council	ESB supervision required / ESB could

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	Location ID Stakeholder / land ownership or		Access Constraint
		operator	
			not clear a safe distance from services.
BH206		Dublin City Council / ESB	ESB supervision required / ESB could not clear a safe distance from services.
BH207		Dublin City Council	ESB supervision required / ESB could not clear a safe distance from services.
BH209		Dublin Port Company	No access approved during engagement with Dublin City Council Parks.
BH210		Dublin Port Company	No access approved during engagement with Dublin City Council Parks.
BH211		Dublin Port Company	No access approved during engagement with Dublin City Council Parks.
BH213		Dublin Port Company	No access approved during engagement with ESB & National Oil Reserves Agency (NORA).
BH214		Dublin City Council	No access approved during engagement

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	Location ID	Stakeholder / land ownership or operator	Access Constraint
			with ESB & National Oil Reserves Agency (NORA).
RC201		Dublin City Council	No access approved.
ST201		Dublin City Council	No safe utility clearance from ESB.
ST202		Dublin City Council / Shellybanks Road	No access approved during engagement with Covanta.
ST205		Dublin City Council / Shellybanks Road	No access approved during engagement with ESB.
ST206		Dublin City Council / Pigeon House Road	l No safe utility clearance from ESB.
ST207		Dublin City Council / Shellybanks Road	No safe utility clearance from ESB.
ST208		ESB	No safe utility clearance from ESB.
ST209		Dublin City Council	No safe utility service clearance in this area.
ST210		Dublin City Council	No safe utility service clearance in this area.
ST211		Dublin City Council	No access approved during engagement with Dublin City Council Parks.
ST212		Dublin City Council	No access approved during engagement



Location ID	Stakeholder / land ownership or	Access Constraint	
		operator	
			with Dublin City Council Parks.
ST213		Dublin City Council	No access approved during engagement with Dublin City Council Parks.
ST214		Dublin City Council	No access approved during engagement with Dublin City Council Parks.
ST215		Dublin Port Company	No access approved during engagement with Dublin City Council Parks.
ST216		Dublin Port Company	No access approved during engagement with Dublin City Council Parks.
ST217		Dublin Port Company	No access approved during engagement with Dublin City Council Parks.
ST218		Dublin Port Company	No access approved during engagement with Dublin City Council Parks.
ST219		Dublin Port Company	No access approved during engagement with Dublin City Council Parks.



	Location ID	Stakeholder / land ownership or	Access Constraint
		operator	
TP201		Dublin City Council / Pigeon House Road	No safe utility service clearance in this area.
TP202		Dublin City Council / Pigeon House Road	ESB supervision required, could not attend site during the programme of the investigation.
TP203		Dublin City Council	ESB supervision required, could not attend site during the programme of the investigation.



5 ADDITIONAL GROUND INVESTIGATION 2024

5.1 Methodology

As the scope of the 3FM project expanded, further ground investigation works were carried out between March 2024 and June 2024 to provide further information on ground conditions within Area O. Further information was also required from within Area L which was not originally included within the scope of works.

The same approach described in Chapter 4 of this report was adopted for the contamination assessment. Information obtained from Area L, and the additional information obtained from Area O between March 2024 and June 2024 have been included in the overall assessment.

5.2 Sampling strategy

An intrusive geotechnical and geo-environmental ground investigation was undertaken at the site by Causeway Geotech Ltd between the March 2024 and June 2024. The investigation was divided into Area L and Area O.

5.2.1 Area L

The investigation undertaken on lands owned by DPC consisted of the following:

- Thirteen (13) sonic drilled boreholes
- The installation of twelve (12) combined gas / shallow groundwater monitoring standpipes;
- Four (4) machine dug trial pits
- Insitu testing, including:
 - Indirect CBR tests at four (4) locations
 - Standard Penetration Tests
 - Photoionization Detection (PID) testing
- Ground Penetrating Radar (GPR) surveying

The exploratory hole locations are shown in Appendix A. Details of the borehole logs, trial pit logs and monitoring installations are provided in the Causeway Geotech Ground Investigation Report in Appendix B.

A total of thirteen (13) boreholes were put to their completion by sonic drilling techniques. The boreholes were completed using a Fraste CRS XL Duo and a Fraste XL Duo rubber-tracked sonic drilling rig.

Six of the boreholes were 'deep' boreholes and reached a maximum depth of 30.15m bgl (BH304, BH306, BH308, BH309, BH313 & BH314). Six (6) of the boreholes were 'shallow'



boreholes and reached a maximum target depth of 8.0m bgl (BH301-303, BH305, BH307, BH310 & BH311).

One (1) borehole was cancelled from the scope (BH312) due to health and safety and traffic management issues.

Standpipe installations

Combined gas / groundwater monitoring standpipes were installed in twelve (12) boreholes (all boreholes excluding BH312 which was removed from the scope and BH314) per RPS instructions to target shallow groundwater and ground gas in the Made Ground strata and Sands & Gravels. Each standpipe comprised a 50mm HDPE well casing and well screen sections with associated gravel filter pack, bentonite pellet seal, push fit base cap, geotextile filter sock, push fit gas bung, cement/bentonite grout seals and steel head cover.

Details of groundwater strikes, as encountered during boring operations, and presented on the exploratory hole logs together with details of the water levels as recorded upon completion of the boreholes.

Trial Pits

Four (4) trial pits (TP301-TP304) were excavated using a compact 3t tracked excavator fitted with a 600mm wide toothless bucket, to depths of up to 1.5m bgl.

5.2.2 Area O additional boreholes

The additional boreholes undertaken within Area O consisted of the following:

- Eight (8) boreholes
 - Three (3) light cable percussion boreholes
 - Five (5) sonic boreholes

Details of the borehole logs and monitoring installations are provided in the Causeway Geotech Ground Investigation Report in Appendix B.

Light cable percussion boreholes

Three (3) boreholes (BH315-BH317) were excavated to a depth of 8.0m bgl by using a 200mm diameter Dando 2500 light cable percussion boring rig. All boreholes were terminated at scheduled depth.

Sonic boreholes

Five (5) boreholes (BH318-BH322) were put to their completion by sonic drilling techniques. The boreholes were completed using a Fraste CRS-XL Duo rubber-tracked sonic drilling rig.



Table 5-1 Exploratory location rationale

Exploratory Hole	Rationale for location
Area L	
BH301	Located in the north-west of Area L to target potential downgradient migration of hydrocarbons from adjacent bulk fuel tanks. To facilitate environmental soil, groundwater and ground gas sampling.
BH302	Located on the western boundary of Area L , adjacent to location of former bulk fuel storage tank. To facilitate environmental soil, groundwater and ground gas sampling.
BH303	Located within north-west of Area L in lands operated by Irish Cement and targeting above ground fuel storage tank. To facilitate environmental soil, groundwater and ground gas sampling.
BH304	Located in the north of Area L, between building occupied by Irish Cement and the petcoke storage bund. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for design.
BH305	Located in the north of Area L, north of the petcoke storage bund. To facilitate environmental soil, groundwater and ground gas sampling.
BH306	Located in the south of Area L within Hammond Lane Recycling to target above ground fuel storage tanks. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for design.
BH307	Located centrally within Area L, within Hammond Lane Recycling. To facilitate environmental soil, groundwater and ground gas sampling.
BH308	Located in the south of Area L, within Hammond Lane Recycling. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for design.
BH309	Located along the eastern boundary of the Hammond Lane Recycling within Area L. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for design.
BH310	Located in the north of Area L, north of the petcoke storage bund. To facilitate environmental soil, groundwater and ground gas sampling.
BH311	Located in the north-east of Area L, north of Ecocem. To facilitate environmental soil, groundwater and ground gas sampling.
BH312	Located in the south-east of Area L, to the south-east of Ecocem. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for design. Later removed from the scope due to health and safety and traffic management issues.
BH313	Located in the south-east of Area L, to the south-east of Ecocem. To facilitate environmental soil, groundwater and ground gas sampling. Required for geotechnical information for road design.
BH314	Located in the south-east of Area L. Required for geotechnical information for road design.
TP301	Located at the entrance to Hammond Lane Recycling within Area L. Required for geotechnical information for design.
TP302	Located in the north of Area L, between building occupied by Irish Cement and the petcoke storage bund. Required for geotechnical information for design.


Exploratory Hole	Rationale for location
Area L	
TP303	Located in the south of Area L. Required for geotechnical information for design.
TP304	Located centrally within Area L, within Hammond Lane Recycling. Required for geotechnical information for design.

Exploratory Hole	Rationale for location
Area O	
BH315	Located within Area O to facilitate environmental soil, groundwater and ground gas sampling.
BH316	Located within Area O to facilitate environmental soil, groundwater and ground gas sampling.
BH317	Located within Area O to facilitate environmental soil, groundwater and ground gas sampling.
BH318	Located within Area O to facilitate environmental soil, groundwater and ground gas sampling.
BH319	Located within Area O to facilitate environmental soil, groundwater and ground gas sampling.
BH320	Located within Area O to facilitate environmental soil, groundwater and ground gas sampling.
BH321	Located within Area O to facilitate environmental soil, groundwater and ground gas sampling.
BH322	Located within Area O to facilitate environmental soil, groundwater and ground gas sampling.



Table 5-2 Exploratory hole summary Area L

Location	Proposed Termination Depth (m)	Actual Termination Depth (m)	Observations/Problems Encountered	Installation Monitoring Details
BH301B	6.00	8.00	Target strata reached, terminated in SANDS	0.0-0.5m plain pipe 0.5-6.0m slotted pipe, to target made ground
BH302	6.00	7.00	Target strata reached, terminated in SANDS	0.0-0.5m plain pipe 0.5-5.5m slotted pipe, to target made ground
BH303	6.00	8.00 Terminated at schedule depth		0.0-0.5m plain pipe 0.5-6.0m slotted pipe, to target made ground
BH304	30.00	30.15	Target depth reached, terminated in CLAY	0.0-2.8m plain pipe 2.8-6.5m slotted pipe, to target made ground
BH305	6.00	6.00 Target strata reached, terminated in SANDS 0.		0.0-0.5m plain pipe 0.5-3.0m slotted pipe, to target made ground
BH306	30.00	0 29.70 Terminated due to refusal		0.0-0.5 plain pipe 0.5-2.5m slotted pipe, to target made ground
BH307	6.00	6.00	Target strata reached, terminated in SANDS	0.0-0.50m plain pipe 0.5-3.5m slotted pipe, to target made ground
BH308	30.00	0. Target depth reached, 5.5- terminated in CLAY to		0.0-5.5m plain pipe 5.5-10.0m slotted pipe, to target SANDS & GRAVELS
BH309	30.00	0.0 30.15 Target depth reached, 0.5-8. terminated in CLAY ta		0.0-0.5m plain pipe 0.5-8.0m slotted pipe, to target SANDS & GRAVELS
BH310	6.00	6.00	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-5.5m slotted pipe, to target made ground
BH311	6.00	6.00	Target strata reached, terminated in SANDS	0.0-0.5m plain pipe 0.5-3.5m slotted pipe, to target made ground



Location	Proposed Termination Depth (m)	Actual Termination Depth (m)	Observations/Problems Encountered	Installation Monitoring Details
BH312	30.00	n/a	Borehole cancelled due to unsafe access / egress for vehicles and plant	n/a
BH313	30.00	30.15	Terminated at scheduled depth	0.0-4.0 plain pipe 4.5-8.0m slotted pipe, to target SANDS & GRAVELS
BH314	30.00	30.15	Terminated at scheduled depth	No installation

Table 5-3 Exploratory hole summary Area O

Location	Actual Proposed Terminati (Termination on Depth Depth (m) (m)		Observations/Problems Encountered	Installation Monitoring Details	
BH315	8.00	8.00	Terminated at scheduled depth	0.0-0.5m plain pipe, 0.5-3.0m slotted pipe, to target made ground	
BH316	16 8.00 8.00 ^{Te}		Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-4.0m slotted pipe, to target made ground	
BH317	8.00	8.00 Terminated at scheduled depth		0.0-0.5m plain pipe 0.5-4.7m slotted pipe, to target made ground	
BH318	8.00	8.00	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-4.5m slotted pipe, to target made ground including household waste	
BH319	8.00	8.00	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-4.5m slotted pipe, to target made ground including household waste	
BH320	8.00	8.00	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-4.5m slotted pipe, to target made ground including household waste	
BH321	8.00	8.00	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-4.5m slotted pipe,	



Location	Proposed Termination Depth (m)	Actual Terminati on Depth (m)	Observations/Problems Encountered	Installation Monitoring Details
				to target made ground including household waste
BH322	8.00	8.00	Terminated at scheduled depth	0.0-0.5m plain pipe 0.5-4.5m slotted pipe, to target made ground including household waste



5.3 Analytical strategy

Environmental soil samples were taken at regular intervals throughout the length of the excavation of each borehole. The protocol observed during the recovery of samples followed the guidance set out in BS 10175:2011 + A2:2017 The Code of Practice for the Investigation of Potentially Contaminated Sites.

A total of fifty-six (56) soil samples were sent to DETS for analysis. Samples were analysed for; Asbestos identification, moisture content, pH, Boron (hot water soluble), Sulphate (2:1 water soluble) as SO4, Total Sulphur, Sulphur (Elemental), Cyanide (total), Iron (total), Arsenic, Beryllium, Cadmium, Chromium (total), Copper, Mercury, Nickel, Lead, Selenium, Vanadium, Zinc, Chromium (hexavalent), Organic matter, Total Petroleum Hydrocarbons (TPH-CWG C5 – C35 aromatic-aliphatic split), speciated Polycyclic Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), speciated Poly Chlorinated Biphenyls (PCBs) and Phenols (speciated HPLC).

A total of nine (9) soil samples were also analysed for soil leachability analysis. As per the EA Remedial Targets Methodology, the Level 1 screen examines the potential for contaminants to leach from soil to soil pore water.

Speciated TPH analysis was undertaken to provide a better understanding of the 'make up' of any hydrocarbon contamination in relation to the specific carbon banding, as suggested within the 'Total Petroleum Hydrocarbon Criteria Working Group' (TPH-CWG) literature and recommended by the Environment Agency document P5-080/TR3 'The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbon in Soil'.

Twenty (20) groundwater samples were collected and sent to DETS for a similar range of contaminants as listed above for the soil samples.

5.4 Observation of potential contaminants in soil and groundwater

No visual or olfactory evidence of contamination was noted by Causeway Geotech Ltd on the borehole logs, however, comments regarding hydrocarbon odours at the following locations were noted during conversations with RPS;

- Area L BH302: Mild hydrocarbon odour within made ground comprising construction & demolition material between 3.50 – 5.50mbgl.
- Area O BH316: Moderate strong hydrocarbon odour within made ground and household waste between 0.50 3.00mbgl.
- Area O BH318: Mild hydrocarbon smell within made ground and household waste.



5.5 **Problems encountered during investigation**

5.5.1 Access constraints

The approval for exploratory hole locations was discussed following a walkover with representatives from RPS and Dublin Port Company. The table below outlines access constraint issues encountered as part of the investigation.

Table 5-4 Ground investigation locations and access constraint issues

Loca	tion ID	Stakeholder / land ownership or operator	Access Constraint
BH312		Ecocem Ireland	No safe location due to traffic management issues regarding safe access / egress for plant and vehicles.



6 **RISK ASSESSMENT METHODOLOGY**

6.1 Soils risk assessment methodology

6.1.1 Contamination assessment methodology

In the absence of government guidance on contaminated land risk assessment within the Republic of Ireland, current guidance provided by the UK Environment Agency (EA) has been utilised to form the basis of this assessment.

6.1.2 Human health risk assessment framework

The Environment Agency has published guidance in relation to assessing the potential risk from contaminated land to human health. Science Report SR2 'Human Health Toxicological Assessment of Contaminants in Soil' and Science Report SR3 'Updated Technical Background to the CLEA Model' have replaced CLR 9 and 10 respectively and together with 'Land Contamination Risk Management' (LCRM) provide the most up to date framework for human health risk assessment within the UK.

CLR10 previously stated that 'the contamination is assumed to be at or within 1m of the surface' (CLR10 pg. 10). SR3 contains a brief discussion of contamination depth on p13 and although it does not specifically mention a depth of 1.0m it states that 'it is assumed that the pollution is at the surface or close to it' and 'whether or not soil contamination at greater depth or beneath hard standing poses a risk to health depends on the importance of the contact pathways (primarily ingestion and dermal contact) and the likelihood that such soils may be brought to the surface through activities such as gardening or building works'. For the purpose of this assessment therefore, it is considered that at depths greater than 1m, the probability of human exposure via the direct contact pathways are significantly reduced.

6.1.3 Published generic site assessment criteria

In order to assess the human health and environmental risks posed by potential contaminants within the underlying soils, RPS undertook an initial screen of the laboratory results using the 2015 LQM/CIEH Suitable 4 Use Levels (S4ULs) (Copyright Land Quality management Limited reproduced with permission; Publication Number S4UL3474. All Rights Reserved) as trigger values. Where contamination results are recorded above these S4ULs, further assessment of the risks or remedial action may be needed.

These LQM/CIEH S4ULs replace the second edition of the LQM/CIEH Generic Assessment Criteria (GAC) published in 2009. Differences in modelling assumptions and added land uses



and substances create the difference between these S4ULs and the previous GAC. These values are provided for 6 land use classifications:

- Residential with homegrown produce
- Residential without homegrown produce
- Allotments
- Commercial
- Public open space near residential housing
- Public open space Park

The provisional Category 4 Screening Levels (pC4SLs) developed by Defra provide the same added land uses as the S4ULs but are based on a different toxicological benchmark. The pC4SLs are based on a 'low level of toxicological concern' (LLTC) whereas the S4ULs remain based on the 'minimal' or 'tolerable' risk level outlined in SR2 to ensure a fully conservative approach is being taken.

These values have been adopted within this investigation as they provide the most up to date trigger values that are based on appropriate and rationale assumptions. Similarly to the previous GAC, the S4ULs are provided for 1%, 2.5% and 6% soil organic matter (SOM). In the absence of complete analysis of SOM at the site, generic values derived for a SOM value of 1% have been utilised in the risk assessment where possible to ensure the most conservative approach is taken.

For pollutants with no relevant S4ULs, assessment criteria were provided by the following publications:

- Soil Guideline Values (SGVs)
- The Soil Generic Assessment Criteria (GAC) for Human Health Risk Assessment CL:AIRE December 2009

In light of the publication of SR2 and SR3 the Environment Agency published SGVs for Benzene, Toluene, Ethylbenzene, Xylene, Selenium, Mercury, Arsenic, Cadmium, Phenol, Nickel and Sum of PCDDs, PCDFs and dioxin-like PCBs for the following standard land use scenarios assuming a Sandy Loam soil and Soil Organic Matter (SOM) content of 6%:

- Residential
- Allotments
- Commercial

CL:AIRE in association with The Environmental Industries Commission (EIC) and Association of Geotechnical and Geo-environmental Specialists (AGS) published a set of Generic Assessment Criteria in 2009 for previously unpublished contaminants which are intended to



complement the SGVs derived by the Environment Agency. The GACs have been derived predominantly for VOCs and SVOCs using CLEA v1.06 for a number of different Soil Organic Matter contents (1%, 2.5% and 6%).

The current development proposals are predominantly in keeping with a commercial end use, with the exception of Port Park and Wildflower Meadow, Coastal Park, and the extension to Irishtown Nature Park which will comprise soft landscaping and public realm. Consequently, all soil samples have been screened against generic values derived for public open space near residential end use to provide a conservative assessment with the consideration of more sensitive public use in these areas. A secondary screen has been undertaken using commercial end use values which are considered more appropriate where end use activities are proposed to be solely commercial.

6.1.4 Ground contamination assessment

The soil laboratory analytical results are contained within Appendix B and screening tables are contained within Appendix D. Within these tables, those cells with no value recorded indicate that the samples were not scheduled for that particular suite of analysis. All samples were screened against the generic site assessment criteria discussed above.

6.2 Groundwater risk assessment methodology

6.2.1 Published generic site assessment criteria

The groundwater chemical analysis results were initially screened against threshold values listed by:

- 1. Guidelines for Drinking-water Quality, World Health Organization, 4th edition, 2011 (WHO).
- 2. European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (S.I. No. 366 of 2016)
- 3. European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 (S.I. No. 386 of 2015)
- 4. Interim Guideline Values provided by 'Towards setting guideline values for the protection of groundwater in Ireland', Environmental Protection Agency, January 2003
- 5. European Communities (Drinking Water) Regulations 2014 (S.I. No. 122 of 2014)
- 6. SoBRA GAC for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater Commercial GAC (SoBRA).

The annual average environmental quality standards (AA-EQS) for other surface waters, and groundwater from the European Union Environmental Objectives (Amendment) Regulations 2015/2016 have been used as screening values for the purposes of the risk assessment. Groundwater will not be used for drinking water and therefore drinking water threshold values



(1 and 5) have not been used in this assessment. Interim Guideline Values have been superseded by the EQS values and exceedances of IGVs have been highlighted for comparison purposes only. Groundwater chemistry results used as part of the site assessment are included in Appendix B and screening tables are contained within Appendix E.



7 ACTUAL GROUND CONDITIONS

This section summarises the ground conditions encountered during the investigation based on the exploratory hole logs provided by Causeway Geotech Ltd during the 2023 and 2024 investigations and observations made by RPS. The logs are contained within the Causeway Geotech Ltd Ground Investigation report in Appendix B. A number of geological cross sections have been prepared and are shown in Appendix C.

7.1 Summary of ground conditions

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Paved surface:** Bitmac, concrete and paving stones was encountered at ground level at almost every location across the site ranging in thickness from 60-200mm primarily, and 500mm at BH203. At some locations, paved surfacing was underlain by a second concrete/bitmac layer.
- **Topsoil:** encountered in 150mm thickness in BH112.
- **Made Ground (sub-base):** majority of locations which had a paved surface were underlain by granular fill of varying thicknesses.
- Made Ground (fill): reworked sandy gravelly clay/silt fill or sandy clayey gravel or gravelly clayey sand fill with varying amounts of concrete, red brick, timber, steel and glass fragments as well as varying amounts of wire, plastic, cloth, and ash was encountered across the site to a maximum depth of 15.80m in BH130. It should be noted that this location is through an existing caisson, and aside from this the maximum depth was 6.50m in BH120 in the south of the site, which is a former landfill area.
- **Marine beach deposits:** typically, medium dense to dense sands and gravels interspersed with layers of sandy gravelly clay frequently with shell fragments encountered across the site to a maximum depth of 20.10m in BH120 generally overlying Port Clay.
- **Port Clay:** Firm to stiff sandy silty clay often with laminations of silty sand encountered across the site to a maximum depth of 36.5m in BH217.
- **Glacial till/Fluvioglacial deposits:** very stiff sandy gravelly clay or very dense sandy clayey gravel generally encountered beneath Port Clay and overlying bedrock, encountered greatest in extent in the south of the site in BH124 to a depth of 40.00m.
- Bedrock (Limestone and Mudstone): Medium strong to strong limestone or mudstone was encountered at depths ranging from 24.50m in BH101 to 39.05 in BH217.



Made ground was identified at all ground investigation locations. A review of ground conditions found that the depth of made ground was found to be deeper in the north of the study area due to hard engineering structures such as caissons e.g. 15.80m bgl at BH130. Made ground was encountered within Area O to a maximum depth of 6.50m bgl at BH120, ranging in composition from grey slightly sandy, slightly silty, angular fine to coarse GRAVEL, to firm to stiff grey slightly sandy gravelly CLAY with low cobble content and fragments of plastic, concrete and red brick. Sand is fine to coarse. Gravel is subangular fine to coarse. This was subsequently followed by made ground comprising loose to medium dense grey very sandy silty subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded.

Beneath the Made Ground layer at the site, raised marine deposits were encountered comprising medium, dense, slightly gravelly, silty, fine to coarse SAND, interchanging with medium dense, grey, very sandy, slightly silty, rounded, fine GRAVEL to a maximum depth of 20.10 bgl at BH120. This stratum is a result of the reclamation of land during the development of the wider port.

Firm to stiff, grey, sandy, silty CLAY which is known locally as Port Clay was encountered in deeper boreholes to a maximum depth of 36.50m bgl at BH217.

A GRAVEL layer was encountered at some locations above bedrock, comprising dense, dark grey, slightly sandy, slightly clayey, subangular gravel of dark grey limestone with low cobble content.

Bedrock was encountered in some of the deeper boreholes comprising MUDSTONE of very stiff, brown, and light brownish-grey, slightly gravelly clay (highly to completely weathered) e.g. BH124 (40m bgl); and medium, strong, locally moderately weak, thickly laminated to thinly bedded dark grey LIMESTONE e.g. BH125 (36.50m bgl).

Borehole cross sections within Area O are provided as Appendix C.

7.2 Groundwater Strikes during investigation

During the ground investigation undertaken in 2023 and 2024, groundwater was encountered during excavation at a number of the exploratory locations. Groundwater strikes are summarised in Table 7.1.



Exploratory Hole	Groundwater	Strata
SPAR Bridge		
BH101	Water strike at 6.50m (rose to 6.20m after 20 mins)	Medium dense becoming dense very sandv
	Water strike at 8.30m (rose to 1.90m after 20 mins)	slightly silty subangular fine to medium GRAVEL. Sand is fine to coarse.
	Water strike at 9.70m	
Maritime Village		
BH102	Water strike at 2.40m	MADE GROUND: Firm becoming stiff greyish brown slightly sandy gravelly SILT with fragments of red brick, concrete, metal and timber. Sand is fine to coarse. Gravel is angular fine to coarse.
BH130	Water strike at 4.40m (rose to 3.00m after 20 mins)	MADE GROUND: Medium dense locally dense brown fine to coarse SAND and subangular fine to coarse GRAVEL with low cobble content and
	Water strike at 8.60m (rose to 2.10m after 20 mins)	fragments of red brick. Cobbles are subangular.
BH131	Water strike at 6.30m (rose to 1.70m after 20 mins)	MADE GROUND: Medium dense greyish brown sandy slightly silty subangular fine to coarse GRAVEL with low cobble content and fragments of red brick and concrete. Cobbles are subrounded.
Roads / Transport Routes		
BH112	Water strike at 4.00m (rose to 3.50m in 20 mins)	MADE GROUND: Loose dark greyish black very sandy silty angular fine to coarse GRAVEL with abundant fragments of red brick, concrete, glass and rootlets. Gravel is angular fine to medium. (Contamination encountered).

Table 7-1 Groundwater Strikes during Investigation



Exploratory Hole	Groundwater	Strata
Area O		
BH119	Water strike at 0.25m	MADE GROUND: Light grey sandy very silty angular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are
		angular
BH120	Water strike 5.00m (rose to 4.30m after 20 mins)	MADE GROUND: Loose to medium dense grey very sandy silty subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded.
BH121	Water strike at 3.10m (rose to 2.60m after 20 mins)	MADE GROUND: Medium dense greyish black sandy silty subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded.
BH122	Slow seepage at 0.35m	MADE GROUND: Grey very sandy silty subangular fine to coarse GRAVEL with high cobble content. Sand is fine to coarse. Cobbles are subangular.
	Water strike at 4.30m (rose to 3.90m after 20 mins)	MADE GROUND: Firm to stiff grey sandy gravelly SILT with fragments of red brick, concrete, glass and wood. Sand is fine to coarse. Gravel is subangular fine to coarse.
	Water strike at 9.50m (rose to 3.60 after 20 mins)	Medium dense grey gravelly fine to coarse SAND. Gravel is subrounded fine to coarse.
BH123	Slow seepage at 0.30m	MADE GROUND: Dark greyish black very sandy slightly silty subangular fine to coarse GRAVEL with high cobble content and cobbles sized fragments of red brick. Sand is fine to coarse. Cobbles are angular.
	Slow seepage at 4.30m	Medium dense greyish gravelly fine to coarse SAND with shell fragments. Gravel is subangular to subrounded fine to coarse.
BH124	Seepage at 0.80m	MADE GROUND: Grey very sandy very clayey subrounded fine to coarse GRAVEL with high cobble content and cobbles sized fragments of red brick. Sand is fine to coarse. Cobbles are subangular.
BH125	Slow seepage at 4.70m	MADE GROUND: Stiff dark greyish black sandy gravelly SILT with fragments of wood,



Exploratory Hole	Groundwater	Strata
		plastic and cloth. Sand is fine to coarse. Gravel is subrounded fine to coarse.
BH315	Strike at 1.50m	MADE GROUND: Greyish black gravelly silty fine to coarse SAND with medium cobble content and brick fragments
BH316	Strike at 4.00m (rose to 2.00m after 20 mins)	MADE GROUND: Soft greyish black very gravelly silty CLAY with fragments of glass and wood, newpaper, and household waste. Gravel is subangular fine to coarse.
BH317	Strike at 3.40m	MADE GROUND: Firm black sandy gravelly silty CLAY with fragments of brick, glass, wood, and household waste. Sand is fine to coarse. Gravel is subangular fine to coarse.
BH320	Strike at 3.60m	MADE GROUND: Firm to stiff brown sandy CLAY with fragments of glass, paper and wood. Sand is fine to coarse.
BH322	Strike at 3.30m	MADE GROUND: Soft dark brownish black slightly sandy gravelly CLAY with low cobble content and fragments of concrete, brick, plastic, rubber and household waste. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.
Port Park		
BH127	Water strike at 3.00m (rose to 2.50m after 20 mins)	MADE GROUND: Medium dense grey very sandy silty subangular fine to coarse GRAVEL. Sand is fine to coarse.
BH128	Slow flow at 1.50m	MADE GROUND: Very stiff grey sandy
	Seepage at 2.00m	glass. Sand is fine to coarse. Gravel is subangular fine to coarse.
Area N		
BH212	Sea water ingress at 1.85m	MADE GROUND: Light slightly gravelly slightly silty fine to coarse SAND. Gravel is rounded fine to medium.
	Water strike at 3.00m (rose to 1.50m after 10 mins)	Medium dense brown fine to coarse SAND and subrounded fine to coarse GRAVEL with shell fragments.
47A Hardstand Area / Turning Circle		
BH215	Strong seepage at 4.30m (rose to 2.10m after 20 mins)	MADE GROUND: Dense grey slightly sandy angular to subangular fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are angular.



Exploratory Hole	Groundwater	Strata	
BH216	Strong seepage at 13.00m (rose to 1.60m after 20 mins)	Medium dense brownish grey very sandy slightly sitly subangular fine to coarse GRAVEL. Sand is fine to coarse.	
BH217	Water strike at 7.65m	Soft grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.	
Area L			
BH305	Strike at 4.80m	Grey fine to coarse SAND and fine to coarse subangular GRAVEL with cobbles and boulders. Cobbles and boulders are subangular.	
BH309	Strike at 3.20m	Medium dense grey fine to medium SAND.	
BH313	Strike at 6.00m	Medium dense (locally dense) brown SAND and GRAVEL with occasional cobbles and boulders.	
BH314	Strike at 5.00m	Loose becoming medium dense brown gravelly fine to coarse SAND with low cobble content and shell fragments.	

7.3 Groundwater monitoring

Standing groundwater levels within all installed 2023 GI boreholes were monitored on a number of occasions between 15th February 2023 and 14th April 2023, using an acoustic dipmeter. The results of the monitoring are presented in Table 7.2.



Table 7-2 Standing groundwater levels

Develop	G	roundwater	Levels	(mOD)		
ID	15.02.2023	16.02.2023	17.02.2023	23.03.2023	07.04.2023	14.04.2023
Maritime V	/illage					
BH102 3.05 mOD	-	-	DRY	DRY	DRY	DRY
BH103 3.52 mOD		Ν	o Access dur	ing monitorir	ig	
BH105 3.55 mOD		N	lo access dur	ing monitorin	ıg	
Roads / Tr	ansport rou	te				
BH112 4.23 mOD	DRY	-	-	0.98 mOD	DRY	DRY
Area O						
BH120 5.13 mOD	-	0.48 mOD	-	0.23 mOD	0.68 mOD	0.49 mOD
BH121 4.81 mOD	-	0.61mOD	-	0.56 mOD	0.66 mOD	0.71 mOD
BH122 4.72 mOD	-	-	-	-	No Access	No Access
BH123 4.58 mOD	0.45 mOD	-	-	0.67 mOD	0.49 mOD	0.83 mOD
BH124 4.75 mOD	-	-	-	-	3.28 mOD	3.77mOD
BH125 4.94 mOD	0.42 mOD	-	-	0.54 mOD	0.48 mOD	0.52 mOD
Port Park						
BH126A 4.89 mOD	DRY	-	-	DRY	DRY	No Access



Borobolo	G	roundwater	Levels	(mOD)		
ID	15.02.2023	16.02.2023	17.02.2023	23.03.2023	07.04.2023	14.04.2023
BH127 4.65 mOD	DRY	-	-	DRY	DRY	No Access
BH128 4.71 mOD	3.11 mOD	-	-	3.76 mOD	3.07 mOD	No Access

Screened across groundwater within MADE GROUND
Screened across groundwater within GRAVELS
Screened across groundwater within SANDS

Standing groundwater levels within all installed boreholes within Area L were monitored on six occasions between 25th April 2024 and Tuesday 18th June 2024, using an acoustic dip-meter. The results of the monitoring are presented in Table 7.3.

Table 7.3 Standing groundwater levels within Area L

Borehole		Groun	udwater	vater Levels (mOD)		
ID	25.04.24	08.05.24	06.06.24	13.06.24	14.06.24	18.06.24
BH301B 3.12 mOD	1.20mOD	0.36mOD	0.58mOD	0.27mOD	0.39mOD	0.30mOD
BH302 3.56 mOD	1.57mOD	1.41mOD	1.71mOD	1.19mOD	1.71mOD	1.13mOD
BH303 3.73 mOD	0.99mOD	DRY	DRY	DRY	DRY	DRY
BH304 3.49 mOD	0.30mOD	0.26mOD	0.30mOD	0.35mOD	0.24mOD	0.45mOD
BH305 3.41 mOD	1.10mOD	DRY	No Access	No Access	No Access	No Access
BH306 3.79 mOD	1.21mOD	1.14mOD	1.17mOD	DRY	1.27mOD	DRY



Borehole		Groun	dwater Levels		s (mOD)	
ID	25.04.24	08.05.24	06.06.24	13.06.24	14.06.24	18.06.24
BH307 3.62 mOD	DRY	0.67mOD	DRY	DRY	No Access	DRY
BH308 3.76 mOD	0.77mOD	0.11mOD	0.84mOD	0.21mOD	0.89mOD	0.56mOD
BH309 3.92 mOD	0.61mOD	0.36mOD	0.64mOD	0.36mOD	No Access	0.52mOD
BH310 3.47 mOD	No Access	No Access	0.02mOD	0.03mOD	No Access	0.07mOD
BH311 3.44 mOD	No Access	No Access	No Access	No Access	No Access	No Access
BH313 3.86 mOD	0.88mOD	0.81mOD	0.89mOD	0.14mOD	-0.04mOD	0.16mOD
BH314 3.97 mOD	No Access	0.57mOD	0.70mOD	-	0.07mOD	-

Screened across groundwater within
MADE GROUND
Screened across groundwater within
GRAVELS
Screened across groundwater within
SANDS



7.4 Hydrogeological units and groundwater flow

Two boreholes (BH103 & BH105) were not accessible during the monitoring. Groundwater was encountered in a total of twenty-seven (27) boreholes during the ground investigation in the form of groundwater strikes during the drilling process. Water strikes were observed during drilling noted within sands and gravels underlying made ground.

The monitoring data indicates that perched shallow groundwater within boreholes installed within the made ground strata across the study area was generally encountered between 0.03mOD and 3.76mOD. A review of the monitoring data suggests the perched groundwater is discontinuous and on a number of occasions some wells were noted to be dry.

Monitoring data from BH123 and BH120 within Area O which were installed into sands and gravels suggests the direction of groundwater flow is broadly eastern towards Dublin Bay.

Monitoring data from BH308, BH309, and BH313 within Area L which were installed into sand and gravel response zones suggests that a shallow groundwater body is present and is flowing in a broadly northern direction towards the River Liffey.

Overall, the changes in groundwater levels between monitoring rounds suggests there is a tidal influence at a number of borehole locations.



8 **GROUND CONTAMINATION**

8.1 Introduction

The results of the laboratory analysis were used to carry out a generic quantitative risk assessment (GQRA) using the methodology outlined in Section 5. The soil results have been screened against the latest available LQM/CIEH S4ULs and CL:AIRE GAC for commercial end use. Soil laboratory analytical results from boreholes within the proposed Port Park area (BH315, BH316, BH317, BH126, BH127 and BH128) have been screened against a public open space near residential end use.

Samples were analysed for the following chemical parameters:

- Heavy metals;
- Speciated total petroleum hydrocarbons (TPHs);
- Speciated polycyclic aromatic hydrocarbons (PAHs);
- Speciated polychlorinated biphenyls (PCBs);
- Phenols
- Volatile & semi volatile organic compounds (VOCs & SVOCs);
- Inorganics;
- Asbestos screen.

The screening table for the soil laboratory test results is presented in Appendix D. Within these tables, those cells with no recorded values indicate that the samples were not scheduled for that particular suite of analysis.

8.2 Summary of soil results

All soil samples were found to be below the generic assessment criteria for commercial end use. One soil sample from BH308 is on the threshold for the commercial end use of Benzo(a)pyrene in Area L and recorded a concentration of 35 mg/kg (S4UL Commercial is 35 mg/kg). All soil samples from the proposed Port Park area recorded concentrations below the public open space near residential end use screening values.

The laboratory analytical certificates for soil results are included in Appendix B.

8.2.1 Asbestos in Soils

A total of thirty-two (32) environmental soil samples were initially screened for the presence of asbestos during the Causeway Geotech Ltd investigation between the 8th of November 2022 and the 10th of February 2023. A further fifty-six (56) environmental soil samples were



screened for the presence of asbestos during the Causeway Geotech Ltd investigation between the 19th of March and 6th June 2024. Asbestos containing materials (ACM) were identified in nine (9) of the samples. Table 8.1 below provides a summary of asbestos identified in soils.

Investigation Location	Depth (m bgl)	Asbestos Identification	Asbestos
			Quantification (%)
BH119 (Area O)	1.00	Amosite	<0.004
BH120 (Area O)	0.50	Chrysotile	<0.002
BH112 (Road north of Area O)	1.50	Chrysotile	0.004
BH116 (Road)	0.50	Chrysotile	0.004
BH317 (Port Park)	0.50	Chrysotile	Not quantified
BH320 (Area O)	0.50	Chrysotile	Not quantified
BH322 (Area O)	0.50	Chrysotile	Not quantified
BH322 (Area O)	3.00	Chrysotile	Not quantified
BH305 (Area L)	2.00	Chrysotile/Amosite	Not quantified

Table 8-1 Table Summary of asbestos in soils

9 **GROUNDWATER CONTAMINATION**

9.1 Introduction

A groundwater screening table for the groundwater and surface water samples is presented in Appendix E with laboratory analytical certificates contained within Appendix B. The results have been screened against the generic site assessment criteria discussed in Section 5.

9.1.1 2023 Sampling

One round of groundwater and surface water sampling and analysis was undertaken on 7th March 2023. Five (5) groundwater samples were obtained for laboratory analysis, four of which were from shallow boreholes installed into made ground (BH120, BH121, BH125 & BH128), and one from a borehole installed within the natural sand strata (BH123).

Three (3) surface water samples were also collected for laboratory analysis from the adjacent River Liffey and Dublin Bay (SW01 – SW03). Sample SW01 was taken from the River Liffey adjacent to the Poolbeg Yacht Club. SW02 is considered to be representative of 'mid-stream' and was taken from the River Liffey adjacent to an area of vacant land known as the '47A hardstand'. Sample SW03 is considered to be representative of 'downstream' and was obtained from Dublin Bay i.e. where the River Liffey discharges into to Irish Sea, from the Great South Wall, prior to reaching Poolbeg Lighthouse.

9.1.2 2024 Sampling

Round 1 – April 2024

A round of groundwater sampling and analysis from eight (8) boreholes within Area O was undertaken on the 8th April 2024. Seven (7) of the samples were obtained from boreholes installed within the made ground strata (BH315, BH316, BH317, BH318, BH319, BH320 and BH322). One (1) sample was obtained from a borehole installed within the sand (BH321).

A round of groundwater sampling and analysis from six (6) boreholes within Area L was undertaken on the 25th April 2024. Four (4) of the samples were obtained from boreholes installed in the made ground strata (BH301B, BH302, BH313, BH314). Two (2) of the samples were obtained from boreholes installed in the natural sands (BH308, BH309).

Round 2 – May 2024

A further round of groundwater sampling and analysis from eight (8) boreholes within Area O was undertaken on the 8th May 2024. Six (6) of the samples were obtained from boreholes installed within the made ground strata (BH315, BH316, BH317, BH319, BH320 and BH322). One (1) sample was obtained from a borehole installed within the sand (BH321).

A further round of groundwater sampling and analysis was undertaken between 8th and 9th May 2024 targeting the boreholes in Area L.

The Samples were analysed for the following chemical parameters:

- Heavy metals;
- Speciated total petroleum hydrocarbons (TPHs);
- Speciated polycyclic aromatic hydrocarbons (PAHs);
- Phenols
- Volatile & semi volatile organic compounds (VOCs & SVOCS);
- Inorganics

9.2 Summary of groundwater & surface water chemical results

Table 9.1 summaries the exceedances identified in groundwater and surface water samples taken during the initial 2023 investigation. Table 9.2 summaries the exceedances identified in groundwater samples taken during the first round of sampling undertaken in April 2024. The second round of sampling undertaken in May 2024 is summarised in table 9.3, any exceedances identified are included herein.

Contaminant	Screening Value ⁴	Exceeding Concentrations	Locations Exceeding
Surface Waters			
Lead	1.30 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	4.10 µg/l	SW01
Area O			
Nickel	8.60 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	23 μg/l 12 μg/l 23 μg/l 21 μg/l	BH120 BH121 BH123 BH125
Port Park			
Zinc	0.2 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	2.3 µg/l	BH128

Table 9-1 Summary of Groundwater & Surface Water Exceedances 2023

⁴ AA = Annual Average, MAC = Maximum Allowable Concentration.

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Contaminant	Screening Value ⁴		Exceeding Concentrations	Locations Exceeding
Lead	1.30 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)		180 µg/l	BH128
Nickel	8.60 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)		44 µg/l	BH128
Zinc	75 μg/l (EU Environmental Objectives, Groundwater)		820 µg/l	BH128
EU Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 AA- EQS other surface waters		EU Envii (Ground ^y 2016	ronmental Objectiv water) (Amendmer	es nt) Regulations

Table 9-2 Summa	y of	Groundwater	&	Surface	Water	Exceedances	April	2024
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Contaminant	Screening Value ⁵	Exceeding Concentrations	Locations Exceeding
Area O Round 1 – April 2024			
Nickel	8.60 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	13 μg/l 14 μg/l	BH318 BH320
Zinc	75 μg/l (EU Environmental Objectives, Groundwater)	89 μg/l 130 μg/l 100 μg/l	BH319 BH320 BH321
TPH (Ali & Alo)	7.5 μg/l (EU Environmental Objectives, Groundwater)	190 μg/l 35 μg/l 18 μg/l 240 μg/l 94 μg/l	BH318 BH319 BH320 BH321 BH322
Anthracene	0.1 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	63 μg/l 6.70 μg/l 190 μg/l 5.10 μg/l 3.70 μg/l	BH318 BH319 BH320 BH321 BH322
Benzo(a)pyrene	0.00017 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	1 μg/l 1 μg/l 11 μg/l 29 μg/l	BH318 BH320 BH321 BH322

⁵ AA = Annual Average, MAC = Maximum Allowable Concentration.



Contaminant	Screening Value ⁵	Exceeding Concentrations	Locations Exceeding
Fluoranthene	0.0063 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	750 μg/l 47 μg/l 890 μg/l 32 μg/l 37 μg/l	BH318 BH319 BH320 BH321 BH322
Naphthalene	2 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	660 μg/l 4.1 μg/l 130 μg/l 3.1 μg/l 2.1 μg/l	BH318 BH319 BH320 BH321 BH322
1,2,4 Trichlorobenzene	0.4 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	5 μg/l 5 μg/l 5 μg/l 5 μg/l 1 μg/l	BH318 BH319 BH320 BH321 BH322
bis(2-Ethylhexyl) phthalate	1.3 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	5 μg/l 5 μg/l 5 μg/l 5 μg/l	BH318 BH319 BH320 BH321
Port Park			
Nickel	8.60 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	8.5µg/l 9.6 µg/l	BH316 BH317
Zinc	75 μg/l (EU Environmental Objectives, Groundwater)	130 µg/l	BH316
TPH (Ali & Alo)	7.5 μg/l (EU Environmental Objectives, Groundwater)	170 μg/l 1,400 μg/l 450 μg/l	BH315 BH316 BH317
Anthracene	0.1 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	5.10 μg/l 2.70 μg/l 73 μg/l	BH315 BH316 BH317
Benzo(a)pyrene	0.00017 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	15 μg/l 8.2 μg/l	BH315 BH316
Fluoranthene	0.0063 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	27 μg/l 31 μg/l 730 μg/l	BH315 BH316 BH317



Contaminant	Screening Value ⁵	Exceeding Concentrations	Locations Exceeding
Naphthalene	2 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	25 μg/l 5.00 μg/l 33 μg/l	BH315 BH316 BH317
1,2,4 Trichlorobenzene	0.4 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	5 μg/l 5 μg/l 5 μg/l	BH315 BH316 BH317
bis(2-Ethylhexyl) phthalate	1.3 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	5 μg/l 15 μg/l 5 μg/l	BH315 BH316 BH317
Area L			
Cadmium	0.20 μg/l AA-EQS (EU Environmental Objectives, Surface Waters)	0.35 µg/l 0.66 µg/l 0.25 µg/l	BH304 BH309 BH313
Lead	1.30 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	2.7 µg/l	BH308
Nickel	8.60 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	13 μg/l 25 μg/l	BH304 BH309
Zinc	75 μg/l (EU Environmental Objectives, Groundwater)	96 µg/l	BH308
TPH (Ali & Alo)	7.5 μg/l (EU Environmental Objectives, Groundwater)	66 μg/l 10 μg/l 210 μg/l 6,900 μg/l 5,400 μg/l 53 μg/l	BH301A BH302 BH304 BH308 BH309 BH313
Anthracene	0.1 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	0.57 µg/l	BH302
Benzo(a)pyrene	0.00017 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	0.32 μg/l 9.50 μg/l 4.00 μg/l	BH301A BH302 BH304
Fluoranthene	0.0063 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	0.29 μg/l 10 μg/l 5 μg/l 0.03 μg/l	BH301A BH302 BH304 BH309



Contaminant	Screening Value ⁵		Exceeding Concentrations	Locations Exceeding
Naphthalene	2 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)		5.00 μg/l 5.00 μg/l	BH304 BH308
1,2,4 Trichlorobenzene	0.4 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)		2 µg/l 2 µg/l	BH301A BH302
bis(2-Ethylhexyl) phthalate	1.3 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)		10 µg/l 10 µg/l	BH304 BH309
EU Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 AA- EQS other surface waters		EU Envir (Groundv 2016	onmental Objectiv vater) (Amendmer	es nt) Regulations

Table 9-3 Summary o	f Groundwater &	Surface Water	Exceedances	May 2024
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Contaminant	Screening Value ⁶	Exceeding Concentrations	Locations Exceeding
Area O Round 2 – May 2024			
Nickel	8.60 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	12 µg/l 9.6 µg/l	BH319 BH322
TPH (Ali & Alo)	7.5 μg/l (EU Environmental Objectives, Groundwater)	10 µg/l 1200 µg/l 77 µg/l 10 µg/l	BH319 BH320 BH321 BH322
Anthracene	0.1 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	0.33 µg/l 0.97 µg/l 0.69 µg/l	BH319 BH320 BH321
Benzo(a)pyrene	0.00017 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	0.85 µg/l 1.7 µg/l	BH319 BH321
Fluoranthene	0.0063 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	1.4 μg/l 2.8 μg/l 3.0 μg/l 0.05 μg/l	BH319 BH320 BH321 BH322
1,2,4 Trichlorobenzene	0.4 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	1 µg/l 1 µg/l 1 µg/l	BH319 BH320 BH321

⁶ AA = Annual Average, MAC = Maximum Allowable Concentration.



Contaminant	Screening Value ⁶	Exceeding Concentrations	Locations Exceeding
		1 µg/l	BH322
bis(2-Ethylhexyl) phthalate	1.3 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	5 µg/l	BH322
Port Park			
Zinc	75 μg/l (EU Environmental Objectives, Groundwater)	81 µg/l	BH316
TPH (Ali & Alo)	7.5 μg/l (EU Environmental Objectives, Groundwater)	2100 µg/l 3600 µg/l 980 µg/l	BH315 BH316 BH317
Anthracene	0.1 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	35 μg/l 41 μg/l 3.2 μg/l	BH315 BH316 BH317
Benzo(a)pyrene	0.00017 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	77 μg/l 130 μg/l 5.5 μg/l	BH315 BH316 BH317
Fluoranthene	0.0063 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	380 µg/l 280 µg/l 16 µg/l	BH315 BH316 BH317
Naphthalene	2 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	15 μg/l 44 μg/l	BH315 BH316
1,2,4 Trichlorobenzene	0.4 μg/ AA-EQS (EU Environmental Objectives, Surface Waters)	1 μg/l 1 μg/l 1 μg/l	BH315 BH316 BH317
Area L			
Cadmium	0.20 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	0.6 µg/l	BH314
Lead	1.30 µg/I AA-EQS (EU Environmental Objectives, Surface Waters)	2.4 µg/l	BH314
Nickel	8.60 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	13 µg/l	BH309
Zinc	75 μg/l (EU Environmental Objectives, Groundwater)	100 µg/l	BH308
TPH (Ali & Alo)	7.5 μg/l (EU Environmental Objectives, Groundwater)	10 µg/l 10 µg/l 56,000 µg/l	BH301B BH302 BH308



Contaminant	Screening Value ⁶		Exceeding Concentrations	Locations Exceeding
			790 µg/l	BH309
			10 µg/l	BH313
			10 µg/l	BH314
Anthracene	0.1 µg/ AA-EQS (EU		0.21 µg/l	BH301B
	Environmental Object	ives,	3.60 µg/l	BH302
	ounace waters)		100 µg/l	BH308
			5.00 µg/l	BH309
Benzo(a)pyrene	0.00017 µg/ AA-EQS	(EU	1.20 µg/l	BH301B
	Environmental Object	ives,	32 µg/l	BH302
	Surface Waters)		<100 µg/l	BH308
			8.4 µg/l	BH309
			0.41 µg/l	BH313
			0.23 µg/l	BH314
Fluoranthene	0.0063 µg/ AA-EQS (I	EU	1.90 µg/l	BH301B
	Environmental Object	ives,	32 µg/l	BH302
	Surface Waters)		100 µg/l	BH308
			21 µg/l	BH309
			0.50 µg/l	BH313
			0.28 µg/l	BH314
Naphthalene	2 µg/ AA-EQS (EU		500 µg/l	BH308
	Environmental Object Surface Waters)	ives,	6.80 µg/l	BH309
EU Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 AA- EQS other surface waters		EU Envir (Ground 2016	ronmental Objectiv water) (Amendme	ves nt) Regulations

As groundwater in the vicinity of the site is not used as a potable water supply, no risk to human health exists through ingestion and as such, drinking water standards are not considered as part of the assessment.

A number of heavy metals including cadmium, lead and nickel were found to exceed the EU Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 AA-EQS for other surface waters. Zinc at BH128 was found to exceed the EU Environmental Objectives (Groundwater) (Amendment) Regulations 2016. Furthermore, zinc at BH308 (Area L) and BH316, BH319, BH320 and BH321 (Area O) was found exceed the EU Environmental Objectives (Groundwater) (Amendment) Regulations 2016.



Elevated concentrations of phosphate and boron above the EU Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 AA-EQS for other surface waters was observed in all 3 no. surface water samples. Elevated concentrations of lead were observed in surface water sample SW01 but was not noted in further downstream samples.

A number of samples across all monitoring rounds recorded elevated concentrations of PAHs and Hydrocarbons.

The groundwater and surface water results are discussed further in Section 10.0

9.3 Remedial Targets Methodology – Level 1 Leachability Soil Screening

A total of five (5) no. soil samples obtained from boreholes during the initial ground investigation were sent for soil leachability analysis. A further three (3) no. soil samples obtained from boreholes within Area L during the 2024 ground investigation (26th March – 17th April) were sent for soil leachability analysis. Furthermore, within the latest ground investigation 2024 a further four (4) no. soil samples were obtained within Area O for further leachability analysis. The laboratory certificates are included in Appendix B with a screening table summarising the results in Appendix F. The results were screened against the EU Environmental Objectives Regulations for surface waters and groundwater (Amendment) Regulations. Where there were no available EU Environmental Objective values available, the EPA Interim Guideline Values, 2003 were used.

As per the EA Remedial Targets Methodology, the Level 1 screen examines the potential for contaminants to leach from soil to soil pore water. The compliance point utilised is the soil pore space and as such, is the most conservative compliance point as it does not take into account attenuation and dilution within the aquifer.

The results indicate that soil leachability contamination is confined to samples obtained from the made ground strata within Area O. Elevated concentrations of heavy metals including arsenic, lead and manganese were observed. Elevated total TPH concentrations were noted within BH123 at 4.0m bgl where the PID reading on site was relatively low and recorded as 11.40ppm. A number of PAH exceedances were also noted above the screening values.

The contamination identified within Area L and Area O are all confined to the made ground present throughout the site, as similar to the previous site investigation. Elevated concentrations of heavy metals, such as aluminium (Area L within BH304) and lead exceedances within Area L and Area O were identified. Furthermore, as observed in the previous site investigation, elevated total TPH concentrations were noted within all samples obtained in Area L and Area O. However, the PID readings taken on site during the investigations remained consistently low with a high of 0.50ppm at BH304 at 2.00m bgl being the highest reading of the samples within Area L. A high of 2.70ppm was recorded at BH318



at sample depth 4.00m bgl within Area O. As consistent with previous investigations of site, a number of PAH exceedances were noted above the screening values.

Contaminant	Screening Value ⁷	Exceeding Concentrations	Locations Exceeding
Area O			
Arsenic	7.50 μg/l (EU Environmental Objectives, Groundwater)	8.7 µg/l	BH123 at 4.0m bgl
Lead	1.30 μg/l AA-EQS (EL Environmental Objectives, Surface Waters)	J 1.50 μg/l 2.70 μg/l 4.70 μg/l 6.50 μg/l	BH125 at 1.00m bgl BH123 at 4.05m bgl BH122 at 4.70m bgl BH318 at 4.00-4.10m bgl
Total TPH (aliphatic & aromatic)	7.50 μg/l (EU Environmental Objectives, Groundwater)	320 µg/l	BH123 at 2.00m bgl
Anthracene	0.10 µg/l AA-EQS (EU Environmental Objectives, Surface Waters)	1.70 μg/l	BH125 at 1.00m bgl
Fluoranthene	0.0063 µg/I AA-EQS (EU Environmental Objectives, Surface Waters)	3.40 µg/l	BH125 at 1.00m bgl
EU Environmental Ob Waters) (Amendment) EQS other surface wa	jectives (Surface) Regulations 2019 AA- iters	EU Environmental Ot (Groundwater) (Amer 2016	ojectives ndment) Regulations

Table 9-4 Exceedances of screening values within soil leachability tests 2023

⁷ AA = Annual Average, MAC = Maximum Allowable Concentration.



Table 9-5 Exceedances of screening values within soil leachability tests 2024

Contaminant Area O	Screening Value ¹⁰	Exceeding Concentrations	Locations Exceeding
Lead	1.30 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	6.50 µg/l	BH318 at 4.00-4.10m bgl
Total TPH (aliphatic & aromatic)	7.50 μg/l (EU Environmental Objectives, Groundwater)	10 μg/l 10 μg/l	BH318 at 4.00-4.10m bgl BH319 at 2.00-2.10m bgl
Benzo(a)pyrene	0.00017 μg/l AA-EQS (EU Environmental Objectives, Surface Waters)	0.04 µg/l	BH319 at 2.00-2.10m bgl
Fluoranthene	0.0063 μg/l AA-EQS (EU Environmental Objectives, Surface Waters)	0.01 μg/l 0.15 μg/l	BH318 at 4.00-4.10m bgl BH319 at 2.00-2.10m bgl
Port Park			
Lead	1.30 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	8.40 µg/l	BH316 at 4.00-4.10m bgl
Total TPH (aliphatic & aromatic)	7.50 μg/l (EU Environmental Objectives, Groundwater)	10 μg/l 10 μg/l	BH315 at 3.00-3.10m bgl BH316 at 4.00-4.10m bgl
Benzo(a)pyrene	0.00017 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	0.03 µg/l	BH316 at 4.00-4.10m bgl
Fluoranthene	0.0063 µg/I AA-EQS (EU Environmental Objectives, Surface Waters)	0.06 μg/l 0.01 μg/l	BH315 at 3.00-3.10m bgl BH316 at 4.00-4.10m bgl

¹⁰ AA = Annual Average, MAC = Maximum Allowable Concentration.



Contaminant	Screening Value ¹⁰	Exceeding Concentrations	Locations Exceeding
Area L			
Lead	1.30 μg/l AA-EQS (EU Environmental Objectives, Surface Waters)	1.50 µg/l	BH304 at 2.00m bgl
Total TPH (aliphatic & aromatic)	7.50 μg/l (EU Environmental Objectives, Groundwater)	10 μg/l 10 μg/l 10 μg/l 10 μg/l 10 μg/l	BH308 at 2.00m bgl BH301B at 2.00m bgl BH306 at 2.00m bgl BH304 at 2.00m bgl BH313 at 1.00m bgl
Benzo(a)pyrene	0.00017 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	0.07 µg/l	BH301B at 2.00m bgl
Fluoranthene	0.0063 μg/I AA-EQS (EU Environmental Objectives, Surface Waters)	0.09 μg/l 0.03 μg/l	BH301B at 2.00m bgl BH306 at 2.00m bgl
EU Environmental C (Amendment) Regul surface waters	bjectives (Surface Waters) ations 2019 AA-EQS other	EU Environment (Groundwater) (Regulations 201	al Objectives Amendment) 6



10 GROUND BORNE GAS SURVEY

10.1 Introduction

The principal components of ground borne gas are Methane and Carbon dioxide, but other gases such as Hydrogen sulphide and Carbon monoxide can also be present. Ground borne gas can present a hazard to end users of a site and can enter buildings, thus presenting a toxic, asphyxiation or explosion hazard.

Guidance on gas risk assessment is set-out in the following documentation:

- The Local Authority Guide to Ground Gas (Chartered Institute of Environmental Health, September 2008)
- CIRIA Report C665 Assessing risks posed by hazardous ground gases to buildings (CIRIA, 2007)
- Guidance on investigation for ground gas Permanent gases and Volatile Organic Compounds (VOCs) (British Standard 8576, 2013)

10.2 Gas survey results

The gas results from four rounds of monitoring undertaken between April 2023 and March 2023 have been used to assess the gas condition on the site. The maximum recorded gas volumes (Methane and Carbon dioxide) and flow rate results recorded at each borehole location are summarised in Appendix G.

The gas results from four rounds of monitoring undertaken throughout June 2024, have been used to assess the gas conditions within Area L. The maximum recorded gas volumes (Methane and Carbon dioxide) and flow rate results recorded at each borehole location are summarised in Appendix G.

10.2.1 Area O

The lowest atmospheric pressure throughout the monitoring period was recorded as 994mb on 16th March 2023. The maximum recorded concentration (volume gas/volume air) within boreholes was 59.4 vol/vol% for Methane in BH120 and 16.4 vol/vol% for Carbon Dioxide in BH125. The maximum flow rate was recorded as 10.8 litres / hour in BH120.

Negative flow rates were also recorded within some boreholes during the first round of monitoring, which may be represent falling groundwater levels or a tidal influence.



10.2.2 Area L

The lowest atmospheric pressure throughout the 2024 Area L monitoring period was 991mb, recorded on the 14th of June 2024. The maximum recorded concentration (volume gas/volume air) within boreholes was 0.2 vol/vol% for Methane in BH302 and 6.3 vol/vol% for carbon dioxide in BH308. The maximum flow rate recorded was 0.2 litres / hour.

10.2.3 Maritime Village

BH102 provided the only location in which access was available to carry out four rounds of gas monitoring. The lowest atmospheric pressure throughout the monitoring period was recorded as 994mb on the first round on monitoring. The maximum recorded concentration (volume gas/volume air) within the borehole, which was installed within made ground was 0.3 vol/vol% for Carbon Dioxide and 0.1 vol/vol% for Methane. The maximum flow rate was recorded as 0.1 litres / hour.

10.3 Gas risk assessment

Methane and Carbon dioxide are classified as hazardous gases. Table 10.1 summarises the toxic and explosive effects and specified exposure or trigger limits for these gases.

Gas	Concentration	Exposure limits
Methane -	<1%	Building Regulations Limit
	0.25%	Ventilation required in tunnels and other confined spaces
	5%	Potentially explosive when mixed with air (LEL)
	30%	Potentially explosive when mixed with air (UEL), Asphyxiation
Carbon dioxide	0.5%	8 hour exposure limit (OEL)
	1.5%	10 min exposure limit (OEL) and Building Regulations Limit
	>3%	Breathing difficulties
	>5%	Asphyxiation

Table 10-1 Significant gas concentrations in air

Guidance on gas risk assessment and the design of gas protection measures is set-out in the following documentation:


- DOE Waste Management Paper 27
- UK Building Regulations (1991)
- CARD Geotechnics Research Report (1999)
- CIRIA Report 149 (1995)
- NHBC and RSK Group 10627-R01 (2007)
- CIRIA Report C665 (2007)
- Local Authority Guide to Ground Gas (2008)
- British Standards 8576 (2013)

CIRIA report C665 represents the current best practice guidance. It outlines a holistic approach to gas risk assessment, which takes account of the following factors:

- Nature of source and migration pathway
- Borehole flow rate and surface emission rate
- Frequency and distribution of elevated gas concentrations
- Nature of the proposed development
- Confidence and reliability of results

The most important aspect relating to the classification of a site's gas regime is governed by the concentration of the gas and how quickly it is coming out of the ground. This is reflected by the limiting volume flow rate of the gas, which is calculated as the gas concentration (expressed as a volumetric fraction) multiplied by the borehole flow rate. The limiting borehole gas volume flow has been renamed as the gas screening value (GSV) in CIRIA C665.

This GSV is applied to six characteristic situations, the threshold criteria for which are listed in Appendix G - Table 2.

10.4 Ground gas conceptual site model

10.4.1 Sources

A review of ground gas monitoring data highlights that elevated levels of methane and carbon dioxide are present within the made ground strata and underlying sands and gravels. Borehole logs have been reviewed to determine any potential hydrocarbon and / or organic indicators as a source of ground gas.

Area O

The borehole log for BH125, which had the most elevated concentrations of methane during the ground gas monitoring, notes fragments of tar within made ground between 0 - 1.70m bgl. Fragments of wood and plastic are also noted within made ground between 1.70 - 5.00m bgl. A handheld photo-ionisation detector (PID) was used to determine any volatile vapours



present from soil samples obtained during the site investigation. The PID readings from soil sampled at BH125 within made ground ranged from 1.70ppm – 30.30ppm. This area is known to be an area historically used as a landfill, with the borehole logs also highlighting some organic materials and as such it is likely that the composition of made ground is the source of elevated ground gases within Area O.

Two (2) boreholes were installed within sands and gravels underlying made ground, BH120 and BH123. Both boreholes are located within Area O. Ground monitoring data from BH120 indicated elevated methane and flow rates. A review of the borehole log for BH120 did not determine any potential organic indicators within the gravel response zone. PID readings from soil obtained within the gravel strata ranged from 0.10 - 0.80ppm. These PID readings are considered very low in the context of this risk assessment, suggesting there is no volatile source of ground gas within this strata. Rising and falling pressure within response zones within the sands may be the source of elevated results.

Area L

Three (3) boreholes within Area L were installed within sands and gravels underlying the made ground; BH308, BH309 and BH313. The highest concentration of carbon dioxide was recorded within Area L at BH308. Methane concentrations remained consistently low at 0.1 vol/vol% at the three (3) locations.

The PRA report produced for the 3FM Project, identified that this area of Dublin Port has been historically developed by reclaiming mud flats. It is recognised that sedimentary soils such as estuarine alluvium often contain organic matter which may biodegrade over time. The sand and gravel strata which underlies the made ground, may comprise gas stored within soils and groundwater. The made ground present across Area L is also a likely source of elevated ground gas concentrations.

Maritime Village

Ground gas levels from the borehole (BH102) at the proposed Maritime Village site recorded low levels of ground gas.

10.4.2 Pathways

The predominant mechanism for migration of gases from made ground is diffusive flow, with no driving pressure. Gas present within the soil pore structure will diffuse through the soils forming a continuum between a source and ground level i.e. proposed commercial development. The majority of gas will remain trapped in the soil pores, sorbed to soil particles, or, if applicable, dissolved in groundwater.

<u>Area O</u>



Normal surface applied ground treatment techniques are proposed within Area O where elevated ground gases have been observed. Compaction of soil pore structure may result in a build-up of gases during and post construction. The proposal of buildings situated within Area O may create a subsequent pathway for ground gas within made ground via service entries into the buildings. There is no piling requirement within Area O and as such, no preferential pathway is being created for gas migration from within the sands into proposed buildings.

10.4.3 Receptors

Proposals detail commercial end use and as such site operators / users within buildings are considered to be receptors. Buildings are proposed within Area L and O.

10.5 Calculation of Gas Screening Value

10.5.1 Area O

The maximum gas concentration (59.4 vol/vol% for Methane at BH120) and flow rate (10.8 litres/hour at BH120) was used to calculate a GSV, which was calculated as 6.42 l/hr which is categorised as Characteristic Situation 4.

10.5.2 Area L

The maximum gas concentration in Area L (6.3 vol/vol% for carbon dioxide at BH308) and flow rate (0.2 litres / hour at BH310) was used to calculate a GSV. The GSV value was calculated as 0.0126 l/hr, however the carbon dioxide concentrations were >5% on 3 no. occasions which would result in a Characteristic Situation 2 classification.

10.5.3 Maritime Village

As the only borehole accessible throughout the gas monitoring, BH102 which was installed within made ground maximum gas concentration (0.3 vol/vol% for Carbon Dioxide) and flow rate (0.1 litres/hour at) was used to calculate a GSV representative of this area. This was calculated as 0.0003 l/hr which is a Characteristic Situation 1, and ground gas protection measures will not be required.

10.6 Radon Gas

According to the EPA Radon Risk Map of Ireland, the study area falls outside of mapped radon risk areas, likely due to the site being developed on reclaimed land. It is therefore anticipated that the study area is in an area of low radon potential.



11 RISK ASSESSMENT

Using the methodology outlined in the previous sections, the laboratory analytical results were used to carry out a quantitative risk assessment of the risk to human health and environmental receptors.

11.1 Overview of contaminant sources, pathways and receptors

11.1.1 Sources – ground contamination

Roads / Transport Routes

Asbestos

Chrysotile asbestos was identified within 2 no. samples obtained from locations proposed as roads / transport routes; BH112 at 1.50m bgl, BH116 at 0.50m bgl. Both of these samples were quantified and the asbestos in soil composition was found to be 0.004%. As these samples were obtained from areas of proposed road surfacing, there is no significant risk to future site users, however, there is an exposure risk associated with construction workers.

Maritime Village

No soil sources of contamination were identified.

Area O

Asbestos

Chrysotile asbestos was identified within five (5) soil samples within Area O obtained between 0.50m - 3.00m bgl, with quantifications between 0.002 - 0.004%. Five (5) samples were obtained from BH119, BH120, BH320, BH322 at 0.50m & BH322 at 3.00m. Amosite asbestos was identified within 1 no. soil sample obtained at 1.00m (BH119). Given the proposed hardstanding within the road network, Area O, it is anticipated that the risk to future site users from asbestos fibres is low. However, there is a potential risk to workers during construction from activities such as excavations, which may disturb and release asbestos fibres in soil.

Area L

<u>Asbestos</u>

One (1) soil sample obtained from Area L returned a positive asbestos identification. A sample obtained from BH305 at 2.00m bgl comprised chrysotile amosite asbestos fibres. Given the depth at which the asbestos was detected, and the proposed hardstanding, there is no significant risk posed to future site users. However, this asbestos may pose a risk to construction workers.



Port Park

<u>Asbestos</u>

One (1) soil sample obtained from Area Port Park returned a positive asbestos identification. A sample obtained from BH317 at 0.50m comprised chrysotile fibres. Given the shallow depth at which this asbestos was identified and the proposed soft landscaping in this area, asbestos in soils are considered a source of contamination at this location.

11.1.2 Sources - groundwater and surface water contamination

Area O & Port Park

Heavy Metals

Concentrations of cadmium (BH128), lead (BH128 & SW01), and nickel (BH120, BH121, BH123, BH125, BH128) exceeded the EU Environmental Objectives values for surface water receptors, however, notably, these issues did not appear to be significant within the surface water samples obtained during the investigation. The concentration of zinc in groundwater sampled from BH128 exceeded the EU Environmental Objectives for groundwater. The source of these metals is likely to be the made ground/waste material beneath the site.

Total Petroleum Hydrocarbons

The concentrations of total petroleum hydrocarbons in groundwater samples obtained from the 2023 boreholes in Area O were all found to be below the Groundwater Amendment Regulations 2016 threshold value of 7.5 mg/kg.

Groundwater samples obtained from subsequent boreholes put down across Area O and Port Park as part of the 2024 site investigation works showed elevated concentrations of total petroleum hydrocarbons above the Groundwater Amendment Regulations.

Polycyclic Aromatic Hydrocarbons

The concentrations of PAHs in groundwater samples obtained from the 2023 boreholes in Area O were all found to be below the EQS values. The samples obtained in 2024 all recorded exceedances for a number of PAHs including Anthracene, Benzo(a)pyrene, Fluoranthene and Napthalene.

The source of the elevated Hydrocarbons and PAHs is likely to be the made ground/waste material beneath the site.

Area L

Heavy Metals

Groundwater samples were obtained from Area L on two (2) occasions; 25th April and 8-9th May 2024. Concentrations of heavy metals within Area L were found to be in excess of the



appropriate screening values. Notably, there is a decrease in the concentrations of particular heavy metals such as Barium, Cadmium, and Manganese during the second round of sampling. Other parameters such as Boron increase in concentration during the second round of sampling. Overall, the concentrations of metals are generally higher in samples obtained from the natural sands and slightly lower within the made ground.

Total Petroleum Hydrocarbons

Groundwater samples obtained from both monitoring rounds showed elevated concentrations of total petroleum hydrocarbons above the Groundwater Amendment Regulations. In particular, a highly elevated concentration of 56,000 ug/L was noted in the sample from BH308 on 9th May.

Polycyclic Aromatic Hydrocarbons

The samples obtained from both monitoring rounds recorded exceedances for a number of PAHs including Anthracene, Benzo(a)pyrene, Fluoranthene and Napthalene.

The source of the elevated Hydrocarbons and PAHs is likely to be the made ground/waste material beneath the site. With regard to the elevated Hydrocarbons at BH308, it is noted that this borehole is located within the Hammond Lane metal recycling facility. Is it likely that a spill or leak of fuel or oil has occurred within the vicinity of the borehole.

Leachability Analysis

A number of heavy metal parameters were found to exceed threshold screening values. The concentration of arsenic within groundwater sampled from BH123 exceeded the EU Environmental Objectives Regulations derived to be protective of groundwater. Concentrations of lead at BH122, BH123 and BH125 were found to be above the threshold screening value for EU Environmental Objectives Regulations for surface waters. Manganese concentrations within groundwater sampled from BH120 & BH122 exceed the EPA interim Guideline Values.

The concentration of total TPH at BH123 was found to exceed the EU Environmental Objectives Regulations derived to be protective of groundwater. It is noted that elevated concentrations of hydrocarbons were not observed within the groundwater sampled from BH128 which was installed within sands underlying made ground. A number of PAH parameters including anthracene (BH125), fluoranthene (BH125), and naphthalene (BH120 & BH125), were found to exceed the EU Environmental Objectives Regulations derived to be protective of surface waters. A review of the borehole logs confirm the presence of tar within the top 1.70m of made ground at BH125 which is the likely source of PAH contamination. The concentrations of total PAH at BH122, BH123 & BH125 also exceeded the EU Environmental Objectives derived to be protective of groundwater. It is however, noted, that elevated PAH



concentrations were not observed in shallow groundwater sampled from this location, or within surface water samples.

11.1.3 Sources – ground borne gases (Carbon Dioxide and Methane)

The monitoring results indicate that the gas regime is classified as a Characteristic Situation 4 for Area O and a Characteristic Situation 2 for Area L in accordance with CIRIA C665. As such, ground gas protection measures will be required within buildings proposed for these areas. The source of these elevated ground gases is the made ground and waste material encountered beneath Area O and L.

11.1.4 Off-site sources

There is the potential for contaminated ground water and ground gas to migrate on to the site from off-site due to the historical industrial use of Dublin Port, and a number of present-day industrial uses.

11.1.5 Pathways

- A pathway with impacts to human health for construction workers through the inhalation of asbestos fibres is considered to be active where proposals require breaking ground / earthworks. Construction workers will require PPE / RPE to mitigate risks when disturbing the ground. An active pathway has been determined for long-term site users of Port Park within the vicinity of BH317 where asbestos was identified within shallow soils at 0.50m bgl where soft landscaping is proposed.
- A pathway for the migration of ground gas from made ground within Area O and L into the proposed development and the subsequent inhalation of indoor gases is considered to be active on the site.
- A pathway for the leaching of contaminants from made ground material to shallow groundwater is considered to be active on the site.
- Groundwater within the site will not be used as a potable source of water, therefore, the ingestion pathway for contamination to human health from groundwater is not deemed to be active.
- A pathway for vertical migration of contaminants in groundwater towards the bedrock aquifer is not considered to be active due to the presence of a significant thickness (10m or more in more) of firm to very stiff clay which provides low permeability cover.
- A pathway for the horizontal migration of contaminants on site within groundwater via shallow groundwater within made ground and within underlying sands / gravels to the adjacent River Liffey is considered to be active.



11.1.6 Receptors

End-users

The proposed development predominantly comprises commercial use. All soil samples were found to be below the generic assessment criteria for a commercial end use site. As such, no risk to commercial end users was identified from the investigation.

A public realm (Port Park) is proposed in the south-east corner of the site with some soft landscaping. Soil sampled from BH126, BH127 and BH128 situated within the proposed Port Park area returned concentrations below the relevant public open space near residential end use screening criteria. Asbestos in shallow soils at BH317 within the proposed soft landscaping area of Port Park is considered to pose a risk to future site users who may over time be exposed to disturbed fibres within soils.

Construction workers involved in site clearance, excavation, earthmoving and material handling operations may be exposed to the inhalation of soil and dust particles and asbestos.

Shallow groundwater

Shallow groundwater perched within made ground and shallow groundwater within sands and gravels underlying the made ground exceeded a number of contaminant concentrations for heavy metal parameters, hydrocarbons and PAHs. Shallow groundwater on site is not considered to be an exploitable source of groundwater.

Bedrock aquifer

The deeper bedrock aquifer in the underlying Limestone and Mudstone is very unlikely to be impacted by the site due to the presence of a significant thickness (c.10m) of firm to very stiff clay anticipated to prevent the vertical migration of contaminants towards the bedrock aquifer.

Surface water – River Liffey

The River Liffey samples appear to be of generalyl good surface water quality.

Buildings

Ground gas monitoring has characterised Area O as Characteristic Situation 4 and Area L as Characteristic Situation 2 meaning gas protection measures will be required.

11.2 Risk assessment and revised conceptual site model

The revised site conceptual model is illustrated in Table 11.1 and the risks to receptors are summarised below.



11.2.1 Human Health

The risk to site end users from identified contamination will be minimal due to the emplacement of hard-standing and proposed building footprints across the majority of the site. A potential risk is present to construction workers with regards to asbestos fibres within Area O (BH119, BH120, BH317, BH320, BH322 at 0.50m & BH322 at 3.00m), proposed roads (BH112 and BH116) and Area L (BH305) where earthworks or breaking ground is required during the construction phase. Risks to construction workers within these areas should be mitigated using PPE & RPE and appropriate work methods.

Asbestos in shallow soils at BH317 within the proposed soft landscaping area of Port Park is considered to pose a risk to future site users who may over time be exposed to disturbed fibres within soils.

It is anticipated that future site users may be at risk of ground gas ingress within the proposed buildings in the Area O and L due to a ground gas classification of Characteristic Situation, which results in the requirement for ground gas protection measures.

11.2.2 Risk to shallow groundwater

Shallow groundwater on site is not considered to be a controlled water and does not represent an exploitable source of groundwater.

11.2.3 Risk to bedrock aquifer

The deeper bedrock aquifer is very unlikely to be impacted by the site due to the presence of a significant thickness (c.10m) of firm to very stiff clay anticipated to prevent vertical migration of contaminants towards the bedrock aquifer.

11.2.4 Risk to adjacent water bodies

Whilst the shallow groundwater has been impacted by heavy metals, PAHs and Hydrocarbons the surface water sampling and analysis appears to demonstrate that this is not impacting upon the quality of River Liffey. However, a source-pathway-receptor linkage is present from contaminated shallow groundwater to the River Liffey and a risk is present for this groundwater to impact upon the quality of the River Liffey.

11.2.5 Risk to buildings

Ground gas monitoring has recorded elevated ground gas levels meaning gas protection measures will be required within proposed buildings in Area O and L.



Table 11-1 Conceptual Site Model Summary – Roads & Transport Routes

Source	Pathway(s)	Receptors(s)	Relevant Source – Pathway – Receptor linkage (SPR)	Mitigation measures & Recommendations
On-site sources				
Asbestos in soils	in soils Construction workers Disturbance of asbestos fibres during any excavations to facilitate ro or laying of services which may result in the inhalation of fugitive dusts and / or asbestos fibres asbestos fibres asbestos fibres excavations.	Is Ensure construction workers are aware that asbestos fibres have been identified, ensure the use of appropriate PPE / RPE and employ		
			Where proposals outline the presence of hardstanding, the relevant SPR linkage is removed.	dust suppression methods during excavations.



Table 11.2 - Conceptual Site Model Summary - Maritime Village

Source	Pathway(s)	Receptors(s)	Relevant Source – Pathway – Receptor linkage (SPR)	Mitigation measures & Recommendations
On-site sources				
No contamination source identified	Direct contact including dermal.	Construction workers	No SPR linkage identified.	No specific remedial measures required.
	absorption and inhalation of fugitive dusts	Site end users		



Table 11.3 Conceptual Site Model Summary - Area O

Source	Pathway(s)	Receptors(s)	Relevant Source – Pathway – Receptor linkage (SPR)	Mitigation measures & Recommendations
On-site sources				
Made ground/waste material	Leaching into shallow groundwater	Shallow and deeper groundwater, River Liffey and Dublin Bay	Shallow groundwater on site is not considered to be a controlled water and does not represent an exploitable source of groundwater. SPR linkage may be present with potential to impact upon quality of River Liffey.	Monitoring of groundwater and surface water quality is recommended during construction and ground compaction works.
Asbestos in soil	Direct contact including dermal and absorption.	Construction workers	Disturbance of asbestos fibres during any excavations to facilitate roads or laying of services which may result in the inhalation of fugitive dusts and / or asbestos fibres. Direct contact with contaminated soils during excavations.	Ensure construction workers are aware that asbestos fibres and elevated PAH concentrations have
	Inhalation of fugitive dusts and / or asbestos fibres		Where proposals outline the presence of hardstanding, the relevant SPR linkage is removed.	been identified, ensure the use of appropriate PPE / RPE and employ dust suppression methods during excavations.
Contaminants in shallow groundwater	Vertical and Horizontal migration	Deeper groundwater, River Liffey	Shallow groundwater on site is not considered to be a controlled water and does not represent an exploitable source of groundwater. SPR linkage may be present with potential to impact upon quality of River Liffey.	Monitoring of groundwater and surface water quality is recommended during construction and ground compaction works.



GENERIC QUANTITATIVE RISK ASSESSMENT (GQRA)

Source	Pathway(s)	Receptors(s)	Relevant Source – Pathway – Receptor linkage (SPR)	Mitigation measures & Recommendations
	Vertical migration	Bedrock aquifer (Limestone and Mudstone)	The deeper bedrock aquifer is very unlikely to be impacted due to the presence of a significant thickness (c.10m) of firm to very stiff clay overlying the bedrock aquifer.	Monitoring of groundwater and surface water quality is recommended during construction and ground compaction works.
Ground borne gases (Carbon dioxide and Methane)	Migration to indoor air	Humans in the form of future site users	The gas regime within Area O has been classified as Characteristic Situation 4.	Ground gas protection measures will be required.
,	Migration via service entries	Buildings & infrastructure		



Table 11.4 Conceptual Site Model Summary - Port Park

Source	Pathway(s)	Receptors(s)	Relevant Source – Pathway – Receptor linkage (SPR)	Mitigation measures & Recommendations
On-site sources				
Asbestos in soil	sbestos in soil Inhalation of asbestos fibres during any earthworks which may res asbestos fibres Site end users Site end users	Disturbance of asbestos fibres during any earthworks which may result in the inhalation of asbestos fibres.	Ensure construction workers are aware that asbestos fibres have	
			Where proposals outline the presence of hardstanding, the relevant SPR linkage is removed.	appropriate PPE / RPE are used during earthworks and employ
			Where soft landscaping is required in the vicinity of BH317 such as the proposed wildflower meadow, there is a potential risk of disturbance of asbestos containing soils by future site users.	dust suppression methods.
				Remedial measures required to address risk from asbestos in Port Park in vicinity of BH317.

Table 11.5 Conceptual Site Model Summary - Area L

Source	Pathway(s)	Receptors(s)	Relevant Source – Pathway – Receptor linkage (SPR)	Mitigation measures & Recommendations
On-site sources				
Made ground/waste material	Leaching into shallow groundwater	Shallow and deeper groundwater, River Liffey and Dublin Bay	Shallow groundwater on site is not considered to be a controlled water and does not represent an exploitable source of groundwater. SPR linkage may be present with potential to impact upon quality of River Liffey.	Monitoring of groundwater and surface water quality is recommended during construction.
Asbestos in soils	Direct contact including dermal and absorption.	Construction workers	Disturbance of asbestos fibres during any excavations to facilitate roads or laying of services which may result in the inhalation of fugitive dusts and / or asbestos fibres. Direct contact with contaminated soils during excavations.	Ensure construction workers are aware that asbestos fibres have been identified, ensure the use of appropriate
	Inhalation of fugitive dusts and / or asbestos fibres		Where proposals outline the presence of hardstanding, the relevant SPR linkage is removed.	PPE / RPE and employ dust suppression methods during excavations.
Contaminants in shallow groundwater	Vertical and Horizontal migration	Deeper groundwater, River Liffey	Shallow groundwater on site is not considered to be a controlled water and does not represent an exploitable source of groundwater. SPR linkage may be present with potential to impact upon quality of River Liffey.	Monitoring of groundwater and surface water quality is recommended during construction.
	Vertical migration	Bedrock aquifer (Limestone and Mudstone)	The deeper bedrock aquifer is very unlikely to be impacted due to the presence of a significant thickness (c.10m) of firm to very stiff clay overlying the bedrock aquifer.	Monitoring of groundwater and surface water quality is recommended during construction.



GENERIC QUANTITATIVE RISK ASSESSMENT (GQRA)

Source	Pathway(s)	Receptors(s)	Relevant Source – Pathway – Receptor linkage (SPR)	Mitigation measures & Recommendations
Ground borne gases (Carbon dioxide and Methane)	Migration to indoor air	Humans in the form of future site users	The gas regime within Area L has been classified as Characteristic Situation 2.	Ground gas protection measures will be required.
	Migration via service entries	Buildings & infrastructure		

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12 CONCLUSIONS & RECOMMENDATIONS

12.1 Conclusions

- Asbestos fibres have been identified within shallow sub soils at BH112, BH116, BH119, BH120, BH317, BH320 & BH322. There is the potential for asbestos fibres to be released during any earth works at these locations. Construction workers should employ appropriate use of PPE / RPE and dust suppression methods to mitigate risks from asbestos fibres during the construction phase. There is a potential risk of disturbance of asbestos in shallow soils within the proposed Port Park & wildflower meadow and as such, remedial measures will be required.
- Shallow groundwater samples recorded elevated concentrations of heavy metals, PAHs and TPH which are likely leaching from the made ground.
- Area O classified as a Characteristic Situation 4 and gas protection measures will be required.
- Area L classified as a Characteristic Situation 2 and gas protection measures will be required.

12.2 Recommendations

• A Detailed Remedial Strategy should be produced which will outline how the above risks will be mitigated.



Appendix A

Proposed Development Layout with Ground Investigation Locations





Appendix B

Causeway Geotech Ltd Ground Investigation Reports



3FM Planning Design GI Lot A DPC Lands – Ground Investigation



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The works were conducted in accordance with:

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for ground investigations.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9



METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Ground Investigation.

Abbreviations use	ed on exploratory hole logs
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
Р	Nominal 100mm diameter undisturbed piston sample.
В	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
С	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa.V: undisturbed vane shear strengthVR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of Nx5=Cu is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
\bigtriangledown	Water strike: initial depth of strike.
•	Water strike: depth water rose to.
Abbreviations relatin	g to rock core – reference Clause 36.4.4 of BS 5930: 2015+A1:2020
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.





3FM Planning Design GI Lot A DPC Lands

1 AUTHORITY

On the instructions of RPS, ("the Client's Representative"), acting on the behalf of Dublin Port Company (DPC) ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical and environmental information for input to the design and construction of a proposed development of the southern port lands.

This report details the work carried out both on site and in the geotechnical and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the ground investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2 SCOPE

The extent of the investigation, as instructed by the Client's Representative, included boreholes, trial pits, slit trenches, pavement cores, soil sampling, in-situ and laboratory testing, and the preparation of a factual report on the findings.

3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted on Dublin Port Company owned lands in Dublin Port north of the Liffey and in southern port areas south of the River Liffey in Poolbeg/Ringsend, Dublin. Works were conducted along Alexandra Road, within the P&O Ferry Terminal, within Stella Maris Rowing Club, within MTL's compound, within Nolan's compound, along South Bank Road, and within contractor's compounds off South Bank Road across mostly hardstanding areas. Elevations vary across the site.





4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between the 8^{th} of November 2022 and the 8^{th} of February 2023, comprised:

- Twenty-one boreholes
 - five light cable percussion boreholes
 - five boreholes by light cable percussive extended by rotary follow-on drilling
 - eleven boreholes by dynamic (windowless) sampling
- a standpipe installation in thirteen boreholes
- two machine dug slit trenches
- indirect CBR tests at two locations; and
- four pavement cores.

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, and as shown on the exploratory hole location plan in Appendix A.

4.2 Boreholes

A total of twenty-one boreholes were put down in a minimum diameter of 150mm through soils and rock strata to their completion depths by a combination of methods, including light percussion boring, light cable percussion boring and rotary drilling.

The borehole logs state the methodology and plant used for each location, as well as the appropriate depth ranges.

A summary of the boreholes, subdivided by category in accordance with the methods employed for their completion, is presented in the following sub-sections.

4.2.1 Light cable percussion boreholes

Five boreholes (BH119, BH121, BH122,BH130, BH131) were put down to completion in minimum 200mm diameter using either a Dando 2000 or Dando 3000 light cable percussion boring rigs. All boreholes were terminated at scheduled depth or on encountering virtual refusal on obstructions.

Hand or machine dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions.





Disturbed (bulk and small bag) samples were taken within the encountered strata. Undisturbed (U100) samples were taken where appropriate and as directed within fine soils. Environmental samples were taken at standard intervals, as directed by the Client's Representative.

Standard penetration tests were carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix J.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded.

Where water was added to assist with boring, a note has been added to the log to account for same.

Appendix B presents the borehole logs.

4.2.2 Boreholes by combined percussion boring and rotary follow-on drilling

Five boreholes (BH101, BH120 and BH123-BH125) were put down by a combination of light cable percussion boring (Dando 200 and 3000 rigs) and rotary follow-on drilling techniques using a Beretta T44 or Commachio 601 rotary drilling rig with core recovery in overburden and bedrock. Where the cable percussion borehole had not been advanced onto bedrock, rotary percussive methods were employed to advance the borehole to competent strata after which coring was carried out to completion. Symmetrix cased full-hole drilling was used, with SPTs carried out at standard intervals as required.

Hand dug or machine dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions.

Disturbed (bulk and small bag) samples were taken within the encountered strata. Undisturbed (U100) samples were taken where appropriate and as directed within fine soils. Environmental samples were taken at standard intervals, as directed by the Client's Representative.

Standard penetration tests were carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals throughout the overburden using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix J.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded.



Where water was added to assist with boring, a note has been added to the log to account for same.

Where coring was carried out, Geobor S Coring was used. The core was extracted in up to 1.5m lengths using an SK6L core barrel, which produced core of nominal 102mm diameter, and was placed in single channel wooden core boxes.

The core was subsequently photographed and examined by a qualified and experienced Engineering Geologist, thus enabling the production of an engineering log in accordance with *BS 5930: 2015+A1:2020: Code of practice for ground investigations.*

Appendix B presents the borehole logs, with core photographs presented in Appendix C.

4.2.3 Dynamic sampled boreholes

Eleven boreholes (BH102-103, BH105, BH110, BH112, BH116-117 and BH126-128) were put down to completion by light percussion boring techniques using a Dando Terrier or Premier 110 dynamic sampling rig. The boreholes were put down initially in 150mm diameter, reducing in diameter with depth as required, down to 50mm by use of the smallest sampler.

Hand dug or machine dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down clear of services or subsurface obstructions. The boreholes were taken to depths ranging between 1.50m and 4.00m where they were terminated on encountering virtual refusal on obstructions.

Disturbed (bulk and small bag) samples were taken within the encountered strata. Environmental samples were taken at standard intervals, as directed by the Client's Representative.

Standard penetration tests were carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The *N*-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix J.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded. Details of the water strikes are presented on the individual borehole logs.

Appendix B presents the borehole logs.

4.3 Standpipe installations

A groundwater monitoring standpipe was installed in thirteen boreholes as listed below in Table 1.



GI Ref	Туре	Response Zone
		(IIIbgi)
BH102	50mm	0.50-2.40
BH103	50mm	0.50-3.70
BH105	50mm	0.50-2.20
BH112	50mm	0.50-3.40
BH120	50mm	6.50-20.00
BH121	50mm	0.50-5.50
BH122	50mm	0.50-5.00
BH123	50mm	4.50-6.50
BH124	50mm	0.50-1.50
BH125	50mm	0.50-5.00
BH126A	50mm	0.50-1.50
BH127	50mm	0.50-2.50
BH128	50mm	0.50-2.10

Table 1. Summary of standpipe installations

Details of the installations, including the depth range of the response zone, are provided in Appendix B on the individual borehole logs.

4.4 Slit trenches

Two slit trenches (ST102 and ST104) were excavated by a combination of hand digging and mechanical excavation using a compact 3t tracked excavator fitted with a 600mm wide toothless bucket, to locate and identify buried services at the site.

Drawing of the trenches and the locations of services encountered during excavation are shown along with the slit trench logs in Appendix D, with photographs presented in Appendix E.

4.5 PID tests

PID (Photo ionizing detection) testing was undertaken on small, disturbed samples recovered from all boreholes using a hand-held PID meter, to determine if any volatile organic compound contamination was present in the overburden.

Results of the PID tests are presented on the individual borehole logs in Appendix B.

4.6 Indirect CBR tests (DCP)

An indirect CBR test was conducted at two locations (RC102 and RC104) using a Dynamic Cone Penetrometer (DCP). The equipment was developed in conjunction with the UK Transport Research Laboratory, and is discussed in Highways England CS229 (2020) which refers to the methodology described in TRL Overseas Road Note 18 (1999).





The test results are presented in Appendix F in the form of plots of the variation with depth of the penetration per blow. Straight lines have been fitted to the plots and the CBR for each depth range estimated using the following relationship, which is taken from TRRL Overseas Road Note 8 (1990), *A user's manual for a program to analyse dynamic cone penetrometer data*.

Log CBR = 2.48-1.057 Log (mm/blow)

The frequently elevated CBR values are a consequence of the coarse-grained content of the penetrated soils and are often not representative of the soil matrix.

4.7 Pavement cores

Four cores (RC101-RC104) were carried out at locations as directed by the Client's Representative to establish the pavement make-up. The cores were taken using hand-held diamond coring equipment. Core thicknesses and compositions are outlined in Table 2.

Location	Thickness (mm)	Composition
RC101	198	Concrete
RC102	400	Bitmac
RC103	120	Bitmac
RC104	300	Concrete over bitmac

 Table 2: Pavement core thickness and composition

Photographs of the pavement cores are presented in Appendix G.

4.8 Surveying

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R10 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish Transverse Mercator) and ground elevation (mOD Malin) at each location are recorded on the individual exploratory hole logs. The exploratory hole location plan presented in Appendix A shows these as-built positions.

4.9 Groundwater and ground gas monitoring

Following completion of site works, groundwater and ground gas monitoring was conducted over five rounds. Ground water monitoring was carried out using a water interface probe. Ground gas measurements were carried out using a GA5000 gas meter.

The monitoring records are presented in Appendix K.





5 LABORATORY WORK

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described, and their descriptions incorporated into the borehole logs.

5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests and particle size distribution analysis.
- compressibility: one dimensional consolidation (oedometer).
- **shear strength** (total stress): unconsolidated undrained triaxial tests.
- **direct shear:** shear box tests.
- compaction related: California bearing ratio tests.
- **soil chemistry:** pH and water soluble sulphate content.

Laboratory testing of soils samples was carried out in accordance with British Standards Institute: *BS 1377, Methods of test for soils for civil engineering purposes; Part 1 (2016), and Parts 2-9 (1990).*

The test results are presented in Appendix H.

5.2 Geotechnical laboratory testing of rock

Laboratory testing of rock sub-samples comprised:

- point load index
- unconfined compressive strength (UCS) tests

Test	Test carried out in accordance with		
Point load index	ISRM Suggested Methods (1985) Suggested method for determining point-load		
	strength. Int. J. Rock Mech. Min. Sci. Geomech. Abstr. 22, pp. 53–60		
Uniaxial	ISRM Suggested Methods (1981) Suggested method for determining		
compression	deformability of rock materials in uniaxial compression, Part 2		
strength tests	and		
	ISRM (2007) Ulusay R, Hudson JA (eds) The complete ISRM suggested methods		
	for rock characterization, testing and monitoring, 2007		





The test results are presented in Appendix H.

5.3 Environmental laboratory testing of soils

Environmental testing, as specified by the Client's Representative was conducted on selected environmental soil samples by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out according to RPS Soil Testing Suites A, B, C, D and E, testing for a range of determinants, including:

- Metals
- Speciated total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- BTEX compounds
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds (SVOCs)
- Polychlorinated biphenyls (PCBs)
- Phenols
- Organic matter
- Total Organic Carbon (TOC)
- Cyanides
- Asbestos screen
- Sulphate and sulphide
- Sulphur
- Calcium
- pH

Results of environmental laboratory testing are presented in Appendix I.

6 GROUND CONDITIONS

6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise urban sediments. These deposits are underlain by dark limestones and shales of the Lucan Formation.

6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

• **Paved surface:** Bitmac, concrete and paving stones was encountered at ground level at almost every





location across the site ranging in thickness from 60-200mm. At some locations, paved surfacing was underlain by a second concrete/bitmac layer.

- **Topsoil:** encountered in 150mm thickness in BH112.
- **Made Ground (sub-base):** majority of locations which had a paved surface were underlain by granular fill of varying thicknesses.
- Made Ground (fill): reworked sandy gravelly clay/silt fill or sandy clayey gravel or gravelly clayey sand fill with varying amounts of concrete, red brick, timber, steel and glass fragments as well as varying amounts of wire, plastic, cloth, and ash was encountered across the site to a maximum depth of 15.80m in BH130. It should be noted that this location is through an existing caisson, and aside from this the maximum depth was 6.50m in BH120 in the south of the site, which is a former landfill area.
- **Marine beach deposits:** typically, medium dense to dense sands and gravels interspersed with layers of sandy gravelly clay frequently with shell fragments encountered across the site to a maximum depth of 20.10m in BH120 generally overlying Port Clay.
- **Port Clay:** Firm to stiff sandy silty clay often with laminations of silty sand encountered across the site to a maximum depth of 34.80m in BH120.
- **Glacial till/Fluvioglacial deposits:** very stiff sandy gravelly clay or very dense sandy clayey gravel generally encountered beneath Port Clay and overlying bedrock, encountered greatest in extent in the south of the site in BH124 to a depth of 40.00m.
- **Bedrock (Limestone and Mudstone):** Medium strong to strong limestone or mudstone was encountered at depths ranging from 24.50m in BH101 to 38.25m in BH124.

6.3 Groundwater

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.

Groundwater was encountered during the ground investigation as water strikes seen in Table 2 below.

Location	Depth (mbgl)	Comments
BH101	6.50	Water rose from 6.50 to 6.20m over 20 minutes
	8.30	Water rose from 8.30 to 1.90 over 20 minutes
	9.70	
BH102	2.40	
BH112	4.00	Water rose from 4.00 to 3.50 over 20 minutes

Table 2. Groundwater strikes encountered during the ground investigation.



BH119	0.25	
BH120	5.00	Water rose from 5.00 to 4.30 over 20 minutes
BH121	3.10	Water rose from 3.10 to 2.60 over 20 minutes
BH122	0.35	
	4.30	Water rose from 4.30 to 3.90m over 20 minutes
	9.50	Water rose from 9.50m to 3.60m over 20 minutes
BH123	0.30	
	4.30	
BH124	0.80	
BH125	4.70	
BH127	3.00	Water rose from 3.00 to 2.50 over 20 minutes
BH128	1.50	
	2.00	
BH130	4.40	Water rose from 4.40m to 3.00m over 20 minutes
	8.60	Water rose from 8.60 to 2.10 over 20 minutes
BH131	6.30	Water rose from 6.30 to 1.70 over 20 minutes

Groundwater was not noted during drilling at several of the borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out additional groundwater strikes and the possibility of encountering groundwater during excavation works should not be ruled out.

It should be noted that any groundwater strikes within bedrock may have been masked by the fluid used as the drilling flush medium.

Seasonal variation should be factored into design, and continued monitoring of the installed standpipes will give an indication of the seasonal variation in groundwater level.

Details of further groundwater monitoring, as well as results of gas monitoring, are presented in Appendix K.

7 **REFERENCES**

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.





BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

BS EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description.

BS EN ISO 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.


APPENDIX A SITE AND EXPLORATORY HOLE LOCATION PLANS





CALISTIMAY	Project No.:	22-1041A	Client:	Dublin Port Company (DPC)
GEOTECH	Project Name:	3FM Planning Design GI - Lot A DPC Lands	Client's Representative:	RPS
 Legend Key Locations By Type - CP Locations By Type - DS Locations By Type - IP Locations By Type - PC Locations By Type - TP 			Representative:	
Exploratory Hole Location Plan - 1	- (1	-		the state of the s
Last Revised: Scale: 19/04/2023 1:500	bing Microsoft product screen	shott(s) rearinted with permission from Microsoft Corr	poration	20 Metres 80 Feet

	SEVA/AV	Project No.:	22-1041A	Client:	Dublin Port Company (DPC)
CAU	GEOTECH	Project Name:	3FM Planning Design GI - Lot A DPC Lands	Client's Representative:	RPS
Legend Key Locations By T Locations By T Locations By T Locations By T Locations By T T T T T T T T T T T T T T	ype - CP ype - CP+RC ype - DS ype - PC ype - TP				
Exploratory Hole	Location Plan - 2				
Last Revised:	Scale:	b bing	A State		20 Metres 80 Feet
14/04/2023	1:200	Microsoft product screen :	shot(s) reprinted with permission from Microsoft Corporation		

		Project No.:	22-1041A	Client:	Dublin Port Company (DPC)
GEO	OTECH	Project Name:	3FM Planning Design GI - Lot A DPC Lands	Client's Representative:	RPS
Legend Key Locations By Type - Locations By Type -	CP CP+RC DS PC TP				
				в	H130 BH131
		BH102		BH103	
					BH105
Title: Exploratory Hole Loca	ation Plan - 3				CBM S
Last Revised: 14/04/2023	Scale: 1:1500	bing Microsoft product screen sl	rot(s) reprinted with permission from Microsoft Corporation	The second	70 Metres 200 Feet

		Project No.:	22-1041A	Client:	Dublin Port Company (DPC)
CAU	GEOTECH	Project Name:	3FM Planning Design GI - Lot A DPC Lands	Client's Representative:	RPS
Legend Key Locations By Ty Locations By Ty Locations By Ty Locations By Ty Locations By Ty Locations By Ty	rpe - CP rpe - CP+RC rpe - DS rpe - IP rpe - PC rpe - TP		STI02		
Title:	Location Plan 4				
	Location Plan - 4				
Last Revised:	Scale:	Dobina			70 Metres 200 Feet
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APPENDIX B BOREHOLE LOGS

8					Pr	oject No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands		Borehole ID
	-{}} ⊂		WAY		22	2-1041A	Client: Dublin Port Company (DPC)		BH101
	8 -	GEC	DIECH				Client's Rep: RPS		
Met Inspect	h od ion Pit	Plant Used 3t Excavator	Top (m) Base (1	n) Co	ordinates	Final Depth: 30.00 m Start Date: 23/11/2022 Driller:	CC+GT	Sheet 1 of 4
Cable Per	rcussion	Dando 3000	1.50	15.50	71	8076.10 E			Scale: 1:50
Rotary	Coring	Beretta T44 Beretta T44	15.50	30.00	/ /3	4394.29 N	Elevation: 3.74 mOD End Date: 25/11/2022 Logger:	CMc+RS	DRAFT
Depth (m)	Sample / Tests	Field Red	cords	Casing Wa Depth De (m) (r	ter Lev hth) mO	el Depth D (m)	Legend Description		Backfill
					3.6 3.6	67 0:98 64 0 30	MADE GROUND: Cobblestone Pavement MADE GROUND: Brown silty fine to coarse SAND.		-
0.50	ES1				3.4 3.3	4 0.40	CONCRETE MADE GROUND: Stiff grey slightly sandy slightly gravelly CLAY	. Sand is	0.5
0.50		PID = 4.00ppm					Image: Control of the state of the	D with	-
1.00 1.00	ES2	PID = 0.00ppm				-	low cobble content and shell fragments. Gravel is rounded fin coarse. Cobbles are rounded.	ne to	1.0
1 50	562				2.2	4 4 5 4 5 4			-
1.50	ES3 B9				2.2	4 [1.50	MADE GROUND: Medium dense brown sandy silty rounded fi coarse GRAVEL. Sand is fine to coarse.	ine to	-
1.50 2.00	D10	PID = 0.00ppm						ſ	2.0
2.00 2.00 - 2.45	ES4 SPT (C)	N=14 (2,3/3,3,4,4)	Hammer SN	= 2.00 D	v				-
2.00		0197 PID = 0.60ppm							2.5 —
2.50	ES5	PID = 0.30 ppm			1.0	4 2.70	MADE GROUND: Firm sandy gravelly CLAY. Sand is fine to coal	rse.	-
2.70 - 3.60	B11	110 - 0.30ppm							3.0
3.00	ES6	N-1/ (2 2// / 2 2)	Hammer SN	- 2 00 0					
3.00 - 3.45	3F1 (C)	0197		- 3.00 D	y 0.1	4 3.60	Firm grey sandy silty rounded fine to coarse GRAVEL with high	h cobble	=
3.50	ES7					-	(අ) (전 학교 에 content. Sand is fine to coarse. Cobbles are subangular.		4.0
3.50 3.60 - 4.50	B13	PID = 0.20ppm					**************************************		-
4.00 4.00 - 4.45	D14 SPT (C)	N=13 (2,3/3,3,3,4)	Hammer SN	= 4.00 D	γ				4.5 —
4.00		0197 PID = 0.10ppm					* ± − − − − − − − − − − − − − − − − − −		-
4.50 5.00	ES8 D15								5.0
5.00 - 6.00 5.00 - 5.45	B16 SPT (C)	N=10 (1,1/2,2,3,3)	Hammer SN	= 5.00 D	-y		49 次 2 1 2 2 2 3 2 3 2 3 4 2 3 2 3 2 3 2 3 2 3 2		5.5 —
		0197							-
							ိုင်ကို မှိသူက်ရှိ နောက်ကို ကိုလိုက်ရောက် နောက်ကို ကိုလိုက်		6.0
6.50 6.50 - 6.95	D17 SPT (C)	N=11 (1,2/2,3,3,3)	Hammer SN	= 6.50 6.	-2.7	76 6.50	Medium dense becoming dense very sandy slightly silty suba	ngular	✓ 6.5 –
		0197 Seepage at 6.50m					nne to medium GRAVEL. Sand is fine to coarse.		
7.00 - 8.00	B18	1.0							
									- - 7.5
						Ē			
8.00 8.00 - 9.45	D19	N=28 (1 5/6 7 7 9)	Hammor CN	8 16 2	10				8.0
0.00 - 0.45		0197 Water strike at 9.3	Inaminel SN	- 0.43 3.				Ľ	
8.50 - 9.50	B20	Water strike at 6.3	om						8.5 —
									9.0
									-
	Wate	r Strikes		Chisel	ing Det	ails	Remarks		
Struck at (m) 6 50	Casing to (m) Time (min) Rose	to (m) From	(m) 1 70	o (m) 6.50	Time (hh:mm)	Inspection pit machine excavated to 1.50m.		
8.30	0.50	20 1	.90	-	5.50				
5.70									
Casing	Details	Water Add	ed						
To (m) 12.00	Diam (mm 250) From (m) To	(m)						
15.00	200		e Barrel	Flu	ish Type	Type Termination Reason Last I			
			SK6L				Terminated at scheduled depth.	12/06/2	O23 AGS

CAUSEWAY GEOTECH								Proje 22-1	ect No. L 041A	 Project Name: 3FM Planning Design GI - Lot A DPC Lands Client: Dublin Port Company (DPC) 						Borehole ID BH101		
	- 19		GEC	DTE	СН					Client's	s Rep: RPS		one compe	, (2: 0)				
Metho	bd	Plant l	Jsed		Top (n	n) Bas	ie (m)	Coor	dinates			20		22/11/2022		CC. CT	Sh	eet 2 of 4
Inspectio Cable Perc	on Pit Jussion	3t Exca Dando	vato 3000	r)	0.00 1.50	1	50 5.50	7180	76.10 E	Final De	epth: 30.0	J0 m	Start Date	: 23/11/2022	Driller:	CC+G1	Sc	ale: 1:50
Rotary Dr	rilling	Beretta	a T44		15.50		6.50	7343	94.29 N	Elevatio	on: 3.74 r	mOD	End Date:	25/11/2022	Logger:	CMc+RS	[DRAFT
Rotary Co Depth	Sample /	Beretta	ald Re	cords	16.50	Casin Deat	y.00	Level	Depth	Legend			De	scription			iter	Backfill
(m)	Tests		eiu ne	corus		(m)	(m)	mOD	(m)	Legenu			De				Wa	-
9.50 9.50 - 9.95	D21 SPT (C)	N=30 (3,4/5, = 0197 Water strike	6,9,1 at 9.3	0) Har 70m	nmer Sl	N 9.5	0 5.40										¥	9.5 10.0
10.30 - 12.00	B22							-6.56	10.30		Medium dens GRAVEL. Sand	se dark d is fine	greyish blac to coarse.	k sandy silty rou	nded fine to	medium		
11.00 11.00 - 11.45	D23 SPT (C)	N=19 (2,3/4, 0197	4,5,6) Ham	mer SN	= 11.	0 7.60											11.0
12.50 12.50 - 12.95	D24 SPT (C)	N=17 (2,4/4,4,4,5) Hammer SN = 12.5 0197																12.5 — — — —
13.10 - 14.10	B25																	13.0 — — — 13.5 — —
14.00 14.00 - 14.45	D26 SPT (C)	N=20 (3,4/3,4,6,7) Hammer SN = 14.0 8 0197					0 8.20	-10.36	14.10		Medium dens low cobble co	se grey ontent.	sandy silty ı	ounded fine to c	coarse GRAVE	L with		14.0
								-11.26	- 15.00	2000 2000 2000 2000 2000 2000 2000 200	Stiff dark grey Gravel is subre	/ish bla ounde	ick sandy gra d fine to coa	avelly CLAY. Sand rse.	is fine to coa	rse.		
									- (1.50)									15.5
16.50 - 18.00 16.50 - 16.61	C1 SPT(S) 5 40mm/5 69mm) = 0208	0 (25 for 50 for Hammer SN	100	0	0	—16.	5 9.00	-12.76	16.50	ender ander ender ander ender en en en en en en en en en Bester forster en	Very stiff dark low cobble co subrounded fi subangular of	c brown ontent. ine to c f limest	nish grey slig Sand is fine coarse of var tone.	htly gravelly slig to coarse. Grave rious lithologies.	htly sandy CL I is subangula Cobbles are	AY with ar to		16.5 -
18.00																		18.0
	Water	Strikes	TCR	SCR	RQD F	L Ch	isellin	g Detail	s	Remarks								
Struck at (m) Ca 6.50 8.30 9.70 9.70 Casing D To (m) D	etails	Time (min) 20 20 Water From (m)	Rose 6 1 Add	e to (m 5.20 1.90 ed	1) Fron 5.	<u>1 (m)</u> 70	<u>To</u> 6.	(m) Tin 50	ne (hh:mm) 01:00	Inspectior	n pit machine ex	xcavate	d to 1.50m.					
12.00 15.00	250 200					ro Po	rrel	Eluch	Type	Terminat	tion Reason					act line	12104	
		Core Barr SK6L					ilei	Wa	i ype ater	Terminate	d at scheduled	depth.				12/06/2	2023	AGS

CAUSEWAY					v		Proje	ct No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole ID	
			GEC	ЭΤΙ	EC	Н		22-1	041A	Client: Dublin Port Company (DPC)	DUINI
Meth	nod	Plant L	Jsed		Тор	(m)	Base (m)	Coord	linates		Sheet 3 of 4
Inspecti Cable Per	ion Pit cussion	3t Exca Dando	vato 3000	r)	0. 1.	00 50	1.50 15.50	71807	76.10 E	Final Depth: 30.00 m Start Date: 23/11/2022 Driller: CC+GT	Scale: 1:50
Rotary D Rotary (Drilling Coring	Beretta Beretta	a T44 a T44		15 16	.50 .50	16.50 30.00	73439	94.29 N	Elevation: 3.74 mOD End Date: 25/11/2022 Logger: CMc+RS	DRAFT
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend Description	Backfill
19.50			100	0	0	-				Very stiff dark brownish grey slightly gravelly slightly sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies. Cobbles are subangular of limestone.	
19.50 - 21.0	00 C2		100	0	0	N/A			(4.50)		20.0
21.00 21.00	C3							-17.26	- 21.00	Very stiff dark brownish grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular of various lithologies but predominantly dark grey limestone.	21.0
			90	0	0	N/A			(1.60)		21.5
22.50 22.50 - 24.0	00 C4		95	0	0	-		-18.86	22.60	Very stiff slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to medium of various lithologies. Cobbles are subangular of dark grey limestone.	22.5
24.00	0.05					N/A			- (2.80)	24.00-24.65m: Very dense dark grey slightly gravelly slightly clayey fine to coarse sand.	23.5
24.00 25.5			95	0	0						24.5 — 25.0 —
25 50								-21.66	25.40	Medium strong thinly to thickly laminated dark grey to black	25.5 —
			100	100	62					LIMESTONE with occassional steeply oriented white calcite veins. Slightly weathered: slightly reduced strength, slightly closer fracture spacing. Discontinuities:	 26.0 —
26.70 - 26.8 26.80 - 27.0	30 C1 10 C2					8			(4.60)	1. 5-20 degree bedding fractures, closely spaced (10/135/430), planar, smooth.	26.5
27.00			100	100	87	-				2. 75-90 degree joints from 25.50-25.60m, 26.20-26.70m, 27.00-27.40m, 27.55-27.90m and 29.50-30.00m, predominantly planar, smooth.	27.0
	Water	Strikes	ICR	SUR		FI	Chisellin	g Details		Remarks	
Struck at (m) 6.50 8.30 9.70	Casing to (m) 6.50 Details	Time (min) 20 20 Water	Rose	e to (r 5.20 90	n) F	rom (5.70	m) To 6.	(<u>m) Tim</u> 50 .	e (hh:mm) 01:00	Inspection pit machine excavated to 1.50m.	
To (m)	Diam (mm)	From (m)	To	o (m)							
12.00	250					Core	Barrel	Flush	Туре	Termination Reason Last Up	dated
						S	K6L	Wa	ter	Terminated at scheduled depth. 12/06,	²⁰²³ AGS

								Proje	ect No.	: No. Project Name: 3FM Planning Design GI - Lot A DPC Lands						
	X) C	CAUS	E	W	A	Y		22-1	.041A	lient: Dublin Port Company (DPC)		BH101				
	<i>₽</i> / −		GEC	DTE	EC	Н				lient's Rep: RPS						
Meth	nod	Plant I	Jsed		Тор	(m)	Base (m	Coor	dinates			Sheet 4 of 4				
Inspecti Cable Per	ion Pit rcussion	3t Exca Dando	vato 3000	r)	0. 1.	00 50	1.50 15.50	7180	76.10 F	nal Depth: 30.00 m Start Date: 23/11/2022	Driller: CC+G1	Scale: 1:50				
Rotary D	Drilling	Beretta	a T44		15	.50	16.50	7343	94.29 N	evation: 3.74 mOD End Date: 25/11/2022	Logger: CMc+RS	DRAFT				
Depth	Coring	Beretta	144	S C D	10	.50	30.00	Level	Depth	accord Description		t Bookfill				
(m)	Samples	/ Field Records	ICR	SCR	RQD	FI	Depth Depth (m) (m)	mOD	(m)	egena Description Medium strong thinly to thickly laminated dark gre	ev to black					
28 20 - 28 4	10 (3									LIMESTONE with occassional steeply oriented whit	e calcite veins. tly closer fracture					
28.40 - 28.5	50 C4									spacing.		28.5 —				
28.50 28.60 - 28.8	30 C5									Discontinuities:		-				
28.80 - 29.0	10 C6								-	1. 5-20 degree bedding fractures, closely spaced (1	.0/135/430),	29.0				
			100	100	75					planar, smooth.						
										2. 75-90 degree joints from 25.50-25.60m, 26.20-2 27.00-27.40m, 27.55-27.90m and 29.50-30.00m, p	6.70m, redominantly	29.5 —				
										planar, smooth.						
30.00								-26.26	- 30.00	End of Borehole at 30.00m		30.0				
												30.5				
												_				
												31.5				
												32.0				
												32.5 —				
									-							
												33.5 —				
												34.0				
												35.0				
												35.5				
												36.0				
												36.5 —				
												37.0				
			TCR	SCR	RQD	FI			f							
Struck at (m)	Water	Strikes	Rose	to (n	n) F	rom (Chisellin	g Detail	5 De (bh:mm)	marks						
6.50 8.20	6.50	20	6	5.20	, .	5.70) 6	.50	01:00	pection pit machine excavated to 1.50m.						
9.70		20	1	90												
	L															
Casing	Details	Water	Add	ed												
12.00	250			, (11)												
15.00	200					Core	Barrel	Flush	Туре	e Termination Reason Last U						
						S	K6L	Wa	iter	minated at scheduled depth.	12/06/2	²⁰²³ AGS				

GEOTECH Method Plant Used Top (m) Base						Proje 22-1	.041A	Project Client: Client':	t N : 's F	lame: 3FM P Dublir Rep: RPS	יlan n Pc	nning Desig ort Compar	n GI - Lot A D ıy (DPC)	PC Lands		Boi E	rehole 3H10	≗ ID 2
Meth	od	Plant Used	Top (r	n) Bas	e (m)	Coord	dinates	Final Dr				Chart Data:	04/01/2022	Drillori	1500	Sh	eet 1 c	of 1
Dynamic Sa	ampling	Dando Terrier	0.00	3.	00	71872 73404	29.62 E 44.81 N	Elevatio	on:	: 3.05 mC	m DD	End Date:	04/01/2023	Logger:	CH	Sc	ale: 1: DRAF	.50 T
Depth (m)	Sample / Tests	Field Reco	ords	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend				Desc	ription			Water	Backfill	
Depth (m) 0.30 - 1.20 0.50 1.00 1.00 1.20 - 2.00 1.50 2.00 2.00 - 3.00 2.50 3.00 3.00	Sample / Tests B3 ES1 ES2 B8 SPT (C) ES4 ES5 B9 SPT (C) ES6 ES7 SPT (C)	Field Reco PID = 13.80ppm PID = 12.90ppm N=24 (4,5/7,7,6,4) I 0696 PID = 8.90ppm N=37 (5,6/7,6,6,18) = 0696 PID = 9.50ppm PID = 3.20ppm N=13 (3,4/3,3,4,3) I 0696 PID = 3.00ppm PID = 3.00ppm PID = 3.00ppm	Hammer SN) Hammer S Hammer SN	Casing Depth Depth I = 0.000 N 0.000 I = 2.000 I = 2.000 I = 2.000 I = 2.000 I = 0.000 I = I = I = I = I = <td>Detai Diam 14</td> <td>Level mOD 2.99 2.75</td> <td>Depth (m) 0.06 0.30</td> <td>Legend</td> <td></td> <td>ITMAC AADE GROUND: nedium cobble of ed brick and cor re subangular. AADE GROUND: ravelly SILT with and is fine to co</td> <td>: Gree cont ncre : Firri h fra parse</td> <td>ey sandy roun tent with low te. Sand is fin m becoming s igments of rec e. Gravel is an End of Bore</td> <td>ription ded fine to coars boulder content le to coarse. Cob tiff greyish brow d brick, concrete igular fine to coa thole at 3.00m</td> <td>se GRAVEL v and fragm ibles and bo (n slightly sa , metal and irse.</td> <td>with hents of bulders andy I timber.</td> <td></td> <td></td> <td></td>	Detai Diam 14	Level mOD 2.99 2.75	Depth (m) 0.06 0.30	Legend		ITMAC AADE GROUND: nedium cobble of ed brick and cor re subangular. AADE GROUND: ravelly SILT with and is fine to co	: Gree cont ncre : Firri h fra parse	ey sandy roun tent with low te. Sand is fin m becoming s igments of rec e. Gravel is an End of Bore	ription ded fine to coars boulder content le to coarse. Cob tiff greyish brow d brick, concrete igular fine to coa thole at 3.00m	se GRAVEL v and fragm ibles and bo (n slightly sa , metal and irse.	with hents of bulders andy I timber.			
						Te Te	erminatic erminated	on Reaso due to cas	ח sing	g refusal at 2.50)m.				Last Up 12/06/	dated	A	- GS

2					Pro	ject No.	o. Project Name: 3FM Planning Design GI - Lot A DPC Lands				5	Borehol	le ID
	-{}) (CAUSEN			22-	1041A	Client:	Dublin P	Port Company (DPC)			BH10)3
	8-	GEOT	ECH				Client'	s Rep: RPS					
Met	hod ion Pit	Plant Used	Top (m)	Base (r	n) Coc	ordinates	Final De	epth: 4.00 m	Start Date: 05/01/20	23 Driller:	JFSC	Sheet 1	of 1
Dynamic S	Sampling	Dando Terrier	1.50	4.00	718	868.51 E						Scale: 1	1:50
					734	045.91 N	Elevatio	on: 3.52 mOD	End Date: 06/01/20	23 Logger:	RS	DRAF	-T
Depth (m)	Sample / Tests	Field Records		Casing Wat Depth Dep (m) (m	^{er} Level th mOD	Depth (m)	Legend		Description			Backfil	1
					3.45	- 0.07 - 0.30		BITMAC CONCRETE					
0.50	B1					-		MADE GROUND: Br cobble content and	rown gravelly silty fine to o I fragments of concrete. G	coarse SAND wit ravel is rounded	th low I fine to		• 0.5 —
0.50	ES2	PID = 0.70ppm				-		coarse. Cobbles are	e subrounded.				
1.00 1.00	B3 ES4					-							1.0 —
1.00 1.50	B5	PID = 0.20ppm			2 02	- - - 150							• –
1.50 1.50	D7 ES6				2.02	-		MADE GROUND: St medium cobble cor	tiff to very stiff brown sand intent and fragments of co	ly gravelly CLAY ncrete. Sand is f	with fine to		· · ·
1.50 - 1.95	SPT (S)	N=24 (3,3/3,4,6,11) Ha	ammer SN	1.20 0.0	0	-		coarse. Gravel is ro	unded fine to coarse.				2.0
1.50	FS9	PID = 2.20ppm				-							· · -
2.00 - 2.40	SPT (C)	N=48 (25 for 95mm/7, Hammer SN = 0696	7,15,19)	2.00 0.0	0	-							° 2.5 —
2.00	FS10	PID = 0.20ppm				-							•
3.00	D8				0.42	- 3.10		MADE GROUND: M	ledium dense brown slight	tly gravelly fine	to		•
3.00 - 3.45	SPT (S)	N=13 (13,8/4,4,3,2) Ha	ammer SN	2.00 0.0	0.02	- 3.50		MADE GROUND' Ei	rm grevish brown sandy g	n. ravelly CLAY wit	h		3.5
3.00	D14	PID = 0.10ppm				-		fragments of red br	rick and concrete. Sand is t	fine to coarse. G	Gravel is	••. [=]*.	• -
3.50	ES12				-0.48	4.00			End of Borehole at 4.0	0m			4.0
4.00	ES13		nmor SN -	2000		-							
4.00 - 4.45	3F1 (C)	0696	1111121 311 -	2.000.0		-							4.5 —
						-							5.0
						-							
						- -							5.5 —
						-							-
						-							6.0 -
						-							6.5 -
						- -							
						-							7.0
						-							-
													7.5 -
						-							- 8.0
						-							
						-							8.5
						-							-
						-							9.0 -
	Wate	r Strikes	Cas	ing Det	ails	Remarks							
Struck at (m)	Casing to (m) Time (min) Rose to (m) To (n 2.00	n) Dia)	ameter 140	Inspection p No groundw	oit machin vater enco	e excavated to 1.50m untered.					
						U							
					F	Terminatio	n Reaso	n		I	act la	dated 🖃	
						Terminated	due to bo	•• rehole collapse.			12/06/2	2023	69

	CAUSEWAY GEOTECH						ct No. 041A	 No. Project Name: 3FM Planning Design GI - Lot A DPC Lands Client: Dublin Port Company (DPC) Client's Rep: RPS 						Borehole ID BH105	
		GLOT	LCII					Client's	Rep: RPS						
Meth Inspecti	10d ion Pit	Plant Used 3t Excavator	Top (m) 0.00	Base	(m) 20	Coord	linates	Final De	pth: 2.5	0 m Start Date	e: 20/01/2023	Driller: J	IFSC	Sheet Scale	1 of 1 • 1•50
Dynamic S	Sampling	Dando Terrier	1.20	2.5	<i>;</i> 0	71897 73397	'5.72 E '9.48 N	Elevatio	n: 3.55 r	mOD End Date:	20/01/2023	Logger: F	RS	DR	4FT
Depth (m)	Sample / Tests	Field Records	<u>.</u> ;	Casing Depth (m)	Water Depth	Level mOD	Depth (m)	Legend		D	escription			Back	cfill
Depth (m) 0.50 0.50 1.00 1.20 1.20 - 1.65 1.50 1.50 1.85 1.85 - 2.30 2.00 2.50 - 2.90 2.50 2.50	Sample / Tests B2 ES1 B4 ES3 D5 SPT (S) ES7 D6 SPT (S) ES8 ES9 SPT (C)	Field Records PID = 6.60ppm PID = 7.90ppm N=32 (5,8/8,8,8,8) Har 0696 PID = 0.00ppm 23 (11,8/23 for 297mr Hammer SN = 0696 PID = 37.10ppm 50 (15,9/50 for 245mr Hammer SN = 0696 PID = 0.00ppm	nmer SN = n) n) n)	Casing Dopth (m) 1.20 1.20 1.20 1.20 1.20	Water (m) D.000 0.000 0.000 0.000	Level mop 3.45 3.20 1.05	Depth (m) 0.10 0.35 2.50 - - <td></td> <td>BITMAC CONCRETE MADE GROUN SILT. Sand is fu</td> <td>Di Very stiff browne to coarse. Grav</td> <td>rnish yellow slightl rnish yellow slightl el is rounded fine</td> <td>ly sandy grav</td> <td>relly</td> <td></td> <td></td>		BITMAC CONCRETE MADE GROUN SILT. Sand is fu	Di Very stiff browne to coarse. Grav	rnish yellow slightl rnish yellow slightl el is rounded fine	ly sandy grav	relly		
			<u>n)</u> 10 (n			N N	o groundw	/ater encou	excavated to 1.	20m.					
	1					Te Te	erminated	on Reasor	n Npler refusal.				Last Upda	ited	

CAUSEWAY GEOTECH						Project No. 22-1041A		Project Client:	Name: 3FM Pla Dublin P	nning Design Port Company	GI - Lot A D (DPC)	PC Lands	Borehole ID BH110		ID)
		GEOT	ECH					Client's	Rep: RPS						
Metho	od n Pit	Plant Used	Top (m)	Base (m) (Coord	linates	Final De	pth: 4.00 m	Start Date: 0	08/02/2023	Driller: JC	S	heet 1 of	1
Dynamic Sa	mpling	Dando Terrier	1.50	4.00	5 7	1922	24.54 E							scale: 1:5	50
					7	3370	08.03 N	Elevatio	n: 4.18 mOD	End Date: 0	08/02/2023	Logger: RS		DRAFT	-
Depth (m)	Sample / Tests	Field Records		Casing W Depth D (m)	/ater L epth (m) N	evel nOD	Depth (m)	Legend		Descrip	ption		Water	Backfill	
2.00 - 2.45 2.50 3.00 3.00 - 3.45 3.50 4.00 4.00 - 4.45 4.00	SPT (C) ES2 ES3 ES4 SPT (C)	N=6 (1,1/1,1,1,3) Ham 1367 N=3 (1,0/1,0,1,1) Ham 1367 PID = 5.50ppm r Strikes	mer SN = mer SN = mer SN = <u>n To (r</u> 2.00	2.00 C 2.00 C 2.00 C 2.00 C	2 Ory Ory Ory Ory 0 Ory 0 0 0 0 0 0 0 0 0 0 0 0 0		1.50 - 4.00	bit machine oit carried o	MADE GROUND: Da coarse GRAVEL. San MADE GROUND: Lo coarse SAND with n red brick, concrete, medium. (Contami edium. (Contami e excavated to 1.20m. but in ST102.	erk brownish grey nd is fine to coars	ish black slight ontent, rootlet c. Gravel is ang red)	y clayey fine to s and fragments o ular fine to			
				Te	erminatio	due to bor	• ehole collapse from 4	4.00m to 3.50m.		Last 12/	opdate 06/2023		LL GS		

						Proje	ct No.	Project	: Name: 3FM P	lanning Design GI - Lot A [PC Lands	Be	orehole	e ID
	X) C	AUSEW	/AY			22-1	041A	Client:	Dublir	Port Company (DPC)			BH11	2
	7/ -	GEOT	ECH					Client's	Ren: RPS					
Meth	nod	Plant Used	Top (m)	Base	(m)	Coord	linates					5	heet 1 c	of 1
Inspecti	ion Pit	3t Excavator	0.00	1.2	20			Final De	epth: 4.00	m Start Date: 07/02/2023	Driller: JC		icale: 1	:50
Dynamic S	Sampling	Dando Terrier	1.20	4.0	00	71929	95.60 E	F 1		D End Date: 07/02/2022	Lanary DC	+		т
						/3355	54.60 N	Elevatio	n: 4.23 mC	End Date: 07/02/2023	Logger: RS		DRAF	
Depth (m)	Sample / Tests	Field Records	i	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Description		Water	Backfill	
						4.08	0.15		TOPSOIL MADE GROUND:	Brown very sandy silty subround	led fine to coarse	-		
0.50	B2						-		GRAVEL with low	cobble content, frequent brick	ragments,			
0.50	ES1						-		coarse. Cobbles	are angular.	e. Sand is line to			-
0.50	83	PID = 5.00ppm				3.33	0.90		MADE GROUND:	Firm brown slightly sandy grave	ly CLAY with low	-		-
1.00	B6						-		cobble content,	occasional brick fragments and o	ccasional concrete			-
1.00 1.00	ES4	PID = 0.20ppm					-		Cobbles are sub	is fine to coarse. Gravel is suban angular.	gular fine to coarse.			
1.50	ES5													
1.50		PID = 0.40ppm					-							
2.00 2.00 - 2.45	ES8 D1					2.23	- 2.00		MADE GROUND:	Loose dark greyish black very sa	ndy silty angular	1		2.0
2.00 - 4.00	B7	N-8 (1 1/2 2 2 2) Ham	mor SN -	0.00	Dry		-		concrete, glass a	nd rootlets. Gravel is angular fine	to medium.			
2.00 - 2.45	551 (5)	1467	11101 514 -	0.00			-		(Contamination	encountered).				2.5 -
2.00 2.50	FS3	PID = 0.30ppm												
3.00	ES4						-							3.0
3.00 - 3.45 3.00 - 4.00	D2 B7						-							
3.00 - 3.45	SPT (S)	N=6 (1,1/1,2,2,1) Ham	mer SN =	0.00	Dry		-							3.5 _
3.50	ES5	1407					-							_
4.00	ES6					0.23	4.00			End of Borehole at 4.00m				4.0
4.00 - 4.45	SPT (C)	N=3 (1,0/0,0,1,2) Ham 1467	mer SN =	0.00	4.00		-							-
														4.5
							-							-
							-							5.0 -
							-							5.5 —
							-							
							-							6.0
														-
							-							6.5 -
							-							
							-							7.0
							-							-
							-							7.5
							-							-
							-							80-
							-							-
							-							-
														8.3 <u>-</u>
							-							-
							-							9.0
	Wate	r Strikes	Ca	sing D	etail	s R	emarks					<u> </u>		
Struck at (m) 4.00	Casing to (m 0.00) Time (min) Rose to (m) To (r	n)	Diam	eter In	spection p	it machine	e excavated to 1.20	m.				
4.00	0.00													
						Ļ		n Dec -:			1 + * *		a 1	
						l fe	erminatio	m Reason			Last U	Juate	"	Ц
						Te	erminated	due to bor	ehole collapse.		12/06	/2023		5

			Proje	ect No.	Project	Name:			Tria	al Pit ID
	CALIS	ΕΨΑΥ	22-1	1041A	3FM PI	anning Design GI - Lot A DPC Lands				
		FOTECH	Coor	dinates	Client:				B	H116
	0		71040	02 70 E	Dublin	Port Company (DPC)				
Method:			71340	03.79 E	Client's	Representative:			She	et 1 of 1
Inspection Pit			/5563	51.04 1	RPS				Sca	le: 1:25
Plant:			Elev	vation	Date:		Logger:			
3T Excavator			4.73	8 mOD	08/11/	2022	RS		0	NAFI
Depth	Sample /	Field Records	Level	Depth	Legend	Description			Vater	
(11)	lesis			- (11)		MADE GROUND: Grey sandy very silty subangular fine	e to coarse G	GRAVEL.	-	
			4.63	0.10		Sand is fine to coarse.		od fino		-
				• •		to coarse GRAVEL with high cobble content and cobble	le sized fragr	nents		_
				-		of red brick, shale and plastic. Sand is fine to coarse. (Cobbles are			_
0.50	ES1			-						0.5
										-
			4.08	- 0.65		MADE GROUND: Soft dark greyish black slightly sand	y gravelly CL/	AY with		-
				-		coarse. Cobbles are subrounded.	Jbrounded T	ine to		-
				-						-
1.00	B3			-						1.0
										_
				-						_
				-						_
1.50	ES2			-						1.5
			3.13	1.60		End of trial pit at 1.60m				-
				-						-
				ar ar						-
										-
				-						2.0
				-						_
										-
				-						_
				-						2.5 —
				-						-
				-						-
				-						_
				-						3.0
										_
				-						-
				-						-
				-						-
				-						3.5 —
				-						_
				-						_
				a.						_
				-						4.0
				-						-
										-
										-
				-						-
				-						4.5
										_
				-						_
										-
									+	
Water	Strikes	Depth: 1.60	Rem	arks:						
Struck at (m)	Remarks	Width.	Insp	ection pit	machine	excavated to 1.60m.				
		length:	I NO B	siouriuwat	er encou	intered.				
				• .•						
		Stability:	Tern	nination R	eason			Last Upd	ated	
			Locat	tion termina	ated by Cli	ent.		12/06/2	023	AGS

			Proje	ect No.	Project	Name:			Tria	al Pit ID
		EWAY	22-2	1041A	3FM Pl	anning Design GI - Lot A DPC Lands				
		FOTECH	Coor	dinates	Client:				В	H117
	0	LOTLETT	7104		Dublin	Port Company (DPC)				
Method:			71940	04.00 E	Client's	s Representative:			She	et 1 of 1
Inspection Pit			/338	53.97 N	RPS				Sca	le: 1:25
Plant:			Elev	vation	Date:		Logger:			
3T Excavator			4.35	5 mOD	08/11/	2022	RS		D	KAFI
Depth (m)	Sample /	Field Records	Level	Depth	Legend	Description			Vater	
(m)	lests		(mod)	(m) -		MADE GROUND: Grey sandy very silty subangular fine	e to coarse	GRAVEL.	<u>></u>	
			4.25	0.10		Sand is fine to coarse.	iltu fino to r			-
				-		SAND with low cobble content. Gravel is subrounded	fine to coar	rse.		_
				-		Cobbles are subrounded.				_
0.50	ES1			-						0.5
				-						_
				-						-
				-						-
				-						-
1.00	B3		3.35	- 1.00		Very soft grey slightly sandy slightly gravelly CLAY. Sar	d is fine to	coarse.		1.0
				-		Gravel is subangular fine to coarse.				_
				-						_
				-						_
1.50	ES2			-						1.5 —
			2.75	- 1.60		End of trial pit at 1.60m				-
				-						-
				-						-
				-						-
				-						2.0
				-						_
				-						_
				-						-
				-						2.5
				-						-
				-						-
				-						-
				-						3.0
				-						5.0
				-						_
				-						-
				_						-
				-						3.5 —
				-						-
				-						_
				-						_
				-						4.0
				-						-
				-						-
				-						-
				-						-
										4.5
				-						_
				-						_
				- -						-
				-					+	
Water	Strikes	Denth: 1.00	Rem	harks:						
Struck at (m)	Remarks		Insp	ection pit	machine	excavated to 1.60m.				
		vviutn:	Four	r attempts	made to	advance borehole.				
		Length:								
		Stability:	Tern	nination R	eason			Last Upd	ated	
			Term	ninated on r	efusal.			12/06/2	023	AGS

View Part large Calculate Point Series Dublin Point Company (DPC) BH119 Interference The all black Point View Open 1000 3.00 7.00 Series 1.00 Series Series 1.00 Series 1.00 Series 1.00 Series Series Serie						Proj	ect No.	Project N	Name: 3FM Plai	nning Design GI - L	ot A DPC Lands	;	Borehol	e ID
New Control Clerc's fig:: P3: Clerc's fig:: P3:		() (CAUSEW	/AY		22-:	1041A	Client:	Dublin P	ort Company (DPC))		BH11	.9
Meter Provide Provide Provide Description Source		9 –	GEOT	ECH				Client's F	Rep: RPS					
Image Participant Site Cardie Out 1.00 1.	Meth	od	Plant Used	Top (m)	Base (r	n) Cooi	dinates	- Final Dam	4b. 2 E0 m	Start Data: 21/11/			Sheet 1	of 1
Number Number Number Number Number Add model Part Model Number Number <thn< td=""><td>Trial Pit Cable Perc</td><td>tting cussion</td><td>3T Excavator Dando 3000</td><td>0.00</td><td>1.50 3.50</td><td>7197</td><td>'35.30 E</td><td>Final Dep</td><td>tn: 3.50 m</td><td>Start Date: 21/11/</td><td>2022 Driller:</td><td></td><td>Scale: 1</td><td>:40</td></thn<>	Trial Pit Cable Perc	tting cussion	3T Excavator Dando 3000	0.00	1.50 3.50	7197	'35.30 E	Final Dep	tn: 3.50 m	Start Date: 21/11/	2022 Driller:		Scale: 1	:40
Image: Process of the second						7334	21.29 N	Elevation	: 4.86 mOD	End Date: 24/11/2	2022 Logger:	RS	DRAF	T
IP No. No. IP IP No. Mode Mode <th>Depth</th> <th>Sample /</th> <th>Field Records</th> <th></th> <th>Casing Wat Depth Dep</th> <th>^{er} Level</th> <th>Depth</th> <th>Legend</th> <th>1</th> <th>Description</th> <th></th> <th></th> <th>a Backfill</th> <th></th>	Depth	Sample /	Field Records		Casing Wat Depth Dep	^{er} Level	Depth	Legend	1	Description			a Backfill	
Solutione at 0.2500 A14 0.28 Control	(m)	Tests			(m) (m) mOD	(m)		MADE GROUND: Gr	ey sandy very silty very	angular fine to co	arse	3	
action iss. PD = 0.20pm Action action <td></td> <td></td> <td>Fast inflow at 0.25m</td> <td></td> <td></td> <td>4.71 4.61</td> <td>0.15</td> <td></td> <td>GRAVEL. Sand is fin MADE GROUND: Li</td> <td>e to coarse. ght grey sandy very silt</td> <td>y angular fine to co</td> <td>Darse</td> <td></td> <td>-</td>			Fast inflow at 0.25m			4.71 4.61	0.15		GRAVEL. Sand is fin MADE GROUND: Li	e to coarse. ght grey sandy very silt	y angular fine to co	Darse		-
0.40 P0 = 0.20pm H0 = 0.20pm A.31 1.05 SALE GOLUNG. Gev Jugethy Landy Lan	0.50	ES1				4.36	- 0.50		GRAVEL with low co angular.	obble content. Sand is fi	ine to coarse. Cobb	oles are		- 0.5 —
100 102 100 102 100 <td>0.50</td> <td></td> <td>PID = 0.20ppm</td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td>MADE GROUND: Gr</td> <td>ey slightly sandy slightl high cobble content. S</td> <td>y silty very angula and is fine to coar</td> <td>r fine to se.</td> <td></td> <td>-</td>	0.50		PID = 0.20ppm				-		MADE GROUND: Gr	ey slightly sandy slightl high cobble content. S	y silty very angula and is fine to coar	r fine to se.		-
100 852 PID = 0.30pm 3.81 1.55 MD ECROUND. Strift get splittly and yet greet splittly and yet gree	1.00	B3					-		Cobbles are very an Terram at 0.35m	gular.		Jei		-
Low of Output Image: Control Collogen	1.00	ES2	PID = 0.30 ppm			3.81	1.05		MADE GROUND: Sti cobble content. San	iff grey slightly sandy ve id is fine to coarse. Grav	ery gravelly SILT wi vel is subangular fi	th low ne to		
1.00 D2 D3 D4 <	1.00		- 0.30ppiii				-		coarse. Cobbles are	subangular.	e sandy gravelly cla			-
130 - 28 86 (1) 1, 22, 23, 33 Hammer SN = 1.50 (207) D	1.50 1.50	D9 ES4				3.36	- 1.50 -		MADE GROUND: Fir	m to stiff grey slightly g	gravelly sandy CLA	Y with		1.5 —
Number State Number State<	1.50 - 2.50 1.50 - 1.95	B8 SPT (S)	N=11 (1.2/2.3.3.3) Hai	nmer SN =	1.50 Dr	v	-	s s	subangular to subro	ounded fine to medium	is fine to coarse. G	iravel is		_
200 55 De 1.20 pm 1 <	1 50		0197			´	_							2.0
230 Imp I	2.00	ES5					_							
250 2	2.00	D10	PID = 1.20ppm				-							2.5 —
250 250 250 250 100 250 100 1	2.50	ES6					-							-
2-50 0 0.00 <t< td=""><td>2.50 - 2.95</td><td>SPT (S)</td><td>N=16 (2,3/3,4,4,5) Hai</td><td>nmer SN =</td><td>2.50 Dr</td><td>У</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td></t<>	2.50 - 2.95	SPT (S)	N=16 (2,3/3,4,4,5) Hai	nmer SN =	2.50 Dr	У	-							-
3.00 E7 PLD = 0.30ppm Image: Simple Si	2.50		PID = 1.40ppm				-							3.0
3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 1.36 3.50 3.50 1.36 3.50 1.36 3.50 1.36 3.50 1.36 3.50 1.36 3.50 1.36 3.50 1.36 3.50 1.36 1.36 3.50 1.36 1.36 3.50 1.36	3.00 3.00	ES7	PID = 0.30ppm				-							-
3.0 3.0 9 (1) (1) (1) (2) (2) (3) (1) (1) (10) (10) (10) (10) (10) (10)	3.50	D12		mmor CN -		1.36	- 3.50			End of Borehole at 3	.50m			3.5 _
3.50 PID = 0.50pm I	5.50 - 5.95	3PT (3)	0197		5.50 D	y	-							-
Struck at (m) [2sing to (m)] Yater Struck at (m) [2sing to (m)] Yater Strikes Chiselling Details Remarks Struck at (m) [2sing to (m)] Time (min) Resc Important (min) Important (min) Struck at (m) [2sing to (m)] Yater Strikes Chiselling Details Remarks Struck at (m) [2sing to (m)] Yater Strikes Important (min) [2more (min)] Important (min) [2more (min)] Struck at (m) [2sing to (m)] Yater Strikes Chiselling Details Remarks Struck at (m) [2sing to (m)] Time (min) [2more (min)] Time (min) Important (min) Outs Diameter From (m) To (m) Time (min) To (m) To (m) Time (min) Important (min) Important (min) To (m) To (m) To (m) Time (min) Important (min) Important (min) Struck at (m) [2sing to (m)] Time (min) Time (min) Important (min) Important (min) Struck at (m) [2sing to (m)] Time (min) Time (min) Important (min) Important (min) Struck at (m) [2sing to (m)] Time (min) Time (min) Time (min) Timportant (min) Stru	3.50		PID = 0.50ppm				-							4.0
Water Strikes Chielling Details Remarks Seruck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Seruck at (m) Casing to (m) From (m) To (m) Time (berm) Seruck at (m) Casing to (m) From (m) To (m) Time (berm) Solution From (m) To (m) Time (berm) Solution Time (berm) To (m) Time (berm) Solution To (m) Time (berm) Time (berm) Solution To (m) Time (berm) Time (berm) To (m) To (m) Time (berm) Time (berm) Solution To (m) Time (berm) Time (berm) Solution To (m) Time (berm) Time (berm) Solution Time (berm) Time (berm) Time (berm) To (m) Time (berm) Time (berm) Time (berm) To (m) Time (berm) Time (berm) <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td>							-							-
Image: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Image: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Image: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Image: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Image: Struck at (m) Casing to (m) From (m) To (m) Image: Struck at (m) Casing to (m) From (m) To (m) Image: Struck at (m) Casing to (m) From (m) To (m) Image: Struck at (m) Casing to (m) From (m) To (m) Image: Struck at (m) Casing to (m) From (m) To (m) Image: Struck at (m) Casing to (m) From (m) To (m) Image: Struck at (m) Casing to (m) From (m) To (m) Image: Struck at (m) From (m) To (m) To (m) Image: Struck at (m) From (m) To (m) From (m)							-							-
Water Strikes Chiselling Details Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Tom (m) Time (min) Rose to (m) From (m) Time (Munn) Remarks Casing Details Remarks Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Time (Munn) Time (Munn) Time (Munn) Remarks 0.25 Vater Added Time (Munn) Time (Munn) Time (Munn) Time (Munn) 0.25 Vater Added Time (Munn) Time (Munn) Time (Munn) Time (Munn) 0.25 Vater Added Time (Munn) Time (Munn) Time (Munn) 0.25 Vater Added Time (Munn) Time (Munn) 0.26 Vater Added Time (Munn) Time (Munn) 0.200 Time (Munn) Time (Munn) Time (Munn)							-							-
Water Strikes Chiseling Details Remarks Struck at (m] Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) To (m) Time (min) Rose to (m) From (m) To (m) Time (min) Rose to (m) Time (min) Rose to (m) From (m) To (m) 0.25 Vater Added From (m) To (m) To (m) Time (min) Rose to (m) Time (min)							-							-
Water Strikes Chiseling Details Remarks Strukt at (m) (asing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Time (hhum) To (m) Time (min) Rose to (m) From (m) To (m) Time (hhum) Remarks Casing Details Water Added Image: Strukt at (m) Casing to (m) Time (min) To (m) To (m) Time (hhum) Image: Strukt at (m) Casing to (m) Time (hhum) Image: Strukt at (m) Casing to (m) Time (hhum) 0.25 Vater Added Image: Strukt at (m) To (m) Time (hhum) Image: Strukt at (m) Time (hhum) Image: Strukt at (m) Time (hhum) 3.50 200 Image: Strukt at (m) Time (hhum) Termination Reason Last Updated Termination Reason Last Updated Termination Reason Last Updated							-							5.0 -
Image: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (-							-
Vater Strikes Chiselling Details Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Time (htmm) 0.25 Vater Added Image: Struck at (m) To (m) Time (htmm) 3.50 200 Image: Struck at (m) To (m) Termination Reason Last Updated 1/06/2003 Termination Reason Last Updated 11/06/2003 Image: Struck at (m) Terminated on refusal							-							5.5 —
Image: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) To (m) To (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Casing to (m) Image: Struck at (m) Casing to (m) From (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Casing to (m) Image: Struck at (m) To (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Image: Struck at (m) Image: Struck at (m) To (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Image: Struck at (m) To (m) To (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Image: Struck at (m) To (m) To (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Image: Struck at (m) To (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Image: Struck at (m) Image: Struck at (m) To (m) The thirmse (hind) is performed to 1.50m. Image: Struck at (m) Image: Struck at (m)							-							_
Vater Strikes Chiselling Details Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Time (hhrman) 0.25 Image: Chiselling Details Remarks To (m) Diameter From (m) To (m) 3.50 200 Image: Chiselling Details Termination Reason Terminated on refusal 12/06/2023 Image: Chiselling Details Terminated on refusal							_							60-
Image: Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Time (httm) Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Time (httm) Remarks Casing Details Water > Added Name (httm) Remarks 0.25 Mater > Added To (m) To (m) Time (httm) 0.25 Mater > Added From (m) To (m) To (m) Time (httm) 3.50 200 To (m) To (m) Termination Reason Last Updated Terminated on refusal 12/06/2023 Remarks Terminated on refusal 12/06/2023							-							-
Image: Strike							-							-
Water Strikes Chiselling Details Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Time (hh:mo) Inspection pit machine excavated to 1.50m. 0.25 Image: Chiselling Details Remarks Casing Details Water Added To (m) Diameter From (m) To (m) 3.50 200 Last Updated Terminated on refusal Terminated on refusal 12/06/2023							-							6.5 —
Water Strikes Chiselling Details Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Time (hh:m) Inspection pit machine excavated to 1.50m. 0.25 Vater Added To (m) Diameter From (m) To (m) 3.50 200 Image: Casing to (m) To (m) Termination Reason Last Updated Terminated on refusal 12/06/2023							-							-
Water Strikes Chiselling Details Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) To (m) Time (h:mm) Inspection pit machine excavated to 1.50m. 0.25 Image: Casing Details Mater Added To (m) Diameter From (m) To (m) 3.50 200 Image: Casing Details Image: Casing Details Image: Casing Details Water Added Image: Casing Details Image: Casing Details To (m) Diameter From (m) To (m) Image: Casing Details Image: Casing Details 3.50 200 Image: Casing Details Image: Casing Details Image: Casing Details Image: Casing Details To (m) Diameter From (m) To (m) Image: Casing Details Image: Casing Details Image: Casing Details 3.50 200 Image: Casing Details 12/06/2023 Image: Casing Details							_							7.0
Water Water Added To (m) Diameter From (m) To (m) To (m) Time (hh:mm) 0.25 Water Vater Vater Vater Casing Details Water Added Vater Vater To (m) Diameter From (m) To (m) 3.50 200 Vater Image: Name of the second concentration on refusal							-							-
Water Strikes Chiselling Details Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Time (hh:mn) Ime (hh:mn) 0.25														
0.25 Water Added Casing Details Water Added To (m) Diameter From (m) To (m) 3.50 200 Termination Reason Last Updated 12/06/2023 Terminated on refusal	Struck at (m) C	Water Casing to (m	n) Time (min) Rose to (m) From	(m) T	o (m) Ti	IS me (hh:mm)	Remarks	oit machine excavate	ed to 1.50m.				
Casing Details Water Added To (m) Diameter S.50 200 Image: Second Details Image: Second Details To (m) Diameter S.50 200 Image: Second Details Image: Second Details Image: Second Deta	0.25													
Casing Details Water Added To (m) Diameter From (m) To (m) 3.50 200 Termination Reason Last Updated 12/06/2023														
Ceasing Declaris Water Added To (m) Diameter From (m) To (m) 3.50 200 Last Updated Terminated on refusal 12/06/2023	Casina D)otaila	Matar Addad	_										
3.50 200 Termination Reason Last Updated 12/06/2023	To (m)	Diameter	From (m) To (m)											
Terminated on refusal 12/06/2023	3.50	200					-	Terminatio	on Reason			Last Lind	ated 💻	
								Terminated	on refusal.			12/06/2	023	60

	C	AUS	EW	AY		Proje 22-1	ect No.	Project Nam Client:	e: 3FM Plai Dublin P	nning Desig ort Compar	n GI - Lot A D y (DPC)	PC Lands		Boreho BH1	ole ID 120
	/ -	——G	EOTE	СН				Client's Rep:	RPS						
Metho Cable Percu Rotary Co	od ussion oring	Plant U Dando 3 Beretta	sed 3000 T44	Top (m) 0.00 29.00	Base (m 29.00 40.50) Coor 7198	dinates 06.19 E	Final Depth:	40.50 m	Start Date:	21/11/2022	Driller: GT	T+CC	Sheet Scale:	1 of 5 : 1:50
						7333	35.91 N	Elevation:	5.13 mOD	End Date:	22/11/2022	Logger: DN	M+RS	DRA	4FT
Depth (m)	Sample / Tests	Fiel	ld Records		Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend		Dese	cription			Back	.fill
Depth (m) 0.00 - 0.50 0.50 - 1.50 0.50 - 1.50 0.50 1.00 1.20 1.20 - 1.65 1.50 2.00 2.00 - 2.45 2.00 2.00 - 3.00 2.00 - 2.45 2.00 2.50 2.50 3.00 3.00 3.00 - 3.45 3.00 3.50 3.50 - 4.50 3.50 4.00 4.00 4.00 4.00 4.00 4.50 5.00 5.0	Sample / Tests B15 ES1 B16 ES2 D17 SPT (C) ES3 D18 ES4 B19 SPT (C) ES5 D20 ES6 SPT (C) ES7 B21 D22 ES8 SPT (C) ES8 SPT (C) ES8	Fiel PID = 0.20ppr PID = 0.30ppr N=26 (3,4/6,7 0197 PID = 0.10ppr PID = 0.40ppr N=22 (3,4/5,5 0197 PID = 0.20ppr PID = 0.30ppr PID = 0.20ppr PID = 0.20ppr	n n 7,7,6) Hami n n 5,6,6) Hami n n 8,3,4) Hami n n	mer SN = mer SN = mer SN =	Casing Meter Propint Pr	Level mOD 4.63	0.50 0.50 3.50	Legend MAD coars MAD low c Sand MAD subar fine t	E GROUND: Gr e GRAVEL. San E GROUND: Fii obble content is fine to coars	Desi rey slightly sam d is fine to co rm to stiff grey and fragment se. Gravel is su pose to mediur coarse GRAVEI bles are subrou	ription Idy slightly silty a arse. / slightly sandy g s of plastic, conc ibangular fine to ibangular fine to m dense grey ver . with low cobble unded.	ravelly CLAY wi crete and red b coarse.	ith rrick.	Back	fil
5.00 - 6.00 5.00 - 5.45 5.50 6.00 6.00 6.50 6.50 6.50 - 7.50 6.50 - 6.95 6.50 7.50 8.00 - 8.45 8.50 - 9.50 Struck at (m) Ca 5.00 Casing De To (m) Di 13.50	B23 SPT (C) ES11 ES12 D25 ES13 B26 SPT (C) B27 C) B27 Water sing to (m 5.00 etails iam (mm 250	N=8 (2,2/2,1, 0197 PID = 0.70ppr PID = 0.20ppr PID = 0.10ppr PID = 0.10ppr PID = 0.10ppr N=13 (2,2/3,3 0197 Strikes Time (min) 20 Water J From (m) 5.00	2,3) Hamm n n n 3,3,3) Hamm n 8,3,4) Hamm <u>Rose to (m</u> 4.30 Added <u>To (m)</u> 29.00	mer SN = mer SN = mer SN =	5.00 4.30 6.50 3.10 8.00 5.30 Chisellin m) To	-1.37 -2.87	6.50 8.00 s	Medi GRAV Medi Sand Sand Sand	um dense grey 'EL. Sand is fin um dense bec is fine to coars	y sandy slightly e to coarse.	y silty subrounde	unded fine GR	Se AVEL.		
29.00	200			Core	Barrel	Flush	Type ater	Termination Re	eason	1.		L	ast Upda 12/06/20	1 ted	AGS

	1						Proje	ect No.	Project I	Name: 3	FM Plai	nning Desig	gn GI - Lot A D	PC Lands		Bore	hole	e ID
		CAUSE	W	AY			22-1	.041A	Client:	D	ublin P	ort Compai	ny (DPC)			Bŀ	112	0
	/ -	GEC	DTE	СН					Client's	Rep: R	PS							
Metho	d	Plant Used	-	Top (m)	Base	e (m)	Coord	dinates	- Final Dan	+h , <i>A</i> (0 E0 m	Start Data	21/11/2022	Drillor	CTLCC	Shee	et 2 o	of 5
Cable Percu Rotary Co	ussion pring	Dando 300 Beretta T44) 	0.00 29.00	29 40	.00 .50	71980	06.19 E		un: 40	J.50 m	Start Date:	21/11/2022	Driller:	GI+CC	Scal	e: 1:	50
,	U						73338	35.91 N	Elevation	: 5.1	3 mOD	End Date:	22/11/2022	Logger:	DM+RS	DF	RAF	Т
Depth	Sample /	Field Re	cords		Casing	Water	Level	Depth	Legend	I	I	Des	crintion			ia Ba	ckfill	
(m)	Tests				(m)	(m)	mOD	(m)	Legenu							<u>×</u>	tkiii ⊢!: •̀	,
9.50 9.50 - 9.95	D28 SPT (C)	N=28 (3,4/5,7,7,9) Hamr	ner SN =	9.50	3.10												9.5 -
10.00	C1	0197						Ē										*10.0
10.00 - 11.00	B29							Ē								•		-
																•		10.5
								Ē								•		
11.00	D30	N 25 (2 2 / 4 C 7 0			11.0	5 60		Ē								•		11.0
11.00 - 11.45	SPT (C)	0197) Hamr	ner SN =	11.0	5.60		Ē										1 =
11.50 - 12.50	B31							Ē										11.5 -
								Ē								°		-
																•		12.0 -
12.50	D32							Ē								•		12.5 -
12.50 - 12.95	SPT (C)	N=29 (3,4/5,7,8,9) Hamr	ner SN =	12.5	7.30		Ē										_
13.00 - 14.00	B33	0197						E.										13.0
								Ē										-
								Ē								•		13.5
								Ē								•		
14.00 14.00 - 14.45	D34 SPT (C)	N=31 (4.5/9.6.7.9) Hamr	ner SN =	14.0	1.60		Ē								•		, 14.0 -
	0 (0)	0197	,			1.00		Ē								•		
								Ē										, 14.5
15.00 - 16.00	B35							Ē										*15.0 -
10.00 10.00	200							Ē								°		-
15.50	D36							E .								•		15.5 -
15.50 - 15.95	SPT (C)	N=29 (4,6/6,7,8,8 0197) Hamr	ner SN =	15.5	3.90										•		
								-										16.0 -
								Ē										=
16.50 - 17.30	B37							Ē										16.5 -
47.00								Ê										
17.00 17.00 - 17.45	D38 SPT (C)	N=12 (3,4/3,3,3,3) Hamr	ner SN =	17.0	5.70										•		17.0 -
17.30 - 19.00	B39	0197					-12.17	17.30		Medium de	ense grey	y silty fine to c	oarse SAND.			•		17.5 -
								Ê	$\times \times $							•••		
								Ē	$\left(\begin{array}{c} \times & \times \\ \times & \times \end{array} \right)$									18.0
								Ē	× × ×							• • •		-
18.50 - 18.95	SPT (C)	N=14 (2,2/3,3,4,4) Hamr	ner SN =	18.5	8.90		Ē	× × ×							• • •		18.5 -
	Wate	r Strikes			Chis	sellin	g Details	5	Remarks									<u> </u>
Struck at (m) Ca 5.00	sing to (m 5.00) Time (min) Rose	e to (m 1.30) From (m)	To	m) Tim	ie (hh:mm)	Inspection p	pit hand du	g to 1.20)m.						
	2.00																	
Casing De	etails	Water Add	ed	-														
To (m) Di 13.50	am (mm 250) From (m) To	o (m) 9.00															
29.00	200			Core	Bar	rel	Flush	Туре	Terminatio	on Reasor	1				Last Up	dated		
				S	K6L		Wa	ter	Terminated	at schedule	ed depth	l.			12/06/2	2023	A	GS

	¢	CAUS	EW	AY		Pro 22	oject No. -1041A	Project Client:	t Name:	3FM Pla Dublin P	nning Desig Port Compar	n GI - Lot A D אין (DPC)	PC Lands		Borehole ID BH120	
		G		СП				Client'	s Rep:	RPS						
Cable Percu	d Ission	Plant U	Jsed	Top (m)	Base (1	n) Co	ordinates	Final De	epth:	40.50 m	Start Date:	21/11/2022	Driller:	GT+CC	Sheet 3 of 5	
Rotary Co	ring	Beretta	T44	29.00	40.50	,) 719	}806.19 E								Scale: 1:50	
						733	385.91 N	Elevatio	on:	5.13 mOD	End Date:	22/11/2022	Logger: [DM+RS	DRAFT	
Depth (m)	Sample / Tests	Fie	ld Records		Casing Wa Depth De (m) (r	ter Leve	l Depth	Legend		1	Des	cription			Backfill	
20.00 20.00 - 20.45	C2 SPT (C)	N=13 (2,3/3,3	3,3,4) Hami	mer SN =	20.0 20	.6 -14.9	7 20.10		Eirm gre	v siltv CLAY	(.				* • <u>-</u> • • 20.0 ·	_
20 10 - 21 00	B40	0197	-,-, , -			-		×		y sity chai						
21.50 - 21.95 22.00 22.00 - 23.00	U41 D42 B43	Ublow=30 10	00% Recove	ry	21.5 8.	00									20.5 21.0 21.5 22.0	
23.00 23.00 - 23.45 23.50 - 24.50	D44 SPT (S) B45	N=13 (2,3/3,3 0197	3,3,4) Hami	mer SN =	23.0 11	.2									23.0 · 23.5 24.0 ·	
24.50 - 24.95 25.00 25.00 - 26.00	U46 D47 B48	Ublow=31 10	00% Recove	ry	24.5 14	.6									24.5 25.0 ·	
26.00 - 26.45	SPT (S)	N=15 (2,3/4,3 0197	3,4,4) Hami	mer SN =	26.0 21	.0									25.5 26.0 26.5	
27.00 - 28.00 27.50 - 27.95	B49 U50	Ublow=33 10	00% Recove	ry	27.5 4.	50									27.0 - 27.5	1
									2							
├───	Water	r Strikes			Chisel	ing Deta	ails	Remarks	<u> </u>							_
Struck at (m) Cas 5.00 Casing De To (m) Di	sing to (m 5.00 etails am (mm	Viring Viring<	Rose to (m 4.30 Added To (m) 20.00) From ((m)	ing Det a	IIIS Time (hh:mm)	Inspection	s n pit hand	dug to 1.20	Dm.					
29.00	250 200	5.00	29.00	Core	Barrel	Flu	sh Type	Termina	tion Reas	on			T	Last Upd	ated 📕 🔳	
				9	K6L	,	Water	Terminate	ed at sched	duled depth	۱.			12/06/2	O23 AGS	3

	v		Y			Proje	ect No.	Project	t Nam	e: 3FM Pla	inning Desi	gn GI - Lot A D	PC Lands		Borehole ID	,			
			EC	DTI	ECI	Η			22-1	U41A	Client'	s Ren:	RPS	on compa	IIY (DPC)			01120	
Metho	od	Plant L	Jsed		Тор	(m)	Base	: (m)	Coord	dinates	- Einal De		40 E0 m	Start Data	21/11/2022	Drillor	CTLCC	Sheet 4 of 5	
Cable Percu Rotary Co	ussion oring	Dando Beretta	3000 a T44)	0. 29	00 .00	29 40	.00 .50	71980	06.19 E		eptn:	40.50 m	Start Date:	21/11/2022	Driller:	GI+CC	Scale: 1:50	_
									73338	35.91 N	Elevatio	on:	5.13 mOD	End Date:	22/11/2022	Logger:	DM+RS	DRAFT	
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			Des	scription			Backfill	
28.00	D51																	28.0	
																		28.5	;
29.00 29.00 - 30.00	D53 B52						29.0	7.10	-23.87	29.00		Dark I	prown slightly	y sandy CLAY. S	Sand is fine to me	edium.		29.0	
29.00 - 29.45	SPT(S) N (2,3/4,5	l=17 ,4,4)										-						29.5	- - ; _
	Hamme	r SN = 0208	25																-
30.00 30.00 - 30.45	D54 SPT(S) N	I=18					30.0	9.80				-						30.0	- -
30.50	(2,3/4,4, Hamme	,5,5) r SN = 0208																30.5	
												-							-
																		31.0	
			70									-						31 5	-
												-							-
32.00 32.00 - 32.45	SPT(C) N	l=15								(5.80)		-						32.0	,
52.00 52.45	(2,2/3,3) Hamme	,4,5) r SN = 0208										-						22.5	-
			90															32.3	-
												-						33.0)
																			-
33.50 33.50 - 33.95	SPT(C) N	I=17										-						33.5	-
	(3,3/4,4) Hamme	,4,5) r SN = 0208																34.0	,
			95	15	0							-							-
																		34.5	
35.00						-			-29.67	34.80		Stron with c	g dark grey th occasional wh	ninly to thickly nite calcite veir	laminated calcar ns up to 10mm th	eous MUDS nick. Slightly	TONE	35.0	,
35.00 - 35.11	SPT(C) 5 45mm/5	0 (25 for 50 for										weath	nered: slight d	discolouration	, slight weakening	g.			
25 40 25 55	68mm) I = 0208	наттеr SN	05	05	05							Disco	ntinuities:			. /===-`		35.5	
35.40 - 35.55 35.55 - 35.70	C1 C2		95	95	85	10						1. 5-1 smoo	0 degree frac th and clean.	tures medium	spaced (100/400	0/770), plan	ar,	36.0	- - (
												2.35-	45 degree fra	ctures widely	spaced (250/650	/1010), und	ulating		-
36.50 36.50 - 36.60	C3												- 3 - 1					36.5	
36.60 - 36.75	C4																	37.0	- - (
			TCR	SCR	RQD	FI													-
Struck at (m) Ca	Water	Strikes	Rose	to (r	n) F	rom	Chis	ellin	g Details	e (bb:mm)	Remarks	5		0					
5.00	5.00	20	4	1.30		(,	10	<u>,</u> IIII	- (пізреспог	i pic nai	ia aug to 1.20	UIII.					
Casing De	etails	Water	Add	ed															
To (m) Di 13.50	iam (mm) 250	From (m) 5.00	Tc	o (m) 9.00															
29.00	200			-		Core	Barı	el	Flush	Туре	Termina	tion Re	ason				Last Upc	lated	
	SK6L									ter	Terminate	ed at scł	neduled depth	h.			12/06/2	023 AG	3

								Proj	ect No.	Project	t Name: 3FM Pla	nning Design GI - Lot	A DPC Lands	5	Bore	hole ID
		SUA	SE	W		Y		22-:	1041A	Client:	Dublin P	Port Company (DPC)			BH	1120
	9 -	C	SEC	ЭТІ	ECI	Н				Client's	s Rep: RPS					
Metho	od	Plant I	Used		Тор	(m)	Base (r	n) Coor	dinates		40 E0 m	21/11/20	Drillor	CTUCC	Shee	et 5 of 5
Cable Perc Rotary C	ussion: oring	Dando Beretta	3000 a T44) Į	0.0 29	00 .00	29.00	7198	- 06.19 E		9ptn: 40.50 m		Driner.	GI+UU	Scal	e: 1:50
·								7333	85.91 N	Elevatic	5.13 mOD	End Date: 22/11/20	Logger:	DM+RS	DF	RAFT
Depth	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Wa Depth De	ter Level	Depth	Legend		Description			ater Ba	ckfill
(m)			-			\vdash	(m) (m	mOD	(m)		Strong dark grey th	inly to thickly laminated c	alcareous MUD	STONE	3	-
			95	95	60						with occasional wh weathered: slight d	ite calcite veins up to 10n liscolouration, slight weak	ım thick. Slightl ^ı ening.	¥		37.5 — -
									-		Discontinuities:					-
38.00											1. 5-10 degree fract	tures medium spaced (10	0/400/770), pla	nar,		38.0
											smooth and clean.					38.5
			95	95	85				(5 70)		2. 35-45 degree fra and rough.	ctures widely spaced (250)/650/1010), un	dulating		
									(5.70) -							39.0
39.30 - 39.40) C5					6										
39.40 - 39.50 39.50) (C6															39.5
39.50 - 39.65 39.65 - 39.80) C8		87	87	80											40.0
			0.	0.	00											
40.50				<u> </u>	<u> </u>	<u> </u>	-	-35.37	40.50			End of Borehole at 40.	50m			40.5 —
																41.0
																41.5
																-
																42.0
																42.5 -
																43.0
																- 43.5 —
																-
																44.0
																-
																44.5 -
																45.0
																45.5
																-
																46.0
																-
	Wate	r Strikes	TCR	SCR	RQD	FI	Chisel	ing Detai	ls I	Remark	<u> </u>					
Struck at (m) C	asing to (m	1) Time (min)	Rose	2 to (r	n) F	rom ((m) T	o (m) Tir	ne (hh:mm)	Inspectior	n pit hand dug to 1.20	Dm.				
5.00	5.00	20														
Casing D	etails	Water	Add	ed												
To (m) D 13.50	Diam (mm 250) From (m) 5.00	To) (m) 9.00	_											
29.00	200				(Core	Barrel	Flush	і Туре	Termina	tion Reason			Last Upd	lated	
						S	K6L	W;	ater	Terminate	ed at scheduled depth	۱.		12/06/2	023	AGS

						Proje	ect No.	Project	t Name: 3FM Pla	nning Desig	n GI - Lot A D	PC Lands		Boreho	ole ID
	X) C	AUSE	NAY			22-1	1041A	Client:	Dublin P	ort Compar	w (DPC)			BH1	21
	9 -	GEO	TECH			-		Client's	Ren: RPS	0.000	'y (2· -,			-	
Met	hod	Plant Used	Top (r	n) Bas	e (m)	Coor	dinates						_	Sheet (1 of 5
Cable Per	rcussion	Dando 3000	0.00	32	2.45	7100	10.00 F	Final De	epth: 32.45 m	Start Date:	15/11/2022	Driller: CC		Scale:	1:40
						7332	16.63 E 92.27 N	Flevatic	4.81 mOD	End Date:	17/11/2022	Logger RS			ст
	<u> </u>			Casing	Water	,		LIEValia	Л. ч.от шор	Enu Date.	1//11/2022	LUgger. No			۲ ^۳ ۱
Deptn (m)	Sample / Tests	Field Reco	ords	Depth (m)	Depth (m)	Levei mOD	Depth (m)	Legend		Desc	ription			Backf	ill
0.00 - 0.50	B30						-		MADE GROUND: Gi coarse GRAVEL. Sar	rey slightly san nd is fine to coa	dy slightly siity a arse.	ingular fine to			
							-								-
0.50 0.50 - 1.20	ES1 B29					4.31	- 0.50 -		MADE GROUND: Fi	rm to stiff dark	greyish black sli	ightly sandy			0.5
0.50		PID = 0.00ppm					-		and red brick. Sand	is fine to coar	se. Gravel is suba	ents of plastic, as angular fine to	ⁿ		
1.00	ES2						-		coarse. Cobbles are	subangular.					1.0
1.00 1.20	D28	PID = 0.30ppm					-								
1.20 - 1.65	SPT (C)	N=30 (3,5/7,7,8,8) 0197	Hammer SN	= 1.20) Dry										
1.50	ES3						-								
1.50 - 2.50	BZ /	PID = 0.20ppm													
2.00	D26														2.0
2.00 2.00 - 2.45	ES4 SPT (C)	N=15 (2,3/3,3,4,5)	Hammer SN	1 = 2.00	Dry										
2.00		0197 PID = 1.30ppm					-								2.5
2.50 2.50	ES5	PID = 0.80ppm					-							◩╟╟	
2.50		110 - 0.00pp					-								
3.00 3.00	D25 ES6					1.81	- 3.00		MADE GROUND: M	edium dense g	greyish black san	dy silty		z	3.0
3.00 - 4.00	B24						-		subrounded fine to fine to coarse. Cobb	coarse GRAVE ples are subrou	L with low cobbl unded.	le content. Sand	is		
3.00 - 3.45	SPI (C)	N=12 (1,2/2,3,3,4) 0197	Hammer Six	= 3.0u	Dry		-								3.5
3.00		PID = 0.20ppm Water strike 3.10m					-								
3.50	ES7	DID = 0.40ppm					-								
4.00	D23	PID = 0.40ppm					-								4.0
4.00 4.00 - 4.45	ES8 SPT (C)	N=14 (2,2/3,4,4,3)	Hammer SN	1 = 4.00	1.60		-								
4.00		0197 0 – 0 50ppm					-								4.5
4.15	EW1	PID - 0.50pp					-								
4.50 4.50 - 5.50	ES9 B22						- -								
4.50 5.00	D21	PID = 0.10ppm					-								5.0
5.00	ES10	N-17 (2 1/5 2 5 5)	Lammar SN				-								
5.00 - 5.45	551 (C)	N=17 (3,4/3,2,3,3) 0197	Hammer 3r	= 3.00	2.90	-0.69	- - 5.50		Medium dense grev	v slightly grave	lly silty fine to co	arse SAND, Gra		* * <u> </u>	5.5 —
5.50 5.50 - 6.50	ES11 B20						-	$\mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x}$	is subrounded fine	to coarse.	ily sitty into to 1.				-
5.50		PID = 0.30ppm					-	$\overset{\times}{\underset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{$							-
6.00 6.00	ES12	PID = 0.10ppm					-	$\overset{\times}{\overset{\times}{}}\overset{\times}{\overset{\times}{}}\overset{\times}{\overset{\times}{$							6.0
								$\mathbf{x}, \mathbf{x}, \mathbf{x}$							
6.50	D19					1 70	6.60	× × × × ×							6.5 —
6.50 - 6.95	SPT (C)	N=28 (4,5/6,7,7,8) 0197	Hammer SN	1= 6.50	4.60	-1.79	- 0.00	× × ×	Medium dense grey Sand is fine to coar	y very sandy sl se.	ightly silty round	led fine GRAVEL			
6.60 - 8.00	B18						-	× × ×							-
							-	××××							-
							-	,×					-		┛┤
	Wate	r Strikes		Chi	sellin	g Detail	s	Remarks	5						
Struck at (m) 3.10	Casing to (m 3.10	1) Time (min) Rose 1 20 2.	:o (m) Fror 60 4	n (m) .50	To (m) Tin)0	ne (hh:mm) 01:00	Hand dug	inspection pit excava	ted to 1.20m					
					1										
					1										
Casing	Details	Water Adde	d		1										
To (m)	Diameter	From (m) To	(m)		1										
13.50 32.00	250	4.00 32	00		1		-	Termina	tion Reason			Las	t Upda	ted	
					1			Terminate	ed at scheduled depth	ı		1:	2/06/20	23	A G G
	1												-,,	1	

	C	AUS	EW				Proje 22-1	ect No. 1 041A	Project Client:	t Name:	3FM Plai Dublin P	nning Desig ort Compar	n GI - Lot A D אין (DPC)	PC Lands	B	orehole ID BH121
		G	EOTE	:CH					Client's	s Rep:	RPS					
Metho	d	Plant Us	sed	Top (m)	Base	2 (m)	Coord	dinates	Final De	epth:	32.45 m	Start Date:	15/11/2022	Driller:	cc :	Sheet 2 of 5
Cable Ferce	1551011	Danuo 5.	000	0.00	52.	.45	71981	16.63 E		·			•			Scale: 1:40
							73329	∂2.27 N	Elevatio	on:	4.81 mOD	End Date:	17/11/2022	Logger:	RS	DRAFT
Depth (m)	Sample / Tests	Field	d Records		Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			Des	cription	·	Water	Backfill
1						İ.		-	××××	Mediun Sand is	n dense grey	very sandy sl	lightly silty round	led fine GRA	VEL.	- 75
				ļ					× × ×	Janaie						-
l				ļ				-	×. × .× ×							_
8.00 8.00 - 8.45	D17 SPT (C)	N=12 (2,3/2,3	3.3,4) Ham	ımer SN =	8.00	3.10			$\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}$							8.0
	- · ·	0197				Ĩ		-	××××							
8.50 - 9.50	B15			ļ				-	× × × ×							8.5 —
				ļ					× × × ×							-
				ļ				_	× × ×							9.0
				ļ				-	×. × ×							-
				ļ				-	× × ×							
9.50 9.50 - 9.95	D16 SPT (C)	N=25 (4,5/6,6	5,6,7) Ham	ımer SN =	9.50	5.60		-	× × × ×							9.5 —
-		0197		ļ		Ĺ		-	× × × ×							_
10.00 - 11.00	B13			ļ				-	× × × ×							10.0
				ļ					× ^ × × ×							
				ļ				[×							10.5 —
				ļ				[× × ×							-
				ļ				-	××××							-
11.00 11.00 - 11.45	D14 SPT (C)	N=28 (3.4/5.7	/ & &) Ham	mer SN =	11.0	7 20		-	×. × ×							11.0
11.00 - 11.45	SFI (C)	0197	,8,0,110111	IIIei Jiv -	11.0	/.20		-	× × ×							
				ļ				-	×. ×. ×. ×							11.5 —
				ļ				-	×. × × ×							-
11.90 - 13.00	B45			ļ			-7.09	- 11.90	××××	Dense p	rov slightly	sandy rounde	d fine to coarse (2RAV/FL with		-
				ļ				-	°°°°°	cobble	content. Sar	id is fine to co	arse. Cobbles are	e rounded.		12.0
				ļ					a ° ° °							
12.50	D44	N-22 /4 6/6 7	7 0 11\ Lla		125	30		-	a ° ° °							12.5 —
12.50 - 12.95	SPI (C)	N=33 (4,6/6,7, = 0197	,9,11) ⊓ai	nmer Siv	12.5	/.30		[a 9 0 0							-
				ļ				-	a							
				ļ				-	0 0 0 0 0 0 0 0 0 0 0 0 0 0							_
				ļ				-	a 9 9 9							
				ļ				-	a 9 0							13.5 —
				ļ				-	a 9 0							-
14.00	D42			ļ				-	0 0 0 0							
14.00 - 15.00 14.00 - 14.45	B43 SPT (C)	N=34 (5,5/7,8	3,9,10) Haı	mmer SN	14.0	1.20		-	°°°°°							-
14.05		= 0197		ļ				-								
14.50 - 14.95	059	UDIOW=41 100)% Recove	ery	14.5	8.10		-	, e , e , g							14.5
	Wate	r Strikes			Chis	ellin	g Details	s l	Remarks	5					I	
Struck at (m) Cas 3.10	sing to (m 3.10	1) Time (min) R 20	Rose to (m 2.60	1) From (4.50	m))	To ((m) Tim	ne (hh:mm) 01:00	Hand dug	inspectio	on pit excava	ted to 1.20m				
0.22	0.22					-		01.01								
Casing De	etails	Water A	Added	-												
To (m) D	Diameter	From (m)	To (m)	_												
32.00	200	4.00	32.00					ŀ	Terminat	tion Rea	son				Last Updat	ed 📕 🔳
									Terminate	ed at sche	duled depth	I.			12/06/202	AGS

						Proje	ect No.	Project	t Name: 3FM Pla	nning Desig	n GI - Lot A D	PC Lands	Во	rehole ID
		CAUSEV	VAY			22-1	041A	Client:	Dublin P	ort Compar	יע (DPC)			BH121
	/ -	GEOT	TECH			l		Client's	s Rep: RPS					
Metho	d	Plant Used	Top (m)	Base	e (m)	Coor	dinates			1			Sł	ieet 3 of 5
Cable Percu	ussion	Dando 3000	0.00	32	.45	7198	16 63 F	Final De	epth: 32.45 m	Start Date:	15/11/2022	Driller: C	s s	cale: 1:40
						7332	92.27 N	Elevatio	on: 4.81 mOD	End Date:	17/11/2022	Logger: R	RS	DRAFT
Denth	comple /	,		Casing	Water	Level	Denth	+	T	-	- , .			
(m)	Tests	Field Record	ls	Depth (m)	Depth (m)	mOD	(m)	Legend	Dense grov slightly	Desc	ription	CDAV/EL with	Mat	Backfill
						l	-	a • • •	cobble content. Sar	nd is fine to co	arse. Cobbles are	e rounded.	low	
1						I	-	0 0 0						15.0
						I		a ° 0						
15 50	D40					I		à 40 0 2 0 0						15.5
15.50 - 15.95	SPT (C)	N=14 (2,3/3,3,4,4) H;	ammer SN =	= 15.5	3.60	-10.79	15.60	a . o a . o	Medium dense bro	wn gravelly fin	e to coarse SANI	D. Gravel is	$ \longrightarrow $	-
15.60 - 16.50	B41	0197				I	-		rounded fine.					
						l	-		;					16.0
						l	-							
1						l	-							- 16.5 —
						I	-							
						I	-							
17.00 17.00 - 17.45	D39 SPT (C)	N=13 (1,1/2,3,4,4) H	ammer SN =	- 17.0	7.45	I	-							17.0
1		0197				l	-							
17.50 - 17.95	U58	Ublow=46 100% Recr	overy	17.5	2.30	I	-							17.5 —
17.70	B38					-12.89	17.70	×	Firm to stiff grey sa	ndv siltv CLAY.	Sand is fine to c	oarse.		
						l		×	, , , , , , , , , , , , , , , , , , ,	110, 5,		50.50		-
						l		×						-
						l		×						
18.50 - 18.95	U31	Ublow=37 100% Rec	overy	18.5	11.3	l		×						18.5
						l		×						
19.00	750					I	[×						
15.00	0.5,					l		×						
						l	-	×						
19.50 - 21.00	B36					l	-	×— —	4					19.5 —
						l	-	× ×	4					
20.00 - 20.45	SPT (S)	N=15 (2,3/3,4,4,4) H	ammer SN =	- 20.0	14.2	l	-	— <u>×</u>	-					20.0 —
		0197				l	-	×						
						l	-	×						
						l	-	×						20.5 —
						l	-	×						
						l	-	×						21.0
						l	-	×						
		11 100% D				l	-	×						-
21.50 - 21.95	032	Ublow=41 100% Reco	overy	21.5	16.0	l	-	×						21.5
						l		×						
						L	Ĺ,							
Struck at (m) Ca	Wate	r Strikes	(m) From	Chis	elling	g Details	s ne (hh:mm)	Remarks	s	-+				
3.10	3.10	20 2.60) 4.5	0	5.(00	01:00	Hafiu uu _b	пѕресноп ри елсата	1160 10 1.2011				
Casing De	etails	Water Added												
To (m) D 13.50	Diameter 250	From (m) To (m) 4.00 32.00	<u>1)</u> 0											
32.00	200						F	Termina	tion Reason				Last Updated	
								Terminate	ed at scheduled depth	۱.			12/06/2023	AGS

		Pr	Project No.		Project N	Bc	Borehole ID							
	C	CAUSEW	/AY		22	2-1 (041A	Client:	Client: Dublin Port Company (DPC)					
	/ -	GEOT	ECH					Client's R	ep: RPS					
Metho	od	Plant Used	Top (m)	Base (I	n) Co	ord	linates	-Final Denti	• • • • • • • • • • • • • • • • • • • •	Start Date:	1 - /11 /2022	Drillor: (Sr Sr	neet 4 of 5
Cable Percu	ussion	Dando 3000	0.00	32.45	71	1981	 16.63 E	Finai Depti	1: 32.45 m	Start Date.	15/11/2022	Driller.	Sr Sr	cale: 1:40
					73:	,329 [°]	2.27 N	Elevation:	4.81 mOD	End Date:	17/11/2022	Logger: F	RS	DRAFT
Depth (m)	Sample /	/ Field Records	s	Casing Wa Depth De	ter Leve	/el	Depth (m)	Legend		Des	cription		Vater	Backfill
(m) 22.00	D35			(m) (n) mo.	D	(m)	X Fir	rm to stiff grey sar	ndy silty CLAY.	Sand is fine to c	oarse.	\$	22.0
22.00 - 23.00	B34					ł	ŀ	×					- I I	
						ļ	F	×					- I I	22.5
						ļ	Ē	×					- I I	-
						ļ	Ļ	×					- I I	
23.00 23.00 - 23.45	D33 SPT (S)	N=18 (3,3/4,4,5,5) Har	mmer SN =	23.0 2.	70	ł	F	×					- I I	23.0
		0197				ļ	F	×					- I I	
23.50 - 25.40	B57					ļ	E	X					- I I	23.5 —
						ļ	Ļ	×					- I I	
						ł	F	×					- I I	24.0 —
						ł	F	×					- I I	
24 50 - 24 95		115-00-41 100% Reco		2458	10	ļ	F	×					- I I	24.5
24.50 - 24.55	001	UDIOW=41 100/0 meter	ery	24.5 0	10	ļ	Ē	×					- I I	-
						ļ	Ļ	×					- I I	
25.00 25.00 - 26.00	D56 B55					ł	F	×					- I I	25.0
						ţ	F	×					- I I	
						ļ	F	×					- I I	25.5 —
						ļ	Ē	×					- I I	
26.00	D54					ļ	Ļ	×					- I I	26.0 —
26.00 - 26.45	SPT (S)	N=14 (3,2/3,3,4,4) Har	nmer SN =	26.0 10	.6	ł	ļ	×					- I I	
		013,				ļ	F	×					- I I	
26.50 - 27.50	823					ļ	E	×					- I I	
						ļ	Ļ	× ×					- I I	
						ł	F						- I I	27.0 —
						ł	F	× ×					- I I	
27.50 - 27.95	U62	Ublow=46 100% Recov	very	27.5 2.	30	ļ	F	×					- I I	27.5 —
						ļ	Ē	×					- I I	
28.00	D52					ļ	Ļ	×					- I I	28.0 —
28.00 - 29.00	B51					ł	F	×					- I I	
						ţ	F	× ×					- I I	-
						ļ	F	×					- I I	28.5 -
						ļ	Ē	×					- I I	
29.00 29.00 - 29.45	D50 SPT (S)	N=17 (3.3/4.4,4,5) Har	mmer SN =	29.0 <u>6</u> .	20	ļ	F	X					- I I	29.0
25.00	J	0197					†							
	Wate	r Strikes	Erom (Chisel	ing Det	ails	"mm)	Remarks		1.20m				
3.10	3.10	20 2.60	4.50		5.00	(J1:00	Hand dug insp	pection pit excava	ted to 1.20m				
					ļ									
					ļ									
Casing Do	etails	Water Added			ļ									
13.50	250	4.00 32.00	-				ļ							
32.00	200				ļ			Termination	1 Reason				Last Updated	
								Terminated at	t scheduled depth	۱.			12/06/2023	Att

				Proje 22-1	ct No. .041A	Project Client:	t Name	Во	orehole ID BH121						
								Client's	s Rep:	RPS	1				
Meth Cable Perc	od cussion	Plant Used Dando 3000	Top (m) Bas 0 32	e (m) 2.45	Coord	linates	Final De	epth:	32.45 m	Start Date:	15/11/2022	Driller:	CC SI	neet 5 of 5 Icale: 1:40
						719816.63 E 733292.27 N		Elevatio	on:	4.81 mOD	End Date:	17/11/2022	Logger: F	RS	DRAFT
Depth (m)	Sample / Tests	, Field Rec	ords	Casing Depth (m)	Water Depth	Level mOD	Depth (m)	Legend			Des	cription	1	Vater	Backfill
29.50 - 30.50) B49				(11)		-	X	Firm to	stiff grey sa	ndy silty CLAY.	Sand is fine to c	oarse.		 29.5
30.50 - 30.95	5 060	Ublow=48 100% R	ecovery	32.0) 13.7		-								
31.00 31.00 - 32.00	D48) B47						- - -								 31.0
							- - - - -								 31.5
32.00 32.00 - 32.45	D46 5 SPT (C)	N=19 (3,4/4,4,5,6) 0197	Hammer S	N = 32.0) 12.7	27.04	- - - -								
							_ 32.45				End of Bore	hole at 32.45m			32.5 —
							-								-
							-								33.0
							-								
							-								
							-								-
							-								= 34.5 —
							-								-
							-								 35.0
							-								-
							-								35.5 —
							-								-
							-								
							-								-
							-								-
	Wate	r Strikes		Chi	sellin	g Details	 ;	Remarks	<u> </u>						
Struck at (m) C 3 10	asing to (n	n) Time (min) Rose	to (m) Fro	m (m) 1 50	To (m) Tim	e (hh:mm)	Hand dug	inspectio	on pit excava	ited to 1.20m				
5.10	5.10	20 2.			5.0		01.00								
Casing D	Details	Water Adde	ed (m)												
13.50	250 200	4.00 32	.00											<u> </u>	
52.00	200							Terminat	tion Rea					Last Update	
								.c.miate		uepti				12,00,2023	- 141FD]

		GEOT	AY ECH		Р 2	roje 2-1	ct No. 041A	Project Name: 3FM Planning Design GI - Lot A DPC Lands Client: Dublin Port Company (DPC) Client's Rep: RPS	Borehole ID BH122		
Meth	nod	Plant Used	Top (m)	Base	(m) C	oord	inates	Final Danth, 22.50 m Start Date: 10/11/2022 Date: 00	Sheet 1 o		
Inspecti Cable Per	rcussion Dando 3000 1.50 23.50		50 7 50 7 7	719630.45 E 733425.20 N		Elevation: 4.72 mOD End Date: 20/11/2022 Logger: RS	2	DRAFT			
Depth (m)	Sample / Tests	Field Records		Casing Depth (m)	Water Le Depth (m) m	vel OD	Depth (m)	Legend Description	Water	Backfill	
0.50 0.50	ES1	Slow seepage at 0.35n PID = 0.00ppm	n		4.	42	- - 0.30 - - -	MADE GROUND: Grey very sandy very silty subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular. MADE GROUND: Grey very sandy silty subangular fine to coarse GRAVEL with high cobble content. Sand is fine to coarse. Cobbles are subangular.	×		
1.00 1.00 1.50 1.50	B4 ES2 ES3	PID = 1.70ppm			3.	22	- - - - - - -	MADE GROUND: Brownish grey sandy silty angular fine to coarse GRAVEL with fragments of red brick and concrete. Sand is fine to coarse.			
2.00 2.00 2.00 - 3.00 2.00 - 2.45	D5 ES16 B6 SPT (C) ES17	N=13 (2,3/3,5,3,2) Har 0197	nmer SN =	2.00	2. Dry	72	- 2.00 - - - -	MADE GROUND: Firm greyish brown sandy gravelly SILT with fragments of red brick and concrete. Sand is fine to coarse. Gravel is subangular fine to medium.		2.0	
2.50 3.00 3.00 3.00 - 3.45 3.00 3.20 - 4.50 3.50	D7 ES18 SPT (S) B8 ES19	PID = 1.00ppm N=22 (4,5/7,8,3,4) Har 0197 PID = 0.60ppm	nmer SN =	3.00	Dry 1.	52	- - - - - - - -	MADE GROUND: Firm to stiff grey sandy gravelly SILT with fragments of red brick, concrete, glass and wood. Sand is fine to coarse. Gravel is subangular fine to coarse.		3.0 - 3.0 - 3.5 -	
3.50 4.00 4.00 - 4.45 4.00 4.50 4.50 4.50 4.60 - 5.50 5.00 5.00	D9 ES20 SPT (C) ES21 B10 D11 ES22	PID = 1.80ppm N=12 (2,3/3,4,3,2) Har 0197 PID = 1.00ppm Slow seepage at 4.30n PID = 0.60ppm	nmer SN = n	4.00	Dry 0.	12	- - - - - - - - - - - - - - - - - - -	MADE GROUND: Firm grey very gravelly CLAY with fragments of red brick, concrete, timber, plastic, glass and wires. Gravel is subangular fine to coarse.		4.0	
5.00 - 5.45 5.00 5.50 5.50 - 6.50 5.50 6.00 6.00	ES23 B12 ES24	N=9 (1,2/2,2,2,3) Ham 0197 PID = 4.30ppm PID = 0.10ppm PID = 0.00ppm	mer SN =	5.00	-0	.78	- - 5.50 - - - - - -	Medium dense grey fine to coarse SAND and subrounded fine to coarse GRAVEL.		5.5 -	
6.50 6.50 6.50 - 6.95 7.00 - 8.00	D13 ES25 SPT (C) B14	N=12 (2,2/3,3,3,3) Har 0197	nmer SN =	6.50	5.90		- - - - - - - -			6.5 -	
	Water	r Strikes		Chise	elling De	tails		Remarks			
Struck at (m) 0.35 4.30 9.50 Casing To (m) 13.50	Casing to (m 0.35 4.30 9.50 Details Diameter 250	Water Added From (m) To (m) 4 50 22 50	m) From	(m)	To (m)	Time	e (hh:mm)	Inspection pit machine excavated to 1.50m. Blowing sands from 8.00m to 9.70m.			
23.50	200							Termination Reason Last Up	odate		
								12/06	12023	AUD	

	Pro	ject No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole ID			
GEOTECH	22-	-1041A	Client: Dublin Port Company (DPC)	BH122			
Mathad Plant Lied Ton (m) Base (m		rdinatos	Client's Rep: RPS	Chaot 2 of 4			
Inspection Pit 3T Excavator 0.00 1.50	710		Final Depth: 23.50 m Start Date: 18/11/2022 Driller: CC	Scale: 1:40			
Cable Percussion Dando 3000 1.50 23.50	733	425.20 N	Elevation: 4.72 mOD End Date: 20/11/2022 Logger: RS	DRAFT			
Depth Sample / Field Records Depth Depth (m) Tests	Level mOD	Depth (m)	Legend Description	Backfill			
		-	Medium dense grey fine to coarse SAND and subrounded fine to	- 75 -			
		-		-			
8.00 D15	-3.28			8.0			
8.00 - 8.45 SPT (C) N=17 (2,3/4,4,5,4) Hammer SN = 8.00 5.10 0197		-	Medium dense grey gravelly fine to coarse SAND. Gravel is subrounded fine to coarse.	-			
8.50 - 9.70 B26		-		8.5 —			
		-		-			
		-	- 492.84 126.893	9.0			
		-		-			
9.50 D27		-		9.5 -			
9.50 - 9.95 SPT (C) N=14 (2,3/2,3,4,5) Hammer SN = 9.50 3.60 0197	-4.98	- 9.70	Medium dense grey sandy subrounded fine to medium GRAVEL.	-			
Strong flow at 9.50m 9.70 - 11.00 B28		-	Sand is fine to coarse.				
				-			
		-		- 10.5 —			
		-		-			
11.00 D29		-					
11.00 - 11.45 SPT (C) N=23 (3,4/5,5,6,7) Hammer SN = 11.0 4.90 0197		-		-			
11.50 - 12.50 B30		-		- 11.5 —			
		-		-			
		-					
		-		-			
12.50 D31	-7.78	- - 12.50	Medium dense to dense grev sandy subrounded fine to medium	- 12.5 —			
12.50 - 12.95 SPT (C) N=29 (4,4/6,7,7,9) Hammer SN = 12.5 5.50 0197		-	GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded.	-			
13.00 - 14.00 B34		-					
		-		-			
		-		13.5 —			
		-					
14.00 D35		-		14.0			
14.00 - 14.45 SN (J) N=31 (4,5/7,7,8,9) Hammer SN = 14.06.30 0197		-		-			
		-					
Water Strikes Chicollin	g Deta	ils	Remarks				
Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To	(m) T	iiine (hh:mm)	Inspection pit machine excavated to 1.50m.				
4.30 4.30 20 3.90 9.50 9.50 20 3.60			biowing sands from 8.00m to 9.70m.				
Casing Details Water Added							
13.50 250 4.50 23.50 23.50 200			Termination Reason				
			Terminated at scheduled depth. 12/06/2				

	CAUS	SEW	AY		Pro 22	oject No. -1041A	Project Name: 3FM Planning Design GI - Lot A DPC Lands Client: Dublin Port Company (DPC)	Borehole ID BH122
	C	GEOTE	СН				Client's Rep: RPS	
Method	Plant I	Used ·	Top (m) E	Base (n	n) Co	ordinates	Final Depth: 23.50 m Start Date: 18/11/2022 Driller: CC	Sheet 3 of 4
Cable Percussio	n Dando	3000	1.50	23.50	719	9630.45 E		Scale: 1:40
				Casing Wat	/33	5425.20 N	Levation: 4.72 mob End Date: 20/11/2022 Logger: KS	
(m) Te:	its Fi	eld Records		Depth Dep (m) (m	mOE	- - - - - -	Legend Description Medium dense to dense grey sandy subrounded fine to medium GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded.	
15.50 B36 15.50 D37 15.50 - 15.95 SPT	(C) N=33 (2,4/6, = 0197	,7,9,11) Han	nmer SN :	15.5 7.9	o			
17.00 D39 17.00 - 17.45 SPT 17.10 - 18.50 B38	(C) N=13 (1,2/3, 0197	,3,3,4) Hamı	ner SN = 1	17.0 9.2	0 -12.3	- - - - - - - - - - - - - - - - - - -	Medium dense brown silty fine SAND.	16.5
18.50 - 18.95 U32 18.50 - 19.50 B40 19.00 D41	Ublow=21 1	00% Recove	ry 1	18.5 10	1 -13.7	78 - 18.50 - - - - - - - - - - - - - - - - - - -	X X	18.0
20.00 D43 20.00 - 21.00 B42 20.00 - 20.45 SPT	(S) N=18 (2,3/3, 0197	,4,5,6) Hamı	ner SN = 2	20.0 1.6	0			
21.50 - 21.95 U33						-		21.0
Wi	ter Strikes	Poso to /~	Erom /=	Chisell	ng Deta	ails	Remarks	
Casing t 0.35 0.3 4.30 4.3 9.50 9.5 Casing Detail: To (m) Diame 13.50 250	0 (m) 1100 (min) 5 0 20 0 20 5 Water teter From (m) 0 4.50	XOSE to (m) 3.90 3.60	<u>, ⊦rom (n</u> - -		<u>s (m)</u>	ııme (hh:mm)	Inspection pit machine excavated to 1.50m. Blowing sands from 8.00m to 9.70m.	
23.50 200)						Termination Reason Last L	pdated
							Terminated at scheduled depth. 12/0	5/2023 AGS

							Proje	ect No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands							Borehole ID			
			EW	AY			22-1	.041A	Client:		Dublin P	ort Compar	ny (DPC)			BH1	.22		
	/ -	———GE	EOTE	СН					Client'	s Rep:	RPS								
Metho	bd	Plant Us	ed T	op (m)	Base	e (m)	Coor	dinates	Einel D.		22.50	Charles Dates	10/11/2022	Duilleur	66	Sheet 4	4 of 4		
Inspection Pit Cable Percussion		3T Excavator Dando 3000		3T Excavator Dando 3000		0.00 1.50	1.! 23.	50 .50	71963	30.45 E		eptn:	23.50 m	Start Date:	18/11/2022	Driller:		Scale:	1:40
							733425.20 N		Elevation:		4.72 mOD	End Date:	20/11/2022	Logger:	RS	DRAFT			
Depth	Sample /	Field	Pacardo		Casing	Water	Level	Depth	Logond			Doc	rintion			E Back	611		
(m) 22.00	Tests D44	Field	Records		(m)	(m)	mOD	(m)		Stiff gr	ey silty CLAY.	Dest				S	22.0		
22.00 - 23.00	B45							-	×_×_								-		
								-	×								-		
								-	×								22.5 —		
								-									-		
23.00	D46							-	×								 23.0		
23.00 - 23.45	SPT (S)	N=22 (3,4/5,5,6 0197	6,6) Hamm	ner SN =	23.0	4.70		-									-		
							-18.78	- 23.50	×								23.5 —		
								-				End of Bore	hole at 23.50m				-		
								-									-		
								-									24.0		
								-									-		
								[24.5 —		
								-									-		
								-									- 25.0		
								-									-		
								-									-		
								-									25.5 —		
																	-		
								-									26.0		
								-									-		
								-									- 26.5 —		
								-									-		
								-									-		
																	27.0		
								-									-		
								-									27.5 —		
								-									-		
								-									28.0		
	1							E											
	1							E									28.5		
	1							ŀ									-		
	1							-											
	1							-									29.0		
Struck at (m) C	Wate	r Strikes	ose to (m)	From (Chis	elling	g Details	S	Remarks		hino arc	ad to 1 50							
0.35	0.35	20	2 00		,	10 (,	(Blowing s	ands fro	m 8.00m to 9	eu to 1.50m. 9.70m.							
4.30 9.50	4.30 9.50	20	3.90 3.60																
Casing D	etails	Water A	dded																
13.50	250	4.50	23.50																
23.50	200								Termina	tion Rea	ason				Last Upda	ated			
									Terminate	d at sch	eduled depth	۱.			12/06/20	23	AUS		
							Proje	ct No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole	e ID								
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			EW	AY			22-1	041A	Client: Dublin Port Company (DPC)	BH12	3								
	X	GL	.011				-		Client's Rep: RPS										
Inspect	nod ion Pit	Plant Use 3t Excavat	ed tor	Top (m) 0.00	Base 1.5	(m) 0	Coord	linates	Final Depth: 41.00 m Start Date: 18/11/2022 Driller: BM+GT	Sheet 1 o Scale: 1:	of 5 50								
Cable Per Rotary (cussion Coring	Dando 20 Beretta Ta)00 '44	1.50 27.50	27.5 41.(50 00	71961 73335	5.17 E 1.40 N	Elevation: 4.58 mOD End Date: 10/01/2023 Logger: RS+CMc	DRAF	Т								
Depth (m)	Sample / Tests	Field	Records		Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Backfill									
		Slow seenage a	at 0.30m				4.43 4.38	0:20	MADE GROUND: Grey very sandy very silty subangular fine to coarse GRAVEL. Sand is fine to coarse.	<u>_</u>									
0.50	ES1	Siow Scepage a	10.5011						CONCRETE // MADE GROUND: Dark greyish black very sandy slightly silty		0.5								
0.50		PID = 1.10ppm							subangular fine to coarse GRAVEL with high cobble content and cobbles sized fragments of red brick. Sand is fine to coarse. Cobbles		-								
1.00 1.00	B4 ES2							-	are angular.		1.0								
1.00 1.50	ES3	PID = 0.10ppm					3.08	- 1.50											
1.80 - 2.00	B14								MADE GROUND: Stiff greyish black SILT with fragments of wood and plastic.		-								
2.00	D21							-			2.0								
2.00 2.00 - 2.45	ES5 SPT (C)	N=16 (2,5/7,4,3	3,2) Ham	mer SN =	2.00	Dry					-								
2.00		1386 PID = 3.40ppm									2.5 _								
2.50 2.50	ES6	PID = 0.60ppm									-								
2.80 - 3.00 3.00	B15 D22										3.0 -								
3.00 3.00 - 3.45	ES7 SPT (C)	N=21 (2,2/3,8,5	5,5) Ham	mer SN =	3.00	Dry					3.5 —								
3.00		1386 PID = 15.00ppm	n								-								
3.50 3.50	ES8	PID = 11.00ppm	n								4.0								
3.80 - 4.00 4.00	B16 D23						0.28	4.30	Medium dense greyish gravelly fine to coarse SAND with shell		-								
4.00 4.00 - 4.45	ES9 SPT (C)	N=18 (2.3/3.3.7	7.5) Ham	mer SN =	4.00	Drv			fragments. Gravel is subangular to subrounded fine to coarse.		4.5 -								
4.00		1386 PID = 11.40ppm	n					_			5.0								
4.09	EW1	Slow seenage a	 at 4 30m																
4.50	ES10	PID = 2 94ppm	11 4.5011								5.5								
4.80 - 5.00	B17	110 - 2.3+ppm																	
5.00	ES11	N-16 (2 / /2 / /	1 5) Ham	mor SN -	5 00/	1 60		-			6.0 -								
5.00 - 5.45	3F1 (C)	1386	+,5) Halli		5.00 2	+.00													
5.50	ES12	PID = 4.70ppm	_				-2.12	6.70	Medium dense beroming dense grev sandv subangular to		-								
5.80 - 6.00	B18	PID = 72.00ppm	n					-	subrounded fine to coarse GRAVEL. Sand is fine to coarse.		7.0								
6.00 6.00	D25 ES13										-								
6.00 - 6.45	SPT (C)	N=18 (3,4/4,5,4 1386	4,5) Ham	mer SN =	6.00 4	1.90					7.5 —								
6.00 6.80 - 7.30	B19	PID = 66.00ppm	n								-								
7.50 7.50 - 7.95	D26 SPT (C)	N=30 (6,6/7,7,8	8,8) Ham	mer SN =	7.50 5	5.30					8.0								
		1386									8.5								
8.80 - 9.00	B20										-								
9.00	D27		7 ()								9.0								
9.00 - 9.45	SPT (C)	N=25 (6,6/6,6,7 1386	7,6) Ham	mer SN =	9.00	1.80					_								
	Water	Strikes			Chise	elling [Details		Remarks	1									
Struck at (m) 0.30	Casing to (m 0.30	i) Time (min) Ro	ose to (m	10.50 ID	m) D	10 (m 13.50) Tim	e (hh:mm) 03:00	Inspection pit machine excavated to 1.50m.										
4.30	4.30																		
Casing To (m)	Details Diam (mm	Water Ac	dded To (m)	-															
15.00 27.50	250 200	4.30	27.50		Barri	<u>.</u>	Eluch	Tuna	Termination Reason	tod -									
41.00	145			core	Darre	-	ΓΙΟΣΠ	rype	Terminated at scheduled denth										
							vvd			~ A	ЧD								

	CAUSEW	AY		Proje 22-1	ect No. L 041A	Project Name: 3FM Planning Design GI - Lot A DPC Lands Client: Dublin Port Company (DPC)	Borehole ID BH123
	GEOTE	CH				Client's Rep: RPS	
Method Inspection Pit	Plant Used 3t Excavator	Top (m) 0.00	Base (m 1.50) Coor	dinates	Final Depth: 41.00 m Start Date: 18/11/2022 Driller: BM+GT	Sheet 2 of 5 Scale: 1:50
Cable Percussion Rotary Coring	Dando 2000 Beretta T44	1.50 27.50	27.50 41.00	7196 7333	15.17 E 51.40 N	Elevation: 4.58 mOD End Date: 10/01/2023 Logger: RS+CMc	DRAFT
Depth Sample / (m) Tests	Field Records		Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend Description	Backfill
10.30 - 10.50 B28 10.50 D29 10.50 - 10.95 SPT (C)	N=26 (5,6/6,7,6,7) Ham 1386	mer SN =	10.5 3.00				
11.80 - 12.30 B30 12.00 D32 12.00 - 12.45 SPT (C)	N=26 (6,6/6,6,7,7) Ham 1386	mer SN =	12.0 3.40				11.5
13.30 - 13.50 B31 13.50 D33 13.50 - 13.95 SPT (C)	N=27 (6,7/6,7,7,7) Ham 1386	mer SN =	13.5 5.20	-8.92	13.50	Medium dense becoming dense grey subangular fine to coarse GRAVEL.	13.0
14.50 - 15.00 B36 15.00 D37 15.00 - 15.45 SPT (C)	N=29 (7,7/7,7,7,8) Ham 1386	mer SN =	5.10				
16.00 - 16.50 B38 16.50 D39 16.50 - 16.95 SPT (C)	N=30 (6,7/8,7,7,8) Ham 1386	mer SN =	9.30	-12.42	- 17.00	Very stiff dark greyish black sandy silty CLAY. Sand is fine to coarse.	
17.50 - 18.00 B40 18.00 - 18.45 U34	Ublow=50 60% Recover	у					17.5
Wate	r Strikes		Chisellir	ng Detail	s	Remarks	
Casing to (n 0.30 0.30 4.30 4.30 To (m) Diam (mm 15.00 250 27.50 200 41.00 145	Water Added N) From (m) To (m) 4.30 27.50	i) From (r 10.50	m) To) 13 Barrel	(m) Tin 5.50 Flush	ne (hh:mm) 03:00	Inspection pit machine excavated to 1.50m. Termination Reason Last Upd	ated
		Sł	<6L	Wa	ater	Terminated at scheduled depth. 12/06/2	OZ3 AGS

				AY CH			Proje 22-1	ect No. . 041A	Project Name: 3FM Planning Design GI - Lot A DPC Lands Client: Dublin Port Company (DPC) Client's Rep: PDS	Borehole ID BH123
Method Inspection Cable Percus Rotary Cor	I Pit ssion ing	Plant U 3t Excav Dando 2 Beretta	Jsed /ator 2000 T44	Top (m) 0.00 1.50 27.50	Base 1.5 27. 41.	(m) 50 50 00	Coor 71962 73332	dinates 15.17 E 51.40 N	Final Depth: 41.00 m Start Date: 18/11/2022 Driller: BM+GT Elevation: 4.58 mOD End Date: 10/01/2023 Logger: RS+CMc	Sheet 3 of 5 Scale: 1:50 DRAFT
Depth (m)	Sample / Tests	Fie	ld Records		Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Backfill
19.50 19.50 - 20.00 19.50 - 19.95	D42 B41 SPT (C)	N=30 (4,5/6,8 1386	3,8,8) Ham	imer SN =		15.8				
21.00 - 21.45	35	Ublow=50 70	1% Recover	γ						20.5
22.00 - 23.00	B43								Coarse. Gravel is subangular fine to coarse.	
23.00 23.00 - 23.45	D44 SPT (S)	N=32 (6,6/7,8 1386	8,8,9) Ham	imer SN =	22.0	18.0				23.0 —
24.00 - 25.00	B45									24.0 —
25.00 - 25.45	U48	Ublow=50 60	% Recovei	Ŷ						
26.00 - 27.00	B47									26.0 —
27.00 27.00 - 27.45	D46 SPT (S)	N=37 (6,8/8,9 SN = 1386	9,10,10) Ha	ammer	22.0	24.0	-22.92 -22.92	27.50	Very stiff dark greyish brown slightly sandy CLAY. Sand is fine to medium.	27.0 — — 27.5 — — —
	Wate	r Strikes	TCR SCR	RQD FI	Chie	elling	7 Detail		Remarks	
Struck at (m) Casi	ing to (m) Time (min)	Rose to (n	n) From	(m)	To (m) Tim	∙ ne (hh:mm) 03∙00	Inspection pit machine excavated to 1.50m.	
4.30	4.30			10.5		13.	50	03.00		
Casing Det To (m) Dia	tails Im (mm	Water	Added To (m)	-						
15.00 27.50 41.00	250 200 145	4.30	27.50	Core	Barr	el	Flush	Туре	Termination Reason Last Upd	ated
				9	K6L		Wa	ter	Terminated at scheduled depth. 12/06/20	AGS

	C	AUS	E	w	Ά	Y		Proje 22-1	ct No. 041A	Project Client:	Name: 3FM Pla	anning Desig Port Compar	n GI - Lot A D v (DPC)	PC Lands		Borel BH	hole ID 1 123
	9 -		GEC	DTE	EC	Н				Client's	Rep: RPS		, , ,				
Meth	od	Plant U	Jsed		Тор	(m)	Base (m)	Coord	linates	- Final De	onth : 41.00 m	Start Date:	18/11/2022	Driller	BM+GT	Shee	t 4 of 5
Cable Perc	on Pit cussion	3t Exca Dando	vatoi 2000	r)	0.	00 50	1.50 27.50	71961	5.17 E		.ptil. 41.00 m	Start Date.	10/11/2022		biviron	Scale	e: 1:50
KOLATY C	oning	Deretta	1 1 4 4		27	.50	41.00	73335	1.40 N	Elevatio	n: 4.58 mOE	End Date:	10/01/2023	Logger:	RS+CMc	DR	AFT
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend		Des	cription			Mater Bac	ckfill
											Very stiff dark grey medium.	vish brown sligh	itly sandy CLAY. S	and is fine t	to		28.0
			100	0	0	N/A			(1.40)								- 28.5 -
																	-
29.00						-		-24.32	28.90		Very stiff dark grey	vish brown sligh	ntly sandy slightly	/ gravelly CL	AY. Sand		29.0
29.00 - 29.45	5 SPT(C) N (6,7/8,8)	l=31 ,7,8)									dark grey limeston	ravel is subang ie.	ular fine to coars	e of predor	ninantiy		-
	Hammei	r SN = 0208															29.5 —
			100	0	0												-
									-								30.0 — — —
30.50						N/A			(3.10)								- - 30.5 -
30.50 - 30.95	5 SPT(C) N	=34 8 0)															-
	Hammer	r SN = 0208							-								
			90	0	0												-
																	31.5 —
																	-
32.00								-27.42	32.00		Dense dark grey sl	ightly sandy slig	ghtly clayey suba	ngular fine	to		32.0
											coarse.	predominantiy	uark grey innest	one. Sanu is	s line to		-
			50	0	0	N/A			- (150)	· · · · · · · · · · · · · · · · · · ·	00 55 00 50 4301 (7						-
					Ū	,,,					32.75-33.50m: AZCL (P	ossibly due to fines a	i <u>n</u> d gravel being washei	d out with flush).			 33.0
											Dense dark greyisł	n brown slightly	v sandy clayey sul	bangular fir	ne to		-
33.50								-28.92	33.50		coarse GRAVEL of Dense dark greyisł	dark grey limes 1 brown slightly	tone. Sand is fine gravelly clayey f	e to coarse. ine to coars	se SAND.		33.5 — -
						N/A			(0.75)		Gravel is subangul Very stiff dark grey	ar fine to coars vish brown sligh	e of dark grey lim tly sandy gravell	nestone. y CLAY with	low		-
						,			- (0.1.0,		cobble content. Sa coarse of predomi	nd is fine to co nantly dark gre	arse. Gravel is su y limestone. Cob	bangular fir bles are sul	ne to bangular		34.0 —
			95	0	0			-29.67	34.25		of dark grey limest 35.00-35.40m: Dark bro	one. wnish grey slightly sa	andy slightly clayey sub	angular fine to c	coarse		_
						N/A			(0.75)		gravel. Medium strong thi	inly to thickly la	aminated dark gr	ey LIMESTO	DNE.		34.5 — -
35.00								-30.42	35.00		spacing, clay infill	on some fractu	re surfaces within	n top 40cm	of		 35.0
35.00 - 35.15	5 SPT(C) 5	0 (25 for									stratum.						-
	79mm) H	Hammer SN									Discontinuities:						35.5 —
	- 0208		95	0	0						1. 35-55 degree be planar, predomina	edding fractures natly smooth, o	s, closely spaced clay infill on some	(30/165/54 e fracture si	10), urfaces		-
						N/A			(2.00)		(up to 20mm thick).					36.0
											2. 70-90 degree jo 39 50-39 70m pla	ints from 37.40 nar to undulati	-37.70 and 38.75	5-38.90m ar ofill on ioint	nd from		-
36.50											37.40-37.70m (up	to 25mm thick)).	inin on jointe			36.5 — -
								-37 47	37.00		3. 10-30 degree jo	ints, medium sj	paced (140/570/	1400), plana	ar,		- - 37.0
			TCR	SCR	ROD	FI		52.42	57.00		37.00-37.40m: Moderate	ely weak from 37.00-	37.40m, clay infill on m	ost fracture surf	faces.		
	Water	Strikes		oon			Chisellin	g Details		Remarks	;						
Struck at (m) C 0.30	asing to (m) 0.30	Time (min)	Rose	e to (n	n) F	rom (10.5	m) To (0 13.	(m) Tim .50 0	e (hh:mm) 03:00	Inspectior	n pit machine excava	ted to 1.50m.					
4.30	4.30																
Casing D)etails	Water	Add	ed													
To (m) [15.00	Diam (mm) 250	From (m) 4.30	Tc 2	o (m) 7.50													
27.50 41.00	200 145					Core	Barrel	Flush	Туре	Terminat	tion Reason				Last Upd	ated	
						S	K6L	Wat	ter	Terminate	d at scheduled dept	h.			12/06/2	023	AGS

	1						Proje	ect No.	Project	t Name: 3FM Pla	nning Design Gl	- Lot A DP	PC Lands		Borel	hole ID
	CAU	ISE	W	/ A	Y		22-1	.041A	Client:	Dublin P	ort Company (D	PC)			BH	123
		-GE	011	ECI	Н				Client's	s Rep: RPS						
Metho Inspection	n Pit 3t E	nt Use	d or	Top	(m) .00	Base (m 1.50) Coord	dinates	Final De	epth: 41.00 m	Start Date: 18/2	11/2022	Driller: B	M+GT	Sheet	t 5 of 5
Cable Percu Rotary Co	ussion Dan oring Ber	do 200 etta T4)0 4	1. 27	50 .50	27.50 41.00	71961 7333!	15.17 E 51.40 N	Elevatic	on: 4.58 mOD	End Date: 10/0	01/2023	Logger: R	S+CMc	DR	AFT
Depth (m)	Samples / Field Reco	ords TC	R SCR	RQD	FI	Casing Water Depth Deptr	Level	Depth (m)	Legend		Description	n			Vater Ba	ckfill
(111)		+	+	+	\vdash	(m) (m,			+	. Medium strong thir	nly to thickly laminat	ted dark gre	y LIMESTON	E.	3	-
27 70 - 37 80	C1	10	0 43	10						Slightly weathered: spacing, clay infill o	slightly reduced strong n some fracture surf	ength, siigni faces within	tly closer fra top 40cm of	cture f		37.5 —
37.80 - 37.90	C1 C2									stratum.						
38.00			Τ							Discontinuities:	··· • •		- 1: 5= /5 40			-
38.40	СЗ									 1. 35-55 degree bec planar, predominan (up to 20mm thick) 	dding fractures, clos natly smooth, clay in	ely spaced (fill on some	30/165/540 fracture sur), faces		
		100	0 100	90	9			(4.00)		2. 70-90 degree joir 39.50-39.70m, plan	nts from 37.40-37.70 har to undulating, roo	0 and 38.75- ugh, clay inf	-38.90m and ill on joint fr	om		
39.50					-					37.40-37.70m (up to	to 25mm thick).	(140/570/1	400) olanar			
39.50 - 39.70 39.70 - 39.90	C4 C5									rough.	ills, illeuluiri spacea	(140/370/2	.400), piana.,	, 		3
										•						40.0
		100	0 100	83						-						
										-						40.5
41.00				<u> </u>	<u> </u>		-36.42	41.00		 	End of Borehole a	-+ 41 00m				41.0
												dl 4 1.00m				
																41.5 — -
																-
																42.0
																- 42.5 —
																-
																43.0
																43.5 — -
																- 44.0
																-
																44.5 — -
																-
																45.0 — - -
																- 45.5 —
																-
																46.0
																-
	Martine Chrikes	тся	R SCR	RQD	FI		Datail	<u> </u>								
Struck at (m) Ca	Water Strikes using to (m) Time (n	nin) Ro	se to (m) F	[;] rom (Chiseilin (m) Tc	ig Details	، ne (hh:mm)	Remarks Inspection	; n pit machine excavat	ed to 1.50m.					
0.30 4.30	0.30 4.30				10.50	0 13	3.50	03:00								
Casing De	etails Wa	ater Ad	ded	\neg												
To (m) Di	iam (mm) From (m)	To (m)													
27.50	200		27.52	┝	Core	Barrel	Flush	Туре	Termina	tion Reason				Last Upc	lated	
					S	K6L	Wa	iter	Terminate	ed at scheduled depth	۱.			12/06/2	.023	AGS

	Ċ	GEO	NAY TECH		Proje 22 -1	ect No. 1041A	Project Name: 3FM Planning Design GI - Lot A DPC Lands Client: Dublin Port Company (DPC) Client: DDC	Borehole ID BH124
Meti Inspect Cable Per Rotary	hod ion Pit rcussion Coring	Plant Used 3T Excavator Dando 2000 Comacchio 60	Top (m 0.00 1.50 1 20.50) Base (m 1.50 20.50 40.00) Coor 7195	dinates	Client's Rep: RPS Final Depth: 40.00 m Start Date: 18/11/2022 Driller: BM+JG Eleventions 175 m OD End Date: 10/11/2022 Levent DC CM	Sheet 1 of 5 Scale: 1:50
Denth	Sample /			Casing Water	/ 555	Denth		DKAFI
(m)	Tests	Field Reco	ords	Depth Depth (m) (m)	mOD	(m)	Legend Description MADE GROUND: Grey very sandy very clayey subrounded fine to	Backfill
0.50 0.50 1.00	ES1 B4 ES2	PID = 3.00ppm Seepage at 0.80m					coarse GRAVEL with high cobble content and cobbles sized fragments of red brick. Sand is fine to coarse. Cobbles are subangular.	
1.00 1.50 1.50 1.80 - 2.00 2.00 2.00	ES3 B5 D7 ES6	PID = 0.20ppm PID = 0.10ppm			3.25	1.50	MADE GROUND: Very stiff dark greyish black slightly sandy gravelly SILT with fragments of wood, plastic glass and red brick. Sand is fine to coarse. Gravel is subangular fine to coarse.	
2.00 - 2.45 2.00 2.50 2.50 2.80 - 3.00	SPT (C) ES9 B8	N=36 (3,7/7,15,8,6 = 1386 PID = 0.30ppm PID = 1.10ppm) Hammer SN	2.00 Dry	1.75	- 3.00	MADE GROUND: Very stiff greyish black sandy gravelly SILT with	2.5 — 3.0 —
3.00 3.00 3.00 - 3.45 3.00 3.50	D10 ES11 SPT (C) ES13	N=50 (2,2/12,14,19 SN = 1386 PID = 1.80ppm),5) Hammer	3.00 Dry			fragments of wood, plastic and glass. Sand is fine to coarse. Gravel is subrounded fine to coarse.	3.5
3.50 3.80 - 4.00 4.00 4.00 4.00 - 4.45	B12 D14 ES16 SPT (C)	PID = 5.50ppm N=19 (5,7/7,4,4,4) 1386	Hammer SN :	= 4.00 Dry	r			4.0
4.00 4.50 4.50 4.80 - 5.00 5.00 5.00 5.00 - 5.45	ES19 B15 D17 ES22 SPT (C)	PID = 1.50ppm PID = 12.00ppm N=14 (3,5/3,3,4,4)	Hammer SN :	= 5.00 4.7(-0.35	5.10	Medium dense grey gravelly fine to coarse SAND with shell fragments. Gravel is subrounded fine to coarse.	5.0 — - - 5.5 — - - - - - -
5.00 5.50 5.50 5.80 - 6.00 6.00 6.00	ES25 B18 D20 ES28	1386 PID = 12.90ppm PID = 2.10ppm			-2.25	7.00		6.0
6.00 - 6.45 6.00 6.80 - 7.00 7.50 7.50 - 7.95	SPT (C) B21 D23 SPT (C)	N=18 (3,4/5,4,4,5) 1386 PID = 1.90ppm N=25 (5,6/6,6,6,7) 1386	Hammer SN = Hammer SN =	= 6.00 4.50 = 7.50 5.10)		GRAVEL.	7.5
8.80 - 9.00 9.00 9.00 - 9.45	B24 D26 SPT (C)	N=27 (5,6/7,6,7,7) 1386	Hammer SN :	= 9.00 4.60)			8.5
Struck at (m) 0.80 Casing To (m)	Water Casing to (m 0.80 Details Diam (mm	r Strikes) Time (min) Rose + Water Adde) From (m) To	(m) From 12.0 (m)	Chisellir (m) To 00 15	ng Detail:	5 ae (hh:mm) 00:41	Remarks	
15.00 20.50 40.00	250 200 145		Cor	e Barrel	Flush Wa	ı Type ater	Termination Reason Last Upd Terminated at scheduled depth. 12/06/2	ated LI 023 AGS

	1						Proje	ect No.	Project	Name:	3FM Pla	nning Desig	;n GI - Lot A D	PC Land	s	Borehole ID
		CAUS	EW	AY			22-1	L041A	Client:		Dublin P	ort Compar	ny (DPC)			BH124
	/ -	G	EOTI	CH					Client's	s Rep:	RPS					
Metho	d	Plant U	lsed	Top (m)	Base	(m)	Coor	dinates	- Final Da		40.00 m		10/11/2022	Driller	DMUIC	Sheet 2 of 5
Inspection Cable Percu	n Pit Jssion	3T Excav Dando 2	vator 2000	0.00 1.50	1.5 20.	50 50	7195	12.78 E	Final De	eptn:	40.00 m	Start Date:	18/11/2022	Driller:	RINI+1C	Scale: 1:50
Rotary Co	oring	Comacch	io 601	20.50	40.	00	7333	76.20 N	Elevatio	on: 4	1.75 mOD	End Date:	18/11/2022	Logger:	RS+CMc	DRAFT
Depth	Sample /	Fie	ld Records		Casing	Water	Level	Depth	Legend		I	Des	cription			Backfill
(m)	Tests		iu necorus		(m)	(m)	mOD	(m)	Legenu							S Backing
																9.5 -
10.00 - 10.50	827															10.0
10.00 10.50	027							-								-
10.50	D29							-								10.5 -
10.50 - 10.95	SPT (C)	N=29 (5,6/7,7 1386	7,7,8) Ham	nmer SN =	10.5	5.30										
								-								11.0
								-								11.5 -
								-								
12.00 - 12.45	SPT (C)	N=30 (5,6/7,8 1386	8,7,8) Ham	imer SN =	12.0	6.10										12.0
																125
								-								-
								-								
13.50	B42							-								13.5 -
13.50 13.50 - 13.95	D43 SPT (C)	N=31 (6,7/8,7	7,8,8) Harr	mer SN =	13.5	8.10										
		1386						-								14.0
																14.5 -
15.00 15.00	В44 D45						-10.25	- 15.00		Dense g	rey subang	ular fine to coa	arse GRAVEL.			15.0 —
15.00 - 15.45	SPT (C)	N=31 (6,6/7,8 1386	8,8,8) Harr	mer SN =	15.0	9.50										
							-11.55	16.30		Ctiff boo	onoin a vonu	stiff group cons	hu CLAV Cand is f	ino to coo		
16.50	B30	11111-1-10-00	0/ D							зап вес	oming very	stiff grey sand	iy CLAY. Sand is n	ine to coar	se.	16.5 -
16.95 - 16.95	030	0010w=40 60	י∕₀ ĸecove	ý												
								-								17.0 —
										-						17.5 -
18.00	B31															18.0 —
18.00 18.00 - 18.45	D34 SPT (S)	N=23 (5 5/5 4	5 6 6) Ham	imer SN –	18 0	11 2										
10.00 - 10.43	(3)	1386	2,0,0j i idil		10.0	- 1.4				-						18.5 —
	Mate	r Strikes			Chic	alling	Dotail		Romarka							
Struck at (m) Ca	sing to (m	n) Time (min)	Rose to (r	n) From (m)	To (I	n) Tin	ne (hh:mm)	Inspection	• n pit mach	ine excavat	ed to 1.50m				
0.80	0.80			12.0	υ	15.0	00	00:41								
Casing Dr	ataile	Wator	νepμα	-												
To (m) Di	iam (mm) From (m)	To (m)													
15.00 20.50	250 200			Core	Barr	el	Flush	Type	Terminat	tion Reas	son				Last Un	dated 🗖 🗖
40.00	145				K6I		Wa	ter	Terminate	ed at scher	duled denth).			12/06/2	
															,,	AUD

		AUS	Ē	w	Ά	Y			Proje 22-1	ct No. 041A	Project Client:	Name	e: 3FM Pla Dublin F	inning Desig Port Compa	gn GI - Lot A D ny (DPC)	PC Lands	5	Bore BH	hole ID 1124
	9 –	C	GEC	DTE	EC	Н					Client's	Rep:	RPS						
Metho	od	Plant U	Jsed		Тор	(m)	Base	(m)	Coord	linates	Final De	oth:	40.00 m	Start Date:	18/11/2022	Driller:	BM+IG	Shee	et 3 of 5
Cable Perc	on Pit cussion	3T Exca Dando	vato 2000	r)	0. 1.	00 50	1. 20.	50 50	71951	.2.78 E		.p	10.00 111		10/11/2022		Diritio	Scal	e: 1:50
Rotary Co	oring	Comacch	io 60	01	20	.50	40.	00	73337	'6.20 N	Elevatio	n:	4.75 mOD	End Date:	18/11/2022	Logger:	RS+CMc	DF	RAFT
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			Des	scription	1		Water Ba	ckfill
																			-
																			19.0 — — —
																			- - 19.5 -
																			-
20.00	B32																		20.0
20.00 - 20.45	037	Ublow=50 80)% Re	cove	ry														-
									-15.75	20.50		Very s	tiff dark brow	vn slightly san	dy CLAY Sand is fi	ne.			20.5 —
																			21.0
						AZCL													-
																			21.5 — _
																			-
22.00 22.00	B33 D35		45	0	0		22.0	12.0											22.0
22.00 - 22.45	5 SPT(S) N (5,6/7,7	l=29 ,7,8)																	- - 22.5 -
	Hamme	r SN = 1387				N/A													-
																			23.0
																			-
23.50						Δ7CI				(6.30)									23.5 —
24.00	B39					~2CL													_ 24.0
24.00 - 24.45	U38Uble Recover	ow=50 50% v	30	0	0														-
						N/A													 24.5
																			-
25.00						AZCL													25.0 —
																			- 25.5 -
			30	0	0														-
26.00	B40 D41					N/A	23.0	14.0											26.0
26.00 - 26.45	5 SPT(S) N	I=30 6 10)																	-
26.50	Hamme	r SN = 1387							22.05	20.00									26.5 —
						AZCL			-22.05	26.80	<u>.0</u>	Dense coarse	dark grey sli GRAVEL of c	ghtly sandy sli Jark grey limes	ghtly clayey suba stone with low co	ngular fine bble conte	to nt. Sand		 27.0
			40	0	0							is fine	to coarse. Co	obbles are sub	angular of dark g	rey limesto	one.		-
						N/A													27.5 —
			TCP	SCP	ROD	FI					0								
	Water	Strikes		1 2011			Chis	ellin	g Details		Remarks								
Struck at (m) Ci 0.80	m) Casing to (m) Time (min) Rose to (m) From (m) 0.80 12.00								(m) Tim .00 0	e (hh:mm) 00:41	Inspection	n pit ma	chine excavat	ed to 1.50m					
Casing D To (m)	etails Diam (mm)	Water	Add To	ed (m)															
15.00 20.50	250 200			. ,		Corr	Barr		Eluate	Turc	Tormine	ion De	2505			T		lated	
40.00	145					S	K6L	eı	Wat	ter	Terminate	d at sch	neduled depth	٦.			12/06/2	2023	AGS

						v		Proj	ect No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole ID
			ΞEC	DTE	ECI	Н		22-	1041A	Client's Ren: RPS	01124
Meth	nod	Plant L	Jsed		Тор	(m)	Base (m) Coo	rdinates		Sheet 4 of 5
Inspecti Cable Per	ion Pit cussion	3T Exca Dando	vato 2000	r)	0.0	00 50	1.50 20.50	7195	512.78 E		Scale: 1:50
Rotary (Coring	Comacch	io 60	01	20.	.50	40.00	7333	376.20 N	Elevation: 4.75 mOD End Date: 18/11/2022 Logger: RS+CMc	DRAFT
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend Description	Backfill
28.00			53	0	0	AZCL			(2.70)	coarse GRAVEL of dark grey slightly sandy slightly clayey subangular fine to coarse GRAVEL of dark grey limestone with low cobble content. Sand is fine to coarse. Cobbles are subangular of dark grey limestone.	28.0
						N/A					-
29.50	200 200 200 200 200 200 200 200 200 200							-24.75	29.50 (0.50) - 30.00	Dark brownish grey slightly clayey fine to coarse SAND. Dark grey slightly sandy slightly clayey subangular fine to coarse GRAVEL of dark grey limestone. Sand is fine to coarse.	29.5
31.00 31.00	C1		43	0	0	AZCL N/A			 (2.50) 		31.0 — - 31.5 — - - - - - - - - - - - - - - - - - - -
32.50			33	0	0	AZCL		-27.75	32.50	Dark brownish grey slightly gravelly very clayey fine to coarse SAND. Gravel is subangular fine to medium.	32.5 —
34.00						N/A		-29.10	33.85	Dark brownish grey slightly sandy slightly clayey subangular fine to coarse GRAVEL of dark grey limestone. Sand is fine to coarse.	
35 50			33	0	0	AZCL N/A					34.5
55.50			33	0	0	AZCL					36.0
37.00											 37.0
			TCR	SCR	RQD	FI			-		
Struck at (m) 0.80 Casing To (m) 15.00	Water Casing to (m) 0.80 Details Diam (mm) 250	Strikes Time (min) Water From (m)	Rose Add	e to (n ed o (m)	n) Fi	rom (12.00	Chisellir m) To D 15	ng Detai (m) ™ 5.00	ls me (hh:mm) 00:41	Remarks	
20.50 40.00	200 145				-	Core	Barrel	Flus	h Type ater	Termination Reason Last Up Terminated at scheduled depth. 12/06/2	lated LI AGS

								Pi	roje	ct No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole ID
	C	CAUS	SE'	W		Y		2;	2-1 [/]	041A	Client: Dublin Port Company (DPC)	BH124
	- 14		SEC	OTE	ECI	Н					Client's Rep: RPS	
Meth	10d	Plant I	Jsed	-	Тор	(m)	Base (r	n) Cr	oord	linates	Final Denth: 40.00 m Start Date: 18/11/2022 Driller: BM+JG	Sheet 5 of 5
Cable Per	on Pit cussion	Dando	vato 2000	r J	1.	.50	20.50) 71	1951	.2.78 E		Scale: 1:50
Rotary (Coring	Comacch	1io 60	J1	20.	.50	40.00) 73	337	6.20 N	Elevation: 4.75 mOD End Date: 18/11/2022 Logger: RS+CMc	DRAFT
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing W; Depth Dr (m) (ter Lev pth m) mC	vel DD	Depth (m)	Legend Description	Backfill
											Dark brownish grey slightly sandy slightly clayey subangular fine to	
						N/A		-32	.85	37.60	Very stiff thickly laminated brown slightly gravelly slightly sandy CLAY	37.5 —
			87	23	10	`` ,``				(0.65)	(highly to completely weathered calcareous mudstone bedrock).	38.0
								-33	.50	38.25		
38.50			\vdash	<u> </u>	<u> </u> _'	5				(0.55)	weathered: significantly reduced strength.	38.5 —
								-34	.05	38.80	Discontinuities:	
											1	39.0
			100	20	10	NI				(1.20)	2. 0-5 degree bedding fractures at 38.85m and 38.65m, planar, rough.	
											$\frac{1}{1 + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}}$ Very stiff brown and light brownish grey slightly gravelly CLAY (highly $\frac{1}{1 + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}}$ to completely weathered mudstone). Sand is fine to coarse. Gravel is	- 49.5
40.00			L					-35	.25	40.00	Image: State of the state o	40.0
												40.5 —
												41.0
												415
												- c.1+
												42.0
												42.5
												43.0
												43.5 -
												44.0
												44.5 —
										Ę		45.0
												45.5
												46.0
			TCR	SCR	800							
	Water	Strikes	10	30	N.w.=		Chisel	ling De ¹	tails	,	Remarks	
Struck at (m) 0.80	Casing to (m) 0.80) Time (min)	Rose	e to (n	n) Fr	rom (12.0	_m) 7 0	io (m) 15.00	Time	e (hh:mm) 00:41	Inspection pit machine excavated to 1.50m	
Casing I	Details	Water	Add	led								
To (m) 15.00	Diam (mm) 250	From (m)	Тс	(m) כ	7							
20.50 40.00	200 145					Core	Barrel	Fir	ush '	Туре	Termination Reason Last Upda	ated
						S	K6L		Wat	ter	Terminated at scheduled depth. 12/06/20	AGS

						Proj	ect No.	Project	t Name: 3FM Pla	nning Design GI - Lot A D	PC Lands		Borel	nole	ID
	C	CAUS	EW	AY		22-:	1041A	Client:	Dublin P	ort Company (DPC)			вн	125	5
	8/ -	G	EOTI	ECH				Client'	s Rep: RPS						
Meth	hod	Plant U	lsed	Top (m)	Base (r	n) Cooi	rdinates	Final De	anth: 36.50 m	Start Date: 01/12/2022	Driller: BM+	IG	Sheet	t 1 o	ŕ4
Inspecti Cable Per	ion Pit rcussion	3T Excav Dando 2	vator 2000	0.00 1.70	1.70 21.50) 7195	510.27 E		:ptil. 30.30 m	Start Date: 01/12/2022		.10	Scale	e: 1:5	50
Rotary D	Drilling	Comacch	io 601	21.50	35.00	7334	⊧50.28 N	Elevatio	9. 4.94 mOD	End Date: 17/01/2023	Logger: RS+0	CMc	DR	AF1	-
Depth (m)	Sample / Tests	Fie	ld Records		Casing Wa Depth Dep (m) (n	ter Level	Depth (m)	Legend		Description		Mator	Bac	:kfill	
									MADE GROUND: Br	ownish grey very sandy very cl	ayey subrounded	d l	-		
0.50 0.50	ES1	PID = 1.70ppr	m						fragments of tar an subrounded.	d red brick. Sand is fine to coar	rse. Cobbles are				0.5
1.00 1.00 1.00 1.50	B4 ES2 ES3	PID = 10.00pp	pm												1.0
1.50 1.80 - 2.00 2.00	B5 D16	PID = 3.30ppr	m			3.24	1.70		MADE GROUND: St fragments of wood,	iff dark greyish black sandy gra , plastic and cloth. Sand is fine	velly SILT with to coarse. Gravel	l is			2.0
2.00 2.00 - 2.45 2.00	ES9 SPT (C)	N=19 (2,5/9,5 1386 PID = 11.80pp	5,3,2) Ham om	imer SN =	2.00 D	ry			subrounded line to	Coarse.					2.5
2.50 2.50 - 21.00 2.50 2.80 - 3.00	ES10) B41	PID = 2.30ppr	m												3.0
3.00 3.00 3.00 - 3.45	D17 ES11 SPT (C)	N=17 (2,2/3,3	3,5,6) Ham	ımer SN =	3.00 D	ry									3.5
3.00		1386 PID = 30.30pr	pm												4.0
3.50 3.50	ES12	PID = 7.30ppr	m												
3.80 - 4.00 4.00	B7 D18						-						-		4.5
4.00 4.00 - 4.45	ES13 SPT (C)	N=26 (3,4/13	,8,2,3) Ha	mmer SN	4.00 D	ry									
4.00	514/4	= 1386 PID = 10.70pp	pm			-0.06	- 5.00		Medium dense grey fragments. Gravel is	y gravelly fine to coarse SAND v s subangular fine to coarse.	vith shell			8	5.0 _
4.46 4.50 4.50	EW1 ES14	PID = 5.50ppr Slow seepage	m e at 4.70m						- -						5.5 -
4.80 - 5.00 5.00 5.00 5.00 - 5.45	B8 D19 ES15 SPT (C)	N=17 (4,5/4,4	4,4,5) Harr	ımer SN =	5.00 4.	50									6.0 -
5.00 5.50	ES24	1386 PID = 18.90pp	pm												6.5 -
6.00 6.00 6.00 - 6.45	D26 ES25 SPT (C)	N=17 (3,3/4,4	4,4,5) Ham	ımer SN =	6.00 4.0	-2.16 60	7.10		Medium dense grey	y sandy subangular fine to coar	se GRAVEL.				7.0
6.00 7.30 - 7.50 7.50	B21 D27	1386 PID = 13.40pp	pm												8.0 -
7.50 - 7.95	SPT (C)	N=20 (4,4/4,5 1386	5,5,6) Ham	imer SN =	7.50 5.3	20									8.5
9.00 9.00 - 9.45	D28 SPT (C)	N=25 (5,6/6,6 1386	5,6,7) Harr	nmer SN =	9.00 4.	70									9.0
Struck at (m)	Water Casing to (m	r Strikes	Rose to (r	n) From (Chisell	ing Detai וה (m) דיי	i S me (hh:mm)	Remarks	nit machine excavat	ed to 1 70m					l
4.70	4.70	Water	Added	12.0	0	15.00	03:00	inspection	i pit machine excavati	eu to 1.70m					
IO (M) 15.00	Diam (mm) 250) From (m) 5.00	ro (m) 21.50	_											
26.00 35.00	200 150			Core	Barrel	Flush	า Туре	Termina	tion Reason		Las	t Upda	ited	Ļ	IJ
	1			S	K6L	W	ater	Terminate	ed at scheduled depth	l.	12	2/06/20	23	A	55

					Pro	ject No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole ID
	CAUS	EW			22-	-1041A	Client: Dublin Port Company (DPC)	BH125
	(EOH	CH				Client's Rep: RPS	
Method Inspection Pit	Plant L 3T Exca	Jsed vator	Top (m) 0.00	Base (n 1.70	1) Coc	ordinates	Final Depth: 36.50 m Start Date: 01/12/2022 Driller: BM+JG	Sheet 2 of 4 Scale: 1:50
Cable Percussic Rotary Drilling	on Dando g Comacch	2000 nio 601	1.70 21.50	21.50 35.00	719 733	510.27 E 450.28 N	Elevation: 4.94 mOD End Date: 17/01/2023 Logger: RS+CMo	DRAFT
Depth Sam (m) Te	ple / sts Fie	eld Records		Casing Wat Depth Dep (m) (m	m Level mOD	Depth (m)	Legend Description	Backfill
10.30 - 10.50 B22 10.50 D29 10.50 - 10.95 SPT 11.00 - 12.00 B23	2 9 • (C) N=28 (5,6/7, 1386 3	7,7,7) Han	imer SN =	10.5 8.1	0			9.5
12.00 D3(12.00 - 12.45 SPT) (C) N=30 (5,6/7, 1386	7,7,9) Ham	nmer SN =	4.7	-7.06	5 – 12.00	Medium dense to dense grey silty subrounded fine to coarse GRAVEL.	- - - - - - - - - - - - - - - - - - -
13.00 - 13.50 B32	2							 13.0
13.50 D33 13.50 - 13.95 SPT	3 (C) N=28 (6,6/6, 1386	7,7,8) Ham	nmer SN =	13.5 5.1	0			13.5 — — — — — — — — — — — — — — — — — — —
14.50 - 15.00 B34	1							
15.00 D35 15.00 - 15.45 SPT	5 (C) N=29 (6,6/7, 1386	7,7,8) Ham	imer SN =	15.0 6.2	0			15.0 —
16.00 - 16.50 B36	5				-10.7	6 15.70	Very stiff dark greyish black sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.	
16.50 D37 16.50 - 16.95 SPT	7 - (S) N=31 (6,7/8, 1386	7,8,8) Ham	nmer SN =	16.5 9.1	0		Test Control (A) Execution	16.5 17.0
17.50 - 18.00 B38 18.00 18.00 - 18.45 SPT	9 7 (S) N=31 (5,7/8, 1386	8,7,8) Ham	nmer SN =	18.0 1.5	0			17.5
w	ater Strikes	1		Chisell	ng Deta	ils	Remarks	
Struck at (m) Casing 1 4.70 4.7 Casing Detail	to (m) Time (min) 0 s Water mm) From (m) 0 5.00 0 0	Rose to (r Added To (m) 21.50	n) From (12.00	m) T) 1 Barrel	5.00 Flue	rime (hh:mm) 03:00 sh Type Vater	Inspection pit machine excavated to 1.70m Termination Reason Last U Terminated at scheduled depth	odated
			3		, v	.a.cl		AUD

GEOTECH 22-1041A Client: Dublin Port Company (DPC)	BH125
Method Plant Used Top (m) Base (m) Coordinates Final Denth: 36.50 m Start Date: 01/12/2022	Sheet 3 of 4
Inspection Pit 3T Excavator 0.00 1.7	Scale: 1:50
Depth Sample / Caing war Level Depth	
(m) Tests Field Records Degrin branch mOD (m) Legend Description	
19.00 - 19.50 B40	
19 50 - 19 95 U31 Ublow=50 70% Becovery 19 515 4	
	-
	20.0
	 20.5
21.00 D44 21.00 - 21.45 SPT (S) N=29 (5,5/6,7,8,8) Hammer SN = 21.0 4.50	
-16.56 21.50 Very stiff often thinly to thickly laminated dark brown slightly sandy	21.5 —
	 22.0
54 0 0	-
22.50 - 23.00 B43	22.5 —
23.00 23.00 - 23.45 U42Ublow=50 70%	 23.0 —
Recovery X	 23.5
	-
	24.0
24.50 Z4.50 R45	
25.00 - 25.45 SPT(5) N=34 (6,7/8,9,8,9) 63 0 0	-
Hammer SN = 1387	
	26.0
	20.5
	 27.0 —
27.50 Dry	27.5 —
27.50 - 27.95 SPT(C) N=32 (5,5/7,8,8,9) Hammer SN = 1387 rp. cop pp. rt	
Water Strikes Chiselling Details Remarks	
Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Time (hh:mm) 4.70 4.70 12.00 15.00 03:00 Inspection pit machine excavated to 1.70m	
Casing Details Water Added	
To (m) Diam (mm) From (m) To (m) 15.00 250 5.00 21.50 26.00 200	
25.00 250 250 35.00 150 SK6L Water Terminated at scheduled depth. 12/06/20.	23 AGS

								Proj	ect No.	Project	Name: 3FM Pla	anning Desig	n GI - Lot A DI	PC Lands		Boreho	le ID
	CA	۲US	E	W	A	Y		22-:	1041A	Client:	Dublin F	Port Compar	ny (DPC)			BH12	25
	/ —	—-G	EC)TE	ECI	Н				Client's	Rep: RPS						
Metho	d	Plant U	Jsed		Тор	(m)	Base (r	n) Coor	dinates			Stort Date:	01/10/2022	Duillor: DA	1.10	Sheet 4	of 4
Inspection Cable Percu	ו Pit ussion	3T Exca Dando 2	vator 2000	·)	0.0	00 .70	1.70 21.50	7195	- 10.27 E	Final De	ptn: 36.50 m	Start Date.	01/12/2022	Driller: Div	N+JG	Scale:	1:50
Rotary Dri	lling (Comacch	1io 60)1	21.	.50	35.00	7334	50.28 N	Elevatio	n: 4.94 mOD	End Date:	17/01/2023	Logger: RS	+CMc	DRA	FT
Depth (m)	Samples / Fie	d Records	TCR	SCR	RQD	FI	Casing Wat Depth Dep (m) (n	tr dh) mOD	Depth (m)	Legend		Desc	cription			Backfi	
					<u> </u>			\square		×	Very stiff often thin slightly silty CLAY. S	nly to thickly lai Sand is fine.	minated dark bro	wn slightly sa	ndy		28.0
			11							×	28.15-29.00m: AZCL (Po	ossibly due to fines b	eing washed out with flu	ısh).			
			41				1			×							28.5 —
20.00				_													-
29.00 29.00 - 29.45	SPT(C) N=37	7					Dr	y		×							29.0
	(4,6/8,9,9,1 Hammer SN	.1) N = 1387					1			×	29.40-30.50m: AZCL (Pc	ossibly due to fines b	eing washed out with flu	ish).			29.5
			30	0			1			×			-				
			50				1			×							30.0
					'		1			×							-
30.50				\vdash	<u> </u>		Dr	v			Ц						30.5
30.50 - 30.95	SPT(C) N=34	4			'		1	, -25.86	20.80	×							
	(5,6,6,6,5,5 Hammer SN) N = 1387			'		1	-23.00	50.00	a X o X o a X o	Dense dark grey sli	ightly sandy slig	shtly clayey anguive limestone with	lar to subangu Iow cobble	ılar		31.0
			47	0	0	N/A	1			a X , a X 9	content. Cobbles a	re subangular o	of dark grey limes	stone. Sand is	fine		
					'		1		(1.20)	0 × ۲ × ۲ •	31.05-32.00m AZCL (Po	ossibly due to fines ar	nd gravel being washed	out with flush).			- 31.5 —
					'		1			• × • • • • •							
32.00			\mid	⊢-'	<u> </u> '		Di	y -27.06	32.00	°°×°°	Stiff clightly sandy	cliabtly cilty (L	AV Sand is fine				32.0
32.00 - 32.30	0 0 - 32.30 SPT(C) 50 (7,13/50 for 150mm) Hammer SN = 1387						1		(0.50)	×	Sull Silginity Sundy .	Slightly sirry CE	AY. Jahu is inic.				
	9 - 32.30 SPT(C) 50 (7,13/50 for 150mm) Hammer SN = 1387				'		1	-27.56	32.50	X	Dense dark grey sli	ightly sandy slig	obtly clavey prede	minantly			32.5
			50	0	0		1			000 - U	subangular fine to	coarse GRAVEL	of dark grey lime	estone with lo	w		
					'		1				grey limestone.	nd is fine to co	arse. Cobbies are	subangular o	f dark		33.0
					'		1				32.75-33.50m: AZCL (PC	ossibly due to fines a	<u>n</u> d gravel being washed	l out with flush).			-
33.50		- 10/50	\vdash	\vdash	<u> </u> '		Dr	У	(2.20)								33.5 —
33.50 - 33.80	for 150mm)	5,18/50)			'		1		· · · · · · · · · · · · · · · · · · ·	0.00							
	Hammer SN	∖ = 1387			'		1										34.0 —
			100	15	7		1										
					'		1										34.5 —
					'		1	-29.76	34.70		Medium strong, log	cally moderate	ly weak, thickly la	minated to th	ninly		
35.00 35.00 - 35.18	SPT(C) N=5(0 (25 for	\vdash	 	\square		Dr	У			reduced strength, l	locally reduced	strength, closer	fracture spaci	ng,		35.0 -
55.00 12.22	65mm/50 fr	or		1 1	'		1				patchy brown stain joint surface.	ning on most fra	acture surfaces, c	lay infill on or	ne		
	115mm) на SN = 1387	immer		1 1	'	14	1		(1.80)		Discontinuities						35.5 -
			100	86	52		1					··· • •		((
					'		1				1. 5-10 degree bea smooth, pathcy bro	lding fractures, own staining or	closely spaced (1 n most joint surfa	15/75/420), pi ces.	anar,		36.0
					'		1				2. 75-90 degree joi	int from 35.10-	35.60m. undulati	ng. rough, pat	tchv		-
36.50							1	-31.56	- 36.50 -		brown staining on j	joint surface.	JJ.0011, anaa.c	115, 1005.,	icity		36.5
					'		1		Ē		3. 60-75 degree joi	int from 35.90-	36.05, planar, rou	igh, clay infill (on /		-
							1				joint surface (up to	15mm thick). End of Bore	hole at 36.50m				37.0
) Michar St	11-24	TCR	SCR	RQD	FI		· Datai	<u> </u>	Domorke	L						
Struck at (m) Ca	sing to (m) Ti	пкеs me (min)	Rose	to (r	n) F	rom (m) T		S me (hh:mm)	Inspectior	י ג pit machine excavat	ted to 1.70m					
4.70	4.70				Τ	12.00	ז ו	.5.00	03:00	· .	. F.						
										I							
				_						I							
Casing De	atails	Water	Adde	ed						I							
To (m) וע 15.00	am (mm) Fi 250	rom (m) 5.00	21	(m) 1.50	\neg					I							
26.00 35.00	200 150				'	Core	Barrel	Flush	ı Туре	Terminat	tion Reason			L	ast Upd	ated	
						S	K6L	W	ater	Terminate	d at scheduled depth	h.			12/06/2	023	\GS

					Proje	ect No.	Project	t Name: 3FM Pla	nning Design GI - Lot A	DPC Lands	Bc	rehole	ID
	XI C		VAY		22-1	041A	Client:	Dublin P	ort Company (DPC)			BH12(6
	- <i> </i>	GEO	TECH				Client'	s Ren' RPS	,,,,,				
Met	hod	Plant Used	Top (m) Base (m)	Coor	dinates	chent				Sł	neet 1 o	f 1
Inspect	ion Pit	3t Excavator	0.00	1.50	7100	DC 11 F	Final De	epth: 1.50 m	Start Date: 23/11/2022	Driller: RS	S	cale: 1:	50
					7334	96.11 E 43 52 N	Flevatio	4 89 mOD	End Date: 01/12/2022	Logger: BS			г
					, 551	13.32 11	Lievatic	4.85 1100		LUGGEI. NO		DNAI	1
Depth (m)	Sample / Tests	Field Reco	rds	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend		Description		Wate	Backfill	
0.00 - 1.00	U5	Ublow=94 70% Reco	overy		4.64	0.25		MADE GROUND: GI GRAVEL. Sand is fin	rey sandy very silty subrounc e to coarse.	ed fine to coarse			-
0.50	ES1				4.49	0.40		MADE GROUND: Gi coarse GRAVEL with	rey slightly sandy very silty su high cobble content. Sand i	ibangular fine to s fine to coarse.			0.5 —
0.50		PID = 2.30ppm				-		Cobbles are angula	r. erv dense dark grev slightly s	andy very silty]		-
1.00	B4					-		angular fine to coar	se GRAVEL with low cobble	content and cobble			1.0
1.00 1.00 - 1.08	ES2 SPT (C)	50 (25 for 75mm/50	for 0mm)			-		fragments of steel a	and glass and a hydrocarbon	odour. Sand is fine to			-
1.00		Hammer SN = AI2 PID = 9.70ppm			3.39	1.50		coarse. Cobbles are 0.40 - 0.40 Terram at 0.4	subangular. ^{Om}				1.5 —
1.50	ES3	DID = 1.40ppm				-			End of Borenole at 1.50m				-
1.50		PID = 1.40ppm				-							2.0 -
						-							-
						-							2.5 -
						-							-
						-							3.0
						-							-
						-							3.5 —
						-							-
													4.0
						-							-
						-							4.5 —
						-							-
						-							5.0 -
						-							-
						-							5.5 -
						-							-
						-							
						-							-
						-							-
						-							7.0
						-							-
						[7.5
						-							-
						-							8.0
						-							-
						-							8.5 —
						-							-
													9.0 -
						-					-		-
Struck at (m)	Wate	r Strikes	Ca	m) Dian	ls R	emarks	it machin	e excavated to 1 50m					
	<u> </u>				N	lo groundw	ater enco	untered.					
					L			-		· · · ·			
						erminatio	m Keaso	n		Last U	pdated	╵┠	븼
					Te	erminated	on refusal			12/0	5/2023	A	55

					Proj	ect No.	Project	t Name: 3FM Pla	nning Design GI - Lot A D	PC Lands	Bo	rehole	e ID
	<u>}</u>	CAUSEW	AY		22-:	1041A	Client:	Dublin P	Port Company (DPC)		B	H126	БA
	8 -	GEOT	ECH				Client'	s Rep: RPS					
Met	nod	Plant Used	Top (m)	Base (r	n) Coor	rdinates	Final De	• nth: 150 m	Start Date: 01/12/2022	Driller: IM	Sł	neet 1 c	of 1
Dynamic S	ampling	Premier 110	0.00	1.50	7193	95.11 E					S	cale: 1:	:50
					7334	44.52 N	Elevatio	9 1 4.89 mOD	End Date: 01/12/2022	Logger: RS		DRAF	Т
Depth (m)	Sample / Tests	Field Records	I	Casing Wat Depth Dep (m) (m	th) mOD	Depth (m)	Legend		Description		Water	Backfill	
0.00 - 1.00	U1	Ublow=129 60% Recov	ery			-		MADE GROUND: Da with cobbles and fr	ark greyish black angular fine to agments of glass and plastic. C	o coarse GRAVEL	-		-
						-		subangular.					0.5
					4.09	- 0.80							· -
1.00 - 1.45	SPT (C)	N=22 (1,1/2,10,4,6) Ha	mmer SN	Dr	y 3.79	- 1.10							1.0
1 / 5 1 69		= AIZ	Hammor			-		MADE GROUND: De	ense greenish grey COBBLES wi	th some clay.		_	-
1.45 - 1.06	3P1 (C)	SN = AI2	naiiiiiei		y 3.39	- 1.50	*****		End of Borehole at 1.50m				1.5 —
						-							2.0 -
						-							-
						-							2.5
						-							-
						-							3.0
						-							3.5 —
						-							-
						-							4.0
						-							-
						-							4.5 —
						-							5.0 -
						-							-
						-							5.5 —
						-							-
						-							6.0 -
						-							65
						-							-
						-							7.0
						-							-
						-							7.5 -
						-							80-
						-							-
						-							8.5
						-							-
						-							9.0
	Wate	r Strikes	Cas	ing Det	ails F	Remarks							
Struck at (m)	Casing to (m)) Time (min) Rose to (r	n) To (m	n) Dia	ameter F	Hand dug in No groundw Ferminatic	spection p vater enco	nit excavated to 1.20m untered.	n.	Last	Updated	1	
					г	Ferminated	on refusal			12/	/06/2023	A	GS

						Proje	ect No.	Project	t Name: 3FM Pla	anning Design GI - Lot A D	PC Lands	B	orehol	e ID
	2) (AUSEW	VAY			22-1	041A	Client:	Dublin P	Port Company (DPC)			BH12	27
	9 -	GEOT	ECH			l		Client'	s Rep: RPS					
Metł	hod	Plant Used	Top (m)	Base	e (m)	Coor	dinates		·	1	T		Sheet 1	of 1
Dynamic S	Jampling	Premier 110	0.00	3.	.00	7103	40.16 E	Final De	:pth: 3.00 m	Start Date: 01/12/2022	Driller: JM		Scale: 1	.:50
						7333	42.10 E 89.93 N	Flevatic	4 65 mOD	End Date: 01/12/2022	Logger: RS	\top		:т
				Casing	Water						LUBBCT THE	+-		
Depth (m)	Sample / Tests	Field Records	5	Depth (m)	Depth (m)	Levei mOD	Deptn (m)	Legend		Description		Wate	Backfill	
0.00	B7					1 25	0.30		MADE GROUND: Da with fragments of g	ark greyish black angular fine to glass.	coarse GRAVEL			
0.50	ES1					4.35	0.40		MADE GROUND: La MADE GROUND: D	arge COBBLE Park grevish black ASH with frag	ments of red brick,	7	· ·	0.5
0.50		PID = 2.70ppm				I	-		plastic and timber.					·]
1.00	B8					3.75	0.90		MADE GROUND: Ve	ery soft dark greyish black sligh	tly sandy gravelly	-		1.0
1.00 1.00 - 1.45	ES2 SPT (C)	N=4 (1,0/1,0,1,2) Harr	nmer SN =			I	-		CLAY with fragment Gravel is subangula	ts of timber and red brick. Sand ar fine to coarse.	l is fine to coarse.			
1 00		AI2 PID = 2.70ppm				I								1.5
1.50	ES3					I	-							
1.50 2.00	В9	PID = 6.40ppm				2.65	2.00		MADE GROUND: M	Aedium dense grey very sandy :	silty subangular fine	2		2.0
2.00 2.00 - 2.45	ES4 SPT (C)	N=17 (1.2/3.3,6,5) Ha	mmer SN =	_		I	-		to coarse GRAVEL.	Sand is fine to coarse.				:] _
2.00 2.13		AI2	lliner o			I	-						H	2.5
2.50	E35					l	-							1
3.00	ES6		CN			1.65	- 3.00			End of Borehole at 3.00m				3.0
3.00 - 3.45	SPI (C)	N=16 (0,1/9,5,1,1) Hai Al2	mmer SN =			I	-	'						=
3.45 - 3.90	SPT (C)	Water strike at 3.00m N=50 (2,6/12,16,11,1	1) Hammer	r		l		'						3.5
0.12	. ,	SN = AI2	.,			l	-	'						
						l	-	'						4.0 -
						l	-	'						
						l	-	'						4.5
						l	-	'						
						l	-	'						5.0
						I	-	'						
						l		'						5.5
						I	-	'						
						I	-	'						6.0
						l	-	'						
						l		'						6.5
						l	-	'						
						I		'						7.0
						l	-	'						
						l	-	'						7.5
						l	-	'						
						l	-	'						8.0
						l	-	'						
						l	-	'						8.5
						I	-	'						
						l	-	'						9.0
							-					_		
~ <u>t</u> t ()	Wate	r Strikes		sing [Detai	ls R	emarks							
3.00	3.00	20 2.50	<u>m) Io (ii</u>		Diam	eter H	and dug in	spection p	it excavated to 1.20m	n.				
	I				L									
	I				L									
	I				L.									
	1													
	I				L	Т	erminatic	on Reaso	n		Last l	Jpdate	ed 📕	
	I				L	Т	erminated	on refusal			12/0)6/202:	3	rig R
													1	

		ALISEW	ΔΥ		Proje	ect No.	Project	t Name: 3FM Pla	nning Design GI - Lot A D	PC Lands	Bo	rehole	e ID o
		GEOT	ECH		22	1041A	Client'	s Ren: RPS	on company (DPC)			20120	0
Meth	hod	Plant Used	Top (m)	Base (r	n) Coor	dinates	- Final D		Stort Date: 22/11/2022	Drillon IM	Sh	ieet 1 c	of 1
Inspecti Dynamic S	ion Pit Sampling	3t Excavator Premier 110	0.00 1.50	1.50 2.60	7193	73.75 E		2.60 m	Start Date: 23/11/2022	Driller: JM	S	cale: 1:	50
					7334	62.43 N	Elevatio	on: 4.71 mOD	End Date: 01/12/2022	Logger: RS	[JRAF	Т
Depth (m)	Sample / Tests	Field Records		Casing Wa Depth Dep (m) (n	er th) mOD	Depth (m)	Legend		Description		Water	Backfill	
0.50 0.50 1.00 1.00 1.00 1.50 1.64 2.00 - 2.45 2.45 - 2.60	ES1 B4 ES2 SPT (C) ES3 EW1 SPT (C) SPT (C) SPT (C)	Field Records PID = 0.40ppm Al2 PID = 2.40ppm PID = 0.10ppm Slow flow at 1.50m N=30 (1,2/12,15,2,1) H SN = Al2 Seepage at 2.00m 50 (2,17/50 for 0mm) I SN = Al2	mer SN = lammer Hammer	sing Det n) Di	ails F ails F Immeter N	Depth (m) - 0.65	g inspectio	MADE GROUND: G Sand is fine to coars MADE GROUND: Lo coarse GRAVEL with fine to coarse. MADE GROUND: Ve of timber and glass to coarse.	Description rey sandy very silty angular fine se. oose dark grey very sandy silty i h coarse gravel sized fragments ery stiff grey sandy gravelly CLA . Sand is fine to coarse. Gravel End of Borehole at 2.60m 50m.	e to coarse GRAVEL. subrounded fine to o of wood. Sand is Y with fragments is subangular fine		Backfill	
					ו ד	erminatio erminated	on Reaso	n		Last Uj 12/06	dated		L GS

						Proj	ect No.	Project	t Name: 3FM Pla	anning Design	GI - Lot A D	PC Lands		Boreh	ole ID
	XI C	CAUS	EW	ΔΥ		22-	1041A	Client	Dublin	Port Company				BH	130
	- \{	G	EOTE	СН				Client	Dubiin	r ort company	(010)			211.	
Mad	had	Diant Li			(Client	s kep: RPS	1				<u> </u>	1 ()
Inspect	noa ion Pit	3T Excav	ator	ор (m) в 0.00	ase (m 1.50) (001	rainates	Final De	epth: 21.00 m	Start Date:	05/01/2023	Driller: CC		Sheet	1 of 3 • 1•40
Cable Per	rcussion	Dando 3	000	1.50	21.00	7188	97.32 E							Julie	. 1.40
						7340	93.66 N	Elevatio	on: 3.42 mO[D End Date:	11/01/2023	Logger: RS		DR	AFT
Depth (m)	Sample /	Fiel	d Records	C	epth Depti	Level	Depth (m)	Legend		Descri	iption	4		Back	kfill
(,	10303				(m) (m)	3.35	- 0.07		вітмас					5	_
						3.17	0.25		CONCRETE MADE GROUND: E	Brownish grev gra	avelly very silty	fine to coarse			_
0.50	B1						-		SAND with cobble	content. Gravel i	is subrounded.	Cobbles are			0.5 —
0.50	ES2								rounded.						-
0.50		PID = 1.00ppn	n				-								-
1.00	В3						-								1.0
1.00 1.00	ES4	PID = 1.70ppn	n				-								_
						2.12	- 1.30		MADE GROUND: 0	Grey gravelly very	silty fine to co	arse SAND with			_
1.50	B5 ES6					1.92	- 1.50		low cobble conter MADE GROUND: N	nt. Gravel is subro Medium dense lo	ounded. Cobble cally dense bro	es are rounded. I wn fine to coars	e		1.5 —
1.50 - 2.50	B26						_		SAND and subang	ular fine to coars	e GRAVEL with	low cobble cont	ent		-
1.50	D27	PID = 1.90ppn	n				-		and fragments of	red brick. Cobble	s are subangula	ar.			-
2.00	ES7						-								2.0 -
2.00 - 2.45	SPT (C)	N=36 (3,4/7,9	,9,11) Ham	mer SN 2	.00 1.6	D	-								-
2.00		PID = 0.10ppn	n				-								2.5 —
2.50 2.50	ES8	PID = 0 30ppn	n				-								_
2.50		1 10 - 0.50ppn					-								-
3.00	D28						-								3.0
3.00 3.00 - 4.00	ES9 B29						-								-
3.00 - 3.45	SPT (C)	N=21 (2,3/4,5	,5,7) Hamn	ner SN = 3	.00 1.9	D	-								-
3.00		0197 PID = 0.30ppn	n				-								3.5 —
3.50	ES10	DID = 0.20mm					-								-
3.50	020	PID = 0.20ppn	n				-								40-
4.00	ES11						-								4.0
4.00 - 5.00	B31 SPT (C)	N=12 (2 3/3 3	3 3) Hamn	ner SN = 4	00/2 10		-							_	-
4.00 4.45	511 (0)	0197	,5,5) Harm				-								4.5 —
4.00		PID = 0.20ppn Seepage at 4.4	n 40m				-								-
4.50	ES12						-								-
4.50 5.00	D32	PID = 0.20ppn	n				-								5.0
5.00	ES13	N-12 /1 2/2 2	4.2) 110 mm		001		-								-
5.00 - 5.45	3P1 (C)	0197	,4,3) Hallin		.00 1.5		-								-
5.00	ES14	PID = 0.10ppn	n				-								5.5 -
5.50	2314	PID = 0.20ppn	n				-								-
5.80 - 7.00 6.00	B33 FS15						-								6.0
6.00		PID = 0.10ppn	n				-								-
							-								
6.50	D34						-								6.5 —
6.50 6.50 - 6.95	ES16 SPT (C)	N=10 (1,2/2,2	.,3,3) Hamn	ner SN = 6	.50 3.10		-								-
6.50		0197	n				F								-
6.50 7.00	ES17	PID = 0.30ppn	n				-								7.0
7.00		PID = 0.10ppn	n				-								
Struck at (m)	Water Casing to (m	r Strikes) Time (min) F	Rose to (m)	From (m	niselli	ng Detai (m) Ti	IS me (hh:mm)	Machine	o dug inspection pit ex	xcavated to 1 50m	n				
4.40	4.40	20	3.00	1.50	1	.90	01:30	machine	aab mopeenon pir e						
8.60	8.60	20	2.10												
Casing	Details	Water A	Added	1											
To (m)	Diameter	From (m)	To (m)	-											
13.50 21.00	250 200	0.50	21.00					Termina	tion Reason				tlad	tod	
								-	aon neasuíl			Lds	ic opus	iteu	
								Terminate	ed at scheduled dept	th.		1	2/06/20	23	AUS

							Proj	ect No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole ID
	() (CAUS	SEW	'AY			22- 1	1041A	Client: Dublin Port Company (DPC)	BH130
	9 -	G	SEOTE	CH			I		Client's Rep: RPS	
Meth	nod	Plant L	Used	Top (m)	Base	e (m)	Coor	dinates		Sheet 2 of 3
Inspecti	on Pit	3T Excar Dando	vator	0.00	1.	50	7188	497 32 F	Final Depth: 21.00 m Start Date: 05/01/2023 Driller: CC	Scale: 1:40
	Cussion	Danae	5000	1.50	21	.00	7340	93.66 N	Elevation: 3.42 mOD End Date: 11/01/2023 Logger: RS	DRAFT
Depth	Sample /	/			Casing	y Water	Level	Depth		
(m)	Tests	Fie	eld Records		Depth (m)	Depth (m)	mOD	(m)	Legend Description	Backfill ≥
7.50	ES18						-4.08	- - 7.50	SAND and subangular fine to coarse GRAVEL with low cobble content	7.5 —
7.50 - 8.50 7.50	B35	PID = 0.10pp	νm				ı	-	And fragments of red brick. Cobbles are subangular. MADE GROUND: Medium dense brown very sandy slightly silty	-
	226						ı	- -	subangular fine to coarse GRAVEL with fragments of red brick and concrete. Sand is fine to coarse.	• 0
8.00 8.00	Dзь ES19						ı			8.0
8.00 - 8.45	SPT (C)	N=14 (2,2/3,3 0197	.3,4,4) Ham	mer SN =	8.00	5.60		-		-
8.00	EC20	PID = 0.30pp	m					-		8.5 -
8.50 - 9.50	B37									-
8.50		PID = 0.10pp Seepage at 8	.m 3.60m					-		-
9.00 9.00	ES21	PID = 0,20pp	۱m					-		-
9.00		FID - 0.2-1.	ani.				I.	-		
9.50	D38									9.5 —
9.50 9.50 - 9.95	ES22 SPT (C)	N=19 (3,3/5,	,7,4,3) Harr	ımer SN =	9.50	5.10		-		-
9.50		0197 PID = 0.40pp	۱m					-		
10.00	ES23	110 . 01.15						F		- 10.0 .
10.00 - 11.0 10.00	0 839	PID = 0.30pp	Jm					-		
10.50	ES24	2.20mm								10.5 —
10.50		PID = 0.20pp	'n							-
	540						7 5 9	11 00		
11.00 11.00	ES25						-/.50	- 11.00 -	MADE GROUND: Medium dense becoming dense grey sandy slightly	
11.00 - 12.0 11.00 - 11.4	10 B53 15 SPT (C)	N=23 (3,4/4,	5.6.8) Harr	= mer SN	11.0	14.70		F	fragments of red brick and concrete. Sand is fine to coarse. Cobbles	
11.00		0197		Inc.	-	[]		- -	are subrounded.	11.5 —
11.00 11.50	ES41	PID = 0.30pp	m					- -		
12.00	5642							-		-
12.00	E542							F		
								-		
12.50	D54							F		12.5 —
12.50 12.50 - 12.9	ES43 35 SPT (C)	N=29 (4,5/7,	,9,7,6) Harr	1mer SN =	12.5	5.60		-		
		0197	-,			Î		- -		12.0
13.00 13.00 - 14.0	ES44)0 B55						ı	-		13.0
								-		
13.50	ES45							F		13.5 —
								-		
14.00	556							-		-
14.00 14.00	D56 ES46							-		14.0 -
14.00 - 14.4	.5 SPT (C)	N=32 (6,7/7,9	9,11,5) Har	mmer SN	14.0	7.60		-		
14.50	ES47							-		14.5 —
Struck at (m)	Water	r Strikes	Tpose to (r		Chis	selling	J Detail	S	Remarks	
4.40	4.40	20	3.00	1.50	0	1.9	30	01:30	Machine dug inspection pit excavated to 1.50m.	
8.60	8.60	20	2.10					ļ		
	I							ļ		
Casing	Details	Water	Added	-				ļ		
To (m)	Diameter 250	From (m)	To (m)	-						
21.00	200	0.50	11.00					ł	Termination Reason Last Upda	ated
	I							ļ	Terminated at scheduled depth. 12/06/20	
1		,			1			1		1417.171

							Proj	ject No.	Project	: Name: 3FM Pl	anning Desig	gn GI - Lot A D	OPC Lands		Borehole ID
	C	CAUS	SEW	AY			22-	1041A	Client:	Dublin	Port Compai	ny (DPC)			BH130
	/ -		GEOTI	ECH					Client's	Rep: RPS					
Metho	d	Plant U	Used	Top (m)	Base	e (m)	Соо	rdinates				05/04/2022	D :!!		Sheet 3 of 3
Inspection	n Pit	3T Exca	ivator 3000	0.00	1.	50	718	397 32 F	Final De	epth: 21.00 m	Start Date:	05/01/2023	Driller:	СС	Scale: 1:40
Cable Ferce	0331011	Danuo	3000	1.50	21	.00	734()93.66 N	Elevatio	n: 3.42 mOl	End Date:	11/01/2023	Logger:	RS	DRAFT
Depth	Sample /				Casing	Water	Level	Depth			_				ā
(m)	Tests	Fie	eld Records		Depth (m)	Depth (m)	mOD	(m)	Legend	MADE GROUND'	Des Medium dense	becoming dense	grev sandy	slightly	₩ Backfill
15.00 15.00 - 15.80	ES48 B57							- - - - -		sitly subangular fi fragments of red l are subrounded.	ne to coarse GF	RAVEL with low c	obble conte to coarse. Co	nt and obbles	- - 15.0 — - -
15.50 15.50 15.50 - 15.95	D58 ES49 SPT (C)	N=9 (4,5/3,2	2,2,2) Hamr	ner SN =	15.5	2.10	-12.38	- - - 3 - 15.80		Firm grou SUT					- - 15.5 — - - -
15.80 - 17.00 16.00	B59 ES50	0197						- 		Firm grey SILI.					
16.50	ES51							- - - -							
17.00 17.00	D60 ES52						-13.68	3 - 17.10	$(\times \times \times$	Medium dense gr	ev gravelly fine	to coarse SAND	Gravel is		17.0
17.00 - 17.45	SPT (C)	N=19 (1,3/4, 0197	,5,5,5) Han	nmer SN =	17.0	4.70		-		subrounded fine.	cy graveny mie		Graveris		-
17.10 - 18.00	B61							_							17.5 —
								-							-
								-							
								-							-
18 50	D62							-							- 185
18.50 - 18.95	SPT (C)	N=23 (2,2/4,	,6,6,7) Han	nmer SN =	18.5	5.30		-							-
		0137					-15.48	3 - 18.90		Stiff grov silty CLA	v				-
								-		Still grey sitty CEA					19.0
								-							-
19.50 - 19.95	U63	Ublow=21 10	00% Recov	ery	19.5	7.60		-							19.5 —
								-							-
								-							20.0 —
								-							-
								-							20.5 —
								-							-
21.00 21.45		N-21 (2 4/5		mar CN -	21.0	0 10	17 50								
21.00 - 21.45	SPT (S)	N=21 (3,4/5, 0197	,5,5,6) Han	imer SN =	21.0	9.10	-17.58	; = 21.00			End of Bore	ehole at 21.00m			
								-							-
								-							21.5 —
								-							-
Struck at (m) Ca	Wate	r Strikes	Rose to (r	n) From	Chis	selling	g Detai	ls	Remarks			0			
4.40	4.40	20	3.00	1.5)	1.9))	01:30	iviacnine d	aug inspection pit e	cavated to 1.50	Jm.			
8.0U	ō.bU	20	2.10												
Casing De	etails	Water	Added	_											
13.50	250	0.50	21.00	1										<u> </u>	
21.00	200								Terminat	tion Reason				Last Upd	ated
									Terminate	d at scheduled dep	th.			12/06/20	J23 AGS

						Proje	ect No.	Project	: Name: 3FM Pla	nning Design GI - L	ot A DPC La	nds	Bore	hole ID
			WAY			22-1	.041A	Client:	Dublin P	Port Company (DPC)		BH	131
		GLC					<u> </u>	Client's	s Rep: RPS	1				
Metn Inspectio	on Pit	Plant Used 3T Excavato	r 0.00	n) Bas) 1	se (m) 50	Coor	dinates	Final De	epth: 17.00 m	Start Date: 09/01/	2023 Drille	er: CC	Shee Scal	t 1 of 3 e: 1:40
Cable Per	cussion	Dando 3000	1.50) 1	7.00	71891 73409	10.51 E 91 75 N	Flevatio	α. 3.41 mOD	End Date: 17/01/	2022 1000	RC		-
Denth	cample /			Casin	g Water	, o . c .	Denth	LICVUUS	II. 3.41 mob		2023	er. NJ		
(m)	Tests	Field Re	cords	Dept (m)	h Depth (m)	mOD 3.34	(m)	Legend	BITMAC	Description			të Bao	ckfill
						3.11	- 0.30	*****	CONCRETE					-
0.50	B1					3.01	- 0.40		MADE GROUND: Br	rownish yellow gravelly inded fine to coarse.	silty very fine	to coarse		0.5 —
0.50 0.50	ES2	PID = 6.00ppm					-		cobble content. Gra	own gravelly silty fine t avel is rounded fine to c	coarse SANL coarse. Cobble	s are		-
1.00	В3						-		rounded.					1.0
1.00 1.00	ES4	PID = 4.50ppm					-							-
1.50	B5					1.91	- - 1.50			ladium danca gravich h	rown condy cli	abtly cilty		1.5 —
1.50 1.50 - 2.50	ES6 ES19						-		subangular fine to	coarse GRAVEL with lov	v cobble conte	nt and		-
1.50 2.00	D20	PID = 1.10ppm					-		inaginents of red bi	ick and concrete. Cobb		nueu.		2.0
2.00 2.00 - 2.45	ES7 SPT (C)	N=49 (4,6/9,11,13	8,16) Hamme	er 2.0	0 1.00		-							-
2.00		SN = 0197 PID = 0.60ppm	, , , - , -				-							- 25 -
2.50 2.50	ES8	PID = 0.30ppm					-							-
2 00	22						-							
3.00	ES9 B21						-							-
3.00 - 3.45	SPT (C)	N=42 (7,8/9,9,11, SN = 0197	13) Hammer	3.0	0 2.30		-							-
3.00 3.50	FS10	PID = 0.10ppm					-							3.5 -
3.50		PID = 0.10ppm					-							-
4.00 4.00	D23 ES11						-							4.0
4.00 - 5.00 4.00 - 4.45	B24 SPT (C)	N=23 (2,3/4,6,6,7) Hammer SN	N = 4.0	0 2.60		-							-
4.00	5612	0197 PID = 0.10ppm					-							4.5 —
4.50	E312	PID = 0.70ppm					-							-
5.00 5.00	D25 ES13						-							5.0 -
5.00 - 5.45	SPT (C)	N=30 (4,6/9,6,7,8 0197) Hammer SN	N = 5.0	0 1.00		-							-
5.00 5.50	ES14	PID = 0.20ppm					-							5.5 —
5.50 - 6.50 5.50	B26	PID = 0.10ppm					-							-
6.00		PID = 0.10ppm					-							6.0
							-							-
6.50 6.50	D27 ES15						-							6.5 —
6.50 - 6.95	SPT (C)	N=20 (3,4/4,5,6,5 0197) Hammer SN	N = 6.5	0 1.80		-							-
6.50 7.00	ES16	PID = 0.20ppm					-							7.0
7.00 - 8.00 7.00	B28	PID = 0.10ppm					-						. –	-
	Water	Strikes		Chi	isellin	g Details	s l	Remarks	;					
Struck at (m) 0 6.30	Casing to (m 6.30) Time (min) Rose 20 1	to (m) From 70 7	m (m) '.60	To (8.0	m) Tim 00	ne (hh:mm) 01:00	Machine	dug inspection pit exc	cavated to 1.50m.				
Casing I To (m)	Details Diameter	Water Add From (m) To	ed (m)											
							ŀ	Termina	tion Reason			l art l in	dated	
								Terminate	d on refusal.			12/06/	2023	AGS

							Proje	ect No.	oject Name: 3FM Planning [esign GI - Lot A [DPC Lands	Borehole ID
	() (W E	AY			22-1	1041A	ient: Dublin Port Cor	npany (DPC)		BH131
	- /	———Ge	OTE	СН					ient's Rep: RPS			
Meth	od	Plant Use	ed	Top (m)	Base	: (m)	Coord	dinates	al Donth: 17.00 m Start D	ata: 00/01/2022	Drillor: CC	Sheet 2 of 3
Inspection Cable Period	on Pit cussion	3T Excavat Dando 30	tor 000	0.00 1.50	1.5	50 .00	7189:	- 10.51 E		ate: 09/01/2023	Driller: CC	Scale: 1:40
							73409	91.75 N	evation: 3.41 mOD End Da	te: 17/01/2023	Logger: RS	DRAFT
Depth	Sample /	Field	Pecords		Casing	Water	Level	Depth	acond	Description		a Backfill
(m)	Tests		Records		(m)	(m)	mOD	(m)	MADE GROUND: Medium d	ense greyish brown s	andy slightly silty	
7.50	ES17	BID = 0.10 nm						-	subangular fine to coarse G	AVEL with low cobb	le content and	7.5 —
7.50		PID = 0.10ppm						-			Subrounded.	-
8.00	D29						-4.59	- - 8.00		anco to donco brown	ich grou grouellu	- 8.0
8.00 8.00 - 8.45	ES18 SPT (C)	N=20 (2.4/5,6,4	4.5) Ham	mer SN =	8.00	2.30		-	very sandy slightly silty suba	ngular fine to coarse	GRAVEL with low	
8.00		0197 010 – 0 10ppm	.)-,					-	cobble content and tragmer to coarse. Cobbles are subro	ts of red brick and co ounded.	oncrete. Sand is fine	-
8.50 8.50	ES30	FID - 0.10pp						-				
8.50 - 5.50	DHJ	PID = 0.20ppm						-				-
9.00 9.00	ES31	PID = 0.00ppm						-				9.0
								-				
9.50	D44							-				9.5 —
9.50 9.50 - 9.95	ES32 SPT (C)	N=37 (6,6/7,9,1	10,11) Ha	mmer	9.50	4.70		-				
9.50		SN = 0197 PID = 0.10ppm						-				10.0
10.00 10.00 - 11.0	ES33							-				
10.00		PID = 0.00ppm						-				
10.50 10.50	ES34	PID = 0.00ppm						-				10.5 —
								-				
11.00	D46							F				11.0
11.00 11.00 - 11.4	5 SPT (C)	N=20 (7,6/6,5,5	5,4) Hamı	mer SN =	11.0	6.10		-				-
11.00		0197 PID = 0.10ppm						-				11.5 -
11.50 11.50 - 12.5	ES36 0 B47							-				
11.50		PID = 0.00ppm						-				
12.00		PID = 0.10ppm										
								-				-
12.50 12.50	D48 FS37							-				12.5 -
12.50 - 12.9	5 SPT (C)	N=29 (8,9/9,10)	,5,5) Han	nmer SN	12.5	7.00		-				
12.50		PID = 0.30ppm						-				
13.00 13.00 - 14.0	ES38 0 B49							-				
13.00	E\$20	PID = 0.00ppm										
13.50	2339	PID = 0.20ppm						-				-
								-				-
14.00 14.00	D50 ES40							-				14.0
14.00 - 14.4	5 SPT (C)	N=26 (3,4/5,5,7 0197	7,9) Hamı	mer SN =	14.0	7.30		-				-
14.00	FS/11	PID = 0.10ppm										14.5 —
14.50		PID = 0.10ppm						<u> </u>				
Struck at (m) (Wate Casing to (m	r Strikes	ose to (m) From (Chis (m)	elling To (3 Details m) Tim	ne (hh:mm)	marks chine dug inspection pit excavated to	0 1.50m.		
6.30	6.30	20	1.70	7.60)	8.0)0	01:00				
			<u></u>	_								
Casing I To (m)	Diameter	From (m)	ded To (m)	-								
								r	mination Passon		Last U	datad
									innateu on refusal.		12/00	

		AUSEN	νΔΥ			Proje	ct No.	Project	: Name: 3FM Pla	nning Design GI - Lot A D	PC Lands	Boreh	nole ID
	- 13	——GEOT	ECH				0417	Client's	s Rep: RPS				131
Meth	nod	Plant Used	Top (m)	Base	e (m)	Coord	dinates	Final De	epth: 17.00 m	Start Date: 09/01/2023	Driller: CC	Sheet	t 3 of 3
Cable Per	on Pit cussion	Dando 3000	0.00 1.50	1.	.00	71891	L0.51 E					Scale	2: 1:40
						73409	91.75 N	Elevatio	n: 3.41 mOD	End Date: 17/01/2023	Logger: RS	DR.	AFT
Depth (m)	Sample / Tests	Field Record	s	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Description	h grov gravelly	ate S Bac	kfill
15.00 15.00	ES42	PID = 0.00ppm				-11.99	- - - - - - - - - - - - - - - - - - -		very sandy slightly s cobble content and to coarse. Cobbles a Dense grey sandy si to coarse	ubrounded fine to medium GR	SRAVEL with low increte. Sand is fine	_	
15.50 15.50 - 16.5 15.50 - 15.9 15.50 16.00 16.50 16.50	ES51 0 B54 5 SPT (C) ES52 ES53	N=44 (5,7/9,11,11,13 SN = 0197 PID = 0.10ppm PID = 0.20ppm PID = 0.20ppm) Hammer	15.5	3.30		- - - - - - - -						
17.00 17.00 - 17.4	D56 5 SPT (C)	N=45 (4,5/8,12,13,12 SN = 0197) Hammer	17.0	4.70	-13.59	- - - 17.00			End of Borehole at 17.00m		-	17.0 —
							-						
							- - -						
							-						
							-						
							-						
							-						20.0
							-						20.5 — - - -
							-						21.0
							- - - -						21.5 — - -
		- Chrikes		<u> </u>		- D-+ "	[
Struck at (m) 6.30 Casing I To (m)	wate Casing to (m 6.30 Details Diameter	SUTIKES Dime (min) Rose to (20 1.70 Water Added From (m) From (m) To (m)	(m) From 7.60	(m)	To (g vetails m) Tim DO	e (hh:mm) 01:00	Machine of Terminal	dug inspection pit exc	cavated to 1.50m.	Last Up	odated	F. .3
								Terminate	d on refusal.		12/06	/2023	AC



APPENDIX C CORE PHOTOGRAPHS

3FM Planning Design GI Lot A DPC LandsReport No.: 22-1041Afor the first transformation of
BH101 Box 1: 16.50-18.00m



BH101 Box 2: 18.00-19.50m



BH101 Box 3: 19.50-21.00m



BH101 Box 4: 22.00-22.50m



BH101 Box 5: 22.50-24.00m



April 2023

3FM Planning Design GI Lot A DPC Lands Report No.: 22-1041A Project: 3FM Project: No:: 22-1041A BH No.: BH 101 Box: 6

BH101 Box 6: 24.00-25.50m

in all



BH101 Box 7: 25.50-27.00m



BH101 Box 8: 27.00-28.50m



BH101 Box 9: 28.50-30.00m



Report No.: 22-1041A



BH120 Box 1: 29.00-30.50m



BH120 Box 2: 30.50-32.00m



BH120 Box 3: 32.00-33.50m



BH120 Box 4: 33.50-35.00m



BH120 Box 5: 35.00-36.50m



Report No.: 22-1041A



BH120 Box 1: 36.50-38.00m

E	• CA	USEWA	Y	Project:	3f.	M		1. 1980	Project No	.: 21-104	IA				
		GLOTLET		BH No.:	BU 120		Box: 7		Depth:	8.00-39.50)m				
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
Ê		1						7)		han	A	1)-		

BH120 Box 7: 38.00-39.50m



BH120 Box 8: 39.50-40.50m



Report No.: 22-1041A



BH123 Box 1: 27.50-29.00m

	Project	3FM				Project No	22-10	41A		F			
		BH No.	BHIZE	3	вох: 2		Depth: 29	00-30	0.20		E		
0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
		Par.			al 2		A					T	

BH123 Box 2: 29.00-30.50m



BH123 Box 3: 30.50-32.00m



BH123 Box 4: 32.00-33.50m



BH123 Box 1: 33.50-35.00m



3FM Planning Design GI Lot A DPC Lands Report No.: 22-1041A Image: CAUSEWAY GEOTECH Project: 3FM Project No.: 22-1041A Image: Depth: 35-00-36.50 Image: Depth: 35-00-36.50 Image: Depth: 30-00-36.50 Image: Depth: 35-00-36.50

BH123 Box 1: 35.00-36.50m



BH123 Box 7: 36.50-38.00m



BH123 Box 8: 38.00-39.50m



BH123 Box 9: 39.50-41.00m



Report No.: 22-1041A



BH124 Box 1: 20.50-23.50m

•	CAL	SEWAY		Projec	: 3FN	1			Project No	22-10	941A		F		F
				BH No	BH 12	4	Вох: 2		Depth: 23	·50-20	6.50		E		
(m)	<u>(</u> .1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
					2	-		H					R		

BH124 Box 2: 23.50-26.50m



BH124 Box 3: 26.50-29.50m



BH124 Box 4: 29.50-32.50m



BH124 Box 5: 32.50-37.00m





BH124 Box 6: 37.00-38.50m



BH124 Box 7: 38.50-40.00m



Report No.: 22-1041A



BH125 Box 1: 21.50-23.00m

				Pro	ject: 3F	Μ			Project No.						
		GEOTECH		вн	No.: BH 1	25	Box: 2		Depth: 23.(20-24	-50				
(m)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
	A day		4		III - Constant of Artematicae constant	- Alter	-		大学	11				14	

BH125 Box 2: 23.00-24.50m



BH125 Box 3: 24.50-26.00m



BH125 Box 4: 26.00-27.50m



BH125 Box 5: 27.50-29.00m & 29.00-30.50m



April 2023

Report No.: 22-1041A



BH125 Box 6: 30.50-32.00m



BH125 Box 7: 32.00-33.50m



BH125 Box 8: 33.50-35.00m



BH125 Box 9: 35.00-36.50m





APPENDIX D SLIT TRENCH LOGS AND DRAWINGS


			Proj	ect No.	Project	Name:			Tri	ial Pit ID
	CAUS	SEWAY	22-	1041A	3FM Pl	anning Design GI - Lot A DPC Lands				
		GEOTECH	Coor	dinates	Client:				S	ST102
			7192	22.99 E	Dublin	Port Company (DPC)				
Method:			7337	09.48 N	Client	s Representative:			She	eet 1 of 1
Slit Trenching			- Eloi	vation	RPS		Loggor		Sc	ale: 1:25
3t Tracked Ever	avator				Date:	2023	Logger:		ſ	FINAL
Depth	Sample /		Level	Depth	07/02/		11.5		er	
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description	ndad fina ta		Wat	
						GRAVEL with frequent fragments of red brick and co	nded fine to o ncrete. Sand	fine to		_
				-		coarse.				-
				-						_
0 50 - 0 50	B4			-						0.5
0.50 - 0.50	ES1			-						_
0.50		PID = 0.10ppm								-
				-						_
1 00 1 00	95			-						-
1.00 - 1.00 1.00 - 1.00	BS ES2									1.0
1.00		PID = 0.00ppm		-						_
				-						-
										-
1.50 - 1.50	B6		2.67	- 1.50		End of trial pit at 1.50m				1.5 —
1.50 - 1.50 1.50	E33	PID = 0.10ppm		-						-
										_
				-						_
				-						2.0
										-
				-						_
										_
				-						2.5
				-						_
										_
				-						_
				-						-
				_						3.0
				-						_
				-						-
										-
				-						3.5 —
				-						_
										_
				-						_
				-						4.0
										_
				-						_
				-						_
				-						4.5
				-						_
										_
				-						-
				-						_
	Cauil		Por							
Water Struck at (m)	Remarke	Depth: 1.50	No s	groundwat	er encou	ntered.				
		Width: 0.60								
		Length: 3.55								
		Stability:	Terr	nination R	eason			Last Upd	ated	
		Unstable	Term	ninated at m	aximum r	each of excavator.		14/04/20	023	AGS
1			1							



	LOCATIO	N [:] ST102					
IPMENT 3	Tonne Exc	cavator & Hand Tools					
	TRENCH - ORIENTATION						
		N					
	NW						
	315°	45°					
	W 270°	90°E					
	225° SW	135° 135°					
	011	180°					
		S					
Т	RENCH ORIEI	NTATED : 135° FROM NORTH					
(COORDINATES:	DATUM					
	EASTING: -	719223.986					
	NORTHING: -	7330709.476					
	ELEVATION: -	4.171					
	TRENCH LENGTH	(m): 3.65					
	TRENCH DEPTH (I	m): 1.50					
	TRENCH WIDTH (r	n): 0.60					
		UNGTABLE					
	GROUNDWATER:	DRY					
	SCALE:	NTS@A3					
	DRAWN:	BS					
	CHECKED:	СН					
	DATE EXCAVATE	D: 07/02/2023					
		CAUSEWAY					
		GEOTECH					

			Proje	ect No.	Project	Name:		1	rial Pit ID
	CAUS	SEWAY	22-2	1041A	3FM Pl	anning Design GI - Lot A DPC Lands			
		GEOTECH	Coor	dinates	Client:				ST104
			7194	10.72 E	Dublin	Port Company (DPC)			
Method:			7338	51.66 N	Client's	s Representative:		S	heet 1 of 1
Slit Trenching					RPS	1-			Scale: 1:25
Plant:			Elev	vation	Date:	LO	gger:		FINAI
St Iracked Exca	vator	1	4.58	s mod	08/12/	2022 RS			1
Depth (m)	Tests	Field Records	(mOD)	Depth (m)	Legend	Description		Wate	
			4.48	- 0.10		MADE GROUND: Grey sandy very silty angular fine to coa	rse GRAVEL.		_
				-		MADE GROUND: Grey sandy silty angular fine to coarse G	RAVEL with		_
						high cobble content and fragments of concrete and red b to coarse.	rick. Sand is fi	ne	_
			4.13	- 0.45					_
0.50 - 0.50	B1 FS2			-		MADE GROUND: Soft brown slightly gravelly sandy SILT. So coarse. Gravel is subrounded fine to coarse.	and is fine to		0.5
0.50	232	PID = 0.50ppm							_
				[
				-					_
1.00 - 1.00	B4								1.0
1.00 - 1.00 1.00	ES3	PID = 0.30ppm							_
				-					_
				-					_
1.50 - 1.50	B6			[1.5 —
1.50 - 1.50	ES5		2.98	1.60		End of trial pit at 1.60m			_
1.50		PID = 0.50ppm							-
				-					_
				-					_
									2.0
				-					_
				-					_
									_
				-					2.5
				-					-
				-					_
				-					3.0
				-					-
				-					_
				-					_
				-					3.5 —
				-					_
									_
				-					_
				-					-
				-					4.0
				-					_
				-					_
				-					_
				-					4.5
				-					_
				-					_
				<u> </u>					
Water	Strikes	Death: 1.00	Rem	narks:	1				1
Struck at (m)	Remarks		Nog	groundwate	er encou	ntered.			
		vviatn: 0.50							
		Length: 3.35	<u> </u>	<u> </u>			1 -		
		Stability:	Tern	nination R	eason		Last	Update	
		Unstable	Term	ninated on p	it wall col	apse.	14/	04/2023	AGS

JOBI	NUMBER:	22-1041A	JOB NAME:		3FM Planning	Design GI - Lot A DPC Lanc	s
CLIENT:	Dublin Pr	ort Company (DPC)	CLIENTS REPR			CREW:	PLANT & EQU
TRENCH				RP5		NO	
			Datu	m 00 00 00 00 00 00 00 00 00 00 00 00 00			
	Type	e Of Diameter	Denth to Top	Distance to Centre			
No:	Type Serv	e of Diameter rice: (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)		Details/Comments	
No:	Type Serv	e of Diameter rice: (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	lo Services Found	Details/Comments	
No: 01 02 03	Type Serv	e of Diameter ice: (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	lo Services Found	Details/Comments	
No: 01 02 03 04	Type Serv	e of Diameter ice: (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	lo Services Found	Details/Comments	
No: 01 02 03 04 05	Type Serv	e of Diameter ice: (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	lo Services Found	Details/Comments	
No: 01 02 03 04 05 06	Type Serv	e of Diameter ice: (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	lo Services Found	Details/Comments	
No: 01 02 03 04 05 06 07	Type Serv	e of Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	lo Services Found	Details/Comments	
No: 01 02 03 04 05 06 07 08	Type Serv	e of Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	lo Services Found	Details/Comments	
No: 01 02 03 04 05 06 07 08 09	Type Serv	e of Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	lo Services Found	Details/Comments	
No: 01 02 03 04 05 06 07 08 09 10	Type Serv	e of Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	No Services Found	Details/Comments	
No: 01 02 03 04 05 06 07 08 09 10 11 12	Type Serv	e of Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	No Services Found	Details/Comments	
No: 01 02 03 04 05 06 07 08 09 10 11 11 12 13	Type Serv	e of Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	No Services Found	Details/Comments	
No: 01 02 03 04 05 06 07 08 09 10 11 12 13 14	Type Serv	e of Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	No Services Found	Details/Comments	

LOCATION:	ST104						
וe Exca	vator & Hand Tools						
TRENCH - ORIENTATION							
on onen							
	Ν						
315°	45°						
1							
°	90°E						
°							
225°	135°						
SW SW	SE SE						
	S						
H ORIENTA	TED: 255° FROM NORTH						
DINATES: DA	ТИМ						
G: -	719410.716						
ING: -	733851.662						
10N: -	4.578						
H LENGTH (m) :	3.35						
H DEPTH (m) :	1.60						
H WIDTH (m) :	0.50						
.ITY:	UNSTABLE						
IDWATER:	DRY						
 E:	NTS@A3						
N:	BS						
KED:	СН						
EXCAVATED:	08/12/2022						
C	AUSEWAY						
-0/							
	LOCATION: DE EXCAV CH - ORIEN CH - ORIEN V CH - ORIENTA OINATES: DA CH ORIENTA DINATES: DA CH ORIENTA CH OR						



APPENDIX E SLIT TRENCH PHOTOGRAPHS

Report No.: 22-1041A



ST102





Report No.: 22-1041A



ST102





Report No.: 22-1041A



ST102



April 2023

Report No.: 22-1041A





Report No.: 22-1041A





Report No.: 22-1041A



ST104



ST104



April 2023

Report No.: 22-1041A





Report No.: 22-1041A



ST104





Report No.: 22-1041A





Report No.: 22-1041A



ST104







APPENDIX F INDIRECT IN-SITU CBR TESTS

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

Project Number	22-1041A	
Project Name	3FM Planning Design GI	CAUSEWAY
Site Location	Dublin Port South	GEOTECH

Test Number	3FM-RC102	Date Tested	14/12/2022
Depth bgl (m)	0.43	Weather	Dry + Cloudy

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND



CBR	Min: #NUM!	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal.

Approved Name and Appointment

Darren O'Mahony Director Jam Ollion.

January 2023



Dynamic Cone Penetrometer (DCP) test results and estimated CBR

Project Number	22-1041A		
Project Name	3FM Planning Design G		
Site Location	Dublin Port South	GEOTECH	
Test Number	3FM-RC104	14/12/2022	

Depth bgl (m)	0.38	Weather	Dry + Cloudy

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND

	Cumulative Number of Blows	top /	,	(DD
375		layer (mm)	mm/ blow	(%)
		375 405	3.8	75
395		405 435	2.3	>100
) (jiii) ⁴¹⁵		435 495	- 3	95
Tevel 435		495 498	0.3	>100
1019 8 455			-	
epth Belc			_	
Ω 475			_	
495				
515	1]	_	

CBR Range	Min: 75	The selection of layers is based on visual interpretation of the data.
	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal.

Approved Name and Appointment

Darren O'Mahony Director Jam Ollon.

April 2023





APPENDIX G PAVEMENT CORES

Report No.: 22-1041A

	RC101	
Easting	Northing	Elevation
718186.96	734903.82	3.68m0D
	GEOTECH	
Project Name	Dr	piect Number
3f	M	22-1041A
Date 11/4/	23 EH Number	: 101
	0.3	0.4 ~ 0.5
STR.	The second second	
		the store

Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.198	198	Strong grey CONCRETE. 70-80% aggregate of subangular to subrounded fine to medium gravel. No small voids.	White



April 2023

Report No.: 22-1041A



Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
1	0-0.22	220	Strong brownish grey BITMAC. 60- 70% aggregate of subangular to subrounded fine to medium gravel. No small voids.	Faint Yellow
2	0.22-0.40	180	Strong black BITMAC. 30-40% aggregate of subangular to subrounded fine to medium gravel. 1- 5% small voids	White



	RC103		
Easting	Easting Northing Elevation		
719312.88	733516.65	4.08m0D	
	GEOTECH		
Project Name	° BFM	roject Number 22 – 1041A	
Date 4/4	- / 23	22103	
	0.2 0.3	0.4 ~ 0.5	

Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
1	0-0.12	120	Strong black BITMAC. 40-50% aggregate of subangular to subrounded fine to medium gravel. 1- 5% small voids	Faint Yellow



Report No.: 22-1041A



Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
			Strong brown CONCRETE. 40-50%	
1	0-0.21	210	aggregate of subangular to	Faint Vollow
1	0-0.21	210	subrounded fine to medium gravel. No	Faint Tenow
			small voids	
			Strong black BITMAC. 30-40%	
2	0.21-0.3	90	aggregate of angular to subangular	Faint Yellow
_	0.22 010		fine to medium gravel. 1-5% small	
			voids.	



April 2023



APPENDIX H GEOTECHNICAL LABORATORY TEST RESULTS





HEAD OFFICE Causeway Geotech Ltd 8 Drumahiskey Road Ballymoney Co. Antrim, N. Ireland, BT53 7QL NI: +44 (0)28 276 66640

Registered in Northern Ireland.

Company Number: NI610766

REGIONAL OFFICE Causeway Geotech (IRL) Ltd Unit 1 Fingal House Stephenstown Industrial Estate Balbriggan, Co Dublin, Ireland, K32 VR66 ROI: +353 (0)1 526 7465

Registered in Ireland. Company Number: 633786

www.causewaygeotech.com

SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

3 April 2023

Project Name:	3FM Planning Design GI - Lot A DPC Lands		
Project No.:	22-1041A		
Client:	Dublin Port Company (DPC)		
Engineer:	RPS		

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 08/03/2023 and 03/04/2023.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

John Worm

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd











BRITISH

DRILLING ASSOCIATION

Project Name: 3FM Planning Design GI - Lot A DPC Lands

Report Reference: Schedule 1

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received.

Tests marked with* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of	Standard specifications	No. of results included in
	measurement		the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	18
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	5
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	11
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	21
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	8
SOIL	California Bearing Ratio (CBR)	BS 1377-4: 1990: Cl 7	9
SOIL	Consolidation properties in oedometer - Using 5 pressures (up to 5 days total duration)	BS 1377-5: 1990: Cl 3: 1	7
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	7
SOIL	Undrained shear strength – triaxial compression with multistage loading and without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 9	1
SOIL	Direct Shear Test using 60mm Small Shearbox (up to 3 days)	BS EN ISO 17892- 10:2018	15
	Extra over days (more than initial 3 days)		3
ROCK	Point load index	ISRM Commission on Testing Methods. Suggested Method for Determining Point Load Strength 1985	18

SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All subcontracting laboratories used are UKAS accredited.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – Subcontracted to Eurofins Chemtest Ltd (UKAS 2183)	pH Value of Soil		12
SOIL – Subcontracted to Eurofins Chemtest Ltd (UKAS 2183)	Sulphate Content water extract		12
ROCK – subcontracted to MATtest Limited (UKAS 2643)	Uniaxial Compressive Strength (UCS)	ASTM D7012 - 14	1

	JSE' GEC	WAY DTECH	Summary of Classification						ation	Test	Res	sult	s	
Project No.	Project Name				oject Name									
22-10	22-1041A			3FM Planning Design GI - Lot A DPC Lands										
Hole No.	Ref	Sar Top	nple Base	Туре	Specimen Description	Dens bulk Mg/m	ity dry 13	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH101	15	5.00		D	Grey sandy slightly gravelly silty CLAY.			16	37	24 -1pt	17	7		CL
BH101	2	19.50	21.00	С	Grey sandy slightly gravelly silty CLAY.			9.4	62	29	14	15		CL
BH101	4	22.50	24.00	С	Grey sandy slightly gravelly silty CLAY.			7	61	25	12	13		CL
BH103	8	3.00	3.00	D	Grey sandy slightly gravelly silty CLAY.			7.7	60	26	14	12		CL
BH121	32	21.50	21.95	U	Greyish brown sandy slightly gravelly silty CLAY.			21	98	33	17	16		CL
BH121	56	25.00		D	Greyish brown sandy slightly gravelly silty CLAY.			22	99	34	9	25		CL
BH122	9	4.00		D	Greyish brown sandy slightly gravelly clayey SILT.			33	55	53	42	11		МН
BH122	44	22.00		D	Greyish brown sandy slightly gravelly silty CLAY.			21	98	27	14	13		CL
BH123	22	3.00		D	Greyish brown sandy gravelly clayey SILT.			20	50	54	38	16		МН
BH123	42	19.50		D	Greyish brown sandy slightly gravelly silty CLAY.			18	98	31	16	15		CL
BH123	44	23.00		D	Greyish brown sandy slightly gravelly silty CLAY.			25	100	44	19	25		СІ
BH124	10	3.00		D	Greyish brown sandy slightly gravelly clayey SILT.			34	51	50 -1pt	30	20		MI/MH
All tests performed in accordance with BS1377:1990 unless specified otherwise LAB 01R Version 6														
Key Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer wd - water displacement cas - Casagrande method gj - gas jar					Date F	Printed 30/03/20	23	Appr	oved	Ву				

4

wi - immersion in water

1pt - single point test

10122

Stephen Watson

•	CAL	JSE GEC	WAY DTECH	Summary of Classific					ation	Test	est Results				
Project N	0.			Project Name											
	22-104	41A				3FN	3FM Planning Design GI - Lot A DPC Lands								
Hole N	lo.	Ref	Top	Base	Туре	Specimen Description	Dens bulk Mg/m	ity dry n3	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH12	4	17	5.00		D	Greyish brown sandy slightly gravelly clayey SILT.			81						
BH12	5	18	4.00		D	Greyish brown sandy slightly gravelly clayey SILT.			89	57	56 -1pt	38	18		МН
BH12	5	46	25.00		D	Greyish brown sandy slightly gravelly silty CLAY.			25	100	42	22	20		СІ
BH13	0	36	8.00		D	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL.			5.6	17	26 -1pt	15	11		CL
BH13	1	23	4.00		D	Greyish brown sandy slightly gravelly silty CLAY.			10	17	32 -1pt	23	9		ML/CL
BH13	1	44	9.50		D	Greyish brown sandy slightly gravelly silty CLAY.			11						
All tests p	perform	ned ir	n accord	ance wit	h BS1	377:1990 unless specified	otherwis	e						LAE	3 01R Version 6
Key D L	Density to inear mo rd - wate	est easurei er displa	ment unles	s :	Liquid I 4pt con cas - C	Limit Partic e unless : sp - sr asagrande method gj - ga	le density mall pyknom is jar	eter	Date F	Printed 30/03/20	23	Appr	oved	By	
wi - immersion in water 1pt - single point test								Step	hen	Watson	10122				





75	100	0.03642	33	Gravel
63	100	0.02606	29	Sand
50	100	0.01853	27	Silt
37.5	100	0.00979	19	Clay
28	100	0.00495	14	
20	100	0.00289	10	Grading A
14	98	0.00153	6	D100
10	94			D60
6.3	90			D30
5	87			D10
3.35	83			Uniformit
2	73			Curvature
1.18	67			
0.6	60	Particle density	(assumed)	Remarks
0.425	57	2.65	Mg/m3	Preparation
0.3	53			
0.212	50			
0.15	46			
0.063	39			

Suna		55.7			
Silt		31.3			
Clay		7.9			
Grading Analysis					
D100	mm				
D60	mm	0.601			
D30	mm	0.0285			

D60	mm	0.601
D30	mm	0.0285
D10	mm	0.00275
Uniformity Coefficient		220
Curvature Coefficient		0.49

and testing in accordance with BS1377-2 :1990 unless noted below



LAB 05R - Version 6

Approved

Stephen Watson





LAB 05R - Version 6

Approved Stephen Watson

22

16

0.15

0.063





LAB 05R - Version 6

Approved Stephen Watson

29

22

0.15

0.063





LAB 05R - Version 6

10122

Approved

Stephen Watson






Stephen Watson









LAB 05R - Version 6

Approved Stephen Watson

26

16

0.15

0.063





LAB 05R - Version 6

Approved Stephen Watson

22

17

0.15

0.063

vatson

















Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	29
90	100	0.05090	26
75	100	0.03644	23
63	100	0.02608	20
50	100	0.01855	19
37.5	100	0.00980	13
28	100	0.00498	9
20	100	0.00291	6
14	98	0.00155	1
10	94		
6.3	89		
5	87		
3.35	84		
2	79		
1.18	75		
0.6	69	Particle density	(assumed)
0.425	66	2.65	Mg/m3
0.3	63		
0.212	59		
0.15	52		
0.063	29		

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	21.1
Sand	50.0
Silt	25.7
Clay	3.2

Grading Analysis		
D100	mm	
D60	mm	0.238
D30	mm	0.0657
D10	mm	0.00613
Uniformity Coefficient		39
Curvature Coefficient		3

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below



LAB 05R - Version 6

Approved Stephen Watson



















CAL	JSEWAY	ONE		NONAL CO		DATI	ON T	EST	┢	Job Ref		22	-1041A	
•0//	-GEOTECH		0313	11.Fait 5.	1990, CI	ause	3			Borehole/Pit No	D.	E	3H121	
Site Nam	ne	3FM Planni	ng Design (GI - Lot A DPC	C Lands					Sample No.	on.		31	
Soil Des	cription	Grey sandy	slightly gra	velly silty CLA	Υ.					Depth (m) Bo	ttom		18.95	
Specime Reference	en Ce	Ę	5	Specimen Depth		18	.55	n	۱	Sample Type			U	
Specime Descripti	n ion	Grey sandy	slightly gra	velly silty CLA	Y.					KeyLAB ID		Caus20	0230308110	
Test Met	thod	BS1377:Pa	rt 5:1990, c	ause 3						Date started		21/	03/2023	
0.3 0.3 0.3 <u>spino</u> 0.3 0.3 0.3 0.2 0.2 0.2 0.2 0.2	60 40 20 80 60 40 20 40 00			e _o										
0.1 25.0 20.0 15.0 15.0 0.0 0.0 0.0				10		App	lied Pr	00 ressure k	Pa		10			10000
Applied Pressure kPa 0.0 185	Voids ratio 0.364 0.316	Mv m2/MN - 0.19	Cv (t50, log) m2/yr - 4.8	Cv (t90, root) m2/yr - 5	Csec - 0.00065		Prepa	aration	. u					
370 740 1,480 370	0.303 0.289 0.273 0.274	0.052 0.029 0.017 0.00018	11 17 22	19 27 34	0.0007 0.00097 0.001		Partic Speci Diame Heigh Moist Bulk o Dry de Voids Satur Avera Swelli Settle Rema	men deta eter It ure Conte density ensity Ratio ation age tempe ing Press ement on arks	/ ent eratu ure satu	ure for test uration		Initial	2.65 Final - 18.67 17.0 2.43 2.08 0.274 165	Mg/m3
Final values Cv plotted at Cv corrected	should be use t mid point of I	ed with cautior	n ts			St	Appr	oved Watson		Printed : 30	/03/20 3 <u>1</u> 3R)23 11:40 - Ve <u>r</u> sion 6		

	CAL	JSEWAY	ONE		SIONAL C		SOLI	DAT		1 TI	EST	Jol	b Ref					22-1	1041A		
•		-GEOTECH		0313		. 199	U, CI	ause	; J			Во	rehol	e/Pit	t No		 	BH	1121		
Sit	e Nam	ie	3FM Planni	ing Design	GI - Lot A DI	PC Lai	nds					Sa	mple	No.	т.				60		
So	il Desc	cription	Grey sandy	slightly gra	velly silty Cl	LAY.						Sa Dep	mple th (m)	Bott	op tom		30).50).95		
Sp Re	ecime ferenc	n :e	;	5	Specime Depth	en		30).55		m	Sa	mple	Тур	е				U		
Sp	ecime	n on	Grey sandy	slightly gra	velly silty Cl	LAY.						Ke	yLAB	ID			Ca	aus202	230308	3114	
Te	st Met	hod	BS1377:Pa	ırt 5:1990, c	lause 3							Da	ite sta	artec	1			23/0	3/2023	3	
	0.5				e _o																
	0.50																				
	0.4	50				+							~	_							
ţi	0.40	00	_				_							\geq	•				_		
ids Ra	0.3	50													_						
Vo	0.00																	- s e			
	0.30																				
	0.25	50				-	-														
	0.20	00					-		+				-	\square	+						
	0.1	50				_		+				-		_				_			
	0.10																				
	0.01	-																			
(ə	25.0	0																			
g tim	20.0	0																	_		
r (lo	15.0	0																			
, m²/)	5.0	0												*		_*					
õ	0.0	0									*						,				
		1			10			Ар	olied	10 Pre	00 essure kPa	a				1(000				10000
Арр	olied		Mv	Cv	Cv	Cs	sec]	Pr€	epai	ration										
Pres	ssure Pa	Voids ratio	m2/MN	(t50, log) m2/vr	(t90, root) m2/vr)															
0	.0	0.523	-	-	-		-														
3	00	0.434	0.19	2.8 6.8	2.9 8.9	0.0	014	-	Pa	rticl	e densitv						assumed		2.65		Ma/m3
1,2	200	0.375	0.038	9.4	11	0.0	022	1	. u						r			1			
2,4	400 00	0.337	0.023	13	14	0.0	029	-	Sp	ecir	nen details	;					Initial		Fina	l	mm
		0.002	0.0000						He	eight							20.00		17.70	6	mm
									Mc	oistu	ire Content	t					19.0		25.0)	%
								1	Bu	ılk d	ensity						2.07		2.45		Mg/m3
<u> </u>								-	Dr	y de	nsity						1.74		1.96	; ว	Mg/m3
-					-	۷0 ج2	nus itura	rtau0 Ition						96		188	۷	%			
								1	Av	erad	ge tempera	ture fo	or tes	t				20.0			oC
								1	Sw	vellir	ng Pressur	е									kPa
								1	Se	ttler	ment on sa	turatio	n								%
							Re	emai	rks												
																		â	n -		
Final	values	should be use	ed with cautior	า			┣—		A	ppro	oved		Pi	rinte	d :					X	۲.
Cv plo	otted at	mid point of	load incremen			S	teph	nen '	Watson				30/	03/2	023 11:40						
Cv co	rrected	to 20oC											L	AB	13F	R - Version	6		101	22	

	CAL	SEWAY	ONE	E DIMENS BS13	SIONAL C	ONSOL 1990. പ	IDATI lause	ON T 3	EST	Jo	b Ref	•/D:•	No			22-10	41A 22	
Sit	to Nam	9	3EM Plann	ing Design		C Lands		-		Б0 5а	mnla		INO.			33	22	
				ing Design						Sa	mple	NU.	То	p		21.5	50	
Sc	oil Desc	ription	Greyish bro	own sandy s	slightly gravel	ly silty CL/	ΥΥ .			Dep	th (m)	Bott	om		21.9	95	
Re	eferenc	e	:	5	Depth	•	21	.55	m	Sa	mple	Туре	е			U		
Sp De	ecimer	ו on	Greyish bro	own sandy s	lightly gravel	ly silty CL/	AY.			Ke	yLAB	B ID			Ca	aus2023(0308120	
Te	est Meth 0.36	nod 50 -	BS1377:Pa	art 5:1990, c	lause 3					Da	ate sta	arted				23/03/2	2023	
	0.34	+0			e _o									_				
	0.32	20																
Ratio	0.30	00										ø						
Voids	0.28	80 -												6				
	0.26	60 -								-		~	-	-				
	0.24	i0 -								-								
	0.22	20																
	0.20	00								-								
	0.18	80								-								
_	0.16 25.0	30 L																
time	20.0	o	_		_										*			
fol)	15.0	0																
m²/yr	10.0				_						*							
Š	5.00 0.00								*									
		1			10		Арр	1 Iied Pr	00 ressure kF	a				10	000			10000
Ар	plied		Мv	Cv	Cv	Csec	1	Prepa	aration									
Pre	ssure Pa	Voids ratio	m2/MN	(t50, log) m2/vr	(t90, root) m2/vr													
(0.0	0.350	-	-	-	-												
2	215 128	0.307	0.15	2.8 9.5	2.2	0.00056	-	Partic	le densitv					á	assumed	:	2.65	Ma/m3
8	358	0.272	0.036	15	47	0.0011							-			1		
1,	/18 132	0.248	0.022	19	31	0.0013		Speci Diam	men detail eter	S			┝		Initial 75.00	F	-inal -	mm
								Heigh	nt				ŀ		20.00	1	8.68	mm
								Moist	ure Conter	nt			Ī		14.0		15.0	%
								Bulk o	density				ļ		2.23	:	2.42	Mg/m3
							-	Ury de	ensity				┟		1.96		2.10	Mg/m3
					-	Satur	ation				ŀ		103		152	%		
							1	Avera	ige temper	ature fo	or tes	st	ŀ		2	0.0		oC
								Swell	ing Pressu	re			Ī					kPa
							_	Settle	ment on sa	aturatio	on		Ľ					%
								Kema	arks									
Final	values s	should be use	ed with caution	n			Appr	oved		Pi	rinteo	: t						
Cv pl	otted at	mid point of	load incremer	nts			St	ephen	Watson				30/0)3/2(023 11:40			
Cv cc	orrected	to 20oC										L	AB	13F	R - Version 6	6	10	122

	CAU	SEWAY	ONE	DIMENS	SIONAL C	ONSOL :1990. d	_IDATI clause	ON T 3	EST	┝	Job Re	ef	Dit NI	0		22- ⁻	1041A		
Sit	to Nam		3EM Planni			C Lands		<u> </u>		-	Somol			0.		DI	1123		
				ing Design	GI-LOLADF					+	Sample	e	ר	Гор		2	5.00		
So	DI Desc	ription	Greyish bro	own sandy s	slightly gravel	ly silty CL	AY.				Depth (r	m)	Bo	ottom	ı	2	5.45		
Re	eference	8		5	Depth		25	5.05	m	I	Sampl	le Ty	pe				U		
Sp De	ecimer	n Dn	Greyish bro	own sandy s	lightly gravel	ly silty CL	AY.				KeyLA	B ID)			Caus202	2303081	28	
Те	est Meth 0.54	nod 0 -	BS1377:Pa	rt 5:1990, c	lause 3					_	Date s	starte	ed		_	21/0	3/2023		
Voids Ratio	0.52 0.50 0.48 0.46 0.44 0.42 0.42				e _o						•								
	0.38 0.36	60 -											œ==			20			
$Cv m^{2/}yr$ (log time)	0.34 10.00 8.00 6.00 4.00 2.00 0.00					App	1 Ilied Pr	00 ressure kł	Pa		~			1000				10000	
App Pres k 0	plied ssure Pa 0.0 250	Voids ratio 0.526 0.448	Mv m2/MN - 0.2	Cv (t50, log) m2/yr - 3	Cv (t90, root) m2/yr - 3.1	Csec - 0.0016		Prepa	aration										
5	500	0.427	0.058	4.3	5.7	0.0017		Partic	le density						assumed		2.65		Mg/m3
	000	0.375	0.031	0.0019		Speci Diamo Heigh Moist Bulk o Dry de	imen detai eter it ure Conter density ensity	ils nt					Initial 75.00 20.00 20.0 2.08 1.74		Final - 18.07 27.0 2.44 1.92		mm mm % Mg/m3 Mg/m3		
								Voids	Ratio						0.526		0.379]
							-	Satur: Avera	ation ige tempei	ratu	ure for te	est		⊢	100	20.0	189		% oC
								Swell	ing Pressu	ure	rotion								kPa ∞∕
							Rema	arks	alu	nauon			L					70	
Final Cv plo	values s	should be use		Si	Appr	oved Watson		F	Print	ed : 30)/03/	2023 11:40			₹ €				
Cv co	orrected	to 20oC											LAE	3 13	R - Versio	n 6		1012	2

	CAL	JSEWAY	ONE		SIONAL	CONS	SOLI	DAT	ON 3	TE	ST	Job	o Ref					22-1	1041A		
•		GEOTECH		6313		J. 199	U, U	ause	J			Bo	rehol	e/Pi	t No			BH	1124		
Sit	e Nam	е	3FM Planni	ing Design	GI - Lot A	DPC La	nds					Sa	mple	No.	т.			:	37		
So	il Desc	cription	Grey sandy	slightly gra	avelly silty	CLAY.						Dept	npie th (m)	Bot	om		20).00).45		
Sp Re	ecime ferenc	n e	:	5	Specin Depth	nen		20	0.05		m	Sa	mple	Тур	е				U		
Sp De	ecime	n	Grey sandy	slightly gra	avelly silty	CLAY.						Ke	yLAB	ID			Ca	aus202	30308´	35	
Te	st Met	hod	BS1377:Pa	ırt 5:1990, o	clause 3							Da	te sta	artec	1			21/03	3/2023		
	0.50																				
	0.48	30			C ₀		_								_						
	0.46	50																			
0	0.44	10																			
Ratic																					
/oids	0.42	20						+				$\overline{\mathbf{x}}$		\vdash			+			+	
>	0.40												\sum								
	0.40									Π					$\overline{}$						
	0.38	30				_	+					_	\square	\rightarrow	R						
	0.36	50										6		+							
	0.34	10				_						_									
	0.32	20											-			_					
	0.30																				
(əi	25.0	0																			
g tim	20.0	0				_											×				
yr (lo	15.0	0													*	1					
/ m ^{2/}	5.0	0																			_
ú	0.0	0																			
		1			10			Ар	olied	10 Pre	0 ssure kPa	a				1(000				10000
App	olied		Mv	Cv	Cv (t90, roo	C:	sec		Pre	para	ation										
k	Pa	voids ratio	m2/MN	m2/yr	m2/yr	.,															
0	.0	0.488	-	-	-	0.0	-														
4	00	0.424	0.21	7.2	9.3	0.0	0093	_	Part	ticle	e density						assumed		2.65		Mg/m3
8	00 500	0.378	0.043	11	14	0.0	013	_	Sno	ncim	nen detaile				I		Initial		Final		1
4	00	0.358	0.0047						Diar	met	er						75.00		-		mm
								_	Heig	ght							20.00		18.26		mm
-								-	Bulk	stur k de	e content ensity						2.12		2.42		™ Mg/m3
								1	Dry	der	nsity						1.78		1.95		Mg/m3
					_	Void	ds F	Ratio						0.488		0.358		0/.			
-		1						-	Ave	erad	e tempera	ture fo	or tes	t			2	20.0	170		oC
									Swe	ellin	g Pressure	е									kPa
-						_		-	Sett Ren	tlerr narl	nent on sa ks	turatio	n								%
																			_		
Final	values	should be use	ed with cautior	า			1		Ар	prov	ved		Pi	rinte	d :					(table	_
													1							(≱∢	
Cv plo	otted at	mid point of	load incremen	ts			1	9	tenhe	en V	Vatson				30/)3/2	023 11.40		Ē	IKA	s I
							1	0		J.1 V					50/					TESTIN	IG
Cv co	rrected	to 20oC										L	AB	13F	R - Version	6		1012	2		

•	CAL	SEWAY	ONAL CO	NSOI	LID clar	ATI	ON 3	TE	ST		Job	Ref	f					22	2-104	1A						
		GEUTECH		in - 5						43C	5			+	Bor	rehol	ie/Pi	it No).	+		E	3H12	5		
Sit	te Nam	e	3FM Plann	ing L	esign	GI	- Lot A DPC	Lands	3					_	Sar	mple	NO.	т	on	_			31 19.50)		
So	oil Desc	ription	Greyish bro	own s	sandy	slig	htly gravelly	silty Cl	LAY	•					Dept	th (m)	Bo	tton	ı			19.95	5		
Sp Re	ecimer	า e		5			Specimen Depth			19	.55		m	۱	Sar	mple	тур	be					U			
Sp De	ecimer escriptio	ר n	Greyish bro	own s	sandy	slig	htly gravelly	silty Cl	LAY	•					Key	yLAE	3 ID				(Caus2	02303	30813	39	
Te	est Meth	nod 10	BS1377:Pa	art 5:	1990,	clau	use 3								Dat	te sta	arte	d				23/	/03/20)23		
	0.38	30					- e _o	_	_	_																
	0.36	50																								
s Ratio	0.34	10																								
Voids	0.32	20																								
	0.30	00 -														6	-	4	+		\sum_{i}					
	0.28	80																+								
	0.26	50 -																								
	0.24	ł0 -																								
	0.22	20																								
_	0.20 25.0								_					_				_								
time	20.0	o	_						_	_	_			_				_			*			_	_	
(log	15.0	0 							_	_	_			-					_					_		
m²/yr	10.0													-	_*											
Š	0.0											*														
		1				1	0			Арр	lied	10 Pre	0 ssure k	Pa						100	0					10000
App Pres	plied ssure	Voids ratio	Mv	(t5	Cv 0, log) (Cv t90, root)	Csec	:		Pre	epar	ation													
k	Pa	0 390	m2/MN	n	n2/yr		m2/yr																			
1	95	0.342	0.18		3.7		3.8 (0.0007	7																	
3	890 780	0.326	0.058	-	9.5 14	-	12 (19	0.0009	94 1		Par	rticle	e density	/						as	sumed		2.	65		Mg/m3
1,	560	0.286	0.022		19		27	0.0014	4		Spe	ecin	nen deta	ils						l	Initial		Fi	nal]
3	90	0.293	0.0047	-		_					Dia	imet	ter						<u> </u>	7	74.90		10	-		mm mm
						+			-		не Мо	istu	re Conte	ent					⊢		15.0	+	18	B.0		%
				L	_						Bul	lk de	ensity						L		2.20		2.	42		Mg/m3
											Dry	/ dei	nsity								1.91		2.	05	_	Mg/m3
						_					Voi	ids F	Ratio						<u> </u>	(0.390		0.2	293		
										Sat	turat		vro*	1110 4-	vr to-	•+				103	20.0	1	63		% •C	
				+		+			_		AV6	eillin	ne rempe na Pressi	n at Ure		л tes	οι					20.0				kPa
-				+		+					Set	ttlen	nent on s	sati	uratio	n			⊢							%
											Rei	mar	ks													-
Final	nal values should be used with caution										Ap	pro	ved			Ρ	rinte	ed :							ب (ع	
Cv plo	plotted at mid point of load increments									SI	teph	en \	Watson					30	/03/	202	3 11:40					ン 」 IG
Cv co	orrected	to 20oC											AE	3 13	8R -	Versio	n 6		1	012	2					

	CAL	JSEWAY	ONE						EST	Job	o Ref		22	-1041A	
-	/	-GEOTECH		D313	//:Part 5:	1990, 0	lause	: 3		Bo	rehole/Pit No).	E	3H130	
Si	te Nam	e	3FM Plann	ing Design (GI - Lot A DP	C Lands				Sa	mple No.			63	
So	oil Desc	ription	Grey sandy	v slightly gra	velly silty CLA	ΑY.				Sar Dept	th (m) Bot	op tom		19.50 19.95	
Sp Re	pecimer eferenc	า e	:	5	Specimen Depth		1	9.55	m	Sa	mple Type			U	
Sp		<u>ן</u> 1 חר	Grey sandy	slightly gra	velly silty CLA	λY.				Ke	yLAB ID		Caus20	230308150	
Te	est Met	nod	BS1377:Pa	art 5:1990, c	lause 3					Da	te started		21/	03/2023	
	0.44	10													
	0.42	20			e _o		_								
	0.40	0													
0	0.38	30			_										
Ratic															
/oids	0.36	50		+ + + +											
_	0.34	IO -													
	0.0-														
	0.32	20	_				_	+++-							
	0.20											\mathbb{N}			
	0.30														
	0.28	30													
	0.26	50													
	0.24	10													
ne)	25.0														
og tir	15.0	0													
/yr (l	10.0	0											*		
∑v m₃	5.0	0													
0	0.0	0			10			1	<u>1</u> 00			100	00		10000
—							Ар	plied Pi	ressure kP	а					
Ap Pre	plied ssure	Voids ratio	Mv	Cv (t50, log)	Cv (t90, root)	Csec		Prepa	aration						
k	Pa	. 100	m2/MN	m2/yr	m2/yr										
(0.0 195	0.426	- 0.28	- 2.2	- 2	- 0.00095	5								
3	390	0.332	0.065	4.7	6.2	0.001		Partic	le density			a	ssumed	2.65	Mg/m3
1,	560	0.311	0.041	11	9.5	0.0014	· ·	Speci	men details	6			Initial	Final	
3	390	0.290	0.0029				_	Diam	eter				75.00	-	mm
								Moist	ure Conten	t			17.0	23.0	%
								Bulk (density				2.17	2.53	Mg/m3
							_	Dry d	ensity Ratio				0.426	2.05	Mg/m3
-							-	Satur	ation				104	210	%
								Avera	ige tempera	ature fo	or test		20.0		oC
							_	Swell	ing Pressur	e	'n				kPa %
								Rema	arks	nurallO					/0
Final	values	should be use	ed with caution	n				Appr	oved		Printed :			E	<u>ل</u>
														 (≯	≰) -
Cv pl	otted at	mid point of	load incremer	its			S	stephen	Watson		30/	/03/20	23 11:40	UK	∕ ≟ AS
											20,			TEST	ING
Cv co	orrected	to 20oC									LAB	13R	- Version 6	101	22
















Direct Shear Test BS EN ISO 17892-10:2018						
Project Number	22-1041A	22-1041A Project 3FM Planning Design GI - Lot				
Location Number	BH101	Sample Referen	ce	1	.8	
Depth (m)	7.00	Sample Submerge	ed?	Yes	No	
Sample Type	В	Particle Density (M	g/m³)	2.65	Assumed	
Description		Grey slightly gravelly slight	ly silty fine to c	coarse SAND.		
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve	
		Stage	1	2	3	
		Initial Conditions		-	-	
	Height (mm)		20.0	20.0	20.0	
	Diameter (mm)	60.0	60.0	60.0	
W	/ater Content (%)	9.1	9.1	9.1	
Bul	k Density (Mg/	′m³)	1.68	1.72	1.71	
Dr	y Density (Mg/	m ³)	1.54	1.58	1.57	
	Voids Ratio		0.724	0.680	0.692	
		Consolidation				
Nor	mal Pressure (kPa)	70	140	280	
Vertica	al Displacemen	t (mm)	0.257	0.467	0.931	
		Shearing				
Rate	of Strain (mm,	/min)	0.600	0.600	0.600	
Pea	k Shear Stress ((kPa)	53.6	119.5	187.0	
Hoz Displacement (mm)			10.2	10.2	10.2	
Hoz Displacem	isplacement at Peak Shear Stress (mm)			3.603	2.403	
	Final Conditions					
W	/ater Content (%)	21.0	22.0	22.0	
Dr	y Density (Mg/	m ³)	1.55	1.64	1.72	
	Voids Ratio		0.706	0.634	0.596	



	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Planning Design GI -		GI - Lot A		
Location Number	BH101		Sample Reference		1	.8
Depth (m)	7.00		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	



Consolidation Graphs

	Direct Shea	r Test	Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design (GI - Lot A		
Location Number	BH101		Sample Reference		1	8	
Depth (m)	7.00		Sample Submerged?		Yes	No	
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	r Test	Test BS EN ISO 17892-10:2018				
Project Number	22-1041A		Project 3FM Plann		nning Design G	GI - Lot A	
Location Number	BH101		Sample Reference		1	.8	
Depth (m)	7.00		Sample Submerged?		Yes	No	
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed		

	Stage	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			20	
Angle of Shearing Resistance (°)			31.5	





Direct Shear Test BS EN ISO 17892-10:2018						
Project Number	22-1041A	22-1041A Project 3FM Planning Design GI - L				
Location Number	BH120	Sample Referen	ce		1	
Depth (m)	10.00	Sample Submerge	ed?	Yes	No	
Sample Type	С	Particle Density (M	g/m³)	2.65	Assumed	
Description		Greyish brown slightly grave	elly silty fine to	coarse SAND.		
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve	
		Stage	1	2	3	
		Initial Conditions				
	Height (mm)		20.0	20.0	20.0	
	Diameter (mm)	60.0	60.0	60.0	
W	/ater Content (%)	8.4	8.4	8.4	
Bul	k Density (Mg/	′m³)	1.73	1.73	1.76	
Dr	y Density (Mg/	m ³)	1.60	1.60	1.62	
	Voids Ratio		0.660	0.656	0.633	
		Consolidation				
Nor	mal Pressure (kPa)	100	200	400	
Vertica	al Displacemen	t (mm)	0.456	0.549	0.638	
		Shearing				
Rate	of Strain (mm,	/min)	0.600	0.600	0.600	
Pea	k Shear Stress (kPa)	82.7	154.1	326.8	
Hoz Displacement (mm)			10.2	10.2	10.2	
Hoz Displacem	Hoz Displacement at Peak Shear Stress (mm)			2.463	2.637	
		Final Conditions				
W	/ater Content (%)	20.0	20.0	20.0	
Dr	y Density (Mg/	m ³)	1.62	1.68	1.71	
	Voids Ratio		0.606	0.601	0.575	



	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Planning Design GI - Lo		GI - Lot A		
Location Number	BH120		Sample Reference			1
Depth (m)	10.00		Sample Submerged?		Yes	No
Sample Type	С		Particle Density (Mg/m ³)		2.65	Assumed



	Direct Shea	r Test	st BS EN ISO 17892-10:2018				
Project Number	22-1041A		Project 3FM Planning Desi		nning Design (GI - Lot A	
Location Number	BH120		Sample Reference			1	
Depth (m)	10.00		Sample Submerged?		Yes	No	
Sample Type	С		Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	r Test	Test BS EN ISO 17892-10:2018				
Project Number	22-1041A		Project 3FM Planning Design GI		GI - Lot A		
Location Number	BH120		Sample Reference		:	1	
Depth (m)	10.00		Sample Submerged?		Yes	No	
Sample Type	С		Particle Density (Mg/m ³)		2.65	Assumed	

	Stage	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			4	
Angle of Shearing Resistance (°)			38.5	





Direct Shear Test BS EN ISO 17892-10:2018						
Project Number	22-1041A	22-1041A Project 3FM Planning Design GI - I				
Location Number	BH120	Sample Referen	ce		2	
Depth (m)	20.00	Sample Submerge	ed?	Yes	No	
Sample Type	С	Particle Density (M	g/m³)	2.65	Assumed	
Description		Grey slightly sa	andy silty CLAY			
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve	
		Stage	1	2	3	
		Initial Conditions				
	Height (mm)		20.0	20.0	20.0	
	Diameter (mm)	60.0	60.0	60.0	
W	/ater Content (%)	21.0	21.0	21.0	
Bul	k Density (Mg/	′m³)	2.09	2.06	2.10	
Dr	y Density (Mg/	m ³)	1.74	1.71	1.74	
	Voids Ratio		0.527	0.550	0.520	
		Consolidation				
Nor	mal Pressure (kPa)	200	400	800	
Vertica	al Displacemen	t (mm)	2.147	2.204	3.023	
		Shearing				
Rate	of Strain (mm	/min)	0.062	0.062	0.062	
Pea	k Shear Stress ((kPa)	131.9	247.4	489.9	
Hoz Displacement (mm)			10.2	10.2	10.2	
Hoz Displacem	ent at Peak Sh	ear Stress (mm)	7.431	4.323	4.857	
	Final Conditions					
W	/ater Content (%)	24.0	23.0	24.0	
Dr	y Density (Mg/	m ³)	2.13	2.17	2.38	
	Voids Ratio		0.344	0.357	0.264	



	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Planning Design GI - Lo		GI - Lot A		
Location Number	BH120		Sample Reference			2
Depth (m)	20.00		Sample Submerged?		Yes	No
Sample Type	С		Particle Density (Mg/m ³)		2.65	Assumed



	Direct Shea	r Test	Fest BS EN ISO 17892-10:2018			
Project Number	22-1041A	A Project 3FM Planning Desig		Project 3FM Planning		GI - Lot A
Location Number	BH120		Sample Reference			2
Depth (m)	20.00		Sample Submerged?		Yes	No
Sample Type	С		Particle Density (Mg/m ³)		2.65	Assumed





	Direct Shea	r Test	st BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Planning Design GI - Lo		GI - Lot A	
Location Number	BH120		Sample Reference			2
Depth (m)	20.00		Sample Submerged?		Yes	No
Sample Type	С		Particle Density (Mg/m ³)		2.65	Assumed

Sta	ige	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			11	
Angle of Shearing Resistance (°)			31.0	





	Direct Shea	r Test BS EN ISO 178	92-10:2018					
Project Number	22-1041A	Project	3FM Pla	nning Design (GI - Lot A			
Location Number	BH121	Sample Referen	ce	1	.5			
Depth (m)	8.50	Sample Submerge	ed?	Yes	No			
Sample Type	В	Particle Density (Mg	g/m³)	2.65	Assumed			
Description	Greyish brown slightly sandy subangular fine to coarse GRAVEL.							
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve			
		Stage	1	2	3			
		Initial Conditions						
	Height (mm)		20.0	20.0	20.0			
	Diameter (mm)	60.0	60.0	60.0			
Water Content (%)			6.6	6.6	6.6			
Bulk Density (Mg/m ³)			1.72	1.68	1.73			
Dr	y Density (Mg/	m ³)	1.61	1.58	1.62			
	Voids Ratio		0.646	0.681	0.631			
		Consolidation						
Nor	mal Pressure (kPa)	85	170	340			
Vertica	al Displacemen	t (mm)	0.291	0.460	0.856			
		Shearing						
Rate	of Strain (mm,	/min)	0.600	0.600	0.600			
Реа	k Shear Stress (kPa)	75.9	137.4	250.3			
Hoz	Displacement ((mm)	10.2	10.2	10.2			
Hoz Displacem	nent at Peak Shear Stress (mm) 2.223 3.363				2.637			
		Final Conditions						
W	/ater Content (%)	19.0	19.0	19.0			
Dr	y Density (Mg/	m ³)	1.61	1.66	1.71			
	Voids Ratio		0.622	0.553	0.637			



	Direct Shea	r Test	est BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Planning Design (GI - Lot A	
Location Number	BH121		Sample Reference		1	.5
Depth (m)	8.50		Sample Submerged?		Yes	No
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed



	Direct Shea	r Test	Test BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Plan		lanning Design GI - Lot A	
Location Number	BH121		Sample Reference		1	.5
Depth (m)	8.50		Sample Submerged?		Yes	No
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed





	Direct Shea	r Test	st BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Plann		nning Design GI - Lot A	
Location Number	BH121		Sample Reference		1	5
Depth (m)	8.50		Sample Submerged?		Yes	No
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed

Sta	ge 1	2	3
Envelope Failure Results			
Apparent Cohesion (kPa)		19	
Angle of Shearing Resistance (°)		34.5	



	Tested	Approved
UKAS TESTING 10122	Aaron Nutt	Joseph Nicholl

	Direct Shea	r Test BS EN ISO 178	92-10:2018				
Project Number	22-1041A	Project	3FM Pla	nning Design (GI - Lot A		
Location Number	BH121	Sample Referen	ce	4	1		
Depth (m)	15.60	Sample Submerge	ed?	Yes	No		
Sample Type	В	Particle Density (Mg	g/m³)	2.65	Assumed		
Description	Brown gravelly slightly silty fine to coarse SAND.						
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve		
		Stage	1	2	3		
		Initial Conditions		-	-		
	Height (mm)		20.0	20.0	20.0		
	Diameter (mm)	60.0	60.0	60.0		
W	Water Content (%)			5.9	5.9		
Bul	k Density (Mg/	′m³)	1.59	1.60	1.59		
Dr	y Density (Mg/	m ³)	1.50	1.51	1.50		
	Voids Ratio		0.768	0.755	0.766		
		Consolidation					
Nor	rmal Pressure (kPa)	160	320	640		
Vertica	al Displacemen	t (mm)	0.492	0.444	0.891		
		Shearing					
Rate	of Strain (mm	/min)	0.600	0.600	0.600		
Pea	k Shear Stress (kPa)	148.3	265.4	503.3		
Hoz	Displacement	(mm)	10.2	10.2	10.2		
Hoz Displacem	ient at Peak Shear Stress (mm) 4.563 3.117				4.803		
		Final Conditions		1	1		
W	/ater Content (%)	24.0	22.0	22.0		
Dr	y Density (Mg/	m ³)	1.51	1.53	1.52		
	Voids Ratio		0.741	0.722	0.674		



	Direct Shea	r Test	Test BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Planning D		inning Design (GI - Lot A
Location Number	BH121		Sample Reference		4	1
Depth (m)	15.60		Sample Submerged?		Yes	No
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed



	Direct Shea	r Test	Fest BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Plannin		lanning Design GI - Lot A	
Location Number	BH121		Sample Reference		4	-1
Depth (m)	15.60		Sample Submerged?		Yes	No
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed





	Direct Shea	r Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project 3FM Plan		Project 3FM Plannir		nning Design (GI - Lot A
Location Number	BH121	Sample Reference		4	1		
Depth (m)	15.60		Sample Submerged?		Yes	No	
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed		

	Stage	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			29	
Angle of Shearing Resistance (°)			36.5	





	Direct Shea	r Test BS EN ISO 178	92-10:2018		
Project Number	22-1041A	Project	3FM Pla	nning Design (GI - Lot A
Location Number	BH122	Sample Referen	ce	1	.5
Depth (m)	8.50	Sample Submerge	ed?	Yes	No
Sample Type	В	Particle Density (Mg	g/m³)	2.65	Assumed
Description		Grey gravelly slightly sil	lty fine to coar	se SAND.	
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve
		Stage	1	2	3
		Initial Conditions			
	Height (mm)		20.0	20.0	20.0
	Diameter (mm)	60.0	60.0	60.0
Water Content (%)			8.6	8.6	8.6
Bulk Density (Mg/m ³)			1.73	1.71	1.71
Dr	y Density (Mg/	m ³)	1.60	1.57	1.57
	Voids Ratio		0.659	0.687	0.687
		Consolidation			
Nor	mal Pressure (kPa)	85	170	340
Vertic	al Displacemen	t (mm)	0.775	0.619	0.877
		Shearing			
Rate	of Strain (mm,	/min)	0.600	0.600	0.600
Реа	k Shear Stress (kPa)	74.4	136.3	246.2
Hoz Displacement (mm)			10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)			2.523	2.337	4.443
		Final Conditions			
W	/ater Content (%)	23.0	22.0	22.0
Dr	y Density (Mg/	m ³)	1.68	1.67	1.74
	Voids Ratio		0.577	0.608	0.586



	Direct Shea	ar Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design (GI - Lot A	
Location Number	BH122	Sample Reference		1	.5	
Depth (m)	8.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	



Consolidation Graphs

	Direct Shea	Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design (GI - Lot A	
Location Number	BH122	Sample Reference		1	.5	
Depth (m)	8.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design (GI - Lot A	
Location Number	BH122	Sample Reference		1	5	
Depth (m)	8.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	

	Stage	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			19	
Angle of Shearing Resistance (°)			34.0	





	Direct Shear Test BS EN ISO 17892-10:2018								
Project Number	22-1041A	Project	3FM Pla	nning Design (GI - Lot A				
Location Number	BH122	Sample Referen	ce	3	0				
Depth (m)	11.50	Sample Submerge	ed?	Yes	No				
Sample Type	В	Particle Density (Mg	g/m³)	2.65	Assumed				
Description	Greys	lightly sandy slightly silty sub	prounded fine	to medium GR	AVEL.				
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve				
		Stage	1	2	3				
		Initial Conditions							
	Height (mm)		20.0	20.0	20.0				
	60.0	60.0	60.0						
Water Content (%)			5.7	5.7	5.7				
Bulk Density (Mg/m ³)			1.62	1.62	1.64				
Dr	y Density (Mg/	m ³)	1.53	1.53	1.56				
	Voids Ratio		0.733	0.731	0.703				
		Consolidation							
Nor	mal Pressure (kPa)	115	230	460				
Vertica	al Displacemen	t (mm)	0.601	0.659	1.381				
		Shearing							
Rate	of Strain (mm,	/min)	0.600	0.600	0.600				
Pea	k Shear Stress (kPa)	93.6	183.6	326.5				
Hoz Displacement (mm)			10.2	10.2	10.2				
Hoz Displacem	3.123	3.178	2.877						
Final Conditions									
W	/ater Content (%)	21.0	21.0	21.0				
Dr	y Density (Mg/	m ³)	1.57	1.61	1.78				
	Voids Ratio		0.676	0.670	0.559				



	Direct Shea	ar Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design (GI - Lot A	
Location Number	BH122	Sample Reference		3	0	
Depth (m)	11.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	



	Direct Shea	ar Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design (GI - Lot A	
Location Number	BH122	Sample Reference		3	0	
Depth (m)	11.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design G	GI - Lot A	
Location Number	BH122	Sample Reference		3	0	
Depth (m)	11.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	

	Stage	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			22	
Angle of Shearing Resistance (°)			33.5	





Direct Shear Test BS EN ISO 17892-10:2018								
Project Number	22-1041A	22-1041A Project 3FM Planning Design GI - Lot A						
Location Number	BH123	Sample Referen	ce	1	.8			
Depth (m)	5.80	Sample Submerge	ed?	Yes	No			
Sample Type	В	Particle Density (M	g/m³)	2.65	Assumed			
Description	Greyish browi	Greyish brown gravelly slightly silty fine to medium SAND containing shell fragments						
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve			
		Stage	1	2	3			
		Initial Conditions						
	Height (mm)		20.0	20.0	20.0			
	Diameter (mm)	60.0	60.0	60.0			
Water Content (%)			26.0	26.0	26.0			
Bulk Density (Mg/m ³)			1.80	1.77	1.77			
Dry Density (Mg/m ³)			1.43	1.41	1.41			
Voids Ratio			0.852	0.881	0.885			
Consolidation								
Noi	rmal Pressure (kPa)	60	120	240			
Vertic	al Displacemen	t (mm)	0.520	0.472	0.611			
		Shearing		-				
Rate	e of Strain (mm,	/min)	0.600	0.600	0.600			
Реа	Peak Shear Stress (kPa)			99.2	163.6			
Hoz Displacement (mm)			10.2	10.2	10.2			
Hoz Displacement at Peak Shear Stress (mm)			2.103	2.103	2.823			
Final Conditions								
W	29.0	30.0	30.0					
Dr	1.43	1.40	1.44					
	0.822	0.849	0.827					



	Direct Shea	r Test	Fest BS EN ISO 17892-10:2018			
Project Number	22-1041A	Project 3FM Planning Design GI - Lo		GI - Lot A		
Location Number	BH123		Sample Reference		18	
Depth (m)	5.80	Sample Submerged?		Yes	No	
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	



Consolidation Graphs

	Direct Shea	r Test	st BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Planning Design GI - L		GI - Lot A	
Location Number	BH123		Sample Reference		18	
Depth (m)	5.80		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	r Test	st BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Planning Design G		GI - Lot A	
Location Number	BH123		Sample Reference		18	
Depth (m)	5.80		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	

Stage	1	2	3
Envelope Failure Results			
Apparent Cohesion (kPa)		15	
Angle of Shearing Resistance (°)		32.0	





Direct Shear Test BS EN ISO 17892-10:2018								
Project Number	22-1041A	22-1041A Project 3FM Planning Design GI - Lot A						
Location Number	BH124	Sample Referen	ce	1	.8			
Depth (m)	5.80	Sample Submerge	ed?	Yes	No			
Sample Type	В	Particle Density (M	g/m³)	2.65	Assumed			
Description		Brownish grey sandysubangular Ine to coarse GRAVEL.						
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve			
		Stage	1	2	3			
		Initial Conditions		-	-			
	Height (mm)		20.0	20.0	20.0			
	Diameter (mm)	60.0	60.0	60.0			
Water Content (%)			27.0	27.0	27.0			
Bulk Density (Mg/m ³)			1.78	1.79	1.80			
Dry Density (Mg/m ³)			1.40	1.41	1.42			
Voids Ratio			0.890	0.875	0.871			
Consolidation								
Nor	mal Pressure (kPa)	60	120	240			
Vertica	al Displacemen	t (mm)	0.281	0.563	0.708			
		Shearing						
Rate	of Strain (mm,	/min)	0.600	0.600	0.600			
Peak Shear Stress (kPa)			50.5	94.3	166.4			
Hoz Displacement (mm)			10.2	10.2	10.2			
Hoz Displacement at Peak Shear Stress (mm)			1.863	1.737	2.337			
Final Conditions								
W	29.0	29.0	29.0					
Dr	1.37	1.46	1.49					
	0.876	0.818	0.802					



	Direct Shea	r Test	est BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Planning Design GI - Lot		GI - Lot A	
Location Number	BH124		Sample Reference		18	
Depth (m)	5.80	Sample Submerged?		Yes	No	
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	


	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design GI - Lot A		
Location Number	BH124	Sample Reference		1	.8	
Depth (m)	5.80		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design GI - Lot A		
Location Number	BH124	Sample Reference		1	.8	
Depth (m)	5.80		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	

Stage	1	2	3
Envelope Failure Results			
Apparent Cohesion (kPa)		14	
Angle of Shearing Resistance (°)		32.5	





	Direct Shea	r Test BS EN ISO 178	92-10:2018						
Project Number	22-1041A	Project	3FM Pla	nning Design (GI - Lot A				
Location Number	BH124	Sample Referen	ce	4	2				
Depth (m)	13.50	Sample Submerge	ed?	Yes	No				
Sample Type	В	Particle Density (Mg	g/m³)	2.65	Assumed				
Description	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL.								
Sample Preparation	Sa	Sample is recompacted using material passing 2mm test sieve							
		Stage	1	2	3				
		Initial Conditions		-	-				
	Height (mm)		20.0	20.0	20.0				
Diameter (mm)			60.0	60.0	60.0				
Water Content (%)			7.8	7.8	7.8				
Bulk Density (Mg/m ³)			1.81	1.82	1.80				
Dr	Dry Density (Mg/m ³)			1.69	1.67				
	Voids Ratio		0.582	0.568	0.583				
		Consolidation							
Nor	mal Pressure (kPa)	135	270	540				
Vertica	al Displacemen	t (mm)	0.465	0.740	1.170				
		Shearing							
Rate	of Strain (mm,	[/] min)	0.600	0.600	0.600				
Реа	k Shear Stress (kPa)	96.3	196.0	397.5				
Hoz Displacement (mm)			10.2	10.2	10.2				
Hoz Displacement at Peak Shear Stress (mm)3.0033.477					4.563				
		Final Conditions							
W	/ater Content (%)	15.0	15.0	16.0				
Dr	y Density (Mg/	m ³)	1.77	1.83	1.92				
	Voids Ratio		0.530	0.496	0.469				



	Direct Shea	ar Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		ning Design GI - Lot A		
Location Number	BH124	Sample Reference		4	2	
Depth (m)	13.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	



	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design GI - Lot A		
Location Number	BH124	Sample Reference		4	-2	
Depth (m)	13.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design GI - Lot A		
Location Number	BH124		Sample Reference		4	2
Depth (m)	13.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	

Stag	e 1	2	3
Envelope Failure Results			
Apparent Cohesion (kPa)		1	
Angle of Shearing Resistance (°)		36.0	





	Direct Shear Test BS EN ISO 17892-10:2018								
Project Number	22-1041A	Project	3FM Pla	nning Design (GI - Lot A				
Location Number	BH124	Sample Referen	ce		1				
Depth (m)	31.00	Sample Submerge	ed?	Yes	No				
Sample Type	С	Particle Density (M	g/m³)	2.65	Assumed				
Description	Dark gre	Dark grey slightly sandy slightly clayey subangular fine to coarse GRAVEL.							
Sample Preparation	Sa	Sample is recompacted using material passing 2mm test sieve							
		Stage	1	2	3				
		Initial Conditions							
	Height (mm)		20.0	20.0	20.0				
	60.0	60.0	60.0						
Water Content (%)			18.0	18.0	18.0				
Bulk Density (Mg/m ³)			1.90	1.91	1.89				
Dr	Dry Density (Mg/m ³)			1.62	1.60				
	Voids Ratio		0.642	0.633	0.653				
		Consolidation							
Nor	mal Pressure (kPa)	300	600	1200				
Vertica	al Displacemen	t (mm)	1.006	1.263	1.759				
		Shearing							
Rate	of Strain (mm,	/min)	0.600	0.600	0.600				
Pea	k Shear Stress (kPa)	253.1	498.6	869.8				
Hoz	Hoz Displacement (mm)			10.2	10.2				
Hoz Displacement at Peak Shear Stress (mm)3.4174.323					5.643				
		Final Conditions		-					
W	/ater Content (%)	20.0	20.0	19.0				
Dr	y Density (Mg/	m ³)	1.77	1.86	1.96				
	Voids Ratio		0.555	0.491	0.457				



	Direct Shea	ar Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design GI - Lot A		
Location Number	BH124		Sample Reference			1
Depth (m)	31.00		Sample Submerged?		Yes	No
Sample Type	С	Particle Density (Mg/m ³)		2.65	Assumed	









	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project 3FM Plan		nning Design GI - Lot A		
Location Number	BH124		Sample Reference			1
Depth (m)	31.00		Sample Submerged?		Yes	No
Sample Type	С	Particle Density (Mg/m ³)		2.65	Assumed	

	Stage	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			68	
Angle of Shearing Resistance (°)			34.0	





Direct Shear Test BS EN ISO 17892-10:2018							
Project Number	22-1041A	22-1041A Project 3FM Planning Design GI - Lot					
Location Number	BH130	Sample Referen	ce	2	.9		
Depth (m)	3.00	Sample Submerge	ed?	Yes	No		
Sample Type	В	Particle Density (M	g/m³)	2.65	Assumed		
Description		Greyish brown gravell	y fine to coars	e SAND.			
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve		
		Stage	1	2	3		
		Initial Conditions					
	Height (mm)		20.0	20.0	20.0		
	Diameter (mm)	60.0	60.0	60.0		
W	/ater Content (%)	11.0	11.0	11.0		
Bul	k Density (Mg/	′m³)	1.76	1.71	1.74		
Dry	y Density (Mg/	m ³)	1.58	1.54	1.56		
	Voids Ratio		0.679	0.726	0.696		
		Consolidation					
Nor	mal Pressure (kPa)	30	60	120		
Vertica	al Displacemen	t (mm)	0.183	0.276	0.573		
		Shearing					
Rate	of Strain (mm,	/min)	0.600	0.600	0.600		
Peal	k Shear Stress ((kPa)	41.2	52.6	99.2		
Hoz Displacement (mm)			10.2	10.2	10.2		
Hoz Displacement at Peak Shear Stress (mm)			1.617	2.703	2.163		
		Final Conditions					
W	/ater Content (%)	23.0	23.0	22.0		
Dry	y Density (Mg/	m ³)	1.56	1.54	1.63		
	Voids Ratio		0.682	0.689	0.646		



	Direct Shea	r Test	Test BS EN ISO 17892-10:2018				
Project Number	22-1041A		Project 3FM Planning Design GI - Lot			GI - Lot A	
Location Number	BH130		Sample Reference		2	.9	
Depth (m)	3.00		Sample Submerged?		Yes	No	
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed	



	Direct Shea	r Test	est BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Planning Design GI		GI - Lot A	
Location Number	BH130		Sample Reference		2	.9
Depth (m)	3.00		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	Test BS EN ISO 17892-10:2018				
Project Number	22-1041A		Project 3FM Planning Design GI - Lot			GI - Lot A
Location Number	BH130		Sample Reference		2	9
Depth (m)	3.00		Sample Submerged?		Yes	No
Sample Type	В		Particle Density (Mg/m ³) 2.65		2.65	Assumed

Sta	je 1	2	3
Envelope Failure Results			
Apparent Cohesion (kPa)		18	
Angle of Shearing Resistance (°)		33.5	





Direct Shear Test BS EN ISO 17892-10:2018							
Project Number	22-1041A	22-1041A Project 3FM Planning Design GI - Lo					
Location Number	BH130	Sample Referen	ce	3	9		
Depth (m)	10.00	Sample Submerge	ed?	Yes	No		
Sample Type	В	Particle Density (M	g/m³)	2.65	Assumed		
Description		Greyish brown gravell	y fine to coars	e SAND.			
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve		
		Stage	1	2	3		
		Initial Conditions					
	Height (mm)		20.0	20.0	20.0		
	Diameter (mm)	60.0	60.0	60.0		
W	/ater Content (%)	8.4	8.4	8.4		
Bul	k Density (Mg/	′m³)	1.73	1.74	1.75		
Dr	y Density (Mg/	m ³)	1.60	1.60	1.61		
	Voids Ratio		0.659	0.653	0.641		
		Consolidation					
Nor	rmal Pressure (kPa)	100	200	400		
Vertica	al Displacemen	t (mm)	0.358	0.740	1.178		
		Shearing					
Rate	of Strain (mm	/min)	0.600	0.600	0.600		
Pea	k Shear Stress ((kPa)	95.5	170.4	312.6		
Hoz Displacement (mm)			10.2	10.2	10.2		
Hoz Displacement at Peak Shear Stress (mm)			4.623	4.143	3.663		
Final Conditions							
W	/ater Content (%)	23.0	23.0	22.0		
Dr	y Density (Mg/	m ³)	1.61	1.71	1.80		
	Voids Ratio		0.644	0.574	0.536		



	Direct Shea	r Test	Test BS EN ISO 17892-10:2018				
Project Number	22-1041A		Project 3FM Planning Design GI - Lot			GI - Lot A	
Location Number	BH130		Sample Reference		3	9	
Depth (m)	10.00		Sample Submerged?		Yes	No	
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed		



	Direct Shea	r Test	Test BS EN ISO 17892-10:2018			
Project Number	22-1041A		Project 3FM Planning Design GI -		GI - Lot A	
Location Number	BH130		Sample Reference		3	9
Depth (m)	10.00		Sample Submerged?		Yes	No
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed





	Direct Shea	r Test	Test BS EN ISO 17892-10:2018				
Project Number	22-1041A		Project 3FM Planning Design GI - L		GI - Lot A		
Location Number	BH130		Sample Reference		3	9	
Depth (m)	10.00		Sample Submerged?		Yes	No	
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed	

	Stage	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			24	
Angle of Shearing Resistance (°)			36.0	





Direct Shear Test BS EN ISO 17892-10:2018							
Project Number	22-1041A	22-1041A Project 3FM Planning Design GI - Lo					
Location Number	BH130	Sample Referen	ce	5	57		
Depth (m)	15.00	Sample Submerge	ed?	Yes	No		
Sample Type	В	Particle Density (Mg	g/m³)	2.65	Assumed		
Description	Greyish b	rown slightly sandy slightly s	ilty subangula	r fine to coarse	e GRAVEL.		
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve		
		Stage	1	2	3		
		Initial Conditions					
	Height (mm)		20.0	20.0	20.0		
	Diameter (mm)	60.0	60.0	60.0		
W	/ater Content (%)	11.0	11.0	11.0		
Bul	k Density (Mg/	⁷ m ³)	1.76	1.72	1.77		
Dr	y Density (Mg/	m ³)	1.58	1.55	1.58		
	Voids Ratio		0.682	0.713	0.672		
		Consolidation					
Nor	rmal Pressure (kPa)	150	300	600		
Vertica	al Displacemen	t (mm)	0.675	1.468	1.374		
		Shearing		-			
Rate	of Strain (mm,	/min)	0.600	0.600	0.600		
Pea	k Shear Stress (kPa)	127.5	222.0	426.5		
Hoz Displacement (mm)			10.2	10.2	10.2		
Hoz Displacement at Peak Shear Stress (mm)			3.363	4.377	3.777		
		Final Conditions			1		
W	/ater Content (%)	20.0	21.0	20.0		
Dr	y Density (Mg/	m ³)	1.72	1.86	1.88		
	Voids Ratio		0.605	0.558	0.519		



	Direct Shea	r Test BS EN ISO 17892-10:2018				
Project Number	22-1041A		Project 3FM Planning Design GI - Lot			GI - Lot A
Location Number	BH130		Sample Reference		5	7
Depth (m)	15.00		Sample Submerged?		Yes	No
Sample Type	В		Particle Density (Mg/m ³)		2.65	Assumed



	Direct Shea	r Test	BS EN ISO 178					
Project Number	22-1041A		Project 3FM Plan			nning Design GI - Lot A		
Location Number	BH130		Sample Reference			57		
Depth (m)	15.00		Sample Submerged?		Yes	No		
Sample Type	В		Particle Density (Mg/m ³)			Assumed		





	Direct Shea	near Test BS EN ISO 17892-10:2018						
Project Number	22-1041A	Project 3FM I		3FM Pla	anning Design GI - Lot A			
Location Number	BH130		Sample Reference			57		
Depth (m)	15.00		Sample Submerged?			No		
Sample Type	В		Particle Density (Mg/m ³) 2.65			Assumed		

Stag	e 1	2	3
Envelope Failure Results			
Apparent Cohesion (kPa)		25	
Angle of Shearing Resistance (°)		33.5	





	Direct Shear Test BS EN ISO 17892-10:2018						
Project Number	22-1041A	Project	3FM Pla	nning Design (GI - Lot A		
Location Number	BH131	Sample Referen	ce	5	54		
Depth (m)	15.50	Sample Submerge	ed?	Yes	No		
Sample Type	В	Particle Density (Mg	g/m³)	2.65	Assumed		
Description	Bro	ownish grey slightly sandy sul	bangular fine t	o coarse GRAV	′EL.		
Sample Preparation	Sa	mple is recompacted using n	naterial passin	g 2mm test sie	ve		
		Stage	1	2	3		
		Initial Conditions					
	Height (mm)		20.0	20.0	20.0		
	Diameter (mm)	60.0	60.0	60.0		
W	/ater Content (%)	6.1	6.1	6.1		
Bul	k Density (Mg/	⁷ m ³)	1.61	1.72	1.63		
Dr	y Density (Mg/	m ³)	1.52	1.62	1.54		
	Voids Ratio		0.748	0.639	0.725		
		Consolidation					
Nor	mal Pressure (kPa)	160	320	640		
Vertica	al Displacemen	t (mm)	0.500	0.367	1.015		
		Shearing					
Rate	of Strain (mm,	/min)	0.600	0.600	0.600		
Pea	k Shear Stress (kPa)	138.7	254.0	476.0		
Hoz	Displacement	(mm)	10.2	10.2	10.2		
Hoz Displacem	ent at Peak Sh	5.157	3.903	6.957			
		Final Conditions	1	1	1		
W	/ater Content (%)	23.0	21.0	22.0		
Dr	y Density (Mg/	m ³)	1.59	1.54	1.82		
	Voids Ratio		0.677	0.636	0.587		



	Direct Shea	t Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project 3FM Plan			nning Design GI - Lot A		
Location Number	BH131		Sample Reference			4	
Depth (m)	15.50		Sample Submerged?			No	
Sample Type	В	Particle Density (Mg/m ³) 2.65			Assumed		



Lab Sheet Reference : LAB25R - Version 4

	Direct Shea	r Test	BS EN ISO 178			
Project Number	22-1041A	Project				
Location Number	BH131		Sample Reference		5	4
Depth (m)	15.50		Sample Submerged?		Yes	No
Sample Type	В	Particle Density (Mg/m ³)		2.65	Assumed	





	Direct Shea	ear Test BS EN ISO 17892-10:2018						
Project Number	22-1041A	Project 3FM I		3FM Pla	anning Design GI - Lot A			
Location Number	BH131		Sample Reference			54		
Depth (m)	15.50		Sample Submerge	ed?	Yes	No		
Sample Type	В		Particle Density (Mg/m ³) 2.6			Assumed		

	Stage	1	2	3
Envelope Failure Results				
Apparent Cohesion (kPa)			28	
Angle of Shearing Resistance (°)			35.0	



	Tested	Approved
UKAS TESTING 10122	Aaron Nutt	Joseph Nicholl

	GEO			Point Load Strength Index Tests Summary of Results														
Project No. 22	2-1041A			Proje	ect Nam	e	3	FM P	lannin	g Desi	ign GI -	· Lot A	DPC L	ands				
Borehole	Sa	ample		Spe	ecimen	Deek Time	Test T see IS		alid (Y/N)		Dime	nsions		Force P	ent diameter, De	Point Strengtł	Load n Index	Remarks (including
No.	Depth	Ref.	Туре	Ref.	Depth	Rock Type	Type (D, A, I, B)	Direction (L, P or U)	Failure Va	Lne	W	Dps	Dps' mm	kN	a Equivale	Is MPa	Is(5 0) MPa	water content if measured)
BH101	26.70	1	с	1	26.70	LIMESTONE	D	U	YES	97.1	101.8	101.8	99.0	41.0	100.4	4.1	5.6	
BH101	26.80	2	с	1	26.80	LIMESTONE	A	U	NO		101.7	50.0	47.0	27.0	78.0	4.4	5.4	
BH101	28.30	3	с	1	28.30	LIMESTONE	D	U	NO	79.5	101.8	101.8	100.0	24.0	100.9	2.4	3.2	
BH101	28.40	4	С	1	28.40	LIMESTONE	А	U	NO		101.8	84.0	81.0	26.7	102.5	2.5	3.5	
BH101	28.60	5	с	1	28.60	LIMESTONE	D	U	YES	86.4	101.8	101.8	100.0	4.3	100.9	0.4	0.6	
BH101	28.80	6	с	1	28.80	LIMESTONE	А	U	YES		101.8	96.0	94.0	24.9	110.4	2.0	2.9	
BH120	35.40	1	с	1	35.40	LIMESTONE	D	U	YES	83.4	101.9	101.9	99.0	11.3	100.4	1.1	1.5	
BH120	35.55	2	с	1	35.55	LIMESTONE	A	U	NO		102.0	86.0	84.0	23.9	104.4	2.2	3.1	
BH120	36.50	3	с	1	36.50	LIMESTONE	D	U	YES	83.2	102.1	102.1	99.0	32.0	100.5	3.2	4.3	
BH120	36.60	4	с	1	36.60	LIMESTONE	A	U	NO		101.9	84.0	82.0	23.7	103.1	2.2	3.1	
BH120	39.30	5	с	1	39.30	LIMESTONE	D	U	NO	110.0	102.0	102.1	98.0	17.4	100.0	1.7	2.4	
BH120	39.40	6	с	1	39.40	LIMESTONE	A	U	NO		102.2	60.0	54.0	26.0	83.8	3.7	4.7	
BH120	39.50	7	С	1	39.50	LIMESTONE	D	U	YES	75.1	101.9	101.9	100.0	10.6	100.9	1.0	1.4	
BH120	39.65	8	с	1	39.65	LIMESTONE	A	U	NO		102.0	75.0	71.0	19.5	96.0	2.1	2.8	
BH123	37.70	1	с	1	37.70	LIMESTONE	D	U	YES	68.2	101.8	101.8	100.0	8.0	100.9	0.8	1.1	
BH123	37.80	2	С	1	37.80		A	U	YES		101.6	67.0	61.0	10.8	88.8	1.4	1.8	
BH123	39.50	4	С	1	39.50	LIMESTONE	D	U	YES	105.2	101.6	101.6	100.0	18.6	100.8	1.8	2.5	
BH123	39.70	5	С	1	39.70	LIMESTONE	A	U	YES		101.6	35.0	32.0	2.6	64.3	0.6	0.7	
D - Diametral, A - Axial, I - Irregular Lump, B - Block Direction L - parallel to planes of weakness P - perpendicular to planes of weakness U - unknown or random Dimensions Dps - Distance between platens (platen separation) Dps' - at failure (see ISRM note 6) Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P						P D _{ps}												
Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise Date Printed Approved By Detailed legend for test and dimensions, based on ISRM, is shown above. 04/03/2023 00:00 Version 5 UKA Size factor, F = (De/50)0.45 for all tests. LAB 17R - Version 5 Stephen Watson 10122																		

LABORATORY TEST CERTIFICATE

Certificate No :

To :

Client :

Stephen Watson

23/334 - 01-1

Causeway Geotech Limited 8 Drumahiskey Road Ballymoney Co. Antrim BT53 7QL



10 Queenslie Point Queenslie Industrial Estate 120 Stepps Road Glasgow G33 3NQ

Tel: 0141 774 4032

email: info@mattest.org Website: www.mattest.org

LABORATORY TESTING OF ROCK

Introduction

We refer to samples taken from 3FM Planning Design GI - Lot A DPC Lands and delivered to our laboratory on 20th March 2023.

Material & Source

Sample Reference	:	See Report Plate
Sampled By	:	Client
Sampling Certificate	:	Not Supplied
Location	:	See Report Plate
Description	:	Rock Core
Date Sampled	:	Not Supplied
Date Tested	:	20th March 2023 Onwards
Source	:	22-1041A - 3FM Planning Design GI - Lot A DPC Lands
_ / _ //		

Test Results

As Detailed On Page 2

Comments

The results contained in this report relate to the sample(s) as received Opinions and interpretations expressed herein are outside the scope of UKAS accreditation This report should not be reproduced except in full without the written approval of the laboratory All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks



- T.M.

T McLelland (Director)



29/03/2023



CAUSEWAY GEOTECH LIMITED 3FM PLANNING DESIGN GI - LOT A DPC LANDS



BOREHOLE		BH123	1
SAMPLE		C3	
DEPTH	m	38.40-38.90	SAMPLE FAILURE SHAPES
SAMPLE DIAMETER	mm	101.90	
SAMPLE HEIGHT	mm	206.75	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	1.2	
TEST DURATION	min.sec	4.10	
DATE OF TESTING		28/03/2023	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	296.9	
UNCONFINED COMPRESSIVE STRENGTH	MPa	36.4	
WATER CONTENT (ISRM Suggested Methods)	%	0.1	External Internal
BULK DENSITY (ISRM Suggested Methods)	Mg/m ³	2.68	
DRY DENSITY (ISRM Suggested Methods)	Mg/m ³	2.68]

BOREHOLE			
SAMPLE			
DEPTH	m	SAMPLE FAIL	URE SHAPES
SAMPLE DIAMETER	mm		
SAMPLE HEIGHT	mm		
TEST CONDITION			
RATE OF LOADING	kN/s		
TEST DURATION	min.sec		
DATE OF TESTING			
LOAD FRAME USED			
LOAD DIRECTION WITH RESPECT TO LITHOLOGY			
FAILURE LOAD	kN		
UNCONFINED COMPRESSIVE STRENGTH	MPa		
WATER CONTENT (ISRM Suggested Methods)	%	External	Internal
BULK DENSITY (ISRM Suggested Methods)	Mg/m ³		
DRY DENSITY (ISRM Suggested Methods)	Mg/m ³		

BOREHOLE		
SAMPLE		
DEPTH	m	SAMPLE FAILURE SHAPES
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	External Internal
BULK DENSITY (ISRM Suggested Methods)	Mg/m ³	
DRY DENSITY (ISRM Suggested Methods)	Mg/m ³	

Tested in accordance with ASTM D7012 - 14

SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

🔅 eurofins

Chemtest

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

Report No.:	23-08765-1		
Initial Date of Issue:	17-Mar-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Colm Hurley Stephen Watson Alistair McQuat Carin Cornwall Celine Rooney Darren O'Mahony Dean McCloskey Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Matthew Graham Neil Haggan Neil Patton Paul Dunlop		
Project	22-1041A 3FM Lot A DPC Lands		
Quotation No.:		Date Received:	15-Mar-2023
Order No.:		Date Instructed:	15-Mar-2023
No. of Samples:	22		
Turnaround (Wkdays):	5	Results Due:	21-Mar-2023
Date Approved:	17-Mar-2023		
Approved By:			
sont			

Details:

Stuart Henderson, Technical Manager



🔅 eurofins

Chemtest

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

<u> Results - Soil</u>

Project: 22-1041A 3FM Lot A DPC Lands

Client: Causeway Geotech Ltd		Che	mtest J	ob No.:	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765
Quotation No.:	(Chemte	est Sam	ple ID.:	1607653	1607654	1607655	1607656	1607657	1607658	1607659	1607660	1607661
Order No.:		Clie	nt Samp	le Ref.:	10	17	24	3	7	5	1	9	10
		Sa	ample Lo	ocation:	BH101	BH101	BH101	BH101	BH103	BH105	BH112	BH119	BH119
	Sample Type:				SOIL	SOIL							
		Top Depth (m):		2.0	6.5	12.5	21.0	1.5	1.2	2.0	1.5	2.5	
		Date Sampled:		14-Mar-2023									
Determinand	Accred.	SOP	Units	LOD									
Moisture	N	2030	%	0.020	12	20	15	11	17	9.0	22	18	14
рН	U	2010		4.0	8.6	8.4	8.4	8.3	8.7	8.8	8.2	8.2	8.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.31	0.18	0.19	0.14	0.12	< 0.010	0.44	0.41	0.37

<u> Results - Soil</u>

Project: 22-1041A 3FM Lot A DPC Lands

Client: Causeway Geotech Ltd		Che	mtest J	ob No.:	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765
Quotation No.:	(Chemte	est Sam	ple ID.:	1607662	1607663	1607664	1607665	1607666	1607667	1607668	1607669	1607670
Order No.:		Clie	nt Samp	le Ref.:	20	2	25	14	37	7	46	21	34
		Sa	ample Lo	ocation:	BH120	BH120	BH121	BH121	BH121	BH122	BH122	BH123	BH124
	Sample Type:				SOIL	SOIL							
	Top Depth (m):			3.0	20.0	3.0	11.0	19.0	3.0	23.0	2.0	18.0	
		Date Sampled:		14-Mar-2023									
Determinand	Accred.	SOP	Units	LOD									
Moisture	N	2030	%	0.020	20	17	16	3.0	16	22	15	21	15
рН	U	2010		4.0	8.1	8.1	8.0	9.1	8.2	8.1	8.3	8.1	7.9
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.14	0.28	0.51	0.027	0.91	0.87	0.20	0.73	0.70

<u> Results - Soil</u>

Project: 22-1041A 3FM Lot A DPC Lands

Client: Causeway Geotech Ltd		Chemtest Job No.:			23-08765	23-08765	23-08765	23-08765
Quotation No.:	(Chemte	st Sam	ple ID.:	1607671	1607672	1607673	1607674
Order No.:		Client Sample Ref .:			17	28	22	48
		Sa	ample Lo	ocation:	BH125	BH130	BH131	BH131
		Sample Type:			SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			3.0	3.0	3.0	12.5
			Date Sa	ampled:	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023
Determinand	Accred.	SOP	Units	LOD				
Moisture	Ν	2030	%	0.020	22	11	10	10
рН	U	2010		4.0	7.7	8.6	8.5	8.7
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.35	0.035	0.035	0.16

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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


LABORATORY RESTRICTION REPORT

		Ĩ			
Project Reference	22-1041A			То	Colm Hurley
				Position	Project Manager
Project Name	3FM Planning Design GI - Lot A DPC L	3FM Planning Design GI - Lot A DPC Lands			
				From	Joseph Nicholi
TR reference	22-1041A / G01		Position	Laboratory Quality Manager	

The following sample(s) and test(s) are restricted as detailed below. Could you please complete the "Required Action" column and return the completed form to the laboratory.

Hole	0,	Sample		Test				
Number	Number	Depth	Туре	Туре	Reason for Restriction	Required Action		
BH102	3	(m) 0.30	В	CBR	>25% retained on 20mm test sieve	CANCEL		
BH112	2	0.50	В	CBR	Unsuitable material for test - GRAVEL	CANCEL		
BH116	3	1.00	В	CBR	>25% retained on 20mm test sieve	CANCEL		
BH119	3	1.00	В	CBR	>25% retained on 20mm test sieve	CANCEL		
BH120	16	0.50	В	CBR	>25% retained on 20mm test sieve	CANCEL		
BH120	3	32.00	С	UU Triaxial, Oedometer	Unable to obtain suitable specimen for test	CANCEL		
BH124	17	5.00	D	Atterberg limits	Unsuitable material for test - GRAVEL	CANCEL		
BH131	44	9.50	D	Atterberg limits	Unsuitable material for test - GRAVEL	CANCEL		
ST102	4	0.50	В	CBR	>25% retained on 20mm test sieve	CANCEL		
BH101	1	16.50	С	UU Triaxial, Oedometer	Material was too granular to obtain test specimen	CANCEL		
					aboratory Signature	Project Manager Signature		
For electronic reporting a form of		Joseph Nicholl	Colm Hurley					
electronic signature or printed name is acceptable			e is	Date	Date			
					20 Watch 2023			



APPENDIX I ENVIRONMENTAL LABORATORY TEST RESULTS



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

Final Report

Report No.:	22-43309-1		
Initial Date of Issue:	21-Dec-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken Stephen Watson		
Project	22-1041 3FM Planning Design Gl		
Quotation No.:	Q21-25198	Date Received:	10-Nov-2022
Order No.:		Date Instructed:	15-Nov-2022
No. of Samples:	1		
Turnaround (Wkdays):	10	Results Due:	28-Nov-2022
Date Approved:	21-Dec-2022		
Approved By:			

SAN

Details:

Stuart Henderson, Technical Manager

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Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.:		22-43309		
Quotation No.: Q21-25198	(Chemte	st Sam	ple ID.:	1543231
		Sa	ample Lo	ocation:	BH116
			Sampl	е Туре:	SOIL
			Top Dep	oth (m):	0.50
			Date Sa	ampled:	08-Nov-2022
			DURHAM		
Determinand	Accred.	SOP	Units	LOD	
АСМ Туре	U	2192		N/A	Fibres/Clumps
Asbestos Identification	U	2192		N/A	Chrysotile
Moisture	N	2030	%	0.020	9.6
рН	U	2010		4.0	8.1
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.55
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010
Total Sulphur	U	2175	%	0.010	0.18
Sulphur (Elemental)	U	2180	mg/kg	1.0	< 1.0
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50
Thiocyanate	U	2300	mg/kg	5.0	< 5.0
Aluminium (Total)	N	2430	mg/kg	100	3300
Iron (Available)	N	2430	mg/kg	20.0	210000
Arsenic	U	2455	mg/kg	0.5	13
Barium	U	2455	mg/kg	0	190
Beryllium	U	2455	mg/kg	0.5	1.0
Cadmium	U	2455	mg/kg	0.10	0.72
Chromium	U	2455	mg/kg	0.5	20
Manganese	U	2455	mg/kg	1.0	640
Copper	U	2455	mg/kg	0.50	35
Mercury	U	2455	mg/kg	0.05	0.22
Nickel	U	2455	mg/kg	0.50	27
Lead	U	2455	mg/kg	0.50	180
Selenium	U	2455	mg/kg	0.25	0.72
Vanadium	U	2455	mg/kg	0.5	27
Zinc	U	2455	mg/kg	0.50	270
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	U	2625	%	0.40	13
Total Organic Carbon	U	2625	%	0.20	7.8
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10
	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >035-044	N	2680	mg/kg	0.10	< 0.10
	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C5-C7	I N	2680	rna/ka	0.010	< 0.010

Client: Causeway Geotech Ltd	Causeway Geotech Ltd Chemtest Job No.:			22-43309		
Quotation No.: Q21-25198	(Chemte	ple ID.:	1543231		
		Sa	ample Lo	ocation:	BH116	
			Sampl	е Туре:	SOIL	
			Top Dep	oth (m):	0.50	
			Date Sa	ampled:	08-Nov-2022	
		Asbestos Lab:				
Determinand	Accred.	SOP	Units	LOD		
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C21-C35	Ν	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0	
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20	
Chloromethane	N	2760	µg/kg	0.20	< 0.20	
Vinyl Chloride	N	2760	µg/kg	0.20	< 0.20	
Bromomethane	N	2760	µg/kg	0.20	< 0.20	
Chloroethane	N	2760	µg/kg	0.20	< 0.20	
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20	
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50	
Trichloromethane	N	2760	µg/kg	0.20	< 0.20	
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	
Tetrachloromethane	N	2760	µg/kg	0.20	< 0.20	
1,1-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	
Benzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	
Trichloroethene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	
Dibromomethane	N	2760	µg/kg	0.20	< 0.20	
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20	
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	
Toluene	N	2760	µg/kg	0.20	< 0.20	
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	
Tetrachloroethene	N	2760	µg/kg	0.20	< 0.20	
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	
Chlorobenzene	N	2760	ua/ka	0.20	< 0.20	

Client: Causeway Geotech Ltd		Chemtest Job No.:			22-43309	
Quotation No.: Q21-25198	C	hemte	ple ID.:	1543231		
		Sa	ample Lo	ocation:	BH116	
			Sample	e Type:	SOIL	
			Тор Dep	oth (m):	0.50	
			ampled:	08-Nov-2022		
		Asbestos Lab:				
Determinand	Accred.	SOP	Units	LOD		
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	< 0.20	
Ethylbenzene	N	2760	µg/kg	0.20	< 0.20	
m & p-Xylene	N	2760	µg/kg	0.20	< 0.20	
o-Xylene	N	2760	µg/kg	0.20	< 0.20	
Styrene	N	2760	µg/kg	0.20	< 0.20	
Tribromomethane	N	2760	µg/kg	0.20	< 0.20	
Isopropylbenzene	N	2760	µg/kg	0.20	< 0.20	
Bromobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20	
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20	
2-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
Tert-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
4-Isopropyltoluene	N	2760	µg/kg	0.20	< 0.20	
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Hexachlorobutadiene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	< 0.20	
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	< 0.050	
Phenol	N	2790	mg/kg	0.050	< 0.050	
2-Chlorophenol	N	2790	mg/kg	0.050	< 0.050	
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	< 0.050	
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
2-Methylphenol	N	2790	mg/kg	0.050	< 0.050	
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	< 0.050	
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050	
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050	
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050	
Nitrobenzene	N	2790	ma/ka	0.050	< 0.050	

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-43309	
Quotation No.: Q21-25198	(Chemte	ple ID.:	1543231	
		Sa	ample Lo	ocation:	BH116
			Sample	е Туре:	SOIL
			oth (m):	0.50	
			ampled:	08-Nov-2022	
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Isophorone	N	2790	mg/kg	0.050	< 0.050
2-Nitrophenol	N	2790	mg/kg	0.050	< 0.050
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050
Naphthalene	N	2790	mg/kg	0.050	< 0.050
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050	< 0.050
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050
2-Nitroaniline	N	2790	mg/kg	0.050	< 0.050
Acenaphthylene	N	2790	mg/kg	0.050	< 0.050
Dimethylphthalate	N	2790	mg/kg	0.050	< 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050
Acenaphthene	N	2790	mg/kg	0.050	< 0.050
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050
Dibenzofuran	N	2790	mg/kg	0.050	< 0.050
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050
Fluorene	N	2790	mg/kg	0.050	< 0.050
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050
4-Nitroaniline	N	2790	mg/kg	0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	< 0.050
Azobenzene	N	2790	mg/kg	0.050	< 0.050
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	< 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050
Phenanthrene	N	2790	mg/kg	0.050	0.72
Anthracene	N	2790	mg/kg	0.050	0.25
Carbazole	N	2790	mg/kg	0.050	0.10
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	< 0.050
Fluoranthene	N	2790	mg/kg	0.050	2.3
Pyrene	N	2790	mg/kg	0.050	1.8
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-43309
Quotation No.: Q21-25198	(Chemte	st Sam	ple ID.:	1543231
		Sa	ample Lo	ocation:	BH116
			Sampl	e Type:	SOIL
			Top Dep	oth (m):	0.50
			ampled:	08-Nov-2022	
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Benzo[a]anthracene	N	2790	mg/kg	0.050	1.2
Chrysene	Ν	2790	mg/kg	0.050	1.1
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	< 0.050
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	1.5
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	0.51
Benzo[a]pyrene	N	2790	mg/kg	0.050	1.2
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	0.54
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	0.16
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	0.66
4-Nitrophenol	N	2790	mg/kg	0.050	< 0.050
Naphthalene	N	2800	mg/kg	0.010	< 0.010
Acenaphthylene	N	2800	mg/kg	0.010	< 0.010
Acenaphthene	N	2800	mg/kg	0.010	< 0.010
Fluorene	N	2800	mg/kg	0.010	< 0.010
Phenanthrene	N	2800	mg/kg	0.010	< 0.010
Anthracene	N	2800	mg/kg	0.010	< 0.010
Fluoranthene	N	2800	mg/kg	0.010	0.34
Pyrene	N	2800	mg/kg	0.010	0.29
Benzo[a]anthracene	N	2800	mg/kg	0.010	< 0.010
Chrysene	N	2800	mg/kg	0.010	< 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	< 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	< 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	< 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	< 0.010
Total Of 16 PAH's	N	2800	mg/kg	0.20	0.63
Resorcinol	U	2920	mg/kg	0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020
1-Naphthol	Ν	2920	mg/kg	0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020
Total Phenols	U	2920	ma/ka	0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary			
2010	pH Value of Soils	pН	pH Meter			
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.			
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930			
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES			
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.			
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection			
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry			
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.			
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.			
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.			
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.			
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.			
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.			
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection			
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.			
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS			
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS			
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.			

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

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Chemtest

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

Final Report

Report No.:	22-44367-1		
Initial Date of Issue:	12-Dec-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Ciaran Doherty Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Megan Walsh Neil Haggan Paul Dunlop Rachel White Sean Ross Stephe		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	18-Nov-2022
Order No.:		Date Instructed:	22-Nov-2022
No. of Samples:	3		
Turnaround (Wkdays):	10	Results Due:	05-Dec-2022
Date Approved:	12-Dec-2022		
Approved By:			

Approved By:

Details:

Stuart Henderson, Technical Manager

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Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-44367		
Quotation No.: Q22-28455		(ple ID.:	1548481		
			ocation:	BH121		
				Sampl	e Type:	SOIL
				Top Dep	oth (m):	1
		ampled:	15-Nov-2022			
Determinand	Accred.	SOP	Туре	Units	LOD	
рН	U	1010	10:1		N/A	8.5
Phosphate as P	U	1220	10:1	mg/l	0.050	< 0.050
Sulphur	N	1220	10:1	mg/l	1.0	29
Cyanide (Total)	U	1300	10:1	mg/l	0.050	< 0.050
Cyanide (Free)	U	1300	10:1	mg/l	0.050	< 0.050
Sulphide	U	1325	10:1	mg/l	0.050	< 0.050
Calcium	U	1455	10:1	mg/l	2.00	50
Aluminium (Dissolved)	N	1455	10:1	µg/l	5.0	32
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	2.6
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	120
Barium (Dissolved)	U	1455	10:1	µg/l	5.00	46
Beryllium (Dissolved)	U	1455	10:1	µg/l	1.00	< 1.0
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11
Chromium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	2.5
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05
Manganese (Dissolved)	U	1455	10:1	µg/l	0.50	20
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	2.4
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	0.51
Selenium (Dissolved)	U	1455	10:1	µg/l	0.50	1.5
Vanadium (Dissolved)	U	1455	10:1	µg/l	0.50	1.0
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	3.0
Iron (Dissolved)	N	1455	10:1	µg/l	5.0	12
Low-Level Chromium (Hexavalent)	N	1495	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.010	< 0.010
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.010	< 0.010
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.010	< 0.010
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.010	< 0.010
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10

Client: Causeway Geotech Ltd		b No.:	22-44367						
Quotation No.: Q22-28455		(ple ID.:	1548481					
			ocation:	BH121					
			e Type:	SOIL					
		Top Depth (m)							
				Date Sa	mpled:	15-Nov-2022			
Determinand	Accred.	SOP	Туре	Units	LOD				
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10			
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0			
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	2.0	< 2.0			
Dichlorodifluoromethane	N	1760	10:1	µg/l	0.10	< 0.10			
Chloromethane	Ν	1760	10:1	µg/l	0.10	< 0.10			
Vinyl Chloride	N	1760	10:1	µg/l	0.10	< 0.10			
Bromomethane	Ν	1760	10:1	µg/l	2.0	< 2.0			
Chloroethane	Ν	1760	10:1	µg/l	0.20	< 0.20			
Trichlorofluoromethane	Ν	1760	10:1	µg/l	0.10	< 0.10			
1,1-Dichloroethene	N	1760	10:1	µg/l	0.10	< 0.10			
Dichloromethane	N	1760	10:1	µg/l	50	< 50			
1,1-Dichloroethane	N	1760	10:1	µg/l	0.10	< 0.10			
cis 1,2-Dichloroethene	N	1760	10:1	µg/l	0.10	< 0.10			
Bromochloromethane	N	1760	10:1	µg/l	0.50	< 0.50			
Trichloromethane	N	1760	10:1	µg/l	0.10	< 0.10			
1,1,1-Trichloroethane	N	1760	10:1	µg/l	0.10	< 0.10			
Tetrachloromethane	N	1760	10:1	µg/l	0.10	< 0.10			
1,1-Dichloropropene	N	1760	10:1	µg/l	0.10	< 0.10			
Benzene	N	1760	10:1	µg/l	0.10	< 0.10			
1,2-Dichloroethane	N	1760	10:1	µg/l	0.20	< 0.20			
Trichloroethene	N	1760	10:1	µg/l	0.10	1.3			
1,2-Dichloropropane	N	1760	10:1	µg/l	0.10	< 0.10			
Dibromomethane	N	1760	10:1	µg/l	0.10	< 0.10			
Bromodichloromethane	N	1760	10:1	µg/l	0.50	< 0.50			
cis-1,3-Dichloropropene	Ν	1760	10:1	µg/l	1.0	< 1.0			
Toluene	N	1760	10:1	µg/l	0.10	< 0.10			
Trans-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	< 1.0			
1,1,2-Trichloroethane	N	1760	10:1	µg/l	1.0	< 1.0			
Tetrachloroethene	N	1760	10:1	µg/l	0.10	< 0.10			
1,3-Dichloropropane	N	1760	10:1	µg/l	0.20	< 0.20			
Dibromochloromethane	N	1760	10:1	µg/l	1.0	< 1.0			
1,2-Dibromoethane	N	1760	10:1	µg/l	0.50	< 0.50			
Chlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10			
1,1,1,2-Tetrachloroethane	N	1760	10:1	μg/l	0.20	< 0.20			
Ethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10			
m & p-Xylene	N	1760	10:1	µg/l	0.10	< 0.10			
o-Xylene	N	1760	10:1	µg/l	0.10	< 0.10			
Styrene	N	1760	10:1	µg/l	0.10	< 0.10			
Tribromomethane	N	1760	10:1	µg/l	1.0	< 1.0			
Isopropylbenzene	Ν	1760	10:1	µg/l	0.10	< 0.10			

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Quotation No.: Q22-28455		(ple ID.:	1548481		
			Sa	ample Lo	ocation:	BH121
				Sampl	e Type:	SOIL
			oth (m):	1		
				Date Sa	ampled:	15-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
Bromobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,3-Trichloropropane	N	1760	10:1	µg/l	5.0	< 5.0
N-Propylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
2-Chlorotoluene	N	1760	10:1	µg/l	0.10	< 0.10
1,3,5-Trimethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
4-Chlorotoluene	Ν	1760	10:1	µg/l	0.10	< 0.10
Tert-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,4-Trimethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
Sec-Butylbenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
1,3-Dichlorobenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
4-Isopropyltoluene	N	1760	10:1	µg/l	0.10	< 0.10
1,4-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
N-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dibromo-3-Chloropropane	N	1760	10:1	µg/l	5.0	< 5.0
1,2,4-Trichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
Hexachlorobutadiene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,3-Trichlorobenzene	N	1760	10:1	µg/l	0.20	< 0.20
Naphthalene	N	1760	10:1	µg/l	0.10	< 0.10
Phenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050
1,3-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,4-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,2-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylphenol (o-Cresol)	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroisopropyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050
Hexachloroethane	N	1790	10:1	µg/l	0.050	< 0.050
N-Nitrosodi-n-propylamine	N	1790	10:1	µg/l	0.050	< 0.050
4-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
Nitrobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Isophorone	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dimethylphenol	Ν	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroethoxy)Methane	Ν	1790	10:1	µg/l	0.050	< 0.050
2,4-Dichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
1,2,4-Trichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Naphthalene	N	1790	10:1	µg/l	0.050	< 0.050
4-Chloroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobutadiene	Ν	1790	10:1	µg/l	0.050	< 0.050

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Quotation No.: Q22-28455			ple ID.:	1548481		
			Sa	ample Lo	ocation:	BH121
			e Type:	SOIL		
				Top Dep	oth (m):	1
				Date Sa	ampled:	15-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
4-Chloro-3-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylnaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorocyclopentadiene	N	1790	10:1	µg/l	0.050	< 0.050
2,4,6-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4,5-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chloronaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthylene	N	1790	10:1	µg/l	0.050	< 0.050
Dimethylphthalate	N	1790	10:1	µg/l	0.050	< 0.050
2,6-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthene	N	1790	10:1	µg/l	0.050	< 0.050
3-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Dibenzofuran	N	1790	10:1	µg/l	0.050	< 0.050
4-Chlorophenylphenylether	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Fluorene	Ν	1790	10:1	µg/l	0.050	< 0.050
Diethyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
4-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
Azobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050
4-Bromophenylphenyl Ether	Ν	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Pentachlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Phenanthrene	N	1790	10:1	µg/l	0.050	< 0.050
Anthracene	Ν	1790	10:1	µg/l	0.050	< 0.050
Carbazole	Ν	1790	10:1	µg/l	0.050	< 0.050
Di-N-Butyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Pyrene	Ν	1790	10:1	µg/l	0.050	< 0.050
Butylbenzyl Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]anthracene	Ν	1790	10:1	µg/l	0.050	< 0.050
Chrysene	Ν	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Di-N-Octyl Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050
Benzo[b]fluoranthene	Ν	1790	10:1	µg/l	0.050	< 0.050
Benzo[k]fluoranthene	Ν	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]pyrene	Ν	1790	10:1	µg/l	0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	Ν	1790	10:1	µg/l	0.050	< 0.050
Dibenz(a,h)Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[g,h,i]perylene	N	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd		ob No.:	22-44367			
Quotation No.: Q22-28455		(ple ID.:	1548481		
			ocation:	BH121		
				Sampl	e Type:	SOIL
			oth (m):	1		
				Date Sa	ampled:	15-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
Naphthalene	N	1800	10:1	µg/l	0.010	< 0.010
Acenaphthylene	N	1800	10:1	µg/l	0.010	< 0.010
Acenaphthene	N	1800	10:1	µg/l	0.010	< 0.010
Fluorene	N	1800	10:1	µg/l	0.010	< 0.010
Phenanthrene	N	1800	10:1	µg/l	0.010	< 0.010
Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Chrysene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[b]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[k]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	10:1	µg/l	0.010	< 0.010
Total Of 16 PAH's	N	1800	10:1	µg/l	0.20	< 0.20
PCB 81	N	1815	10:1	µg/l	0.010	< 0.010
PCB 77	N	1815	10:1	µg/l	0.010	< 0.010
PCB 105	N	1815	10:1	µg/l	0.010	< 0.010
PCB 114	N	1815	10:1	µg/l	0.010	< 0.010
PCB 118	N	1815	10:1	µg/l	0.010	< 0.010
PCB 123	N	1815	10:1	µg/l	0.010	< 0.010
PCB 126	N	1815	10:1	µg/l	0.010	< 0.010
PCB 156	N	1815	10:1	µg/l	0.010	< 0.010
PCB 157	N	1815	10:1	µg/l	0.010	< 0.010
PCB 167	N	1815	10:1	µg/l	0.010	< 0.010
PCB 169	N	1815	10:1	µg/l	0.010	< 0.010
PCB 189	N	1815	10:1	µg/l	0.010	< 0.010
Total PCBs (12 Congeners)	N	1815	10:1	µg/l	0.010	< 0.010
Phenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Chlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Methylphenol (o-Cresol)	N	1900	10:1	µg/l	0.20	< 0.20
3-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
4-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Nitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4-Dimethylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4-Dichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,6-Dichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Chloro-3-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20

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Quotation No.: Q22-28455			Chemte	st Sam	ple ID.:	1548481
			Sa	ample Lo	ocation:	BH121
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	1
				Date Sa	mpled:	15-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
2,3,4-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,5-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,6-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Nitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,4,5-Tetrachlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,4,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,5,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
3,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Methyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
Pentachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Sec-Butyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
Total Phenols	N	1900	10:1	µg/l	5.00	< 5.0

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-44367	22-44367
Quotation No.: Q22-28455	(Chemte	st Sam	ple ID.:	1548480	1548491
		Sa	ample Lo	ocation:	BH121	BH121
			Sampl	е Туре:	SOIL	SOIL
			Top Dep	oth (m):	0.5	6
			Date Sa	ampled:	15-Nov-2022	15-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
АСМ Туре	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	16	8.1
Natural Moisture Content	N	2030	%	0.020	19	8.9
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	Ν	2040		N/A	Sand	Sand
рН	U	2010		4.0	8.1	8.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	3.4	1.3
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.65	0.33
Total Sulphur	U	2175	%	0.010	0.28	0.10
Sulphur (Elemental)	U	2180	mg/kg	1.0	360	67
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	0.80	< 0.50
Thiocyanate	U	2300	mg/kg	5.0	< 5.0	< 5.0
Aluminium (Total)	N	2430	mg/kg	100	7200	2400
Iron (Total)	N	2430	mg/kg	100	23000	7000
Arsenic	U	2455	mg/kg	0.5	23	8.4
Barium	U	2455	mg/kg	0	210	30
Beryllium	U	2455	mg/kg	0.5	1.0	< 0.5
Cadmium	U	2455	mg/kg	0.10	2.2	0.29
Chromium	U	2455	mg/kg	0.5	30	9.1
Manganese	U	2455	mg/kg	1.0	1100	260
Copper	U	2455	mg/kg	0.50	75	9.4
Mercury	U	2455	mg/kg	0.05	0.51	0.08
Nickel	U	2455	mg/kg	0.50	37	9.6
Lead	U	2455	mg/kg	0.50	460	37
Selenium	U	2455	mg/kg	0.25	1.3	0.52
Vanadium	U	2455	mg/kg	0.5	32	11
Zinc	U	2455	mg/kg	0.50	310	39
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	7.9	0.86
Total Organic Carbon	U	2625	%	0.20	4.6	0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/ka	0.10	< 0.10	< 0.10

Client: Causeway Geotech Ltd		Che	ntest Jo	22-44367	22-44367	
Quotation No.: Q22-28455	(Chemte	st Sam	ple ID.:	1548480	1548491
		Sa	ample Lo	ocation:	BH121	BH121
			Sample	SOIL	SOIL	
	[Top Dep	oth (m):	0.5	6
			Date Sa	ampled:	15-Nov-2022	15-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0	< 2.0
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Chloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Vinyl Chloride	N	2760	µg/kg	0.20	< 0.20	< 0.20
Bromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Chloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50	< 0.50
Trichloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Tetrachloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Benzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Trichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Dibromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Toluene	N	2760	µg/kg	0.20	0.87	0.73
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1.1.2-Trichloroethane	I N	2760	ua/ka	0.20	< 0.20	< 0.20

Client: Causeway Geotech Ltd		Che	mtest Jo	22-44367	22-44367	
Quotation No.: Q22-28455	(Chemte	st Sam	1548480	1548491	
		Sa	ample Lo	ocation:	BH121	BH121
			Sampl	SOIL	SOIL	
			Top Dep	0.5	6	
			Date Sa	ampled:	15-Nov-2022	15-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Tetrachloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Chlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Ethylbenzene	N	2760	µg/kg	0.20	0.26	0.21
m & p-Xylene	N	2760	µg/kg	0.20	0.50	0.37
o-Xylene	N	2760	µg/kg	0.20	0.43	0.34
Styrene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Tribromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20
Isopropylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Bromobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
2-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Hexachlorobutadiene	N	2760	µg/kg	0.20	< 0.20	< 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	< 0.20	< 0.20
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	< 0.050	< 0.050
Phenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
2-Chlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	< 0.050	< 0.050
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	0.25	< 0.050
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050
2-Methylphenol	N	2790	ma/ka	0.050	< 0.050	< 0.050

Client: Causeway Geotech Ltd		Che	mtest Jo	22-44367	22-44367	
Quotation No.: Q22-28455	(Chemte	est Sam	ple ID.:	1548480	1548491
		Sa	ample Lo	ocation:	BH121	BH121
			Sampl	SOIL	SOIL	
			Top Dep	oth (m):	0.5	6
			Date Sa	ampled:	15-Nov-2022	15-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	< 0.050	< 0.050
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050	< 0.050
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050
Isophorone	N	2790	mg/kg	0.050	< 0.050	< 0.050
2-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050	< 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050
Naphthalene	N	2790	mg/kg	0.050	< 0.050	< 0.050
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050	< 0.050	< 0.050
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050	< 0.050
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050	< 0.050
2-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050
Acenaphthylene	N	2790	mg/kg	0.050	< 0.050	< 0.050
Dimethylphthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	< 0.050
Acenaphthene	N	2790	mg/kg	0.050	< 0.050	< 0.050
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050
Dibenzofuran	N	2790	mg/kg	0.050	< 0.050	< 0.050
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050	< 0.050
2,4-Dinitrotoluene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050
Fluorene	N	2790	mg/kg	0.050	0.059	< 0.050
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050
4-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
Azobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	< 0.050	< 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
Phenanthrene	N	2790	mg/kg	0.050	0.80	0.20
Anthracene	Ν	2790	mg/kg	0.050	0.21	0.054

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-44367	22-44367
Quotation No.: Q22-28455	(Chemte	est Sam	1548480	1548491	
		Sa	ample Lo	ocation:	BH121	BH121
			Sampl	е Туре:	SOIL	SOIL
			Top Dep	oth (m):	0.5	6
			Date Sa	ampled:	15-Nov-2022	15-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Carbazole	Ν	2790	mg/kg	0.050	0.083	< 0.050
Di-N-Butyl Phthalate	Ν	2790	mg/kg	0.050	0.90	0.31
Fluoranthene	Ν	2790	mg/kg	0.050	1.8	0.28
Pyrene	Ν	2790	mg/kg	0.050	1.5	< 0.050
Butylbenzyl Phthalate	Ν	2790	mg/kg	0.050	< 0.050	0.13
Benzo[a]anthracene	N	2790	mg/kg	0.050	0.83	0.16
Chrysene	Ν	2790	mg/kg	0.050	0.88	< 0.050
Bis(2-Ethylhexyl)Phthalate	Ν	2790	mg/kg	0.050	8.1	< 0.050
Di-N-Octyl Phthalate	Ν	2790	mg/kg	0.050	< 0.050	< 0.050
Benzo[b]fluoranthene	Ν	2790	mg/kg	0.050	1.1	0.16
Benzo[k]fluoranthene	Ν	2790	mg/kg	0.050	0.42	0.054
Benzo[a]pyrene	Ν	2790	mg/kg	0.050	0.90	0.13
Indeno(1,2,3-c,d)Pyrene	Ν	2790	mg/kg	0.050	0.46	0.065
Dibenz(a,h)Anthracene	Ν	2790	mg/kg	0.050	0.13	< 0.050
Benzo[g,h,i]perylene	Ν	2790	mg/kg	0.050	0.55	0.098
4-Nitrophenol	Ν	2790	mg/kg	0.050	< 0.050	< 0.050
Naphthalene	Ν	2800	mg/kg	0.010	0.37	< 0.010
Acenaphthylene	Ν	2800	mg/kg	0.010	0.14	< 0.010
Acenaphthene	Ν	2800	mg/kg	0.010	0.16	< 0.010
Fluorene	Ν	2800	mg/kg	0.010	0.20	< 0.010
Phenanthrene	Ν	2800	mg/kg	0.010	1.2	0.26
Anthracene	Ν	2800	mg/kg	0.010	0.33	< 0.010
Fluoranthene	Ν	2800	mg/kg	0.010	1.9	0.36
Pyrene	Ν	2800	mg/kg	0.010	1.7	0.25
Benzo[a]anthracene	Ν	2800	mg/kg	0.010	1.0	< 0.010
Chrysene	Ν	2800	mg/kg	0.010	1.1	< 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	1.2	< 0.010
Benzo[k]fluoranthene	Ν	2800	mg/kg	0.010	0.45	< 0.010
Benzo[a]pyrene	Ν	2800	mg/kg	0.010	1.4	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	0.90	< 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	0.15	< 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	0.77	< 0.010
Total Of 16 PAH's	Ν	2800	mg/kg	0.20	13	0.87
Resorcinol	U	2920	mg/kg	0.020	< 0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	0.097	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020
Trimethylphenols	U	2920	ma/ka	0.020	< 0.020	< 0.020

Client: Causeway Geotech Ltd		Che	mtest Jo	b No.:	22-44367	22-44367
Quotation No.: Q22-28455	C	Chemte	est Sam	1548480	1548491	
		Sa	ample Lo	BH121	BH121	
			Sample	SOIL	SOIL	
			Тор Dep	0.5	6	
			Date Sa	mpled:	15-Nov-2022	15-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary		
1010	pH Value of Waters	pН	pH Meter		
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.		
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.		
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl- pphenylenediamine.		
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).		
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.		
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection		
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.		
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection		
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection		
1815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Waters by GC-MS	ICES7 PCB congeners	Solvent extraction / GCMS detection		
1900	Phenols in Waters by GC-MS	Approximately 24 substituted Phenols, including Chlorophenols	Solvent extraction / GCMS detection		
2010	pH Value of Soils	pН	pH Meter		
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.		
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930		
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES		
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.		
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection		
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry		
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.		

Test Methods

SOP	Title	Parameters included	Method summary
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

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Chemtest

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

Final Report

Report No.:	22-44935-1		
Initial Date of Issue:	21-Dec-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken Stephen Watson		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	22-Nov-2022
Order No.:		Date Instructed:	28-Nov-2022
No. of Samples:	5		
Turnaround (Wkdays):	10	Results Due:	09-Dec-2022
Date Approved:	21-Dec-2022		
Approved By:			

Details:

Stuart Henderson, Technical Manager

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Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.:					22-44935
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1550635
		ocation:	BH125			
		SOIL				
		1				
				Date Sa	ampled:	18-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
рН	U	1010	10:1		N/A	8.4
Phosphate as P	U	1220	10:1	mg/l	0.050	< 0.050
Sulphur	N	1220	10:1	mg/l	1.0	24
Cyanide (Total)	U	1300	10:1	mg/l	0.050	0.16
Cyanide (Free)	U	1300	10:1	mg/l	0.050	< 0.050
Sulphide	U	1325	10:1	mg/l	0.050	< 0.050
Calcium	U	1455	10:1	mg/l	2.00	38
Aluminium (Dissolved)	Ν	1455	10:1	µg/l	5.0	30
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	5.6
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	120
Barium (Dissolved)	U	1455	10:1	µg/l	5.00	25
Beryllium (Dissolved)	U	1455	10:1	µg/l	1.00	< 1.0
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11
Chromium (Dissolved)	U	1455	10:1	µg/l	0.50	0.71
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	3.5
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05
Manganese (Dissolved)	U	1455	10:1	µg/l	0.50	15
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	3.8
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	1.5
Selenium (Dissolved)	U	1455	10:1	µg/l	0.50	1.7
Vanadium (Dissolved)	U	1455	10:1	µg/l	0.50	5.1
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	< 2.5
Iron (Dissolved)	Ν	1455	10:1	µg/l	5.0	19
Low-Level Chromium (Hexavalent)	Ν	1495	10:1	µg/l	0.10	0.34
Aliphatic TPH >C5-C6	Ν	1675	10:1	µg/l	0.010	< 0.010
Aliphatic TPH >C6-C8	Ν	1675	10:1	µg/l	0.010	< 0.010
Aliphatic TPH >C8-C10	Ν	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C10-C12	Ν	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C12-C16	Ν	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C16-C21	Ν	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C21-C35	Ν	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C35-C44	Ν	1675	10:1	µg/l	0.10	< 0.10
Total Aliphatic Hydrocarbons	Ν	1675	10:1	µg/l	1.0	< 1.0
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.010	< 0.010
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.010	< 0.010
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C16-C21	Ν	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C21-C35	Ν	1675	10:1	µg/l	0.10	< 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:					22-44935		
Quotation No.: Q22-28455	Chemtest Sample ID.:					1550635		
		Sample Location:						
		SOIL						
		Top Depth (m):						
				Date Sa	ampled:	18-Nov-2022		
Determinand	Accred.	SOP	Туре	Units	LOD			
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10		
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0		
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	2.0	< 2.0		
Dichlorodifluoromethane	N	1760	10:1	µg/l	0.10	< 0.10		
Chloromethane	N	1760	10:1	µg/l	0.10	< 0.10		
Vinyl Chloride	N	1760	10:1	µg/l	0.10	< 0.10		
Bromomethane	N	1760	10:1	µg/l	2.0	< 2.0		
Chloroethane	N	1760	10:1	µg/l	0.20	< 0.20		
Trichlorofluoromethane	N	1760	10:1	µg/l	0.10	< 0.10		
1,1-Dichloroethene	N	1760	10:1	µg/l	0.10	< 0.10		
Dichloromethane	N	1760	10:1	µg/l	50	< 50		
1,1-Dichloroethane	N	1760	10:1	µg/l	0.10	< 0.10		
cis 1,2-Dichloroethene	N	1760	10:1	µg/l	0.10	< 0.10		
Bromochloromethane	N	1760	10:1	µg/l	0.50	< 0.50		
Trichloromethane	N	1760	10:1	µg/l	0.10	< 0.10		
1,1,1-Trichloroethane	N	1760	10:1	µg/l	0.10	< 0.10		
Tetrachloromethane	N	1760	10:1	µg/l	0.10	< 0.10		
1,1-Dichloropropene	N	1760	10:1	µg/l	0.10	< 0.10		
Benzene	N	1760	10:1	µg/l	0.10	< 0.10		
1,2-Dichloroethane	N	1760	10:1	µg/l	0.20	< 0.20		
Trichloroethene	N	1760	10:1	µg/l	0.10	< 0.10		
1,2-Dichloropropane	N	1760	10:1	µg/l	0.10	< 0.10		
Dibromomethane	N	1760	10:1	µg/l	0.10	< 0.10		
Bromodichloromethane	N	1760	10:1	µg/l	0.50	< 0.50		
cis-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	< 1.0		
Toluene	N	1760	10:1	µg/l	0.10	< 0.10		
Trans-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	< 1.0		
1,1,2-Trichloroethane	N	1760	10:1	µg/l	1.0	< 1.0		
Tetrachloroethene	N	1760	10:1	µg/l	0.10	< 0.10		
1,3-Dichloropropane	N	1760	10:1	µg/l	0.20	< 0.20		
Dibromochloromethane	N	1760	10:1	µg/l	1.0	< 1.0		
1,2-Dibromoethane	N	1760	10:1	µg/l	0.50	< 0.50		
Chlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10		
1,1,1,2-Tetrachloroethane	N	1760	10:1	µg/l	0.20	< 0.20		
Ethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10		
m & p-Xylene	N	1760	10:1	µg/l	0.10	< 0.10		
o-Xylene	N	1760	10:1	µg/l	0.10	< 0.10		
Styrene	N	1760	10:1	µg/l	0.10	< 0.10		
Tribromomethane	N	1760	10:1	µg/l	1.0	< 1.0		
Isopropylbenzene	N	1760	10:1	µg/l	0.10	< 0.10		

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-44935	
Quotation No.: Q22-28455	Chemtest Sample ID.:					1550635
			Sa	ample Lo	ocation:	BH125
		SOIL				
		1				
				Date Sa	ampled:	18-Nov-2022
Determinand	Accred.					
Bromobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,3-Trichloropropane	N	1760	10:1	µg/l	5.0	< 5.0
N-Propylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
2-Chlorotoluene	N	1760	10:1	µg/l	0.10	< 0.10
1,3,5-Trimethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
4-Chlorotoluene	Ν	1760	10:1	µg/l	0.10	< 0.10
Tert-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,4-Trimethylbenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
Sec-Butylbenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
1,3-Dichlorobenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
4-Isopropyltoluene	N	1760	10:1	µg/l	0.10	< 0.10
1,4-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
N-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dibromo-3-Chloropropane	N	1760	10:1	µg/l	5.0	< 5.0
1,2,4-Trichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
Hexachlorobutadiene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,3-Trichlorobenzene	N	1760	10:1	µg/l	0.20	< 0.20
Naphthalene	N	1760	10:1	µg/l	0.10	< 0.10
Phenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050
1,3-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,4-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,2-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylphenol (o-Cresol)	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroisopropyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050
Hexachloroethane	N	1790	10:1	µg/l	0.050	< 0.050
N-Nitrosodi-n-propylamine	N	1790	10:1	µg/l	0.050	< 0.050
4-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
Nitrobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Isophorone	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dimethylphenol	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroethoxy)Methane	Ν	1790	10:1	µg/l	0.050	< 0.050
2,4-Dichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
1,2,4-Trichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Naphthalene	N	1790	10:1	µg/l	0.050	< 0.050
4-Chloroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobutadiene	Ν	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-44935		
Quotation No.: Q22-28455	Chemtest Sample ID.:					1550635
			Sa	ample Lo	ocation:	BH125
		e Type:	SOIL			
				Top Dep	oth (m):	1
				Date Sa	ampled:	18-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
4-Chloro-3-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylnaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorocyclopentadiene	N	1790	10:1	µg/l	0.050	< 0.050
2,4,6-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4,5-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chloronaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthylene	N	1790	10:1	µg/l	0.050	< 0.050
Dimethylphthalate	N	1790	10:1	µg/l	0.050	< 0.050
2,6-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthene	N	1790	10:1	µg/l	0.050	< 0.050
3-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Dibenzofuran	N	1790	10:1	µg/l	0.050	< 0.050
4-Chlorophenylphenylether	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Fluorene	Ν	1790	10:1	µg/l	0.050	< 0.050
Diethyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
4-Nitroaniline	Ν	1790	10:1	µg/l	0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	Ν	1790	10:1	µg/l	0.050	< 0.050
Azobenzene	N	1790	10:1	µg/l	0.050	< 0.050
4-Bromophenylphenyl Ether	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Pentachlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Phenanthrene	N	1790	10:1	µg/l	0.050	5.3
Anthracene	N	1790	10:1	µg/l	0.050	1.2
Carbazole	N	1790	10:1	µg/l	0.050	1.7
Di-N-Butyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Fluoranthene	N	1790	10:1	µg/l	0.050	2.7
Pyrene	N	1790	10:1	µg/l	0.050	2.5
Butylbenzyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Chrysene	Ν	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050
Di-N-Octyl Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050
Benzo[b]fluoranthene	Ν	1790	10:1	µg/l	0.050	< 0.050
Benzo[k]fluoranthene	Ν	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	Ν	1790	10:1	µg/l	0.050	< 0.050
Dibenz(a,h)Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[g,h,i]perylene	N	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:					22-44935
Quotation No.: Q22-28455	Chemtest Sample ID.:					1550635
			Sa	ample Lo	ocation:	BH125
		SOIL				
		oth (m):	1			
				Date Sa	ampled:	18-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
Naphthalene	N	1800	10:1	µg/l	0.010	1.6
Acenaphthylene	N	1800	10:1	µg/l	0.010	4.8
Acenaphthene	N	1800	10:1	µg/l	0.010	2.4
Fluorene	N	1800	10:1	µg/l	0.010	3.0
Phenanthrene	N	1800	10:1	µg/l	0.010	5.8
Anthracene	Ν	1800	10:1	µg/l	0.010	1.7
Fluoranthene	N	1800	10:1	µg/l	0.010	3.4
Pyrene	N	1800	10:1	µg/l	0.010	2.6
Benzo[a]anthracene	Ν	1800	10:1	µg/l	0.010	< 0.010
Chrysene	Ν	1800	10:1	µg/l	0.010	< 0.010
Benzo[b]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[k]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	10:1	µg/l	0.010	< 0.010
Total Of 16 PAH's	N	1800	10:1	µg/l	0.20	25
PCB 81	N	1815	10:1	µg/l	0.010	< 0.010
PCB 77	N	1815	10:1	µg/l	0.010	< 0.010
PCB 105	N	1815	10:1	µg/l	0.010	< 0.010
PCB 114	N	1815	10:1	µg/l	0.010	< 0.010
PCB 118	N	1815	10:1	µg/l	0.010	< 0.010
PCB 123	N	1815	10:1	µg/l	0.010	< 0.010
PCB 126	N	1815	10:1	µg/l	0.010	< 0.010
PCB 156	N	1815	10:1	µg/l	0.010	< 0.010
PCB 157	N	1815	10:1	µg/l	0.010	< 0.010
PCB 167	N	1815	10:1	µg/l	0.010	< 0.010
PCB 169	N	1815	10:1	µg/l	0.010	< 0.010
PCB 189	Ν	1815	10:1	µg/l	0.010	< 0.010
Total PCBs (12 Congeners)	Ν	1815	10:1	µg/l	0.010	< 0.010
Phenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Chlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Methylphenol (o-Cresol)	Ν	1900	10:1	µg/l	0.20	< 0.20
3-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
4-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Nitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4-Dimethylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4-Dichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,6-Dichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
4-Chloro-3-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20

Client: Causeway Geotech Ltd		22-44935						
Quotation No.: Q22-28455		1550635						
			Sa	ample Lo	ocation:	BH125		
				Sampl	e Type:	SOIL		
				Тор Dep	oth (m):	1		
				Date Sa	mpled:	18-Nov-2022		
Determinand	Accred.	SOP	Туре	Units	LOD			
2,3,4-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
2,3,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2,3,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2,4,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2,4,5-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
4-Nitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
2,3,4,5-Tetrachlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
2,3,4,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2,3,5,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
3,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2-Methyl-4,6-Dinitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
Pentachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2-Sec-Butyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20		
Total Phenols	N	1900	10:1	µg/l	5.00	< 5.0		
Client: Causeway Geotech Ltd	Chemtest Job No.:		22-44935	22-44935	22-44935	22-44935		
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Quotation No.: Q22-28455	(Chemte	est Sam	ple ID.:	1550626	1550628	1550632	1550634
		Sa	ample Lo	ocation:	BH122	BH123	BH124	BH125
			Sampl	e Type:	SOIL	SOIL	SOIL	SOIL
			Top De	pth (m):	1	0.5	1	0.5
			Date Sa	ampled:	18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD				
АСМ Туре	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	Ν	2030	%	0.020	18	9.7	16	12
Natural Moisture Content	N	2030	%	0.020	22	11	19	14
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand
рН	U	2010		4.0	8.4	7.9	9.6	8.5
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.87	< 0.40	< 0.40	1.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.11	0.066	0.20	0.19
Total Sulphur	U	2175	2175 % 0.010		0.067	0.055	0.076	0.088
Sulphur (Elemental)	U	2180	2180 mg/kg 1.0		13	49	20	43
Cyanide (Free)	U	2300	2300 mg/kg 0.50		< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	00 mg/kg 0.50		< 0.50	< 0.50	0.50	< 0.50
Thiocyanate	U	2300	00 mg/kg 5.0		< 5.0	< 5.0	< 5.0	< 5.0
Aluminium (Total)	N	2430	mg/kg	100	1500	920	1300	1500
Iron (Total)	Ν	2430	mg/kg	100	4900	3200	5000	6900
Arsenic	U	2455	mg/kg	0.5	4.6	2.5	4.0	5.5
Barium	U	2455	mg/kg	0	15	9	13	15
Beryllium	U	2455	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cadmium	U	2455	mg/kg	0.10	0.12	< 0.10	< 0.10	< 0.10
Chromium	U	2455	mg/kg	0.5	8.7	5.3	7.0	9.1
Manganese	U	2455	mg/kg	1.0	82	55	87	110
Copper	U	2455	mg/kg	0.50	3.8	2.4	3.2	4.4
Mercury	U	2455	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	10	6.8	11	17
Lead	U	2455	mg/kg	0.50	4.1	3.3	3.0	4.1
Selenium	U	2455	mg/kg	0.25	0.53	0.32	0.33	0.48
Vanadium	U	2455	mg/kg	0.5	13	8.6	11	14
Zinc	U	2455	mg/kg	0.50	12	7.9	12	18
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	6.2	6.3	0.72	0.99
Total Organic Carbon	U	2625	%	0.20	3.6	3.6	0.42	0.57
Aliphatic TPH >C5-C6	Ν	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	Ν	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	Ν	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	ma/ka	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-44935	22-44935	22-44935	22-44935	
Quotation No.: Q22-28455	(Chemte	est Sam	ple ID.:	1550626	1550628	1550632	1550634
		Sa	ample L	ocation:	BH122	BH123	BH124	BH125
			Sampl	e Type:	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1	0.5	1	0.5
	Date Sampled:			18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022	
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD				
Aliphatic TPH >C16-C21	Ν	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	Ν	2680	mg/kg	0.10	< 0.10	830	< 0.10	< 0.10
Aliphatic TPH >C35-C44	Ν	2680	2680 mg/kg 0.10		< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	830	< 1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	Ν	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	Ν	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	Ν	2680	mg/kg	0.10	< 0.10	42	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	150	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	2680	2680 mg/kg 0.10		< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	Ν	2680	2680 mg/kg 1.0		< 1.0	190	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	2680 mg/kg 2.0		< 2.0	1000	< 2.0	< 2.0
Dichlorodifluoromethane	N	2760	2760 µg/kg 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Chloromethane	Ν	2760	2760 µg/kg 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Vinyl Chloride	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Bromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Chloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
cis 1,2-Dichloroethene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Bromochloromethane	Ν	2760	µg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloromethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,1,1-Trichloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Tetrachloromethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloropropene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzene	Ν	2760	µg/kg	0.20	0.39	< 0.20	< 0.20	< 0.20
1,2-Dichloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichloroethene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,2-Dichloropropane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibromomethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
cis-1,3-Dichloropropene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Toluene	Ν	2760	µg/kg	0.20	0.70	0.55	0.82	0.60
Trans-1,3-Dichloropropene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1.1.2-Trichloroethane	N	2760	ua/ka	0.20	< 0.20	< 0.20	< 0.20	< 0.20

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-44935	22-44935	22-44935	22-44935	
Quotation No.: Q22-28455	(Chemte	est Sam	ple ID.:	1550626	1550628	1550632	1550634
		Sa	ample L	ocation:	BH122	BH123	BH124	BH125
			Sampl	e Type:	SOIL	SOIL	SOIL	SOIL
			Top De	pth (m):	1	0.5	1	0.5
	Date Sampled:			18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022	
			Asbest	tos Lab:	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD				
Tetrachloroethene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,3-Dichloropropane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane	N	2760	2760 µg/kg 0.20		< 0.20	< 0.20	< 0.20	< 0.20
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Chlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Ethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	0.20
m & p-Xylene	N	2760	µg/kg	0.20	0.27	0.24	0.29	0.30
o-Xylene	N	2760	µg/kg	0.20	0.24	0.25	0.29	0.24
Styrene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Tribromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Isopropylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Bromobenzene	N	2760	2760 µg/kg 0.20		< 0.20	< 0.20	< 0.20	< 0.20
1,2,3-Trichloropropane	N	2760	2760 µg/kg 0.20		< 0.20	< 0.20	< 0.20	< 0.20
N-Propylbenzene	N	2760	760 µg/kg 0.20		< 0.20	< 0.20	< 0.20	< 0.20
2-Chlorotoluene	N	2760	2760 µg/kg 0.20		< 0.20	< 0.20	< 0.20	< 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Hexachlorobutadiene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Chlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis-(2-Chloroethyl)Ether	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,3-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,4-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylphenol	N	2790	ma/ka	0.050	< 0.050	< 0.050	< 0.050	< 0.050

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-44935	22-44935	22-44935	22-44935	
Quotation No.: Q22-28455	(Chemte	est Sam	ple ID.:	1550626	1550628	1550632	1550634
		Sa	ample L	ocation:	BH122	BH123	BH124	BH125
			Sampl	e Type:	SOIL	SOIL	SOIL	SOIL
			Top De	pth (m):	1	0.5	1	0.5
			Date Sa	ampled:	18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD				
Bis(2-Chloroisopropyl)Ether	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachloroethane	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine	N	2790	2790 mg/kg 0.050		< 0.050	< 0.050	< 0.050	< 0.050
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Isophorone	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Naphthalene	N	2790	2790 mg/kg 0.050		0.57	0.18	0.072	0.068
4-Chloroaniline	N	2790	2790 mg/kg 0.050		< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobutadiene	N	2790	2790 mg/kg 0.050		< 0.050	< 0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol	N	2790	2790 mg/kg 0.050		< 0.050	< 0.050	< 0.050	< 0.050
2-Methylnaphthalene	N	2790	2790 mg/kg 0.050		0.50	0.27	< 0.050	< 0.050
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene	N	2790	mg/kg	0.050	0.098	0.055	< 0.050	< 0.050
Dimethylphthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthene	N	2790	mg/kg	0.050	1.3	0.61	0.084	0.11
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenzofuran	N	2790	mg/kg	0.050	0.79	0.41	0.060	0.080
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluorene	N	2790	mg/kg	0.050	1.3	0.57	0.11	0.10
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Azobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	N	2790	mg/kg	0.050	6.3	3.8	0.55	0.83
Anthracene	N	2790	mg/kg	0.050	2.1	0.65	0.18	0.23

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-44935	22-44935	22-44935	22-44935	
Quotation No.: Q22-28455	(Chemte	est Sam	ple ID.:	1550626	1550628	1550632	1550634
		Sa	ample Lo	ocation:	BH122	BH123	BH124	BH125
			Sampl	e Type:	SOIL	SOIL	SOIL	SOIL
			Top De	oth (m):	1	0.5	1	0.5
			Date Sa	ampled:	18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred. SOP Units LOD		LOD					
Carbazole	N	2790	mg/kg	0.050	0.39	0.19	< 0.050	< 0.050
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	N	2790	2790 mg/kg 0.050		1.3	3.6	0.85	1.6
Pyrene	N	2790	mg/kg	0.050	6.9	3.1	0.78	1.5
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[a]anthracene	N	2790	mg/kg	0.050	3.5	1.6	0.44	0.81
Chrysene	N	2790	mg/kg	0.050	3.4	1.8	0.50	0.89
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	0.098	< 0.050	< 0.050	< 0.050
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	4.1	1.8	0.61	1.1
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	1.6	0.69	0.22	0.34
Benzo[a]pyrene	N	2790	2790 mg/kg 0.050		3.6	1.6	0.53	0.93
Indeno(1,2,3-c,d)Pyrene	N	2790	2790 mg/kg 0.050		1.7	0.70	0.26	0.48
Dibenz(a,h)Anthracene	N	2790	2790 mg/kg 0.050		< 0.050	0.22	< 0.050	0.11
Benzo[g,h,i]perylene	N	2790	790 mg/kg 0.050		2.0	0.96	0.35	0.55
4-Nitrophenol	N	2790	2790 mg/kg 0.050		< 0.050	< 0.050	< 0.050	< 0.050
Naphthalene	N	2800	mg/kg	0.010	0.32	0.21	0.055	0.13
Acenaphthylene	N	2800	mg/kg	0.010	0.13	< 0.010	< 0.010	0.093
Acenaphthene	N	2800	mg/kg	0.010	1.0	0.43	< 0.010	0.14
Fluorene	N	2800	mg/kg	0.010	0.99	0.41	< 0.010	0.13
Phenanthrene	N	2800	mg/kg	0.010	9.0	4.0	0.37	0.86
Anthracene	N	2800	mg/kg	0.010	2.9	0.49	0.14	0.21
Fluoranthene	N	2800	mg/kg	0.010	17	4.1	0.57	1.7
Pyrene	N	2800	mg/kg	0.010	13	3.8	0.52	1.5
Benzo[a]anthracene	N	2800	mg/kg	0.010	6.8	1.6	0.26	0.88
Chrysene	N	2800	mg/kg	0.010	6.8	1.5	0.24	0.74
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	8.2	1.9	< 0.010	0.87
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	3.1	0.57	< 0.010	0.24
Benzolajpyrene	N	2800	mg/kg	0.010	6.6	1.5	< 0.010	0.85
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	3.8	0.91	0.19	0.58
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	0.67	0.14	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	3.3	0.93	< 0.010	0.56
Total Of 16 PAH's	N	2800	mg/kg	0.20	84	22	2.4	9.5
Resorcinol	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020
Xyienois	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020
Irimethylphenols	I U	1 2920	ma/ka	0.020	< 0.020	< 0.020	< 0.020	< 0.020

Results - Soil

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-44935	22-44935	22-44935	22-44935	
Quotation No.: Q22-28455	C	Chemtest Sample ID.:			1550626	1550628	1550632	1550634
	Sample Location:			BH122	BH123	BH124	BH125	
	Sample Type:			SOIL	SOIL	SOIL	SOIL	
	Top Depth (m):			1	0.5	1	0.5	
			Date Sa	ampled:	18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD				
Total Phenols	U	2920	mg/kg 0.10		< 0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary			
1010	pH Value of Waters	pН	pH Meter			
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.			
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.			
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl- pphenylenediamine.			
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).			
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.			
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection			
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.			
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection			
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection			
1815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Waters by GC-MS	ICES7 PCB congeners	Solvent extraction / GCMS detection			
1900	Phenols in Waters by GC-MS	Approximately 24 substituted Phenols, including Chlorophenols	Solvent extraction / GCMS detection			
2010	pH Value of Soils	pН	pH Meter			
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.			
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930			
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES			
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.			
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection			
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry			
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.			

Test Methods

SOP	Title	Parameters included	Method summary
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	22-45125-1		
Initial Date of Issue:	21-Dec-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken Stephen Watson		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	23-Nov-2022
Order No.:		Date Instructed:	28-Nov-2022
No. of Samples:	4		
Turnaround (Wkdays):	10	Results Due:	09-Dec-2022
Date Approved:	21-Dec-2022		
Approved By:			

Details:

Stuart Henderson, Technical Manager

🔅 eurofins

Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.:					22-45125
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1551502
			Sa	ample Lo	ocation:	BH120
				Sampl	e Type:	SOIL
			oth (m):	1.00		
				Date Sa	ampled:	21-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
рН	U	1010	10:1		N/A	7.8
Phosphate as P	U	1220	10:1	mg/l	0.050	< 0.050
Sulphur	N	1220	10:1	mg/l	1.0	23
Cyanide (Total)	U	1300	10:1	mg/l	0.050	< 0.050
Cyanide (Free)	U	1300	10:1	mg/l	0.050	< 0.050
Sulphide	U	1325	10:1	mg/l	0.050	< 0.050
Calcium	U	1455	10:1	mg/l	2.00	40
Aluminium (Dissolved)	N	1455	10:1	µg/l	5.0	44
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	3.3
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	35
Barium (Dissolved)	U	1455	10:1	µg/l	5.00	42
Beryllium (Dissolved)	U	1455	10:1	µg/l	1.00	< 1.0
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11
Chromium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	1.1
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05
Manganese (Dissolved)	U	1455	10:1	µg/l	0.50	67
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	1.8
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	0.72
Selenium (Dissolved)	U	1455	10:1	µg/l	0.50	2.1
Vanadium (Dissolved)	U	1455	10:1	µg/l	0.50	1.1
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	3.0
Iron (Dissolved)	N	1455	10:1	µg/l	5.0	8.4
Low-Level Chromium (Hexavalent)	N	1495	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.010	< 0.010
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.010	< 0.010
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.010	< 0.010
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.010	< 0.010
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:					22-45125
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1551502
			Sa	ample Lo	ocation:	BH120
				Sample	e Type:	SOIL
				Тор Dep	oth (m):	1.00
				Date Sa	ampled:	21-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	2.0	< 2.0
Dichlorodifluoromethane	N	1760	10:1	µg/l	0.10	< 0.10
Chloromethane	N	1760	10:1	µg/l	0.10	< 0.10
Vinyl Chloride	N	1760	10:1	µg/l	0.10	< 0.10
Bromomethane	N	1760	10:1	µg/l	2.0	< 2.0
Chloroethane	Ν	1760	10:1	µg/l	0.20	< 0.20
Trichlorofluoromethane	N	1760	10:1	µg/l	0.10	< 0.10
1,1-Dichloroethene	Ν	1760	10:1	µg/l	0.10	< 0.10
Dichloromethane	N	1760	10:1	µg/l	50	< 50
1,1-Dichloroethane	N	1760	10:1	µg/l	0.10	< 0.10
cis 1,2-Dichloroethene	Ν	1760	10:1	µg/l	0.10	< 0.10
Bromochloromethane	N	1760	10:1	µg/l	0.50	< 0.50
Trichloromethane	N	1760	10:1	µg/l	0.10	< 0.10
1,1,1-Trichloroethane	N	1760	10:1	µg/l	0.10	< 0.10
Tetrachloromethane	N	1760	10:1	µg/l	0.10	< 0.10
1,1-Dichloropropene	N	1760	10:1	µg/l	0.10	< 0.10
Benzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dichloroethane	N	1760	10:1	µg/l	0.20	< 0.20
Trichloroethene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dichloropropane	N	1760	10:1	µg/l	0.10	< 0.10
Dibromomethane	N	1760	10:1	µg/l	0.10	< 0.10
Bromodichloromethane	N	1760	10:1	µg/l	0.50	< 0.50
cis-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	< 1.0
Toluene	N	1760	10:1	µg/l	0.10	< 0.10
Trans-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	< 1.0
1,1,2-Trichloroethane	N	1760	10:1	µg/l	1.0	< 1.0
Tetrachloroethene	N	1760	10:1	µg/l	0.10	< 0.10
1,3-Dichloropropane	N	1760	10:1	µg/l	0.20	< 0.20
Dibromochloromethane	N	1760	10:1	µg/l	1.0	< 1.0
1,2-Dibromoethane	N	1760	10:1	µg/l	0.50	< 0.50
Chlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,1,1,2-Tetrachloroethane	N	1760	10:1	µg/l	0.20	< 0.20
Ethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
m & p-Xylene	N	1760	10:1	µg/l	0.10	< 0.10
o-Xylene	N	1760	10:1	µg/l	0.10	< 0.10
Styrene	N	1760	10:1	µg/l	0.10	< 0.10
Tribromomethane	N	1760	10:1	µg/l	1.0	< 1.0
Isopropylbenzene	Ν	1760	10:1	µg/l	0.10	< 0.10

Client: Causeway Geotech Ltd		b No.:	22-45125					
Quotation No.: Q22-28455		(ple ID.:	1551502				
			ocation:	BH120				
			e Type:	SOIL				
		Top Depth (m)						
				Date Sa	ampled:	21-Nov-2022		
Determinand	Accred.	SOP	Туре	Units	LOD			
Bromobenzene	N	1760	10:1	µg/l	0.10	< 0.10		
1,2,3-Trichloropropane	N	1760	10:1	µg/l	5.0	< 5.0		
N-Propylbenzene	N	1760	10:1	µg/l	0.10	< 0.10		
2-Chlorotoluene	N	1760	10:1	µg/l	0.10	< 0.10		
1,3,5-Trimethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10		
4-Chlorotoluene	N	1760	10:1	µg/l	0.10	< 0.10		
Tert-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10		
1,2,4-Trimethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10		
Sec-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10		
1,3-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10		
4-Isopropyltoluene	N	1760	10:1	µg/l	0.10	< 0.10		
1,4-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10		
N-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10		
1,2-Dichlorobenzene	Ν	1760	10:1	µg/l	0.10	< 0.10		
1,2-Dibromo-3-Chloropropane	Ν	1760	10:1	µg/l	5.0	< 5.0		
1,2,4-Trichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10		
Hexachlorobutadiene	N	1760	10:1	µg/l	0.10	< 0.10		
1,2,3-Trichlorobenzene	Ν	1760	10:1	µg/l	0.20	< 0.20		
Naphthalene	Ν	1760	10:1	µg/l	0.10	< 0.10		
Phenol	Ν	1790	10:1	µg/l	0.050	< 0.050		
2-Chlorophenol	N	1790	10:1	µg/l	0.050	< 0.050		
Bis-(2-Chloroethyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050		
1,3-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050		
1,4-Dichlorobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050		
1,2-Dichlorobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050		
2-Methylphenol (o-Cresol)	N	1790	10:1	µg/l	0.050	< 0.050		
Bis(2-Chloroisopropyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050		
Hexachloroethane	N	1790	10:1	µg/l	0.050	< 0.050		
N-Nitrosodi-n-propylamine	Ν	1790	10:1	µg/l	0.050	< 0.050		
4-Methylphenol	Ν	1790	10:1	µg/l	0.050	< 0.050		
Nitrobenzene	N	1790	10:1	µg/l	0.050	< 0.050		
Isophorone	N	1790	10:1	µg/l	0.050	< 0.050		
2-Nitrophenol	N	1790	10:1	µg/l	0.050	< 0.050		
2,4-Dimethylphenol	Ν	1790	10:1	µg/l	0.050	< 0.050		
Bis(2-Chloroethoxy)Methane	Ν	1790	10:1	µg/l	0.050	< 0.050		
2,4-Dichlorophenol	Ν	1790	10:1	µg/l	0.050	< 0.050		
1,2,4-Trichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050		
Naphthalene	N	1790	10:1	µg/l	0.050	< 0.050		
4-Chloroaniline	N	1790	10:1	µg/l	0.050	< 0.050		
Hexachlorobutadiene	Ν	1790	10:1	µg/l	0.050	< 0.050		

Client: Causeway Geotech Ltd		22-45125				
Quotation No.: Q22-28455			Chemte	st Sam	ple ID.:	1551502
			ocation:	BH120		
			e Type:	SOIL		
			oth (m):	1.00		
				Date Sa	ampled:	21-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
4-Chloro-3-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylnaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorocyclopentadiene	N	1790	10:1	µg/l	0.050	< 0.050
2,4,6-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4,5-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chloronaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthylene	N	1790	10:1	µg/l	0.050	< 0.050
Dimethylphthalate	N	1790	10:1	µg/l	0.050	< 0.050
2,6-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthene	N	1790	10:1	µg/l	0.050	< 0.050
3-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Dibenzofuran	N	1790	10:1	µg/l	0.050	< 0.050
4-Chlorophenylphenylether	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Fluorene	N	1790	10:1	µg/l	0.050	< 0.050
Diethyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
4-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
Azobenzene	N	1790	10:1	µg/l	0.050	< 0.050
4-Bromophenylphenyl Ether	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Pentachlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Phenanthrene	N	1790	10:1	µg/l	0.050	< 0.050
Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Carbazole	N	1790	10:1	µg/l	0.050	< 0.050
Di-N-Butyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Butylbenzyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Chrysene	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Di-N-Octyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[b]fluoranthene	Ν	1790	10:1	µg/l	0.050	< 0.050
Benzo[k]fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Dibenz(a,h)Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[g,h,i]perylene	N	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd		22-45125				
Quotation No.: Q22-28455		(ple ID.:	1551502		
			ocation:	BH120		
			e Type:	SOIL		
			oth (m):	1.00		
				Date Sa	ampled:	21-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
Naphthalene	N	1800	10:1	µg/l	0.010	1.1
Acenaphthylene	N	1800	10:1	µg/l	0.010	< 0.010
Acenaphthene	N	1800	10:1	µg/l	0.010	< 0.010
Fluorene	N	1800	10:1	µg/l	0.010	< 0.010
Phenanthrene	N	1800	10:1	µg/l	0.010	< 0.010
Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]anthracene	Ν	1800	10:1	µg/l	0.010	< 0.010
Chrysene	Ν	1800	10:1	µg/l	0.010	< 0.010
Benzo[b]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[k]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]pyrene	Ν	1800	10:1	µg/l	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	10:1	µg/l	0.010	< 0.010
Total Of 16 PAH's	N	1800	10:1	µg/l	0.20	1.1
PCB 81	N	1815	10:1	µg/l	0.010	< 0.010
PCB 77	N	1815	10:1	µg/l	0.010	< 0.010
PCB 105	N	1815	10:1	µg/l	0.010	< 0.010
PCB 114	N	1815	10:1	µg/l	0.010	< 0.010
PCB 118	N	1815	10:1	µg/l	0.010	< 0.010
PCB 123	N	1815	10:1	µg/l	0.010	< 0.010
PCB 126	N	1815	10:1	µg/l	0.010	< 0.010
PCB 156	N	1815	10:1	µg/l	0.010	< 0.010
PCB 157	N	1815	10:1	µg/l	0.010	< 0.010
PCB 167	N	1815	10:1	µg/l	0.010	< 0.010
PCB 169	N	1815	10:1	µg/l	0.010	< 0.010
PCB 189	Ν	1815	10:1	µg/l	0.010	< 0.010
Total PCBs (12 Congeners)	Ν	1815	10:1	µg/l	0.010	< 0.010
Phenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Chlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Methylphenol (o-Cresol)	N	1900	10:1	µg/l	0.20	< 0.20
3-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
4-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Nitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4-Dimethylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4-Dichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,6-Dichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
4-Chloro-3-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20

Client: Causeway Geotech Ltd			Chei	ntest Jo	ob No.:	22-45125		
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1551502		
		Sample Location						
				Sampl	e Type:	SOIL		
				Тор Dep	oth (m):	1.00		
				Date Sa	mpled:	21-Nov-2022		
Determinand	Accred.	SOP	Туре	Units	LOD			
2,3,4-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
2,3,5-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
2,3,6-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
2,4,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
4-Nitrophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2,3,4,5-Tetrachlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20		
2,3,4,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2,3,5,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
3,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2-Methyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20		
Pentachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20		
2-Sec-Butyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20		
Total Phenols	N	1900	10:1	µg/l	5.00	< 5.0		

Client: Causeway Geotech Ltd		Che	mtest J	ob No.:	22-45125	22-45125	22-45125
Quotation No.: Q22-28455	(Chemte	est Sam	ple ID.:	1551499	1551501	1551513
		Sa	ample Lo	ocation:	BH119	BH120	BH120
			Sampl	e Type:	SOIL	SOIL	SOIL
			Top De	oth (m):	1.00	0.50	6.50
			Date Sa	ampled:	21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
АСМ Туре	U	2192		N/A	Fibres/Clumps	Fibres/Clumps	-
Asbestos Identification	U	2192		N/A	Amosite	Chrysotile	No Asbestos Detected
Asbestos by Gravimetry	U	2192	%	0.001	0.004	0.002	
Total Asbestos	U	2192	%	0.001	0.004	0.002	
Moisture	Ν	2030	%	0.020	10	9.7	9.5
Natural Moisture Content	Ν	2030	%	0.020	11	11	10
Soil Colour	Ν	2040		N/A	Brown	Brown	Brown
Other Material	Ν	2040		N/A	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Gravel	Sand	Sand
рН	U	2010		4.0	10.0	8.4	8.4
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.3	0.48	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.48	0.27	0.027
Total Sulphur	U	2175	%	0.010	0.099	0.26	0.14
Sulphur (Elemental)	U	2180	mg/kg	1.0	38	420	160
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Thiocyanate	U	2300	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Aluminium (Total)	Ν	2430	mg/kg	100	3200	4200	1600
Iron (Total)	Ν	2430	mg/kg	100	8200	12000	6000
Arsenic	U	2455	mg/kg	0.5	8.5	16	4.4
Barium	U	2455	mg/kg	0	71	190	24
Beryllium	U	2455	mg/kg	0.5	< 0.5	< 0.5	< 0.5
Cadmium	U	2455	mg/kg	0.10	0.57	0.88	0.23
Chromium	U	2455	mg/kg	0.5	15	16	9.1
Manganese	U	2455	mg/kg	1.0	610	1100	1200
Copper	U	2455	mg/kg	0.50	19	44	27
Mercury	U	2455	mg/kg	0.05	0.07	0.45	0.08
Nickel	U	2455	mg/kg	0.50	16	24	11
Lead	U	2455	mg/kg	0.50	40	260	25
Selenium	U	2455	mg/kg	0.25	0.79	1.2	0.39
Vanadium	U	2455	mg/kg	0.5	24	20	9.5
Zinc	U	2455	mg/kg	0.50	62	170	49
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	3.2	5.5	4.8
Total Organic Carbon	U	2625	%	0.20	1.9	3.2	2.8
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/ka	0.10	< 0.10	< 0.10	< 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:			ob No.:	22-45125	22-45125	22-45125
Quotation No.: Q22-28455	(Chemte	est Sam	ple ID.:	1551499	1551501	1551513
	Sample Location:				BH119	BH120	BH120
	Sample Type:			SOIL	SOIL	SOIL	
			Top Dep	oth (m):	1.00	0.50	6.50
			Date Sa	ampled:	21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	Ν	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	Ν	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Chloromethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Vinyl Chloride	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Bromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Chloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Trichlorofluoromethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50	< 0.50	< 0.50
Trichloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tetrachloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Benzene	N	2760	µg/kg	0.20	0.38	0.68	0.29
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Trichloroethene	N	2760	µg/kg	0.20	0.22	< 0.20	< 0.20
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Dibromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Toluene	N	2760	µg/kg	0.20	0.58	0.81	0.88

Client: Causeway Geotech Ltd	Chemtest Job No.:			ob No.:	22-45125	22-45125	22-45125
Quotation No.: Q22-28455	Chemtest Sample ID.:			ple ID.:	1551499	1551501	1551513
		Sa	ample Lo	ocation:	BH119	BH120	BH120
			Sampl	e Type:	SOIL	SOIL	SOIL
			Top De	oth (m):	1.00	0.50	6.50
			Date Sa	ampled:	21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
Trans-1,3-Dichloropropene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1,2-Trichloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tetrachloroethene	Ν	2760	µg/kg	0.20	0.21	< 0.20	< 0.20
1,3-Dichloropropane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dibromoethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Chlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1,1,2-Tetrachloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Ethylbenzene	Ν	2760	µg/kg	0.20	< 0.20	0.29	< 0.20
m & p-Xylene	Ν	2760	µg/kg	0.20	0.28	0.35	0.60
o-Xylene	Ν	2760	µg/kg	0.20	< 0.20	0.40	0.30
Styrene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tribromomethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Isopropylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Bromobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2,3-Trichloropropane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
N-Propylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
2-Chlorotoluene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,3,5-Trimethylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
4-Chlorotoluene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tert-Butylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2,4-Trimethylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Sec-Butylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,3-Dichlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
4-Isopropyltoluene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,4-Dichlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
N-Butylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dichlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dibromo-3-Chloropropane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2,4-Trichlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Hexachlorobutadiene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2,3-Trichlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Methyl Tert-Butyl Ether	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
N-Nitrosodimethylamine	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Phenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Chlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Bis-(2-Chloroethyl)Ether	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
1,3-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
1,4-Dichlorobenzene	N	2790	mg/ka	0.050	< 0.050	< 0.050	< 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:			ob No.:	22-45125	22-45125	22-45125
Quotation No.: Q22-28455	Chemtest Sample ID.:			ple ID.:	1551499	1551501	1551513
		Sa	ample Lo	ocation:	BH119	BH120	BH120
			Sampl	e Type:	SOIL	SOIL	SOIL
			Top Dep	oth (m):	1.00	0.50	6.50
			Date Sa	ampled:	21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Isophorone	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Naphthalene	N	2790	mg/kg	0.050	< 0.050	0.17	< 0.050
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050	< 0.050	0.17	< 0.050
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Dimethylphthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Acenaphthene	N	2790	mg/kg	0.050	< 0.050	0.19	< 0.050
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Dibenzofuran	N	2790	mg/kg	0.050	< 0.050	0.12	< 0.050
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Fluorene	N	2790	mg/kg	0.050	< 0.050	0.18	< 0.050
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Azobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050	0.16	< 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:			ob No.:	22-45125	22-45125	22-45125
Quotation No.: Q22-28455	Chemtest Sample ID.:				1551499	1551501	1551513
		Sa	ample Lo	ocation:	BH119	BH120	BH120
			Sampl	e Type:	SOIL	SOIL	SOIL
			Top Dep	oth (m):	1.00	0.50	6.50
			Date Sa	ampled:	21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbest	os Lab:	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
Phenanthrene	Ν	2790	mg/kg	0.050	0.13	1.5	< 0.050
Anthracene	Ν	2790	mg/kg	0.050	< 0.050	0.48	< 0.050
Carbazole	Ν	2790	mg/kg	0.050	< 0.050	0.12	< 0.050
Di-N-Butyl Phthalate	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	N	2790	mg/kg	0.050	0.18	3.1	< 0.050
Pyrene	N	2790	mg/kg	0.050	0.16	2.8	< 0.050
Butylbenzyl Phthalate	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Benzo[a]anthracene	Ν	2790	mg/kg	0.050	0.078	1.5	< 0.050
Chrysene	Ν	2790	mg/kg	0.050	0.089	1.6	< 0.050
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	< 0.050	0.10	< 0.050
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Benzo[b]fluoranthene	Ν	2790	mg/kg	0.050	< 0.050	1.7	< 0.050
Benzo[k]fluoranthene	Ν	2790	mg/kg	0.050	< 0.050	0.69	< 0.050
Benzo[a]pyrene	Ν	2790	mg/kg	0.050	0.067	1.4	< 0.050
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	< 0.050	0.69	< 0.050
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	< 0.050	0.19	< 0.050
Benzo[g,h,i]perylene	Ν	2790	mg/kg	0.050	< 0.050	0.82	< 0.050
4-Nitrophenol	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Naphthalene	Ν	2800	mg/kg	0.010	< 0.010	0.38	0.12
Acenaphthylene	Ν	2800	mg/kg	0.010	< 0.010	0.14	< 0.010
Acenaphthene	N	2800	mg/kg	0.010	< 0.010	0.12	< 0.010
Fluorene	Ν	2800	mg/kg	0.010	< 0.010	0.22	< 0.010
Phenanthrene	Ν	2800	mg/kg	0.010	< 0.010	1.5	0.34
Anthracene	Ν	2800	mg/kg	0.010	< 0.010	0.34	0.12
Fluoranthene	Ν	2800	mg/kg	0.010	< 0.010	1.9	0.37
Pyrene	Ν	2800	mg/kg	0.010	< 0.010	1.7	0.36
Benzo[a]anthracene	Ν	2800	mg/kg	0.010	< 0.010	0.88	< 0.010
Chrysene	Ν	2800	mg/kg	0.010	< 0.010	0.71	< 0.010
Benzo[b]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010	0.93	< 0.010
Benzo[k]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010	0.42	< 0.010
Benzo[a]pyrene	Ν	2800	mg/kg	0.010	< 0.010	0.59	< 0.010
Indeno(1,2,3-c,d)Pyrene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	2800	mg/kg	0.20	< 0.20	9.8	1.3
Resorcinol	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020

<u>Results - Soil</u>

Client: Causeway Geotech Ltd		Che	mtest Jo	ob No.:	22-45125	22-45125	22-45125
Quotation No.: Q22-28455	(Chemtest Sample ID.:				1551501	1551513
		Sa	ample Lo	ocation:	BH119	BH120	BH120
			Sampl	e Type:	SOIL	SOIL	SOIL
			Top Dep	oth (m):	1.00	0.50	6.50
	Date Sampled:			21-Nov-2022	21-Nov-2022	21-Nov-2022	
			Asbest	os Lab:	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
1-Naphthol	Ν	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	рН	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl- pphenylenediamine.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Waters by GC-MS	ICES7 PCB congeners	Solvent extraction / GCMS detection
1900	Phenols in Waters by GC-MS	Approximately 24 substituted Phenols, including Chlorophenols	Solvent extraction / GCMS detection
2010	pH Value of Soils	pН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.

Test Methods

SOP	Title	Parameters included	Method summary
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	22-45332-1		
Initial Date of Issue:	11-Jan-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken Stephen Watson		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	24-Nov-2022
Order No.:		Date Instructed:	07-Dec-2022
No. of Samples:	2		
Turnaround (Wkdays):	7	Results Due:	15-Dec-2022
Date Approved:	11-Jan-2023		
Approved By:			

Details:

Stuart Henderson, Technical Manager

🔅 eurofins

Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.					22-45332	
Quotation No.: Q22-28455		(ple ID.:	1552425			
			Sa	ample Lo	ocation:	BH123	
				Sampl	e Type:	SOIL	
				Top Dep	oth (m):	4.0	
				Date Sa	ampled:	22-Nov-2022	
Determinand	Accred.	SOP	Туре	Units	LOD		
рН	U	U 1010 10:1 N/A					
Phosphate as P	U	1220	10:1	mg/l	0.050	< 0.050	
Sulphur	Ν	1220	10:1	mg/l	1.0	21	
Cyanide (Total)	U	1300	10:1	mg/l	0.050	0.050	
Cyanide (Free)	U	1300	10:1	mg/l	0.050	< 0.050	
Sulphide	U	1325	10:1	mg/l	0.050	< 0.050	
Calcium	U	1455	10:1	mg/l	2.00	29	
Aluminium (Dissolved)	N	1455	10:1	µg/l	5.0	130	
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	8.7	
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	130	
Barium (Dissolved)	U	1455	10:1	µg/l	5.00	28	
Beryllium (Dissolved)	U	1455	10:1	µg/l	1.00	< 1.0	
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11	
Chromium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05	
Manganese (Dissolved)	U	1455	10:1	µg/l	0.50	31	
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	3.2	
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	2.7	
Selenium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	
Vanadium (Dissolved)	U	1455	10:1	µg/l	0.50	0.91	
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	2.9	
Iron (Dissolved)	N	1455	10:1	µg/l	5.0	16	
Low-Level Chromium (Hexavalent)	N	1495	10:1	µg/l	0.10	< 0.10	
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.010	[B] < 0.010	
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.010	[B] < 0.010	
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	[B] < 0.10	
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	[B] 41	
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	[B] 21	
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	[B] < 0.10	
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	[B] 100	
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	[B] < 0.10	
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	1.0	[B] 170	
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.010	[B] < 0.010	
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.010	[B] < 0.010	
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	[B] < 0.10	
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	[B] 55	
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	[B] 67	
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	[B] < 0.10	
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	[B] 28	

Client: Causeway Geotech Ltd			Che	ntest Jo	ob No.:	22-45332
Quotation No.: Q22-28455		(ple ID.:	1552425		
			Sa	ample Lo	ocation:	BH123
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	4.0
				Date Sa	ampled:	22-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	[B] < 0.10
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	1.0	[B] 150
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	2.0	[B] 320
Dichlorodifluoromethane	N	1760	10:1	µg/l	0.10	[B] < 0.10
Chloromethane	N	1760	10:1	µg/l	0.10	[B] < 0.10
Vinyl Chloride	N	1760	10:1	µg/l	0.10	[B] < 0.10
Bromomethane	N	1760	10:1	µg/l	2.0	[B] < 2.0
Chloroethane	N	1760	10:1	µg/l	0.20	[B] < 0.20
Trichlorofluoromethane	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,1-Dichloroethene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Dichloromethane	N	1760	10:1	µg/l	50	[B] < 50
1,1-Dichloroethane	N	1760	10:1	µg/l	0.10	[B] < 0.10
cis 1,2-Dichloroethene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Bromochloromethane	N	1760	10:1	µg/l	0.50	[B] < 0.50
Trichloromethane	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,1,1-Trichloroethane	N	1760	10:1	µg/l	0.10	[B] < 0.10
Tetrachloromethane	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,1-Dichloropropene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Benzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,2-Dichloroethane	N	1760	10:1	µg/l	0.20	[B] < 0.20
Trichloroethene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,2-Dichloropropane	N	1760	10:1	µg/l	0.10	[B] < 0.10
Dibromomethane	N	1760	10:1	µg/l	0.10	[B] < 0.10
Bromodichloromethane	N	1760	10:1	µg/l	0.50	[B] < 0.50
cis-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	[B] < 1.0
Toluene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Trans-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	[B] < 1.0
1,1,2-Trichloroethane	N	1760	10:1	µg/l	1.0	[B] < 1.0
Tetrachloroethene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,3-Dichloropropane	N	1760	10:1	µg/l	0.20	[B] < 0.20
Dibromochloromethane	N	1760	10:1	µg/l	1.0	[B] < 1.0
1,2-Dibromoethane	N	1760	10:1	µg/l	0.50	[B] < 0.50
Chlorobenzene	N	1760	10:1	µg/l	0.10	[B] 39
1,1,1,2-Tetrachloroethane	N	1760	10:1	µg/l	0.20	[B] < 0.20
Ethylbenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
m & p-Xylene	N	1760	10:1	µg/l	0.10	[B] < 0.10
o-Xylene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Styrene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Tribromomethane	N	1760	10:1	µg/l	1.0	[B] < 1.0
Isopropylbenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10

Client: Causeway Geotech Ltd			Cher	mtest Jo	ob No.:	22-45332
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1552425
			ocation:	BH123		
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	4.0
				Date Sa	ampled:	22-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
Bromobenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,2,3-Trichloropropane	Ν	1760	10:1	µg/l	5.0	[B] < 5.0
N-Propylbenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
2-Chlorotoluene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,3,5-Trimethylbenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
4-Chlorotoluene	Ν	1760	10:1	µg/l	0.10	[B] < 0.10
Tert-Butylbenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,2,4-Trimethylbenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Sec-Butylbenzene	Ν	1760	10:1	µg/l	0.10	[B] < 0.10
1,3-Dichlorobenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
4-Isopropyltoluene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,4-Dichlorobenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
N-Butylbenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,2-Dichlorobenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,2-Dibromo-3-Chloropropane	N	1760	10:1	µg/l	5.0	[B] < 5.0
1,2,4-Trichlorobenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Hexachlorobutadiene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,2,3-Trichlorobenzene	N	1760	10:1	µg/l	0.20	[B] < 0.20
Naphthalene	N	1760	10:1	µg/l	0.10	[B] < 0.10
Phenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050
1,3-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,4-Dichlorobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050
1,2-Dichlorobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050
2-Methylphenol (o-Cresol)	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroisopropyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050
Hexachloroethane	N	1790	10:1	µg/l	0.050	< 0.050
N-Nitrosodi-n-propylamine	Ν	1790	10:1	µg/l	0.050	< 0.050
4-Methylphenol	Ν	1790	10:1	µg/l	0.050	< 0.050
Nitrobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050
Isophorone	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dimethylphenol	Ν	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroethoxy)Methane	Ν	1790	10:1	µg/l	0.050	< 0.050
2,4-Dichlorophenol	Ν	1790	10:1	µg/l	0.050	< 0.050
1,2,4-Trichlorobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050
Naphthalene	Ν	1790	10:1	µg/l	0.050	< 0.050
4-Chloroaniline	Ν	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobutadiene	N	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd		ob No.:	22-45332			
Quotation No.: Q22-28455		(ple ID.:	1552425		
			Sa	ample Lo	ocation:	BH123
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	4.0
				Date Sa	ampled:	22-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
4-Chloro-3-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylnaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorocyclopentadiene	N	1790	10:1	µg/l	0.050	< 0.050
2,4,6-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4,5-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chloronaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthylene	N	1790	10:1	µg/l	0.050	< 0.050
Dimethylphthalate	N	1790	10:1	µg/l	0.050	< 0.050
2,6-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthene	N	1790	10:1	µg/l	0.050	< 0.050
3-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Dibenzofuran	N	1790	10:1	µg/l	0.050	< 0.050
4-Chlorophenylphenylether	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Fluorene	N	1790	10:1	µg/l	0.050	< 0.050
Diethyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
4-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
Azobenzene	N	1790	10:1	µg/l	0.050	< 0.050
4-Bromophenylphenyl Ether	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Pentachlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Phenanthrene	N	1790	10:1	µg/l	0.050	< 0.050
Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Carbazole	N	1790	10:1	µg/l	0.050	< 0.050
Di-N-Butyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Butylbenzyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Chrysene	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate	N	1790	10:1	μg/l	0.050	< 0.050
Di-N-Octyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[b]fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[k]fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Dibenz(a,h)Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[g,h,i]perylene	N	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd		ob No.:	22-45332			
Quotation No.: Q22-28455		(ple ID.:	1552425		
			Sa	ample Lo	ocation:	BH123
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	4.0
				Date Sa	ampled:	22-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
Naphthalene	N	1800	10:1	µg/l	0.010	0.74
Acenaphthylene	N	1800	10:1	µg/l	0.010	0.31
Acenaphthene	N	1800	10:1	µg/l	0.010	0.52
Fluorene	N	1800	10:1	µg/l	0.010	0.20
Phenanthrene	N	1800	10:1	µg/l	0.010	0.21
Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]anthracene	Ν	1800	10:1	µg/l	0.010	< 0.010
Chrysene	Ν	1800	10:1	µg/l	0.010	< 0.010
Benzo[b]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[k]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]pyrene	Ν	1800	10:1	µg/l	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	10:1	µg/l	0.010	< 0.010
Total Of 16 PAH's	N	1800	10:1	µg/l	0.20	2.0
PCB 81	N	1815	10:1	µg/l	0.010	< 0.010
PCB 77	N	1815	10:1	µg/l	0.010	< 0.010
PCB 105	N	1815	10:1	µg/l	0.010	< 0.010
PCB 114	N	1815	10:1	µg/l	0.010	< 0.010
PCB 118	N	1815	10:1	µg/l	0.010	< 0.010
PCB 123	N	1815	10:1	µg/l	0.010	< 0.010
PCB 126	N	1815	10:1	µg/l	0.010	< 0.010
PCB 156	N	1815	10:1	µg/l	0.010	< 0.010
PCB 157	N	1815	10:1	µg/l	0.010	< 0.010
PCB 167	N	1815	10:1	µg/l	0.010	< 0.010
PCB 169	N	1815	10:1	µg/l	0.010	< 0.010
PCB 189	Ν	1815	10:1	µg/l	0.010	< 0.010
Total PCBs (12 Congeners)	Ν	1815	10:1	µg/l	0.010	< 0.010
Phenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Chlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Methylphenol (o-Cresol)	Ν	1900	10:1	µg/l	0.20	< 0.20
3-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
4-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Nitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4-Dimethylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4-Dichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,6-Dichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
4-Chloro-3-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20

Client: Causeway Geotech Ltd		ob No.:	22-45332			
Quotation No.: Q22-28455		(ple ID.:	1552425		
		ocation:	BH123			
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	4.0
				Date Sa	mpled:	22-Nov-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
2,3,4-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,5-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,6-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Nitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,4,5-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,4,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,5,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
3,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Methyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
Pentachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Sec-Butyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
Total Phenols	N	1900	10:1	µg/l	5.00	< 5.0

Client: Causeway Geotech Ltd		ob No.:	22-45332		
Quotation No.: Q22-28455	(Chemte	ple ID.:	1552424	
		Sa	ample Lo	ocation:	BH123
			Sampl	e Type:	SOIL
			Top Dep	oth (m):	3.5
			Date Sa	ampled:	22-Nov-2022
			Asbest	os Lab:	COVENTRY
Determinand	Accred.	SOP			
АСМ Туре	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	20
Natural Moisture Content	N	2030	%	0.020	25
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones, Roots and Wood
Soil Texture	N	2040		N/A	Clay
рН	U	2010		4.0	8.1
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	2.6
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	1.3
Total Sulphur	U	2175	%	0.010	0.77
Sulphur (Elemental)	U	2180	mg/kg	1.0	5900
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[B] 1.1
Thiocyanate	U	2300	mg/kg	5.0	[B] < 5.0
Aluminium (Total)	N	2430	mg/kg	100	4100
Iron (Total)	N	2430	mg/kg	100	18000
Arsenic	U	2455	mg/kg	0.5	16
Barium	U	2455	mg/kg	0	170
Beryllium	U	2455	mg/kg	0.5	0.5
Cadmium	U	2455	mg/kg	0.10	2.0
Chromium	U	2455	mg/kg	0.5	19
Manganese	U	2455	mg/kg	1.0	540
Copper	U	2455	mg/kg	0.50	56
Mercury	U	2455	mg/kg	0.05	0.79
Nickel	U	2455	mg/kg	0.50	24
Lead	U	2455	mg/kg	0.50	1400
Selenium	U	2455	mg/kg	0.25	0.66
Vanadium	U	2455	mg/kg	0.5	16
Zinc	U	2455	mg/kg	0.50	200
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	U	2625	%	0.40	8.2
Total Organic Carbon	U	2625	%	0.20	4.8
Aliphatic TPH >C5-C6	Ν	2680	mg/kg	0.010	[B] < 0.010
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010	[B] < 0.010
Aliphatic TPH >C8-C10	Ν	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C10-C12	N	2680	ma/ka	0.10	[B] < 0.10

Client: Causeway Geotech Ltd		ob No.:	22-45332		
Quotation No.: Q22-28455	(Chemte	st Sam	ple ID.:	1552424
		Sa	ample Lo	ocation:	BH123
			Sample	е Туре:	SOIL
			Top Dep	oth (m):	3.5
			Date Sa	ampled:	22-Nov-2022
			Asbest	os Lab:	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	[B] < 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	[B] < 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	[B] < 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	[B] < 2.0
Dichlorodifluoromethane	N	2760	µg/kg	0.20	[B] < 0.20
Chloromethane	N	2760	µg/kg	0.20	[B] < 0.20
Vinyl Chloride	N	2760	µg/kg	0.20	[B] < 0.20
Bromomethane	N	2760	µg/kg	0.20	[B] < 0.20
Chloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Trichlorofluoromethane	N	2760	µg/kg	0.20	[B] < 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20
1,1-Dichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20
Bromochloromethane	N	2760	µg/kg	0.50	[B] < 0.50
Trichloromethane	N	2760	µg/kg	0.20	[B] < 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Tetrachloromethane	Ν	2760	µg/kg	0.20	[B] < 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20
Benzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Trichloroethene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichloropropane	N	2760	µg/kg	0.20	[B] < 0.20
Dibromomethane	N	2760	µg/kg	0.20	[B] < 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	[B] < 0.20
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20
Toluene	N	2760	µg/kg	0.20	[B] 0.66
Trans-1 3-Dichloropropene	N	2760	ua/ka	0.20	[B] < 0.20
Client: Causeway Geotech Ltd		22-45332			
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Quotation No.: Q22-28455	C	1552424			
		Sa	ocation:	BH123	
			Sample	e Type:	SOIL
			Тор Dep	oth (m):	3.5
			Date Sa	mpled:	22-Nov-2022
			Asbest	os Lab:	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Tetrachloroethene	N	2760	µg/kg	0.20	[B] < 0.20
1,3-Dichloropropane	N	2760	µg/kg	0.20	[B] < 0.20
Dibromochloromethane	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dibromoethane	N	2760	µg/kg	0.20	[B] < 0.20
Chlorobenzene	N	2760	µg/kg	0.20	[B] 190
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Ethylbenzene	N	2760	µg/kg	0.20	[B] 0.39
m & p-Xylene	N	2760	µg/kg	0.20	[B] 0.53
o-Xylene	N	2760	µg/kg	0.20	[B] 0.66
Styrene	N	2760	µg/kg	0.20	[B] < 0.20
Tribromomethane	N	2760	µg/kg	0.20	[B] < 0.20
Isopropylbenzene	N	2760	µg/kg	0.20	[B] 0.74
Bromobenzene	N	N 2760 μg/kg 0.20		0.20	[B] < 0.20
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	[B] < 0.20
N-Propylbenzene	N	2760	µg/kg	0.20	[B] 0.58
	N	2760	µg/kg	0.20	[B] < 0.20
1,3,5- I rimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
4-Chiorotoluene	IN N	2760	µg/кд	0.20	[B] < 0.20
	IN N	2760	µg/кд	0.20	[B] 0.25
1,2,4-11Intethylbenzene	IN N	2760	µg/kg	0.20	[B] 0.55
	IN N	2760	µg/kg	0.20	[B] (0.00
	IN N	2760	µg/kg	0.20	[D] < 0.20
	IN N	2760	µg/kg	0.20	[D] 0.25
N Rutylbopzopo	IN N	2760	µg/kg	0.20	[D] 20
1.2 Dichlorobonzono	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichiorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
1.2.4-Trichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
Hexachlorobutadiene	N	2760	ug/kg	0.20	[B] < 0.20
1 2 3-Trichlorobenzene	N	2760	ug/kg	0.20	[B] < 0.20
Methyl Tert-Butyl Ether	N	2760	ug/kg	0.20	[B] < 0.20
N-Nitrosodimethylamine	N	2790	ma/ka	0.050	[B] < 0.050
Phenol	N	2790	mg/kg	0.050	[B] < 0.050
2-Chlorophenol	N	2790	ma/ka	0.050	[B] < 0.050
Bis-(2-Chloroethyl)Ether	N	2790	ma/ka	0.050	[B] < 0.050
1.3-Dichlorobenzene	N	2790	ma/ka	0.050	[B] < 0.050
1.4-Dichlorobenzene	N	2790	ma/ka	0.050	[B] < 0.050
1,2-Dichlorobenzene	N	2790	mg/ka	0.050	[B] 2.6

Client: Causeway Geotech Ltd		22-45332			
Quotation No.: Q22-28455	C	1552424			
		Sa	ample Lo	ocation:	BH123
			Sample	е Туре:	SOIL
			Тор Dep	oth (m):	3.5
			Date Sa	ampled:	22-Nov-2022
			Asbest	os Lab:	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
2-Methylphenol	Ν	2790	mg/kg	0.050	[B] < 0.050
Bis(2-Chloroisopropyl)Ether	Ν	2790	mg/kg	0.050	[B] < 0.050
Hexachloroethane	N	2790	mg/kg	0.050	[B] < 0.050
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	[B] < 0.050
4-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050
Nitrobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050
Isophorone	Ν	2790	mg/kg	0.050	[B] < 0.050
2-Nitrophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
2,4-Dimethylphenol	Ν	2790	mg/kg	0.050	[B] < 0.050
Bis(2-Chloroethoxy)Methane	Ν	2790	mg/kg	0.050	[B] < 0.050
2,4-Dichlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
Naphthalene	Ν	2790	mg/kg	0.050	[B] 0.63
4-Chloroaniline	N 2790 mg/kg 0.050		0.050	[B] < 0.050	
Hexachlorobutadiene	Ν	2790	mg/kg	0.050	[B] < 0.050
4-Chloro-3-Methylphenol	Ν	2790	mg/kg	0.050	[B] < 0.050
2-Methylnaphthalene	Ν	2790	mg/kg	0.050	[B] 0.31
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	[B] < 0.050
2,4,6-Trichlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
2,4,5-Trichlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
2-Chloronaphthalene	Ν	2790	mg/kg	0.050	[B] 0.33
2-Nitroaniline	Ν	2790	mg/kg	0.050	[B] < 0.050
Acenaphthylene	Ν	2790	mg/kg	0.050	[B] 0.10
Dimethylphthalate	Ν	2790	mg/kg	0.050	[B] < 0.050
2,6-Dinitrotoluene	Ν	2790	mg/kg	0.050	[B] < 0.050
Acenaphthene	Ν	2790	mg/kg	0.050	[B] 0.35
3-Nitroaniline	Ν	2790	mg/kg	0.050	[B] < 0.050
Dibenzofuran	N	2790	mg/kg	0.050	[B] 0.29
4-Chlorophenylphenylether	Ν	2790	mg/kg	0.050	[B] < 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050
Fluorene	Ν	2790	mg/kg	0.050	[B] 0.44
Diethyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050
4-Nitroaniline	Ν	2790	mg/kg	0.050	[B] < 0.050
2-Methyl-4,6-Dinitrophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
Azobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050
4-Bromophenylphenyl Ether	Ν	2790	mg/kg	0.050	[B] < 0.050
Hexachlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050
Pentachlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
Phenanthrene	Ν	2790	mg/kg	0.050	[B] 3.0

Client: Causeway Geotech Ltd		Chemtest Job No.:					
Quotation No.: Q22-28455	0	Chemtest Sample ID.:					
		Sample Location:					
			Sample	e Type:	SOIL		
			Тор Dep	oth (m):	3.5		
			Date Sa	ampled:	22-Nov-2022		
			Asbest	os Lab:	COVENTRY		
Determinand	Accred.	SOP	Units	LOD			
Anthracene	Ν	2790	mg/kg	0.050	[B] 0.78		
Carbazole	N	2790	mg/kg	0.050	[B] 0.35		
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050		
Fluoranthene	N	2790	mg/kg	0.050	[B] 6.2		
Pyrene	N	2790	mg/kg	0.050	[B] 5.7		
Butylbenzyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050		
Benzo[a]anthracene	N	2790	mg/kg	0.050	[B] 3.5		
Chrysene	N	2790	mg/kg	0.050	[B] 3.6		
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	[B] < 0.050		
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050		
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	[B] 3.7		
Benzo[k]fluoranthene	N	N 2790 mg/kg 0.0		0.050	[B] 1.4		
Benzo[a]pyrene	N	N 2790 mg/kg (0.050	[B] 3.1		
Indeno(1,2,3-c,d)Pyrene	N	N 2790 mg/kg 0.05		0.050	[B] 1.3		
Dibenz(a,h)Anthracene	N	N 2790 mg/kg (0.050	[B] < 0.050		
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	[B] 1.7		
4-Nitrophenol	N	2790	mg/kg	0.050	[B] < 0.050		
Naphthalene	N	2800	mg/kg	0.010	0.58		
Acenaphthylene	N	2800	mg/kg	0.010	0.22		
Acenaphthene	N	2800	mg/kg	0.010	0.57		
Fluorene	N	2800	mg/kg	0.010	0.81		
Phenanthrene	N	2800	mg/kg	0.010	4.8		
Anthracene	N	2800	mg/kg	0.010	1.7		
Fluoranthene	N	2800	mg/kg	0.010	9.0		
Pyrene	N	2800	mg/kg	0.010	7.4		
Benzo[a]anthracene	N	2800	mg/kg	0.010	5.3		
Chrysene	Ν	2800	mg/kg	0.010	4.5		
Benzo[b]fluoranthene	Ν	2800	mg/kg	0.010	5.6		
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	2.2		
Benzo[a]pyrene	N	2800	mg/kg	0.010	7.1		
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	3.3		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	0.71		
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	2.3		
Total Of 16 PAH's	N	2800	mg/kg	0.20	56		
Resorcinol	U	2920	mg/kg	0.020	< 0.020		
Phenol	U	2920	mg/kg	0.020	< 0.020		
Cresols	U	2920	mg/kg	0.020	< 0.020		
Xylenols	U	2920	mg/kg	0.020	< 0.020		
1-Naphthol	N	2920	ma/ka	0.020	< 0.020		

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-45332
Quotation No.: Q22-28455	0	Chemte	st Sam	ple ID.:	1552424
		Sa	BH123		
			SOIL		
		3.5			
		ampled:	22-Nov-2022		
			Asbest	os Lab:	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1552424			BH123	22-Nov-2022	В	Amber Glass 250ml
1552424			BH123	22-Nov-2022	В	Amber Glass 60ml
1552424			BH123	22-Nov-2022	В	Plastic Tub 500g
1552425			BH123	22-Nov-2022	В	Amber Glass 250ml
1552425			BH123	22-Nov-2022	В	Amber Glass 60ml
1552425			BH123	22-Nov-2022	В	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary			
1010	pH Value of Waters	рН	pH Meter			
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.			
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.			
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl- pphenylenediamine.			
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).			
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.			
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection			
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.			
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection			
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection			
1815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Waters by GC-MS	ICES7 PCB congeners	Solvent extraction / GCMS detection			
1900	Phenols in Waters by GC-MS	Approximately 24 substituted Phenols, including Chlorophenols	Solvent extraction / GCMS detection			
2010	pH Value of Soils	рН	pH Meter			
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.			
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930			
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES			
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.			
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection			
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry			
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.			

Test Methods

SOP	Title	Parameters included	Method summary
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

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Chemtest

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

Final Report

Report No.:	22-45548-1		
Initial Date of Issue:	10-Jan-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken Stephen Watson		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	25-Nov-2022
Order No.:		Date Instructed:	07-Dec-2022
No. of Samples:	3		
Turnaround (Wkdays):	7	Results Due:	15-Dec-2022
Date Approved:	10-Jan-2023		
Approved By:			

Details:

Stuart Henderson, Technical Manager

🔅 eurofins

Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-45548	22-45548	22-45548	
Quotation No.: Q22-28455	(Chemtest Sample ID.:		1553287	1553290	1553293	
		Sample Location:				BH126	BH128
		Sample Type		e Type:	SOIL	SOIL	SOIL
			Top Dep	oth (m):	0.5	0.5	0.5
			Date Sa	ampled:	23-Nov-2022	23-Nov-2022	23-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	5.9	4.6	3.2
Natural Moisture Content	N	2030	%	0.020	6.2	4.9	3.3
Soil Colour	N	2040		N/A	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand
рН	U	2010		4.0	8.2	8.1	8.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.43	2.0	0.76
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.11	0.34	0.11
Total Sulphur	U	2175	%	0.010	0.048	0.18	0.17
Sulphur (Elemental)	U	2180	mg/kg	1.0	5.2	270	26
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Thiocyanate	U	2300	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Aluminium (Total)	Ν	2430	mg/kg	100	5200	7100	8300
Iron (Total)	Ν	2430	mg/kg	100	12000	12000	18000
Arsenic	U	2455	mg/kg	0.5	10	10	13
Barium	U	2455	mg/kg	0	17	150	110
Beryllium	U	2455	mg/kg	0.5	< 0.5	< 0.5	< 0.5
Cadmium	U	2455	mg/kg	0.10	0.30	0.76	0.36
Chromium	U	2455	mg/kg	0.5	13	40	57
Manganese	U	2455	mg/kg	1.0	380	510	660
Copper	U	2455	mg/kg	0.50	12	53	66
Mercury	U	2455	mg/kg	0.05	0.11	0.16	0.05
Nickel	U	2455	mg/kg	0.50	16	34	31
Lead	U	2455	mg/kg	0.50	31	100	69
Selenium	U	2455	mg/kg	0.25	0.47	2.0	0.45
Vanadium	U	2455	mg/kg	0.5	14	20	26
Zinc	U	2455	mg/kg	0.50	42	330	190
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	0.97	5.9	4.9
Total Organic Carbon	U	2625	%	0.20	0.56	3.4	2.9
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	Ν	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-45548	22-45548	22-45548	
Quotation No.: Q22-28455	Chemtest Sample ID.:			1553287	1553290	1553293	
	Sample Location: Sample Type:		BH101	BH126	BH128		
			SOIL	SOIL	SOIL		
			Top Dep	oth (m):	0.5	0.5	0.5
			Date Sa	ampled:	23-Nov-2022	23-Nov-2022	23-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD			
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	370	270
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	370	270
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	500	890
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	23	99
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	520	990
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0	900	1300
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Chloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Vinyl Chloride	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Bromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Chloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50	< 0.50	< 0.50
Trichloromethane	Ν	2760	µg/kg	0.20	2.5	< 0.20	< 0.20
1,1,1-Trichloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tetrachloromethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Benzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	0.76
1,2-Dichloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Trichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Dibromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Toluene	N	2760	µg/kg	0.20	0.70	0.81	0.98
Trans-1,3-Dichloropropene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-45548	22-45548	22-45548	
Quotation No.: Q22-28455	Chemtest Sample ID.:		1553287	1553290	1553293		
	Sample Location:		BH101	BH126	BH128		
	Sample Type:		SOIL	SOIL	SOIL		
			Top Dep	oth (m):	0.5	0.5	0.5
			Date Sa	ampled:	23-Nov-2022	23-Nov-2022	23-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD			
Tetrachloroethene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,3-Dichloropropane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dibromoethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Chlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,1,1,2-Tetrachloroethane	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Ethylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
m & p-Xylene	Ν	2760	µg/kg	0.20	0.34	< 0.20	< 0.20
o-Xylene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Styrene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tribromomethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Isopropylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Bromobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
2-Chlorotoluene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,3,5-Trimethylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
4-Chlorotoluene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tert-Butylbenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
4-Isopropyltoluene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,4-Dichlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2,4-Trichlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Hexachlorobutadiene	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Methyl Tert-Butyl Ether	Ν	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
N-Nitrosodimethylamine	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Phenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Chlorophenol	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-45548	22-45548	22-45548	
Quotation No.: Q22-28455	0	Chemtest Sample ID.:		1553287	1553290	1553293	
		Sa	ample Lo	ocation:	BH101	BH126	BH128
		Sample Type:		SOIL	SOIL	SOIL	
		Top Depth (m):		0.5	0.5	0.5	
			Date Sa	mpled:	23-Nov-2022	23-Nov-2022	23-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD			
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Isophorone	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Nitrophenol	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4-Dimethylphenol	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Naphthalene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Hexachlorocyclopentadiene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4,6-Trichlorophenol	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Nitroaniline	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Dimethylphthalate	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Acenaphthene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Dibenzofuran	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Fluorene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Nitroaniline	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Azobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Bromophenylphenyl Ether	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Pentachlorophenol	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Anthracene	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:		22-45548	22-45548	22-45548		
Quotation No.: Q22-28455	(Chemtest Sample ID.:		1553287	1553290	1553293	
		Sample Location:		BH101	BH126	BH128	
		Sample Type:		SOIL	SOIL	SOIL	
			Top Dep	oth (m):	0.5	0.5	0.5
			Date Sa	ampled:	23-Nov-2022	23-Nov-2022	23-Nov-2022
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD			
Carbazole	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	N	2790	mg/kg	0.050	< 0.050	0.11	0.083
Pyrene	N	2790	mg/kg	0.050	< 0.050	0.11	0.072
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Benzo[a]anthracene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Chrysene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate	Ν	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Benzo[a]pyrene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
4-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Naphthalene	N	2800	mg/kg	0.010	< 0.010	0.24	0.11
Acenaphthylene	N	2800	mg/kg	0.010	< 0.010	0.093	< 0.010
Acenaphthene	N	2800	mg/kg	0.010	< 0.010	0.13	< 0.010
Fluorene	N	2800	mg/kg	0.010	< 0.010	0.15	< 0.010
Phenanthrene	N	2800	mg/kg	0.010	0.16	0.64	0.26
Anthracene	N	2800	mg/kg	0.010	0.086	0.15	0.12
Fluoranthene	N	2800	mg/kg	0.010	0.18	0.90	0.36
Pyrene	N	2800	mg/kg	0.010	0.21	0.75	0.37
Benzo[a]anthracene	N	2800	mg/kg	0.010	< 0.010	0.65	0.32
Chrysene	N	2800	mg/kg	0.010	< 0.010	0.49	0.21
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	< 0.010	0.80	0.47
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	< 0.010	0.33	0.24
Benzo[a]pyrene	N	2800	mg/kg	0.010	< 0.010	1.0	0.57
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	< 0.010	0.62	0.44
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010	0.15	< 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	< 0.010	0.42	0.30
Total Of 16 PAH's	N	2800	mg/kg	0.20	0.64	7.5	3.8
Resorcinol	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Trimethylphenols	U	2920	mg/ka	0.020	< 0.020	< 0.020	< 0.020

<u> Results - Soil</u>

Client: Causeway Geotech Ltd	Chemtest Job No.:		22-45548	22-45548	22-45548		
Quotation No.: Q22-28455	Chemtest Sample ID.:			1553287	1553290	1553293	
	Sample Location:			BH101	BH126	BH128	
	Sample Type:			SOIL	SOIL	SOIL	
	Top Depth (m):		0.5 0.5		0.5		
	Date Sampled:			23-Nov-2022	23-Nov-2022	23-Nov-2022	
			Asbest	os Lab:	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD			
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	22-45743-1		
Initial Date of Issue:	08-Jan-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken Stephen Watson		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	28-Nov-2022
Order No.:		Date Instructed:	07-Dec-2022
No. of Samples:	1		
Turnaround (Wkdays):	7	Results Due:	15-Dec-2022
Date Approved:	08-Jan-2023		
Approved By:			

Details:

Stuart Henderson, Technical Manager

🔅 eurofins

Chemtest

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

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	(Chemtest Sample ID.:				
		Sa	ample Lo	ocation:	BH119	
			Sampl	е Туре:	SOIL	
			Top Dep	oth (m):	2.5	
			Date Sa	ampled:	24-Nov-2022	
			Asbest	os Lab:	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
АСМ Туре	U	2192		N/A	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	
Moisture	N	2030	%	0.020	12	
Natural Moisture Content	N	2030	%	0.020	14	
Soil Colour	N	2040		N/A	Brown	
Other Material	N	2040		N/A	Stones	
Soil Texture	N	2040		N/A	Clay	
pН	U	2010		4.0	8.1	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.6	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.30	
Total Sulphur	U	2175	%	0.010	0.14	
Sulphur (Elemental)	U	2180	mg/kg	1.0	310	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	
Thiocyanate	U	2300	mg/kg	5.0	< 5.0	
Aluminium (Total)	N	2430	mg/kg	100	8000	
Iron (Total)	Ν	2430	mg/kg	100	23000	
Arsenic	U	2455	mg/kg	0.5	17	
Barium	U	2455	mg/kg	0	110	
Beryllium	U	2455	mg/kg	0.5	0.8	
Cadmium	U	2455	mg/kg	0.10	1.7	
Chromium	U	2455	mg/kg	0.5	16	
Manganese	U	2455	mg/kg	1.0	1100	
Copper	U	2455	mg/kg	0.50	62	
Mercury	U	2455	mg/kg	0.05	0.45	
Nickel	U	2455	mg/kg	0.50	41	
Lead	U	2455	mg/kg	0.50	190	
Selenium	U	2455	mg/kg	0.25	1.7	
Vanadium	U	2455	mg/kg	0.5	25	
Zinc	U	2455	mg/kg	0.50	140	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	
Organic Matter	U	2625	%	0.40	4.2	
Total Organic Carbon	U	2625	%	0.20	2.4	
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010	
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010	< 0.010	
Aliphatic TPH >C8-C10	Ν	2680	mg/kg	0.10	< 0.10	
Aliphatic TPH >C10-C12	Ν	2680	mg/kg	0.10	< 0.10	
Aliphatic TPH >C12-C16	N	2680	mg/ka	0.10	< 0.10	

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	(Chemtest Sample ID.:				
		Sa	ample Lo	ocation:	BH119	
		Sample Type:				
			Top Dep	oth (m):	2.5	
			Date Sa	ampled:	24-Nov-2022	
			Asbest	os Lab:	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Aliphatic TPH >C16-C21	Ν	2680	mg/kg	0.10	< 0.10	
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	44	
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	44	
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	
Aromatic TPH >C8-C10	Ν	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	190	
Aromatic TPH >C35-C44	Ν	2680	mg/kg	0.10	< 0.10	
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	190	
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	240	
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20	
Chloromethane	N	2760	µg/kg	0.20	< 0.20	
Vinyl Chloride	N	2760	µg/kg	0.20	< 0.20	
Bromomethane	N	2760	µg/kg	0.20	< 0.20	
Chloroethane	N	2760	µg/kg	0.20	< 0.20	
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20	
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	2.7	
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50	
Trichloromethane	N	2760	µg/kg	0.20	< 0.20	
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	
Tetrachloromethane	Ν	2760	µg/kg	0.20	< 0.20	
1,1-Dichloropropene	Ν	2760	µg/kg	0.20	< 0.20	
Benzene	N	2760	µg/kg	0.20	1.0	
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	
Trichloroethene	N	2760	µg/kg	0.20	0.42	
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	
Dibromomethane	N	2760	µg/kg	0.20	< 0.20	
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20	
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	
Toluene	Ν	2760	µg/kg	0.20	1.1	
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	
1.1.2-Trichloroethane	Ν	2760	ua/ka	0.20	< 0.20	

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	(Chemtest Sample ID.:				
		Sa	ample Lo	ocation:	BH119	
			Sampl	е Туре:	SOIL	
			Top Dep	oth (m):	2.5	
			Date Sa	ampled:	24-Nov-2022	
			Asbest	os Lab:	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Tetrachloroethene	Ν	2760	µg/kg	0.20	< 0.20	
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	
Chlorobenzene	N	2760	µg/kg	0.20	< 0.20	
1,1,1,2-Tetrachloroethane	Ν	2760	µg/kg	0.20	< 0.20	
Ethylbenzene	Ν	2760	µg/kg	0.20	0.33	
m & p-Xylene	N	2760	µg/kg	0.20	0.48	
o-Xylene	N	2760	µg/kg	0.20	0.26	
Styrene	N	2760	µg/kg	0.20	< 0.20	
Tribromomethane	N	2760	µg/kg	0.20	< 0.20	
Isopropylbenzene	N	2760	µg/kg	0.20	< 0.20	
Bromobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20	
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20	
2-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
Tert-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
4-Isopropyltoluene	N	2760	µg/kg	0.20	< 0.20	
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Hexachlorobutadiene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	< 0.20	
N-Nitrosodimethylamine	Ν	2790	mg/kg	0.050	< 0.050	
Phenol	Ν	2790	mg/kg	0.050	< 0.050	
2-Chlorophenol	Ν	2790	mg/kg	0.050	< 0.050	
Bis-(2-Chloroethyl)Ether	Ν	2790	mg/kg	0.050	< 0.050	
1,3-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	
1,4-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	
1,2-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	
2-Methylphenol	N	2790	ma/ka	0.050	< 0.050	

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	0	Chemtest Sample ID.:				
		Sample Location:				
			Sample	e Type:	SOIL	
			Тор Dep	oth (m):	2.5	
			Date Sa	ampled:	24-Nov-2022	
			Asbest	os Lab:	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	< 0.050	
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050	
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050	
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050	
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050	
Isophorone	N	2790	mg/kg	0.050	< 0.050	
2-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050	
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050	
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050	
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
Naphthalene	N	2790	mg/kg	0.050	< 0.050	
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050	
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050	
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050	
2-Methylnaphthalene	N	2790	mg/kg	0.050	< 0.050	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050	
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050	
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050	
2-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	
Acenaphthylene	N	2790	mg/kg	0.050	< 0.050	
Dimethylphthalate	N	2790	mg/kg	0.050	< 0.050	
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	
Acenaphthene	N	2790	mg/kg	0.050	< 0.050	
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	
Dibenzofuran	N	2790	mg/kg	0.050	< 0.050	
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050	
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050	
Fluorene	N	2790	mg/kg	0.050	< 0.050	
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050	
4-Nitroaniline	N	2790	mg/kg	0.050	< 0.050	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	< 0.050	
Azobenzene	N	2790	mg/kg	0.050	< 0.050	
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	< 0.050	
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050	
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050	
Phenanthrene	N	2790	mg/kg	0.050	1.0	
Anthracene	N	2790	mg/kg	0.050	0.29	

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	0	Chemtest Sample ID.:				
		Sample Location:				
			Sample	e Type:	SOIL	
			Тор Dep	oth (m):	2.5	
			Date Sa	ampled:	24-Nov-2022	
			Asbest	os Lab:	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Carbazole	N	2790	mg/kg	0.050	< 0.050	
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	< 0.050	
Fluoranthene	N	2790	mg/kg	0.050	2.3	
Pyrene	N	2790	mg/kg	0.050	1.9	
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050	
Benzo[a]anthracene	N	2790	mg/kg	0.050	1.2	
Chrysene	N	2790	mg/kg	0.050	1.1	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	< 0.050	
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050	
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	1.4	
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	0.54	
Benzo[a]pyrene	N	2790	mg/kg	0.050	1.2	
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	0.55	
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	< 0.050	
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	0.71	
4-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	
Naphthalene	N	2800	mg/kg	0.010	0.16	
Acenaphthylene	N	2800	mg/kg	0.010	0.072	
Acenaphthene	N	2800	mg/kg	0.010	0.11	
Fluorene	N	2800	mg/kg	0.010	0.10	
Phenanthrene	N	2800	mg/kg	0.010	0.79	
Anthracene	N	2800	mg/kg	0.010	0.19	
Fluoranthene	N	2800	mg/kg	0.010	1.2	
Pyrene	N	2800	mg/kg	0.010	0.95	
Benzo[a]anthracene	N	2800	mg/kg	0.010	0.58	
Chrysene	N	2800	mg/kg	0.010	0.56	
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	0.78	
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	0.27	
Benzo[a]pyrene	N	2800	mg/kg	0.010	0.83	
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	0.56	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	0.083	
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	0.34	
Total Of 16 PAH's	N	2800	mg/kg	0.20	7.6	
Resorcinol	U	2920	mg/kg	0.020	< 0.020	
Phenol	U	2920	mg/kg	0.020	< 0.020	
Cresols	U	2920	mg/kg	0.020	0.066	
Xylenols	U	2920	mg/kg	0.020	< 0.020	
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	
Trimethylphenols	U	2920	ma/ka	0.020	< 0.020	

Client: Causeway Geotech Ltd		Che	mtest Jo	ob No.:	22-45743
Quotation No.: Q22-28455	0	ple ID.:	1554176		
		Sa	ocation:	BH119	
			e Type:	SOIL	
			oth (m):	2.5	
			ampled:	24-Nov-2022	
			Asbest	os Lab:	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

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Chemtest

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

Final Report

Report No.:	22-46669-1		
Initial Date of Issue:	09-Jan-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Dean McCloskey Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	06-Dec-2022
Order No.:		Date Instructed:	22-Dec-2022
No. of Samples:	2		
Turnaround (Wkdays):	8	Results Due:	09-Jan-2023
Date Approved:	09-Jan-2023		
Approved By:			

Details:

Stuart Henderson, Technical Manager

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Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-46669	22-46669	
Quotation No.: Q22-28455	Chemtest Sample ID.:			1558444	1558447	
	Sample Location:			BH125	BH127	
	Sample Type:				SOIL	SOIL
		Top Depth (m):				1.00
			Date Sa	ampled:	01-Dec-2022	01-Dec-2022
			Asbest	os Lab:	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
АСМ Туре	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	23	21
Natural Moisture Content	N	2030	%	0.020	29	27
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones and Roots	Stones
Soil Texture	N	2040		N/A	Sand	Sand
рН	U	2010		4.0	7.5	7.7
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.5	1.3
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.68	0.69
Total Sulphur	U	2175	%	0.010	0.63	0.49
Sulphur (Elemental)	U	2180	mg/kg	1.0	750	2100
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[B] 1.4	[B] 0.70
Thiocyanate	U	2300	mg/kg	5.0	[B] < 5.0	[B] < 5.0
Aluminium (Total)	N	2430	mg/kg	100	7800	8100
Iron (Total)	N	2430	mg/kg	100	13000	16000
Arsenic	U	2455	mg/kg	0.5	15	11
Barium	U	2455	mg/kg	0	220	210
Beryllium	U	2455	mg/kg	0.5	< 0.5	< 0.5
Cadmium	U	2455	mg/kg	0.10	1.3	< 0.10
Chromium	U	2455	mg/kg	0.5	18	14
Manganese	U	2455	mg/kg	1.0	540	820
Copper	U	2455	mg/kg	0.50	67	31
Mercury	U	2455	mg/kg	0.05	0.33	0.34
Nickel	U	2455	mg/kg	0.50	24	27
Lead	U	2455	mg/kg	0.50	200	210
Selenium	U	2455	mg/kg	0.25	< 0.25	< 0.25
Vanadium	U	2455	mg/kg	0.5	18	21
	U	2455	mg/kg	0.50	2300	200
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	10	7.5
Total Organic Carbon	U	2625	%	0.20	6.0	4.4
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-46669	22-46669	
Quotation No.: Q22-28455	Chemtest Sample ID.:			1558444	1558447	
	Sample Location:			BH125	BH127	
	Sample Type:				SOIL	SOIL
	Top Depth (m):				4.00	1.00
			Date Sa	ampled:	01-Dec-2022	01-Dec-2022
			Asbest	os Lab:	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
Aliphatic TPH >C12-C16	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10	[B] 2.0
Aliphatic TPH >C21-C35	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] 84
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	[B] < 1.0	[B] 86
Aromatic TPH >C5-C7	Ν	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aromatic TPH >C7-C8	Ν	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aromatic TPH >C8-C10	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C12-C16	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C16-C21	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] 18
Aromatic TPH >C21-C35	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] 430
Aromatic TPH >C35-C44	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Total Aromatic Hydrocarbons	Ν	2680	mg/kg	1.0	[B] < 1.0	[B] 450
Total Petroleum Hydrocarbons	Ν	2680	mg/kg	2.0	[B] < 2.0	[B] 540
Dichlorodifluoromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Chloromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Vinyl Chloride	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromomethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Chloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Trichlorofluoromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Trans 1,2-Dichloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
cis 1,2-Dichloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromochloromethane	Ν	2760	µg/kg	0.50	[B] < 0.50	[B] < 0.50
Trichloromethane	Ν	2760	µg/kg	0.20	[B] 0.68	[B] 0.56
1,1,1-Trichloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tetrachloromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloropropene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Benzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] 0.42
1,2-Dichloroethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Trichloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2-Dichloropropane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Dibromomethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
cis-1,3-Dichloropropene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Toluene	Ν	2760	µg/kg	0.20	[B] 1.0	[B] 0.74
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20

Client: Causeway Geotech Ltd	Chemtest Job No.:		22-46669	22-46669		
Quotation No.: Q22-28455	Chemtest Sample ID.:			1558444	1558447	
	Sample Location:			BH125	BH127	
	Sample Type:				SOIL	SOIL
	Top Depth (m):				4.00	1.00
			Date Sa	ampled:	01-Dec-2022	01-Dec-2022
			Asbest	os Lab:	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
1,1,2-Trichloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tetrachloroethene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,3-Dichloropropane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Dibromochloromethane	N	2760	µg/kg	0.20	[B] 1.0	[B] < 0.20
1,2-Dibromoethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Chlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1,1,2-Tetrachloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Ethylbenzene	Ν	2760	µg/kg	0.20	[B] 0.55	[B] < 0.20
m & p-Xylene	N	2760	µg/kg	0.20	[B] 2.1	[B] < 0.20
o-Xylene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Styrene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tribromomethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Isopropylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2,3-Trichloropropane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
N-Propylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
2-Chlorotoluene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,3,5-Trimethylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
4-Chlorotoluene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tert-Butylbenzene	Ν	2760	µg/kg	0.20	[B] 0.55	[B] < 0.20
1,2,4-Trimethylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Sec-Butylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,3-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
4-Isopropyltoluene	Ν	2760	µg/kg	0.20	[B] 0.55	[B] < 0.20
1,4-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
N-Butylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2-Dibromo-3-Chloropropane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2,4-Trichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Hexachlorobutadiene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2,3-Trichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Methyl Tert-Butyl Ether	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
N-Nitrosodimethylamine	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Phenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Chlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
1,3-Dichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
1,2-Dichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-46669	22-46669	
Quotation No.: Q22-28455	Chemtest Sample ID.:			1558444	1558447	
	Sample Location:			BH125	BH127	
	Sample Type:				SOIL	SOIL
	Top Depth (m):				4.00	1.00
	Date Sampled:				01-Dec-2022	01-Dec-2022
			Asbest	os Lab:	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
2-Methylphenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Bis(2-Chloroisopropyl)Ether	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Hexachloroethane	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
N-Nitrosodi-n-propylamine	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Nitrobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Isophorone	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Nitrophenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4-Dimethylphenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
1,2,4-Trichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Naphthalene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Chloroaniline	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Hexachlorocyclopentadiene	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4,6-Trichlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Acenaphthylene	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Dimethylphthalate	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Acenaphthene	Ν	2790	mg/kg	0.050	[B] 0.10	[B] < 0.050
3-Nitroaniline	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Dibenzofuran	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Chlorophenylphenylether	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Fluorene	Ν	2790	mg/kg	0.050	[B] 0.10	[B] < 0.050
Diethyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Nitroaniline	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Methyl-4,6-Dinitrophenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Azobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Pentachlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Phenanthrene	N	2790	ma/ka	0.050	[B] 0.49	[B] 0.61

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-46669	22-46669	
Quotation No.: Q22-28455	Chemtest Sample ID.:			1558444	1558447	
	Sample Location:			BH125	BH127	
	Sample Type:				SOIL	SOIL
	Top Depth (m):				4.00	1.00
			Date Sa	ampled:	01-Dec-2022	01-Dec-2022
			Asbest	os Lab:	COVENTRY	COVENTRY
Determinand	Accred.	Accred. SOP Units LOD				
Anthracene	Ν	2790	mg/kg	0.050	[B] 0.14	[B] 0.34
Carbazole	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Di-N-Butyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Fluoranthene	Ν	2790	mg/kg	0.050	[B] 0.94	[B] 1.9
Pyrene	Ν	2790	mg/kg	0.050	[B] 0.90	[B] 1.7
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Benzo[a]anthracene	Ν	2790	mg/kg	0.050	[B] 0.56	[B] 1.1
Chrysene	Ν	2790	mg/kg	0.050	[B] 0.56	[B] 1.0
Bis(2-Ethylhexyl)Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Di-N-Octyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	[B] 0.66	[B] 1.2
Benzo[k]fluoranthene	Ν	2790	mg/kg	0.050	[B] 0.22	[B] 0.42
Benzo[a]pyrene	Ν	2790	mg/kg	0.050	[B] 0.57	[B] 1.1
Indeno(1,2,3-c,d)Pyrene	Ν	2790	mg/kg	0.050	[B] 0.23	[B] 0.45
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	[B] 0.40	[B] 0.59
4-Nitrophenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Naphthalene	Ν	2800	mg/kg	0.010	0.28	1.0
Acenaphthylene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Acenaphthene	Ν	2800	mg/kg	0.010	0.26	< 0.010
Fluorene	N	2800	mg/kg	0.010	0.28	< 0.010
Phenanthrene	Ν	2800	mg/kg	0.010	1.7	2.0
Anthracene	Ν	2800	mg/kg	0.010	0.48	0.80
Fluoranthene	N	2800	mg/kg	0.010	1.9	4.5
Pyrene	N	2800	mg/kg	0.010	1.7	5.0
Benzo[a]anthracene	N	2800	mg/kg	0.010	0.88	2.4
Chrysene	Ν	2800	mg/kg	0.010	0.79	1.6
Benzo[b]fluoranthene	Ν	2800	mg/kg	0.010	0.89	1.4
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	0.41	0.39
Benzo[a]pyrene	N	2800	mg/kg	0.010	0.73	2.6
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	0.48	< 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	0.44	< 0.010
Total Of 16 PAH's	N	2800	mg/kg	0.20	11	22
Resorcinol	U	2920	mg/kg	0.020	< 0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020	< 0.020
1-Naphthol	N	2920	ma/ka	0.020	< 0.020	< 0.020

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-46669	22-46669
Quotation No.: Q22-28455	(Chemte	est Sam	1558444	1558447	
		Sa	ample Lo	BH125	BH127	
	Sample Type:			SOIL	SOIL	
	Top Depth (m):				4.00	1.00
			Date Sa	01-Dec-2022	01-Dec-2022	
	Asbestos Lab:			COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units			
Trimethylphenols	U 2920 mg/kg 0.020				< 0.020	< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10
Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1558444			BH125	01-Dec-2022	В	Amber Glass 250ml
1558444			BH125	01-Dec-2022	В	Amber Glass 60ml
1558444			BH125	01-Dec-2022	В	Plastic Tub 500g
1558447			BH127	01-Dec-2022	В	Amber Glass 250ml
1558447			BH127	01-Dec-2022	В	Amber Glass 60ml
1558447			BH127	01-Dec-2022	В	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

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Chemtest

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

Final Report

Report No.:	22-46675-1		
Initial Date of Issue:	08-Jan-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Ciaran Doherty Colm Hurley Darren O'Mahony Dean McCloskey Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Megan Walsh Neil Haggan Paul Dunlop Rachel White S		
Project	21-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	06-Dec-2022
Order No.:		Date Instructed:	07-Dec-2022
No. of Samples:	1		
Turnaround (Wkdays):	7	Results Due:	15-Dec-2022
Date Approved:	08-Jan-2023		

Approved By:

Details:

Stuart Henderson, Technical Manager

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Chemtest

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

Client: Causeway Geotech Ltd	t: Causeway Geotech Ltd Chemtest Job No.:		22-46675		
Quotation No.: Q22-28455	0	Chemtest Sample ID.:			1558607
		Sample Locatior			BH101
			Sample	e Type:	SOIL
			Тор Dep	oth (m):	3.0
			Date Sa	ampled:	25-Nov-2022
		Asbestos Lab			COVENTRY
Determinand	Accred.	SOP	Units	LOD	
АСМ Туре	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	9.7
Natural Moisture Content	N	2030	%	0.020	11
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones
Soil Texture	N	2040		N/A	Clay
рН	U	2010		4.0	8.0
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.48
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.21
Total Sulphur	U	2175	%	0.010	0.31
Sulphur (Elemental)	U	2180	mg/kg	1.0	450
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50
Thiocyanate	U	2300	mg/kg	5.0	< 5.0
Aluminium (Total)	N	2430	mg/kg	100	6200
Iron (Total)	N	2430	mg/kg	100	17000
Arsenic	U	2455	mg/kg	0.5	15
Barium	U	2455	mg/kg	0	38
Beryllium	U	2455	mg/kg	0.5	< 0.5
Cadmium	U	2455	mg/kg	0.10	1.1
Chromium	U	2455	mg/kg	0.5	15
Manganese	U	2455	mg/kg	1.0	690
Copper	U	2455	mg/kg	0.50	28
Mercury	U	2455	mg/kg	0.05	0.32
Nickel	U	2455	mg/kg	0.50	23
Lead	U	2455	mg/kg	0.50	52
Selenium	U	2455	mg/kg	0.25	1.3
Vanadium	U	2455	mg/kg	0.5	18
Zinc	U	2455	mg/kg	0.50	75
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	U	2625	%	0.40	2.8
Total Organic Carbon	U	2625	%	0.20	1.7
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	ma/ka	0.10	< 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:		22-46675		
Quotation No.: Q22-28455	(Chemtest Sample ID.:			1558607
		Sa	ample Lo	ocation:	BH101
			Sampl	е Туре:	SOIL
			Top Dep	oth (m):	3.0
			Date Sa	ampled:	25-Nov-2022
			Asbest	os Lab:	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20
Chloromethane	N	2760	µg/kg	0.20	< 0.20
Vinyl Chloride	Ν	2760	µg/kg	0.20	< 0.20
Bromomethane	N	2760	µg/kg	0.20	< 0.20
Chloroethane	N	2760	µg/kg	0.20	< 0.20
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	0.95
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50
Trichloromethane	N	2760	µg/kg	0.20	< 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20
Tetrachloromethane	N	2760	µg/kg	0.20	< 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	< 0.20
Benzene	N	2760	µg/kg	0.20	2.9
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20
Trichloroethene	N	2760	µg/kg	0.20	21
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20
Dibromomethane	N	2760	µg/kg	0.20	< 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20
Toluene	N	2760	µg/kg	0.20	0.70
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20
1.1.2-Trichloroethane	N	2760	ua/ka	0.20	< 0.20

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-46675	
Quotation No.: Q22-28455	0	Chemtest Sample ID.:			1558607
		Sample Location			BH101
			Sampl	e Type:	SOIL
			Top Dep	oth (m):	3.0
			Date Sa	ampled:	25-Nov-2022
		Asbestos Lab			COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Tetrachloroethene	N	2760	µg/kg	0.20	< 0.20
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20
Chlorobenzene	N	2760	µg/kg	0.20	< 0.20
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	< 0.20
Ethylbenzene	N	2760	µg/kg	0.20	< 0.20
m & p-Xylene	N	2760	µg/kg	0.20	< 0.20
o-Xylene	N	2760	µg/kg	0.20	< 0.20
Styrene	N	2760	µg/kg	0.20	< 0.20
Tribromomethane	N	2760	µg/kg	0.20	< 0.20
Isopropylbenzene	N	2760	µg/kg	0.20	< 0.20
Bromobenzene	N	2760	µg/kg	0.20	< 0.20
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20
2-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20	< 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	< 0.20
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	< 0.20
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20
Hexachlorobutadiene	N	2760	µg/kg	0.20	< 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	< 0.20
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	< 0.050
Phenol	N	2790	mg/kg	0.050	< 0.050
2-Chlorophenol	N	2790	mg/kg	0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	< 0.050
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050
2-Methylphenol	N	2790	ma/ka	0.050	< 0.050

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-46675	
Quotation No.: Q22-28455	(Chemtest Sample ID.			1558607
		Sa	ample Lo	ocation:	BH101
			Sampl	e Type:	SOIL
			Top Dep	oth (m):	3.0
			Date Sa	ampled:	25-Nov-2022
		Asbestos Lab:			COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	< 0.050
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050
Isophorone	N	2790	mg/kg	0.050	< 0.050
2-Nitrophenol	N	2790	mg/kg	0.050	< 0.050
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050
Naphthalene	N	2790	mg/kg	0.050	< 0.050
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050	< 0.050
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050
2-Nitroaniline	N	2790	mg/kg	0.050	< 0.050
Acenaphthylene	N	2790	mg/kg	0.050	< 0.050
Dimethylphthalate	N	2790	mg/kg	0.050	< 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050
Acenaphthene	N	2790	mg/kg	0.050	< 0.050
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050
Dibenzofuran	N	2790	mg/kg	0.050	< 0.050
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050
Fluorene	N	2790	mg/kg	0.050	< 0.050
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050
4-Nitroaniline	N	2790	mg/kg	0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	< 0.050
Azobenzene	N	2790	mg/kg	0.050	< 0.050
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	< 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050
Phenanthrene	N	2790	mg/kg	0.050	0.31
Anthracene	N	2790	ma/ka	0.050	0.18

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-46675	
Quotation No.: Q22-28455	0	Chemtest Sample ID.:			1558607
		Sa	ample Lo	ocation:	BH101
			Sample	е Туре:	SOIL
			Тор Dep	oth (m):	3.0
			Date Sa	ampled:	25-Nov-2022
	Asbestos Lab			os Lab:	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Carbazole	Ν	2790	mg/kg	0.050	< 0.050
Di-N-Butyl Phthalate	Ν	2790	mg/kg	0.050	< 0.050
Fluoranthene	Ν	2790	mg/kg	0.050	0.62
Pyrene	Ν	2790	mg/kg	0.050	0.47
Butylbenzyl Phthalate	Ν	2790	mg/kg	0.050	< 0.050
Benzo[a]anthracene	Ν	2790	mg/kg	0.050	0.24
Chrysene	Ν	2790	mg/kg	0.050	0.26
Bis(2-Ethylhexyl)Phthalate	Ν	2790	mg/kg	0.050	< 0.050
Di-N-Octyl Phthalate	Ν	2790	mg/kg	0.050	< 0.050
Benzo[b]fluoranthene	Ν	2790	mg/kg	0.050	0.28
Benzo[k]fluoranthene	Ν	2790	mg/kg	0.050	0.11
Benzo[a]pyrene	Ν	2790	mg/kg	0.050	0.22
Indeno(1,2,3-c,d)Pyrene	Ν	2790	mg/kg	0.050	0.089
Dibenz(a,h)Anthracene	Ν	2790	mg/kg	0.050	< 0.050
Benzo[g,h,i]perylene	Ν	2790	mg/kg	0.050	0.11
4-Nitrophenol	Ν	2790	mg/kg	0.050	< 0.050
Naphthalene	Ν	2800	mg/kg	0.010	0.16
Acenaphthylene	Ν	2800	mg/kg	0.010	0.074
Acenaphthene	Ν	2800	mg/kg	0.010	0.14
Fluorene	Ν	2800	mg/kg	0.010	0.14
Phenanthrene	Ν	2800	mg/kg	0.010	0.56
Anthracene	Ν	2800	mg/kg	0.010	0.29
Fluoranthene	Ν	2800	mg/kg	0.010	0.79
Pyrene	Ν	2800	mg/kg	0.010	0.57
Benzo[a]anthracene	Ν	2800	mg/kg	0.010	0.28
Chrysene	Ν	2800	mg/kg	0.010	0.20
Benzo[b]fluoranthene	Ν	2800	mg/kg	0.010	0.22
Benzo[k]fluoranthene	Ν	2800	mg/kg	0.010	0.092
Benzo[a]pyrene	Ν	2800	mg/kg	0.010	0.41
Indeno(1,2,3-c,d)Pyrene	Ν	2800	mg/kg	0.010	0.23
Dibenz(a,h)Anthracene	Ν	2800	mg/kg	0.010	< 0.010
Benzo[g,h,i]perylene	Ν	2800	mg/kg	0.010	0.14
Total Of 16 PAH's	Ν	2800	mg/kg	0.20	4.3
Resorcinol	U	2920	mg/kg	0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020
1-Naphthol	Ν	2920	mg/kg	0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020

Client: Causeway Geotech Ltd	Chemtest Job No.			ob No.:	22-46675
Quotation No.: Q22-28455	Chemtest Sample ID.				1558607
		Sample Location:			BH101
	Sample Type:			SOIL	
	Top Depth (m):			oth (m):	3.0
	Date Sampled: 25			25-Nov-2022	
	Asbestos Lab: COVENTRY		COVENTRY		
Determinand	Accred.	SOP	Units	LOD	
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	22-47580-1		
Initial Date of Issue:	09-Jan-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Dean McCloskey Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	12-Dec-2022
Order No.:		Date Instructed:	22-Dec-2022
No. of Samples:	1		
Turnaround (Wkdays):	8	Results Due:	09-Jan-2023
Date Approved:	09-Jan-2023		
Approved By:			

Details:

Stuart Henderson, Technical Manager

🔅 eurofins

Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-47580	
Quotation No.: Q22-28455	(Chemte	ple ID.:	1562826	
		Sa	ample Lo	ocation:	BH124
			Sample	e Type:	SOIL
			Тор Dep	oth (m):	5.5
			Date Sa	ampled:	07-Dec-2022
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
АСМ Туре	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	Ν	2030	%	0.020	19
Natural Moisture Content	N	2030	%	0.020	24
Soil Colour	N	2040		N/A	Grey
Other Material	N	2040		N/A	Stones
Soil Texture	N	2040		N/A	Sand
pН	U	2010		4.0	8.0
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.5
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.14
Total Sulphur	U	2175	%	0.010	0.052
Sulphur (Elemental)	U	2180	mg/kg	1.0	39
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[B] < 0.50
Thiocyanate	U	2300	mg/kg	5.0	[B] < 5.0
Aluminium (Total)	N	2430	mg/kg	100	2400
Iron (Total)	Ν	2430	mg/kg	100	4100
Arsenic	U	2455	mg/kg	0.5	2.3
Barium	U	2455	mg/kg	0	12
Beryllium	U	2455	mg/kg	0.5	< 0.5
Cadmium	U	2455	mg/kg	0.10	< 0.10
Chromium	U	2455	mg/kg	0.5	4.4
Manganese	U	2455	mg/kg	1.0	140
Copper	U	2455	mg/kg	0.50	4.3
Mercury	U	2455	mg/kg	0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	3.2
Lead	U	2455	mg/kg	0.50	300
Selenium	U	2455	mg/kg	0.25	< 0.25
Vanadium	U	2455	mg/kg	0.5	5.9
Zinc	U	2455	mg/kg	0.50	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	U	2625	%	0.40	0.78
Total Organic Carbon	U	2625	%	0.20	0.45
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	[B] < 0.010
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010	[B] < 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C12-C16	N	2680	mg/ka	0.10	[B] < 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-47580	
Quotation No.: Q22-28455	(Chemte	ple ID.:	1562826	
		Sa	ample Lo	ocation:	BH124
			Sampl	е Туре:	SOIL
			oth (m):	5.5	
			ampled:	07-Dec-2022	
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C16-C21	Ν	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	[B] < 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	[B] < 0.010
Aromatic TPH >C8-C10	Ν	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C10-C12	Ν	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	[B] < 0.10
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	[B] < 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	[B] < 2.0
Dichlorodifluoromethane	N	2760	µg/kg	0.20	[B] < 0.20
Chloromethane	N	2760	µg/kg	0.20	[B] < 0.20
Vinyl Chloride	N	2760	µg/kg	0.20	[B] < 0.20
Bromomethane	N	2760	µg/kg	0.20	[B] < 0.20
Chloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Trichlorofluoromethane	N	2760	µg/kg	0.20	[B] < 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20
1,1-Dichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20
Bromochloromethane	N	2760	µg/kg	0.50	[B] < 0.50
Trichloromethane	N	2760	µg/kg	0.20	[B] < 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
I etrachloromethane	N	2760	µg/kg	0.20	[B] < 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20
Benzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Trichloroethene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichloropropane	N	2/60	µg/kg	0.20	[B] < 0.20
Dibromomethane	N	2760	µg/kg	0.20	[B] < 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	[B] < 0.20
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20
I oluene	N	2760	µg/kg	0.20	[B] < 0.20
I rans-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20
1.1.2-1 richloroethane	I N	2/60	ua/ka	0.20	IBI < 0.20

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-47580
Quotation No.: Q22-28455	(Chemte	ple ID.:	1562826	
		Sa	ample Lo	ocation:	BH124
			Sampl	e Type:	SOIL
			Top Dep	oth (m):	5.5
			ampled:	07-Dec-2022	
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Tetrachloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20
1,3-Dichloropropane	Ν	2760	µg/kg	0.20	[B] < 0.20
Dibromochloromethane	Ν	2760	µg/kg	0.20	[B] 1.6
1,2-Dibromoethane	Ν	2760	µg/kg	0.20	[B] < 0.20
Chlorobenzene	Ν	2760	µg/kg	0.20	[B] 1.1
1,1,1,2-Tetrachloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20
Ethylbenzene	Ν	2760	µg/kg	0.20	[B] 0.26
m & p-Xylene	Ν	2760	µg/kg	0.20	[B] 0.79
o-Xylene	Ν	2760	µg/kg	0.20	[B] 0.60
Styrene	Ν	2760	µg/kg	0.20	[B] < 0.20
Tribromomethane	Ν	2760	µg/kg	0.20	[B] < 0.20
Isopropylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
Bromobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
1,2,3-Trichloropropane	Ν	2760	µg/kg	0.20	[B] < 0.20
N-Propylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
2-Chlorotoluene	Ν	2760	µg/kg	0.20	[B] < 0.20
1,3,5-Trimethylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
4-Chlorotoluene	Ν	2760	µg/kg	0.20	[B] < 0.20
Tert-Butylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
1,2,4-Trimethylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
Sec-Butylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
1,3-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	[B] < 0.20
1,4-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
N-Butylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
1,2-Dibromo-3-Chloropropane	Ν	2760	µg/kg	0.20	[B] < 0.20
1,2,4-Trichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
Hexachlorobutadiene	N	2760	µg/kg	0.20	[B] < 0.20
1,2,3-Trichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20
Methyl Tert-Butyl Ether	Ν	2760	µg/kg	0.20	[B] < 0.20
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	[B] < 0.050
Phenol	Ν	2790	mg/kg	0.050	[B] < 0.050
2-Chlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
Bis-(2-Chloroethyl)Ether	Ν	2790	mg/kg	0.050	[B] < 0.050
1,3-Dichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050
1,4-Dichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050
1,2-Dichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050
2-Methylphenol	N	2790	ma/ka	0.050	[B] < 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-47580
Quotation No.: Q22-28455	(Chemte	ple ID.:	1562826	
		Sa	ample Lo	ocation:	BH124
			Sampl	е Туре:	SOIL
			Top Dep	oth (m):	5.5
			ampled:	07-Dec-2022	
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Bis(2-Chloroisopropyl)Ether	Ν	2790	mg/kg	0.050	[B] < 0.050
Hexachloroethane	Ν	2790	mg/kg	0.050	[B] < 0.050
N-Nitrosodi-n-propylamine	Ν	2790	mg/kg	0.050	[B] < 0.050
4-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050
Nitrobenzene	N	2790	mg/kg	0.050	[B] < 0.050
Isophorone	N	2790	mg/kg	0.050	[B] < 0.050
2-Nitrophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
2,4-Dimethylphenol	Ν	2790	mg/kg	0.050	[B] < 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	[B] < 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
Naphthalene	N	2790	mg/kg	0.050	[B] < 0.050
4-Chloroaniline	N	2790	mg/kg	0.050	[B] < 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	[B] < 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050	[B] < 0.050
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	[B] < 0.050
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	[B] < 0.050
2-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050
Acenaphthylene	N	2790	mg/kg	0.050	[B] < 0.050
Dimethylphthalate	N	2790	mg/kg	0.050	[B] < 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050
Acenaphthene	N	2790	mg/kg	0.050	[B] < 0.050
3-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050
Dibenzofuran	N	2790	mg/kg	0.050	[B] < 0.050
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	[B] < 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050
Fluorene	N	2790	mg/kg	0.050	[B] < 0.050
Diethyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050
4-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	[B] < 0.050
Azobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	[B] < 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
Pentachlorophenol	N	2790	mg/kg	0.050	[B] < 0.050
Phenanthrene	N	2790	mg/kg	0.050	[B] < 0.050
Anthracene	N	2790	ma/ka	0.050	[B] < 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-47580
Quotation No.: Q22-28455	(Chemte	ple ID.:	1562826	
		Sa	ample Lo	ocation:	BH124
			Sample	e Type:	SOIL
			Тор Dep	oth (m):	5.5
			ampled:	07-Dec-2022	
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Carbazole	Ν	2790	mg/kg	0.050	[B] < 0.050
Di-N-Butyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050
Fluoranthene	Ν	2790	mg/kg	0.050	[B] < 0.050
Pyrene	Ν	2790	mg/kg	0.050	[B] < 0.050
Butylbenzyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050
Benzo[a]anthracene	Ν	2790	mg/kg	0.050	[B] < 0.050
Chrysene	Ν	2790	mg/kg	0.050	[B] < 0.050
Bis(2-Ethylhexyl)Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050
Di-N-Octyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050
Benzo[b]fluoranthene	Ν	2790	mg/kg	0.050	[B] < 0.050
Benzo[k]fluoranthene	Ν	2790	mg/kg	0.050	[B] < 0.050
Benzo[a]pyrene	Ν	2790	mg/kg	0.050	[B] < 0.050
Indeno(1,2,3-c,d)Pyrene	Ν	2790	mg/kg	0.050	[B] < 0.050
Dibenz(a,h)Anthracene	Ν	2790	mg/kg	0.050	[B] < 0.050
Benzo[g,h,i]perylene	Ν	2790	mg/kg	0.050	[B] < 0.050
4-Nitrophenol	Ν	2790	mg/kg	0.050	[B] < 0.050
Naphthalene	Ν	2800	mg/kg	0.010	< 0.010
Acenaphthylene	Ν	2800	mg/kg	0.010	< 0.010
Acenaphthene	Ν	2800	mg/kg	0.010	< 0.010
Fluorene	Ν	2800	mg/kg	0.010	< 0.010
Phenanthrene	Ν	2800	mg/kg	0.010	< 0.010
Anthracene	Ν	2800	mg/kg	0.010	< 0.010
Fluoranthene	Ν	2800	mg/kg	0.010	< 0.010
Pyrene	Ν	2800	mg/kg	0.010	< 0.010
Benzo[a]anthracene	Ν	2800	mg/kg	0.010	< 0.010
Chrysene	Ν	2800	mg/kg	0.010	< 0.010
Benzo[b]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010
Benzo[k]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010
Benzo[a]pyrene	Ν	2800	mg/kg	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	Ν	2800	mg/kg	0.010	< 0.010
Dibenz(a,h)Anthracene	Ν	2800	mg/kg	0.010	< 0.010
Benzo[g,h,i]perylene	Ν	2800	mg/kg	0.010	< 0.010
Total Of 16 PAH's	Ν	2800	mg/kg	0.20	< 0.20
Resorcinol	U	2920	mg/kg	0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020
1-Naphthol	Ν	2920	mg/kg	0.020	< 0.020
Trimethylphenols	U	2920	ma/ka	0.020	< 0.020

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-47580
Quotation No.: Q22-28455	C	1562826			
		ocation:	BH124		
		e Type:	SOIL		
		oth (m):	5.5		
	Date Sampled:				07-Dec-2022
	Asbestos Lab:				DURHAM
Determinand	Accred.	SOP	Units	LOD	
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1562826			BH124	07-Dec-2022	В	Amber Glass 250ml
1562826			BH124	07-Dec-2022	В	Amber Glass 60ml
1562826			BH124	07-Dec-2022	В	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Report No.:	22-48476-1		
Initial Date of Issue:	13-Jan-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Dean McCloskey Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen McCracken		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	20-Dec-2022
Order No.:		Date Instructed:	22-Dec-2022
No. of Samples:	3		
Turnaround (Wkdays):	8	Results Due:	09-Jan-2023
Date Approved:	13-Jan-2023		
Approved By:			
sont			

Details:

mc

Final Report

2183

Stuart Henderson, Technical Manager

🔅 eurofins

Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.					22-48476
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1566614
			Sa	ample Lo	ocation:	BH122
				Sampl	e Type:	SOIL
				Top De	oth (m):	2.0
		ampled:	14-Dec-2022			
Determinand	Accred.	SOP	Туре	Units	LOD	
рН	U	1010	10:1		N/A	8.1
Phosphate as P	U	1220	10:1	mg/l	0.050	< 0.050
Sulphur	N	1220	10:1	mg/l	1.0	33
Cyanide (Total)	U	1300	10:1	mg/l	0.050	< 0.050
Cyanide (Free)	U	1300	10:1	mg/l	0.050	< 0.050
Sulphide	U	1325	10:1	mg/l	0.050	< 0.050
Calcium	U	1455	10:1	mg/l	2.00	54
Aluminium (Dissolved)	N	1455	10:1	µg/l	5.0	29
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	6.6
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	160
Barium (Dissolved)	U	1455	10:1	µg/l	5.00	43
Beryllium (Dissolved)	U	1455	10:1	µg/l	1.00	< 1.0
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11
Chromium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	1.8
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05
Manganese (Dissolved)	U	1455	10:1	µg/l	0.50	130
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	3.9
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	4.7
Selenium (Dissolved)	U	1455	10:1	µg/l	0.50	0.83
Vanadium (Dissolved)	U	1455	10:1	µg/l	0.50	2.0
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	< 2.5
Iron (Dissolved)	N	1455	10:1	µg/l	5.0	11
Low-Level Chromium (Hexavalent)	N	1495	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.010	< 0.010
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.010	< 0.010
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.010	< 0.010
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.010	< 0.010
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10

Client: Causeway Geotech Ltd			Cher	ntest Jo	b No.:	22-48476
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1566614
			Sa	ample Lo	ocation:	BH122
				Sample	e Type:	SOIL
				Тор Dep	oth (m):	2.0
				Date Sa	mpled:	14-Dec-2022
Determinand	Accred.					
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	2.0	< 2.0
Dichlorodifluoromethane	N	1760	10:1	µg/l	0.10	< 0.10
Chloromethane	N	1760	10:1	µg/l	0.10	< 0.10
Vinyl Chloride	N	1760	10:1	µg/l	0.10	< 0.10
Bromomethane	N	1760	10:1	µg/l	2.0	< 2.0
Chloroethane	N	1760	10:1	µg/l	0.20	< 0.20
Trichlorofluoromethane	Ν	1760	10:1	µg/l	0.10	< 0.10
1,1-Dichloroethene	N	1760	10:1	µg/l	0.10	< 0.10
Dichloromethane	N	1760	10:1	µg/l	50	< 50
1,1-Dichloroethane	N	1760	10:1	µg/l	0.10	< 0.10
cis 1,2-Dichloroethene	N	1760	10:1	µg/l	0.10	< 0.10
Bromochloromethane	N	1760	10:1	µg/l	0.50	< 0.50
Trichloromethane	N	1760	10:1	µg/l	0.10	< 0.10
1,1,1-Trichloroethane	N	1760	10:1	µg/l	0.10	< 0.10
Tetrachloromethane	N	1760	10:1	µg/l	0.10	< 0.10
1,1-Dichloropropene	N	1760	10:1	µg/l	0.10	< 0.10
Benzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dichloroethane	N	1760	10:1	µg/l	0.20	< 0.20
Trichloroethene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dichloropropane	N	1760	10:1	µg/l	0.10	< 0.10
Dibromomethane	N	1760	10:1	µg/l	0.10	< 0.10
Bromodichloromethane	N	1760	10:1	µg/l	0.50	< 0.50
cis-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	< 1.0
Toluene	N	1760	10:1	µg/l	0.10	< 0.10
Trans-1,3-Dichloropropene	N	1760	10:1	µg/l	1.0	< 1.0
1,1,2-Trichloroethane	N	1760	10:1	µg/l	1.0	< 1.0
Tetrachloroethene	N	1760	10:1	µg/l	0.10	< 0.10
1,3-Dichloropropane	N	1760	10:1	µg/l	0.20	< 0.20
Dibromochloromethane	N	1760	10:1	µg/l	1.0	< 1.0
1,2-Dibromoethane	N	1760	10:1	µg/l	0.50	< 0.50
Chlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,1,1,2-Tetrachloroethane	Ν	1760	10:1	µg/l	0.20	< 0.20
Ethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
m & p-Xylene	N	1760	10:1	µg/l	0.10	< 0.10
o-Xylene	N	1760	10:1	µg/l	0.10	< 0.10
Styrene	N	1760	10:1	µg/l	0.10	< 0.10
Tribromomethane	N	1760	10:1	µg/l	1.0	< 1.0
Isopropylbenzene	Ν	1760	10:1	µg/l	0.10	< 0.10

Client: Causeway Geotech Ltd			Cher	ntest Jo	ob No.:	22-48476
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1566614
			Sa	ample Lo	ocation:	BH122
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	2.0
				Date Sa	ampled:	14-Dec-2022
Determinand	Accred.					
Bromobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,3-Trichloropropane	N	1760	10:1	µg/l	5.0	< 5.0
N-Propylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
2-Chlorotoluene	N	1760	10:1	µg/l	0.10	< 0.10
1,3,5-Trimethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
4-Chlorotoluene	N	1760	10:1	µg/l	0.10	< 0.10
Tert-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,4-Trimethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
Sec-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,3-Dichlorobenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
4-Isopropyltoluene	Ν	1760	10:1	µg/l	0.10	< 0.10
1,4-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
N-Butylbenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
1,2-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dibromo-3-Chloropropane	N	1760	10:1	µg/l	5.0	< 5.0
1,2,4-Trichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
Hexachlorobutadiene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,3-Trichlorobenzene	N	1760	10:1	µg/l	0.20	< 0.20
Naphthalene	N	1760	10:1	µg/l	0.10	< 0.10
Phenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050
1,3-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,4-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,2-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylphenol (o-Cresol)	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroisopropyl)Ether	N	1790	10:1	µg/l	0.050	< 0.050
Hexachloroethane	N	1790	10:1	µg/l	0.050	< 0.050
N-Nitrosodi-n-propylamine	N	1790	10:1	µg/l	0.050	< 0.050
4-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
Nitrobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Isophorone	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dimethylphenol	Ν	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
1,2,4-Trichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Naphthalene	N	1790	10:1	µg/l	0.050	< 0.050
4-Chloroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobutadiene	Ν	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd			Cher	mtest Jo	ob No.:	22-48476
Quotation No.: Q22-28455		(Chemte	st Sam	ple ID.:	1566614
			Sa	ample Lo	ocation:	BH122
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	2.0
				Date Sa	ampled:	14-Dec-2022
Determinand	Accred.					
4-Chloro-3-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylnaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorocyclopentadiene	N	1790	10:1	µg/l	0.050	< 0.050
2,4,6-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4,5-Trichlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chloronaphthalene	N	1790	10:1	µg/l	0.050	< 0.050
2-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthylene	N	1790	10:1	µg/l	0.050	< 0.050
Dimethylphthalate	N	1790	10:1	µg/l	0.050	< 0.050
2,6-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Acenaphthene	N	1790	10:1	µg/l	0.050	< 0.050
3-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
Dibenzofuran	N	1790	10:1	µg/l	0.050	< 0.050
4-Chlorophenylphenylether	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dinitrotoluene	N	1790	10:1	µg/l	0.050	< 0.050
Fluorene	N	1790	10:1	µg/l	0.050	< 0.050
Diethyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
4-Nitroaniline	N	1790	10:1	µg/l	0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
Azobenzene	N	1790	10:1	µg/l	0.050	< 0.050
4-Bromophenylphenyl Ether	N	1790	10:1	µg/l	0.050	< 0.050
Hexachlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
Pentachlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Phenanthrene	N	1790	10:1	µg/l	0.050	< 0.050
Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Carbazole	N	1790	10:1	µg/l	0.050	< 0.050
Di-N-Butyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Butylbenzyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Chrysene	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Di-N-Octyl Phthalate	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[b]fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[k]fluoranthene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[a]pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Dibenz(a,h)Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[g,h,i]perylene	N	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd			Cher	ntest Jo	ob No.:	22-48476
Quotation No.: Q22-28455		(ple ID.:	1566614		
			Sa	ample Lo	ocation:	BH122
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	2.0
				Date Sa	ampled:	14-Dec-2022
Determinand	Accred.					
Naphthalene	N	1800	10:1	µg/l	0.010	< 0.010
Acenaphthylene	N	1800	10:1	µg/l	0.010	< 0.010
Acenaphthene	N	1800	10:1	µg/l	0.010	1.5
Fluorene	N	1800	10:1	µg/l	0.010	< 0.010
Phenanthrene	N	1800	10:1	µg/l	0.010	< 0.010
Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]anthracene	Ν	1800	10:1	µg/l	0.010	< 0.010
Chrysene	Ν	1800	10:1	µg/l	0.010	< 0.010
Benzo[b]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[k]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	10:1	µg/l	0.010	< 0.010
Total Of 16 PAH's	N	1800	10:1	µg/l	0.20	1.5
PCB 81	N	1815	10:1	µg/l	0.010	< 0.010
PCB 77	N	1815	10:1	µg/l	0.010	< 0.010
PCB 105	N	1815	10:1	µg/l	0.010	< 0.010
PCB 114	N	1815	10:1	µg/l	0.010	< 0.010
PCB 118	N	1815	10:1	µg/l	0.010	< 0.010
PCB 123	N	1815	10:1	µg/l	0.010	< 0.010
PCB 126	N	1815	10:1	µg/l	0.010	< 0.010
PCB 156	N	1815	10:1	µg/l	0.010	< 0.010
PCB 157	N	1815	10:1	µg/l	0.010	< 0.010
PCB 167	N	1815	10:1	µg/l	0.010	< 0.010
PCB 169	N	1815	10:1	µg/l	0.010	< 0.010
PCB 189	N	1815	10:1	µg/l	0.010	< 0.010
Total PCBs (12 Congeners)	N	1815	10:1	µg/l	0.010	< 0.010
Phenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Chlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Methylphenol (o-Cresol)	N	1900	10:1	µg/l	0.20	< 0.20
3-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Nitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,4-Dimethylphenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4-Dichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,6-Dichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Chloro-3-Methylphenol	Ν	1900	10:1	µg/l	0.20	< 0.20

Client: Causeway Geotech Ltd		ob No.:	22-48476			
Quotation No.: Q22-28455		ple ID.:	1566614			
			Sa	ample Lo	ocation:	BH122
		e Type:	SOIL			
				Тор Dep	oth (m):	2.0
				Date Sa	mpled:	14-Dec-2022
Determinand	Accred.	SOP	Туре	Units	LOD	
2,3,4-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Nitrophenol	N 1900 10:1 μg/l 0.20					< 0.20
2,3,4,5-Tetrachlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,4,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,5,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
3,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Methyl-4,6-Dinitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
Pentachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2-Sec-Butyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
Total Phenols	N	1900	10:1	µg/l	5.00	< 5.0

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	(Chemte	ple ID.:	1566621		
		Sa	ample Lo	ocation:	BH122	
			Sampl	e Type:	SOIL	
			Top Dep	oth (m):	5.5	
			Date Sa	ampled:	14-Dec-2022	
			Asbest	os Lab:	DURHAM	
Determinand	Accred.	SOP				
АСМ Туре	U	2192		N/A	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	
Moisture	N	2030	%	0.020	11	
Natural Moisture Content	N	2030	%	0.020	12	
Soil Colour	N	2040		N/A	Grey	
Other Material	N	2040		N/A	Stones	
Soil Texture	Ν	2040		N/A	Sand	
рН	М	2010		4.0	8.3	
Boron (Hot Water Soluble)	М	2120	mg/kg	0.40	0.58	
Sulphate (2:1 Water Soluble) as SO4	М	2120	g/l	0.010	0.10	
Total Sulphur	М	2175	%	0.010	0.089	
Sulphur (Elemental)	М	2180	mg/kg	1.0	38	
Cyanide (Free)	М	2300	mg/kg	0.50	< 0.50	
Cyanide (Total)	М	2300	mg/kg	0.50	< 0.50	
Thiocyanate	М	2300	mg/kg	5.0	< 5.0	
Aluminium (Total)	N	2430	mg/kg	100	3000	
Iron (Total)	N	2430	mg/kg	100	5400	
Arsenic	М	2455	mg/kg	0.5	2.7	
Barium	М	2455	mg/kg	0	32	
Beryllium	U	2455	mg/kg	0.5	< 0.5	
Cadmium	М	2455	mg/kg	0.10	< 0.10	
Chromium	М	2455	mg/kg	0.5	5.4	
Manganese	М	2455	mg/kg	1.0	140	
Copper	М	2455	mg/kg	0.50	11	
Mercury	М	2455	mg/kg	0.05	< 0.05	
Nickel	М	2455	mg/kg	0.50	5.1	
Lead	М	2455	mg/kg	0.50	6.2	
Selenium	М	2455	mg/kg	0.25	< 0.25	
Vanadium	U	2455	mg/kg	0.5	5.9	
Zinc	М	2455	mg/kg	0.50	44	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	
Organic Matter	М	2625	%	0.40	1.2	
Total Organic Carbon	М	2625	%	0.20	0.72	
Aliphatic TPH >C5-C6	Ν	2680	mg/kg	0.010	< 0.010	
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010	< 0.010	
Aliphatic TPH >C8-C10	Ν	2680	mg/kg	0.10	< 0.10	
Aliphatic TPH >C10-C12	Ν	2680	mg/kg	0.10	< 0.10	
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	

Client: Causeway Geotech Ltd		Chemtest Job No.:					
Quotation No.: Q22-28455	(Chemtest Sample ID.					
		Sa	ample Lo	ocation:	BH122		
			Sampl	е Туре:	SOIL		
			Top Dep	oth (m):	5.5		
			Date Sa	ampled:	14-Dec-2022		
			Asbest	os Lab:	DURHAM		
Determinand	Accred.	SOP	Units	LOD			
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10		
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10		
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10		
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0		
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010		
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010		
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10		
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10		
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10		
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10		
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10		
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10		
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0		
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0		
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20		
Chloromethane	N	2760	µg/kg	0.20	< 0.20		
Vinyl Chloride	N	2760	µg/kg	0.20	< 0.20		
Bromomethane	N	2760	µg/kg	0.20	< 0.20		
Chloroethane	N	2760	µg/kg	0.20	< 0.20		
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20		
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20		
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20		
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20		
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20		
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50		
Trichloromethane	N	2760	µg/kg	0.20	< 0.20		
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20		
Tetrachloromethane	N	2760	µg/kg	0.20	< 0.20		
1,1-Dichloropropene	Ν	2760	µg/kg	0.20	< 0.20		
Benzene	N	2760	µg/kg	0.20	< 0.20		
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20		
Trichloroethene	N	2760	µg/kg	0.20	< 0.20		
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20		
Dibromomethane	Ν	2760	µg/kg	0.20	< 0.20		
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20		
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20		
Toluene	N	2760	µg/kg	0.20	0.55		
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20		
1.1.2-Trichloroethane	N	2760	ua/ka	0.20	< 0.20		

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	(Chemte	ple ID.:	1566621		
		Sa	ample Lo	ocation:	BH122	
			Sampl	e Type:	SOIL	
			Top Dep	oth (m):	5.5	
			Date Sa	ampled:	14-Dec-2022	
			Asbest	os Lab:	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Tetrachloroethene	Ν	2760	µg/kg	0.20	< 0.20	
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	
Chlorobenzene	N	2760	µg/kg	0.20	2.6	
1,1,1,2-Tetrachloroethane	Ν	2760	µg/kg	0.20	< 0.20	
Ethylbenzene	Ν	2760	µg/kg	0.20	< 0.20	
m & p-Xylene	N	2760	µg/kg	0.20	< 0.20	
o-Xylene	N	2760	µg/kg	0.20	< 0.20	
Styrene	N	2760	µg/kg	0.20	< 0.20	
Tribromomethane	Ν	2760	µg/kg	0.20	< 0.20	
Isopropylbenzene	N	2760	µg/kg	0.20	< 0.20	
Bromobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20	
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20	
2-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
4-Chlorotoluene	Ν	2760	µg/kg	0.20	< 0.20	
Tert-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
4-Isopropyltoluene	N	2760	µg/kg	0.20	< 0.20	
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromo-3-Chloropropane	Ν	2760	µg/kg	0.20	< 0.20	
1,2,4-Trichlorobenzene	Ν	2760	µg/kg	0.20	< 0.20	
Hexachlorobutadiene	Ν	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	< 0.20	
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	< 0.050	
Phenol	N	2790	mg/kg	0.050	< 0.050	
2-Chlorophenol	N	2790	mg/kg	0.050	< 0.050	
Bis-(2-Chloroethyl)Ether	Ν	2790	mg/kg	0.050	< 0.050	
1,3-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	
1,4-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	
1,2-Dichlorobenzene	Ν	2790	mg/kg	0.050	< 0.050	
2-Methylphenol	N	2790	ma/ka	0.050	< 0.050	

Client: Causeway Geotech Ltd		Chemtest Job No.:					
Quotation No.: Q22-28455	0	Chemte	ple ID.:	1566621			
		Sa	ample Lo	ocation:	BH122		
			Sample	e Type:	SOIL		
			Тор Dep	oth (m):	5.5		
			Date Sa	ampled:	14-Dec-2022		
		Asbestos Lab:					
Determinand	Accred.	SOP	Units	LOD			
Bis(2-Chloroisopropyl)Ether	Ν	2790	mg/kg	0.050	< 0.050		
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050		
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050		
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050		
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050		
Isophorone	N	2790	mg/kg	0.050	< 0.050		
2-Nitrophenol	Ν	2790	mg/kg	0.050	< 0.050		
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050		
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050		
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050		
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050		
Naphthalene	N	2790	mg/kg	0.050	< 0.050		
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050		
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050		
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050		
2-Methylnaphthalene	N	2790	mg/kg	0.050	< 0.050		
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050		
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050		
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050		
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050		
2-Nitroaniline	N	2790	mg/kg	0.050	< 0.050		
Acenaphthylene	N	2790	mg/kg	0.050	< 0.050		
Dimethylphthalate	N	2790	mg/kg	0.050	< 0.050		
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050		
Acenaphthene	N	2790	mg/kg	0.050	< 0.050		
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050		
Dibenzofuran	N	2790	mg/kg	0.050	< 0.050		
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050		
2,4-Dinitrotoluene	Ν	2790	mg/kg	0.050	< 0.050		
Fluorene	N	2790	mg/kg	0.050	< 0.050		
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050		
4-Nitroaniline	N	2790	mg/kg	0.050	< 0.050		
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	< 0.050		
Azobenzene	N	2790	mg/kg	0.050	< 0.050		
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	< 0.050		
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050		
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050		
Phenanthrene	N	2790	mg/kg	0.050	< 0.050		
Anthracene	N	2790	ma/ka	0.050	< 0.050		
Client: Causeway Geotech Ltd		ob No.:	22-48476				
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Quotation No.: Q22-28455	C	ple ID.:	1566621				
		Sa	ocation:	BH122			
			e Type:	SOIL			
			oth (m):	5.5			
			Date Sa	ampled:	14-Dec-2022		
			Asbest	os Lab:	DURHAM		
Determinand	Accred.	SOP	Units	LOD			
Carbazole	Ν	2790	mg/kg	0.050	< 0.050		
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	< 0.050		
Fluoranthene	N	2790	mg/kg	0.050	< 0.050		
Pyrene	N	2790	mg/kg	0.050	< 0.050		
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050		
Benzo[a]anthracene	N	2790	mg/kg	0.050	< 0.050		
Chrysene	N	2790	mg/kg	0.050	< 0.050		
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	< 0.050		
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050		
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	< 0.050		
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	< 0.050		
Benzo[a]pyrene	Ν	2790	mg/kg	0.050	< 0.050		
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	< 0.050		
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	< 0.050		
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	< 0.050		
4-Nitrophenol	N	2790	mg/kg	0.050	< 0.050		
Naphthalene	Ν	2800	mg/kg	0.010	< 0.010		
Acenaphthylene	Ν	2800	mg/kg	0.010	< 0.010		
Acenaphthene	N	2800	mg/kg	0.010	< 0.010		
Fluorene	N	2800	mg/kg	0.010	< 0.010		
Phenanthrene	N	2800	mg/kg	0.010	< 0.010		
Anthracene	N	2800	mg/kg	0.010	< 0.010		
Fluoranthene	Ν	2800	mg/kg	0.010	< 0.010		
Pyrene	N	2800	mg/kg	0.010	< 0.010		
Benzo[a]anthracene	Ν	2800	mg/kg	0.010	< 0.010		
Chrysene	Ν	2800	mg/kg	0.010	< 0.010		
Benzo[b]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010		
Benzo[k]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010		
Benzo[a]pyrene	Ν	2800	mg/kg	0.010	< 0.010		
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	< 0.010		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010		
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	< 0.010		
Total Of 16 PAH's	Ν	2800	mg/kg	0.20	< 0.20		
Resorcinol	М	2920	mg/kg	0.020	< 0.020		
Phenol	М	2920	mg/kg	0.020	< 0.020		
Cresols	М	2920	mg/kg	0.020	< 0.020		
Xylenols	М	2920	mg/kg	0.020	< 0.020		
1-Naphthol	N	2920	mg/kg	0.020	< 0.020		
Trimethylphenols	М	2920	mg/kg	0.020	< 0.020		

Client: Causeway Geotech Ltd		Che	ntest Jo	ob No.:	22-48476	
Quotation No.: Q22-28455	C	1566621				
		ocation:	BH122			
		e Type:	SOIL			
	Top Depth (m):				5.5	
	Date Sampled:				14-Dec-2022	
	Asbestos Lab:			DURHAM		
Determinand	Accred. SOP Units LOD					
Total Phenols	М	2920	mg/kg	0.10	< 0.10	

Chemtest Job No:	22-48476				Landfill V	e Criteria	
Chemtest Sample ID:	1566615					Limits	
Sample Ref:						Stable, Non-	
Sample I	BH122					hozardous	Hozardous
Sample Location.	2.5				Inort Wasto	mazaruous	Wasto
Pottom Donth(m)	2.5					waste in non-	Vasie
Sompling Date:	14-Dec-2022				Lanum	Londfill	Lanum
Sampling Date:	14-DeC-2022	Approd	Unito			Lanomi	
Total Organia Carbon	30P	Accred.	Units %	0.1	2	5	6
	2625	IVI	% 0/	9.1	3	5	0
	2610	IVI	% %	8.3			10
	2760	IVI	mg/kg	0.015	0		
TOTAL PCBS (7 Congeners)	2815	IVI	mg/kg	< 0.10	500		
	2670	IVI	mg/kg	150	500		
Total (OFT7) PAHS	2700	IN NA	mg/kg	< 2.0	100		
	2010	IVI	1/1	7.8		>0	
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090		l o evaluate	l o evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance	eaching test
			mg/l	mg/kg	using B	S EN 12457 at L/	S 10 I/Kg
Arsenic	1455	U	0.0056	0.056	0.5	2	25
Barium	1455	U	0.029	0.29	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0034	0.034	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.023	0.23	0.5	10	30
Nickel	1455	U	0.0033	0.033	0.4	10	40
Lead	1455	U	0.0036	0.036	0.5	10	50
Antimony	1455	U	0.028	0.28	0.06	0.7	5
Selenium	1455	U	0.0012	0.012	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.025	4	50	200
Chloride	1220	U	16	160	800	15000	25000
Fluoride	1220	U	0.27	2.7	10	150	500
Sulphate	1220	U	76	760	1000	20000	50000
Total Dissolved Solids	1020	N	250	2500	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.1	61	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	20

Waste Acceptance Criteria

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

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	рН	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl- pphenylenediamine.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Waters by GC-MS	ICES7 PCB congeners	Solvent extraction / GCMS detection
1900	Phenols in Waters by GC-MS	Approximately 24 substituted Phenols, including Chlorophenols	Solvent extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	рН	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES

SOP	Title	Parameters included	Method summary
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3- band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS

SOP	Title	Parameters included	Method summary
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	23-00401-1		
Initial Date of Issue:	02-Feb-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Dean McCloskey Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Matthew Graham Neil Haggan Paul Dunlop Sean Ross Stephen Franey S		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	09-Jan-2023
Order No.:		Date Instructed:	25-Jan-2023
No. of Samples:	2		
Turnaround (Wkdays):	7	Results Due:	02-Feb-2023
Date Approved:	02-Feb-2023		

Approved By:

Details:

Stuart Henderson, Technical Manager

eurofins 👬

Chemtest

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

Client: Causeway Geotech Ltd	Chemtest Job No.:		23-00401	23-00401		
Quotation No.: Q22-28455	Chemtest Sample ID.:			1571052	1571055	
Order No.:		Client Sample Ref.:			1	4
	Sample Location:			BH102	BH102	
		Sample Type:			SOIL	SOIL
			Top Dep	oth (m):	0.5	2.0
			Date Sa	ampled:	04-Jan-2023	04-Jan-2023
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
АСМ Туре	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	8.6	8.0
Natural Moisture Content	N	2030	%	0.020	9.4	8.6
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand
H	U	2010		4.0	9.4	9.2
Boron (Hot Water Soluble)	U	2120	ma/ka	0.40	3.2	3.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	a/l	0.010	0.34	0.26
Total Sulphur	U	2175	9,. %	0.010	0.12	0.14
Sulphur (Elemental)	U	2180	ma/ka	1.0	91	68
Cvanide (Free)	U	2300	ma/ka	0.50	[B] < 0.50	[B] < 0.50
Cvanide (Total)	U	2300	ma/ka	0.50	[B] < 0.50	[B] < 0.50
Thiocvanate	U	2300	ma/ka	5.0	[B] < 5.0	[B] < 5.0
Aluminium (Total)	N	2430	ma/ka	100	7600	8600
Iron (Total)	N	2430	ma/ka	100	29000	27000
Arsenic	U	2455	mg/kg	0.5	25	25
Barium	U	2455	mg/kg	0	160	150
Beryllium	U	2455	mg/kg	0.5	0.9	0.9
Cadmium	U	2455	mg/kg	0.10	1.4	1.4
Chromium	U	2455	mg/kg	0.5	36	31
Manganese	U	2455	mg/kg	1.0	1400	1300
Copper	U	2455	mg/kg	0.50	84	61
Mercury	U	2455	mg/kg	0.05	1.3	0.29
Nickel	U	2455	mg/kg	0.50	43	38
Lead	U	2455	mg/kg	0.50	1400	290
Selenium	U	2455	mg/kg	0.25	0.97	0.97
Vanadium	U	2455	mg/kg	0.5	41	38
Zinc	U	2455	mg/kg	0.50	250	240
Chromium (Hexavalent)	Ν	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	8.5	6.3
Total Organic Carbon	U	2625	%	0.20	4.9	3.6
Aliphatic TPH >C5-C6	Ν	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aliphatic TPH >C8-C10	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] 170
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:		23-00401	23-00401		
Quotation No.: Q22-28455	Chemtest Sample ID.:			1571052	1571055	
Order No.:		Client Sample Ref .:			1	4
	Sample Location:			BH102	BH102	
		Sample Type:			SOIL	SOIL
			Top Dep	oth (m):	0.5	2.0
			Date Sa	ampled:	04-Jan-2023	04-Jan-2023
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Aliphatic TPH >C12-C16	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C21-C35	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C35-C44	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Total Aliphatic Hydrocarbons	Ν	2680	mg/kg	1.0	[B] < 1.0	[B] 170
Aromatic TPH >C5-C7	Ν	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aromatic TPH >C7-C8	Ν	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C10-C12	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C12-C16	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C16-C21	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C21-C35	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C35-C44	Ν	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Total Aromatic Hydrocarbons	Ν	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	[B] < 2.0	[B] 170
Dichlorodifluoromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Chloromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Vinyl Chloride	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromomethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Chloroethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Trichlorofluoromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
cis 1,2-Dichloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromochloromethane	N	2760	µg/kg	0.50	[B] < 0.50	[B] < 0.50
Trichloromethane	N	2760	µg/kg	0.20	[B] 0.37	[B] 0.35
1,1,1-Trichloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tetrachloromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloropropene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Benzene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] 0.39
1,2-Dichloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Trichloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2-Dichloropropane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Dibromomethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromodichloromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Toluene	N	2760	ua/ka	0.20	[B] 0.79	[B] 10

Client: Causeway Geotech Ltd	Chemtest Job No.:			23-00401	23-00401	
Quotation No.: Q22-28455	(Chemte	st Sam	1571052	1571055	
Order No.:		Clie	nt Samp	1	4	
		Sa	ample Lo	ocation:	BH102	BH102
			Sample	е Туре:	SOIL	SOIL
			Тор Dep	oth (m):	0.5	2.0
			Date Sa	ampled:	04-Jan-2023	04-Jan-2023
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tetrachloroethene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,3-Dichloropropane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Dibromochloromethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2-Dibromoethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Chlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Ethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 98
m & p-Xylene	N	2760	µg/kg	0.20	[B] 0.57	[B] 330
o-Xylene	N	2760	µg/kg	0.20	[B] 0.45	[B] 210
Styrene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 24
Tribromomethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Isopropylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 29
Bromobenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
N-Propylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 53
2-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 210
4-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 190
Sec-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 36
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 72
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
N-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 82
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Hexachlorobutadiene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
N-Nitrosodimethylamine	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Phenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Chlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
1.3-Dichlorobenzene	N	2790	ma/ka	0.050	[B] < 0.050	[B] < 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:			23-00401	23-00401	
Quotation No.: Q22-28455	Chemtest Sample ID.:				1571052	1571055
Order No.:		Clie	nt Samp	1	4	
		Sa	ample Lo	ocation:	BH102	BH102
			Sampl	e Type:	SOIL	SOIL
			Top Dep	oth (m):	0.5	2.0
			Date Sa	ampled:	04-Jan-2023	04-Jan-2023
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Hexachloroethane	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Nitrobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Isophorone	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Nitrophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4-Dimethylphenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Naphthalene	N	2790	mg/kg	0.050	[B] < 0.050	[B] 0.29
4-Chloroaniline	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050	[B] < 0.050	[B] 0.17
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Acenaphthylene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Dimethylphthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Acenaphthene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
3-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Dibenzofuran	N	2790	mg/kg	0.050	[B] < 0.050	[B] 0.065
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050	[B] 5.0
Fluorene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Diethyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Nitroaniline	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Azobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Bromophenylphenyl Ether	N	2790	ma/ka	0.050	[B] < 0.050	[B] < 0.050

Client: Causeway Geotech Ltd	Chemtest Job No.:			23-00401	23-00401	
Quotation No.: Q22-28455	C	Chemte	st Sam	1571052	1571055	
Order No.:		Clie	nt Samp	1	4	
		Sa	ample Lo	ocation:	BH102	BH102
			Sample	e Type:	SOIL	SOIL
			Тор Dep	oth (m):	0.5	2.0
			Date Sa	ampled:	04-Jan-2023	04-Jan-2023
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Hexachlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Pentachlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Phenanthrene	N	2790	mg/kg	0.050	[B] 0.41	[B] 0.30
Anthracene	Ν	2790	mg/kg	0.050	[B] 0.098	[B] 0.054
Carbazole	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Di-N-Butyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] 0.12
Fluoranthene	Ν	2790	mg/kg	0.050	[B] 0.53	[B] 0.36
Pyrene	Ν	2790	mg/kg	0.050	[B] 0.46	[B] 0.35
Butylbenzyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Benzo[a]anthracene	Ν	2790	mg/kg	0.050	[B] 0.27	[B] 0.17
Chrysene	Ν	2790	mg/kg	0.050	[B] 0.28	[B] 0.21
Bis(2-Ethylhexyl)Phthalate	Ν	2790	mg/kg	0.050	[B] 0.11	[B] 0.21
Di-N-Octyl Phthalate	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Benzo[b]fluoranthene	Ν	2790	mg/kg	0.050	[B] 0.34	[B] 0.29
Benzo[k]fluoranthene	Ν	2790	mg/kg	0.050	[B] 0.14	[B] 0.11
Benzo[a]pyrene	Ν	2790	mg/kg	0.050	[B] 0.31	[B] 0.22
Indeno(1,2,3-c,d)Pyrene	Ν	2790	mg/kg	0.050	[B] 0.14	[B] 0.11
Dibenz(a,h)Anthracene	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Benzo[g,h,i]perylene	Ν	2790	mg/kg	0.050	[B] 0.20	[B] 0.16
4-Nitrophenol	Ν	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Naphthalene	Ν	2800	mg/kg	0.010	0.95	1.0
Acenaphthylene	Ν	2800	mg/kg	0.010	0.26	0.27
Acenaphthene	Ν	2800	mg/kg	0.010	2.7	1.8
Fluorene	Ν	2800	mg/kg	0.010	2.6	2.0
Phenanthrene	Ν	2800	mg/kg	0.010	19	16
Anthracene	N	2800	mg/kg	0.010	4.0	3.5
Fluoranthene	Ν	2800	mg/kg	0.010	23	20
Pyrene	Ν	2800	mg/kg	0.010	18	16
Benzo[a]anthracene	Ν	2800	mg/kg	0.010	9.1	8.2
Chrysene	Ν	2800	mg/kg	0.010	11	9.6
Benzo[b]fluoranthene	Ν	2800	mg/kg	0.010	12	9.8
Benzo[k]fluoranthene	Ν	2800	mg/kg	0.010	4.0	3.3
Benzo[a]pyrene	Ν	2800	mg/kg	0.010	9.5	8.3
Indeno(1,2,3-c,d)Pyrene	Ν	2800	mg/kg	0.010	5.8	4.6
Dibenz(a,h)Anthracene	Ν	2800	mg/kg	0.010	1.2	0.94
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	5.4	4.5
Total Of 16 PAH's	N	2800	mg/kg	0.20	130	110
Resorcinol	U	2920	mg/kg	0.020	< 0.020	< 0.020

Client: Causeway Geotech Ltd		Che	mtest Jo	ob No.:	23-00401	23-00401
Quotation No.: Q22-28455	C	Chemte	st Sam	ple ID.:	1571052	1571055
Order No.:		Clie	nt Samp	le Ref.:	1	4
		Sa	ample Lo	ocation:	BH102	BH102
			Sample	e Type:	SOIL	SOIL
			Тор Dep	0.5	2.0	
			Date Sa	04-Jan-2023	04-Jan-2023	
			Asbest	os Lab:	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Phenol	U	2920	mg/kg	0.020	< 0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020	0.086
1-Naphthol	Ν	2920	mg/kg	< 0.020	< 0.020	
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020	< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1571052	1		BH102	04-Jan-2023	В	Amber Glass 250ml
1571052	1		BH102	04-Jan-2023	В	Amber Glass 60ml
1571052	1		BH102	04-Jan-2023	В	Plastic Tub 500g
1571055	4		BH102	04-Jan-2023	В	Amber Glass 250ml
1571055	4		BH102	04-Jan-2023	В	Amber Glass 60ml
1571055	4		BH102	04-Jan-2023	В	Plastic Tub 500g

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	23-00855-1		
Initial Date of Issue:	02-Feb-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Colm Hurley		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	12-Jan-2023
Order No.:		Date Instructed:	25-Jan-2023
No. of Samples:	1		
Turnaround (Wkdays):	7	Results Due:	02-Feb-2023
Date Approved:	02-Feb-2023		
Approved By:			
1			

Details:

Stuart Henderson, Technical Manager

Client: Causeway Geotech Ltd		Chemtest Job No.:			
Quotation No.: Q22-28455	(Chemte	st Sam	ple ID.:	1572934
		Sa	ample Lo	ocation:	BH131
			Sample	е Туре:	SOIL
			Тор Dep	oth (m):	1
			Date Sa	ampled:	09-Jan-2023
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
АСМ Туре	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	4.2
Natural Moisture Content	N	2030	%	0.020	4.4
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones
Soil Texture	N	2040		N/A	Sand
pН	U	2010		4.0	8.7
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.23
Total Sulphur	U	2175	%	0.010	0.050
Sulphur (Elemental)	U	2180	mg/kg	1.0	< 1.0
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[B] < 0.50
Thiocyanate	U	2300	mg/kg	5.0	[B] < 5.0
Aluminium (Total)	N	2430	mg/kg	100	8700
Iron (Total)	Ν	2430	mg/kg	100	20000
Arsenic	U	2455	mg/kg	0.5	22
Barium	U	2455	mg/kg	0	41
Beryllium	U	2455	mg/kg	0.5	0.5
Cadmium	U	2455	mg/kg	0.10	1.1
Chromium	U	2455	mg/kg	0.5	25
Manganese	U	2455	mg/kg	1.0	970
Copper	U	2455	mg/kg	0.50	22
Mercury	U	2455	mg/kg	0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	30
Lead	U	2455	mg/kg	0.50	19
Selenium	U	2455	mg/kg	0.25	1.2
Vanadium	U	2455	mg/kg	0.5	32
Zinc	U	2455	mg/kg	0.50	77
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	U	2625	%	0.40	0.69
Total Organic Carbon	U	2625	%	0.20	0.40
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	[B] < 0.010
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010	[B] < 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C10-C12	Ν	2680	mg/kg	0.10	[B] < 0.10
Aliphatic TPH >C12-C16	N	2680	mg/ka	0.10	[B] < 0.10

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	(Chemtest Sample ID.:				
		Sample Location:				
		Sample Type:				
			Top Dep	oth (m):	1	
			Date Sa	ampled:	09-Jan-2023	
			Asbest	os Lab:	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10	
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	[B] < 0.10	
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	[B] < 1.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	[B] < 0.010	
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	[B] < 0.010	
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	[B] < 0.10	
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	[B] < 0.10	
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	[B] < 0.10	
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10	
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	[B] < 0.10	
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10	
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	[B] < 1.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	[B] < 2.0	
Dichlorodifluoromethane	N	2760	µg/kg	0.20	[B] < 0.20	
Chloromethane	N	2760	µg/kg	0.20	[B] < 0.20	
Vinyl Chloride	N	2760	µg/kg	0.20	[B] < 0.20	
Bromomethane	N	2760	µg/kg	0.20	[B] < 0.20	
Chloroethane	N	2760	µg/kg	0.20	[B] < 0.20	
Trichlorofluoromethane	N	2760	µg/kg	0.20	[B] < 0.20	
1,1-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20	
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20	
1,1-Dichloroethane	N	2760	µg/kg	0.20	[B] < 0.20	
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	[B] < 0.20	
Bromochloromethane	N	2760	µg/kg	0.50	[B] < 0.50	
I richloromethane	N	2760	µg/kg	0.20	[B] < 0.20	
1,1,1-I richloroethane	N	2760	µg/kg	0.20	[B] < 0.20	
I etrachloromethane	N	2760	µg/kg	0.20	[B] < 0.20	
1,1-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20	
Benzene	N	2760	µg/kg	0.20	[B] < 0.20	
1,2-Dichloroethane	N	2760	µg/kg	0.20	[B] < 0.20	
Trichloroethene	N	2760	µg/kg	0.20	[B] < 0.20	
1,2-Dichloropropane	N	2/60	µg/kg	0.20	[B] < 0.20	
Dibromomethane	N	2760	µg/kg	0.20	[B] < 0.20	
Bromodichloromethane	N	2760	µg/kg	0.20	[B] < 0.20	
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20	
	N	2760	µg/kg	0.20	[B] 1.4	
I rans-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20	
1.1.2-1 richloroethane	I N	2/60	ua/ka	0.20	IBI < 0.20	

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	(Chemtest Sample ID.:				
		Sa	ocation:	BH131		
		Sample Type:				
			Top Dep	oth (m):	1	
			Date Sa	ampled:	09-Jan-2023	
			Asbest	os Lab:	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Tetrachloroethene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,3-Dichloropropane	Ν	2760	µg/kg	0.20	[B] < 0.20	
Dibromochloromethane	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,2-Dibromoethane	Ν	2760	µg/kg	0.20	[B] < 0.20	
Chlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,1,1,2-Tetrachloroethane	Ν	2760	µg/kg	0.20	[B] < 0.20	
Ethylbenzene	N	2760	µg/kg	0.20	[B] 0.38	
m & p-Xylene	Ν	2760	µg/kg	0.20	[B] 1.0	
o-Xylene	Ν	2760	µg/kg	0.20	[B] 0.62	
Styrene	Ν	2760	µg/kg	0.20	[B] < 0.20	
Tribromomethane	Ν	2760	µg/kg	0.20	[B] < 0.20	
Isopropylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
Bromobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	[B] < 0.20	
N-Propylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
2-Chlorotoluene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,3,5-Trimethylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
4-Chlorotoluene	Ν	2760	µg/kg	0.20	[B] < 0.20	
Tert-Butylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,2,4-Trimethylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
Sec-Butylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,3-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
4-Isopropyltoluene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,4-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
N-Butylbenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,2-Dichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,2-Dibromo-3-Chloropropane	Ν	2760	µg/kg	0.20	[B] < 0.20	
1,2,4-Trichlorobenzene	Ν	2760	µg/kg	0.20	[B] < 0.20	
Hexachlorobutadiene	N	2760	µg/kg	0.20	[B] < 0.20	
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20	
Methyl Tert-Butyl Ether	Ν	2760	µg/kg	0.20	[B] < 0.20	
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	[B] < 0.050	
Phenol	Ν	2790	mg/kg	0.050	[B] < 0.050	
2-Chlorophenol	Ν	2790	mg/kg	0.050	[B] < 0.050	
Bis-(2-Chloroethyl)Ether	Ν	2790	mg/kg	0.050	[B] < 0.050	
1,3-Dichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050	
1,4-Dichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050	
1,2-Dichlorobenzene	Ν	2790	mg/kg	0.050	[B] < 0.050	
2-Methylphenol	N	2790	ma/ka	0.050	[B] < 0.050	

Client: Causeway Geotech Ltd		Chemtest Job No.:				
Quotation No.: Q22-28455	(Chemtest Sample ID.:				
		Sample Location:				
		Sample Type:				
			Top Dep	oth (m):	1	
			Date Sa	ampled:	09-Jan-2023	
			Asbest	os Lab:	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Bis(2-Chloroisopropyl)Ether	Ν	2790	mg/kg	0.050	[B] < 0.050	
Hexachloroethane	N	2790	mg/kg	0.050	[B] < 0.050	
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	[B] < 0.050	
4-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050	
Nitrobenzene	N	2790	mg/kg	0.050	[B] < 0.050	
Isophorone	N	2790	mg/kg	0.050	[B] < 0.050	
2-Nitrophenol	N	2790	mg/kg	0.050	[B] < 0.050	
2,4-Dimethylphenol	N	2790	mg/kg	0.050	[B] < 0.050	
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	[B] < 0.050	
2,4-Dichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050	
Naphthalene	N	2790	mg/kg	0.050	[B] < 0.050	
4-Chloroaniline	N	2790	mg/kg	0.050	[B] < 0.050	
Hexachlorobutadiene	N	2790	mg/kg	0.050	[B] < 0.050	
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050	
2-Methylnaphthalene	N	2790	mg/kg	0.050	[B] < 0.050	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	[B] < 0.050	
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	
2-Chloronaphthalene	N	2790	mg/kg	0.050	[B] < 0.050	
2-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050	
Acenaphthylene	N	2790	mg/kg	0.050	[B] < 0.050	
Dimethylphthalate	N	2790	mg/kg	0.050	[B] < 0.050	
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050	
Acenaphthene	N	2790	mg/kg	0.050	[B] < 0.050	
3-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050	
Dibenzofuran	N	2790	mg/kg	0.050	[B] < 0.050	
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	[B] < 0.050	
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	[B] < 0.050	
Fluorene	N	2790	mg/kg	0.050	[B] < 0.050	
Diethyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	
4-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	[B] < 0.050	
Azobenzene	N	2790	mg/kg	0.050	[B] < 0.050	
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	[B] < 0.050	
Hexachlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050	
Pentachlorophenol	N	2790	mg/kg	0.050	[B] < 0.050	
Phenanthrene	N	2790	mg/kg	0.050	[B] < 0.050	
Anthracene	N	2790	ma/ka	0.050	[B] < 0.050	

Client: Causeway Geotech Ltd		Chemtest Job No.:					
Quotation No.: Q22-28455	(Chemtest Sample ID.:					
		Sample Location:					
		Sample Type:					
			Top Dep	oth (m):	1		
			Date Sa	ampled:	09-Jan-2023		
			Asbest	os Lab:	DURHAM		
Determinand	Accred.	SOP	Units	LOD			
Carbazole	N	2790	mg/kg	0.050	[B] < 0.050		
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050		
Fluoranthene	N	2790	mg/kg	0.050	[B] < 0.050		
Pyrene	N	2790	mg/kg	0.050	[B] < 0.050		
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050		
Benzo[a]anthracene	N	2790	mg/kg	0.050	[B] < 0.050		
Chrysene	N	2790	mg/kg	0.050	[B] < 0.050		
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	[B] < 0.050		
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050		
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	[B] < 0.050		
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	[B] < 0.050		
Benzo[a]pyrene	N	2790	mg/kg	0.050	[B] < 0.050		
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	[B] < 0.050		
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	[B] < 0.050		
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	[B] < 0.050		
4-Nitrophenol	N	2790	mg/kg	0.050	[B] < 0.050		
Naphthalene	N	2800	mg/kg	0.010	0.12		
Acenaphthylene	N	2800	mg/kg	0.010	< 0.010		
Acenaphthene	N	2800	mg/kg	0.010	< 0.010		
Fluorene	N	2800	mg/kg	0.010	< 0.010		
Phenanthrene	N	2800	mg/kg	0.010	< 0.010		
Anthracene	N	2800	mg/kg	0.010	< 0.010		
Fluoranthene	N	2800	mg/kg	0.010	< 0.010		
Pyrene	N	2800	mg/kg	0.010	< 0.010		
Benzo[a]anthracene	N	2800	mg/kg	0.010	< 0.010		
Chrysene	N	2800	mg/kg	0.010	< 0.010		
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	< 0.010		
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	< 0.010		
Benzo[a]pyrene	N	2800	mg/kg	0.010	< 0.010		
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	< 0.010		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010		
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	< 0.010		
Total Of 16 PAH's	N	2800	mg/kg	0.20	< 0.20		
Resorcinol	U	2920	mg/kg	0.020	< 0.020		
Phenol	U	2920	mg/kg	0.020	< 0.020		
Cresols	U	2920	mg/kg	0.020	< 0.020		
Xylenols	U	2920	mg/kg	0.020	< 0.020		
1-Naphthol	Ν	2920	mg/kg	0.020	< 0.020		
Trimethylphenols	U	2920	ma/ka	0.020	< 0.020		

Client: Causeway Geotech Ltd		23-00855			
Quotation No.: Q22-28455	C	1572934			
		Sa	ocation:	BH131	
		e Type:	SOIL		
		oth (m):	1		
		ampled:	09-Jan-2023		
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1572934			BH131	09-Jan-2023	В	Amber Glass 250ml
1572934			BH131	09-Jan-2023	В	Amber Glass 60ml
1572934			BH131	09-Jan-2023	В	Plastic Tub 500g

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	23-01251-1		
Initial Date of Issue:	06-Feb-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Colm Hurley		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	17-Jan-2023
Order No.:		Date Instructed:	25-Jan-2023
No. of Samples:	2		
Turnaround (Wkdays):	7	Results Due:	02-Feb-2023
Date Approved:	06-Feb-2023		
Approved By:			

Details:

Stuart Henderson, Technical Manager

Client: Causeway Geotech Ltd	Chemtest Job No.:					23-01251	
Quotation No.: Q22-28455		1574943					
		Client Sample ID.:					
		Sample Location:					
				Sampl	e Type:	SOIL	
				Top Dep	oth (m):	6.5	
				Date Sa	ampled:	13-Jan-2023	
Determinand	Accred.	SOP	Туре	Units	LOD		
рН	U	1010	10:1		N/A	8.7	
Phosphate as P	U	1220	10:1	mg/l	0.050	< 0.050	
Sulphur	N	1220	10:1	mg/l	1.0	10	
Cyanide (Total)	U	1300	10:1	mg/l	0.050	< 0.050	
Cyanide (Free)	U	1300	10:1	mg/l	0.050	< 0.050	
Sulphide	U	1325	10:1	mg/l	0.050	< 0.050	
Calcium	U	1455	10:1	mg/l	2.00	32	
Aluminium (Dissolved)	N	1455	10:1	µg/l	5.0	340	
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	3.3	
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	110	
Barium (Dissolved)	U	1455	10:1	µg/l	5.00	10	
Beryllium (Dissolved)	U	1455	10:1	µg/l	1.00	< 1.0	
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11	
Chromium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	0.77	
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05	
Manganese (Dissolved)	U	1455	10:1	µg/l	0.50	2.8	
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	
Selenium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	
Vanadium (Dissolved)	U	1455	10:1	µg/l	0.50	2.1	
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	< 2.5	
Iron (Dissolved)	N	1455	10:1	µg/l	5.0	< 5.0	
Low-Level Chromium (Hexavalent)	N	1495	10:1	µg/l	0.10	< 0.10	
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.010	< 0.010	
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.010	< 0.010	
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0	
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.010	< 0.010	
Aromatic TPH >C7-C8	Ν	1675	10:1	µg/l	0.010	< 0.010	
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	
Aromatic TPH >C10-C12	Ν	1675	10:1	µg/l	0.10	< 0.10	
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	

Client: Causeway Geotech Ltd	Chemtest Job No.:					23-01251	
Quotation No.: Q22-28455		1574943					
		10					
		Sample Location:					
				Sampl	e Type:	SOIL	
				Тор Dep	oth (m):	6.5	
				Date Sa	ampled:	13-Jan-2023	
Determinand	Accred.	SOP	Туре	Units	LOD		
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	1.0	< 1.0	
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	2.0	< 2.0	
Dichlorodifluoromethane	N	1760	10:1	µg/l	0.10	< 0.10	
Chloromethane	N	1760	10:1	µg/l	0.10	< 0.10	
Vinyl Chloride	Ν	1760	10:1	µg/l	0.10	< 0.10	
Bromomethane	N	1760	10:1	µg/l	2.0	< 2.0	
Chloroethane	N	1760	10:1	µg/l	0.20	< 0.20	
Trichlorofluoromethane	N	1760	10:1	µg/l	0.10	< 0.10	
1,1-Dichloroethene	Ν	1760	10:1	µg/l	0.10	< 0.10	
Dichloromethane	Ν	1760	10:1	µg/l	50	< 50	
1,1-Dichloroethane	Ν	1760	10:1	µg/l	0.10	< 0.10	
cis 1,2-Dichloroethene	Ν	1760	10:1	µg/l	0.10	< 0.10	
Bromochloromethane	N	1760	10:1	µg/l	0.50	< 0.50	
Trichloromethane	Ν	1760	10:1	µg/l	0.10	< 0.10	
1,1,1-Trichloroethane	N	1760	10:1	µg/l	0.10	< 0.10	
Tetrachloromethane	N	1760	10:1	µg/l	0.10	< 0.10	
1,1-Dichloropropene	Ν	1760	10:1	µg/l	0.10	< 0.10	
Benzene	Ν	1760	10:1	µg/l	0.10	< 0.10	
1,2-Dichloroethane	Ν	1760	10:1	µg/l	0.20	< 0.20	
Trichloroethene	Ν	1760	10:1	µg/l	0.10	< 0.10	
1,2-Dichloropropane	Ν	1760	10:1	µg/l	0.10	< 0.10	
Dibromomethane	Ν	1760	10:1	µg/l	0.10	< 0.10	
Bromodichloromethane	Ν	1760	10:1	µg/l	0.50	< 0.50	
cis-1,3-Dichloropropene	Ν	1760	10:1	µg/l	1.0	< 1.0	
Toluene	Ν	1760	10:1	µg/l	0.10	< 0.10	
Trans-1,3-Dichloropropene	Ν	1760	10:1	µg/l	1.0	< 1.0	
1,1,2-Trichloroethane	Ν	1760	10:1	µg/l	1.0	< 1.0	
Tetrachloroethene	Ν	1760	10:1	µg/l	0.10	< 0.10	
1,3-Dichloropropane	Ν	1760	10:1	µg/l	0.20	< 0.20	
Dibromochloromethane	Ν	1760	10:1	µg/l	1.0	< 1.0	
1,2-Dibromoethane	N	1760	10:1	µg/l	0.50	< 0.50	
Chlorobenzene	Ν	1760	10:1	µg/l	0.10	< 0.10	
1,1,1,2-Tetrachloroethane	N	1760	10:1	µg/l	0.20	< 0.20	
Ethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10	
m & p-Xylene	N	1760	10:1	μg/l	0.10	< 0.10	
o-Xylene	Ν	1760	10:1	µg/l	0.10	< 0.10	
Styrene	Ν	1760	10:1	µg/l	0.10	< 0.10	

Client: Causeway Geotech Ltd		23-01251				
Quotation No.: Q22-28455		1574943				
		10				
		BH131				
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	6.5
				Date Sa	ampled:	13-Jan-2023
Determinand	Accred.	SOP	Туре	Units	LOD	
Tribromomethane	N	1760	10:1	µg/l	1.0	< 1.0
Isopropylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
Bromobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,3-Trichloropropane	N	1760	10:1	µg/l	5.0	< 5.0
N-Propylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
2-Chlorotoluene	N	1760	10:1	µg/l	0.10	< 0.10
1,3,5-Trimethylbenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
4-Chlorotoluene	N	1760	10:1	µg/l	0.10	< 0.10
Tert-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2,4-Trimethylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
Sec-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,3-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
4-Isopropyltoluene	Ν	1760	10:1	µg/l	0.10	< 0.10
1,4-Dichlorobenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
N-Butylbenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dichlorobenzene	N	1760	10:1	µg/l	0.10	< 0.10
1,2-Dibromo-3-Chloropropane	Ν	1760	10:1	µg/l	5.0	< 5.0
1,2,4-Trichlorobenzene	Ν	1760	10:1	µg/l	0.10	< 0.10
Hexachlorobutadiene	Ν	1760	10:1	µg/l	0.10	< 0.10
1,2,3-Trichlorobenzene	Ν	1760	10:1	µg/l	0.20	< 0.20
Naphthalene	Ν	1760	10:1	µg/l	0.10	< 0.10
Phenol	N	1790	10:1	µg/l	0.050	< 0.050
2-Chlorophenol	N	1790	10:1	µg/l	0.050	< 0.050
Bis-(2-Chloroethyl)Ether	Ν	1790	10:1	µg/l	0.050	< 0.050
1,3-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,4-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
1,2-Dichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050
2-Methylphenol (o-Cresol)	N	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroisopropyl)Ether	Ν	1790	10:1	µg/l	0.050	< 0.050
Hexachloroethane	N	1790	10:1	µg/l	0.050	< 0.050
N-Nitrosodi-n-propylamine	N	1790	10:1	µg/l	0.050	< 0.050
4-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050
Nitrobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050
Isophorone	Ν	1790	10:1	µg/l	0.050	< 0.050
2-Nitrophenol	N	1790	10:1	µg/l	0.050	< 0.050
2,4-Dimethylphenol	Ν	1790	10:1	µg/l	0.050	< 0.050
Bis(2-Chloroethoxy)Methane	Ν	1790	10:1	µg/l	0.050	< 0.050
2,4-Dichlorophenol	Ν	1790	10:1	µg/l	0.050	< 0.050
1,2,4-Trichlorobenzene	N	1790	10:1	µg/l	0.050	< 0.050

Client: Causeway Geotech Ltd		23-01251						
Quotation No.: Q22-28455		1574943						
		10						
		BH131						
		Sample Type:						
				Тор Dep	oth (m):	6.5		
				Date Sa	ampled:	13-Jan-2023		
Determinand	Accred.	SOP	Туре	Units	LOD			
Naphthalene	N	1790	10:1	µg/l	0.050	3.8		
4-Chloroaniline	N	1790	10:1	µg/l	0.050	< 0.050		
Hexachlorobutadiene	N	1790	10:1	µg/l	0.050	< 0.050		
4-Chloro-3-Methylphenol	N	1790	10:1	µg/l	0.050	< 0.050		
2-Methylnaphthalene	N	1790	10:1	µg/l	0.050	5.8		
Hexachlorocyclopentadiene	N	1790	10:1	µg/l	0.050	< 0.050		
2,4,6-Trichlorophenol	Ν	1790	10:1	µg/l	0.050	< 0.050		
2,4,5-Trichlorophenol	Ν	1790	10:1	µg/l	0.050	< 0.050		
2-Chloronaphthalene	Ν	1790	10:1	µg/l	0.050	< 0.050		
2-Nitroaniline	Ν	1790	10:1	µg/l	0.050	< 0.050		
Acenaphthylene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Dimethylphthalate	Ν	1790	10:1	µg/l	0.050	< 0.050		
2,6-Dinitrotoluene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Acenaphthene	Ν	1790	10:1	µg/l	0.050	< 0.050		
3-Nitroaniline	Ν	1790	10:1	µg/l	0.050	< 0.050		
Dibenzofuran	Ν	1790	10:1	µg/l	0.050	< 0.050		
4-Chlorophenylphenylether	Ν	1790	10:1	µg/l	0.050	< 0.050		
2,4-Dinitrotoluene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Fluorene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Diethyl Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050		
4-Nitroaniline	Ν	1790	10:1	µg/l	0.050	< 0.050		
2-Methyl-4,6-Dinitrophenol	Ν	1790	10:1	µg/l	0.050	< 0.050		
Azobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050		
4-Bromophenylphenyl Ether	Ν	1790	10:1	µg/l	0.050	< 0.050		
Hexachlorobenzene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Pentachlorophenol	Ν	1790	10:1	µg/l	0.050	< 0.050		
Phenanthrene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Anthracene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Carbazole	Ν	1790	10:1	µg/l	0.050	< 0.050		
Di-N-Butyl Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050		
Fluoranthene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Pyrene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Butylbenzyl Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050		
Benzo[a]anthracene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Chrysene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Bis(2-Ethylhexyl)Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050		
Di-N-Octyl Phthalate	Ν	1790	10:1	µg/l	0.050	< 0.050		
Benzo[b]fluoranthene	Ν	1790	10:1	µg/l	0.050	< 0.050		
Benzo[k]fluoranthene	Ν	1790	10:1	µg/l	0.050	< 0.050		

Client: Causeway Geotech Ltd		23-01251				
Quotation No.: Q22-28455		1574943				
		10				
		BH131				
				Sampl	e Type:	SOIL
				Тор Dep	oth (m):	6.5
				Date Sa	ampled:	13-Jan-2023
Determinand	Accred.	SOP	Туре	Units	LOD	
Benzo[a]pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	N	1790	10:1	µg/l	0.050	< 0.050
Dibenz(a,h)Anthracene	N	1790	10:1	µg/l	0.050	< 0.050
Benzo[g,h,i]perylene	N	1790	10:1	µg/l	0.050	< 0.050
Naphthalene	N	1800	10:1	µg/l	0.010	5.9
Acenaphthylene	N	1800	10:1	µg/l	0.010	< 0.010
Acenaphthene	N	1800	10:1	µg/l	0.010	< 0.010
Fluorene	N	1800	10:1	µg/l	0.010	< 0.010
Phenanthrene	Ν	1800	10:1	µg/l	0.010	< 0.010
Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Pyrene	Ν	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]anthracene	Ν	1800	10:1	µg/l	0.010	< 0.010
Chrysene	Ν	1800	10:1	µg/l	0.010	< 0.010
Benzo[b]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[k]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[a]pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	10:1	µg/l	0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	10:1	µg/l	0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	10:1	µg/l	0.010	< 0.010
Total Of 16 PAH's	N	1800	10:1	µg/l	0.20	5.9
PCB 81	N	1815	10:1	µg/l	0.010	< 0.010
PCB 77	N	1815	10:1	µg/l	0.010	< 0.010
PCB 105	N	1815	10:1	µg/l	0.010	< 0.010
PCB 114	N	1815	10:1	µg/l	0.010	< 0.010
PCB 118	N	1815	10:1	µg/l	0.010	< 0.010
PCB 123	N	1815	10:1	µg/l	0.010	< 0.010
PCB 126	N	1815	10:1	µg/l	0.010	< 0.010
PCB 156	Ν	1815	10:1	µg/l	0.010	< 0.010
PCB 157	N	1815	10:1	µg/l	0.010	< 0.010
PCB 167	N	1815	10:1	µg/l	0.010	< 0.010
PCB 169	N	1815	10:1	µg/l	0.010	< 0.010
PCB 189	Ν	1815	10:1	µg/l	0.010	< 0.010
Total PCBs (12 Congeners)	Ν	1815	10:1	µg/l	0.010	< 0.010
Phenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Chlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Methylphenol (o-Cresol)	N	1900	10:1	µg/l	0.20	< 0.20
3-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20

Client: Causeway Geotech Ltd	Chemtest Job No.:					23-01251
Quotation No.: Q22-28455			Chemte	st Sam	ole ID.:	1574943
			Clie	ent Sam	ple ID.:	10
			Sa	ample Lo	ocation:	BH131
				Sample	e Type:	SOIL
				Тор Dep	oth (m):	6.5
				Date Sa	mpled:	13-Jan-2023
Determinand	Accred.	SOP	Туре	Units	LOD	
2-Nitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4-Dimethylphenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4-Dichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,6-Dichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Chloro-3-Methylphenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,4-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,5-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4,6-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,4,5-Trichlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
4-Nitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,4,5-Tetrachlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2,3,4,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
2,3,5,6-Tetrachlorophenol	N	1900	10:1	µg/l	0.20	< 0.20
3,4,5-Trichlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Methyl-4,6-Dinitrophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
Pentachlorophenol	Ν	1900	10:1	µg/l	0.20	< 0.20
2-Sec-Butyl-4,6-Dinitrophenol	N	1900	10:1	µg/l	0.20	< 0.20
Total Phenols	N	1900	10:1	µg/l	5.00	< 5.0

Client: Causeway Geotech Ltd	Chemtest Job No.:				23-01251	
Quotation No.: Q22-28455	D.: Q22-28455 Chemtest Sample ID.:			ple ID.:	1574937	
	Client Sample ID.:				3	
	Sample Location: Sample Type: Top Depth (m): Date Sampled: Asbestos Lab:			BH131		
				SOIL		
				3		
				13-Jan-2023		
				DURHAM		
Determinand	Accred.	SOP	Units	LOD		
АСМ Туре	U	2192		N/A	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	
Moisture	N	2030	%	0.020	7.5	
Natural Moisture Content	N	2030	%	0.020	8.1	
Soil Colour	N	2040		N/A	Brown	
Other Material	N	2040		N/A	Stones	
Soil Texture	N	2040		N/A	Sand	
рН	U	2010		4.0	9.3	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	3.5	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.35	
Total Sulphur	U	2175	%	0.010	0.12	
Sulphur (Elemental)	U	2180	mg/kg	1.0	38	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	
Thiocyanate	U	2300	mg/kg	5.0	< 5.0	
Aluminium (Total)	N	2430	mg/kg	100	10000	
Iron (Total)	N	2430	mg/kg	100	30000	
Arsenic	U	2455	mg/kg	0.5	25	
Barium	U	2455	mg/kg	0	150	
Beryllium	U	2455	mg/kg	0.5	0.9	
Cadmium	U	2455	mg/kg	0.10	1.2	
Chromium	U	2455	mg/kg	0.5	37	
Manganese	U	2455	mg/kg	1.0	1100	
Copper	U	2455	mg/kg	0.50	59	
Mercury	U	2455	mg/kg	0.05	0.32	
Nickel	U	2455	mg/kg	0.50	40	
Lead	U	2455	mg/kg	0.50	310	
Selenium	U	2455	mg/kg	0.25	0.98	
Vanadium	U	2455	mg/kg	0.5	36	
Zinc	U	2455	mg/kg	0.50	260	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	
Organic Matter	U	2625	%	0.40	4.6	
Total Organic Carbon	U	2625	%	0.20	2.7	
Aliphatic TPH >C5-C6	Ν	2680	mg/kg	0.010	< 0.010	
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	
Aliphatic TPH >C8-C10	Ν	2680	mg/kg	0.10	< 0.10	
Aliphatic TPH >C10-C12	N	2680	ma/ka	0.10	< 0.10	
Client: Causeway Geotech Ltd		Chemtest Job No				
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Quotation No.: Q22-28455	(Chemte	ple ID.:	1574937		
		Clie	ent Sam	ple ID.:	3	
		Sa	ample Lo	ocation:	BH131	
			Sampl	e Type:	SOIL	
		Top Depth (m)				
			Date Sa	ampled:	13-Jan-2023	
		Asbestos Lab:				
Determinand	Accred.	Accred. SOP Units LOD				
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	14	
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	6.6	
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	20	
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	7.5	
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	7.5	
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	28	
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20	
Chloromethane	N	2760	µg/kg	0.20	< 0.20	
Vinyl Chloride	N	2760	µg/kg	0.20	< 0.20	
Bromomethane	N	2760	µg/kg	0.20	< 0.20	
Chloroethane	N	2760	µg/kg	0.20	< 0.20	
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20	
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50	
Trichloromethane	N	2760	µg/kg	0.20	< 0.20	
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	
Tetrachloromethane	N	2760	µg/kg	0.20	< 0.20	
1,1-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	
Benzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	
Trichloroethene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	
Dibromomethane	N	2760	µg/kg	0.20	< 0.20	
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20	
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	
Toluene	N	2760	µq/ka	0.20	0.66	

Client: Causeway Geotech Ltd		ob No.:	23-01251			
Quotation No.: Q22-28455	0	Chemte	ple ID.:	1574937		
		Clie	ent Sam	ple ID.:	3	
		Sa	ample Lo	ocation:	BH131	
			Sample	e Type:	SOIL	
			Тор Dep	oth (m):	3	
		Date Sampled				
		Asbestos Lab:				
Determinand	Accred.	Accred. SOP Units LOD				
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	
Tetrachloroethene	N	2760	µg/kg	0.20	< 0.20	
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	
Chlorobenzene	N	2760	µg/kg	0.20	< 0.20	
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	< 0.20	
Ethylbenzene	N	2760	µg/kg	0.20	< 0.20	
m & p-Xylene	N	2760	µg/kg	0.20	< 0.20	
o-Xylene	Ν	2760	µg/kg	0.20	< 0.20	
Styrene	N	2760	µg/kg	0.20	< 0.20	
Tribromomethane	N	2760	µg/kg	0.20	< 0.20	
Isopropylbenzene	N	2760	µg/kg	0.20	< 0.20	
Bromobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20	
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20	
2-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
Tert-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
4-Isopropyltoluene	N	2760	µg/kg	0.20	< 0.20	
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Hexachlorobutadiene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	< 0.20	
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	< 0.050	
Phenol	N	2790	mg/kg	0.050	< 0.050	
2-Chlorophenol	N	2790	mg/kg	0.050	< 0.050	
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	< 0.050	
1.3-Dichlorobenzene	N	2790	ma/ka	0.050	< 0.050	

Client: Causeway Geotech Ltd		Chemtest Job No				
Quotation No.: Q22-28455	(Chemte	ple ID.:	1574937		
		Clie	ent Sam	ple ID.:	3	
		Sa	ample Lo	ocation:	BH131	
			Sample	e Type:	SOIL	
			Тор Dep	oth (m):	3	
			Date Sa	ampled:	13-Jan-2023	
		Asbestos Lab:				
Determinand	Accred.	Accred. SOP Units LOD				
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
2-Methylphenol	N	2790	mg/kg	0.050	< 0.050	
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	< 0.050	
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050	
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050	
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050	
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050	
Isophorone	N	2790	mg/kg	0.050	< 0.050	
2-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050	
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050	
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050	
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
Naphthalene	N	2790	mg/kg	0.050	< 0.050	
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050	
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050	
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050	
2-Methylnaphthalene	N	2790	mg/kg	0.050	< 0.050	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050	
2.4.6-Trichlorophenol	N	2790	ma/ka	0.050	< 0.050	
2.4.5-Trichlorophenol	N	2790	ma/ka	0.050	< 0.050	
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050	
2-Nitroaniline	N	2790	ma/ka	0.050	< 0.050	
Acenaphthylene	N	2790	ma/ka	0.050	< 0.050	
Dimethylphthalate	N	2790	ma/ka	0.050	< 0.050	
2.6-Dinitrotoluene	N	2790	ma/ka	0.050	< 0.050	
Acenaphthene	N	2790	ma/ka	0.050	0.087	
3-Nitroaniline	N	2790	ma/ka	0.050	< 0.050	
Dibenzofuran	N	2790	ma/ka	0.050	< 0.050	
4-Chlorophenylphenylether	N	2790	ma/ka	0.050	< 0.050	
2,4-Dinitrotoluene	N	2790	mg/ka	0.050	< 0.050	
Fluorene	N	2790	ma/ka	0.050	< 0.050	
Diethyl Phthalate	N	2790	mg/ka	0.050	< 0.050	
4-Nitroaniline	N	2790	mg/ka	0.050	< 0.050	
2-Methyl-4.6-Dinitrophenol	N	2790	ma/ka	0.050	< 0.050	
Azobenzene	N	2790	ma/ka	0.050	< 0.050	
4-Bromophenylphenyl Ether	N	2790	mg/ka	0.050	< 0.050	

Client: Causeway Geotech Ltd		ob No.:	23-01251			
Quotation No.: Q22-28455	0	Chemte	ple ID.:	1574937		
		Clie	ent Sam	ple ID.:	3	
		Sa	ample Lo	ocation:	BH131	
			Sampl	e Type:	SOIL	
			Top Dep	oth (m):	3	
			Date Sa	ampled:	13-Jan-2023	
		Asbestos Lab:				
Determinand	Accred.	Accred. SOP Units LOD				
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050	
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050	
Phenanthrene	N	2790	mg/kg	0.050	0.77	
Anthracene	N	2790	mg/kg	0.050	0.15	
Carbazole	N	2790	mg/kg	0.050	< 0.050	
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	< 0.050	
Fluoranthene	N	2790	mg/kg	0.050	1.3	
Pyrene	N	2790	mg/kg	0.050	1.1	
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050	
Benzo[a]anthracene	N	2790	mg/kg	0.050	0.68	
Chrysene	N	2790	mg/kg	0.050	0.69	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	< 0.050	
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050	
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	0.77	
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	0.29	
Benzo[a]pyrene	N	2790	mg/kg	0.050	0.67	
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	0.26	
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	< 0.050	
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	0.36	
4-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	
Naphthalene	N	2800	mg/kg	0.010	0.67	
Acenaphthylene	N	2800	mg/kg	0.010	0.22	
Acenaphthene	N	2800	mg/kg	0.010	1.7	
Fluorene	N	2800	mg/kg	0.010	1.8	
Phenanthrene	N	2800	mg/kg	0.010	12	
Anthracene	N	2800	mg/kg	0.010	2.9	
Fluoranthene	N	2800	mg/kg	0.010	15	
Pyrene	N	2800	mg/kg	0.010	12	
Benzo[a]anthracene	N	2800	mg/kg	0.010	5.9	
Chrysene	N	2800	mg/kg	0.010	7.0	
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	7.4	
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	2.5	
Benzo[a]pyrene	N	2800	mg/kg	0.010	6.0	
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	3.3	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	0.78	
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	3.4	
Total Of 16 PAH's	N	2800	mg/kg	0.20	83	
Resorcinol	U	2920	mg/kg	0.020	< 0.020	

Client: Causeway Geotech Ltd	Chemtest Job N				23-01251
Quotation No.: Q22-28455	C	Chemte	ple ID.:	1574937	
		Clie	ple ID.:	3	
		Sa	ocation:	BH131	
			e Type:	SOIL	
	Top Depth (m):				3
	Date Sampled:				13-Jan-2023
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Phenol	U	2920	mg/kg	0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020
Xylenols	U 2920 mg/kg 0.020				< 0.020
1-Naphthol	N	< 0.020			
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	рН	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl- pphenylenediamine.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Waters by GC-MS	ICES7 PCB congeners	Solvent extraction / GCMS detection
1900	Phenols in Waters by GC-MS	Approximately 24 substituted Phenols, including Chlorophenols	Solvent extraction / GCMS detection
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.

Test Methods

SOP	Title	Parameters included	Method summary
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	23-02478-1		
Initial Date of Issue:	13-Feb-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Colm Hurley		
Project	22-1041A 3PM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	26-Jan-2023
Order No.:		Date Instructed:	02-Feb-2023
No. of Samples:	1		
Turnaround (Wkdays):	7	Results Due:	10-Feb-2023
Date Approved:	13-Feb-2023		
Approved By:			
1			

Details:

Stuart Henderson, Technical Manager

Client: Causeway Geotech Ltd	Chemtest Job No				23-02478
Quotation No.: Q22-28455	(Chemte	ple ID.:	1580016	
		Sa	ample Lo	ocation:	BH105
			Sampl	е Туре:	SOIL
			Top Dep	oth (m):	1
			Date Sa	ampled:	20-Jan-2023
			Asbest	os Lab:	DURHAM
Determinand	Accred.	Accred. SOP Units LOD			
АСМ Туре	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	7.4
Natural Moisture Content	N	2030	%	0.020	8.0
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones
Soil Texture	Ν	2040		N/A	Loam
pН	U	2010		4.0	9.1
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.41
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.038
Total Sulphur	U	2175	%	0.010	< 0.010
Sulphur (Elemental)	U	2180	mg/kg	1.0	18
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50
Thiocyanate	U	2300	mg/kg	5.0	< 5.0
Aluminium (Total)	N	2430	mg/kg	100	15000
Iron (Total)	N	2430	mg/kg	100	26000
Arsenic	U	2455	mg/kg	0.5	19
Barium	U	2455	mg/kg	0	120
Beryllium	U	2455	mg/kg	0.5	1.3
Cadmium	U	2455	mg/kg	0.10	0.54
Chromium	U	2455	mg/kg	0.5	58
Manganese	U	2455	mg/kg	1.0	1500
Copper	U	2455	mg/kg	0.50	43
Mercury	U	2455	mg/kg	0.05	0.09
Nickel	U	2455	mg/kg	0.50	38
Lead	U	2455	mg/kg	0.50	190
Selenium	U	2455	mg/kg	0.25	0.65
Vanadium	U	2455	mg/kg	0.5	75
Zinc	U	2455	mg/kg	0.50	160
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	U	2625	%	0.40	< 0.40
Total Organic Carbon	U	2625	%	0.20	0.21
Aliphatic TPH >C5-C6	Ν	2680	mg/kg	0.010	< 0.010
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010	< 0.010
Aliphatic TPH >C8-C10	Ν	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C10-C12	Ν	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/ka	0.10	< 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.				23-02478
Quotation No.: Q22-28455	(Chemte	ple ID.:	1580016	
		Sa	ample Lo	ocation:	BH105
			Sampl	е Туре:	SOIL
			Top Dep	oth (m):	1
			Date Sa	ampled:	20-Jan-2023
		Asbestos Lab:			
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C16-C21	Ν	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010
Aromatic TPH >C8-C10	Ν	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20
Chloromethane	N	2760	µg/kg	0.20	< 0.20
Vinyl Chloride	N	2760	µg/kg	0.20	< 0.20
Bromomethane	N	2760	µg/kg	0.20	< 0.20
Chloroethane	N	2760	µg/kg	0.20	< 0.20
Trichlorofluoromethane	N	2760	µg/kg	0.20	< 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20	< 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20
1,1-Dichloroethane	N	2760	µg/kg	0.20	< 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50
Trichloromethane	N	2760	µg/kg	0.20	< 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20
Tetrachloromethane	Ν	2760	µg/kg	0.20	< 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	< 0.20
Benzene	N	2760	µg/kg	0.20	< 0.20
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20
Trichloroethene	N	2760	µg/kg	0.20	< 0.20
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20
Dibromomethane	N	2760	µg/kg	0.20	< 0.20
Bromodichloromethane	N	2760	µg/kg	0.20	< 0.20
cis-1,3-Dichloropropene	Ν	2760	µg/kg	0.20	< 0.20
Toluene	Ν	2760	µg/kg	0.20	< 0.20
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20
1.1.2-Trichloroethane	Ν	2760	ua/ka	0.20	< 0.20

Client: Causeway Geotech Ltd		ob No.:	23-02478			
Quotation No.: Q22-28455	(Chemte	ple ID.:	1580016		
		Sa	ample Lo	ocation:	BH105	
			Sample	e Type:	SOIL	
			Тор Dep	oth (m):	1	
			Date Sa	ampled:	20-Jan-2023	
		Asbestos Lab:				
Determinand	Accred.	SOP	Units	LOD		
Tetrachloroethene	Ν	2760	µg/kg	0.20	< 0.20	
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	
Chlorobenzene	N	2760	µg/kg	0.20	< 0.20	
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	< 0.20	
Ethylbenzene	N	2760	µg/kg	0.20	< 0.20	
m & p-Xylene	N	2760	µg/kg	0.20	< 0.20	
o-Xylene	N	2760	µg/kg	0.20	< 0.20	
Styrene	N	2760	µg/kg	0.20	< 0.20	
Tribromomethane	N	2760	µg/kg	0.20	< 0.20	
Isopropylbenzene	N	2760	µg/kg	0.20	< 0.20	
Bromobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20	
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20	
2-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	
Tert-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	
Sec-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
4-Isopropyltoluene	N	2760	µg/kg	0.20	< 0.20	
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
N-Butylbenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20	< 0.20	
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Hexachlorobutadiene	N	2760	µg/kg	0.20	< 0.20	
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	< 0.20	
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	< 0.20	
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	< 0.050	
Phenol	N	2790	mg/kg	0.050	< 0.050	
2-Chlorophenol	N	2790	mg/kg	0.050	< 0.050	
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	< 0.050	
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	
2-Methylphenol	N	2790	ma/ka	0.050	< 0.050	

Client: Causeway Geotech Ltd		Chemtest Job No.:					
Quotation No.: Q22-28455	0	Chemtest Sample ID.:					
		Sample Location:					
			Sampl	е Туре:	SOIL		
			Top Dep	oth (m):	1		
			Date Sa	ampled:	20-Jan-2023		
			Asbest	os Lab:	DURHAM		
Determinand	Accred.	SOP	Units	LOD			
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050	< 0.050		
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050		
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050	< 0.050		
4-Methylphenol	N	2790	mg/kg	0.050	< 0.050		
Nitrobenzene	N	2790	mg/kg	0.050	< 0.050		
Isophorone	N	2790	mg/kg	0.050	< 0.050		
2-Nitrophenol	N	2790	mg/kg	0.050	< 0.050		
2,4-Dimethylphenol	N	2790	mg/kg	0.050	< 0.050		
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050	< 0.050		
2,4-Dichlorophenol	N	2790	mg/kg	0.050	< 0.050		
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050	< 0.050		
Naphthalene	N	2790	mg/kg	0.050	0.11		
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050		
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050		
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050		
2-Methylnaphthalene	N	2790	mg/kg	0.050	0.76		
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050	< 0.050		
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050		
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050	< 0.050		
2-Chloronaphthalene	N	2790	mg/kg	0.050	< 0.050		
2-Nitroaniline	N	2790	mg/kg	0.050	< 0.050		
Acenaphthylene	N	2790	mg/kg	0.050	< 0.050		
Dimethylphthalate	N	2790	mg/kg	0.050	< 0.050		
2,6-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050		
Acenaphthene	N	2790	mg/kg	0.050	< 0.050		
3-Nitroaniline	N	2790	mg/kg	0.050	< 0.050		
Dibenzofuran	N	2790	mg/kg	0.050	0.18		
4-Chlorophenylphenylether	N	2790	mg/kg	0.050	< 0.050		
2,4-Dinitrotoluene	N	2790	mg/kg	0.050	< 0.050		
Fluorene	N	2790	mg/kg	0.050	0.17		
Diethyl Phthalate	N	2790	mg/kg	0.050	< 0.050		
4-Nitroaniline	N	2790	mg/kg	0.050	< 0.050		
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050	< 0.050		
Azobenzene	N	2790	mg/kg	0.050	< 0.050		
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050	< 0.050		
Hexachlorobenzene	N	2790	mg/kg	0.050	< 0.050		
Pentachlorophenol	N	2790	mg/kg	0.050	< 0.050		
Phenanthrene	N	2790	mg/kg	0.050	0.81		
Anthracene	N	2790	ma/ka	0.050	0.19		

Client: Causeway Geotech Ltd		Chemtest Job No.:					
Quotation No.: Q22-28455	0	Chemtest Sample ID.:					
		Sample Location:					
		Sample Type:					
			Тор Dep	oth (m):	1		
			Date Sa	ampled:	20-Jan-2023		
			Asbest	os Lab:	DURHAM		
Determinand	Accred.	SOP	Units	LOD			
Carbazole	N	2790	mg/kg	0.050	0.097		
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	< 0.050		
Fluoranthene	N	2790	mg/kg	0.050	0.81		
Pyrene	N	2790	mg/kg	0.050	0.65		
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050		
Benzo[a]anthracene	N	2790	mg/kg	0.050	0.28		
Chrysene	N	2790	mg/kg	0.050	0.29		
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	< 0.050		
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050		
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	0.30		
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	0.13		
Benzo[a]pyrene	N	2790	mg/kg	0.050	0.26		
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	0.12		
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	< 0.050		
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	0.16		
4-Nitrophenol	N	2790	mg/kg	0.050	< 0.050		
Naphthalene	N	2800	mg/kg	0.010	< 0.010		
Acenaphthylene	N	2800	mg/kg	0.010	< 0.010		
Acenaphthene	N	2800	mg/kg	0.010	< 0.010		
Fluorene	N	2800	mg/kg	0.010	< 0.010		
Phenanthrene	N	2800	mg/kg	0.010	0.26		
Anthracene	N	2800	mg/kg	0.010	0.088		
Fluoranthene	N	2800	mg/kg	0.010	0.28		
Pyrene	N	2800	mg/kg	0.010	0.19		
Benzo[a]anthracene	N	2800	mg/kg	0.010	< 0.010		
Chrysene	N	2800	mg/kg	0.010	< 0.010		
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	< 0.010		
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	< 0.010		
Benzo[a]pyrene	N	2800	mg/kg	0.010	< 0.010		
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	< 0.010		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010		
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	< 0.010		
Total Of 16 PAH's	N	2800	mg/kg	0.20	0.82		
Resorcinol	U	2920	mg/kg	0.020	< 0.020		
Phenol	U	2920	mg/kg	0.020	< 0.020		
Cresols	U	2920	mg/kg	0.020	< 0.020		
Xylenols	U	2920	mg/kg	0.020	< 0.020		
1-Naphthol	N	2920	mg/kg	0.020	< 0.020		
Trimethylphenols	U	2920	ma/ka	0.020	< 0.020		

Client: Causeway Geotech Ltd		23-02478			
Quotation No.: Q22-28455	C	1580016			
		Sa	ocation:	BH105	
		e Type:	SOIL		
		oth (m):	1		
		mpled:	20-Jan-2023		
			Asbest	os Lab:	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

🔅 eurofins

Chemtest

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

Final Report

Report No.:	23-03006-1		
Initial Date of Issue:	20-Feb-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Colm Hurley		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	31-Jan-2023
Order No.:		Date Instructed:	02-Feb-2023
No. of Samples:	2		
Turnaround (Wkdays):	7	Results Due:	10-Feb-2023
Date Approved:	20-Feb-2023		
Approved By:			

Details:

Stuart Henderson, Technical Manager

Client: Causeway Geotech Ltd	Chemtest Job No.:				23-03006	23-03006
Quotation No.: Q22-28455		Chemtest Sample ID.:			1582097	1582098
		Sample Location:			BH112	BH112
		Sample Type:			SOIL	SOIL
			Top De	epth (m):	1.0	1.5
			Date S	Sampled:	27-Jan-2023	27-Jan-2023
			Asbes	stos Lab:		DURHAM
Determinand	Accred.	SOP	Units	LOD		
АСМ Туре	U	2192		N/A		Fibres/Clumps
Asbestos Identification	U	2192		N/A		Chrysotile
Asbestos by Gravimetry	U	2192	%	0.001		0.004
Total Asbestos	U	2192	%	0.001		0.004
Moisture	N	2030	%	0.020	12	12
Natural Moisture Content	N	2030	%	0.020		14
Soil Colour	N	2040		N/A		Brown
Other Material	N	2040		N/A		Stones
Soil Texture	N	2040		N/A		Loam
рН	U	2010		4.0		8.3
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		1.3
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		0.30
Total Sulphur	U	2175	%	0.010		0.20
Sulphur (Elemental)	U	2180	mg/kg	1.0		76
Cyanide (Free)	U	2300	mg/kg	0.50		< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50		0.80
Thiocyanate	U	2300	mg/kg	5.0		< 5.0
Aluminium (Total)	N	2430	mg/kg	100		7500
Iron (Total)	N	2430	mg/kg	100		24000
Arsenic	U	2455	mg/kg	0.5		29
Barium	U	2455	mg/kg	0		240
Beryllium	U	2455	mg/kg	0.5		1.1
Cadmium	U	2455	mg/kg	0.10		2.5
Chromium	U	2455	mg/kg	0.5		28
Manganese	U	2455	mg/kg	1.0		1200
Copper	U	2455	mg/kg	0.50		130
Mercury	U	2455	mg/kg	0.05		0.95
Nickel	U	2455	mg/kg	0.50		52
Lead	U	2455	mg/kg	0.50		530
Selenium	U	2455	mg/kg	0.25		2.0
Vanadium	U	2455	mg/kg	0.5		37
Zinc	U	2455	mg/kg	0.50		370
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50
Organic Matter	U	2625	%	0.40		4.4
Total Organic Carbon	U	2625	%	0.20		2.6
Aliphatic TPH >C5-C6	Ν	2680	mg/kg	0.010		< 0.010
Aliphatic TPH >C6-C8	Ν	2680	mg/kg	0.010		< 0.010
Aliphatic TPH >C8-C10	Ν	2680	mg/kg	0.10		< 0.10
Aliphatic TPH >C10-C12	Ν	2680	ma/ka	0.10		< 0.10

Client: Causeway Geotech Ltd	Chemtest Job No.:				23-03006	23-03006
Quotation No.: Q22-28455		Chemtest Sample ID.: Sample Location: Sample Type:			1582097	1582098
					BH112	BH112
					SOIL	SOIL
			Top De	epth (m):	1.0	1.5
			Date S	Sampled:	27-Jan-2023	27-Jan-2023
			Asbes	stos Lab:		DURHAM
Determinand	Accred.	SOP	Units	LOD		
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10		< 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10		< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10		7.3
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10		< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0		7.3
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010		< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010		< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10		< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10		< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10		< 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10		9.6
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10		57
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10		< 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0		67
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0		74
Dichlorodifluoromethane	N	2760	µg/kg	0.20		< 0.20
Chloromethane	N	2760	µg/kg	0.20		< 0.20
Vinyl Chloride	N	2760	µg/kg	0.20		< 0.20
Bromomethane	N	2760	µg/kg	0.20		< 0.20
Chloroethane	N	2760	µg/kg	0.20		< 0.20
Trichlorofluoromethane	N	2760	µg/kg	0.20		< 0.20
1,1-Dichloroethene	N	2760	µg/kg	0.20		< 0.20
Trans 1,2-Dichloroethene	N	2760	µg/kg	0.20		< 0.20
1,1-Dichloroethane	N	2760	µg/kg	0.20		< 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20		< 0.20
Bromochloromethane	N	2760	µg/kg	0.50		< 0.50
Trichloromethane	N	2760	µg/kg	0.20		< 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20		< 0.20
Tetrachloromethane	N	2760	µg/kg	0.20		< 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20		< 0.20
Benzene	N	2760	µg/kg	0.20		< 0.20
1,2-Dichloroethane	N	2760	µg/kg	0.20		< 0.20
Trichloroethene	N	2760	µg/kg	0.20		< 0.20
1,2-Dichloropropane	N	2760	µg/kg	0.20		< 0.20
Dibromomethane	N	2760	µg/kg	0.20		< 0.20
Bromodichloromethane	N	2760	µg/kg	0.20		< 0.20
cis-1,3-Dichloropropene	N	2760	µg/kg	0.20		< 0.20
Toluene	N	2760	µg/kg	0.20		< 0.20
Trans-1.3-Dichloropropene	N	2760	ua/ka	0.20		< 0.20

Client: Causeway Geotech Ltd	Chemtest Job No.:				23-03006	23-03006
Quotation No.: Q22-28455	Chemtest Sample ID.:			1582097	1582098	
		Sample Location:			BH112	BH112
		Sample Type:			SOIL	SOIL
			Top D	epth (m):	1.0	1.5
			Date S	Sampled:	27-Jan-2023	27-Jan-2023
			Asbes	stos Lab:		DURHAM
Determinand	Accred.	SOP	Units	LOD		
1,1,2-Trichloroethane	Ν	2760	µg/kg	0.20		< 0.20
Tetrachloroethene	Ν	2760	µg/kg	0.20		< 0.20
1,3-Dichloropropane	Ν	2760	µg/kg	0.20		< 0.20
Dibromochloromethane	Ν	2760	µg/kg	0.20		< 0.20
1,2-Dibromoethane	N	2760	µg/kg	0.20		< 0.20
Chlorobenzene	N	2760	µg/kg	0.20		< 0.20
1,1,1,2-Tetrachloroethane	Ν	2760	µg/kg	0.20		< 0.20
Ethylbenzene	Ν	2760	µg/kg	0.20		< 0.20
m & p-Xylene	Ν	2760	µg/kg	0.20		< 0.20
o-Xylene	N	2760	µg/kg	0.20		< 0.20
Styrene	N	2760	µg/kg	0.20		< 0.20
Tribromomethane	N	2760	µg/kg	0.20		< 0.20
Isopropylbenzene	Ν	2760	µg/kg	0.20		< 0.20
Bromobenzene	N	2760	µg/kg	0.20		< 0.20
1,2,3-Trichloropropane	N	2760	µg/kg	0.20		< 0.20
N-Propylbenzene	N	2760	µg/kg	0.20		< 0.20
2-Chlorotoluene	Ν	2760	µg/kg	0.20		< 0.20
1,3,5-Trimethylbenzene	Ν	2760	µg/kg	0.20		< 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20		< 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20		< 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20		< 0.20
Sec-Butylbenzene	N	2760	µg/kg	0.20		< 0.20
1,3-Dichlorobenzene	N	2760	µg/kg	0.20		< 0.20
4-Isopropyltoluene	Ν	2760	µg/kg	0.20		< 0.20
1,4-Dichlorobenzene	N	2760	µg/kg	0.20		< 0.20
N-Butylbenzene	N	2760	µg/kg	0.20		< 0.20
1,2-Dichlorobenzene	N	2760	µg/kg	0.20		< 0.20
1,2-Dibromo-3-Chloropropane	N	2760	µg/kg	0.20		< 0.20
1,2,4-Trichlorobenzene	N	2760	µg/kg	0.20		< 0.20
Hexachlorobutadiene	N	2760	µg/kg	0.20		< 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20		< 0.20
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20		< 0.20
N-Nitrosodimethylamine	N	2790	mg/kg	0.050		< 0.050
Phenol	N	2790	mg/kg	0.050		< 0.050
2-Chlorophenol	N	2790	mg/kg	0.050		< 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050		< 0.050
1,3-Dichlorobenzene	N	2790	mg/kg	0.050		< 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050		< 0.050
1.2-Dichlorobenzene	N	2790	ma/ka	0.050		< 0.050

Client: Causeway Geotech Ltd		Ch	emtest .	23-03006	23-03006	
Quotation No.: Q22-28455		Chemtest Sample ID.:			1582097	1582098
		Sample Location:			BH112	BH112
		Sample Type:			SOIL	SOIL
			Top De	epth (m):	1.0	1.5
			Date S	Sampled:	27-Jan-2023	27-Jan-2023
			Asbes	stos Lab:		DURHAM
Determinand	Accred.	SOP	Units	LOD		
2-Methylphenol	N	2790	mg/kg	0.050		< 0.050
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.050		< 0.050
Hexachloroethane	N	2790	mg/kg	0.050		< 0.050
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.050		< 0.050
4-Methylphenol	N	2790	mg/kg	0.050		< 0.050
Nitrobenzene	N	2790	mg/kg	0.050		< 0.050
Isophorone	N	2790	mg/kg	0.050		< 0.050
2-Nitrophenol	N	2790	mg/kg	0.050		< 0.050
2,4-Dimethylphenol	N	2790	mg/kg	0.050		< 0.050
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.050		< 0.050
2,4-Dichlorophenol	N	2790	mg/kg	0.050		< 0.050
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.050		< 0.050
Naphthalene	N	2790	mg/kg	0.050		0.75
4-Chloroaniline	N	2790	mg/kg	0.050		< 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050		< 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050		< 0.050
2-Methylnaphthalene	N	2790	mg/kg	0.050		0.51
Hexachlorocyclopentadiene	N	2790	mg/kg	0.050		< 0.050
2,4,6-Trichlorophenol	N	2790	mg/kg	0.050		< 0.050
2,4,5-Trichlorophenol	N	2790	mg/kg	0.050		< 0.050
2-Chloronaphthalene	N	2790	mg/kg	0.050		< 0.050
2-Nitroaniline	N	2790	mg/kg	0.050		< 0.050
Acenaphthylene	N	2790	mg/kg	0.050		0.80
Dimethylphthalate	N	2790	mg/kg	0.050		< 0.050
2,6-Dinitrotoluene	N	2790	mg/kg	0.050		< 0.050
Acenaphthene	N	2790	mg/kg	0.050		1.0
3-Nitroaniline	N	2790	mg/kg	0.050		< 0.050
Dibenzofuran	N	2790	mg/kg	0.050		0.70
4-Chlorophenylphenylether	N	2790	mg/kg	0.050		< 0.050
2,4-Dinitrotoluene	N	2790	mg/kg	0.050		< 0.050
Fluorene	N	2790	mg/kg	0.050		0.97
Diethyl Phthalate	N	2790	mg/kg	0.050		< 0.050
4-Nitroaniline	N	2790	mg/kg	0.050		< 0.050
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.050		1.4
Azobenzene	N	2790	mg/kg	0.050		< 0.050
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.050		< 0.050
Hexachlorobenzene	N	2790	mg/kg	0.050		< 0.050
Pentachlorophenol	N	2790	mg/kg	0.050		< 0.050
Phenanthrene	N	2790	ma/ka	0.050		7.6

Client: Causeway Geotech Ltd	Chemtest Job No.:				23-03006	23-03006
Quotation No.: Q22-28455	Chemtest Sample ID.:				1582097	1582098
		Sample Location:			BH112	BH112
	Sample Type:				SOIL	SOIL
			Top D	epth (m):	1.0	1.5
			Date S	Sampled:	27-Jan-2023	27-Jan-2023
			Asbes	stos Lab:		DURHAM
Determinand	Accred.	SOP	Units	LOD		
Anthracene	Ν	2790	mg/kg	0.050		1.9
Carbazole	Ν	2790	mg/kg	0.050		0.56
Di-N-Butyl Phthalate	Ν	2790	mg/kg	0.050		< 0.050
Fluoranthene	Ν	2790	mg/kg	0.050		14
Pyrene	N	2790	mg/kg	0.050		13
Butylbenzyl Phthalate	N	2790	mg/kg	0.050		< 0.050
Benzo[a]anthracene	N	2790	mg/kg	0.050		8.3
Chrysene	Ν	2790	mg/kg	0.050		9.0
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050		0.19
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050		< 0.050
Benzo[b]fluoranthene	N	2790	mg/kg	0.050		11
Benzo[k]fluoranthene	N	2790	mg/kg	0.050		4.0
Benzo[a]pyrene	N	2790	mg/kg	0.050		9.1
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050		4.3
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050		1.2
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050		5.1
4-Nitrophenol	N	2790	mg/kg	0.050		< 0.050
Naphthalene	N	2800	mg/kg	0.010		1.8
Acenaphthylene	N	2800	mg/kg	0.010		2.1
Acenaphthene	N	2800	mg/kg	0.010		2.3
Fluorene	Ν	2800	mg/kg	0.010		3.5
Phenanthrene	Ν	2800	mg/kg	0.010		32
Anthracene	N	2800	mg/kg	0.010		6.2
Fluoranthene	N	2800	mg/kg	0.010		45
Pyrene	N	2800	mg/kg	0.010		37
Benzo[a]anthracene	N	2800	mg/kg	0.010		19
Chrysene	N	2800	mg/kg	0.010		20
Benzo[b]fluoranthene	N	2800	mg/kg	0.010		23
Benzo[k]fluoranthene	N	2800	mg/kg	0.010		7.8
Benzo[a]pyrene	N	2800	mg/kg	0.010		19
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010		11
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010		1.9
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010		9.3
Total Of 16 PAH's	N	2800	mg/kg	0.20		240
PCB 81	N	2815	mg/kg	0.0010	< 0.0010	
PCB 77	N	2815	mg/kg	0.0010	< 0.0010	
PCB 105	N	2815	mg/kg	0.0010	< 0.0010	
PCB 114	Ν	2815	mg/kg	0.0010	< 0.0010	
PCB 118	N	2815	ma/ka	0.0010	0.011	

Client: Causeway Geotech Ltd		Ch	emtest .	Job No.:	23-03006	23-03006
Quotation No.: Q22-28455		Chem	test Sar	1582097	1582098	
		5	Sample I	_ocation:	BH112	BH112
			Samp	ole Type:	SOIL	SOIL
			Top D	epth (m):	1.0	1.5
			Date S	Sampled:	27-Jan-2023	27-Jan-2023
			Asbes	stos Lab:		DURHAM
Determinand	Accred.	SOP	Units	LOD		
PCB 123	N	2815	mg/kg	0.0010	< 0.0010	
PCB 126	N	2815	mg/kg	0.0010	< 0.0010	
PCB 156	N	2815	mg/kg	0.0010	< 0.0010	
PCB 157	N	2815	mg/kg	0.0010	< 0.0010	
PCB 167	N	2815	mg/kg	0.0010	< 0.0010	
PCB 169	N	2815	mg/kg	0.0010	< 0.0010	
PCB 189	N	2815	mg/kg	0.0010	< 0.0010	
Total PCBs (12 Congeners)	N	2815	mg/kg	0.0010	0.011	
Resorcinol	U	2920	mg/kg	0.020		< 0.020
Phenol	U	2920	mg/kg	0.020		< 0.020
Cresols	U	2920	mg/kg	0.020		< 0.020
Xylenols	U	2920	mg/kg	0.020		< 0.020
1-Naphthol	N	2920	mg/kg	0.020		< 0.020
Trimethylphenols	U	2920	mg/kg	0.020		< 0.020
Total Phenols	U	2920	mg/kg	0.10		< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Кеу	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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

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Chemtest

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

Final Report

Report No.:	23-08329-1		
Initial Date of Issue:	24-Mar-2023		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Alistair McQuat Carin Cornwall Celine Rooney Colm Hurley Darren O'Mahony Dean McCloskey Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Matthew Graham Neil Haggan Neil Patton Paul Dunlop Rachel White S		
Project	22-1041A 3FM Planning Design GI		
Quotation No.:	Q22-28455	Date Received:	10-Mar-2023
Order No.:		Date Instructed:	13-Mar-2023
No. of Samples:	8		
Turnaround (Wkdays):	7	Results Due:	21-Mar-2023
Date Approved:	24-Mar-2023		

Approved By:

Details:

Stuart Henderson, Technical Manager

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Chemtest

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

Client: Causeway Geotech Ltd		Ch	emtest J	ob No.:	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455		Chem	itest Sam	ple ID.:	1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:		CI	ient Samp	le Ref.:	1	1	1	1	1	1	1	1
			Sample Lo	ocation:	BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sampl	e Type:	WATER							
			Top De	oth (m):	4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sa	ampled:	07-Mar-2023							
Determinand	Accred.	SOP	Units	LOD								
рН	U	1010		N/A	7.0	7.4	7.5	7.2	7.3	7.2	7.3	7.4
Dissolved Oxygen	N	1150	mg O2/I	0.50	6.3	6.5	7.3	7.3	6.9	6.4	6.1	6.2
Dissolved CO2	N	1160	mg/l	0.60	110	19	28	99	38	14	12	8.3
Alkalinity (Total)	U	1220	mg/l	10	490	250	440	730	400	120	110	100
Orthophosphate as PO4	U	1220	mg/l	0.050	0.067	0.064	0.064	0.064	0.061	0.16	0.16	0.15
Sulphur	N	1220	mg/l	1.0	570	530	570	17	230	870	830	880
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Sulphide	U	1325	mg/l	0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050
Calcium (Dissolved)	U	1455	mg/l	2.00	350	460	400	200	340	380	390	410
Total Hardness as CaCO3	U	1270	mg/l	15	3900	2100	4100	740	970	5200	5300	5300
Aluminium (Dissolved)	N	1455	µg/l	5.0	12	< 5.0	< 5.0	< 5.0	< 5.0	53	32	31
Arsenic (Dissolved)	U	1455	µg/l	0.20	1.3	2.2	1.1	1.2	3.5	1.7	1.6	1.6
Boron (Dissolved)	U	1455	µg/l	10.0	3100	1400	3200	1300	310	3800	4200	4100
Barium (Dissolved)	U	1455	µg/l	5.00	230	140	250	280	100	63	54	60
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	0.15	< 0.11	< 0.11	2.3	0.12	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	0.52	2.1	< 0.50	0.70	< 0.50	< 0.50	< 0.50	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50	2.2	5.1	2.3	1.4	620	14	1.2	0.98
Iron (Dissolved)	N	1455	µg/l	5.0	< 5.0	< 5.0	< 5.0	9.2	< 5.0	< 5.0	< 5.0	< 5.0
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	µg/l	0.50	3900	1700	4100	740	1100	34	7.7	7.4
Nickel (Dissolved)	U	1455	µg/l	0.50	23	12	23	21	44	1.5	0.52	0.75
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	180	4.1	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	1.5	1.4	1.3	0.79	1.2	1.2	1.5	1.2
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50	1.4	< 0.50	0.50	< 0.50	0.90	0.87	0.92
Zinc (Dissolved)	U	1455	µg/l	2.5	3.7	19	4.0	35	820	24	7.3	6.0
Chromium (Total)	N	1455	µg/l	0.50	4.4	3.7	5.4	5.9	13	3.7	3.7	4.3
Low-Level Chromium (Hexavalent)	U	1495	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Dissolved Organic Carbon	U	1610	mg/l	2.0	7.4	12	14	140	16	3.7	2.8	4.6
Dissolved Methane	N	1630	mg/l	0.050	0.16	< 0.050	0.33	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Aliphatic TPH >C5-C6	N	1675	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	1675	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Client: Causeway Geotech Ltd		Ch	emtest J	ob No.:	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455		Chem	test Sam	ple ID.:	1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:		Cli	ent Samp	le Ref.:	1	1	1	1	1	1	1	1
		0,	Sample L	ocation:	BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sampl	e Type:	WATER							
			Top De	pth (m):	4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sa	ampled:	07-Mar-2023							
Determinand	Accred.	SOP	Units	LOD								
Total Aliphatic Hydrocarbons	N	1675	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	N	1675	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	1675	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chloromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Vinyl Chloride	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromomethane	N	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chloroethane	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichlorofluoromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trans 1,2-Dichloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloroethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
cis 1,2-Dichloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromochloromethane	N	1760	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1,1-Trichloroethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tetrachloromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloropropene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichloroethane	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichloroethene	N	1760	µg/l	0.10	12	< 0.10	11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichloropropane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibromomethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromodichloromethane	N	1760	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trans-1,3-Dichloropropene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	N	1760	µg/l	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tetrachloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3-Dichloropropane	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Client: Causeway Geotech Ltd		Ch	emtest J	ob No.:	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455		Chem	test Sam	ple ID.:	1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:		Cli	ent Samp	le Ref.:	1	1	1	1	1	1	1	1
		0,	Sample Lo	ocation:	BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sampl	e Type:	WATER							
			Top De	pth (m):	4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sa	ampled:	07-Mar-2023							
Determinand	Accred.	SOP	Units	LOD								
1,2-Dibromoethane	N	1760	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1,1,2-Tetrachloroethane	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Ethylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
m & p-Xylene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
o-Xylene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Styrene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tribromomethane	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2,3-Trichloropropane	N	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
N-Propylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2-Chlorotoluene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3,5-Trimethylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chlorotoluene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tert-Butylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2,4-Trimethylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Sec-Butylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3-Dichlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Isopropyltoluene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,4-Dichlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Butylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dibromo-3-Chloropropane	N	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,2,4-Trichlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Hexachlorobutadiene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2,3-Trichlorobenzene	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Methyl Tert-Butyl Ether	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Nitrosodimethylamine	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Chlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,3-Dichlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,4-Dichlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2-Dichlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachloroethane	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050

Client: Causeway Geotech Ltd		Ch	emtest J	ob No.:	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455		Chem	test Sam	ple ID.:	1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:		Cli	ent Samp	le Ref.:	1	1	1	1	1	1	1	1
			Sample Lo	ocation:	BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sampl	e Type:	WATER							
			Top De	oth (m):	4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sa	ampled:	07-Mar-2023							
Determinand	Accred.	SOP	Units	LOD								
4-Methylphenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Nitrobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Isophorone	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitrophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dimethylphenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dichlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2,4-Trichlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Naphthalene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chloroaniline	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobutadiene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylnaphthalene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorocyclopentadiene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4,6-Trichlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4,5-Trichlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Chloronaphthalene	Ν	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitroaniline	Ν	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dimethylphthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,6-Dinitrotoluene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
3-Nitroaniline	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenzofuran	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chlorophenylphenylether	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dinitrotoluene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluorene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Diethyl Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Nitroaniline	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Azobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Bromophenylphenyl Ether	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pentachlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Anthracene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Carbazole	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Di-N-Butyl Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050

Client: Causeway Geotech Ltd		Ch	emtest J	ob No.:	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455		Chem	test Sam	ple ID.:	1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:		Cli	ent Samp	le Ref.:	1	1	1	1	1	1	1	1
		ŝ	Sample Lo	ocation:	BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sampl	e Type:	WATER							
			Top De	pth (m):	4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sa	ampled:	07-Mar-2023							
Determinand	Accred.	SOP	Units	LOD								
Pyrene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Butylbenzyl Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[a]anthracene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Di-N-Octyl Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[b]fluoranthene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[k]fluoranthene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[a]pyrene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)Anthracene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[g,h,i]perylene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Nitrophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Naphthalene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	Ν	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	Ν	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Anthracene	Ν	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	Ν	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Chrysene	Ν	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	Ν	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	Ν	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
PCB 81	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 77	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 105	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 114	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 123	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 126	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 156	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 157	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<u> Results - Water</u>

Client: Causeway Geotech Ltd		Ch	emtest J	ob No.:	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455		Chem	test Sam	ple ID.:	1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:		Cli	ent Samp	ole Ref.:	1	1	1	1	1	1	1	1
		9	Sample L	ocation:	BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Samp	e Type:	WATER							
			Top De	pth (m):	4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sa	ampled:	07-Mar-2023							
Determinand	Accred.	SOP	Units	LOD								
PCB 167	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 169	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 189	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (12 Congeners)	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2-Chlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2-Methylphenol (o-Cresol)	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
3-Methylphenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
4-Methylphenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2-Nitrophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,4-Dimethylphenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,4-Dichlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,6-Dichlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
4-Chloro-3-Methylphenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,3,4-Trichlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,3,5-Trichlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,3,6-Trichlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,4,6-Trichlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,4,5-Trichlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
4-Nitrophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,3,4,5-Tetrachlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,3,4,6-Tetrachlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2,3,5,6-Tetrachlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
3,4,5-Trichlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2-Methyl-4,6-Dinitrophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
Pentachlorophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
2-Sec-Butyl-4,6-Dinitrophenol	N	1900	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	[C] < 0.20	< 0.20	< 0.20	< 0.20
Total Phenols	N	1900	µg/l	5.00	< 5.0	< 5.0	< 5.0	< 5.0	[C] < 5.0	< 5.0	< 5.0	< 5.0

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1605673	1		BH120	07-Mar-2023	В	Coloured Winchester 1000ml
1605673	1		BH120	07-Mar-2023	В	EPA Vial 40ml
1605673	1		BH120	07-Mar-2023	В	Plastic Bottle 1000ml
1605674	1		BH121	07-Mar-2023	В	Coloured Winchester 1000ml
1605674	1		BH121	07-Mar-2023	В	EPA Vial 40ml
1605674	1		BH121	07-Mar-2023	В	Plastic Bottle 1000ml
1605675	1		BH123	07-Mar-2023	В	Coloured Winchester 1000ml
1605675	1		BH123	07-Mar-2023	В	EPA Vial 40ml
1605675	1		BH123	07-Mar-2023	В	Plastic Bottle 1000ml
1605676	1		BH125	07-Mar-2023	В	Coloured Winchester 1000ml
1605676	1		BH125	07-Mar-2023	В	EPA Vial 40ml
1605676	1		BH125	07-Mar-2023	В	Plastic Bottle 1000ml
1605677	1		BH128	07-Mar-2023	BC	EPA Vial 40ml
1605677	1		BH128	07-Mar-2023	BC	Plastic Bottle 1000ml
1605678	1		SW1	07-Mar-2023	В	Coloured Winchester 1000ml
1605678	1		SW1	07-Mar-2023	В	EPA Vial 40ml
1605678	1		SW1	07-Mar-2023	В	Plastic Bottle 1000ml
1605679	1		SW2	07-Mar-2023	В	Coloured Winchester 1000ml
1605679	1		SW2	07-Mar-2023	В	EPA Vial 40ml
1605679	1		SW2	07-Mar-2023	В	Plastic Bottle 1000ml
1605680	1		SW3	07-Mar-2023	В	Coloured Winchester 1000ml

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1605680	1		SW3	07-Mar-2023	В	EPA Vial 40ml
1605680	1		SW3	07-Mar-2023	В	Plastic Bottle 1000ml
Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	рН	pH Meter
1150	Dissolved Oxygen	Dissolved Oxygen (DO)	Electrometric determination (on site preferred), using oxygen sensitive membrane electrode.
1160	Aggressive Dissolved CO2	Aggressive Dissolved CO2	Titration
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg I-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl- pphenylenediamine.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Waters by GC-MS	ICES7 PCB congeners	Solvent extraction / GCMS detection
1900	Phenols in Waters by GC-MS	Approximately 24 substituted Phenols, including Chlorophenols	Solvent extraction / GCMS detection

Report Information

Кеу		
U	UKAS accredited	
Μ	MCERTS and UKAS accredited	
Ν	Unaccredited	
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis	
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis	
Т	This analysis has been subcontracted to an unaccredited laboratory	
I/S	Insufficient Sample	
U/S	Unsuitable Sample	
N/E	not evaluated	
<	"less than"	
>	"greater than"	
SOP	Standard operating procedure	
LOD	Limit of detection	

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

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



APPENDIX J SPT HAMMER ENERGY MEASUREMENT REPORT



Project Number:		22-1041A	
Project Name:	3FM Planning and Design GI Lot A DPC Lands		
BH Location	BH Location Driller SPT Hammer		
BH101	CC / GT	0197 / 0208	
BH102	JFSC	0696	
BH103	JFSC	0696	
BH105	JFSC	0696	
BH110	JC	1367	
BH112	JC	1367	
BH119	CC	0197	
BH120	CC / GT	0197 / 0208	
BH121	CC	0197	
BH122	CC	0197	
BH123	BM / GT	1386 / 0208	
BH124	BM / JG	1386 / 1387	
BH125	BM / JG	1386 / 1387	
BH126	JM	AI2	
BH126A	JM	AI2	
BH127	JM	AI2	
BH128	JM	AI2	
BH130	CC	0197	
BH131	CC	0197	

in accordance with BSEN ISO 22476-3:2005

Southern Testing	
Unit 11	
Charlwoods Road	
East Grinstead	
West Sussex	
RH19 2HU	

SPT Hammer Ref:	T30491
Test Date:	18/02/2023
Report Date:	20/02/2023
File Name:	T30491.spt
Test Operator:	RWS

Instrumented Rod Data

Diameter d _r (mm):	54
Wall Thickness t _r (mm):	6.7
Assumed Modulus E _a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

SPT Hammer Information

Hammer Mass	m (kg):	63.5
Falling Height	h (mm):	760
SPT String Leng	gth L (m):	10.0

Comments / Location

CAUSEWAY



The recommended calibration interval is 12 months





Signed: Bob Stewart Title: Technician

in accordance with BSEN ISO 22476-3:2005

Southern Testing Unit 11 **Charlwoods Road East Grinstead** West Sussex **RH19 2HU**

Instrumented Rod Data

Diameter d _r (mm):	54
Wall Thickness t _r (mm):	6.7
Assumed Modulus E _a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

Test Date:	18/02/2023
Report Date:	20/02/2023
File Name:	0197spt
Test Operator:	RWS

SPT Hammer Ref: 0197.

SPT Hammer Information

Hammer Mass	m (kg):	63.5
Falling Height	h (mm):	760
SPT String Leng	gth L (m):	10.0

Comments / Location

CAUSEWAY





Calculations

Energy Ratio E _r (%	%):	75
Measured Energy E _{meas}	(J):	356
Theoretical Energy E _{theor}	(J):	473
Area of Rod A (mm2):		996

The recommended calibration interval is 12 months





Signed: **Bob Stewart** Title: Technician

in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref:0208.Test Date:18/02/2023Report Date:20/02/2023File Name:0208..sptTest Operator:RWS

Instrumented Rod Data

Diameter d _r (mm):	54
Wall Thickness t _r (mm):	6.7
Assumed Modulus E _a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

SPT Hammer Information

Hammer Mass	m (kg):	63.5
Falling Height	h (mm):	760
SPT String Leng	gth L (m):	10.0

Comments / Location

CAUSEWAY



The recommended calibration interval is 12 months





Signed: Bob Stewart Title: Technician

in accordance with BSEN ISO 22476-3:2005

Southern Testing Unit 11 Charlwoods Road East Grinstead West Sussex RH19 2HU

Instrumented Rod Data

Diameter d _r (mm):	54
Wall Thickness t _r (mm):	6.7
Assumed Modulus E _a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

Test Date:	18/02/2023
Report Date:	20/02/2023
File Name:	T7spt
Test Operator:	RWS

SPT Hammer Ref: T7.

SPT Hammer Information

Hammer Mass	m (kg):	63.5
Falling Height	h (mm):	760
SPT String Len	gth L (m):	10.0

Comments / Location

CAUSEWAY





Calculations

Energy Ratio E _r (%	⁄₀):	75
Measured Energy E _{meas}	(J):	354
Theoretical Energy E _{theor}	(J):	473
Area of Rod A (mm2):		996

The recommended calibration interval is 12 months





Signed: Bob Stewart Title: Technician

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in accordance with BSEN ISO 22476-3:2005

Southern Testing Unit 11 Charlwoods Road East Grinstead West Sussex RH19 2HU

Instrumented Rod Data

Diameter d _r (mm):	54
Wall Thickness t _r (mm):	6.7
Assumed Modulus E _a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

SPT Hammer Ref:	1386.
Test Date:	18/02/2023
Report Date:	20/02/2023
File Name:	1386spt
Test Operator:	RWS

SPT Hammer Information

Hammer Mass	m (kg):	63.5
Falling Height	h (mm):	760
SPT String Leng	gth L (m):	10.0

Comments / Location

CAUSEWAY





Calculations

Energy Ratio E _r (%	%):	65
Measured Energy E _{meas}	(J):	306
Theoretical Energy E _{theor}	(J):	473
Area of Rod A (mm2):		996

The recommended calibration interval is 12 months







Signed: Bob Stewart Title: Technician



in accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:	AI2
Test Date:	05/01/2023
Report Date:	05/01/2023
File Name:	AI2.spt
Test Operator:	RC

Instrumented Rod Data

Diameter d _r (mm):	54
Wall Thickness t _r (mm):	6.5
Assumed Modulus E _a (GPa):	208
Accelerometer No.1:	69556
Accelerometer No.2:	69558

SPT Hammer Information

Hammer Mass m (kg	g): 63.5
Falling Height h (mn	n): 760
SPT String Length L (r	n): 17.0

Comments / Location









Calculations

Energy Ratio E _r (%	%):	74
Measured Energy E _{meas}	(J):	352
Theoretical Energy E _{theor}	(J):	473
Area of Rod A (mm2):		970





APPENDIX K GROUNDWATER AND GAS MONITORING RECORDS



GROUNDWATER MONITORING RECORDS

Project Number:

22-1041A



Project Name:

3FM Planning and Design GI Lot A DPC Lands

		Borehole		Depth to water level (mbgl)										
Borehole Number	Number Type Elevation Date Installe (mOD)	Date Installed	Depth Range (mbgl)	15-Feb	16-Feb	17-Feb	16-Mar	23-Mar	07-Apr	14-Apr	14-Jul	08-Aug	09-Aug	
BH102	50mm	3.05	04/01/2023	0.50-2.40	-	-	Dry	Dry						
BH103	50mm	3.52	06/01/2023	0.50-3.70	NA	NA								
BH105	50mm	3.55	20/01/2023	0.50-2.20	NA	NA								
BH112	50mm	4.23	07/02/2023	0.50-3.40	Dry	-	-	Dry	3.25	Dry	Dry	4.64	3.00	3.00
BH120	50mm	5.13	23/01/2023	6.50-20.00	-	4.65	-	4.02	4.90	4.45	4.64	4.47	4.18	4.40
BH121	50mm	4.81	17/11/2023	0.50-5.50	-	4.20	-	3.93	4.25	4.15	4.10	4.20	3.72	3.72
BH122	50mm	4.72	20/11/2022	0.50-5.00	-	-	-	-	NA	NA	NA	NA	NA	NA
BH123	50mm	4.58	18/12/2022	4.50-6.50	4.13	-	-	3.80	3.91	4.09	3.75	3.88	NA	NA
BH124	50mm	4.75	18/12/2022	0.50-1.50	-	-	-	0.94	-	1.47	0.98	Dry	0.70	0.87
BH125	50mm	4.94	17/01/2022	0.50-5.00	4.52	-	-	2.04	4.40	4.46	4.42	4.45	4.32	4.28
BH126A	50mm	4.89	01/12/2022	0.50-1.50	Dry	-	-	NA	Dry	Dry	NA	NA	NA	NA
BH127	50mm	4.65	01/12/2022	0.50-2.50	Dry	-	-	NA	Dry	Dry	NA	NA	NA	NA
BH128	50mm	4.71	01/12/2022	0.50-2.10	1.60	-	-	NA	0.95	1.64	NA	1.82	NA	NA
	August 2023													



Site:		3FM Planning Desi	gn GI Lot A DP	C Lands		Equipment:		Geotechnica	al Instruments	GA5000		
Project No.:		22-1041A	0			Ambient	Barometric					
Date:		16/03/2023				Conditions	Pressure	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H₂S (ppm)
Weather:		Dry				Before:	994	0.0	0.1	21.4	0	0
Engineer:		RS				After:	994	0.0	0.2	21.1	0	0
BH102		G	as readings			Flow	rates					
Time (sec)	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	r monitoring		mbgl
30	0.0	4.6	15.5	0	0	30	0.1		Depth to top	of water		Dry
60	0.0	6.6	12.5	0	0	60	0.2					
90	0.0	6.2	13.0	0	0	90	0.2					
120	0.0	5.6	13.7	0	0	120	0.2					
150	0.0	5.7	13.7	0	0	150	0.2	-				
180	0.0	5.5	13.9	0	0	180	0.2	-				
300	0.0	2.2	14.1	0	0	300	0.2					
500	0.0	4.5	17.7	0	U	500	0.2]				
BH103	011 (04)	G	as readings			Flow	rates		Groundwate	r monitoring		mbgl
Time (sec)	CH ₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Donth to ton	ofwator		
50 60	-	-	-	-	-	60	-		Depth to top	UI WALEI		-
90	-	_	-	-	-	90	-					
120	-	-	-	-	-	120	-	1		No Acces	s to BH103	
150	-	-	-	-	-	150	-	1				
180	-	-		-	-	180	-]				
240	-	-	-	-	-	240	-					
300	-	-	-	-	-	300	-					
BH105		G	as readings			Flow	rates		Construction of the second			
Time (sec)	CH4 (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	rmonitoring		inpăi
30	-	-	-	-	-	30	-		Depth to top	of water		-
60	-	-	-	-	-	60	-					
90	-	-	-	-	-	90	-			No Acces	s to BH105	
120	-	-	-	-	-	120	-	-				
150	-	-	-	-	-	150	-	-				
240	-	-	-	-	-	240	-					
300	-	-	-	_	-	300	-					
011440				1		<u>Eleve</u>		1				
BH112 Time (see)				CO (nnm)		FIOW	rates		Groundwate	r monitoring		mbgl
30		4.2	15 5		0	30	0.1		Depth to top	of water		Dry
60	0.0	6.6	12.5	0	0	60	0.2	-				5.7
90	0.0	6.2	13.0	0	0	90	0.2					
120	0.0	5.6	13.7	0	0	120	0.2					
150	0.0	5.7	13.7	0	0	150	0.2					
180	0.0	5.5	13.9	0	0	180	0.2					
240	0.0	2.2	14.1	0	0	240	0.2	-				
300	0.0	4.9	14.4	U	U	300	0.2	J				
BH120		G	as readings			Flow	rates		Groundwate	r monitoring		mbal
Time (sec)	CH4 (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	monitoring		mbgi
30	0.5	0.8	19.1	2	0	30	-4.7		Depth to top	of water		4.02
60	0.5	0.9	18.8	1	0	60	-3.8					
90	0.6	1.1	18.4	1	0	90	-3.0					
120	0.7	1.3 1 <i>A</i>	17.9	1	0	120	-2.4					
180	0.9	1.4	17.2	1	0	180	-1.3					
240	1.5	2.0	16.5	1	0	240	-0.4	1				
300	6.3	2.7	14.4	1	0	300	-0.1	1				
400	16.5	3.4	11.6	1	0	400	-0.1]				
500	26.5	4.1	8.9	1	0	500	0.0					
600	34.4	4.8	6.6	1	0	600	0.1					
700	41.0	5.3	4.8	1	0	700	0.1					
800	45.9	5.7	3.5	1	0	800	0.1					
900	49.5	6.0	3.2	1	U	900	0.2	1				



n)

Site:	3FM Planning Design GI Lot A DPC Lands	Equipment:		Geotechnical Instruments GA5000					
Project No.:	22-1041A	Ambient	Barometric	CH (%)	CO (%)	0 (%)	(0 (nnm)		
Date:	16/03/2023	Conditions	Pressure		CO ₂ (70)	02 (70)	CO (ppili)	п ₂ 3 (ррі	
Weather:	Dry	Before:	994	0.0	0.1	21.4	0	0	
Engineer:	RS	After:	994	0.0	0.2	21.1	0	0	

BH121	Gas readings									
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time				
30	0.0	1.2	14.9	0	0	30				
60	0.0	1.3	14.7	0	0	60				
90	0.0	1.3	14.7	0	0	90				
120	0.0	1.3	14.7	0	0	12				
150	0.0	1.3	14.8	0	0	15				
180	0.0	1.3	14.8	0	0	18				
240	0.0	1.2	14.9	0	0	24				
300	0.0	1.2	15.1	0	0	30				

	Flow	Flow rates								
)	Time (sec)	Time (sec) Flow (l/h)								
	30	0.1								
	60	0.1								
	90	0.1								
	120	0.1								
	150	0.1								
	180	0.1								
	240	0.1								
	300	0.1								

Flow (l/h) -15.7 -14.5 -13.3 -12.1 -11.2 -10.0 -8.0 -6.2

Groundwater monitoring	mbgl
Depth to top of water	3.93

BH123		Gas readings										
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow					
30	6.2	2.1	17.7	1	0	30	-1					
60	5.6	1.9	17.9	0	0	60	-1					
90	5.1	1.7	18.2	0	0	90	-1					
120	4.6	1.5	18.5	0	0	120	-1					
150	4.2	1.4	18.7	0	0	150	-1					
180	4.0	1.3	18.9	0	0	180	-1					
240	3.5	1.1	19.1	0	0	240	-8					
300	3.1	1.0	19.4	0	0	300	-6					

Groundwater monitoring	mbgl
Depth to top of water	3.80

BH124		Flow rates					
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	44.8	11.2	0.7	2	0	30	0.1
60	44.7	11.1	0.3	2	0	60	0.1
90	44.9	11.2	0.2	1	0	90	0.2
120	45.3	11.2	0.2	1	0	120	0.2
150	45.6	11.2	0.2	1	0	150	0.2
180	45.7	11.2	0.1	1	0	180	0.2
240	45.9	11.2	0.1	1	0	240	0.2
300	45.9	11.3	0.1	1	0	300	0.1

BH125		Flow rates					
Time (sec)	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	0.0	0.3	24.4	0	0	30	0.1
60	0.0	0.2	20.9	0	0	60	0.1
90	0.0	0.2	21.1	0	0	90	0.1
120	0.0	0.1	21.2	0	0	120	0.1
150	0.0	0.1	21.2	0	0	150	0.1
180	0.0	0.1	21.2	0	0	180	0.1
240	0.0	0.1	21.3	0	0	240	0.1
300	0.0	0.1	21.3	0	0	300	0.1

BH126		Ga	Flow	rates			
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl
Depth to top of water	0.95

Groundwater monitoring	mbgl
Depth to top of water	2.04

Groundwater monitori	ng	mbgl
Depth to top of water		-



H₂S (ppm)

0

0

Site:	3FM Planning Design GI Lot A DPC Lands	Equipment
Project No.:	22-1041A	Ambient
Date:	16/03/2023	Conditions
Weather:	Dry	Before:
Engineer:	RS	After:

BH127	Gas readings							
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (s		
30	-	-	-	-	-	30		
60	-	-	-	-	-	60		
90	-	-	-	-	-	90		
120	-	-	-	-	-	120		
150	-	-	-	-	-	150		
180	-	-	-	-	-	180		
240	-	-	-	-	-	240		
300	-	-	-	-	-	300		

Ambient Conditions	Barometric Pressure	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)		
Before:	994	0.0	0.1	21.4	0		
After:	994	0.0	0.2	21.1	0		
		_					
Flow	rates		Groundwato	monitoring			
Time (sec)	Flow (l/h)		Groundwater monitoring				

Geotechnical Instruments GA5000

Groundwater monitoring	mbgl
Depth to top of water	-

No Access to BH127

BH128		Ga	Flow rates				
Time (sec)	CH4 (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl
Depth to top of water	-



Site:		3FM Planning Desi	gn GI Lot A DP	C Lands		Equipment:		Geotechnica	al Instruments	GA5000		
Project No.:		22-1041A				Ambient	Barometric		CO (44)	0 (%)	<u>() (and)</u>	
Date:		14/04/2023				Conditions	Pressure		CU ₂ (%)	02 (%)	CO (ppm)	н ₂ 5 (ррп
Neather:		Dry				Before:	1000	0.0	0.2	21.0	0	0
ngineer:		MRG				After:	1000	0.0	0.1	21.1	0	0
BH102		G	ias readings			Flow	rates					
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	r monitoring		mbgl
30	0.0	0.1	20.8	0	0	30	0.1		Depth to top	of water		Dry
60	0.0	0.1	20.7	0	0	60	0.1					
90	0.0	0.1	20.7	0	0	90	0.1					
120	0.0	0.1	20.7	0	0	120	0.1					
150	0.0	0.1	20.7	0	0	150	0.1					
180	0.0	0.1	20.7	0	0	180	0.1					
240	0.0	0.1	20.7	0	0	240	0.1					
300	0.0	0.1	20.7	0	0	300	0.1					
BH103		G	ias readings			Flow	rates					
Time (sec)	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	r monitoring		mbgl
30	-	-	-	-	-	30	-		Depth to top	of water		-
60	-	-	-	-	-	60	-					
90	-	-		-	-	90	-]		No Asses		
120	-	-	-	-	-	120	-]		NU ACCES		
150	-	-	-	-	-	150	-					
180	-	-	-	-	-	180	-					
240	-	-	-	-	-	240	-					
300	-	-	-	-	-	300	-					
BH105		G	ias readings			Flow	rates		.			
Time (sec)	CH ₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	r monitoring		mbgl
30	-	-	-	-	-	30	-		Depth to top	of water		-
60	-	-	-	-	-	60	-					
90	-	-	-	-	-	90	-			No Acces	s to BH105	
120	-	-	-	-	-	120	-			110 /10003	5 to 511105	
150	-	-	-	-	-	150	-					
180	-	-	-	-	-	180	-					
240	-	-	-	-	-	240	-					
300	-	-	-	-	-	300	-	<u> </u>				
BH112		G	ias readings			Flow	rates		Groundwate	r monitoring		mbal
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	inonitoring		mbgi
30	0.0	0.1	20.8	0	0	30	0.2		Depth to top	of water		Dry
60	0.0	0.1	20.8	0	0	60	0.2	4				
90	0.0	0.1	20.8	0	0	90	0.1	_				
120	0.0	0.1	20.8	0	0	120	0.1	4				
150	0.0	0.1	20.8	0	0	150	0.1	4				
180	0.0	0.1	20.8	0	0	180	0.1	-				
240	0.0	0.1	20.8	0	0	240	0.1					
300	0.0	0.1	20.8	0	0	300	0.1]				
BH120		G	ias readings			Flow	rates					
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	r monitoring		mogi
30	0.0	6.9	20.2	0	0	30	8.1		Depth to top	of water		4.64
	59.4	7.2	6.3	0	0	60	9.2]				
60	1	7.3	5.8	0	0	90	9.8					
60 90	40.6				0	120	10.7					
60 90 120	40.6 42.1	7.6	5.2	0	0	-						
60 90 120 150	40.6 42.1 43.1	7.6 7.7	5.2 4.8	0	0	150	10.7					
60 90 120 150 180	40.6 42.1 43.1 43.6	7.6 7.7 7.8	5.2 4.8 4.5	0 0 0	0	150 180	10.7 10.8	-				
60 90 120 150 180 240	40.6 42.1 43.1 43.6 43.6	7.6 7.7 7.8 7.8	5.2 4.8 4.5 4.5	0 0 0 0	0 0 0	150 180 240	10.7 10.8 10.8	-				



om)

Site:	3FM Planning Design GI Lot A DPC Lands	Equipment:		Geotechnical Instruments GA5000						
Project No.:	22-1041A	Ambient	Barometric	CH (%)	CO (%)	0 (%)	() (nnm)	LIS (n		
Date:	14/04/2023	Conditions	Pressure		$CU_2(70)$	02 (70)	CO (ppm)	п ₂ 5 (р		
Weather:	Dry	Before:	1000	0.0	0.2	21.0	0	0		
Engineer:	MRG	After:	1000	0.0	0.1	21.1	0	0		

BH121	Gas readings					
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time
30	0.0	2.1	18.4	0	0	30
60	0.0	1.8	18.3	0	0	60
90	0.0	1.9	17.6	0	0	90
120	0.0	1.5	15.4	0	0	12
150	0.0	1.5	15.2	0	0	15
180	0.0	1.5	14.8	0	0	18
240	0.0	1.5	14.8	0	0	24
300	0.0	1.5	14.8	0	0	30

	Flow	Flow rates				
)	Time (sec)	Flow (l/h)				
	30	0.1				
	60	0.1				
	90	0.1				
	120	0.1				
	150	0.1				
	180	0.1				
	240	0.1				
	300	0.1				

Flow (l/h)

5.2 5.6 5.7 5.7 5.7 5.7 5.7 5.7

Groundwater monitoring	mbgl
Depth to top of water	4.10

BH123	Gas readings					Flow	rates
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow
30	2.9	1.3	18.7	0	0	30	5
60	2.8	1.3	18.7	0	0	60	5
90	2.2	1.0	19.0	0	0	90	5
120	1.8	0.9	19.3	0	0	120	5
150	1.7	0.8	19.3	0	0	150	5
180	1.5	0.8	19.3	0	0	180	5
240	1.4	0.8	19.3	0	0	240	5
300	1.4	0.8	19.3	0	0	300	5

Groundwater monitoring	mbgl
Depth to top of water	3.75

BH124	Gas readings					Flow	rates
Гime (sec)	CH4 (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	1.5	1.3	19.0	0	0	30	0.1
60	2.2	2.0	17.8	0	0	60	0.1
90	4.7	3.6	15.3	0	0	90	0.1
120	6.2	5.1	12.3	0	0	120	0.1
150	6.8	5.4	11.6	0	0	150	0.1
180	6.8	5.5	11.4	0	0	180	0.1
240	6.9	5.6	11.3	0	0	240	0.1
300	6.8	5.6	11.3	0	0	300	0.1

BH125		Flow	rates				
Time (sec)	CH ₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	0.0	0.3	20.3	0	0	30	5.2
60	0.0	0.3	20.3	0	0	60	4.1
90	0.0	0.3	20.3	0	0	90	3.8
120	0.0	0.4	20.1	0	0	120	3.5
150	0.0	0.4	20.1	0	0	150	3.6
180	0.0	0.4	20.1	0	0	180	3.4
240	0.0	0.4	20.1	0	0	240	2.8
300	0.0	0.4	20.1	0	0	300	2.5

BH126	Gas readings					Flow	rates
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl
Depth to top of water	0.98

Groundwater monitoring	mbgl
Depth to top of water	4.42

Groundwater monitoring	mbgl
Depth to top of water	-



H₂S (ppm)

0

0

CO (ppm)

0

0

Site:	3FM Planning Design GI Lot A DPC Lands	Equipment:
Project No.:	22-1041A	Ambient
Date:	14/04/2023	Conditions
Weather:	Dry	Before:
Engineer:	MRG	After:

BH127	Gas readings						
Time (sec)	CH ₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (s	
30	-	-	-	-	-	30	
60	-	-	-	-	-	60	
90	-	-	-	-	-	90	
120	-	-	-	-	-	120	
150	-	-	-	-	-	150	
180	-	-	-	-	-	180	
240	-	-	-	-	-	240	
300	-	-	-	-	-	300	

	After:	1000	0.0
	Flow	rates	
1	Time (sec)	Flow (l/h)	
	30	-	
	60	-	
	90	-	
	120	-	
	150	-	
	180	-	
	240	-	

Barometric Pressure

1000

Groundwater monitoring	mbgl
Depth to top of water	-

0₂ (%)

21.0

21.1

Geotechnical Instruments GA5000

CO₂ (%)

0.2

0.1

CH₄ (%)

0.0

No Access to BH127

BH128	Gas readings					Flow	rates
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl
Depth to top of water	-



Project No.: Date: Weather: Engineer: BH102		22-1041A 14/07/2023	6. 2007 D1			Leaspheric		200000000000000000000000000000000000000		2, 19999		
Date: Weather: Engineer: BH102		14/07/2023				Ambient.	Barometric					
Weather: Engineer: BH102						Conditions	Pressure	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)
Engineer: BH102		Wet				Before:	1005	0.1	0.0	21.2	1	0
BH102		RS				After:	1005	0.1	0.0	21.1	0	0
DITIOL		G	as readings			Flow	rates	1				
Time (sec)	CH₄ (%)	CO ₂ (%)	0, (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (I/h)		Groundwate	r monitoring		mbgl
30	0.1	1.0	18.3	1	0	30	0.5		Depth to top	of water		Dry
60	0.1	1.0	18.1	1	0	60	0.5					
90	0.1	1.0	18.0	1	0	90	0.5					
120	0.0	1.0	17.9	0	0	120	0.5					
150	0.1	1.1	17.9	1	0	150	0.5					
180	0.1	1.1	17.8	0	0	180	0.5					
240	0.1	1.1	17.8	0	0	240	0.5					
300	0.1	1.1	17.8	0	0	300	0.5					
BH103		Ga	as readings			Flow	rates		Croundwata	r monitoring		mhal
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	rmonitoring		ingi
30	-	-	-	-	-	30	-		Depth to top	of water		-
60	-	-	-	-	-	60	-					
90	-	-	-	-	-	90	-	-		No Access	to BH103	
120	-	-	-	-	-	120	-					
150	-	-	-	-	-	150	-	-				
180	-	-	-	-	-	180	-					
240	-	-	-	-	-	240	-					
500	-	-	-	-	-	500	-					
BH105		Ga	as readings			Flow	rates		Groundwate	r monitoring		mbgl
Time (sec)	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Double to the	- f t		
30	-	-	-	-	-	30	-	-	Depth to top	of water		-
90	-	-	-	-	-	90	-					
120			-		_	120				No Access	to BH105	
150	-	-	-	-	-	150	-					
180	-	-	-	-	-	180	-					
240	-	-	-	-	-	240	-					
300	-	-	-	-	-	300	-					
BH112		G	as readings	• 		Flow	rates	1				
Time (sec)	CH₄ (%)	CO ₂ (%)	0, (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (I/h)		Groundwate	r monitoring		mbgl
30		2. 7	2,		2	30			Depth to top	of water		
60						60						
90						90						
120						120						
150						150						
180			ļ	ļ		180						
240						240						
300						300						
BH120		Ga	is readings			Flow	rates		Crownshurt			and the set
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H₂S (ppm)	Time (sec)	Flow (l/h)		Groundwate	r monitoring		mbgi
30	40.2	14.6	5.3	2	0	30	0.6		Depth to top	of water		4.47
60	40.5	14.8	4.7	2	0	60	0.7					
90	40.7	14.9	4.5	1	0	90	0.7					
120	41.0	14.9	4.4	1	0	120	0.6					
150	41.5	15.1	4.2	1	0	150	0.6					
180	42.0	15.4	3.9	1	0	180	0.6					
240	43.4	15.9	3.4	1	0	240	0.6					
300	44.8	16.3	2.9	1	U	300	0.6	J				



H₂S (ppm)

0

0

Site:	3FM Planning Design GI Lot A DPC Lands	Equipment: C		Geotechnical Instruments GA5000				
Project No.:	22-1041A	Ambient	Barometric	CH (%)	CO (%)	0 (%)	(0 (nnm)	
Date:	14/07/2023	Conditions	Pressure		CU ₂ (70)	02 (70)	CO (ppin)	
Weather:	Wet	Before:	1005	0.1	0.0	21.2	1	
Engineer:	RS	After:	1005	0.1	0.0	21.1	0	

BH121	Gas readings						
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (s	
30	0.1	4.9	7.1	1	0	30	
60	0.1	4.9	7.1	1	0	60	
90	0.1	4.9	7.0	1	0	90	
120	0.1	4.9	6.9	1	0	120	
150	0.1	4.9	6.9	1	0	150	
180	0.1	4.9	6.9	1	0	180	
240	0.1	4.9	6.7	0	0	240	
300	0.1	2.0	6.5	0	0	300	

/ il certi	000	011	0.0
Flow	rates		Groundur
Time (sec)	Flow (l/h)		Groundwa
30	0.5		Depth to t
60	0.5		
90	0.5		
120	0.5		
150	0.5		
180	0.5		

0.5 0.5

Flow (l/h) -19.8 -18.9 -18.0 -16.9 -16.0 -15.2 -13.6 -12.2

Groundwater monitoring	mbgl
Depth to top of water	4.20

BH123		Flow	rates				
Time (sec)	CH4 (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow
30	19.5	8.9	11.2	3	0	30	-1
60	19.1	8.8	11.3	2	0	60	-1
90	18.9	8.7	11.4	2	0	90	-1
120	18.7	8.6	11.6	2	0	120	-1
150	18.0	8.4	11.8	2	0	150	-1
180	17.0	7.8	12.4	2	0	180	-1
240	15.2	7.4	13.1	2	0	240	-1
300	14.8	7.2	13.3	2	0	300	-1

Groundwater monitoring	mbgl
Depth to top of water	3.88

s	Groundwater monitoring	mbøl
ow (l/h)		
0.5	Depth to top of water	Dry
0.5		

BH124	Gas readings				Flow	rates	
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l
30	28.1	20.7	0.7	9	2	30	0.5
60	28.5	21.0	0.2	8	3	60	0.5
90	29.1	21.1	0.1	8	3	90	0.5
120	29.3	21.1	0.1	7	3	120	0.5
150	29.4	21.2	0.1	7	3	150	0.5
180	29.5	21.1	0.1	7	3	180	0.5
240	29.3	21.0	0.2	6	3	240	0.5
300	29.7	21.2	0.0	6	3	300	0.5

BH125	Gas readings					Flow	rates
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	3.9	13.6	2.8	3	0	30	0.5
60	3.9	13.6	2.8	3	0	60	0.5
90	3.9	13.7	2.9	3	0	90	0.5
120	4.1	14.1	2.5	3	0	120	0.6
150	4.9	15.4	1.9	3	0	150	0.6
180	5.2	16.0	1.6	3	0	180	0.6
240	6.8	18.0	0.6	3	0	240	0.6
300	7.6	18.8	0.2	3	0	300	0.6

BH126	Gas readings					Flow	rates
Time (sec)	CH ₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H₂S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl
Depth to top of water	4.45

Groundwater monitoring	mbgl
Depth to top of water	-



Site:	3FM Planning Design GI Lot A DPC Lands	Equipm
Project No.:	22-1041A	Ambi
Date:	14/07/2023	Condit
Weather:	Wet	Befo
Engineer:	RS	Afte

Equipment:		Geotechnical Instruments GA5000				
Ambient Conditions	Barometric Pressure	CH₄ (%)	C0₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)
Before:	1005	0.1	0.0	21.2	1	0
After:	1005	0.1	0.0	21.1	0	0

BH127	Gas readings						
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)		Time (se
30	-	-	-	-	-		30
60	-	-	-	-	-		60
90	-	-	-	-	-		90
120	-	-	-	-	-		120
150	-	-	-	-	-		150
180	-	-	-	-	-		180
240	-	-	-	-	-		240
300	-	-	-	-	-		300

	Flow	Flow rates						
)	Time (sec)	Flow (l/h)						
	30	-						
	60	-						
	90	-						
	120	-						
	150	-						
	180	-						
	240	-						
	300	-						

Groundwater monitoring	mbgl
Depth to top of water	-

BH128	Gas readings					Flow	rates
Time (sec)	CH4 (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	0.1	1.4	20.7	0	0	30	0.5
60	0.0	1.4	20.9	0	0	60	0.5
90	0.0	1.6	20.8	0	0	90	0.5
120	0.0	1.9	20.7	0	0	120	0.5
150	0.0	2.3	20.4	0	0	150	0.5
180	0.0	2.6	20.1	0	0	180	0.5
240	0.0	3.1	19.5	0	0	240	0.5
300	0.1	3.4	19.0	0	0	300	0.5

Groundwater monitoring	mbgl
Depth to top of water	1.82



Site:		3FM Planning Desi	gn GI Lot A DP	C Lands		Equipment:		Geotechnica	al Instruments	GA5000		
Project No.:		22-1041A	0			Ambient	Barometric					
ate:		08/08/2023				Conditions	Pressure	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppr
/eather:		Dry; LOW TIDE				Before:	1015	0.0	0.0	21.2	1	0
ngineer:		EGA				After:	1015	0.0	0.0	21.3	1	0
		-				El						
BH102		G (%)	as readings	60 (FIOW	rates		Groundwate	r monitoring		mbgl
lime (sec)	CH ₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	FIOW (I/n)		Donth to ton	ofwator		Dati
30	0.1	0.0	21.1	1	0	30	0.1	_	Depth to top	OI Water		Dry
00	0.1	0.0	21.1	1	1	80	0.1					
120	0.1	0.0	21.1	1	1	120	0.1					
120	0.1	0.1	21.0	1	1	150	0.1	_				
180	0.1	0.1	21.0	1	1	180	0.1	-				
240	0.1	0.1	21.0	1	1	240	0.1					
300	0.1	0.1	21.0	1	1	300	0.1					
500	0.1	0.1	21.0	-	-	500	0.1	1				
BH103		G	as readings			Flow	rates		Groundwate	r monitoring		mbgl
ime (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)					
30	-	-	-	-	-	30	-	4	Depth to top	of water		-
60	-	-	-	-	-	60	-	4				
90	-	-	-	-	-	90	-	-		No Acces	s to BH103	
120	-	-	-	-	-	120	-	-				
100	-	-	-	-	-	150	-	-				
240	-	-	-	-	-	240	-					
300						300		_				
500						500		1				
BH105	CH. (%)	G	as readings		H-S (nnm)	Flow	rates		Groundwate	r monitoring		mbgl
30	-	-	-			30			Depth to top	of water		-
60	-	-	-	-	-	60	-					l
90	-	-	-	-	-	90	-					
120	-	-	-	-	-	120	-			No Acces	s to BH105	
150	-	-	-	-	-	150	-					
180	-	-	-	-	-	180	-					
240	-	-	-	-	-	240	-					
300	-	-	-	-	-	300	-					
BH112		G	as readings			Flow	rates					
ïme (sec)	CH₄ (%)	C0 ₂ (%)	0, (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	r monitoring		mbgl
30	0.1	0.2	20.9	1	0	30	0.1		Depth to top	of water		3.00
60	0.1	0.3	20.6	1	0	60	0.1	1	. <u> </u>			•
90	0.1	0.7	20.0	1	0	90	0.1]				
120	0.1	0.5	20.5	1	0	120	0.1					
150	0.1	0.3	20.5	1	0	150	0.1					
180	0.1	0.1	20.8	1	0	180	0.1	1				
240	0.1	3.2	18.5	1	0	240	0.1					
300	0.0	4.0	15.8	1	1	300	0.1					
BH120		G	as readings			Flow	rates		Chaundhuista			ma ha al
Time (sec)	CH ₄ (%)	C0 ₂ (%)	02 (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	monitoring		mogi
30	27.2	10.3	8.7	2	0	30	3.3	1	Depth to top	of water		4.18
	27.7	10.5	8.3	2	0	60	3.8	1				
60		10.7	8.0	2	0	90	4.1	1				
60 90	28.3			2	0	120	4.3	1				
60 90 120	28.3 28.7	10.8	7.7	2								
60 90 120 150	28.3 28.7 29.1	10.8 11.0	7.7 7.5	2	0	150	4.6					
60 90 120 150 180	28.3 28.7 29.1 29.7	10.8 11.0 11.2	7.7 7.5 7.2	2	0 0	150 180	4.6					
60 90 120 150 180 240	28.3 28.7 29.1 29.7 31.6	10.8 11.0 11.2 12.0	7.7 7.5 7.2 6.3	2 2 2 2	0 0 0	150 180 240	4.6 4.7 4.8	-				



H₂S (ppm)

0

0

Site:	3FM Planning Design GI Lot A DPC Lands	Equipment:	Geotechnical Instruments GA5000					
Project No.:	22-1041A	Ambient	Barometric	CH (%)	CO (%)	0 (%)	(0 (nnm)	
Date:	08/08/2023	Conditions	Pressure		CO ₂ (70)	02 (70)	CO (ppin)	
Weather:	Dry; LOW TIDE	Before:	1015	0.0	0.0	21.2	1	
Engineer:	EGA	After:	1015	0.0	0.0	21.3	1	

BH121	Gas readings						
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (s	
30	0.0	1.9	13.1	1	0	30	
60	0.0	1.9	13.0	1	0	60	
90	0.0	1.9	13.0	1	0	90	
120	0.0	1.9	13.0	1	0	120	
150	0.0	1.9	13.0	1	0	150	
180	0.0	1.9	13.0	1	0	180	
240	0.0	1.9	13.1	1	0	240	
300	0.0	1.9	13.3	1	0	300	

	After:	1015	0.0	0.0
	Flow	rates		Groundw
	Time (sec)	Flow (l/h)		Groundw
	30	0.2		Depth to
	60	0.3		
	90	0.3		
	120	0.3		
	150	0.3		
	180	0.3		
	240	0.3		

0.3

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rates Flow (l/h)

Groundwater monitoring	mbgl
Depth to top of water	3.72

BH123		Flov				
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H₂S (ppm)	Time (sec)
30	-	-	-	-	-	30
60	-	-	-	-	-	60
90	-	-	-	-	-	90
120	-	-	-	-	-	120
150	-	-	-	-	-	150
180	-	-	-	-	-	180
240	-	-	-	-	-	240
300	-	-	-	-	-	300

Groundwater monitoring	mbgl
Depth to top of water	-

No Access to BH123

BH124		Flow	rates				
Time (sec)	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	9.4	3.0	0.4	6	4	30	0.1
60	10.0	3.0	0.2	6	4	60	0.1
90	10.0	3.0	0.2	6	4	90	0.1
120	9.9	3.1	0.2	5	5	120	0.1
150	9.7	3.1	0.2	5	5	150	0.1
180	9.7	3.2	0.1	5	6	180	0.1
240	9.5	3.2	0.1	5	6	240	0.1
300	9.4	3.3	0.1	5	3	300	0.1

BH125		Flow	rates				
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	12.0	14.4	6.6	5	0	30	0.2
60	11.7	14.1	6.8	5	0	60	0.2
90	10.7	13.1	7.8	4	0	90	0.2
120	9.2	11.8	9.2	4	0	120	0.2
150	7.7	10.6	10.6	3	0	150	0.2
180	6.4	9.7	11.7	3	0	180	0.2
240	3.7	7.7	14.0	1	0	240	0.2
300	1.8	6.5	15.7	1	0	300	0.2

BH126		Ga	Flow	rates			
Time (sec)	CH4 (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl
Depth to top of water	0.70

Groundwater monitoring	mbgl
Depth to top of water	4.32

Groundwater monitoring	mbgl
Depth to top of water	-



Site:	3FM Planning Design GI Lot A DPC Lands	Equipm
Project No.:	22-1041A	Ambi
Date:	08/08/2023	Condit
Weather:	Dry; LOW TIDE	Befo
Engineer:	EGA	Afte

Equipment:		Geotechnical Instruments GA5000						
Ambient Conditions	Barometric Pressure	CH₄ (%)	H₂S (ppm)					
Before:	1015	0.0	0.0	21.2	1	0		
After:	1015	0.0	0.0	21.3	1	0		

BH127	Gas readings						
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)		Time (se
30	-	-	-	-	-		30
60	-	-	-	-	-		60
90	-	-	-	-	-		90
120	-	-	-	-	-		120
150	-	-	-	-	-		150
180	-	-	-	-	-		180
240	-	-	-	-	-		240
300	-	-	-	-	-		300

	Flow	rates
)	Time (sec)	Flow (l/h)
	30	-
	60	-
	90	-
	120	-
	150	-
	180	-
	240	-
	300	-

Groundwater monitoring	mbgl
Depth to top of water	-

No Access to BH127

BH128		Flow	rates				
Time (sec)	CH4 (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl
Depth to top of water	-



Site:		3FM Planning Desi	gn GI Lot A DP	C Lands		Equipment:		Geotechnica	al Instruments	GA5000		
Project No.:		22-1041A	0			Ambient	Barometric					
ate:		09/08/2023				Conditions	Pressure	CH₄ (%)	C0 ₂ (%)	0 ₂ (%)	CO (ppm)	H₂S (ppi
Weather:		Dry; HIGH TIDE				Before:	10	0.1	0.0	21.4	1	0
ngineer:		EGA				After:	1017	0.0	0.0	21.0	1	0
						El						
BH102	CU (9/)	G	as readings	60 (FIOW	rates		Groundwate	r monitoring		mbgl
lime (sec)	CH ₄ (%)	CU ₂ (%)	U ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (I/h)		Double to the	. f t		
30	0.1	0.9	18.8	0	0	30	0.0	-	Depth to top	of water		Dry
60	0.1	0.9	18.6	0	0	60	0.1	-				
90	0.1	0.9	18.5	0	0	90	0.1					
120	0.1	0.9	18.4	0	0	120	0.1					
190	0.1	1.0	10.5	0	0	190	0.1					
240	0.1	1.0	10.2	0	0	240	0.1	-				
240	0.1	1.0	10.2	0	0	240	0.1					
500	0.1	1.0	16.1	U	0	500	0.1]				
BH103		G	ias readings			Flow	rates		Groundwate	r monitoring		mhøl
īme (sec)	CH4 (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)		Groundwate	a monicoring		III BI
30	-	-	-	-	-	30	-	1	Depth to top	of water		-
60	-	-	-	-	-	60	-	1				
90	-	-	-	-	-	90	-	1		No Acces	s to BH103	
120	-	-	-	-	-	120	-	1				
150	-	-	-	-	-	150	-	_				
180	-	-	-	-	-	180	-	_				
240	-	-	-	-	-	240	-					
300	-	-	-	-	-	300	-					
BH105		G	ias readings			Flow	rates					
īme (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H₂S (ppm)	Time (sec)	Flow (l/h)		Groundwate	r monitoring		mbgi
30	-	-	-	-	-	30	-		Depth to top	of water		-
60	-	-	-	-	-	60	-					
90	-	-	-	-	-	90	-			No Acces	s to BH105	
120	-	-	-	-	-	120	-			NO ACCES.	3 to billos	
150	-	-	-	-	-	150	-					
180	-	-	-	-	-	180	-					
240	-	-	-	-	-	240	-					
300	-	-	-	-	-	300	-					
BH112		G	ias readings			Flow	rates					
Time (sec)	CH₄ (%)	C0₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	0		Groundwate	r monitoring		mbgi
30	0.1	0.1	20.9	0	0	30	0.0		Depth to top	of water		3.00
60	0.1	0.0	20.9	1	0	60	0.0					
90	0.1	0.1	20.8	1	0	90	0.0]				
120	0.1	0.1	20.9	1	0	120	0.0					
150	0.1	0.1	20.9	0	0	150	0.0					
180	0.1	0.0	20.9	1	0	180	0.0					
240	0.0	0.1	20.8	1	0	240	0.0					
300	0.1	1.0	20.7	1	1	300	0.0					
			as readings			Elow	rates	1				
BU120		G		<u>()</u>	H-S (ppm)	Time (see)	Flow (1/b)		Groundwate	r monitoring		mbgl
BH120	CH. /%)	001 (70)	02 (70)	-co (ppin)	-1129 (ppin)	30	 ຊຸຂ		Depth to tor	ofwater		4.40
BH120 Time (sec)	CH ₄ (%)	12.1	5.6	2	0		0.0		- separate top	5		4.40
BH120 Fime (sec) 30	CH ₄ (%) 36.4	13.1	5.6	2	0	60	4.6					
BH120 ime (sec) 30 60 90	CH ₄ (%) 36.4 36.4	13.1 13.2 13.2	5.6 5.3	2 2 2 2	0	60	4.6 4.8	-				
BH120 Time (sec) 30 60 90 120	CH ₄ (%) 36.4 36.4 36.5 36.5	13.1 13.2 13.2 13.3	5.6 5.3 5.2 5.1	2 2 2 2	0 0 0 0 0	60 90	4.6 4.8 5.1	-				
BH120 ime (sec) 30 60 90 120 150	CH ₄ (%) 36.4 36.5 36.7 36.7	13.1 13.2 13.2 13.3 13.4	5.6 5.3 5.2 5.1 4 9	2 2 2 2 2 2 2	0 0 0 0	60 90 120	4.6 4.8 5.1					
BH120 Time (sec) 30 60 90 120 150 180	CH₄ (%) 36.4 36.5 36.7 36.9 37 3	13.1 13.2 13.2 13.3 13.4 13.6	5.6 5.3 5.2 5.1 4.9 4.7	2 2 2 2 2 2 2 2 2		60 90 120 150	4.6 4.8 5.1 5.3 5.4					
BH120 Fime (sec) 30 60 90 120 150 180 240	CH₄ (%) 36.4 36.5 36.7 36.9 37.3 38.7	13.1 13.2 13.2 13.3 13.4 13.6	5.6 5.3 5.2 5.1 4.9 4.7	2 2 2 2 2 2 2 2 2 2 2	0 0 0 0 0 0	60 90 120 150 180	4.6 4.8 5.1 5.3 5.4	- - - -				
BH120 Time (sec) 30 60 90 120 150 180 240 300	CH4 (%) 36.4 36.4 36.5 36.7 36.9 37.3 38.7 40.1 40.1	13.1 13.2 13.2 13.3 13.4 13.6 14.2	5.6 5.3 5.2 5.1 4.9 4.7 4.2 3.0	2 2 2 2 2 2 2 2 2 2 2 2 2	0 0 0 0 0 0 0	60 90 120 150 180 240	4.6 4.8 5.1 5.3 5.4 5.5	- - - - - -				



H₂S (ppm) 0 0

Site:	3FM Planning Design GI Lot A DPC Lands	Equipment:		Geotechnical Instruments GA5000					
Project No.:	22-1041A	Ambient	Barometric	CH (%)	CO (%)	0 (%)	CO (nnm		
Date:	09/08/2023	Conditions	Pressure		C0 ₂ (<i>M</i>)	02 (70)	CO (ppin		
Weather:	Dry; HIGH TIDE	Before:	10	0.1	0.0	21.4	1		
Engineer:	EGA	After:	1017	0.0	0.0	21.0	1		

BH121	Gas readings						
Time (sec)	CH ₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (s	
30	0.0	1.5	16.2	1	0	30	
60	0.0	1.5	16.1	1	0	60	
90	0.0	1.6	15.9	1	0	90	
120	0.0	1.6	15.8	1	0	120	
150	0.0	1.7	15.7	1	0	150	
180	0.0	1.7	15.5	1	0	180	
240	0.0	1.8	15.3	1	0	240	
300	0.0	1.9	14.9	1	0	300	

After:	101/	0.0	0.0	
Flow	rates		Groundwator	
Time (sec)	Flow (l/h)		Groundwater	
30	0.3		Depth to top	С
60	0.3			
90	0.3			
120	0.3			
150	0.3			
180	03			

0.3 0.3

Flow (l/h)

-_

0.1

Groundwater monitoring	mbgl
Depth to top of water	3.72

BH123		Flow	rates				
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow
30	-	-	-	-	-	30	
60	-	-	-	-	-	60	
90	-	-	-	-	-	90	
120	-	-	-	-	-	120	
150	-	-	-	-	-	150	
180	-	-	-	-	-	180	
240	-	-	-	-	-	240	
300	-	-	-	-	-	300	

Groundwater monitoring	mbgl
Depth to top of water	-

No Access to BH123

BH124	Gas readings					Flow	rates
Time (sec)	0.1	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	0.1	3.9	1.8	2	0	30	0.8
60	0.1	3.9	1.4	2	0	60	1.7
90	0.1	3.9	1.1	1	0	90	2.3
120	0.1	3.9	1.0	1	0	120	2.6
150	0.1	4.0	0.8	1	0	150	2.8
180	0.1	4.0	0.6	1	0	180	2.9
240	0.1	4.0	0.4	1	0	240	3.0
300	0.0	4.0	0.3	1	0	300	3.1

BH125		Flow	rates				
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	0.5	5.0	16.8	2	0	30	0.1
60	0.6	5.2	15.4	2	0	60	0.1
90	0.6	5.4	14.8	2	0	90	0.1
120	0.7	5.8	14.4	2	0	120	0.1
150	0.8	6.5	12.9	2	0	150	0.1
180	1.1	8.3	10.0	2	0	180	0.1
240	1.1	10.7	7.0	2	0	240	0.1
300	0.4	11.5	5.7	1	0	300	0.1

BH126	Gas readings						rates
Time (sec)	CH ₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl		
Depth to top of water	0.87		

Groundwater monitoring	mbgl
Depth to top of water	4.28

Groundwater monitoring	mbgl
Depth to top of water	-



H₂S (ppm)

0

0

CO (ppm)

1

1

Site:	3FM Planning Design GI Lot A DPC Lands	Equipment:
Project No.:	22-1041A	Ambient
Date:	09/08/2023	Conditions
Weather:	Dry; HIGH TIDE	Before:
Engineer:	EGA	After:

BH127	Gas readings						
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)		Time (se
30	-	-	-	-	-		30
60	-	-	-	-	-		60
90	-	-	-	-	-		90
120	-	-	-	-	-		120
150	-	-	-	-	-		150
180	-	-	-	-	-		180
240	-	-	-	-	-		240
300	-	-	-	-	-	IF	300

	Flow	rates
)	Time (sec)	Flow (l/h)
	30	-
	60	-
	90	-
	120	-
	150	-
	180	-
	240	-
	300	-

Barometric Pressure

10

1017

Groundwater monitoring	mbgl
Depth to top of water	-

0₂ (%)

21.4

21.0

Geotechnical Instruments GA5000

CO₂ (%)

0.0

0.0

CH₄ (%)

0.1

0.0

No Access to BH127

BH128		Ga	Flow	rates			
Time (sec)	CH₄ (%)	CO ₂ (%)	0 ₂ (%)	CO (ppm)	H ₂ S (ppm)	Time (sec)	Flow (l/h)
30	-	-	-	-	-	30	-
60	-	-	-	-	-	60	-
90	-	-	-	-	-	90	-
120	-	-	-	-	-	120	-
150	-	-	-	-	-	150	-
180	-	-	-	-	-	180	-
240	-	-	-	-	-	240	-
300	-	-	-	-	-	300	-

Groundwater monitoring	mbgl
Depth to top of water	-

Low-Flow Test Report:

Test Date / Time: 07/03/2023 12:20:32 Project: 22-1941 Operator Name: RS

Location Name: BH120 Well Diameter: 5 cm Screen Length: 17 m Ton of Screen: 6 5 m	Pump Type: Geo Sub 2 Flow Cell Volume: 130 ml Final Draw Down: 4.45 m	Instrument Used: Aqua TROLL 500 Serial Number: 787450
Total Depth: 17.05 m Initial Depth to Water: 4.45 m		

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Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	рН	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Salinity
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5	+/- 10
07/03/2023 12:20	00:00	6.73 pH	11.80 °C	31,176 µS/cm	0.00 mg/L	0.59 NTU	-7.8 mV	445.00 cm	19.29 PSU
07/03/2023 12:20	00:20	6.74 pH	11.81 °C	31,172 µS/cm	0.00 mg/L	0.66 NTU	-7.9 mV	445.00 cm	19.29 PSU
07/03/2023 12:21	00:40	6.74 pH	11.79 °C	31,171 µS/cm	0.00 mg/L	0.53 NTU	-8.0 mV	445.00 cm	19.28 PSU
07/03/2023 12:21	01:00	6.74 pH	11.77 °C	31,159 µS/cm	0.00 mg/L	0.55 NTU	-8.1 mV	445.00 cm	19.27 PSU
07/03/2023 12:21	01:20	6.74 pH	11.70 °C	31,183 µS/cm	0.00 mg/L	0.58 NTU	-8.2 mV	445.00 cm	19.29 PSU
07/03/2023 12:22	01:40	6.74 pH	11.69 °C	31,209 µS/cm	0.00 mg/L	0.57 NTU	-8.3 mV	445.00 cm	19.30 PSU
07/03/2023 12:22	02:00	6.74 pH	11.74 °C	31,230 µS/cm	0.00 mg/L	0.58 NTU	-8.5 mV	445.00 cm	19.32 PSU
07/03/2023 12:22	02:20	6.74 pH	11.84 °C	31,243 µS/cm	0.00 mg/L	0.57 NTU	-8.7 mV	445.00 cm	19.34 PSU
07/03/2023 12:23	02:40	6.74 pH	11.86 °C	31,239 µS/cm	0.00 mg/L	0.56 NTU	-8.8 mV	445.00 cm	19.33 PSU
07/03/2023 12:23	03:00	6.74 pH	11.89 °C	31,236 µS/cm	0.00 mg/L	0.57 NTU	-8.9 mV	445.00 cm	19.33 PSU
07/03/2023 12:23	03:20	6.74 pH	11.87 °C	31,222 µS/cm	0.00 mg/L	0.58 NTU	-9.0 mV	445.00 cm	19.32 PSU
07/03/2023 12:24	03:40	6.74 pH	11.82 °C	31,220 µS/cm	0.00 mg/L	0.62 NTU	-9.0 mV	445.00 cm	19.32 PSU
07/03/2023 12:24	04:00	6.74 pH	11.82 °C	31,241 µS/cm	0.00 mg/L	0.56 NTU	-9.1 mV	445.00 cm	19.33 PSU
07/03/2023 12:24	04:20	6.74 pH	11.87 °C	31,255 µS/cm	0.00 mg/L	0.58 NTU	-9.2 mV	445.00 cm	19.35 PSU
07/03/2023 12:25	04:40	6.75 pH	11.92 °C	31,259 µS/cm	0.00 mg/L	0.58 NTU	-9.2 mV	445.00 cm	19.35 PSU
07/03/2023 12:25	05:00	6.74 pH	11.96 °C	31,256 µS/cm	0.00 mg/L	0.60 NTU	-9.3 mV	445.00 cm	19.35 PSU
07/03/2023 12:25	05:20	6.75 pH	11.86 °C	31,237 µS/cm	0.00 mg/L	0.62 NTU	-9.4 mV	445.00 cm	19.33 PSU

07/03/2023 12:26	05:40	6.75 pH	11.71 °C	31,212 µS/cm	0.00 mg/L	0.59 NTU	-9.3 mV	445.00 cm	19.31 PSU
07/03/2023 12:26	06:00	6.75 pH	11.55 °C	31,219 µS/cm	0.00 mg/L	0.60 NTU	-9.4 mV	445.00 cm	19.30 PSU
07/03/2023 12:26	06:20	6.75 pH	11.43 °C	31,240 µS/cm	0.00 mg/L	0.62 NTU	-9.4 mV	445.00 cm	19.31 PSU
07/03/2023 12:27	06:40	6.75 pH	11.38 °C	31,262 µS/cm	0.00 mg/L	3.11 NTU	-9.5 mV	445.00 cm	19.32 PSU
07/03/2023 12:27	07:00	6.75 pH	11.66 °C	31,334 µS/cm	0.00 mg/L	0.59 NTU	-10.0 mV	445.00 cm	19.39 PSU
07/03/2023 12:27	07:20	6.75 pH	11.87 °C	31,298 µS/cm	0.00 mg/L	0.63 NTU	-10.7 mV	445.00 cm	19.37 PSU
07/03/2023 12:28	07:40	6.75 pH	11.89 °C	31,272 µS/cm	0.00 mg/L	0.60 NTU	-11.1 mV	445.00 cm	19.36 PSU
07/03/2023 12:28	08:00	6.75 pH	11.94 °C	31,308 µS/cm	0.00 mg/L	0.61 NTU	-11.5 mV	445.00 cm	19.39 PSU
07/03/2023 12:28	08:20	6.75 pH	11.97 °C	31,279 µS/cm	0.00 mg/L	0.59 NTU	-11.9 mV	445.00 cm	19.37 PSU
07/03/2023 12:29	08:40	6.75 pH	12.01 °C	31,258 µS/cm	0.00 mg/L	0.57 NTU	-12.2 mV	445.00 cm	19.36 PSU
07/03/2023 12:29	09:00	6.75 pH	12.02 °C	31,271 µS/cm	0.00 mg/L	0.59 NTU	-12.5 mV	445.00 cm	19.36 PSU
07/03/2023 12:29	09:20	6.75 pH	12.03 °C	31,262 µS/cm	0.00 mg/L	0.57 NTU	-12.8 mV	445.00 cm	19.36 PSU
07/03/2023 12:30	09:40	6.75 pH	12.03 °C	31,273 µS/cm	0.00 mg/L	0.59 NTU	-13.0 mV	445.00 cm	19.37 PSU
07/03/2023 12:30	10:00	6.75 pH	12.02 °C	31,272 µS/cm	0.00 mg/L	0.62 NTU	-13.2 mV	445.00 cm	19.37 PSU
07/03/2023 12:30	10:20	6.75 pH	12.03 °C	31,264 µS/cm	0.00 mg/L	0.60 NTU	-13.5 mV	445.00 cm	19.36 PSU
07/03/2023 12:31	10:40	6.75 pH	11.99 °C	31,270 µS/cm	0.00 mg/L	0.63 NTU	-13.6 mV	445.00 cm	19.36 PSU
07/03/2023 12:31	11:00	6.75 pH	12.01 °C	31,277 µS/cm	0.00 mg/L	0.62 NTU	-13.9 mV	445.00 cm	19.37 PSU
07/03/2023 12:31	11:20	6.75 pH	12.01 °C	31,268 µS/cm	0.00 mg/L	0.66 NTU	-14.1 mV	445.00 cm	19.36 PSU
07/03/2023 12:32	11:40	6.75 pH	12.05 °C	31,266 µS/cm	0.00 mg/L	0.61 NTU	-14.3 mV	445.00 cm	19.36 PSU
07/03/2023 12:32	12:00	6.75 pH	12.07 °C	31,283 µS/cm	0.00 mg/L	0.62 NTU	-14.5 mV	445.00 cm	19.38 PSU
07/03/2023 12:32	12:20	6.75 pH	12.08 °C	31,282 µS/cm	0.00 mg/L	0.63 NTU	-14.7 mV	445.00 cm	19.38 PSU
07/03/2023 12:33	12:40	6.75 pH	12.07 °C	31,282 µS/cm	0.00 mg/L	0.62 NTU	-14.8 mV	445.00 cm	19.38 PSU
07/03/2023 12:33	13:00	6.75 pH	12.04 °C	31,271 µS/cm	0.00 mg/L	0.63 NTU	-15.0 mV	445.00 cm	19.37 PSU
07/03/2023 12:33	13:20	6.75 pH	12.15 °C	31,302 µS/cm	0.00 mg/L	0.58 NTU	-15.2 mV	445.00 cm	19.39 PSU
07/03/2023 12:34	13:40	6.75 pH	12.26 °C	31,263 µS/cm	0.00 mg/L	0.65 NTU	-15.3 mV	445.00 cm	19.37 PSU
07/03/2023 12:34	14:00	6.75 pH	12.29 °C	31,282 µS/cm	0.00 mg/L	0.64 NTU	-15.3 mV	445.00 cm	19.39 PSU
07/03/2023 12:34	14:20	6.75 pH	12.28 °C	31,262 µS/cm	0.00 mg/L	0.62 NTU	-15.3 mV	445.00 cm	19.37 PSU
07/03/2023 12:35	14:40	6.75 pH	12.29 °C	31,276 µS/cm	0.00 mg/L	0.61 NTU	-15.4 mV	445.00 cm	19.38 PSU
07/03/2023 12:35	15:00	6.75 pH	12.30 °C	31,259 µS/cm	0.00 mg/L	0.64 NTU	-15.4 mV	445.00 cm	19.37 PSU

07/03/2023	15:20	6.75 pH	12.26 °C	31,298 µS/cm	0.00 mg/L	0.62 NTU	-15.4 mV	445.00 cm	19.40 PSU
07/03/2023	15:40	6.75 pH	12.28 °C	31,282 µS/cm	0.00 mg/L	0.66 NTU	-15.5 mV	445.00 cm	19.39 PSU
07/03/2023 12:36	16:00	6.75 pH	12.25 °C	31,280 µS/cm	0.00 mg/L	0.64 NTU	-15.5 mV	445.00 cm	19.38 PSU
07/03/2023 12:36	16:20	6.75 pH	12.21 °C	31,287 µS/cm	0.00 mg/L	0.63 NTU	-15.6 mV	445.00 cm	19.39 PSU
07/03/2023 12:37	16:40	6.75 pH	12.19 °C	31,278 µS/cm	0.00 mg/L	0.67 NTU	-15.7 mV	445.00 cm	19.38 PSU
07/03/2023 12:37	17:04	6.75 pH	12.19 °C	31,299 µS/cm	0.00 mg/L	0.66 NTU	-15.8 mV	445.00 cm	19.39 PSU
07/03/2023 12:40	19:39	6.73 pH	12.28 °C	31,364 µS/cm	0.00 mg/L	0.59 NTU	-16.8 mV	445.00 cm	19.44 PSU
07/03/2023 12:42	22:04	6.74 pH	12.30 °C	31,342 µS/cm	0.00 mg/L	0.58 NTU	-16.9 mV	445.00 cm	19.43 PSU
07/03/2023 12:43	22:29	6.74 pH	12.32 °C	31,352 µS/cm	0.00 mg/L	0.72 NTU	-17.0 mV	445.00 cm	19.44 PSU
07/03/2023 12:44	23:34	6.74 pH	12.33 °C	31,361 µS/cm	0.00 mg/L	0.64 NTU	-17.1 mV	445.00 cm	19.44 PSU
07/03/2023 12:44	23:54	6.74 pH	12.31 °C	31,363 µS/cm	0.00 mg/L	0.71 NTU	-17.2 mV	445.00 cm	19.44 PSU
07/03/2023 12:44	24:14	6.74 pH	12.31 °C	31,384 µS/cm	0.00 mg/L	0.60 NTU	-17.2 mV	445.00 cm	19.46 PSU
07/03/2023 12:45	24:34	6.74 pH	12.35 °C	31,407 µS/cm	0.00 mg/L	0.63 NTU	-17.2 mV	445.00 cm	19.48 PSU
07/03/2023 12:45	24:54	6.74 pH	12.35 °C	31,380 µS/cm	0.00 mg/L	0.62 NTU	-17.3 mV	445.00 cm	19.46 PSU
07/03/2023 12:45	25:14	6.75 pH	12.32 °C	31,366 µS/cm	0.00 mg/L	0.63 NTU	-17.3 mV	445.00 cm	19.45 PSU
07/03/2023 12:46	25:34	6.75 pH	12.32 °C	31,382 µS/cm	0.00 mg/L	0.63 NTU	-17.3 mV	445.00 cm	19.46 PSU
07/03/2023 12:46	25:54	6.75 pH	12.33 °C	31,398 µS/cm	0.00 mg/L	0.62 NTU	-17.4 mV	445.00 cm	19.47 PSU
07/03/2023 12:46	26:14	6.75 pH	12.35 °C	31,380 µS/cm	0.00 mg/L	0.63 NTU	-17.4 mV	445.00 cm	19.46 PSU
07/03/2023 12:47	26:34	6.75 pH	12.33 °C	31,381 µS/cm	0.00 mg/L	0.62 NTU	-17.5 mV	445.00 cm	19.46 PSU
07/03/2023 12:47	26:54	6.75 pH	12.32 °C	31,410 µS/cm	0.00 mg/L	0.63 NTU	-17.5 mV	445.00 cm	19.47 PSU
07/03/2023 12:47	27:14	6.75 pH	12.23 °C	31,401 µS/cm	0.00 mg/L	0.60 NTU	-17.5 mV	445.00 cm	19.46 PSU
07/03/2023 12:48	27:34	6.75 pH	12.15 °C	31,385 µS/cm	0.00 mg/L	0.64 NTU	-17.5 mV	445.00 cm	19.45 PSU
07/03/2023 12:48	27:54	6.75 pH	12.14 °C	31,427 µS/cm	0.00 mg/L	0.66 NTU	-17.5 mV	445.00 cm	19.48 PSU
07/03/2023 12:48	28:14	6.75 pH	12.16 °C	31,388 µS/cm	0.00 mg/L	0.70 NTU	-17.7 mV	445.00 cm	19.45 PSU
07/03/2023 12:49	28:34	6.75 pH	12.27 °C	31,439 µS/cm	0.00 mg/L	0.66 NTU	-17.8 mV	445.00 cm	19.49 PSU
07/03/2023 12:49	28:54	6.75 pH	12.28 °C	31,421 µS/cm	0.00 mg/L	0.64 NTU	-17.8 mV	445.00 cm	19.48 PSU
07/03/2023 12:49	29:14	6.75 pH	12.24 °C	31,418 µS/cm	0.00 mg/L	0.64 NTU	-17.9 mV	445.00 cm	19.48 PSU

Samples

Sample ID:	Description:
BH120	

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 07/03/2023 15:09:11 Project: 22-1041 3FM Planning Design GI Operator Name: Martin Gardiner

Initial Deptil to Water: 4 m Estimated Total Volume Pumped. Serial Number: 787450 25 liter Flow Cell Volume: 130 ml Final Draw Down: 4.65 m	Location Name: BH-123 Initial Depth to Water: 4 m	Pump Type: Geosub 2 Estimated Total Volume Pumped: 25 liter Flow Cell Volume: 130 ml Final Draw Down: 4.65 m	Instrument Used: Aqua TROLL 500 Serial Number: 787450
---	--	--	--

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	рН	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Salinity
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5	+/- 10
07/03/2023 15:09	00:00	7.22 pH	9.22 °C	2,305.7 μS/cm	5.17 mg/L	39.17 NTU	-40.0 mV	400.00 cm	1.18 PSU
07/03/2023 15:09	00:20	7.06 pH	9.57 °C	2,234.8 μS/cm	2.56 mg/L	30.35 NTU	-55.9 mV	400.00 cm	1.14 PSU
07/03/2023 15:09	00:40	7.02 pH	9.62 °C	2,273.2 μS/cm	1.30 mg/L	38.02 NTU	-65.4 mV	400.00 cm	1.16 PSU
07/03/2023 15:10	01:00	7.00 pH	9.57 °C	2,298.5 μS/cm	0.65 mg/L	36.72 NTU	-70.3 mV	400.00 cm	1.18 PSU
07/03/2023 15:10	01:20	6.99 pH	9.50 °C	2,309.5 μS/cm	0.36 mg/L	31.38 NTU	-73.8 mV	400.00 cm	1.18 PSU
07/03/2023 15:10	01:40	6.99 pH	9.44 °C	2,312.4 μS/cm	0.25 mg/L	25.64 NTU	-75.8 mV	400.00 cm	1.18 PSU
07/03/2023 15:11	02:00	6.98 pH	9.38 °C	2,310.7 μS/cm	0.19 mg/L	19.04 NTU	-77.4 mV	400.00 cm	1.18 PSU
07/03/2023 15:11	02:20	6.98 pH	9.33 °C	2,302.5 μS/cm	0.15 mg/L	12.98 NTU	-78.5 mV	400.00 cm	1.18 PSU
07/03/2023 15:11	02:40	6.98 pH	9.28 °C	2,302.7 μS/cm	0.12 mg/L	9.87 NTU	-79.4 mV	400.00 cm	1.18 PSU
07/03/2023 15:12	03:00	6.98 pH	9.30 °C	2,303.9 μS/cm	0.10 mg/L	7.88 NTU	-80.2 mV	400.00 cm	1.18 PSU
07/03/2023 15:12	03:20	6.98 pH	9.32 °C	2,299.2 µS/cm	0.08 mg/L	6.64 NTU	-81.0 mV	400.00 cm	1.18 PSU
07/03/2023 15:12	03:40	6.97 pH	9.33 °C	2,293.8 µS/cm	0.07 mg/L	5.56 NTU	-81.4 mV	400.00 cm	1.17 PSU
07/03/2023 15:13	04:00	6.97 pH	9.31 °C	2,287.8 µS/cm	0.07 mg/L	5.26 NTU	-81.9 mV	400.00 cm	1.17 PSU
07/03/2023 15:13	04:20	6.97 pH	9.28 °C	2,282.0 μS/cm	0.06 mg/L	4.64 NTU	-82.3 mV	400.00 cm	1.17 PSU
07/03/2023 15:13	04:40	6.97 pH	9.28 °C	2,282.6 μS/cm	0.05 mg/L	3.21 NTU	-82.8 mV	400.00 cm	1.17 PSU
07/03/2023 15:14	05:00	6.97 pH	9.30 °C	2,286.1 μS/cm	0.05 mg/L	3.68 NTU	-83.3 mV	400.00 cm	1.17 PSU
07/03/2023 15:14	05:20	6.97 pH	9.30 °C	2,286.5 μS/cm	0.05 mg/L	3.69 NTU	-83.8 mV	400.00 cm	1.17 PSU

07/03/2023 15:14	05:40	6.97 pH	9.28 °C	2,286.4 μS/cm	0.04 mg/L	3.47 NTU	-84.1 mV	400.00 cm	1.17 PSU
07/03/2023 15:15	06:00	6.98 pH	9.23 °C	2,284.5 μS/cm	0.04 mg/L	2.91 NTU	-84.5 mV	400.00 cm	1.17 PSU
07/03/2023 15:15	06:20	6.98 pH	9.15 °C	2,282.8 μS/cm	0.04 mg/L	3.67 NTU	-84.8 mV	400.00 cm	1.17 PSU
07/03/2023 15:15	06:40	6.98 pH	9.10 °C	2,281.9 µS/cm	0.03 mg/L	4.03 NTU	-85.0 mV	400.00 cm	1.17 PSU
07/03/2023 15:16	07:00	6.98 pH	9.07 °C	2,278.3 μS/cm	0.03 mg/L	3.15 NTU	-85.3 mV	400.00 cm	1.16 PSU
07/03/2023 15:16	07:20	6.98 pH	9.08 °C	2,278.4 μS/cm	0.03 mg/L	3.86 NTU	-85.7 mV	400.00 cm	1.16 PSU
07/03/2023 15:16	07:40	6.98 pH	9.08 °C	2,276.9 μS/cm	0.03 mg/L	3.81 NTU	-85.8 mV	400.00 cm	1.16 PSU
07/03/2023 15:17	08:00	6.98 pH	9.05 °C	2,273.4 μS/cm	0.02 mg/L	3.56 NTU	-86.0 mV	400.00 cm	1.16 PSU
07/03/2023 15:17	08:20	6.98 pH	8.98 °C	2,271.2 μS/cm	0.02 mg/L	3.40 NTU	-86.1 mV	400.00 cm	1.16 PSU
07/03/2023 15:17	08:40	6.98 pH	8.92 °C	2,270.8 μS/cm	0.02 mg/L	2.94 NTU	-86.2 mV	400.00 cm	1.16 PSU
07/03/2023 15:18	09:00	6.98 pH	8.88 °C	2,270.1 μS/cm	0.02 mg/L	3.45 NTU	-86.4 mV	400.00 cm	1.16 PSU
07/03/2023 15:18	09:20	6.98 pH	8.84 °C	2,267.9 μS/cm	0.02 mg/L	3.14 NTU	-86.5 mV	400.00 cm	1.16 PSU
07/03/2023 15:18	09:40	6.98 pH	8.79 °C	2,267.4 μS/cm	0.02 mg/L	3.03 NTU	-86.6 mV	400.00 cm	1.16 PSU
07/03/2023 15:19	10:00	6.98 pH	8.75 °C	2,265.4 µS/cm	0.02 mg/L	3.34 NTU	-86.8 mV	400.00 cm	1.16 PSU
07/03/2023 15:19	10:20	6.98 pH	8.70 °C	2,264.1 μS/cm	0.02 mg/L	2.59 NTU	-86.9 mV	400.00 cm	1.15 PSU
07/03/2023 15:19	10:40	6.98 pH	8.75 °C	2,265.3 µS/cm	0.02 mg/L	1.96 NTU	-87.0 mV	400.00 cm	1.16 PSU
07/03/2023 15:20	11:00	6.98 pH	8.55 °C	2,263.3 µS/cm	0.02 mg/L	2.64 NTU	-86.7 mV	400.00 cm	1.15 PSU
07/03/2023 15:20	11:20	6.98 pH	8.57 °C	2,269.6 μS/cm	0.03 mg/L	2.39 NTU	-86.9 mV	400.00 cm	1.16 PSU

Samples

Sample ID:	Description:
BH123	

Created using VuSitu from In-Situ, Inc.



3FM Planning Design and GI Lot B 3rd Party Lands

Client:

Dublin Port Company (DPC)

Client's Representative: RPS

Report No.:

Date:

Status:

22-1041B

October 2023

Final for Issue

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stered in Northern Ireland. Company Number: NI610766 Approved: ISO 9001 • ISO 14001 • OHSAS 18001





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Document Control Sheet

Report No.:		22-1041B					
Project Title:		3FM Planning Design GI Lot B 3 rd Party Lands					
Client:		Dublin Port Company (DPC)					
Client's Repres	entative:	RPS					
Revision:	A02	Status:	Final for Issue	Issue Date:	2 nd October 2023		
Prepared by:		Reviewed by:		Approved by:			
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The works were conducted in accordance with:

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for ground investigations.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9



METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Ground Investigation.

Abbreviations used	on exploratory hole logs
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
Р	Nominal 100mm diameter undisturbed piston sample.
В	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
С	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/ Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa.V: undisturbed vane shear strengthVR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of Nx5=Cu is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
\bigtriangledown	Water strike: initial depth of strike.
•	Water strike: depth water rose to.
Abbreviations relating t	o rock core – reference Clause 36.4.4 of BS 5930: 2015+A1:2020
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.





3FM Planning Design GI Lot B 3rd Party Lands

1 AUTHORITY

On the instructions of RPS, ("the Client's Representative"), acting on the behalf of Dublin Port Company (DPC) ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical and environmental information for input to the design and construction of a proposed development of the southern port lands.

This report details the work carried out both on site and in the geotechnical and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the ground investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2 SCOPE

The extent of the investigation, as instructed by the Client's Representative, included boreholes, slit trenches, concrete coring, soil sampling, in-situ and laboratory testing, and the preparation of a factual report on the findings.

3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted on 3rd party owned lands in Dublin Port in southern port areas south of the River Liffey in Poolbeg/Ringsend, Dublin. Works were conducted within Pigeon House Park, within the Poolbeg Powerstation and CCGT compound, within Nora Oil Storage Terminal, along Pigeon House Road, along Shellybanks Road and along a Dublin City Council owned public path in located in Pembroke. Elevations vary across the site.





4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between the 2^{nd} of December 2022 and the 10^{th} of February 2023, comprised:

- ten boreholes
 - six light cable percussion boreholes
 - three boreholes by light cable percussive extended by rotary follow-on drilling
 - one borehole by dynamic (windowless) sampling
- two machine dug slit trenches
- indirect CBR tests at eighteen locations; and
- twenty pavement cores.

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, and as shown on the exploratory hole location plan in Appendix A.

4.2 Boreholes

A total of ten boreholes were put down in a minimum diameter of 150mm through soils and rock strata to their completion depths by a combination of methods, including light percussion boring light cable percussion boring and rotary drilling.

The borehole logs state the methodology and plant used for each location, as well as the appropriate depth ranges.

A summary of the boreholes, subdivided by category in accordance with the methods employed for their completion, is presented in the following sub-sections.

4.2.1 Light cable percussion boreholes

Six boreholes (BH208-BH208D and BH212) were put down to completion in minimum 200mm diameter using Dando 2500 light cable percussion boring rigs. All boreholes were terminated on encountering virtual refusal on obstructions.

Machine dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions. BH208-BH208D were terminated within the inspection pit upon encountering refusal.





Disturbed (bulk and small bag) samples were taken within the encountered strata. Environmental samples were taken at standard intervals, as directed by the Client's Representative.

Standard penetration tests were carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix J.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded.

Where water was added to assist with boring, a note has been added to the log to account for same.

Appendix B presents the borehole logs.

4.2.2 Boreholes by combined percussion boring and rotary follow-on drilling

Three boreholes (BH215-BH217) were put down by a combination of light cable percussion boring and rotary follow-on drilling techniques with core recovery in overburden and bedrock. Where the cable percussion borehole had not been advanced onto competent strata, rotary percussive methods were employed to advance the borehole to completion. Symmetrix cased full-hole drilling was used, with SPTs carried out at standard intervals as required.

Hand dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions.

Disturbed (bulk and small bag) samples were taken within the encountered strata. Environmental samples were taken at standard intervals, as directed by the Client's Representative. Undisturbed (U100) samples were taken as appropriate within cohesive strata.

Standard penetration tests were carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals throughout the overburden using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix J.

Any water strikes encountered during boring were recorded along with any changes in their levels as the boreholes proceeded.

Where water was added to assist with boring, a note has been added to the log to account for the same.





Where coring was carried out, Geobor S Coring was used. The core was extracted in up to 1.5m lengths using an SK6L core barrel, which produced core of nominal 102mm diameter, and was placed in single channel wooden core boxes.

The core was subsequently photographed and examined by a qualified and experienced Engineering Geologist, thus enabling the production of an engineering log in accordance with *BS 5930: 2015+A1:2020: Code of practice for ground investigations.*

Appendix B presents the borehole logs, with core photographs presented in Appendix C.

4.2.3 Dynamic sampled borehole

One borehole (BH203) was put down to completion by light percussion boring techniques using a Premier 110 dynamic sampling rig.

A hand dug inspection pit was carried out between ground level and 0.60m depth to ensure the borehole was put down clear of services or subsurface obstructions. The borehole was terminated at 0.60m on encountering a watermain obstruction.

No groundwater strikes were encountered during dynamic sampling.

Appendix B presents the borehole logs.

4.3 Slit trenches

Two slit trenches (ST203 and ST204) were excavated by a combination of hand digging and mechanical excavation using a compact 3t tracked excavator fitted with a 600mm wide toothless bucket, to locate and identify buried services at the site.

Drawing of the trenches and the locations of services encountered during excavation are shown along with the slit trench logs in Appendix D, with photographs presented in Appendix E.

4.4 PID tests

PID (Photo ionizing detection) testing was undertaken on small, disturbed samples recovered from all boreholes using a hand-held PID meter, to determine if any volatile organic compound contamination was present in the overburden.

Results of the PID tests are presented on the individual borehole logs in Appendix B.





4.5 Indirect CBR tests (DCP)

An indirect CBR test was conducted at eighteen locations (RC202-RC207, RC209 and RC211-221) using a Dynamic Cone Penetrometer (DCP). The equipment was developed in conjunction with the UK Transport Research Laboratory, and is discussed in Highways England CS229 (2020) which refers to the methodology described in TRL Overseas Road Note 18 (1999).

The test results are presented in Appendix F in the form of plots of the variation with depth of the penetration per blow. Straight lines have been fitted to the plots and the CBR for each depth range estimated using the following relationship, which is taken from TRRL Overseas Road Note 8 (1990), *A user's manual for a program to analyse dynamic cone penetrometer data*.

Log CBR = 2.48-1.057 Log (mm/blow)

The frequently elevated CBR values are a consequence of the coarse-grained content of the penetrated soils and are often not representative of the soil matrix.

4.6 Pavement cores

Twenty cores (RC202 to RC221) were carried out at locations as directed by the Client's Representative to establish the pavement make-up. The cores were taken using hand-held diamond coring equipment. Core thicknesses and compositions are outlined in Table 1.

Location	Thickness (mm)	Composition
RC202	160	Bitmac
RC203	125	Bitmac
RC204	105	Bitmac
RC205	110	Bitmac
RC206	195	Bitmac
RC207	280	Bitmac
RC208	295	Concrete over bitmac
RC209	400	Bitmac
RC210	240	Bitmac
RC211	450	Concrete over bitmac
RC212	355	Concrete over bitmac
RC213	245	Bitmac
RC214	210	Bitmac
RC215	64	Bitmac
RC216	180	Bitmac
RC217	170	Bitmac

Table 1. Pavement core thickness and composition





RC218	250	Bitmac
RC129	61	Bitmac
RC220	150	Bitmac
RC221	210	Bitmac

Photographs of the pavement cores are presented in Appendix G.

4.7 Surveying

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R10 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish Transverse Mercator) and ground elevation (mOD Malin)at each location are recorded on the individual exploratory hole logs. The exploratory hole location plan presented in Appendix A shows these as-built positions.

5 LABORATORY WORK

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described, and their descriptions incorporated into the borehole logs.

5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests and particle size distribution analysis.
- compressibility: one dimensional consolidation (oedometer).
- **shear strength** (total stress): unconsolidated undrained triaxial tests.
- direct shear: shear box tests.
- compaction related: California bearing ratio tests.
- soil chemistry: pH and water soluble sulphate content.

Laboratory testing of soils samples was carried out in accordance with British Standards Institute: *BS 1377, Methods of test for soils for civil engineering purposes; Part 1 (2016), and Parts 2-9 (1990).*

The test results are presented in Appendix H.





5.2 Geotechnical laboratory testing of rock

Laboratory testing of rock sub-samples comprised:

• point load index

Test	Test carried out in accordance with
Point load index	ISRM Suggested Methods (1985) Suggested method for determining point-load
	strength. Int. J. Rock Mech. Min. Sci. Geomech. Abstr. 22, pp. 53–60

The test results are presented in Appendix H.

5.3 Environmental laboratory testing of soils

Environmental testing, as specified by the Client's Representative was conducted on selected environmental soil samples by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out according to RPS Soil Testing Suites A, B, C, D and E, for a range of determinants, including:

- Metals
- Speciated total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- BTEX compounds
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds (SVOCs)
- Polychlorinated biphenyls (PCBs)
- Phenols
- Organic matter
- Total Organic Carbon (TOC)
- Cyanides
- Asbestos screen
- Sulphate
- Sulphur
- Phosphate
- pH
- Waste acceptance criteria (WAC)

Results of environmental laboratory testing are presented in Appendix I.





6 GROUND CONDITIONS

6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise urban sediments. These deposits are underlain by dark limestones and shales of the Lucan Formation.

6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Paved surface:** BH203 encountered 500mm of bitmac surfacing. In addition, bitmac surfacing was encountered in ST203 and ST204 in approximately 100mm thickness.
- **Made Ground (sub-base):** approximately 200mm of aggregate fill beneath all paved surfaces.
- **Made Ground (fill):** reworked sandy gravelly clay fill or reworked sandy silty gravel fill or gravelly silty sand fill with varying fragments of steel, concrete and red brick was encountered across the site extending to a depth of 0.15-6.80m.
- **Marine beach deposits:** typically medium dense to dense sands and gravels interspersed with layers of sandy gravelly clay frequently with shell fragments encountered across the site to a maximum depth of 19.50m in BH216 and BH217.
- **Port Clay:** firm to stiff sandy silty clay often with laminations of silty sand encountered across the site to a maximum depth of 36.50m in BH217.
- **Fluvioglacial deposits:** very dense sandy clayey gravel encountered beneath Port Clay and overlying bedrock in BH217.
- **Bedrock (Limestone):** Medium strong to strong limestone rockhead was encountered at depths ranging from 36.00m in BH215-BH216 and 39.05m in BH217.

6.3 Groundwater

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.

Groundwater was encountered during the ground investigation as water strikes seen in Table 2 below.





Location	Depth (mbgl)	Comments
BH215	4.30	Water rose from 4.30m to 2.10m over 20 minutes
BH216	13.00	Water rose from 13.00m to 1.60m over 20 minutes
BH217	7.65	-

Table 2. Groundwater strikes encountered during the ground investigation.

An ingress of sea water was noted during excavation of the inspection pit in BH212 at a depth of 1.85m.

Groundwater was not noted during drilling at several of the borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any groundwater strikes and the possibility of encountering groundwater during excavation works should not be ruled out.

It should be noted that any groundwater strikes within bedrock may have been masked by the fluid used as the drilling flush medium.

Seasonal variation in groundwater levels should be factored into design considerations.

7 **REFERENCES**

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

BS EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description.

BS EN ISO 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.



APPENDIX A SITE AND EXPLORATORY HOLE LOCATION PLANS









CALISEMAN	Project No.:	22-1041B	Client:	Dublin Port Company (DPC)
GEOTECH	Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	Client's Representative:	RPS
 Locations By Type - CP Locations By Type - CP+RC Locations By Type - IP Locations By Type - PC Locations By Type - TP 	Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	Representative:	<page-header></page-header>
Title: Exploratory Hole Location Plan - 3			4	
Last Revised: Scale: 19/04/2023 1:500	bing Microsoft product <u>screen</u>	shot(s) reprinted with permission from Microsoft <u>Corporation</u>	TTO A COM	80 Feet

CAUSEWAY		Project No.:	22-1041B	Client:	Dublin Port Company (DPC)
	GEOTECH	Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	Client's Representative:	RPS
Legend Key Locations By Typ Locations By Typ Locations By Typ Locations By Typ Locations By Typ	ne - CP ne - CP+RC ne - IP ne - PC ne - TP	RC213		B	H208A BH208 BH208C H208D
Title: Exploratory Hole L Last Revised:	ocation Plan - 4 Scale:		RC214 RC215 RC217	16	Image: Content of the second of the secon
19/04/2023	1:1500	Microsoft product screen s	hot(s) reprinted with permission from Microsoft Corporation		



CAUSEWAY		Project No.:	22-1041B	Client:	Dublin Port Company (DPC)
	GEOTECH	Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	Client's Representative:	RPS
	Elegend Key Locations By Type - CP+RC Locations By Type - IP Locations By Type - PC Locations By Type - TP Locations By Type - TP 			PH212	
╞	Last Revised: Scale:				50 Metres
	19/04/2023 1:1000	Microsoft product screen	shoi(s) reprinted with permission from Microsoft Corporation		1 100 Feet



APPENDIX B BOREHOLE LOGS

			Project No.		Project Name:					Trial Pit ID		
		22-1041B		3FM Planning Design GI - Lot B 3rd Party Lands								
	G	EOTECH	Coordinates		Client:					BH203		
Method:			- 719778.19 E		Dublin Port Company (DPC)							
Dynamic Sampl	ing		73370	38.66 N	RPS	Representative.			Sheet 1 of 1			
Plant:			Elevation		Date:			Logger:				
Premier 110			4.18	4.18 mOD		2022		RS		DRAFT		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend		Description		Water			
,						BITMAC				_		
				- ſ						_		
				- +						-		
			2.60									
			3.58	0.60		MADE GROUND: Grey sl vis fine to coarse.	lightly sandy angular fine to	coarse GRAVEL. Sar	id	_		
				- -			End of trial pit at 0.60m		_	-		
				- ī						-		
				⊢						1.0		
				- L						-		
				- - F						_		
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Water	Strikes	Depth: 0.60	Rem	arks:						•		
Struck at (m)	Remarks		Hand No g	a dug insp groundwat	ection pi er encou	excavated to 0.60m. ntered.						
		Length: 0.80										
		Stability:	Term	nination R	eason			Last	Update	ed 📕 🖬		
		Term	Terminated due to services present. 12/0				06/2023	AGS				

			Project No.		Project Name:				Trial Pit ID			
		22-1041B		3FM Planning Design GI - Lot B 3rd Party Lands								
		GEOTECH	Coor	Coordinates		Client:				H208		
D.d. a di			7204	46.87 E	Dublin	Dublin Port Company (DPC)						
		7337	69.87 N		s Representative:			Sheet 1 of 2				
Plant.			Flo	vation			l ogger:		Sca	ale: 1:25		
3t Excavator			3.7		18/01/	2023	RS		D	RAFT		
Depth	Sample /		Level	Depth				ter				
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description	cilty fing to a		Ma			
(m) 0.50 - 0.50 0.50 - 0.50	B2 ES1	PID = 0.20ppm	(mOD) 3.55 2.85	(m) 0.20		Description MADE GROUND: Brownish yellow very gravelly very sAND. Gravel is angular fine to coarse. MADE GROUND: Dark greyish black very gravelly very sAND with low cobble content and rare brick fragme subrounded fine to coarse. Cobbles are subangular. End of trial pit at 0.90m	silty fine to o	icoarse coarse s				
				ŀ								
	<u> </u>	<u> </u>										
Wate	r Strikes	Depth: 0.90	Ren	narks:								
Struck at (m)	Remark	S Width 0.00	Mac	hine dug i	nspection	n pit excavated to 0.90m. ntered						
			NO §	siounawat	er encou	ntered.						
		Lengtn: 1.80										
		Stability:	Terr	nination R	eason			Last Upd	lated			
		Unstable	Term	ninated on c	oncrete.			12/06/2	:023	AGS		

			Proj	ect No.	Project	Name:		1	rial Pit ID		
		EWAY	22-	1041B	3FM Planning Design GI - Lot B 3rd Party Lands				BUJORA		
	G	EOTECH	Coor	dinates	Client:				BH208A		
Method:			7204	43.47 E	Client'	C					
Inspection Pit			7337	70.59 N	RPS	nepresentative.			neet 1 of 1 Scale: 1:25		
Plant:			Elev	vation	Date:		Logger:		. 1.25		
3t Excavator			3.78	3 mOD	18/01/	2023	RS		DRAFT		
Depth	Sample /	Field Records	Level	Depth	Legend	Description		ater			
(m)	lests		(mOD)	(m) -		MADE GROUND: Brownish yellow gravelly very silt	y fine to coarse	SAND.			
			3 58	0.20		Gravel is subrounded fine to coarse.			_		
			5.50	0.20		MADE GROUND: Dark greyish black gravelly very si SAND with fragments of steel. Gravel is subangular	Ity fine to coars fine to coarse.	e	_		
			3.38	0.40		End of trial pit at 0.40m			-		
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	Chuiles -	,	Por	arks:							
Water Struck at (m)	Remarks	Depth: 0.40	Mac	hine dug i	nspection	n pit excavated to 0.40m.					
		Width: 0.60	Nog	groundwat	er encou	ntered.					
		Length: 2.00									
		Stability:	Tern	nination R	eason			Last Update	ed 🔳		
Unstable			Term	ninated at re	fusal on b	oulders / possible bedrock.		12/06/2023	AGS		

			Proje	ect No.	Project	Name:		Т	rial Pit ID
	CAUS	EWAY	22-1	1041B	3FM Pl	anning Design GI - Lot B 3rd Party Lands		_	
	GI	EOTECH	Coord	dinates	Client:	2 (222)		E	3H208B
			7204	46.87 E	Dublin	Port Company (DPC)			
			73376	67.26 N	Client	s Representative:		Sh	neet 1 of 1
Inspection Pit					RPS		Leasen	S	cale: 1:25
Plant: St Excavator			2 73		Date:	2023	Logger:		DRAFT
Denth	Sample /			Denth	10/01/	2023	0	2	
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description		Wat	
			-	F		MADE GROUND: Brownish yellow gravelly very silty fi Gravel is subangular fine to coarse.	ne to coarse SAND		_
			3 / 8	0.25					-
			3.38	0.25		MADE GROUND: Dark greyish black very gravelly very	silty fine to coarse	:	_
				F		MADE GROUND: Brown very gravelly very silty fine to	coarse SAND with	-	-
				Ē		low cobble content with rare brick fragments and abute fragments. Gravel is subangular fine to coarse. Cobble	indant concrete es are subangular.	ſ	0.5
				-			Ū	ſ	_
			2.93	0.80		End of trial nit at 0.80m			-
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				 -				ſ	1.0
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		Length: 1.80			_				
		Stability:	Tern	nination R	eason		Last	Jpdate	d 🗖 = P
		Unstable	Term	ninated at re	fusal on c	oncrete	12/1	16/2022	
		Unstable		accu at le	usar on C		12/0	512023	- MUD

			Proje	ect No.	Project	Name:		Tr	ial Pit ID
	CAUS	EWAY	22-2	1041B	3FM PI	anning Design GI - Lot B 3rd Party Lands			
	G	EOTECH	Coor	dinates	Client:	Port Company (DPC)		B	H208C
Method:			72044	44.57 E	Client's	Representative:			ast 1 of 1
Inspection Pit			73376	50.47 N	RPS			SU	cale: 1:25
Plant:			Elev	vation	Date:	Lc	ogger:		
3t Excavator			3.79) mOD	18/01/	2023 R:	5		DRAFT
Depth (m)	Sample /	Field Records	Level	Depth	Legend	Description		Vater	
(m)	lests		3.74	0.05		MADE GROUND: Grey sandy very silty angular fine to me	dium GRAVEL.	>	
				- - -		Sand is fine to coarse. MADE GROUND: Brownish yellow gravelly silty fine to co	arse SAND.	/	_
			3.54	- 0.25		Gravel is subrounded fine to coarse.		/	_
			3 3/	- 0.45		SAND with low cobble content. Gravel is subangular fine	to coarse.		-
			5.54	- 0.45 -		Cobbles are angular. MADE GROUND: Grev gravelly very silty fine to coarse SA	ND with low	4	0.5 —
				- Ē		cobble content and rare brick fragments. Gravel is subrout	unded fine to		_
			2.99	- 0.80				_	_
						End of trial pit at 0.80m			_
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				- 				+	
Water	Strikes	Depth: 0.80	Rem	arks:	•				
Struck at (m)	Remarks	Width: 0.70	Mac No ø	nine dug i roundwat	nspection er encou	n pit excavated to 0.80m. ntered.			
		Length: 2.20	Cond	crete wall	found at	south end of pit.			
		Stability:	Tern	nination R	eason		Last I	pdate	
		Unstable	Term	inated at re	efusal on c	oncrete	12/0	6/2023	AGS
	1	1	1				1		

			Proj	ect No.	Project	Name:		Tr	ial Pit ID
	CAUS	EWAY	22-	1041B	3FM Pl	anning Design GI - Lot B 3rd Party Land	S	B	H208D
	G	EOTECH	Coor	dinates	Dublin	Port Company (DPC)		B	N200D
Method:			7204	23.55 E	Client's	Representative:		Sh	eet 1 of 1
Inspection Pit			7337	31.98 N	RPS			Sc	ale: 1:25
Plant:			Ele	vation	Date:		Logger	:	
3t Excavator			3.73	3 mOD	23/01/	2023	RS		JKAFI
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description		Water	
			2.50	-		MADE GROUND: Brown very sandy very clayey GRAVEL. Sand is fine to coarse.	angular fine to c	oarse	_
			3.58	0.15		End of trial pit at 0.15	n		_
				-					_
				-					0.5 —
									_
				-					_
				-					_
									1.0
				-					-
				-					_
				-					_
				-					1.5 —
									_
				-					_
				-					_
				-					2.0
				-					_
				-					_
				-					_
				-					2.5
				-					_
				-					_
				-					3.0
				-					
				-					-
				-					_
				-					3.5 —
				-					_
				-					_
				-					_
				ŀ					4.0
				-					_
				-					_
				-					_
				-					4.5
				Ę					_
				-					_
									-
		i							
Water Struck at (m)	Strikes Remarks	Depth: 0.15	Ken Mac	n arks: hine dug ins	spection p	it excavated to 0.15m.			
	inciniar KS	Width: 0.35	No g	groundwater Id not break	encounte	ered. due close proximity of GPR detected services			
		Length: 4.30	Stee	I found with	iin concre	(e			
		Stability:	Terr	mination R	eason			Last Updated	
		Unstable	Term	ninated at re	fusal on c	oncrete.		12/06/2023	AGS

	e c		W/	AY		Proj 22-	ect No.	Project Name: 3FM Planning Design GI - Lot B 3rd Party Lands Client: Dublin Port Company (DPC)	Borehole ID BH212
	- 19	GE	OTEC	СН				Client's Rep: RPS	
Meth	od	Plant Use	ed Tr	op (m) B	ase (m) Coo	rdinates	First Danth: 10.20 m Start Date: 07/02/2023 Driller: RW	Sheet 1 of 2
Inspectio Cable Perc	on Pit cussion	3t Excavato Dando 250	or / 00	0.00	2.50 10.20	7211	116.74 E		Scale: 1:40
						7338	328.09 N	Elevation: 2.16 mOD End Date: 10/02/2023 Logger: RS	DRAFT
Depth (m)	Sample / Tests	Field P	Records	C C	asing Water Depth Depth	Level	Depth (m)	Legend Description	Backfill
0.00		08-02-2023		0).00 0.00)		MADE GROUND: Light brown BOULDERS with occasional cobbles and	-
								with much sand.	_
0.50	B1					1./0	- 0.4u -	MADE GROUND: Light slightly gravely slightly silty fine to coarse	0.5 —
0.50 0.50	ES6	PID = 0.10ppm						SAND. Clavel 5 rounded mile to media	-
1.00	B2						_		1.0
1.00	ES7	maa00 ח = חופ					-		-
1.00		FID - 0.05 p.					-		-
1.50 1.50	B3 ES8						-		
1.50		PID = 0.00ppm Sea water ingres	ss at 1.85r	m				×	
2.00	B4						_		2.0
2.00	LUU	PID = 0.10ppm					-		-
2.50	B5					-0.34	- 2.50	Modium donce brown fine to coarse SAND and subrounded fine to	2.5 —
2.50 2.50 - 3.00	ES10 B1						-	coarse GRAVEL with shell fragments.	_
2.50	-c2	PID = 0.70ppm					-		7
3.00 - 4.00	B6						-		-
3.00 - 3.45	SPI (L)	N=21 (3,3/4,4,o, 1410	,7) Hamme	er SN = 15	.00 1.50	,	-		-
3.00		PID = 0.90ppm fast				-1.34	- 3.50 -	Medium dense brown very gravelly slightly silty fine to coarse SAND.	3.5 —
3.20 3.50	D2 ES4						-	Gravel is subrounded fine to medium.	-
3.50 4.00	ES5	PID = 1.30ppm					-		4.0
4.00 - 5.00	B8 SPT (C)	NI-18 (3 5/4.5.5	· 4) Hamm	or SN = d	• 0012.6(
4.00 4.12) · · · · · · · · · · · · · · · · · · ·	1410	,4) i lui	er on -	.00 2		_		- 4.5 —
4.20 4.50	יט	PID = 0.50ppm					-		-
30,000						2.94	-		-
5.00 - 6.00 5.00 - 5.45	B10 SPT (C)	N=24 (4,5/5,6,6,	,7) Hamm	ier SN = 5	5.00 2.00	-2.84)	- 5.00 -	Medium dense grey fine to coarse SAND and subrounded fine to coarse GRAVEL with medium cobble content and shell fragments.	5.U — —
5.20	D9	1410					-	Cobbles are subrounded.	
5.50		PID = 0.60ppm					-		5.5 —
							-		-
6.00 - 7.00	B12						-		6.0
6.00 - 6.45	SPT (C)	N=25 (4,5/6,5,7, 1410	,7) Hamm	.er SN = 6	.00 1.80	J	-		
6.20	D11	0 70ppm					_		6.5 —
0.50		HD - 0.70pp					-		-
							-		-
7.00 - 8.00 7.00 - 7.45	B14 SPT (C)	N=20 (3,3/4,4,5,	.7) Hamm	ner SN = 7	7.00 2.00	5	-		7.0
7.20	D13	1410					-		
	Wate	r Strikes			Chisellir	ng Detai	ils	Remarks	
Struck at (m) C 1.85	Casing to (m	i) Time (min) Ros	se to (m)	From (m 2.00	1) To 2	(m) Tir 50	me (hh:mm) 01:00	Machine dug inspection pit excavated to 1.20m.	
3.00	3.00	10	1.50	l			-		
				l					
Casing D	Details	Water Ad	lded	l					
To (m) 9.00	Diameter 250	From (m) 1	To (m)	i					
10.00	200			l			ŀ	Termination Reason Last Upda	ted
				i				Terminated at scheduled depth. 12/06/202	²³ AGS

	2						Proj	ect No.	Project	Name: 3FM Pla	nning Design	GI - Lot B 3ı	d Party Lands	Bore	hole ID
		CAUS	EW	AY			22-1	L 041 B	Client:	Dublin P	ort Company	(DPC)		В	H212
	- 1	G	EOT	ECH					Client's	Rep: RPS					
Metho	d	Plant U	Jsed	Top (m)	Base	e (m)	Coor	dinates						She	et 2 of 2
Inspectio	n Pit	3t Excav	ator	0.00	2.	50 20	7211	16 74 F	Final De	pth: 10.20 m	Start Date: 0)//02/2023	Driller: RW	Sca	le: 1:40
cubic r cre	0351011	Dunuo 2	2500	2.50		.20	7338	28.09 N	Elevatio	n: 2.16 mOD	End Date: 1	10/02/2023	Logger: RS	D	RAFT
Depth	Sample /	5	ld De seude		Casing	Water	Level	Depth			Descrip				1-611
(m)	Tests	Fie	ia Recoras		(m)	(m)	mOD	(m)	Legena	Medium dense grev	v fine to coarse S	SAND and subr	ounded fine to	N N N	зскпіі
7.50		PID = 0.60ppr	m					_		coarse GRAVEL with	h medium cobble	e content and s	hell fragments.		7.5 —
										Copples are subrou	indea.				
8 00 - 9 00	B16						-5 84	- 8.00							80
8.00 - 8.45	SPT (C)	N=30 (4,4/6,7	7,8,9) Han	nmer SN =	8.00	2.10	5.04	0.00		Medium dense grey Gravel is subrounde	y very gravelly sli ed fine to mediur	ightly silty fine m.	to coarse SAND.		
8.20	D15	1410						-							
8.50		PID = 0.30ppr	m					-							8.5 —
								-							
9.00 - 10.00	B18							-							9.0
9.00 - 9.45	SPT (C)	N=25 (3,4/5,5 1410	5,7,8) Han	nmer SN =	9.00	1.90		-							-
9.20	D17							-							-
9.50		PID = 1.20ppr	m					-							9.5 —
10.00 - 10.45	SPT (C)	N=10 (1,3/2,2	2,3,3) Han	nmer SN =	10.0	1.50		-							10.0
10.20	D19	1410					-8.04	10.20			End of Boreho	le at 10.20m			
								-							- 10.5
								-							
								-							
								-							11.0
								-							
								-							11.5 —
								-							
								-							12.0
								-							-
								-							-
								-							12.5 -
								-							-
								-							13.0
								-							
								-							-
								-							
								-							-
								-							14.0
								-							-
								-							14.5
								<u> </u>							
Struck at (m)	Wate	r Strikes	Rose to /-		Chis	ellin	g Detail	S	Remarks	undaria et la					
1.85			1.03e 10 (r	2.0	0	2.5	50	01:00	iviachine d	ug inspection pit exc	avated to 1.20m				
3.00	3.00	10	1.50												
Casing D	etails	Water	Added												
10 (m) [9.00	250 250	From (m)	ľo (m)	-											
10.00	200								Terminat	ion Reason			Last U	Jpdated	
									Terminate	d at scheduled depth	۱.		12/0	6/2023	AGS

		AUS	EW	AY		Pro 22	ject No. -1041B	Project Client:	: Name: 3FM Dub	1 Plar lin Po	nning Desigi ort Compan	n GI - Lot B 3r ıy (DPC)	rd Party La	ands	Bore BH	hole ID 1215
	9/ -	G	EOTE	СН				Client's	s Rep: RPS							
Meth Cable Perc Rotary D	od cussion prilling	Plant U Dando S Beretta	Ised 3000 T44	Top (m) 0.00 17.70	Base (17.70 20.00	m) Cor)) 720	ordinates 139.80 E	Final De	epth: 40.0	0 m	Start Date:	02/12/2022	Driller:	GT+CC	Shee Scal	et 1 of 5 e: 1:50
Rotary C	Coring	Beretta	T44	20.00	40.00	733	916.90 N	Elevatio	on: 2.88 m	nOD	End Date:	06/12/2022	Logger:	DM+RS	DF	RAFT
Depth (m)	Sample / Tests	Fie	ld Records		Casing Wi Depth De (m) (1	n) mOE	Depth (m)	Legend			Desc	ription			Water Bg	ckfill
0.00 - 0.50	B17						-		MADE GROUN coarse GRAVE	ID: Gr L with	rey slightly san Iow cobble co	ndy angular to su ontent. Sand is f	ibangular fir ine to coarse	ne to e.		-
0.50	ES1					2.38	0.50		Cobbles are ar MADE GROUN	ngular. ID: Loo	ose grey slight	ly gravelly fine to	o coarse SAI	ND.		0.5
0.50 - 1.50 0.50	818	PID = 5.00ppr	m						Gravel is subar	ngular	r to subrounde	ed fine to coarse.				-
1.00 1.00	ES2	PID = 0.10ppr	m													1.0
1.20 1.20 - 1.65	D19 SPT (S)	N=11 (2,2/2,3	3,3,3) Ham	mer SN =	1.20 0.	50										- - 1.5 —
1.50	ES3	0197														-
1.50 2.00	D20	PID = 0.10ppr	m			0.88	2.00		MADE GROUN	ID: Loo	ose becoming	medium dense g	grey slightly		•	2.0
2.00 2.00 - 3.00	ES4 B21								gravelly fine to to coarse.	o coars	se SAND. Grav	el is subangular	to subround	led fine		-
2.00 - 2.45	SPT (S)	N=10 (1,1/2,2 0197	2,3,3) Ham	mer SN =	2.00 1.	00										2.5
2.00 2.50	ES5	PID = 0.10ppr	m													3.0
2.50 3.00	D22	PID = 0.10ppr	m													-
3.00 3.00 - 3.45	ES6 SPT (S)	N=19 (2,3/4,4	1,5,6) Ham	mer SN =	3.00 1.	20										3.5 —
3.00		0197 PID = 0.20ppr	m			-0.8	2 3.70		MADE GROUN to coarse GRA	ID: De VEL w	ense grey slight vith medium co	tly sandy angula obble content. S	r to subangu and is fine t	ılar fine o		-
3.50 3.70 - 4.50	ES7 B23								coarse. Cobbl	es are	e angular.				\bigtriangledown	4.0
4.00 4.00	D24 ES8															4.5 -
4.00 - 4.45	SPT (C)	N=36 (6,9/12 SN = 0197	,10,7,7) Ha	ammer	4.00 2.	10										-
4.00	560	Strong seepa	m ge at 4.30ı	n												5.0
4.50	E59	PID = 0.30ppr	m													-
5.00 5.00	ES10	N-40 (4 7/0 (10 12) 11		5 00 2	20										5.5 -
5.00 - 5.45	5PT (C)	SN = 0197	э,10,12) Па	ammer	5.00 5.	30										6.0
5.50	ES11	PID – 0.50ppi														-
5.50	620 FS12	PID = 0.20ppr	m													6.5
6.00	D27	PID = 0.30ppr	m			-3.9	2 6.80		Firm grey SILT.							7.0
6.50 6.50 - 6.95	ES13 SPT (C)	N=17 (4.5/7.6	5.2.2) Ham	mer SN =	6.50 3.	-4.2	2 7.10		Grey sandy SIL	.T. San	nd is fine to coa	arse.				-
6.50		0197 PID = 0.10ppr	m					$\times \times \times \times$								7.5 —
6.80 - 7.10 7.00	B28 ES14															-
7.10 - 8.00 7.50	B29 ES15							$\begin{array}{c} \times \times \times \\ \times \times \times \end{array}$								8.0
8.00 8.00	D30 ES16						-									8.5 —
8.00 - 8.45	SPT (C)	N=10 (2,2/2,3 0197	3,3,2) Ham	mer SN =	8.00 1.	70 -5.8	2 8.70	<u> </u>	Medium dense	e grey	very sandy sli	ghtly clayey sub	angular to			-
8.70 - 10.00	B31								subrounded fi	ne to i	medium GRAV	/EL. Sand is fine t	to coarse.			9.0
	\M/ator	Strikes		1	Chicol	ling Data	ils	Remarks								
Struck at (m) C 4.30	to (m 4.30) Time (min) 20	Rose to (n 2.10	n) From (4.70 5.90 17.60	m) ·	Fo (m) 5.10 6.80 17.70	Time (hh:mm) 01:00 01:00 01:00	Hand dug	inspection pit e	xcavat	ted to 1.20m					
Casing D	Details	Water	Added													
To (m) [17.70	Diam (mm) 200) From (m) 8.00	To (m) 12.50	-												
36.00	150			Core	Barrel	Flu	sh Type	Terminat	tion Reason					Last Up	dated	
				s	K6L	1	Vater	Terminate	d at scheduled o	depth.				12/06/2	2023	AGS

	CAUSEM			Proj 22-	ect No. 1041 B	Project Name: 3FM Planning Design GI - Lot B 3rd Party Lands	Borehole ID BH215
-	GEOT	ECH				Client's Rep: RPS	2.1220
Method Cable Percussion	Plant Used	Top (m)	Base (m) Cool	rdinates	Final Depth: 40.00 m Start Date: 02/12/2022 Driller: GT+CC	Sheet 2 of 5
Rotary Coring	Beretta T44 Beretta T44	17.70 20.00	20.00 40.00	7201 7339	139.80 E 916.90 N	Elevation: 2.88 mOD End Date: 06/12/2022 Logger: DM+RS	DRAFT
Depth Sample (m) Tests	/ Field Record	s	Casing Depth (m) (m)	Level mOD	Depth (m)	Legend Description	Backfill
9.50 D32 9.50 - 9.95 SPT (C) N=27 (4,5/6,6,7,8) На 0197	mmer SN =	9.50 2.90				9.5
11.00 D34 11.00 - 11.45 SPT (C 11.20 - 12.00 B33) N=15 (2,2/3,4,4,4) Ha 0197	mmer SN =	11.0 3.70	-8.32	11.20	Medium dense brown silty fine SAND.	
12.50 - 12.95 SPT (C 12.70 - 13.20 B35) N=17 (2,3/3,4,5,5) Ha 0197	mmer SN =	12.5 7.60	-9.62	12.50	Medium dense brown gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse.	12.5
13.20 - 14.00 B36				-10.32	13.20	Dense locally medium dense brown sandy slightly clayey subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.	13.0
14.00 D37 14.00 - 14.45 SPT (C 14.50 - 15.50 B38) N=32 (3,4/6,8,9,9) Ha 0197	mmer SN =	14.0 4.10				14.0 —
15.50 D39 15.50 - 15.95 SPT (C 16.00 - 17.00 B40) N=25 (2,3/5,5,7,8) На 0197	mmer SN =	15.5 6.60				15.5
17.00 D41 17.00 - 17.45 SPT (C) N=32 (3,4/5,7,9,11) H = 0197	ammer SN	17.0 8.10			Very stiff brown sandy (LAV (Driller's Description)	
17.70 - 17.76 SPT (C) 50 (25 for 25mm/50 fr Hammer SN = 0208	or 30mm)	17.7 9.80	-14.82	17.70		18.0 — — — — — — 18.5 —
Wate Struck at (m) Casing to (i	er Strikes m) Time (min) Rose to ((m) From (Chisellir m) To	n g Detai (m) ∏⊺	ls me (hh:mm)	Remarks Hand dug inspection pit excavated to 1.20m	
Casing Details To (m) Diam (mr 17.70 200 36.00 150	Water Added n) From (m) To (m) 8.00 12.50	4.7(5.90 17.6) 5) 6 0 17	10 80 770	01:00 01:00 01:00 01:00		
		S	K6L	W	ater	Terminated at scheduled depth.	D23 AGS

						Proje	ct No.	Project	Name: 3FM Pla	nning Design (GI - Lot B 3r	d Party Lan	ds Bo	rehole ID
	C	CAUS	EW	AY		22-1	041B	Client:	Dublin F	Port Company	(DPC)		1	3H215
	/ -	C	GEOT	ECH				Client's	Rep: RPS					
Metho	d	Plant U	Jsed	Top (m)	Base (m)	Coord	dinates	Final De	pth: 40.00 m	Start Date: 0	2/12/2022	Driller: GT	-+CC Sh	eet 3 of 5
Rotary Dri	ussion illing	Dando Beretta	3000 a T44	0.00	20.00	72013	39.80 E				,, _022		S	cale: 1:50
Rotary Co	oring	Beretta	a T44	20.00	40.00	73391	l6.90 N	Elevatio	n: 2.88 mOD	End Date: 0	6/12/2022	Logger: DN	/I+RS	ORAFT
Depth (m)	Sample / Tests	Fie	eld Records	1	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend		Descrip	otion		Water	Backfill
														-
10.50 10.64		50 (25 for 62	mm /50 fa	r 70mm)										
19.50 - 19.64	5PT (C)	Hammer SN	= 0208	78000)										- 19.5
						-17.12	20.00	× × × ×	Firm brown slightly	gravelly sandy SI	LT. Sand is fine	to coarse. Gra	avel	20.0 —
								$\times \times $	is subrounded fine	to medium.				-
														20.5 —
			50											21.0
														-
21.50	C1		\vdash					(* * × × * * * * *						21.5 -
21.50 21.50 21.50 - 21.95	D42	1-9						$\begin{array}{c} \times \times \times \times \\ \times \times \times \end{array}$						
21.50 21.55	(3,2/2,2 Hamme	,3,2) r SN = 0208	70											22.0
22.00 - 22.30	C2	1 511 - 0200												 22.5
22.80 - 23.00	C3							$\times \times \times \times$						-
23.00 23.00	D43						(6.00)							23.0
23.00 - 24.50 23.00 - 23.45	C4 SPT(S) N	I =9						$\times \times $						
	(2,2/3,2 Hamme	,2,2) r SN = 0208	60											-
														24.0
								× × × × × × × ×						-
24.50 24.50	D44													24.5 — — —
24.50 - 24.95	SPT(S) N (3,3/2,3	l=11 ,3,3)						$\begin{array}{c} \times \times \times \times \\ \times \times \times \end{array}$						 25.0
	Hamme	r SN = 0208	45											
														25.5 — -
26.00						-72 17	26.00	$\times \times $						
26.00 26.00 - 27 50	D45 C5					23.12	20.00		Firm brown slightly	/ sandy CLAY. Sanc	d is fine.			
26.00 - 26.45	SPT(S) N (2,3/3.3	l=12 ,3,3)												26.5 — -
	Hamme	r SN = 0208	50											-
														27.0
27.50			\mid											 27.5
27.50	D46													-
	\M/ata	Strikes	TCR SCR	RQD FI										
Struck at (m) Ca	sing to (m) Time (min)	Rose to (n) Hand	u ks dug inspec	tion pit ex	cavated t	o 1.20m						
4.30	4.30	20	2.10											
Casing De	etails	Water	Added											
To (m) Di 17.70	iam (mm) 200) From (m) 8.00	To (m) 12.50	_										
36.00	150			Core	Barrel	Flush	Туре	Terminat	ion Reason			La	ast Updated	
				5	ik6L	Wa	ter	Terminate	d at scheduled depth	h.			12/06/2023	AGS

	¢	AUS	E GEC			Y		Proj 22-	ect No. 1 041B	Projec Client:	t Name:	3FM Pla Dublin P	nning Desig Port Compar	gn GI - Lot B 3i ny (DPC)	rd Party L	ands	Bore BH	hole ID 1215
Moth	had	Diant I	Icod		Ton	(m)	Paca (m			Client	s Rep:	RPS	1				cl	- 4 65
Cable Per	rcussion	Dando	3000)	0.	(m) 00	17.70	i) Cool	rdinates	Final D	epth:	40.00 m	Start Date:	02/12/2022	Driller:	GT+CC	Shee Scal	e: 1:50
Rotary D Rotary (Drilling Coring	Beretta Beretta	a T44 a T44		17 20	.70 .00	20.00 40.00	7201	.39.80 E)16.90 N	Elevatio	on: 2	2.88 mOD	End Date:	06/12/2022	Logger:	DM+RS	DF	RAFT
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depti (m) (m)	r Level mOD	Depth (m)	Legend			Des	cription			Water Ba	ckfill
27.50 - 27.9	5 SPT(S) N (2,2/3,3, Hammer	=10 2,2) · SN = 0208	25								Firm bro	wn slightly	sandy CLAY. S	and is fine.				28.0
29.00 29.00 29.00 - 29.4	D47 5 SPT(S) N: (2,2/3,3, Hammer	=12 3,3) SN = 0208	45															29.0 — — 29.5 — — 29.5 — — — 30.0 — — — — — 30.0 —
30.50 30.50 30.50 - 32.0 30.50 - 30.9 31.10 - 31.4 31.40 - 31.6	D48 10 C6 15 SPT(S) N: (2,3/3,3, Hammer 10 C7 50 C8	=10 2,2) SN = 0208	65															30.5
32.00 32.00 - 32.4	I5 SPT(C) N (3,2/3,3, Hammer	=11 2,3) SN = 0208	47			NI			_(10.00))								32.0
33.50 33.50 - 33.9	15 SPT(C) N (3,2/3,2, Hammer	=10 3,2) SN = 0208	65															33.5
35.00 35.00 - 35.1 36.00 - 36.8	.4 SPT(C) 50 55mm/5 83mm) H = 0208 35 C9	D (25 for O for Jammer SN	40	20	0			-33.12	36.00		Strong the occasion weather Discontir	ninly to thia al white ca ed: slightly nuities:	ckly laminated alcite veins of u reduced strer	dark grey LIMES up to 15mm thick gth, slight discol	TONE with k. Slightly louration.	ulation		35.0 — 35.0 — 35.5 — 36.0 — 36.0 — 36.0 —
36.50 36.50 - 36.5	i0 SPT(C) 50 0mm/50 Hammer	0 (25 for for 0mm) 5 SN = 0208									1. 5-15 0 rough wi 2. 40-50 undulatin surfaces. 36.00-38.2	degree fract ith some lig degree fra ng, rough v 2007: Limestone	ght brown disc ctures at 38.50 with light brow	spaced (110/445 colouration on fra 0m, 38.70m, 39.7 /n discolouration	or sol, und acture surfa 75m and 39 1 on fracture	.80m,		36.5
	Water	Strikes	TCR	SCR	RQD	FI	Chiselli	ng Detai	 Is	Remark	5							
Struck at (m) 4.30 Casing I To (m)	Casing to (m) 4.30	Time (min) 20 Water From (m)	Rose 2 Add	e to (r 2.10 ed	n) F	rom (4.70 5.90 17.60	cmselling m) Tc) 5) 6 0 1	(m) Ti .10 .80 7.70	me (hh:mm) 01:00 01:00 01:00	Hand dug	• ; inspectior	n pit excava	ated to 1.20m					
17.70 36.00	200 150	8.00	1	2.50		Corc	Barrol	Eluci	h Type	Termina	tion Ross	on			I	act m	lated	
-	1					S	K6L	w	'ater	Terminat	ed at sched	luled depth	۱.			12/06/2	2023	AGS

VICUUM VICUUM<								Proje	ect No.	Project Name: 3FM Planning Design GI - Lot B 3rd Party Lands	Borehole ID
Nethod Functional Tage (n) Conditional (n) State Sta			USE —GE	EO1	EC	H		22-1	1 041B	Client: Dublin Port Company (DPC)	BH215
Calcel Providering Network Prime Network Prim Network Prime Net	Metho	od P	Plant Use	ed	Tor	p (m)	Base (n	n) Coor	dinates	Client's Rep: RPS	Sheet 5 of 5
BODY CONT BUTCH T-44 2000 0000 77.247.6.01 Deartor 2.05 Do date: 0.01 2 8.00 77.247.6.01 Deartor 2.05 Do date: 0.01 2 8.00 77.247.6.01 Deartor 2.05 Do date: 0.01 2 8.00 77.247.6.01 Deartor 2.05 Deartor Deartor <thdeartor< th=""> <thdeartor< th=""> <thd< td=""><td>Cable Perc</td><td>ussion D;</td><td>ando 30</td><td>00</td><td>0</td><td>.00</td><td>17.70</td><td>7201</td><td>20 80 F</td><td>Final Depth: 40.00 m Start Date: 02/12/2022 Driller: GT+CC</td><td>Scale: 1:50</td></thd<></thdeartor<></thdeartor<>	Cable Perc	ussion D;	ando 30	00	0	.00	17.70	7201	20 80 F	Final Depth: 40.00 m Start Date: 02/12/2022 Driller: GT+CC	Scale: 1:50
Toring in the sequence reset hands in the loss in the l	Rotary Co	oring B	eretta T4	44	20).00	40.00	7339	16.90 N	Elevation: 2.88 mOD End Date: 06/12/2022 Logger: DM+F	RS DRAFT
37.40 17.30 C10 7 1 4 4 4 4 4 4 4 5 <td< td=""><td>Depth (m)</td><td>Samples / Field R</td><td>tecords TC</td><td>CR SC</td><td>R RQE</td><td>) FI</td><td>Casing Wate Depth Dept (m) (m)</td><td>Level mOD</td><td>Depth (m)</td><td>Legend Description</td><td>Backfill</td></td<>	Depth (m)	Samples / Field R	tecords TC	CR SC	R RQE) FI	Casing Wate Depth Dept (m) (m)	Level mOD	Depth (m)	Legend Description	Backfill
37.00 73.00 73.00 73.00 74.00 <th< td=""><td></td><td>T</td><td></td><td></td><td></td><td>T</td><td></td><td>T</td><td></td><td>Strong thinly to thickly laminated dark grey LIMESTONE with occasional white calcite veins of up to 15mm thick. Slightly</td><td>37.5</td></th<>		T				T		T		Strong thinly to thickly laminated dark grey LIMESTONE with occasional white calcite veins of up to 15mm thick. Slightly	37.5
38.00 Image: state in model in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in model in participation on figure in the state in the st	37.60 - 37.80	C10	7	0 65	5 10					weathered: slightly reduced strength, slight discolouration.	
Status Status<	38.00		\vdash	+	+	-				Discontinuities:	38.0
38.80 -7000 -7 <										1. 5-15 degree tractures medium spaced (110/443/550), undorating, rough with some light brown discolouration on fracture surfaces.	'
38.30 211 300 212 7 80 90 7 80 90	20 80 - 39 00	C11	9	90 81	0 65				(4.00)	2. 40-50 degree fractures at 38.50m, 38.70m, 39.75m and 39.80m,	- C.8c
33 50 35 0 35 0 13 7 70 50 57.22 40.00 End of Borehole at 40.00m 60.00 40.00 7 7 70 50 57.22 40.00 End of Borehole at 40.00m 60.00 40.00 7 7 70 50 57.22 40.00 End of Borehole at 40.00m 60.00 40.00 7 8 7	39.00 - 39.20	C11 C12				7				surfaces.	39.0
35.0 27.0 C13											
40.00 27 30 30 37.12 40.00 End of Boendels at 40.00m 100 40.00 10 <t< td=""><td>39.50 39.50 - 39.70</td><td>C13</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td>39.5 —</td></t<>	39.50 39.50 - 39.70	C13				-					39.5 —
Image: Single	40.00		9	17 91) 50			-37.12	40.00		40.0
Value Value <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>End of Borenole at 40.00m</td><td></td></th<>										End of Borenole at 40.00m	
Vater Strike Construction Construction<											40.5
Vater Strikes Chicelling Details Remarks Sinck at (m) Comm / from (m) Solo 17.00 53.00 17.0											
Value Value <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>41.0</td></th<>											41.0
Image: Structure Struct											41.5
Value Value <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>											
Water Strikes Core Barel Core Barel Form (m) To (m) Tom (m) To											42.0
Water Strikes Core Barel Solution Form (m)											425 -
Water Strikes Chielling Details Remarks Struck at (mic) Risop to (mi) Rose Added 17.70 5.00 17.70 17.70 5.00 17.70 17.70 5.00 17.70 1											
Water Strikes Consider consinder consider consider consinder consider consider c											43.0
Vater Strikes Chiselling Details Remarks 4.30 4.30 20 2.10 5.00 17.70 01.00 17.70 200 8.00 12.50 17.70 01.00 17.70 01.00 17.70 200 8.00 12.50											
Value Value <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>43.5</td></th<>											43.5
Vater Strikes Chiselling Details Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) Tore											44.0
Water Strikes Chief Internation Research Form (m) Form (m) <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>											
Value Value <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>44.5 —</td></th<>											44.5 —
$ \begin{array}{ c c c c c c } \hline \begin{tabular}{ c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c } \hline \begin{tabular}{ c c c c c c c c } \hline \begin{tabular}{ c c c c c c c c } \hline \begin{tabular}{ c c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$											
$ \begin{array}{ c c c c c c } \hline \ \ \ \ \ \ \ \ \ \ \ \ \$											45.0
$ \begin{array}{ c c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$											45.5 —
$ \begin{array}{ c c c c c } \hline \ \ \ \ \ \ \ \ \ \ \ \ \$											
$ \begin{array}{ c c c c c c } \hline \ \ \ \ \ \ \ \ \ \ \ \ \$											46.0
Image: Constraint of the constrain											
Struck at (m) Casing to (m) Time (min) Rose to (m) From (m) To (m) Time (hh:mm) 4.30 4.30 20 2.10 4.70 5.90 6.80 01:00 5.90 6.80 01:00 17.60 17.70 01:00 17.60 17.70 Casing Details Water Added To (m) Diam (mm) From (m) To (m) To (m) From (m) To (m) 17.70 200 8.00 12.50 Image: the second s		Water Strike	es to	CR SC	R RQE	i Fl	Chisell	ing Detail	s		
Casing Details Water Added To (m) Diam (mm) From (m) To (m) 17.70 200 8.00 12.50 36.00 150 Core Barrel Flush Type Termination Reason Last Updated Date Updated	Struck at (m) Ca 4.30	asing to (m) Time	(min) Ro	ose to 2.10	(m) !	From (4.7((m) Tr	3 (m) Tin 5.10	ne (hh:mm) 01:00	and dug inspection pit excavated to 1.20m	
Casing Details Water Added To (m) Diam (mm) From (m) To (m) 17.70 200 8.00 12.50 36.00 150 Core Barrel Flush Type Termination Reason Last Updated				-		5.90 17.6) (30 1	5.80 .7.70	01:00 01:00		
Casing Details Water Added To (m) Diam (mm) From (m) To (m) 17.70 200 8.00 12.50 36.00 150 Core Barrel Flush Type Termination Reason Last Updated											
10 (m) Diam (m) From (m) Form (m) <	Casing D	etails V	Nater Ad	dded							
Core Barrel Flush Type Termination Reason Last Updated	17.70 36.00	200 8.	.00	12.50	5						
SK6L Water Terminated at scheduled depth. 12/Ub/2U23	50.00	150				Core	: Barrel	Flush	i Type ater	ermination Reason Last erminated at scheduled depth. 12/	Updated II

							Proj	ect No.	Project	: Name: 3FM Pla	inning Desig	n GI - Lot B 3	rd Party I	Lands	Borehole ID	,
			EW	AY			22-	1041B	Client:	Dublin F	ort Compar	ny (DPC)			BH216	
	9 –	——G	EOTE	СН					Client's	s Rep: RPS						
Metho	bd	Plant Us	sed	Top (m)	Base	e (m)	Соо	rdinates							Sheet 1 of 5	
Cable Perc	ussion	Dando 3	000	0.00	17	.50	7201	40.10 F	Final De	epth: 40.50 m	Start Date:	02/12/2022	Driller:	CC+GT	Scale: 1:50	
Rotary Dr Rotary Co	oring	Beretta Beretta	T44 T44	17.50 21.00	40	.00 .50	7338	396.11 N	Flevatio	n: 2.98 mOD	End Date:	12/12/2022	Logger:	RS+DM	DRAFT	_
										2000					E E	
(m)	Tests	Field	d Records		Depth (m)	Depth (m)	mOD	(m)	Legend		Des	cription			Backfill	
0.00 - 0.60	811									Coarse GRAVEL wit	h low cobble c	ndy angular to su ontent. Sand is f	ibangular f fine to coar	ine to se.		
0.50	ES1						2 20			Cobbles are angula	ır.				0.5	;
0.50 0.60 - 1.50	B12	PID = 0.00ppm	n				2.38	0.60		MADE GROUND: G	rey gravelly silt ounded fine to	ty fine to coarse medium.	SAND. Grav	vel is		
1.00	ES2														1.0)
1.00		PID = 0.00ppm	n					-								-
1.50	ES3	PID = 0.0000000000000000000000000000000000	•												1.5	;
1.50		PID - 0.00ppii	1													
2.00 2.00	D14 ES4						0.98	2.00		Loose grey gravelly	silty fine to co	arse SAND. Grav	el is suban	gular to	2.0)
2.00 - 3.00	B13		2) 110mm	or CN -	2.00	1 10			× × ×	subrounded fine to	coarse.					-
2.00 - 2.45	5FT (5)	0197	2,5) Hallin		2.00	1.10			××××						2.5	, – –
2.00 2.50	ES5	PID = 0.20ppm	n						\mathbf{x} \mathbf{x} \mathbf{x}							-
2.50 3.00	ES6	PID = 0.40ppm	n				-0.02	- 3.00	× × ×	Loose grey silty fin	e SAND.				3.0	
3.00 - 4.00	B15	N-10 (1 2/2 2	2 2) Ham	mor SN -	3 00	2 50			× × × × ×						35	
3.00 3.45	511(5)	0197	,2,3) пап		5.00	2.50			× × ×							-
3.00 3.50	ES7	PID = 0.90ppm	n						$\begin{pmatrix} x & x \\ x & x & x \end{pmatrix}$						4.0	-
3.50 4.00	D16	PID = 0.00ppm	n					Ē	$\times \times \times \times \times \times \times$							
4.00	ES8 SPT (S)	N-11 (1 2/2 3	3 3) Ham	mer SN -	1 00	2 90			× × ×						4.5	; _
4.00 4.45	511(5)	0197	,5,5) пап			2.50			××~××							
4.00 4.50	ES9	PID = 0.00ppm	n						××××						5.0	,
4.50 - 5.50 4.50	B17	PID = 0.10ppm	n						$\mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x}$							
5.00	D18 FS10								× × × × ×						5.5	;
5.00 - 5.45	SPT (S)	N=11 (2,2/3,2,	,3,3) Ham	mer SN =	5.00	1.70	-2.82	5.80	× × ×	Frim grey sandy SII	T Sand is fine	to coarse				-
5.00		PID = 0.00ppm	n					-		Thin Brey sundy sh					6.0)
5.80 - 6.50	B19															
6.50 - 6.95	U28	Ublow=8 1009	% Recover	у	6.50	5.30			× × × × × × × ×						6.5	;
									× × × × × × × ×							
7.00	D20														7.0	-
																-
7.50 - 8.30	в21						-4.52	E 7.50		Loose grey very gra	avelly silty fine	to coarse SAND.	Gravel is		7.5	
8.00	ננח								×, ×, × ,×, ×		. incurunt.					_
8.00 - 8.45	SPT (S)	N=8 (1,0/1,2,2	2,3) Hamn	ner SN =	8.00	1.60			\times \times \times \times \times \times						0.0	-
8.30 - 8.90	B23	0197					-5.32	8.30		Loose grey sandy s	ubangular to s	ubrounded fine t	to coarse G	RAVEL.	8.5	
											50.					
8.90 - 10.00	B24						-5.92	8.90	× × ×	Loose becoming m	edium dense b	rownish grey silt	ty fine SAN	D.	9.0)
								Ē	× × × ×							
┣───	Wate	r Strikes		1	Chie	ellin	g Detai	ls	Remarks							_
Struck at (m) Ca	asing to (m) Time (min) F	Rose to (m	n) From	(m)	To	(m) Ti	me (hh:mm)	Hand dug	inspection pit excava	ated to 1.20m					
13.00	13.00	20	1.60	17.4	.0	17.	50	01:00								
				4												
Casing D To (m) D	etails iam (mm	Water A	Added To (m)	-												
17.50	200	1.00	40.50	1									,			
50.00	10			Core	e Barı	rel	Flus	n Type	Terminat	tion Reason				Last Upd	ated	
				9	SK6L		W	'ater	Terminate	d at scheduled deptl	n.			12/06/2	O23 AG	2

	GEOTE	AY CH		Proje 22-1	ect No. 1 041B	Project Name: 3FM Planning Design GI - Lot B 3rd Party Lands Client: Dublin Port Company (DPC) Client's Rep: RPS	Borehole ID BH216
Method Cable Percussion Rotary Drilling Rotary Coring	Plant Used Dando 3000 Beretta T44 Beretta T44	Top (m) 0.00 17.50 21.00	Base (m) 17.50 21.00 40.50	Coor 72014 73389	dinates 48.19 E 96.11 N	Final Depth: 40.50 m Start Date: 02/12/2022 Driller: CC+GT Elevation: 2.98 mOD End Date: 12/12/2022 Logger: RS+DM	Sheet 2 of 5 Scale: 1:50 DRAFT
Depth Sample (m) Tests	/ Field Records		Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend Description	Backfill
9.50 - 9.95 SPT (S)	N=13 (2,2/3,3,3,4) Hami 0197	mer SN =	9.50 3.10				9.5 -
11.00 D25 11.00 - 12.00 B26 11.00 - 11.45 SPT (S)) N=16 (2,3/3,4,4,5) Hami 0197	mer SN =	11.0 4.30				11.0
12.50 D27	N=16 (1 3/4 4 4 4) Hami	mer SN =	12 5 5 70	-9.52	12.50	Medium dense grey silty fine SAND.	12.5 —
12.90 - 14.00 B29	0197 Strong seepage at 13.00	Im	12.5 5.70	-9.92	12.90	Medium dense brownish grey very sandy slightly sitly subangular fine to coarse GRAVEL. Sand is fine to coarse.	
14.00 D30 14.00 - 14.45 SPT (C 14.50 - 15.50 B31) N=25 (4,5/5,6,7,7) Hami 0197	mer SN =	14.0 2.20				14.0
15.50 D32 15.50 - 15.95 SPT (C 16.00 - 17.00 B33) N=33 (3,6/7,8,8,10) Han = 0197	nmer SN	15.5 2.60	-12.72	15.70	Gravels and Cobbles (Drillers Description).	11.5
17.00 D34 17.00 - 17.45 SPT (C) N=48 (5,5/8,11,15,14) H SN = 0197	lammer	17.0 3.00				
18.50 - 18.95 SPT (C) N=43 (8.8/10.10 11 12)	Hammer				$\begin{bmatrix} a & \cdot & \cdot & \hat{a} & \hat{a} \\ \cdot & \cdot & \hat{a} & \cdot & \hat{a} \\ a & \cdot & \hat{a} & \hat{a} \\ a & \cdot & \hat{a} & \hat{a} \end{bmatrix}$	
	SN = 0208			_	Ē,		
Wate Struck at (m) Casing to (i 13.00 13.00 Casing Details To (m) To (m) Diam (mr 17.50 200	Water Added m) From (m) To (m) Water Added To (m) 1.60 1.60) From (17.4(Chisellin m) To) 17	g Details (m) Tin .50	s ne (hh:mm) 01:00	Remarks Hand dug inspection pit excavated to 1.20m	
36.00 150	1.00 40.50	Core	Barrel	Flush	Туре	Termination Reason Last Up	dated
		s	K6L	Wa	iter	Terminated at scheduled depth. 12/06/	²⁰²³ AGS

Vertex Part Used Tay for a part of the part o							Proje	ct No.	Project Name: 3FM Planning Design GI - Lot B 3rd Party Lands	Borehole ID								
Method Cable (Provide) Benerity Comp. Method Served 144 20.0 Top (Pallace (m. 20.0) Conditation Pallace (m. 20.0) Top (Pallace (m. 20.0) Conditation Pallace (m. 20.0) Conditation Pallace (m. 20.0) Served 144 20.0				EV	AY CH		22-1041B		Client: Dublin Port Company (DPC)	BH216								
Calcular Service State Description 200 <	Method Diget Head Tag (Ton (m)			linator	Client's Rep: RPS	Chaot 2 of F									
Noting Yoring Noting	Cable Percussion		Dando 3000		0.00	Base (m) 17.50	720148.19 E 733896.11 N		Final Depth: 40.50 m Start Date: 02/12/2022 Driller: CC+GT	Sneet 3 of 5 Scale: 1:50								
With Number Part Name Part Name Name Description Name Nam Name Name Nam	Rotary Dri Rotary Co	lling ring	ling Beretta T44 ing Beretta T44		17.50 21.00 21.00 40.50				Elevation: 2.98 mOD End Date: 12/12/2022 Logger: RS+DM	DRAFT								
21.00 20.1 SPT (c) SDD	Depth (m)	Sample / Tests	Fie	ld Records		Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend Description	Backfill								
20.0 - 20.12 SFT (1) S0 (25 for 4) immy/C for 78mm I <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>-16.52</td><td>19.50</td><td>Very stiff brown sandy CLAY (Drillers Description).</td><td></td></t<>							-16.52	19.50	Very stiff brown sandy CLAY (Drillers Description).									
21.00 21.45 CI <	20.00 - 20.12 SPT (C)		50 (25 for 45 Hammer SN :	78mm)					20.0									
22.50 22.50 C2	21.00 - 21.45 21.00 - 21.45	C1 SPT(C) N=10 (1,2/2,2,3,3) Hammer SN = 0208		45			-18.02	21.00	Firm dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.	21.0 21.5 22.0 								
24.00 24.45 SPT(C) N=9 24.00 24.23, 22, 22, 23 Hammer SN = 0208 50 50 -22.52 25.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 27.00 27.00 27.00 27.00 27.00 27.45 SPT(C) N=10 (12/3, 3, 2, 2) Hammer SN = 0208 50 10 10 10 11 12.00 12.00 13.00 13.00 13.00 13.00 13.00 13.00 13.00 13.00 13.00 13.00 13.00 13.00 150 150 150 150 150 150 150 150 150 150	22.50 22.50 - 22.95 22.50 - 22.95	C2 SPT(C) N=10 (2,2/3,3,2,2) Hammer SN = 0208		50				(4.50)		22.5								
25.50 25.50 SPT(C) N=10 -22.52 25.50 25.50 25.50 -22.52 25.50 Firm dark brown sandy CLAX. Sand is fine to medium. 27.00 27.01 -22.52 25.50 Firm dark brown sandy CLAX. Sand is fine to medium. 27.00 27.02 59T(C) N=10 -22.52 25.50 Firm dark brown sandy CLAX. Sand is fine to medium. 27.00 27.45 SPT(C) N=10 -22.52 -25.50 Firm dark brown sandy CLAX. Sand is fine to medium. 27.00 27.45 SPT(C) N=10 -22.52 -25.50 Firm dark brown sandy CLAX. Sand is fine to medium. 12.00 -27.45 SPT(C) N=10 -22.52 -25.50 Firm dark brown sandy CLAX. Sand is fine to medium. 13.00 13.00 20 1.60 Firm dark brown sandy CLAX. Sand is fine to medium. 13.00 13.00 20 1.60 Firm dark brown sandy CLAX. Sand is fine to medium. 17.50 200 1.00 40.50 Firm dark brown sandy CLAX. Sand is fine to medium. 17.50 200 1.00 40.50 Firm dark brown sandy CLAX. Sand is fine to medium. 17.50 200 1.00 40.50 <td< td=""><td>24.00 24.00 - 24.45</td><td>SPT(C) N (3,2/2,3, Hammer</td><td colspan="2">N=9 (,2,2) r SN = 0208 50</td><td></td><td colspan="2"></td><td></td><td></td><td>24.0 — 24.5 — 24.5 — 25.0 —</td></td<>	24.00 24.00 - 24.45	SPT(C) N (3,2/2,3, Hammer	N=9 (,2,2) r SN = 0208 50							24.0 — 24.5 — 24.5 — 25.0 —								
27.00 27.45 SPT(C) N=10 Image: Constraint of the second sec	25.50 25.50 - 25.95	SPT(C) N (1,2/3,3, Hammer	=10 2,2) · SN = 0208	50			-22.52	25.50	Firm dark brown sandy CLAY. Sand is fine to medium.	25.5								
Water Strikes Remarks Struck at (m) Casing to (m) Time (min) Rose to (m) Hand dug inspection pit excavated to 1.20m 13.00 13.00 20 1.60 Casing Details Water Added To (m) Diam (mm) From (m) To (m) 17.50 200 1.00 40.50 36.00 150 Core Barrel Flush Type Termination Reason	27.00 27.00 - 27.45 SPT(C (2,2/2 Hamn		N=10 3,2,3) er SN = 0208 65							27.0								
Struck at (m) Casing to (m) Time (min) Rose to (m) 13.00 13.00 20 1.60 Casing Details Water Added To (m) Diam (mm) From (m) To (m) 17.50 200 1.00 40.50 Core Barrel Flush Type Termination Reason Last Updated		Water	Strikes	ICK SCR	Rema	rks			1 1									
To (m) Diam (mm) From (m) To (m) 17.50 200 1.00 40.50 36.00 150 Core Barrel Flush Type Termination Reason Last Updated	Casing Details Water Added Tr (w) Diam (www)																	
36.00 150 Core Barrel Flush Type Termination Reason Last Updated	To (m) Dia 17.50	am (mm) 200	From (m) 1.00	To (m) 40.50	_													
SK6L Water Terminated at scheduled depth. 12/06/2023	36.00	150			Core	Barrel	Flush Wat	Type ter	Termination Reason Last Upd Terminated at scheduled depth. 12/06/2	o23 AGS								
	1							Proj	ect No.	Project	t Name	: 3FM Pla	inning Desi	gn GI - Lot B 3	rd Party	Lands	Bore	hole ID
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	C	AUS	E	W	A	Y		22-:	1041B	Client:		Dublin P	Port Compa	ny (DPC)			BI	H216
	-	G	GEC	DTI	ECI	Н				Client's	s Rep:	RPS						
Metho Cable Porc	bd	Plant U	Jsed)	Тор	(m)	Base (m) Cooi	dinates	Final De	epth:	40.50 m	Start Date:	02/12/2022	Driller:	CC+GT	She	et 4 of 5
Rotary Dr	rilling	Beretta	a T44		17	.50	21.00	7201	.48.19 E					, ,			Sca	le: 1:50
Rotary Co	oring	Beretta	a T44		21.	.00	40.50	7338	96.11 N	Elevatio	on:	2.98 mOD	End Date:	12/12/2022	Logger:	RS+DM	D	RAFT
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend			De	scription			Water	ackfill
									-		Firm d	ark brown sa	andy CLAY. Sar	nd is fine to mediu	um.			28.0
																		-
28.50 28.50 - 28.95	SPT(C) N	l=10									<u>.</u>							28.5 -
	(2,2/2,3 Hamme	,3,2) r SN = 0208																
			25															-
																		- 29.5 -
											-							-
30.00																		30.0
30.00 - 30.45	SPT(C) N (2,2/2,3	l=10 ,3,2)									-							-
	Hamme	r SN = 0208									-							30.5 — -
			30															-
																		31.0
21 50											-							-
31.50 - 31.95	SPT(C) N	1=9																-
	(3,2/2,2 Hamme	,3,2) r SN = 0208							(10.50)	_							
			47								-							-
						NI												- 32.5 —
																		-
33.00	SPT(C) N	-10																
55.00 - 55.45	(2,2/3,3	,2,2)																-
	натте	r SIN = 0208									_							33.5 —
			40								-							-
34.50																		
34.50 - 34.95	SPT(C) N	I=42 10 12 10)									-							-
	Hamme	r SN = 0208									-							35.0
			90															-
																		35.5 — -
																		-
36.00 36.00 - 36.12	SPT(C) 5	0 (25 for						-33.02	- 36.00		Strong	dark grey th	inly to thickly	laminated LIMES	STONE with	1 athorad		36.0
	48mm/5 69mm)	i0 for Hammer SN									slight v	veakening, s	light discolou	ration.	JIGHTLY WE	ancieu.		265 -
	= 0208		70	60	0						Discon	tinuities:						
											1. 5-10	degree join	ts at 39.85m a	and 40.10m, undu	ulating and	rough.		 37.0
			TCR	SCR	RQD	FI												
	Water	Strikes					Chisellin	ng Detai	ls	Remarks	5							
Struck at (m) Ca 13.00	asing to (m 13.00	20	KOSE	e to (r 1.60	n) Fi	rom (17.40	m) To 0 17	(m) Ti	me (hh:mm) 01:00	Hand dug	; inspecti	on pit excava	ated to 1.20m					
Casing D	etails	Water	Add	ed														
10 (m) D 17.50	200	1.00	4	0.50 0.50	\neg													
36.00	150				1	Core	Barrel	Flus	туре	Termina	tion Rea	ason				Last Up	dated	
						S	K6L	W	ater	Terminate	ed at sch	eduled deptł	n.			12/06/	2023	AGS

CAUSEWAY								Proje	ect No.	Project	: Name: 3FM Pla	nning Design GI - Lot B	3rd Party La	nds	Boreh	ole ID
			GEC	DTE	EC	H		22-1	.0418	Client:	Dublin P	ort Company (DPC)			вп2	10
Meth	od	Plant L	Jsed		Тор	(m)	Base (m) Coor	dinates	Client	кер: крз				Sheet	5 of 5
Cable Per	cussion	Dando	3000 744)	0.	00	17.50	7201	18 19 F	Final De	epth: 40.50 m	Start Date: 02/12/2022	Driller: C	C+GT	Scale:	1:50
Rotary C	Coring	Beretta	a T44		21	.00	40.50	73389	96.11 N	Elevatio	on: 2.98 mOD	End Date: 12/12/2022	Logger: R	S+DM	DRA	λFT
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend		Description			Water Back	fill
37.30 - 37.5	D C4										Strong dark grey the occasional white ca	inly to thickly laminated LIME lcite veins up to 10mm thick.	STONE with Slightly weath	ered:		27.5
37.50											slight weakening, sl	ight discolouration.				-
											Discontinuities:					38.0
			70	60	15						1. 5-10 degree joint	s at 39.85m and 40.10m, und	dulating and ro	ough.		-
38.50 - 38.6 38.60 - 38.8	0 C5 0 C6															38.5 —
39.00									(4.50)							
																-
																39.5 — -
39.80 - 40.0	D C7		55	50	40											-
40.00 - 40.2	0 C8					4										40.0
40.50								-37.52	40.50		-	End of Borebole at 40 50m				40.5 —
												End of Dorenoie at 40.001	I			-
																41.0
																+1.5
																42.0
																42.5
																43.0
																-
																43.5 —
																-
																44.0
																44.5 —
																-
																45.0
																45.5
																-
																46.0
L		<u></u>	TCR	SCR	RQD	FI			Ē							
Struck at (m)	Water Casing to (m)	Strikes Time (min)	Rose	e to (n	n) F	rom (Chisellii m) To	ng Details (m) Tim	5 ne (hh:mm)	Remarks Hand dug	inspection pit excava	ted to 1.20m				
13.00	13.00	20	1	.60		17.40		7.50	01:00							
Casing [Details	Water	Add	ed												
To (m) 17.50	Diam (mm) 200	From (m) 1.00	Тс 4	0.50	\neg											
36.00	150					Core	Barrel	Flush	Туре	Termina	tion Reason			Last Upd	ated	
						S	K6L	Wa	iter	Terminate	ed at scheduled depth	l.		12/06/2	023	AGS

	GEOTECH							No. 1B	Project Name: 3FM Planning Design GI - Lot B 3rd Party Lands Client: Dublin Port Company (DPC) Client's Rep: RPS	Borehole ID BH217
Method	1	Plant U	sed	Top (m)	Base (I	n) Co	ordina	ates	Final Denth: 41.00 m Start Date: 02/12/2022 Driller: CC+GT	Sheet 1 of 5
Cable Percus Rotary Drill Rotary Cori	ing ing	Dando 3 Beretta Beretta	8000 T44 T44	0.00 16.20 20.00	16.20 20.00 41.00) 72) 72) ₇₃	0152.5 3909.5	56 E 53 N	Elevation: 2.96 mOD End Date: 08/12/2022 Logger: RS+CMod	Scale: 1:50 DRAFT
Depth (m)	Sample / Tests	Fiel	ld Records		Casing Wa Depth De (m) (r	ter Lev pth n) mC	el I D	Depth (m)	Legend Description	Backfill
0.00 - 0.40 I 0.30 0.40 - 1.50 I 0.50	B8 B9	PID = 0.30ppn PID = 0.10ppn PID = 0.00ppn	n n			2.5	6	0.40	MADE GROUND: Grey slightly sandy angular to subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are angular. MADE GROUND: Grey slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse.	0.5
1.50		PID = 0.10ppn	n							1.5 -
2.00 3.00 1 2.00 - 3.00 2 2.00 - 2.45 3 2.00 2.50 1 2.50 3.00 1	D11 B10 SPT (C) ES1 D12	N=8 (1,2/2,2,2 0197 PID = 0.20ppn PID = 0.20ppn	2,2) Hamm n n	ner SN =	2.00 0.	90	16	2.00	Loose grey slightly gravelly silty fine to coarse SAND. Gravel is subrounded fine.	2.0
3.00 3.00 - 3.45 3.50 3.50 - 4.50 3.50 4.00 4.00	ES2 SPT (C) ES3 B13 D14 ES4	N=9 (1,1/2,2,2 0197 PID = 4.00ppn	2,3) Hamm n	er SN =	3.00 1.	70				3.5 - - - 4.0 - - -
4.00 - 4.45 4.00 4.50 4.50 4.60 - 5.50 5.00	B5 B15 ES6	N=6 (1,1/1,2,2 0197 PID = 0.10ppn PID = 0.10ppn	2,1) Hamm n n	ier SN =	4.00 2.	-1.0	54	4.60	Soft grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.	4.5
5.00 - 5.45 5.00 5.50 5.50 5.50 6.00 - 7.00 6.50	U27 D16 ES7 B17 D18	Ublow=11 100 PID = 0.00ppn PID = 0.10ppn	0% Recove n n	ry	5.00 4.	40				5.5
7.50 - 8.50 I 8.00 I 8.00 - 8.45 S	B19 D20 SPT (S)	Water strike a N=7 (1,1/1,1,2 0197	at 7.65m 2,3) Hamm	ier SN =	8.00 2.	50		8 50		7.5
9.00 - 10.00	B21							0.50	Stiff grey sandy SILT. Sand is fine to coarse. X X X X X X X X X X X X X X X	9.0
Struck at (m) Casi 7.65 Casing Det To (m) Dia 20.00	Water ing to (m tails m (mm) 200	Strikes) Time (min) F Water A From (m) From (m) 2.00	Rose to (m Added To (m) 41.00) From (14.6 16.1	Chisell m)	l ing Det To (m) 14.90 16.20	Time (hł 01:(01:(h:mm) 00 00	Remarks Hand dug inspection pit excavated to 1.20m	
39.00	150		Water Added From (m) To (m) 2.00 41.00 Core Barrel SK6L					pe	Termination Reason Last Up Terminated at scheduled depth. 12/06	/2023 AGS

							Proje	ect No.	Project	: Name: 3FM Pla	nning Desig	n GI - Lot B 3r	rd Party Lar	nds	Boreh	nole ID
		CAUS	SEW	AY			22-1	L 041 B	Client:	Dublin P	ort Compar	ny (DPC)			вн	217
	7 –	G	GEOTE	СН					Client's	s Rep: RPS						
Metho	bd	Plant L	Jsed	Top (m)	Base	(m)	Coor	dinates		····					Sheet	: 2 of 5
Cable Perc	ussion	Dando	3000	0.00	16.	20	7201		Final De	epth: 41.00 m	Start Date:	02/12/2022	Driller: C	C+GT	Scale	e: 1:50
Rotary Dr Rotary Co	oring	Beretta Beretta	a 144 a T44	16.20 20.00	20. 41.	00	7339	52.56 E 09.53 N	Flevatio	n . 296 mOD	End Date:	08/12/2022	logger: R	S+CMc	DR	ΔET
									Lievatio	2.50 1105	Lina Dater	00/12/2022	Logger A	STENIC	5	
(m)	Tests	Fie	eld Records		Depth (m)	Depth (m)	mOD	(m)	Legend		Des	cription			Bac N	kfill
9.50 9.50 - 9.95	D22 SPT (C)	N=16 (2,2/3, 0197	4,4,5) Hamr	ner SN =	9.50	4.10										9.5
10.60 - 11.50	B23						-7.64	10.60		Medium dense grev	v silty fine SAN	ID				10.5 —
									\mathbf{x}		, one, me o, a					-
11.00	D24															
12.50 - 12.95	SPT (C)	N=19 (2,3/4,4	4,5,6) Hamr	ner SN =	12.5	3.10		Ē	$_{\times} ^{\times} _{\times} ^{\times}$							-
13 00 - 14 00	B28	0197						_	× × × × ×							
13.10 - 13.50	B26						-10.14	13.10	×	Medium dense bro	wnish grey fin	e to coarse SAND	and fine to c	coarse		-
							-10.54	13.50	XXX	GRAVEL with low co	obble content.	hu ciltu cubo ngula	r fina ta mad	liuma		13.5 —
									××××	GRAVEL. Sand is fin	e to coarse.	ly slity subangula	ar fine to med	lum		-
14.00	D29								× × ×							14.0
14.00 - 14.45	SPT (C)	N=37 (3,6/7,9 SN = 0197	9,10,11) Hai	mmer	14.0	13.0		Ē	×. × ×							-
14.50 - 15.50	B30							Ē	× × ×							14.5 —
15.50 - 15.95	SPT (C)	N=32 (2,4/6, = 0197	8,8,10) Ham	nmer SN	15.5	1.90		16 20		Brown silty fine to o GRAVEL. (Driller's d	coarse SAND a escription)	nd subrounded f	ine to coarse			
16.20 16.20 - 16.42	D31 SPT (C)	50 (25 for 65 Hammer SN i	mm/50 for = 0197	160mm)	16.2	2.40	-13.24									
<u> </u>	Water	Strikes	1		Chise	ellin	g Detail	s	Remarks							
Struck at (m) Ca 7.65 Casing Da To (m) Da 20.00	etails) Time (min) Water From (m)	Rose to (m) Added To (m)) From (14.6 16.1	m) D D	To (14. 16.	<u>m) Tin</u> 90 20	ne (hh:mm) 01:00 01:00	Hand dug	inspection pit excava	ted to 1.20m					
20.00 39.00	200 150	2.00	41.00	Core	Barr	el	Flush	Type	Terminat	tion Reason				Last Upd	lated	
				s	K6L		Wa	ater	Terminate	d at scheduled depth	۱.			12/06/2	023	AGS

								Proje	ct No.	Project Name: 3FM Planning Design GI - Lot B 3rd Party Lands	Borehole ID
			E			-		22-1	041B	Client: Dublin Port Company (DPC)	BH217
					T	(mr.)		6	linete	Client's Rep: RPS	
Cable Perc	od ussion	Dando 3	Jsed 3000		тор (0.0	(m) B 10	3ase (m) 16.20	Coord	linates	Final Depth: 41.00 m Start Date: 02/12/2022 Driller: CC+GT	Sheet 3 of 5 Scale: 1:50
Rotary Dr Rotary Co	rilling oring	Beretta Beretta	Т44 Т44		16.2 20.0	20 00	20.00 41.00	72015 73390	92.56 E 99.53 N	Elevation: 2.96 mOD End Date: 08/12/2022 Logger: RS+CMc	DRAFT
Depth (m)	Sample / Tests	Fie	ld Rec	ords			Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend Description	Backfill S
19.50 - 19.95	SPT (C)	N=10 (2,2/2,3 0208	3,3,2)	Ham	mer S	N = 1	19.5 7.65	-16.54	19.50	Firm brown slightly sandy slightly gravelly CLAY. (Driller's description)	
			0			NR			(2.00)		20.0
21.50 21.50 - 21.95	SPT(C) N (2,2/3,2, Hammer	l=11 (3,3) r SN = 0208	60	0	0	AZCL		-18.54	21.50	Medium dense dark brown gravelly to very gravelly slightly clayey fine to coarse SAND. Gravel is subangular to subrounded fine to medium of various lithologies.	21.5
23.00 23.00 - 23.45	SPT(C) N (2,3/3,2, Hamme	l=10 .3,2) r SN = 0208	33	0	0	AZCL		-20.04	23.00	Stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine of various lithologies.	23.0
24.50 24.50 - 24.95	SPT(C) N (3,2/2,2, Hamme	l=9 2,3) r SN = 0208	33	0	0	N/A AZCL			(3.00)		24.5
26.00 26.00 - 26.45	SPT(C) N (4,3/3,4, Hamme	l=13 3,3) r SN = 0208	50	0	0 =	N/A AZCL		-23.04	- 26.00	Stiff dark greyish brown slightly gravelly very sandy CLAY. Sand is fine to coarse. Gravel is predominantly subangular to subrounded fine to medium of various lithologies.	26.0
27.50 27.50 - 27.95	SPT(C) N (3,4/3,2, Hamme	l=11 ,3,3) r SN = 0208	TCR	SCR	RQD	FI		-24.54	27.50	Very stiff slightly sandy slightly silty CLAY. Sand is fine.	27.5
Struck at (m) Ca	Water asing to (m	Strikes Time (min)	Rose	to (m	Re 1) на	emar	ks Jg inspect	ion nit ev	cavated to	1.20m	
Struck at (m) Casing to (m) Time (min) Rose to (m) Hand dug in 7.65 Image: Casing Details I						Core I	Barrel	Flush	Type	Termination Reason	lated
		(mm) From (m) To (m) 00 2.00 41.00 50 Core B SK6						Wat	ter	Terminated at scheduled depth. 12/06/2	AGS

								Pro	jec	t No.	Project Name: 3FM Planning Design GI - Lot B 3rd Party Lands	Borehole ID
		CAUS	E	W	A	Y		22-	-1()41B	Client: Dublin Port Company (DPC)	BH217
	-	C	SEC	OTE	ECI	Н					Client's Rep: RPS	
Meti	hod	Plant I	Jsed		Тор	(m)	Base (n	1) Coo	ordi	nates	Final Depth: 41.00 m Start Date: 02/12/2022 Driller: CC+GT	Sheet 4 of 5
Rotary [Drilling	Beretta	3000 a T44)	16	.20	20.00	720	152	2.56 E		Scale: 1:50
Rotary	Coring	Beretta	3 T44	r	20.	.00	41.00	7339	909).53 N	Elevation: 2.96 mOD End Date: 08/12/2022 Logger: RS+CMc	DRAFT
Depth (m)	Sample	s / Field Records	TCR	SCR	RQD	FI	Casing Wate Depth Dep (m) (m	m Level mOD	;	Depth (m)	Legend Description	Backfill
			\square				1	1	-	-	Very stiff slightly sandy slightly silty CLAY. Sand is fine.	28.0
			23			AZCL				Ē		-
			55							i F		28.5 —
20 00						N/A				Ē		
29.00 - 29.4	45 SPT(C)	N=10				[]				-		
	Hamm	er SN = 0208				AZCL				: F		29.5 —
			27	0	0					i F		-
							4		-	È.		30.0
						N/A	1			÷		
30.50 30.50 - 30.9	95 SPT(C)	N=13	\vdash	\vdash	\vdash	\vdash				-		30.5 —
	(2,3/3, Hamm	3,3,4) er SN = 0208								÷.		31.0
			37	0	0					- : F		-
							1			i F		
										Ē		
32.00			\vdash		<u> </u> _'					i- F		32.0
32.00 - 32.4	(3,3/3,	N=14 3,4,4)								(9.00)		
	Hamm	er SN = 0208					1			÷ F		32.5 —
			32	0	0					÷		
							1			Ē		- 0.65
33.50										: F		
33.50 - 33.9)5 SPT(C) (2.4/3,	N=12 3.3.3)				1.70				÷		
	Hamm	er SN = 0208				AZUL						34.0
			51	0	0					Ē		
										: F		34.5 —
										Ē		
35.00 35.00 - 35.4	15 SPT(C)	N=16	\square						-	Ē		35.0
	(3,3/3, Hamm	4,4,5) er SN = 0208								÷		
			87	0	0		1			Ē		
							1			÷		36.0
							1			: F		-
36.50 36 50 - 36 7	O SPT(C)	50 (10 15/50	\vdash	+	\vdash		1	-33.54	4	36.50	Very dense dark brownish grey slightly sandy clayey angular to	36.5 —
50.50 50.7	for 55r	nm) Hammer					1			Ē	subangular fine to coarse GRAVEL of dark grey limestone with medium cobble content. Sand is fine to coarse. Cobbles are	-
	5IN = 02	208								Ē	subangular of dark grey limestone.	37.0
	Wate	er Strikes	TCR	SCR	RQD	FI	Chisell	ing Deta		<u> </u>	Remarks	
Struck at (m)	Casing to (r	n) Time (min)	Rose	e to (n	n) F	rom (m) T	2 (m) ⊺	Fime	(hh:mm)	Hand dug inspection pit excavated to 1.20m	
7.05						16.10) 1) 1	.6.20	0	1:00		
Casing	Details	Water	Add	ed	-							
To (m)	Diam (mm	n) From (m)	Tc 4	2 (m)	_							
39.00	150	2.00		2.00		Core	Barrel	Flus	sh T	Гуре	Termination Reason Last Updat	ted
						S	K6L	v	Vate	er	Terminated at scheduled depth. 12/06/202	²³ AGS

	GEOTECH							Pro 22-	ject No. •1041B	Project Client:	t Name: 3FM Pla Dublin P	nning Design G ort Company (GI - Lot B 3rd (DPC)	d Party L	ands	Borel BH	hole ID 1217
Meth Cable Per Rotary D Rotary C	nod rcussion Drilling Coring	Plant U Dando Beretta Beretta	Jsed 3000 3 T44 3 T44	C C L L	Top 0. 16 20	(m) .00 5.20 0.00	Base (r 16.20 20.00 41.00	n) Coc)) 720) 733	ordinates 152.56 E 909.53 N	Final De	epth: 41.00 m	Start Date: 02 End Date: 08	2/12/2022 3/12/2022	Driller: Logger:	CC+GT RS+CMc	Sheet Scale	t 5 of 5 e: 1:50
Depth	Complex	/ Field Beserds	тср	SCP.			Casing Wi	ter Level	Depth	Logond		Doccrint	tion			ter Po	ckfill
(m) 38.00			100	0	0	N/A	(m) (m) mOD	(m)		Very dense dark bro subangular fine to o medium cobble cor subangular of dark	ownish grey slight coarse GRAVEL of ntent. Sand is fine grey limestone.	ly sandy claye dark grey lime to coarse. Cob	y angular t estone with obles are	0		37.5 — 38.0 — 38.0 —
20.50			45	30	30	AZCL		-36.0	9 39.05		Medium strong, loc bedded grey to dar veins (up to 10mm	ally moderately w k grey LIMESTONE thick). Moderatel	veak thickly lai E with occasion y weathered: :	minated to nal white o slightly rec	thinly alcite luced		38.5
39.50			96	64	46	8			(1.95)			40.0 40.5 40.5 					
41.00								-38.0	4 – 41.00		fracture surfaces, g 2. 80-90 degree join undulating, rough, <u>39.50-39.60m: Weathere</u>	ravelly clay infill o nts from 39.05-39 patchy brown stai d to light brown slightly g End of Borehole	n some fractu .50m and 40.1 ning on joint s rravelly clay. e at 41.00m	re surfaces			41.0
																	42.0
									-								43.0
																	44.0
																	44.5 — - 45.0 —
																	45.5 46.0
																	-
	Water	Strikes	TCR	SCR	RQD	FI	Chisel	ing Deta	ils	Remark	5						
Struck at (m) (7.65 Casing I To (m) 20.00	Casing to (m) Details Diam (mm) 200	Time (min) Water From (m) 2.00	Add	≥ to (r led o (m)	n) F	rom (14.60 16.10	m) T) :	o (m) 1 14.90 16.20	ïme (hh:mm) 01:00 01:00	Hand dug	inspection pit excava	ted to 1.20m					
39.00	150					Core	Barrel	Flue	h Type	Termina	tion Reason				Last Up	lated	
						S	K6L	V	Vater	Terminate	ed at scheduled depth	1.			12/06/2	2023	AGS



APPENDIX C CORE PHOTOGRAPHS

3FM Planning Design GI



BH215 Box 1 (20.00-21.50m)

GEOTECH Project: 31M	Project No.: 22 - 1041B	
вн ю.: Ви 215 вох:	2 Depth: 21.50-23.00m	
(m) 0.1 0.2 0.3 0.4 0.5 0.6 0	7 0.8 0.9 1.0 1.1	1.2 1.3 1.4 1.5
1 The second states of the sec	CAR DON PARTO	THE STATES

BH215 Box 2 (21.50-23.00m)



BH215 Box 3 (23.00-24.50m)



BH215 Box 4 (24.50-26.00m)



BH215 Box 5 (26.00-27.50m)



3FM Planning Design GI



BH215 Box 6 (27.50-29.00m)



BH215 Box 7 (29.00-30.50m)



BH215 Box 8 (30.50-32.00m)



BH215 Box 9 (32.00-33.50m)



BH215 Box 10 (33.50-35.00m)



3FM Planning Design GI



BH215 Box 11 (35.00-36.50m)

CAUSEWAY GEOTECH	Project:	3fM		Project	No.: 22-1041B			
(m) 0.1 0.2 0.3	BH No.: BU	0.6	Вох: /2 0.7	Depth:	36.50-37.00m	.1 1.2	1.3 1.4	1.5
TEXNESS		0A				AND I	New K	

BH215 Box 12 (36.50-38.00m)



BH215 Box 13 (38.00-39.50m)



BH215 Box 14 (39.50-40.00m)



3FM Planning Design GI



BH216 Box 1 (21.00-22.50m)



BH216 Box 2 (22.50-24.00m)



BH216 Box 3 (24.00-25.50m)



BH216 Box 4 (25.50-27.00m)



BH216 Box 5 (27.00-28.50m)



3FM Planning Design GI



BH216 Box 6 (28.50-30.00m)



BH216 Box 7 (30.00-31.50m)



BH216 Box 8 (31.50-33.00m)

CAUSEWAY		Project:	3	fM			Project	22-10418			19 - E		
debiten		BH No.:	BU216		Box: 9		Depth:	33-00-34.50m					
(m) 0.1 0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
TO T						-	Tanto -		-		- Parti-		
The second						and the second second	and the second second	a fin	CET 1	夏 之,同日日前代			TYN-

BH216 Box 9 (33.00-34.50m)



BH216 Box 10 (34.50-36.00m)



3FM Planning Design GI



BH216 Box 11 (36.00-37.50m)



BH216 Box 12 (37.50-39.00m)



BH216 Box 13 (39.00-40.50m)



3FM Planning Design GI Report No.: 22-1041 B 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5

BH217 Box 1 (21.50-23.00m)



BH217 Box 2 (23.00-24.50m)



BH217 Box 3 (24.50-26.00m)



BH217 Box 4 (26.00-27.50m)



BH217 Box 5 (27.50-29.00m)



3FM Planning Design GI



BH217 Box 6 (29.00-30.50m)

			Project:	3FM				Project No	22-104	1 B	114			
	-		BH No.:	BH217		Box: 7		Depth: 30	-50-32	.00				
-	m) 0.1 0.2 2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
No.			- 7											

BH217 Box 7 (30.50-32.00m)



BH217 Box 8 (32.00-33.50m)



BH217 Box 9 (33.50-35.00m)



BH217 Box 10 (35.00-36.50m)





BH217 Box 11 (36.50-38.00m)



BH217 Box 12 (38.00-39.50m)



BH217 Box 13 (39.50-41.00m)





APPENDIX D SLIT TRENCH LOGS AND DRAWINGS



			Proje	ect No.	Project	Name:		T	rial Pit ID
	CAU	SEWAY	22-2	1041B	3FM Pl	anning Design GI - Lot B 3rd Party Lands			
		GEOTECH	Coor	dinates	Client:				ST203
			7197	61.75 E	Dublin	Port Company (DPC)			
Method:			7335	79.51 N	Client's	s Representative:		Sh	eet 1 of 1
Slit Trenching			Flor	untion	RPS			So	cale: 1:25
3t Excavator			3.60		05/12/	2022 BS	gger:		FINAL
Depth	Sample /		Level	Depth				er	
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description		Wat	
			3.50	0.10		MADE GROUND: Grev sandy very silty angular fine to coar	se GRAVEL.	-	-
				- -		Sand is fine to coarse.			-
				E					_
0.50 - 0.20	ES1		3.15	0.45		MADE GROUND: Brown sandy clayey subangular fine to co	oarse GRAVEL.	-	0.5
0.50 - 0.50	B2			F		Sand is fine to coarse.			_
0.50		PID = 0.70ppm		Ē					-
				F F					_
1.00 1.00	P4			E					10
1.00 - 1.00	ES3		2.50	- 1.10					1.0
1.00		PID = 1.10ppm		F		End of trial pit at 1.10m			_
				Ē					-
				F					_
				E					1.5
				ŀ					_
				F					_
				Ļ					-
				F					2.0
				Ē					_
				- -					_
				F					_
				-					2.5
				F					-
				Ē					_
				ŀ					_
				F					3.0
				-					-
				F					-
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				ŀ					3.5 —
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				-					-
				F					_
				Ĺ					4.0
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				-					-
				F					-
				Ē					4.5
				F					_
				Ē					_
				ŀ					-
	<u>t</u>	±							
Wate	r Strikes	Depth: 1.10	No s	i arks: groundwat	er encou	ntered.			
Struck at (m)	Remarks	• Width: 0.50		,		-			
		Length: 8.35							
		Stability:	Tern	nination R	eason		Last U	pdate	
		Unstable	Servi	ices exposer	d.		19/04	4/2023	AGS



	LOCATION:	ST203								
3 Tonne Excavator & Hand Tools										
TREN	TRENCH - ORIENTATION									
N 290 W 270 S	WW 315° 225° W	N 0° 45° 90°E 135° SE								
TRENC	H ORIENTA	TED : 290° FROM NORTH								
COORD	COORDINATES: DATUM									
EASTIN	EASTING: 719761.75									
NORTHI	NORTHING: 733579.51									
ELEVAT	ELEVATION: 3.60									
	I LENGTH (m) :	8.35								
TRENC	H DEPTH (m) :	1.10								
TRENC	H WIDTH (m) :	0.50								
STABIL	ITY:	UNSTABLE								
GROUN	DWATER:	DRY								
SCALE	:	NTS@A3								
	N: ZED:	BS								
	EXCAVATED:	05/12/2022								
	C	AUSEWAY GEOTECH								

			Project No.		Project Name:				Trial Pit ID	
GEOTECH			22-2	1041B	3FM Pl	anning Design GI - Lot B 3rd Party Lands				
			Coor	Coordinates		Client:			ST204	
			719763 10 F		Dublin Port Company (DPC)					
Method:			722652 79 N		Client's Representative:		9	heet 1 of 1		
Slit Trenching			/550.	JJ.70 N	RPS				Scale: 1:25	
Plant:		Elevation		Date: Logger:						
3T Excavator			3.74	⊧mOD	05/12/	2022	ИМС		FINAL	
Depth (m)	Sample /	Field Records	Level	Depth (m)	Legend	Description		Vater		
()	10313		3.67	0.07		BITMAC				
			2.54	0.07		MADE GROUND: Grey slightly sandy angular fine to coarse	rse GRAVEL. Sa	ind	-	
			3.54	· 0.20		MADE GROUND: Firm light brown slightly sandy gravelly	CLAY with lov	v		
				Ē		cobble content. Gravel is subangular to subrounded fine	e to coarse.		_	
0.50	B4			- F					0.5	
0.50	ES1			ŕ					-	
0.50		PID = 0.60ppm		[-	
				Ē					-	
				ŀ					_	
1.00	B5 FS2			_ t					1.0	
1.00	232	PID = 0.00ppm		[_	
				Ē						
				Ē					_	
1.50	B6		2.24	- 1.50		End of trial pit at 1.50m			1.5 —	
1.50	ES3	DID = 0.40mmm		t		End of that pit at 1.50m			-	
1.50		PID = 0.40ppm		[
				Ē					-	
				-					-	
				- t					2.0	
				[
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				-					_	
									2.5 —	
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				- 						
Water	Strikes		Rem	arks:						
Struck at (m)	Remarks	Depth: 1.50	Nog	groundwate	er encou	ntered.				
		Width: 10.50								
	Length: 7.10									
Stability:			Tern	Termination Reason Last Up				t Updat	ed 🚺	
	Stable		Servi	Services exposed. 19/0				/04/202	³ AGS	





APPENDIX E SLIT TRENCH PHOTOGRAPHS

Report No.: 22-1041B



ST203





Report No.: 22-1041B



ST203





Report No.: 22-1041B



ST203





Report No.: 22-1041B



ST203





Report No.: 22-1041B



ST203





Report No.: 22-1041B





Report No.: 22-1041B





Report No.: 22-1041B





Report No.: 22-1041B



ST204



Report No.: 22-1041B





Report No.: 22-1041B





Report No.: 22-1041B





Report No.: 22-1041B




Report No.: 22-1041B



ST204





APPENDIX F INDIRECT IN-SITU CBR TESTS

Project Number	22-1041B			
Project Name	3FM Planning Design GI	CAUSEWAY		
Site Location	Dublin Port South	GEOTECH		
		_		
Test Number	3FM-RC202		Date Tested	15/12/2022

Depth bgl (m)	0.28		Weather	Dry + Cloudy
		-		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND

	Cumulative Number of Blows	top /	mm/	CBR
280		layer (mm)	blow	(%)
		280 300	10	26
285		300 303	0.3	>100
l (mm)			-	
nd Leve			-	
ow Grou			_	
Jepth Bel			-	
300			_	
			-	
305			_	

CBR	Min: 26	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.



Project Number	22-1041B		
Project Name	3FM Planning Design GI		
Site Location	Dublin Port South	GEOTECH	
		-	
Test Number	3FM-RC203	Date Tested	15/12/2022

Depth bgl (m)	0.20	Weather	Dry + Cloudy

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND

Cumulative Number of Blows								top /				
195	0	20 4	10 6 · · · · ·	8 0	80 1	00 1:	20 1	40 1	160 H	base of layer	mm/ blow	CBR (%)
	They are									(mm) 195	6.1	45
245										250	0.1	45
295									_	250 280	1.9	>100
										200		
1 III 345										280 450	3.1	92
a 395	1									450		
Ind L]									640	4.8	58
Doi 101 101 101 101 101 101 101 101 101 101										640	0.3	>100
8 495	1									645		
pth E												
<u>ර</u> 545	1											
595												
645	1						*](<u></u>	+			
(05	1											
695	-								-			

CBR	Min: 45	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O lito 1.



Project Number	22-1041B		
Project Name	3FM Planning Design G	CAUSEWAY	
Site Location	Dublin Port South	GEOTECH	
			-
Test Number	3FM-RC204	Date Tested	15/12/2022

Depth bgl (m)	0.19		Weather	Dry + Cloudy
		•		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth		
Cored TM	MADE GROUND		

				Cu	mulative Nu	umber of Bl	ows					top /		CDD
185	0 5	5 1	0 1	5 2	20 2	15 3	30 • • • • • •	35 4	40	45	50	layer	mm/ blow	(%)
105	ľ.											(mm)		
205	R.											185 200	15	17
205												200	4.6	60
225	· ``											255		
(uuu)												255 315	2.4	>100
P 245												215		
ld Le	-		×									323	1.3	>100
ID 265														
elow G	-													
ଞ୍ ₂₈₅ ୟୁ	-													
Dep	-													
305	-													
	-							8						
325	<u> </u>									*				
	-													
345														

R	CBR ange	Min: 17	The selection of layers is based on visual interpretation of the data. The insitu DCP reading (mm/blow) and CBR values are valid at the time of testing;
	-	Max: >100	variation in moisture content or other factors may affect the institu value.

Deviation(s) from standard procedure	None						
Observations and comments	Terminated on refusal						

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.



Project Number	22-1041B		
Project Name	3FM Planning Design GI	CAUSEWAY	
Site Location	Dublin Port South	GEOTECH	
Test Number	3FM-RC205	Date Tested	15/12/2022

Depth bgl (m)	0.23	Weather	Dry + Cloudy

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth			
Cored TM	MADE GROUND			

					Cumulat	ive Number	of Blows				Τ.	top /		
	230	0	20 4	10 6	50 8	30 10	00 12	20 14	40 1	60 180		base of layer	mm/ blow	CBR (%)
	250											(mm)		
	330											230 310	8.9	30
	550	-										310		
	120	-										460	3.3	85
2	430	-		R								460		
(mn		-										625	2.5	>100
level	530	-										625	67	40
I pun		-										960	0.7	40
Grot	630	-												
elow														
th B	730	-												
Dep														
	830	-												
		-												
	930													
		-												
	1030	1												

CBR	Min: 30	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None	
Observations and comments		
		*

Approved Name and Appointment

Darren O'Mahony Director Jam Ollion.



Project Number	22-1041B		
Project Name	3FM Planning Design G	CAUSEWAY	
Site Location	Dublin Port South	GEOTECH	
			-
Test Number	3FM-RC206	15/12/2022	

Depth bgl (m)	0.25		Weather	Dry + Cloudy
		•		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND

Cumulative Number of Blows							t	top /	,	(DD			
	250	0	10 2	20 3	60 4	10 5	6	0 7	80	ba la	ase of ayer mm)	mm/ blow	CBR (%)
	250			*							250 385	3.6	79
	350	-			R						385	12	22
	450	-									640		
(mm)		-									640 695	18	14
nd Level	550	-									695 945	36	6.9
ow Grou	650	-					<u> </u>	E			945 960	15	17
pth Bel	750	-											
D	850	-											
	950	-						<u>x</u>	2				
	1050	-											

CBR	Min: 6.9	The selection of layers is based on visual interpretation of the data.
Range	Max: 79	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None	
Observations and comments		
		 *

Approved Name and Appointment

Darren O'Mahony Director Jam Ollion.



Project Number	22-1041B			
Project Name	3FM Planning Design GI	CAUSEWAY		
Site Location	Dublin Port South			GEOTECH
			_	
Test Number	3FM-RC207		Date Tested	14/12/2022

Depth bgl (m)	0.36	Weather	Dry + Cold

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth	
Cored TM	MADE GROUND	



CBR	Min: 10	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O loto 7.



Project Number	22-1041B	
Project Name	3FM Planning Design GI	CAUSEWAY
Site Location	Dublin Port South	GEOTECH
		-

Test Number	3FM-RC209	Date Tested	14/12/2022
Depth bgl (m)	0.42	Weather	Dry + Cloudy

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth		
Cored TM	MADE GROUND		



CBR	Min: 21	The selection of layers is based on visual interpretation of the data.			
Range	Max: 79	variation in moisture content or other factors may affect the insitu value.			

Deviation(s) from standard procedure	None
Observations and comments	

Approved Name and Appointment

Darren O'Mahony Director Jam O loto 7.

January 2023



Project Number	22-1041B		
Project Name	3FM Planning Design G		
Site Location	Dublin Port South	GEOTECH	
			-
Test Number	3FM-RC211	Date Tested	14/12/2022

Depth bgl (m)	0.50		Weather	Dry + Cloudy
		•		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth		
Cored TM	MADE GROUND		

Cumulative Number of Blows								top /				
500	0 1	10 2	20 3	50 4	0 5	0 6	50 7	0	80	base of laver	mm/ blow	CBR (%)
500	1									(mm)		(,,,)
										500 520	10	26
520										520		
										600	2.2	>100
5 40										600		
l mm	-									618	0.6	>100
ivel												
J 560	-								-			
uno	-											
8 500	-											
3elo	-											
epth I	-											
å ₆₀₀									-			
	-				*							
(20)	-					*	×					
620	-											
	-											
640	1											

CBR	Min: 26	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.





Project Number	22-1041B		
Project Name	3FM Planning Design G		
Site Location	Dublin Port South	GEOTECH	
			-
Test Number	3FM-RC213	Date Tested	14/12/2022

Depth bgl (m)	0.34	Weather	Dry + Cloudy

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth MADE GROUND	
Cored TM	MADE GROUND	

	Cumulative Number of Blows	top /		CDD
280		layer (mm)	blow	(%)
		335 360	6.3	44
330		360 450	- 3	95
Jan 1990 (1990) (19900) (19900) (1990) (1990) (1990) (1990) (1990) (1990		450 530	4.7	59
ind Level		530 545	- 1.5	>100
no 430 Dong Mol			-	
Jepth Be			_	
I				
530				
580			-	

CBR	Min: 44	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.



Project Number	22-1041B	
Project Name	3FM Planning Design GI	CAUSEWAY
Site Location	Dublin Port South	GEOTECH

Test Number	3FM-RC214	Date Tested	14/12/2022	
Depth bgl (m)	0.27	Weather	Dry + Cloudy	

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth MADE GROUND	
Cored TM	MADE GROUND	

		Cumulative Number of Blows		top /	,	(777
	270	0 20 40 60 80 100	120	base of layer (mm)	mm/ blow	(%)
	370			270 435	2.9	98
	470			435 645	6	45
(mm)	470			645 955	18	14
nd Level	570					
ow Grou	670					
epth Bel	770 -					
	870		<u></u>			
	970					
	1070					

CBR Range	Min: 14	The selection of layers is based on visual interpretation of the data.
	Max: 98	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.

January 2023



Project Number	22-1041B		
Project Name	3FM Planning Design GI	CAUSEWAY	
Site Location	Dublin Port South	GEOTECH	
Test Number	3FM-RC215	Date Tested	14/12/2022

Depth bgl (m)	0.21		Weather	Dry + Cloudy
		-		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND

Cumulative Number of Blows									top /	,	(DD	
210	0 1	0 2	20 3	50 4	0 5	50 <i>C</i>	50 7	70 80)	base of layer	mm/ blow	CBR (%)
	T.									(mm)		
										250	3.6	77
230										250		
										310	1.3	>100
Ē										310		100
<u></u>	-									318	0.4	>100
level	-											
I pur	-											
010 270	-											
elow	-											
th Bo	-											
Dep	-											
	-											
310	-											
	-						*	×				
	-											
330												

CBR	Min: 77	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.



Project Number	22-1041B		
Project Name	3FM Planning Design G	CAUSEWAY	
Site Location	Dublin Port South	GEOTECH	
Test Number	3FM-RC216	Date Tested	14/12/2022

Depth bgl (m)	0.23	Weather	Dry + Cloudy
	•		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND

Cumulative Number of Blows									top /		CDD			
230	0 :	2 4	4 (5 8	3 1 	0 1	2 :	14 1 +	6	18 20	1	layer	mm/ blow	(%)
	1										((mm)		
	1											230	50	4.8
240	╂────													
												280 286	3	95
250	-													
u 230												286 288	0.1	>100
vel (11													
260	┨┥──													
punc	1													
¢ Gro														
0 270														
th B														
Dept	1													
- 280														
200	-	_								•				
290	-													
	1													
300	1													

CBR	Min: 4.8	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.



Project Number	22-1041B	
Project Name	3FM Planning Design GI	CAUSEWAY
Site Location	Dublin Port South	GEOTECH

Test Number	3FM-RC217	Date Tested	14/12/2022
Depth bgl (m)	0.21	Weather	Dry + Cloudy

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND

Cumulative Number of Blows								top /							
	210	0 2	20 4	0 6	0 8	30 1	00 1	20 1	40 1	60	180	200	base o layer	mm/	CBR (%)
	210												(mm)		
	310	-	**										210 250	5	55
	510	-		the second se	*								250		
		-			R								375	1.9	>100
	410	-											375		
(mm													660	3.6	79
evel	510	-											660		
nd L		-											930	12	22
Jroui	610							*							
O MO		-												-	
Bel	710	-								L					
epth		-												_	
	810														
	010	-												_	
		-													
	910	-												—	
]													
·	1010	<u> </u>			[<u> </u>								_	

CBR	Min: 22	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.

January 2023



Project Number	22-1041B		
Project Name	3FM Planning Design G	CAUSEWAY	
Site Location	Dublin Port South	GEOTECH	
_			-
Test Number	3FM-RC218	Date Tested	14/12/2022

Depth bgl (m)	0.35		Weather	Dry + Cloudy
		•		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
Cored TM	MADE GROUND

Cumulative Number of Blows									
345	0 10	20	30 4	0	50 60		base of layer	mm/ blow	CBR (%)
545							(mm)		
355							345 360	7.5	36
							360		
365							400	2.2	>100
G 375							400	1 5	. 100
l (m							430	1.5	>100
385							430	0.4	>100
pun							434	0.11	100
02 395									
a 405									
pth F									
ළ 415			\land						
425									
423									
435					*				
445	<u> </u>		1	1					

CBR	Min: 36	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.



Project Number	22-1041B		
Project Name	3FM Planning Design GI	CAUSEWAY	
Site Location	Dublin Port South	GEOTECH	
Test Number	3FM-RC219	Date Tested	15/12/2022

Depth bgl (m)	0.13		Weather	Dry + Cloudy
		-		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth		
Cored TM	MADE GROUND		

Cumulative Number of Blows						,	(DD
125		15	20	25 30	base of layer (mm)	mm/ blow	(%)
					125 165	20	13
135					165 175	0.5	>100
)							
level							
uno 155 B M							
epth Belo							
Ā							
175			***				
185							

CBR	Min: 13	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.



Project Number	22-1041B			
Project Name	3FM Planning Design GI	CAUSEWAY		
Site Location	Dublin Port South	GEOTECH		
Test Number	3FM-RC220		Date Tested	15/12/2022

Depth bgl (m)	0.18	Weather	Dry + Cloudy

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth		
Cored TM	MADE GROUND		

	Cumulative Number of Blows	top /		CDD
180		layer (mm)	mm/ blow	(%)
182		180 185	- 5	55
184		185 195	- 2	>100
Î 186		195 197	0.3	>100
Level (
Ground Ground				
190 n Below				
Dept Dept				
194				
196			_	
198			_	

CBR	Min: 55	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O lito 1.



Project Number	22-1041B				
Project Name	3FM Planning Design G	CAUSEWAY			
Site Location	Dublin Port South	GEOTECH			
Test Number	3FM-RC221		Date Tested	15/12/2022	

Depth bgl (m)	0.14		Weather	Dry + Cloudy
		•		

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4. CBR calculated using the TRL equation: log10(CBR) = 2.48 - 1.057 x log10(mm/blow) iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth		
Cored TM	MADE GROUND		

Cumulative Number of Blows								top /	mm /	CDD		
135		3 4	4 5	5 (5 7	· · · · ·	3	9	10	layer (mm)	blow	(%)
										135 155	6.7	41
140										155 160	0.8	>100
Ĵu 145												
nd Level												
mo 150 Mo												
epth Bel												
Q												
160												
165												

CBR	Min: 41	The selection of layers is based on visual interpretation of the data.
Range	Max: >100	variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

Approved Name and Appointment

Darren O'Mahony Director Jam O luto 1.





APPENDIX G PAVEMENT CORE LOGS AND PHOTOGRAPHS



3FM Planning Design GI Lot B 3rd Party Lands Report No.: 22-1041B RC202 Elevation Easting Northing 719729.81 733544.64 3.34m0D GEOTECH **Project Number Project Name** 3FM 22-1041A EH Number Date 4/4/23 £C202 0.5 0.4 0.2 0.3 0.1

Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
1	0-0.1	100	Strong grey BITMAC. 70-80% aggregate of subangular to subrounded fine to medium gravel. No small voids.	Faint Yellow
2	0.1-0.16	60	Strong black BITMAC. 30-40% aggregate of angular to subangular fine gravel. 1-5% small voids.	Faint Yellow



Report No.: 22-1041B



Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
			Strong black BITMAC. 30-40%	
1	0-0.083	83	aggregate of subangular to	White
1	0-0.005	05	subrounded fine to medium gravel. No	VVIIILE
			small voids.	
			Strong dark grey BITMAC. 40-50%	
2	0.083-	12	aggregate of subangular to	White
2	0.125	42	subrounded fine to medium gravel. No	vviiite
			small voids.	



Report No.: 22-1041B



Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.105	105	Strong dark grey BITMAC. 60-70% aggregate of subangular to subrounded fine to medium gravel. No small voids.	Faint Yellow



Report No.: 22-1041B



Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
1	0-0.06	60	Strong black BITMAC. 40-50% aggregate of subangular to subrounded fine to medium gravel. No small voids.	Faint Yellow
2	0.06-0.11	50	Strong greenish dark grey BITMAC. 70-80% aggregate of angular to subangular fine to medium gravel. No small voids	Faint Yellow



Report No.: 22-1041B

	RC206	
Easting	Northing	Elevation
719814.45	733753.69	4.74m0D
Project Name	AUSEWAY GEOTECH Proje	ect Number
3.	FM 2.	2-10417
11/4 /	123 fc2	-96
(m) 0.1	0.2 0.3	0.4 ~ 0.5

Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0.0-0.195	195	Strong black BITMAC. 50-60% aggregate of subangular to subrounded fine to medium gravel. No small voids.	Faint Yellow



Report No.: 22-1041B



Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
			Strong dark grey BITMAC. 60-70%	
1	0-0.18	180	aggregate of subangular to subrounded	Faint Yellow
			fine to medium gravel. 5-10% small voids.	
			Strong dark grey BITMAC. 70-80%	Faint Yellow
2	0.18-0.22	42	aggregate of angular to subangular fine to	
			medium gravel. No small voids.	
			Strong grey BITMAC. 80-90% aggregate	Faint Yellow
3	0.22-0.25	30	of subangular to subrounded fine gravel.	
			No small voids	
			Strong dark grey BITMAC. 60-70%	Faint Yellow
4	0.25-0.28	30	aggregate of subangular to subrounded	
			fine to medium gravel. 5-10% small voids.	



Report No.: 22-1041B



Layer	Depth	Thickness	Thickness Description	
		(mm)		Discoloration
1	0-0.11	110	Strong brownish grey CONCRETE. 50-60% aggregate of subangular to subrounded fine to medium gravel. 5-10% small voids.	Faint Yellow
2	0.11-0.295	185	Strong dark grey BITMAC. 65-75% aggregate of angular to subangular fine to medium gravel. 5-10% small voids.	Faint Yellow



Report No.: 22-1041B

	RC209	
Easting	Northing	Elevation
719905.54	733757.31	3.71m0D
	AUSEWAY GEOTECH	Number
3.	FM 22	-10417
Date 4/41	123 FC20	99
(m) 0.1	0.2 0.3	0.4 0.5
		*

Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
1	0-0.12	120	Strong dark grey BITMAC. 40-50% aggregate of subangular to	White
			5% small voids	
2	0.12-0.40	280	Strong black BITMAC. 50-60% aggregate of subangular to subrounded fine to medium gravel. No small voids	White



Report No.: 22-1041B



Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
			Strong dark grey BITMAC. 50-60%	
1	0-0.20	200	aggregate of angular to subangular	Faint Yellow
			fine to medium gravel. No small voids	
			Strong black BITMAC. 40-50%	
2	0.2-0.24	40	aggregate of angular to subangular	Faint Yellow
			fine gravel. No small voids	





Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
1	0-0.19	190	Strong brownish grey CONCRETE. 60- 70% aggregate of subangular to subrounded fine to coarse gravel. No small voids	Faint Yellow
2	0.19-0.45	260	Strong black BITMAC. 40-50% aggregate of angular to subangular fine to medium gravel. 1-5% small voids	Faint Yellow





Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
1	0-0.095	95	Strong greyish brown CONCRETE. 60- 70% aggregate of subangular to subrounded fine to coarse gravel. 5-10% small voids.	White
2	0.095- 0.24	145	Strong light brown CONCRETE. 40-50% aggregate of subangular to subrounded fine gravel. No small voids.	White
3	0.24-0.30	60	Strong grey BITMAC. 70-80% aggregate of subangular to subrounded fine gravel. 5-10% small voids	White
4	0.30- 0.355	55	Strong dark grey BITMAC. 60-70% aggregate of subangular to subrounded fine to medium gravel. 5-10% small voids.	Faint Yellow



Report No.: 22-1041B



Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
1	0-0.12	120	Strong dark grey BITMAC. 60-70% aggregate of subrounded to rounded fine to coarse gravel. 10-15% small voids.	Faint Yellow
2	0.12-0.21	90	Strong greenish grey BITMAC. 75-85% aggregate of subangular to subrounded fine to medium gravel. No small voids.	White
3	0.21- 0.245	35	Strong dark grey BITMAC. 40-50% aggregate of subangular to subrounded fine gravel. 5-10% small voids.	White



Report No.: 22-1041B



Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
			Strong dark grey BITMAC. 50-60%	
1	0-0.11	110	aggregate of subrounded to rounded	Faint Yellow
			fine to coarse gravel. No small voids.	
			Strong greenish grey BITMAC. 70-	
2	0 1 1 0 2 1	100	80% aggregate of subangular to	Eaint Vallou
2	0.11-0.21	100	subrounded fine to medium gravel. 5-	Faillt Tellow
			10% small voids.	



3FM Planning Design GI Lot B 3rd Party Lands Report No.: 22-1041B RC215 Elevation Northing Easting 720336.54 733619.47 3.71m0D GEOTECH **Project Name Project Number** 3FM 22-1041A **EH Number** Date 11/4/23 RC215 0.4 0.3 0.1 0.2 (m) 1.

Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.064	64	Strong greenish dark grey BITMAC. 65-75% aggregate of subangular to subrounded fine to medium gravel. No small voids.	White



Report No.: 22-1041B



Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.18	180	Strong black BITMAC. 50-60% aggregate of subrounded to rounded fine to medium gravel. No small voids	White


Report No.: 22-1041B

		RC 21	7		
Easti	ng	North	ing	Elevati	on
72034	8.29	733579	9.95	3.79m0	DD
Project N		USEWA GEOTEC	Y H	roject Number	
	3fn	Ч		22-10417	F
Date 4	/4/2	3	EH Number	C217	
(m)	0.1	0.2	0.3	0.4	<i>*</i> 0.5

Layer	Depth	Thickness	Description	PAK Spray
		(mm)		Discoloration
			Stong black BITMAC. 40-50%	
1	0-0.03	30	aggregate of subangular to	White
1	0-0.03	50	subrounded fine to medium gravel. No	VVIIILE
			small voids	
			Strong dark grey BITMAC. 70-80%	
2	0.03-0.17	140	aggregate of angular to subangular	White
			fine gravel. No small voids	



Report No.: 22-1041B



Layer	Depth	Thickness	Description	PAK Spray
	(mm)	(mm)		Discoloration
			Strong black BITMAC. 30-40%	
1	0-0.174	174	aggregate of angular to subangular	White
			fine to medium gravel. No small voids	
			Strong grey BITMAC. 70-80%	
2	0.174-	16	aggregate of subangular to	White
2	0.22	40	subrounded fine to medium gravel. No	vv mile
			small voids	
			Strong dark grey BITMAC. 60-70%	
3	0.22-0.25	30	aggrgate of subangular to subrounded	White
			fine to medium gravel. No small voids.	



	RC219	
Easting	Northing	Elevation
719304.63	733338.93	3.81m0D
	AUSEWAY	
Project Name	FM 22	t Number -1041A
Date 11/4	123 EH Number PC2	.19
(m) 0.1	0.2 0.3	0.4 . 0.5
		2 a

Layer	Depth (mm)	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.061	61	Strong dark grey BITMAC. 70-80% aggregate of subangular to subrounded fine gravel. 0-5% small voids.	White



Report No.: 22-1041B



Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.095	95	Strong dark grey BITMAC. 65-75% aggregate of subangular to subrounded fine to medium gravel. 1- 5% small voids	White



