3FMProject

Bringing
Dublin Port
To 2040

Environmental Impact Assessment Report

Appendix 8.2

Volume 3 Part 4

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

rps
A TETRA TECH COMPANY

Third & Final
Masterplan
Project

3FM – DUBLIN PORT

Generic Quantitative Risk Assessment Report

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3FM
GQRA
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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.

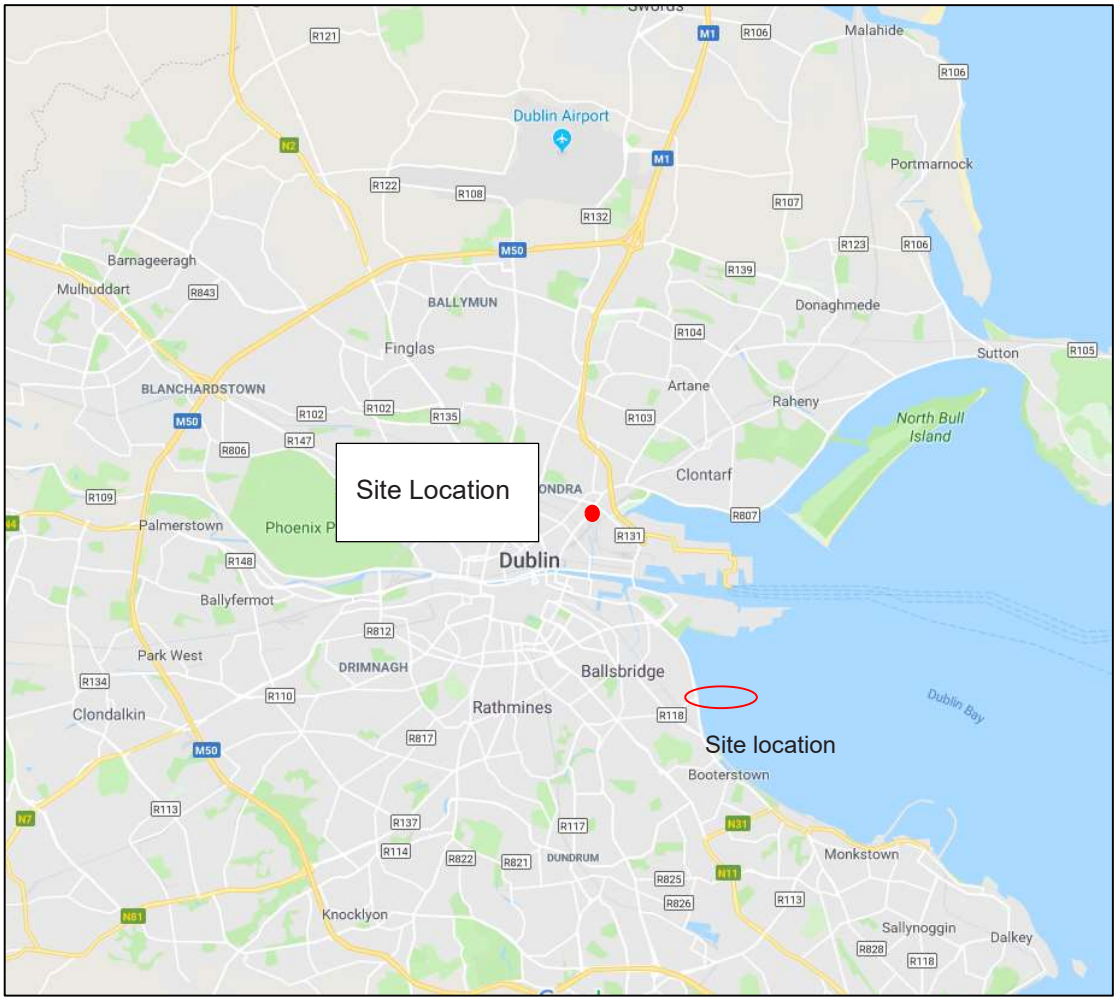

Figure 2.1 Site Location

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.

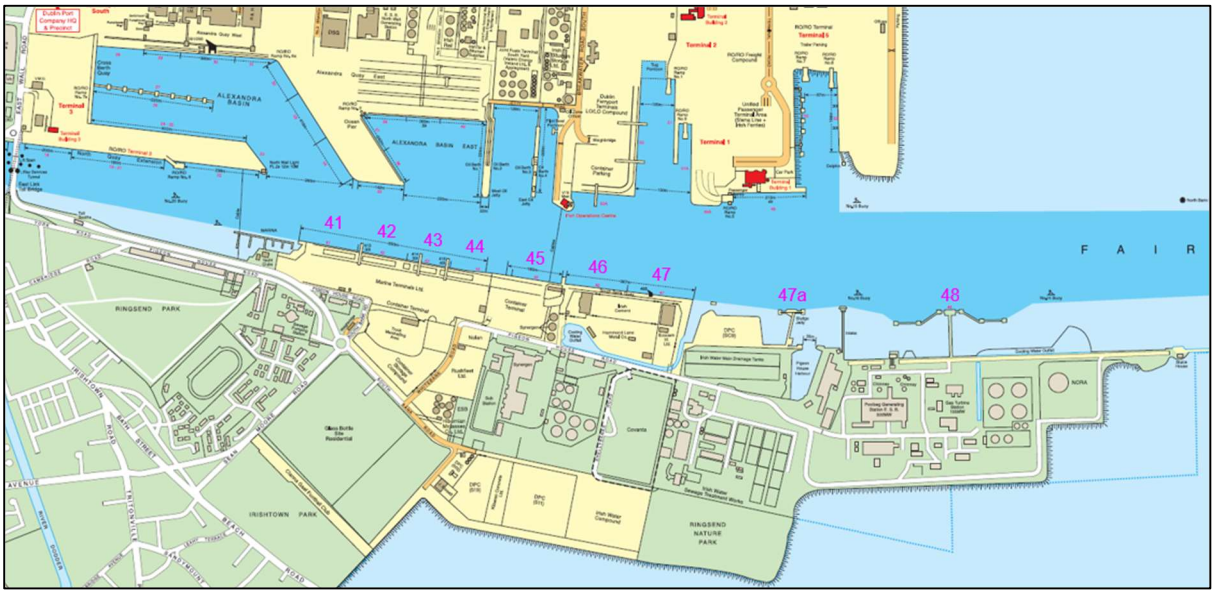

Figure 2.2: Existing Site Layout (colour scheme – yellow owned by DPC, green owned by others)

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 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 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 Route / 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 Route / 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 Road	
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.

Exploratory Hole	Rationale for location
Shellybanks Road	
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.

Table 4-2 Exploratory hole summary DPC lands

Location	Proposed Termination Depth (m)	Actual Termination 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

Location	Proposed Termination Depth (m)	Actual Termination 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

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

Location	Proposed Termination Depth (m)	Actual Termination 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

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.

Table 4-4 Ground investigation locations and access constraint issues

Location ID	Stakeholder / land ownership or operator	Access Constraint
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.

Location ID	Stakeholder / land ownership or operator	Access Constraint
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 operator	Access Constraint
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 and Murphy	ESB 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

Location ID	Stakeholder / land ownership or operator	Access Constraint
		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

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	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 operator	Access Constraint
		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 operator	Access Constraint
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 scheduled 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	0.0-0.5m plain pipe 0.5-3.0m slotted pipe, to target made ground
BH306	30.00	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	30.00	Target depth reached, terminated in CLAY	0.0-5.5m plain pipe 5.5-10.0m slotted pipe, to target SANDS & GRAVELS
BH309	30.00	30.15	Target depth reached, terminated in CLAY	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	Proposed Termination Depth (m)	Actual Termination Depth (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	8.00	8.00	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 Termination 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

Location 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.

Table 7-1 Groundwater Strikes during Investigation

Exploratory Hole	Groundwater	Strata
SPAR Bridge		
BH101	Water strike at 6.50m (rose to 6.20m after 20 mins) Water strike at 8.30m (rose to 1.90m after 20 mins) Water strike at 9.70m	Medium dense becoming dense very sandy slightly silty subangular fine to medium GRAVEL. Sand is fine to coarse.
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) Water strike at 8.60m (rose to 2.10m 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 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).

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 Seepage at 2.00m	MADE GROUND: Very stiff grey sandy gravelly CLAY with fragments of timber and 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 dip-meter. The results of the monitoring are presented in Table 7.2.

Table 7-2 Standing groundwater levels

Borehole ID	Groundwater Levels (mOD)					
	15.02.2023	16.02.2023	17.02.2023	23.03.2023	07.04.2023	14.04.2023
Maritime Village						
BH102 3.05 mOD	-	-	DRY	DRY	DRY	DRY
BH103 3.52 mOD	No Access during monitoring					
BH105 3.55 mOD	No access during monitoring					
Roads / Transport route						
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

Borehole ID	Groundwater Levels (mOD)					
	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 ID	Groundwater Levels (mOD)					
	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 ID	Groundwater Levels (mOD)					
	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.

Table 8-1 Table Summary of asbestos 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

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.

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

Contaminant	Screening Value[4]	Exceeding Concentrations	Locations Exceeding
Surface Waters			
Lead	1.30 µg/l 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/l AA-EQS (EU Environmental Objectives, Surface Waters)	2.3 µg/l	BH128

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

Contaminant	Screening Value[4]	Exceeding Concentrations	Locations Exceeding
Lead	1.30 µg/l 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 Environmental Objectives (Groundwater) (Amendment) Regulations 2016	

Table 9-2 Summary of Groundwater & Surface Water Exceedances April 2024

Contaminant Area O Round 1 – April 2024	Screening Value[5]	Exceeding Concentrations	Locations Exceeding
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/l 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 Environmental Objectives (Groundwater) (Amendment) Regulations 2016	

Table 9-3 Summary of Groundwater & Surface Water Exceedances May 2024

Contaminant Area O Round 2 – May 2024	Screening Value[6]	Exceeding Concentrations	Locations Exceeding
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/l AA-EQS (EU Environmental Objectives, Surface Waters)	0.6 µg/l	BH314
Lead	1.30 µg/l 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 10 µg/l 10 µg/l	BH309 BH313 BH314
Anthracene	0.1 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	0.21 µg/l 3.60 µg/l 100 µg/l 5.00 µg/l	BH301B BH302 BH308 BH309
Benzo(a)pyrene	0.00017 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	1.20 µg/l 32 µg/l <100 µg/l 8.4 µg/l 0.41 µg/l 0.23 µg/l	BH301B BH302 BH308 BH309 BH313 BH314
Fluoranthene	0.0063 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	1.90 µg/l 32 µg/l 100 µg/l 21 µg/l 0.50 µg/l 0.28 µg/l	BH301B BH302 BH308 BH309 BH313 BH314
Naphthalene	2 µg/ AA-EQS (EU Environmental Objectives, Surface Waters)	500 µg/l 6.80 µg/l	BH308 BH309
EU Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 AA-EQS other surface waters		EU Environmental Objectives (Groundwater) (Amendment) Regulations 2016	

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.

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

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 (EU Environmental Objectives, Surface Waters)	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/l AA-EQS (EU Environmental Objectives, Surface Waters)	3.40 µg/l	BH125 at 1.00m bgl
EU Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 AA-EQS other surface waters		EU Environmental Objectives (Groundwater) (Amendment) Regulations 2016	

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

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

Contaminant	Screening Value[10]	Exceeding Concentrations	Locations Exceeding
Area O			
Lead	1.30 µg/l 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/l 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/l AA-EQS (EU Environmental Objectives, Surface Waters)	0.03 µg/l	BH316 at 4.00-4.10m bgl
Fluoranthene	0.0063 µg/l 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 Area L	Screening Value[10]	Exceeding Concentrations	Locations Exceeding
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/l AA-EQS (EU Environmental Objectives, Surface Waters)	0.07 µg/l	BH301B at 2.00m bgl
Fluoranthene	0.0063 µg/l 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 Objectives (Surface Waters) (Amendment) Regulations 2019 AA-EQS other surface waters		EU Environmental Objectives (Groundwater) (Amendment) Regulations 2016	

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.

Table 10-1 Significant gas concentrations in air

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

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.

Area O

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

Asbestos

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

Asbestos

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	Inhalation of fugitive dusts and / or asbestos fibres	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. Where proposals outline the presence of hardstanding, the relevant SPR linkage is removed.	Ensure construction workers are aware that asbestos fibres have been identified, ensure the use of appropriate PPE / RPE and employ 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, absorption and inhalation of fugitive dusts	Construction workers Site end users	No SPR linkage identified.	No specific remedial measures required.

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. Inhalation of fugitive dusts and / or asbestos fibres	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. Where proposals outline the presence of hardstanding, the relevant SPR linkage is removed.	Ensure construction workers are aware that asbestos fibres and elevated PAH concentrations have 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.

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 Migration via service entries	Humans in the form of future site users Buildings & infrastructure	The gas regime within Area O has been classified as Characteristic Situation 4.	Ground gas protection measures will be required.

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	Inhalation of asbestos fibres	Construction workers Site end users	Disturbance of asbestos fibres during any earthworks which may result in the inhalation of asbestos fibres. Where proposals outline the presence of hardstanding, the relevant SPR linkage is removed. 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.	Ensure construction workers are aware that asbestos fibres have been identified and appropriate PPE / RPE are used during earthworks and employ 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. Inhalation of fugitive dusts and / or asbestos fibres	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. Where proposals outline the presence of hardstanding, the relevant SPR linkage is removed.	Ensure construction workers are aware that asbestos fibres have 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.
	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.

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 Migration via service entries	Humans in the form of future site users Buildings & infrastructure	The gas regime within Area L has been classified as Characteristic Situation 2.	Ground gas protection measures will be required.

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

Poolbeg Yacht Boat Club

Area K - Ro-Ro Terminal

Area L - Lo-Lo Terminal

Ship Turning Circle

Area N - Lo-Lo Terminal

Port Park

Area O - Ro-Ro Terminal

NOTES

1. Verifying Dimensions.
   The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.

2. Existing Services.
   Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.

3. Issue of Drawings.
   Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

4. Datum.

5. Key.

	Planning Boundary
3FM-BH24	Borehole (2023)
3FM-RC03	Road Cores (2023)
3FM - ST02	Slit Trench (2023)
3FM - BH24	Borehole (2024)
3FM - TP03	Trialpits (2024)

rev	amendments	check	date

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Project
3FM Plots O & L

Title
Study Area with
Site Investigation Locations

Project Number	Sheet Size	Drawing Scale
794-NI-WAE-02239	A1	1:5000

Drawing Number
101

Drawn By	Status	Revision
J Close	Final	-

Checked By	Approved By	Date
DT	JMcG	24-06-2024

Appendix B

Causeway Geotech Ltd Ground Investigation Reports

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

Client:	Dublin Port Company (DPC)
Client's Representative:	RPS
Report No.:	22-1041A
Date:	October 2023
Status:	Final for Issue

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CONTENTS

APPENDICES

Document Control Sheet

Report No.:		22-1041A			
Project Title:		3FM Planning Design GI Lot A DPC Lands			
Client:		Dublin Port Company (DPC)			
Client's Representative:		RPS			
Revision:	A02	**Status:**	Final for Issue	**Issue Date:**	2nd October 2023
Prepared by:		**Reviewed by:**		**Approved by:**	
 Rachel White B.A. (Mod.) Geoscience		 Sean Ross BSc MSc PGeo MIEI		 Darren O'Mahony BSc MSc MIEI EurGeol PGeo	

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).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
C	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 strength VR: 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.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating 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 8th of November 2022 and the 8th 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.

Table 1. Summary of standpipe installations

GI Ref	Type	Response Zone (mbgl)
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

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.

Table 2: Pavement core thickness and composition

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

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 compression strength tests	ISRM Suggested Methods (1981) Suggested method for determining deformability of rock materials in uniaxial compression, Part 2 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.

Table 2. Groundwater strikes encountered during the ground investigation.

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

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.

CAUSEWAY GEOTECH

APPENDIX A

SITE AND EXPLORATORY HOLE LOCATION PLANS

CAUSEWAY GEOTECH

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

Legend Key

Title:

Site Location Plan

Last Revised:	**Scale:**
03/04/2023	1:20000

CAUSEWAY GEOTECH

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

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - DS
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Title:

Exploratory Hole Location Plan - 1

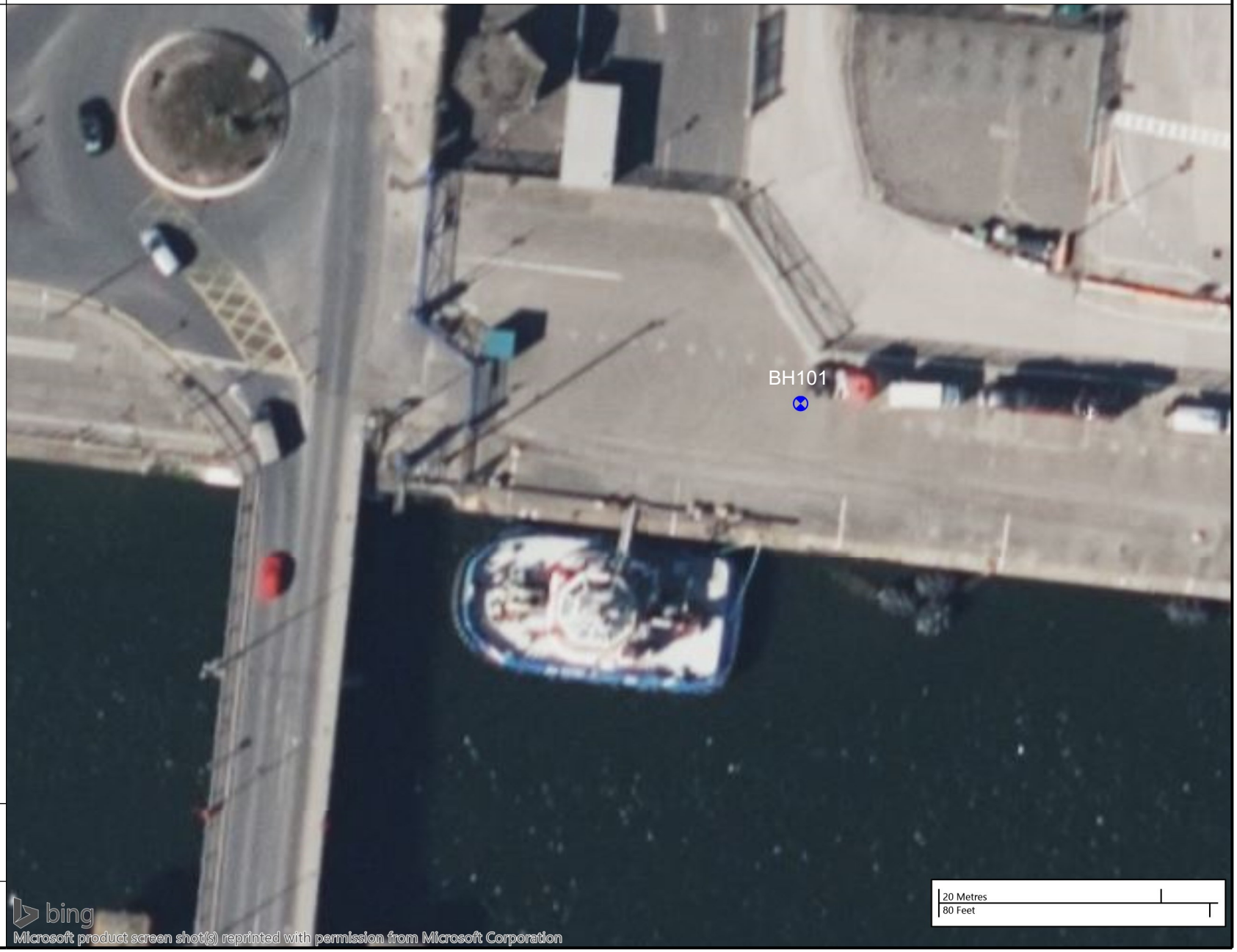
Last Revised:	**Scale:**
19/04/2023	1:500

CAUSEWAY GEOTECH

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

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - DS
- Locations By Type - PC
- Locations By Type - TP



Title:
Exploratory Hole Location Plan - 2

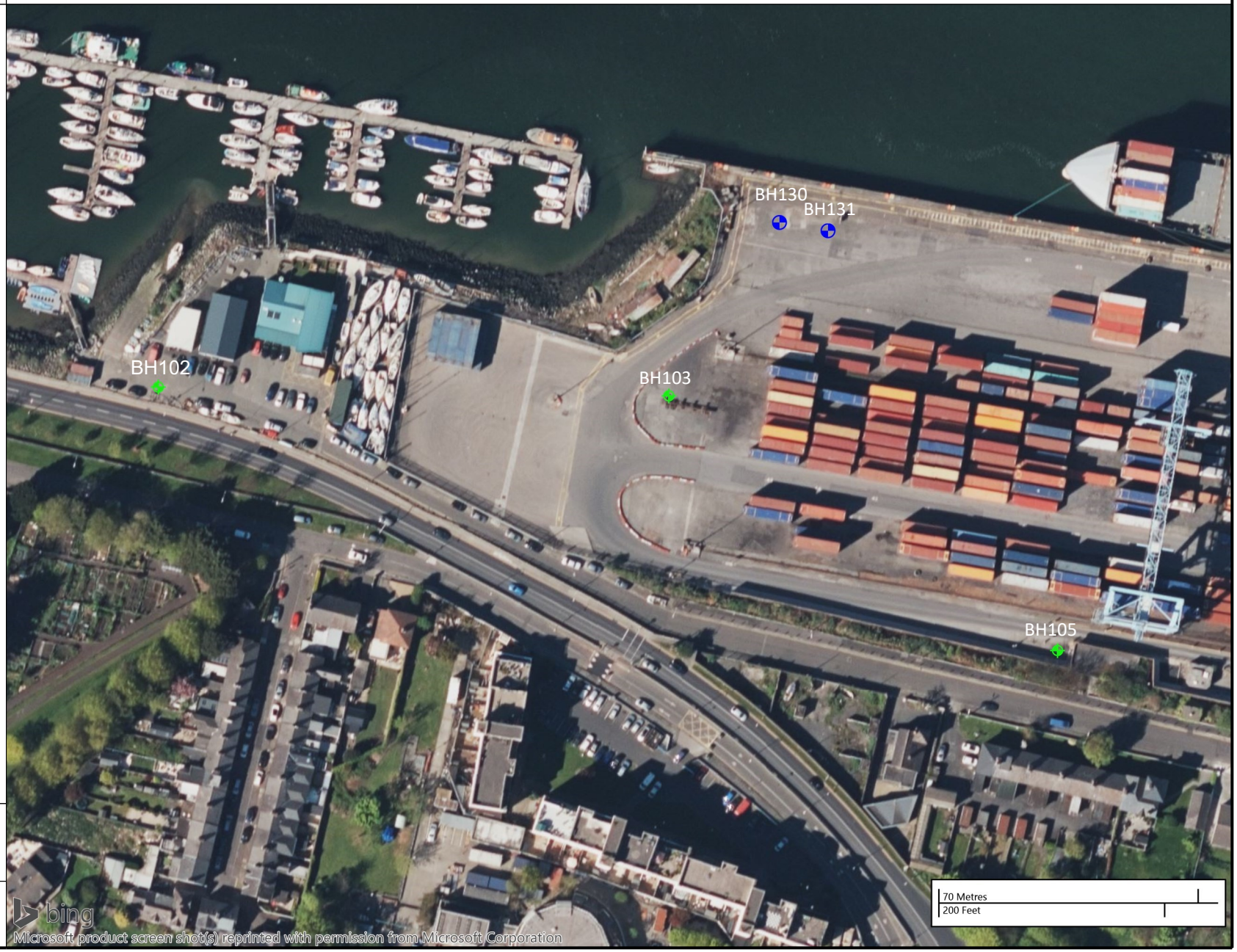
Last Revised:	**Scale:**
14/04/2023	1:500

CAUSEWAY GEOTECH

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

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - DS
- Locations By Type - PC
- Locations By Type - TP



Title:

Exploratory Hole Location Plan - 3

Last Revised:	**Scale:**
14/04/2023	1:1500

CAUSEWAY GEOTECH

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

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - DS
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Title:

Exploratory Hole Location Plan - 4

Last Revised:	**Scale:**
14/04/2023	1:1500

CAUSEWAY GEOTECH

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

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - DS
- Locations By Type - PC
- Locations By Type - TP

Title:

Exploratory Hole Location Plan - 5

Last Revised:	**Scale:**
14/04/2023	1:1000

CAUSEWAY GEOTECH

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

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - DS
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Title:
Exploratory Hole Location Plan - 6

Last Revised:	**Scale:**
14/04/2023	1:1000

CAUSEWAY GEOTECH

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

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - DS
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Title:
Exploratory Hole Location Plan - 7

Last Revised:	**Scale:**
14/04/2023	1:1500

CAUSEWAY GEOTECH

APPENDIX B

BOREHOLE LOGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH101
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	1.50	
Cable Percussion	Dando 3000	1.50	15.50	718076.10 E
Rotary Drilling	Beretta T44	15.50	16.50	734394.29 N
Rotary Coring	Beretta T44	16.50	30.00	

Final Depth:	30.00 m	Start Date:	23/11/2022	Driller:	CC+GT	Sheet 1 of 4 Scale: 1:50
Elevation:	3.74 mOD	End Date:	25/11/2022	Logger:	CMc+RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					3.67	0.07		MADE GROUND: Cobblestone Pavement		
					3.64	0.30		MADE GROUND: Brown silty fine to coarse SAND.		
					3.44	0.40		CONCRETE		
0.50	ES1				3.34			MADE GROUND: Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular fine to medium.		
0.50		PID = 4.00ppm								
1.00	ES2							MADE GROUND: Brown gravelly very silty fine to coarse SAND with low cobble content and shell fragments. Gravel is rounded fine to coarse. Cobbles are rounded.		
1.00		PID = 0.00ppm								
1.50	ES3				2.24	1.50				
1.50 - 2.00	B9							MADE GROUND: Medium dense brown sandy silty rounded fine to coarse GRAVEL. Sand is fine to coarse.		
1.50		PID = 0.00ppm								
2.00	D10									
2.00	ES4									
2.00 - 2.45	SPT (C)	N=14 (2,3/3,3,4,4) Hammer SN = 0197	2.00	Dry						
2.00		PID = 0.60ppm								
2.50	ES5				1.04	2.70		MADE GROUND: Firm sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
2.50		PID = 0.30ppm								
2.70 - 3.60	B11									
3.00	D12									
3.00	ES6									
3.00 - 3.45	SPT (C)	N=14 (3,3/4,4,3,3) Hammer SN = 0197	3.00	Dry						
3.00		PID = 0.10ppm			0.14	3.60		Firm grey sandy silty rounded fine to coarse GRAVEL with high cobble content. Sand is fine to coarse. Cobbles are subangular.		
3.50	ES7									
3.50		PID = 0.20ppm								
3.60 - 4.50	B13									
4.00	D14									
4.00 - 4.45	SPT (C)	N=13 (2,3/3,3,3,4) Hammer SN = 0197	4.00	Dry						
4.00		PID = 0.10ppm								
4.50	ES8									
5.00	D15									
5.00 - 6.00	B16									
5.00 - 5.45	SPT (C)	N=10 (1,1/2,2,3,3) Hammer SN = 0197	5.00	Dry						
6.50	D17				-2.76	6.50				
6.50 - 6.95	SPT (C)	N=11 (1,2/2,3,3,3) Hammer SN = 0197	6.50	6.20				Medium dense becoming dense very sandy slightly silty subangular fine to medium GRAVEL. Sand is fine to coarse.		
		Seepage at 6.50m								
7.00 - 8.00	B18									
8.00	D19									
8.00 - 8.45	SPT (C)	N=28 (4,5/6,7,7,8) Hammer SN = 0197	8.45	3.10						
		Water strike at 8.30m								
8.50 - 9.50	B20									

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
6.50	6.50	20	6.20
8.30		20	1.90
9.70			

Chiselling Details

From (m)	To (m)	Time (hh:mm)
5.70	6.50	01:00

Casing Details

To (m)	Diam (mm)
12.00	250
15.00	200

Water Added

From (m)	To (m)

Remarks

Inspection pit machine excavated to 1.50m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH101
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Inspection Pit	3t Excavator	0.00	1.50
Cable Percussion	Dando 3000	1.50	15.50
Rotary Drilling	Beretta T44	15.50	16.50
Rotary Coring	Beretta T44	16.50	30.00

Coordinates: 718076.10 E, 734394.29 N

Final Depth:	30.00 m	Start Date:	23/11/2022	Driller:	CC+GT	Sheet 2 of 4
Elevation:	3.74 mOD	End Date:	25/11/2022	Logger:	CMc+RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
9.50	D21							
9.50 - 9.95	SPT (C)	N=30 (3,4/5,6,9,10) Hammer SN = 0197 Water strike at 9.70m	9.50	5.40				
10.30 - 12.00	B22				-6.56	10.30		Medium dense dark greyish black sandy silty rounded fine to medium GRAVEL. Sand is fine to coarse.
11.00	D23							
11.00 - 11.45	SPT (C)	N=19 (2,3/4,4,5,6) Hammer SN = 0197	11.0	7.60				
12.50	D24							
12.50 - 12.95	SPT (C)	N=17 (2,4/4,4,4,5) Hammer SN = 0197	12.5	6.60				
13.10 - 14.10	B25							
14.00	D26							
14.00 - 14.45	SPT (C)	N=20 (3,4/3,4,6,7) Hammer SN = 0197	14.0	8.20	-10.36	14.10		Medium dense grey sandy silty rounded fine to coarse GRAVEL with low cobble content.
					-11.26	15.00		Stiff dark greyish black sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.
						(1.50)		
16.50 - 18.00	C1	TCR 100, SCR 0, RQD 0	16.5	9.00	-12.76	16.50		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.
16.50 - 16.61	SPT(S) 50 (25 for 40mm/50 for 69mm) Hammer SN = 0208							
18.00								

Water: ▼ 9.70

Backfill

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
6.50	6.50	20	6.20
8.30		20	1.90
9.70			

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
5.70	6.50	01:00

Casing Details	
To (m)	Diam (mm)
12.00	250
15.00	200

Water Added	
From (m)	To (m)

Remarks

Inspection pit machine excavated to 1.50m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH101
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Inspection Pit	3t Excavator	0.00	1.50
Cable Percussion	Dando 3000	1.50	15.50
Rotary Drilling	Beretta T44	15.50	16.50
Rotary Coring	Beretta T44	16.50	30.00

Coordinates: 718076.10 E, 734394.29 N

Final Depth: 30.00 m | Start Date: 23/11/2022 | Driller: CC+GT | Sheet 3 of 4 | Scale: 1:50

Elevation: 3.74 mOD | End Date: 25/11/2022 | Logger: CMc+RS | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		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													
19.50 - 21.00	C2	100	0	0	N/A				(4.50)				
21.00								-17.26	21.00				
21.00	C3	90	0	0	N/A				(1.60)		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.		
22.50													
22.50 - 24.00	C4	95	0	0	N/A			-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.		
24.00									(2.80)		*24.00-24.65m: Very dense dark grey slightly gravelly slightly clayey fine to coarse sand.*		
24.00 - 25.50	C5	95	0	0									
25.50								-21.66	25.40		Medium strong thinly to thickly laminated dark grey to black LIMESTONE with occassional steeply oriented white calcite veins. Slightly weathered: slightly reduced strength, slightly closer fracture spacing.		
		100	100	62							Discontinuities:		
26.70 - 26.80	C1				8				(4.60)		1. 5-20 degree bedding fractures, closely spaced (10/135/430), planar, smooth.		
26.80 - 27.00	C2												
27.00											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.		
		100	100	87									
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
6.50	6.50	20	6.20
8.30		20	1.90
9.70			

Chiselling Details

From (m)	To (m)	Time (hh:mm)
5.70	6.50	01:00

Remarks

Inspection pit machine excavated to 1.50m.

Casing Details

To (m)	Diam (mm)
12.00	250
15.00	200

Water Added

From (m)	To (m)

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH101
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Inspection Pit	3t Excavator	0.00	1.50
Cable Percussion	Dando 3000	1.50	15.50
Rotary Drilling	Beretta T44	15.50	16.50
Rotary Coring	Beretta T44	16.50	30.00

Coordinates: 718076.10 E, 734394.29 N

Final Depth: 30.00 m | Start Date: 23/11/2022 | Driller: CC+GT | Sheet 4 of 4 | Scale: 1:50

Elevation: 3.74 mOD | End Date: 25/11/2022 | Logger: CMc+RS | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
28.30 - 28.40	C3										Medium strong thinly to thickly laminated dark grey to black LIMESTONE with occassional steeply oriented white calcite veins. Slightly weathered: slightly reduced strength, slightly closer fracture spacing.		
28.40 - 28.50	C4												
28.50											Discontinuities:		
28.60 - 28.80	C5										1. 5-20 degree bedding fractures, closely spaced (10/135/430), planar, smooth.		
28.80 - 29.00	C6												
		100	100	75							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.		
30.00								-26.26	30.00		End of Borehole at 30.00m		

TCR	SCR	RQD	FI

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
6.50	6.50	20	6.20
8.30		20	1.90
9.70			

Chiselling Details

From (m)	To (m)	Time (hh:mm)
5.70	6.50	01:00

Casing Details

To (m)	Diam (mm)
12.00	250
15.00	200

Water Added

From (m)	To (m)

Remarks

Inspection pit machine excavated to 1.50m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH102
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 1 of 1
Dynamic Sampling	Dando Terrier	0.00	3.00	718729.62 E 734044.81 N	3.00 m	04/01/2023	JFSC	Scale: 1:50
					Elevation: 3.05 mOD	End Date: 04/01/2023	Logger: CH	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					2.99	0.06		BITMAC		
0.30 - 1.20	B3				2.75	0.30		MADE GROUND: Grey sandy rounded fine to coarse GRAVEL with medium cobble content with low boulder content. and fragments of red brick and concrete. Sand is fine to coarse. Cobbles and boulders are subangular.		
0.50	ES1							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.		
0.50		PID = 13.80ppm								
1.00	ES2									
1.00		PID = 12.90ppm								
1.20 - 2.00	B8									
1.20 - 1.65	SPT (C)	N=24 (4,5/7,7,6,4) Hammer SN = 0696	0.00	0.00						
1.50	ES4									
1.50		PID = 8.90ppm								
2.00	ES5									
2.00 - 3.00	B9									
2.00 - 2.45	SPT (C)	N=37 (5,6/7,6,6,18) Hammer SN = 0696	0.00	0.00						
2.00		PID = 9.50ppm								
2.50	ES6									
2.50		PID = 3.20ppm								
3.00	ES7				0.05	3.00		End of Borehole at 3.00m		
3.00 - 3.45	SPT (C)	N=13 (3,4/3,3,4,3) Hammer SN = 0696	2.00	2.40						
3.00		PID = 3.00ppm								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
2.40	2.00	20	2.40

Casing Details

To (m)	Diameter
2.50	140

Remarks

Inspection pit hand dug to 1.20m.

Termination Reason

Terminated due to casing refusal at 2.50m.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH103
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	1.50	
Dynamic Sampling	Dando Terrier	1.50	4.00	718868.51 E
				734045.91 N

Final Depth:	4.00 m	Start Date:	05/01/2023	Driller:	JFSC
Elevation:	3.52 mOD	End Date:	06/01/2023	Logger:	RS

Sheet 1 of 1
Scale: 1:50
DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
					3.45	0.07		BITMAC
					3.22	0.30		CONCRETE
0.50	B1							MADE GROUND: Brown gravelly silty fine to coarse SAND with low cobble content and fragments of concrete. Gravel is rounded fine to coarse. Cobbles are subrounded.
0.50	ES2							
0.50		PID = 0.70ppm						
1.00	B3							
1.00	ES4							
1.00		PID = 0.20ppm						
1.50	B5				2.02	1.50		
1.50	D7							MADE GROUND: Stiff to very stiff brown sandy gravelly CLAY with medium cobble content and fragments of concrete. Sand is fine to coarse. Gravel is rounded fine to coarse.
1.50	ES6							
1.50 - 1.95	SPT (S)	N=24 (3,3/3,4,6,11) Hammer SN = 0696	1.20	0.00				
1.50		PID = 2.20ppm						
2.00	ES9							
2.00 - 2.40	SPT (C)	N=48 (25 for 95mm/7,7,15,19) Hammer SN = 0696	2.00	0.00				
2.00		PID = 0.20ppm						
2.50	ES10							
3.00	D8				0.42	3.10		MADE GROUND: Medium dense brown slightly gravelly fine to coarse SAND. Gravel is angular fine to medium.
3.00	ES11							
3.00 - 3.45	SPT (S)	N=13 (13,8/4,4,3,2) Hammer SN = 0696	2.00	0.00	0.02	3.50		MADE GROUND: Firm greyish brown sandy gravelly CLAY with fragments of red brick and concrete. Sand is fine to coarse. Gravel is angular fine to coarse.
3.00		PID = 0.10ppm						
3.10 - 3.50	D14							
3.50	ES12				-0.48	4.00		End of Borehole at 4.00m
3.50 - 4.00	D15							
4.00	ES13							
4.00 - 4.45	SPT (C)	N=19 (5,4/2,6,6,5) Hammer SN = 0696	2.00	0.00				

Water

Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diameter
2.00	140

Remarks

Inspection pit machine excavated to 1.50m.
No groundwater encountered.

Termination Reason

Terminated due to borehole collapse.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH105
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 2.50 m	Start Date: 20/01/2023	Driller: JFSC	Sheet 1 of 1
Inspection Pit	3t Excavator	0.00	1.20					Scale: 1:50
Dynamic Sampling	Dando Terrier	1.20	2.50	718975.72 E				
				733979.48 N	Elevation: 3.55 mOD	End Date: 20/01/2023	Logger: RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					3.45	0.10		BITMAC		
								CONCRETE		
					3.20	0.35				
0.50	B2							MADE GROUND: Very stiff brownish yellow slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is rounded fine to medium.		
0.50	ES1									
0.50		PID = 6.60ppm								
1.00	B4									
1.00	ES3									
1.00		PID = 7.90ppm								
1.20	D5									
1.20 - 1.65	SPT (S)	N=32 (5,8/8,8,8,8) Hammer SN = 0696	1.20	0.00						
1.50	ES7									
1.50		PID = 0.00ppm								
1.85	D6									
1.85 - 2.30	SPT (S)	23 (11,8/23 for 297mm) Hammer SN = 0696	1.20	0.00						
					1.05	2.50		End of Borehole at 2.50m		
2.00	ES8									
2.00		PID = 37.10ppm								
2.50	ES9									
2.50 - 2.90	SPT (C)	50 (15,9/50 for 245mm) Hammer SN = 0696	1.20	0.00						
2.50		PID = 0.00ppm								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diameter

Remarks

Inspection pit machine excavated to 1.20m.
No groundwater encountered.

Termination Reason

Terminated due to sampler refusal.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH110
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Tracked Excavator	0.00	1.50	
Dynamic Sampling	Dando Terrier	1.50	4.00	719224.54 E
				733708.03 N

Final Depth:	4.00 m	Start Date:	08/02/2023	Driller:	JC	Sheet 1 of 1
Elevation:	4.18 mOD	End Date:	08/02/2023	Logger:	RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
								MADE GROUND: Dark brownish grey sandy silty rounded fine to coarse GRAVEL. Sand is fine to coarse.		
					2.68	1.50		MADE GROUND: Loose dark brownish black slightly clayey fine to coarse SAND with medium cobble content, rootlets and fragments of red brick, concrete, glass and plastic. Gravel is angular fine to medium. (Contamination encountered)		
2.00 - 2.45	SPT (C)	N=6 (1,1/1,1,1,3) Hammer SN = 1367	2.00	Dry						
2.50	ES2									
3.00	ES2									
3.00 - 3.45	SPT (C)	N=3 (1,0/1,0,1,1) Hammer SN = 1367	2.00	Dry						
3.50	ES3									
4.00	ES4				0.18	4.00				
4.00 - 4.45	SPT (C)	N=2 (0,0/1,1,0,0) Hammer SN = 1367	2.00	Dry				End of Borehole at 4.00m		
4.00		PID = 5.50ppm								

Water Strikes				Casing Details	
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	To (m)	Diameter
				2.00	140

Remarks

Inspection pit machine excavated to 1.20m.
Inspection pit carried out in ST102.

Termination Reason

Terminated due to borehole collapse from 4.00m to 3.50m.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH112
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	1.20	
Dynamic Sampling	Dando Terrier	1.20	4.00	719295.60 E
				733554.60 N

Final Depth:	4.00 m	Start Date:	07/02/2023	Driller:	JC
Elevation:	4.23 mOD	End Date:	07/02/2023	Logger:	RS

Sheet 1 of 1
Scale: 1:50
DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
					4.08	0.15		TOPSOIL
0.50	B2							MADE GROUND: Brown very sandy silty subrounded fine to coarse GRAVEL with low cobble content, frequent brick fragments, occasional steel fragments and rare strands of wire. Sand is fine to coarse. Cobbles are angular.
0.50	ES1							
0.50		PID = 5.00ppm						
					3.33	0.90		
1.00	B3							MADE GROUND: Firm brown slightly sandy gravelly CLAY with low cobble content, occasional brick fragments and occasional concrete fragments. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.
1.00	B6							
1.00	ES4							
1.00		PID = 0.20ppm						
1.50	ES5							
1.50		PID = 0.40ppm						
2.00	ES8				2.23	2.00		
2.00 - 2.45	D1							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).
2.00 - 4.00	B7							
2.00 - 2.45	SPT (S)	N=8 (1,1/2,2,2,2) Hammer SN = 1467	0.00	Dry				
2.00		PID = 0.30ppm						
2.50	ES3							
3.00	ES4							
3.00 - 3.45	D2							
3.00 - 4.00	B7							
3.00 - 3.45	SPT (S)	N=6 (1,1/1,2,2,1) Hammer SN = 1467	0.00	Dry				
3.50	ES5							
4.00	ES6				0.23	4.00		End of Borehole at 4.00m
4.00 - 4.45	SPT (C)	N=3 (1,0/0,0,1,2) Hammer SN = 1467	0.00	4.00				

Water

Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.00	0.00	25	3.50

Casing Details

To (m)	Diameter

Remarks

Inspection pit machine excavated to 1.20m.

Termination Reason

Terminated due to borehole collapse.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH	**Project No.** 22-1041A	**Project Name:** 3FM Planning Design GI - Lot A DPC Lands	**Trial Pit ID** BH116
	Coordinates 719403.79 E 733831.64 N	**Client:** Dublin Port Company (DPC)	
Method: Inspection Pit		**Client's Representative:** RPS	Sheet 1 of 1 Scale: 1:25
Plant: 3T Excavator	**Elevation** 4.73 mOD	**Date:** 08/11/2022	**Logger:** RS — DRAFT

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			4.63	0.10		MADE GROUND: Grey sandy very silty subangular fine to coarse GRAVEL. Sand is fine to coarse.	
0.50	ES1		4.08	0.65		MADE GROUND: Brownish yellow very sandy very silty subrounded fine to coarse GRAVEL with high cobble content and cobble sized fragments of red brick, shale and plastic. Sand is fine to coarse. Cobbles are subrounded.	
1.00	B3					MADE GROUND: Soft dark greyish black slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles are subrounded.	
1.50	ES2		3.13	1.60		End of trial pit at 1.60m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 1.60
Width:
Length:

Remarks:
Inspection pit machine excavated to 1.60m.
No groundwater encountered.

Stability:

Termination Reason
Location terminated by Client.

Last Updated
12/06/2023

AGS

CAUSEWAY GEOTECH

Project No. 22-1041A	**Project Name:** 3FM Planning Design GI - Lot A DPC Lands		**Trial Pit ID** BH117
Coordinates 719404.68 E 733853.97 N	**Client:** Dublin Port Company (DPC)		
Method: Inspection Pit	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3T Excavator	**Elevation** 4.35 mOD	**Date:** 08/11/2022	**Logger:** RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			4.25	0.10		MADE GROUND: Grey sandy very silty subangular fine to coarse GRAVEL. Sand is fine to coarse.	
0.50	ES1					MADE GROUND: Brownish yellow very gravelly very silty fine to coarse SAND with low cobble content. Gravel is subrounded fine to coarse. Cobbles are subrounded.	
1.00	B3		3.35	1.00		Very soft grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.	
1.50	ES2		2.75	1.60		End of trial pit at 1.60m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 1.60
Width:
Length:

Remarks:
Inspection pit machine excavated to 1.60m.
No groundwater encountered.
Four attempts made to advance borehole.

Stability:

Termination Reason
Terminated on refusal.

Last Updated
12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH119
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Trial Pitting	3T Excavator	0.00	1.50	
Cable Percussion	Dando 3000	1.50	3.50	719735.30 E
				733421.29 N

Final Depth:	3.50 m	Start Date:	21/11/2022	Driller:	CC	Sheet 1 of 1
Elevation:	4.86 mOD	End Date:	24/11/2022	Logger:	RS	Scale: 1:40
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					4.71	0.15		MADE GROUND: Grey sandy very silty very angular fine to coarse GRAVEL. Sand is fine to coarse.		
		Fast inflow at 0.25m			4.61	0.25		MADE GROUND: Light grey sandy very silty angular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are angular.		
0.50	ES1				4.36	0.50		MADE GROUND: Grey slightly sandy slightly silty very angular fine to coarse GRAVEL with high cobble content. Sand is fine to coarse. Cobbles are very angular.		
0.50		PID = 0.20ppm						Terram at 0.35m		
1.00	B3				3.81	1.05		MADE GROUND: Stiff grey slightly sandy very gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.		
1.00	ES2							MADE GROUND: Grey COBBLES with a little sandy gravelly clay.		
1.00		PID = 0.30ppm						MADE GROUND: Firm to stiff grey slightly gravelly sandy CLAY with fragments of red brick and concrete. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.		
1.50	D9				3.36	1.50				
1.50	ES4									
1.50 - 2.50	B8									
1.50 - 1.95	SPT (S)	N=11 (1,2/2,3,3,3) Hammer SN = 0197	1.50	Dry						
1.50		PID = 0.10ppm								
2.00	ES5									
2.00		PID = 1.20ppm								
2.50	D10									
2.50	ES6									
2.50 - 3.50	B11									
2.50 - 2.95	SPT (S)	N=16 (2,3/3,4,4,5) Hammer SN = 0197	2.50	Dry						
2.50		PID = 1.40ppm								
3.00	ES7									
3.00		PID = 0.30ppm								
3.50	D12				1.36	3.50				
3.50 - 3.95	SPT (S)	N=12 (1,2/2,3,3,4) Hammer SN = 0197	3.50	Dry						
3.50		PID = 0.50ppm								
								End of Borehole at 3.50m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.25			

Casing Details

To (m)	Diameter
3.50	200

Water Added

From (m)	To (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit machine excavated to 1.50m.

Termination Reason

Terminated on refusal.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH120
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	29.00	
Rotary Coring	Beretta T44	29.00	40.50	719806.19 E
				733385.91 N

Final Depth:	40.50 m	Start Date:	21/11/2022	Driller:	GT+CC	Sheet 1 of 5
Elevation:	5.13 mOD	End Date:	22/11/2022	Logger:	DM+RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
0.00 - 0.50	B15							MADE GROUND: Grey slightly sandy slightly silty angular fine to coarse GRAVEL. Sand is fine to coarse.
0.50	ES1				4.63	0.50		
0.50 - 1.50	B16							MADE GROUND: 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.
0.50		PID = 0.20ppm						
1.00	ES2							
1.00		PID = 0.30ppm						
1.20	D17							
1.20 - 1.65	SPT (C)	N=26 (3,4/6,7,7,6) Hammer SN = 0197	1.20	Dry				
1.50	ES3							
2.00	D18							
2.00	ES4							
2.00 - 3.00	B19							
2.00 - 2.45	SPT (C)	N=13 (2,3/3,3,3,4) Hammer SN = 0197	2.00	Dry				
2.00		PID = 0.10ppm						
2.50	ES5							
2.50		PID = 0.40ppm						
3.00	D20							
3.00	ES6							
3.00 - 3.45	SPT (C)	N=22 (3,4/5,5,6,6) Hammer SN = 0197	3.00	Dry	1.63	3.50		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.
3.00		PID = 0.20ppm						
3.50	ES7							
3.50 - 4.50	B21							
3.50		PID = 0.40ppm						
4.00	D22							
4.00	ES8							
4.00 - 4.45	SPT (C)	N=13 (2,3/3,3,3,4) Hammer SN = 0197	4.00	Dry				
4.00		PID = 0.30ppm						
4.45	EW1							
4.50	ES9							
4.50		PID = 0.20ppm						
5.00	D24							
5.00	ES10							
5.00 - 6.00	B23							
5.00 - 5.45	SPT (C)	N=8 (2,2/2,1,2,3) Hammer SN = 0197	5.00	4.30				
5.50	ES11							
5.50		PID = 0.70ppm			-1.37	6.50		
6.00	ES12							Medium dense grey sandy slightly silty subrounded fine to coarse GRAVEL. Sand is fine to coarse.
6.00		PID = 0.20ppm						
6.50	D25							
6.50	ES13							
6.50 - 7.50	B26							
6.50 - 6.95	SPT (C)	N=10 (1,2/2,2,3,3) Hammer SN = 0197	6.50	3.10				
6.50		PID = 0.10ppm						
7.00		PID = 0.80ppm						
7.50	ES14				-2.87	8.00		
7.50		PID = 0.10ppm						Medium dense becoming dense grey sandy subrounded fine GRAVEL. Sand is fine to coarse.
8.00 - 8.45	SPT (C)	N=13 (2,2/3,3,3,4) Hammer SN = 0197	8.00	5.30				
8.50 - 9.50	B27							

Water | Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
5.00	5.00	20	4.30

Casing Details

To (m)	Diam (mm)
13.50	250
29.00	200

Water Added

From (m)	To (m)
5.00	29.00

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit hand dug to 1.20m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

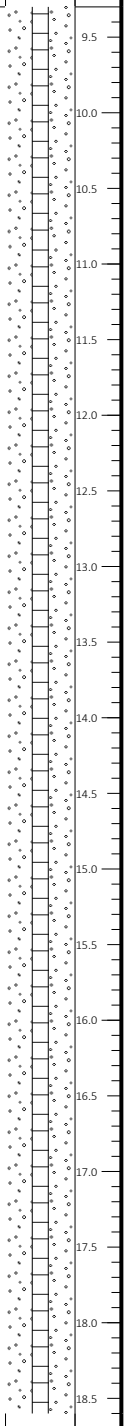
CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH120
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	29.00	
Rotary Coring	Beretta T44	29.00	40.50	719806.19 E
				733385.91 N

Final Depth:	40.50 m	Start Date:	21/11/2022	Driller:	GT+CC	Sheet 2 of 5
Elevation:	5.13 mOD	End Date:	22/11/2022	Logger:	DM+RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
9.50	D28									
9.50 - 9.95	SPT (C)	N=28 (3,4/5,7,7,9) Hammer SN = 0197	9.50	3.10						
10.00	C1									
10.00 - 11.00	B29									
11.00	D30									
11.00 - 11.45	SPT (C)	N=25 (2,3/4,6,7,8) Hammer SN = 0197	11.0	5.60						
11.50 - 12.50	B31									
12.50	D32									
12.50 - 12.95	SPT (C)	N=29 (3,4/5,7,8,9) Hammer SN = 0197	12.5	7.30						
13.00 - 14.00	B33									
14.00	D34									
14.00 - 14.45	SPT (C)	N=31 (4,5/9,6,7,9) Hammer SN = 0197	14.0	1.60						
15.00 - 16.00	B35									
15.50	D36									
15.50 - 15.95	SPT (C)	N=29 (4,6/6,7,8,8) Hammer SN = 0197	15.5	3.90						
16.50 - 17.30	B37									
17.00	D38									
17.00 - 17.45	SPT (C)	N=12 (3,4/3,3,3,3) Hammer SN = 0197	17.0	5.70						
					-12.17	17.30		Medium dense grey silty fine to coarse SAND.		
17.30 - 19.00	B39									
18.50 - 18.95	SPT (C)	N=14 (2,2/3,3,4,4) Hammer SN = 0197	18.5	8.90						



Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
5.00	5.00	20	4.30

Casing Details

To (m)	Diam (mm)
13.50	250
29.00	200

Water Added

From (m)	To (m)
5.00	29.00

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit hand dug to 1.20m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH120
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	29.00	
Rotary Coring	Beretta T44	29.00	40.50	719806.19 E
				733385.91 N

Final Depth:	40.50 m	Start Date:	21/11/2022	Driller:	GT+CC	Sheet 3 of 5
Elevation:	5.13 mOD	End Date:	22/11/2022	Logger:	DM+RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
20.00	C2							
20.00 - 20.45	SPT (C)	N=13 (2,3/3,3,3,4) Hammer SN = 0197	20.0	20.6	-14.97	20.10		Firm grey silty CLAY.
20.10 - 21.00	B40							
21.50 - 21.95	U41	Ublow=30 100% Recovery	21.5	8.00				
22.00	D42							
22.00 - 23.00	B43							
23.00	D44							
23.00 - 23.45	SPT (S)	N=13 (2,3/3,3,3,4) Hammer SN = 0197	23.0	11.2				
23.50 - 24.50	B45							
24.50 - 24.95	U46	Ublow=31 100% Recovery	24.5	14.6				
25.00	D47							
25.00 - 26.00	B48							
26.00 - 26.45	SPT (S)	N=15 (2,3/4,3,4,4) Hammer SN = 0197	26.0	21.0				
27.00 - 28.00	B49							
27.50 - 27.95	U50	Ublow=33 100% Recovery	27.5	4.60				

Water | Backfill

19.0 19.5 20.0 20.5 21.0 21.5 22.0 22.5 23.0 23.5 24.0 24.5 25.0 25.5 26.0 26.5 27.0 27.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
5.00	5.00	20	4.30

Casing Details

To (m)	Diam (mm)
13.50	250
29.00	200

Water Added

From (m)	To (m)
5.00	29.00

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit hand dug to 1.20m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH120
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	29.00	
Rotary Coring	Beretta T44	29.00	40.50	719806.19 E
				733385.91 N

Final Depth:	40.50 m	Start Date:	21/11/2022	Driller:	GT+CC	Sheet 4 of 5
Elevation:	5.13 mOD	End Date:	22/11/2022	Logger:	DM+RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records				Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
28.00	D51												
29.00	D53					29.0	7.10	-23.87	29.00		Dark brown slightly sandy CLAY. Sand is fine to medium.		
29.00 - 30.00	B52												
29.00 - 29.45	SPT(S) N=17 (2,3/4,5,4,4) Hammer SN = 0208	25											
30.00	D54					30.0	9.80						
30.00 - 30.45	SPT(S) N=18 (2,3/4,4,5,5) Hammer SN = 0208	70			NI				(5.80)				
32.00 - 32.45	SPT(C) N=15 (2,2/3,3,4,5) Hammer SN = 0208	90											
33.50 - 33.95	SPT(C) N=17 (3,3/4,4,4,5) Hammer SN = 0208	95	15	0									
35.00 - 35.11	SPT(C) 50 (25 for 45mm/50 for 68mm) Hammer SN = 0208							-29.67	34.80		Strong dark grey thinly to thickly laminated calcareous MUDSTONE with occasional white calcite veins up to 10mm thick. Slightly weathered: slight discolouration, slight weakening.		
35.40 - 35.55	C1	95	95	85	10						Discontinuities:		
35.55 - 35.70	C2										1. 5-10 degree fractures medium spaced (100/400/770), planar, smooth and clean.		
36.50 - 36.60	C3										2. 35-45 degree fractures widely spaced (250/650/1010), undulating and rough.		
36.60 - 36.75	C4												
		TCR	SCR	RQD	FI								

28.0 28.5 29.0 29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0 36.5 37.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
5.00	5.00	20	4.30

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit hand dug to 1.20m.

Casing Details

To (m)	Diam (mm)
13.50	250
29.00	200

Water Added

From (m)	To (m)
5.00	29.00

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH120
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	29.00	
Rotary Coring	Beretta T44	29.00	40.50	719806.19 E
				733385.91 N

Final Depth:	40.50 m	Start Date:	21/11/2022	Driller:	GT+CC	Sheet 5 of 5
						Scale: 1:50
Elevation:	5.13 mOD	End Date:	22/11/2022	Logger:	DM+RS	DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		95	95	60							Strong dark grey thinly to thickly laminated calcareous MUDSTONE with occasional white calcite veins up to 10mm thick. Slightly weathered: slight discolouration, slight weakening.		
38.00											Discontinuities:		
		95	95	85					(5.70)		1. 5-10 degree fractures medium spaced (100/400/770), planar, smooth and clean.		
39.30 - 39.40	C5				6						2. 35-45 degree fractures widely spaced (250/650/1010), undulating and rough.		
39.40 - 39.50	C6												
39.50													
39.50 - 39.65	C7												
39.65 - 39.80	C8	87	87	80									
40.50								-35.37	40.50		End of Borehole at 40.50m		
		TCR	SCR	RQD	FI								

37.5 38.0 38.5 39.0 39.5 40.0 40.5 41.0 41.5 42.0 42.5 43.0 43.5 44.0 44.5 45.0 45.5 46.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
5.00	5.00	20	4.30

Casing Details

To (m)	Diam (mm)
13.50	250
29.00	200

Water Added

From (m)	To (m)
5.00	29.00

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit hand dug to 1.20m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole ID
22-1041A	Client: Dublin Port Company (DPC)	BH121
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	32.45	719816.63 E 733292.27 N

Final Depth:	32.45 m	Start Date:	15/11/2022	Driller:	CC	Sheet 1 of 5 Scale: 1:40
Elevation:	4.81 mOD	End Date:	17/11/2022	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
0.00 - 0.50	B30							MADE GROUND: Grey slightly sandy slightly silty angular fine to coarse GRAVEL. Sand is fine to coarse.
0.50	ES1				4.31	0.50		
0.50 - 1.20	B29							MADE GROUND: Firm to stiff dark greyish black slightly sandy gravelly CLAY with low cobble content and fragments of plastic, ash and red brick. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.
0.50		PID = 0.00ppm						
1.00	ES2							
1.00		PID = 0.30ppm						
1.20	D28							
1.20 - 1.65	SPT (C)	N=30 (3,5/7,7,8,8) Hammer SN = 0197	1.20	Dry				
1.50	ES3							
1.50 - 2.50	B27							
1.50		PID = 0.20ppm						
2.00	D26							
2.00	ES4							
2.00 - 2.45	SPT (C)	N=15 (2,3/3,3,4,5) Hammer SN = 0197	2.00	Dry				
2.00		PID = 1.30ppm						
2.50	ES5							
2.50		PID = 0.80ppm						
3.00	D25				1.81	3.00		
3.00	ES6							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.
3.00 - 4.00	B24							
3.00 - 3.45	SPT (C)	N=12 (1,2/2,3,3,4) Hammer SN = 0197	3.00	Dry				
3.00		PID = 0.20ppm Water strike 3.10m						
3.50	ES7							
3.50		PID = 0.40ppm						
4.00	D23							
4.00	ES8							
4.00 - 4.45	SPT (C)	N=14 (2,2/3,4,4,3) Hammer SN = 0197	4.00	1.60				
4.00		PID = 0.50ppm						
4.15	EW1							
4.50	ES9							
4.50 - 5.50	B22							
4.50		PID = 0.10ppm						
5.00	D21							
5.00	ES10							
5.00 - 5.45	SPT (C)	N=17 (3,4/5,2,5,5) Hammer SN = 0197	5.00	2.90				
					-0.69	5.50		Medium dense grey slightly gravelly silty fine to coarse SAND. Gravel is subrounded fine to coarse.
5.50	ES11							
5.50 - 6.50	B20							
5.50		PID = 0.30ppm						
6.00	ES12							
6.00		PID = 0.10ppm						
6.50	D19							
6.50 - 6.95	SPT (C)	N=28 (4,5/6,7,7,8) Hammer SN = 0197	6.50	4.60	-1.79	6.60		Medium dense grey very sandy slightly silty rounded fine GRAVEL. Sand is fine to coarse.
6.60 - 8.00	B18							

Water

Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.10	3.10	20	2.60

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.50	5.00	01:00

Casing Details

To (m)	Diameter
13.50	250
32.00	200

Water Added

From (m)	To (m)
4.00	32.00

Remarks

Hand dug inspection pit excavated to 1.20m

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH121
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	32.45	719816.63 E 733292.27 N

Final Depth:	32.45 m	Start Date:	15/11/2022	Driller:	CC	Sheet 2 of 5 Scale: 1:40
Elevation:	4.81 mOD	End Date:	17/11/2022	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
8.00	D17							Medium dense grey very sandy slightly silty rounded fine GRAVEL. Sand is fine to coarse.		
8.00 - 8.45	SPT (C)	N=12 (2,3/2,3,3,4) Hammer SN = 0197	8.00	3.10						
8.50 - 9.50	B15									
9.50	D16									
9.50 - 9.95	SPT (C)	N=25 (4,5/6,6,6,7) Hammer SN = 0197	9.50	5.60						
10.00 - 11.00	B13									
11.00	D14									
11.00 - 11.45	SPT (C)	N=28 (3,4/5,7,8,8) Hammer SN = 0197	11.0	7.20						
11.90 - 13.00	B45				-7.09	11.90		Dense grey slightly sandy rounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are rounded.		
12.50	D44									
12.50 - 12.95	SPT (C)	N=33 (4,6/6,7,9,11) Hammer SN = 0197	12.5	7.30						
14.00	D42									
14.00 - 15.00	B43									
14.00 - 14.45	SPT (C)	N=34 (5,5/7,8,9,10) Hammer SN = 0197	14.0	1.20						
14.50 - 14.95	U59	Ublow=41 100% Recovery	14.5	8.10						

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.10	3.10	20	2.60

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.50	5.00	01:00

Casing Details

To (m)	Diameter
13.50	250
32.00	200

Water Added

From (m)	To (m)
4.00	32.00

Remarks

Hand dug inspection pit excavated to 1.20m

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH121
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	32.45	719816.63 E 733292.27 N

Final Depth:	32.45 m	Start Date:	15/11/2022	Driller:	CC
Elevation:	4.81 mOD	End Date:	17/11/2022	Logger:	RS

Sheet 3 of 5
Scale: 1:40
DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
								Dense grey slightly sandy rounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are rounded.		
15.50	D40									
15.50 - 15.95	SPT (C)	N=14 (2,3/3,3,4,4) Hammer SN = 0197	15.5	3.60	-10.79	15.60				
15.60 - 16.50	B41							Medium dense brown gravelly fine to coarse SAND. Gravel is rounded fine.		
17.00	D39									
17.00 - 17.45	SPT (C)	N=13 (1,1/2,3,4,4) Hammer SN = 0197	17.0	7.45						
17.50 - 17.95	U58	Ublow=46 100% Recovery	17.5	2.30						
17.70	B38				-12.89	17.70		Firm to stiff grey sandy silty CLAY. Sand is fine to coarse.		
18.50 - 18.95	U31	Ublow=37 100% Recovery	18.5	11.3						
19.00	D37									
19.50 - 21.00	B36									
20.00 - 20.45	SPT (S)	N=15 (2,3/3,4,4,4) Hammer SN = 0197	20.0	14.2						
21.50 - 21.95	U32	Ublow=41 100% Recovery	21.5	16.6						

15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.10	3.10	20	2.60

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.50	5.00	01:00

Casing Details

To (m)	Diameter
13.50	250
32.00	200

Water Added

From (m)	To (m)
4.00	32.00

Remarks

Hand dug inspection pit excavated to 1.20m

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH121
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	32.45	719816.63 E 733292.27 N

Final Depth:	32.45 m	Start Date:	15/11/2022	Driller:	CC	Sheet 4 of 5 Scale: 1:40
Elevation:	4.81 mOD	End Date:	17/11/2022	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)
22.00	D35					
22.00 - 23.00	B34					
23.00	D33					
23.00 - 23.45	SPT (S)	N=18 (3,3/4,4,5,5) Hammer SN = 0197	23.0	2.70		
23.50 - 25.40	B57					
24.50 - 24.95	U61	Ublow=41 100% Recovery	24.5	8.10		
25.00	D56					
25.00 - 26.00	B55					
26.00	D54					
26.00 - 26.45	SPT (S)	N=14 (3,2/3,3,4,4) Hammer SN = 0197	26.0	10.6		
26.50 - 27.50	B53					
27.50 - 27.95	U62	Ublow=46 100% Recovery	27.5	2.30		
28.00	D52					
28.00 - 29.00	B51					
29.00	D50					
29.00 - 29.45	SPT (S)	N=17 (3,3/4,4,4,5) Hammer SN = 0197	29.0	6.20		

Legend	Description	Water	Backfill
	Firm to stiff grey sandy silty CLAY. Sand is fine to coarse.		

22.0 22.5 23.0 23.5 24.0 24.5 25.0 25.5 26.0 26.5 27.0 27.5 28.0 28.5 29.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.10	3.10	20	2.60

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.50	5.00	01:00

Casing Details

To (m)	Diameter
13.50	250
32.00	200

Water Added

From (m)	To (m)
4.00	32.00

Remarks

Hand dug inspection pit excavated to 1.20m

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH121
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	32.45	719816.63 E 733292.27 N

Final Depth:	32.45 m	Start Date:	15/11/2022	Driller:	CC	Sheet 5 of 5 Scale: 1:40
Elevation:	4.81 mOD	End Date:	17/11/2022	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
29.50 - 30.50	B49							Firm to stiff grey sandy silty CLAY. Sand is fine to coarse.		
30.50 - 30.95	U60	Ublow=48 100% Recovery	32.0	13.7						
31.00	D48									
31.00 - 32.00	B47									
32.00	D46									
32.00 - 32.45	SPT (C)	N=19 (3,4/4,4,5,6) Hammer SN = 0197	32.0	12.7						
					-27.64	32.45		End of Borehole at 32.45m		

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.10	3.10	20	2.60

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
4.50	5.00	01:00

Casing Details	
To (m)	Diameter
13.50	250
32.00	200

Water Added	
From (m)	To (m)
4.00	32.00

Remarks

Hand dug inspection pit excavated to 1.20m

Termination Reason	Last Updated
Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH122
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 3000	1.50	23.50	719630.45 E
				733425.20 N

Final Depth:	23.50 m	Start Date:	18/11/2022	Driller:	CC
Elevation:	4.72 mOD	End Date:	20/11/2022	Logger:	RS

Sheet 1 of 4
Scale: 1:40
DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
					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.
		Slow seepage at 0.35m						
0.50	ES1							MADE GROUND: Grey very sandy silty subangular fine to coarse GRAVEL with high cobble content. Sand is fine to coarse. Cobbles are subangular.
0.50		PID = 0.00ppm						
1.00	B4							
1.00	ES2							
1.50	ES3				3.22	1.50		
1.50		PID = 1.70ppm						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	D5				2.72	2.00		
2.00	ES16							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.
2.00 - 3.00	B6							
2.00 - 2.45	SPT (C)	N=13 (2,3/3,5,3,2) Hammer SN = 0197	2.00	Dry				
2.50	ES17							
2.50		PID = 1.00ppm						
3.00	D7							
3.00	ES18							
3.00 - 3.45	SPT (S)	N=22 (4,5/7,8,3,4) Hammer SN = 0197	3.00	Dry	1.52	3.20		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.
3.00		PID = 0.60ppm						
3.20 - 4.50	B8							
3.50	ES19							
3.50		PID = 1.80ppm						
4.00	D9							
4.00	ES20							
4.00 - 4.45	SPT (C)	N=12 (2,3/3,4,3,2) Hammer SN = 0197	4.00	Dry				
4.00		PID = 1.00ppm						
		Slow seepage at 4.30m			0.12	4.60		
4.50	ES21							MADE GROUND: Firm grey very gravelly CLAY with fragments of red brick, concrete, timber, plastic, glass and wires. Gravel is subangular fine to coarse.
4.50		PID = 0.60ppm						
4.60 - 5.50	B10							
5.00	D11							
5.00	ES22							
5.00 - 5.45	SPT (C)	N=9 (1,2/2,2,2,3) Hammer SN = 0197	5.00	2.30				
5.00		PID = 4.30ppm			-0.78	5.50		Medium dense grey fine to coarse SAND and subrounded fine to coarse GRAVEL.
5.50	ES23							
5.50 - 6.50	B12							
5.50		PID = 0.10ppm						
6.00	ES24							
6.00		PID = 0.00ppm						
6.50	D13							
6.50	ES25							
6.50 - 6.95	SPT (C)	N=12 (2,2/3,3,3,3) Hammer SN = 0197	6.50	5.90				
7.00 - 8.00	B14							

Water

Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.35	0.35		
4.30	4.30	20	3.90
9.50	9.50	20	3.60

Casing Details

To (m)	Diameter
13.50	250
23.50	200

Water Added

From (m)	To (m)
4.50	23.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit machine excavated to 1.50m.
Blowing sands from 8.00m to 9.70m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name: 3FM Planning Design GI - Lot A DPC Lands	Borehole ID
22-1041A	Client: Dublin Port Company (DPC)	BH122
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth: 23.50 m	Start Date: 18/11/2022	Driller: CC	Sheet 2 of 4
Inspection Pit	3T Excavator	0.00	1.50					Scale: 1:40
Cable Percussion	Dando 3000	1.50	23.50	719630.45 E	Elevation: 4.72 mOD	End Date: 20/11/2022	Logger: RS	DRAFT
				733425.20 N				

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
								Medium dense grey fine to coarse SAND and subrounded fine to coarse GRAVEL.		
8.00	D15				-3.28	8.00				
8.00 - 8.45	SPT (C)	N=17 (2,3/4,4,5,4) Hammer SN = 0197	8.00	5.10				Medium dense grey gravelly fine to coarse SAND. Gravel is subrounded fine to coarse.		
8.50 - 9.70	B26									
9.50	D27									
9.50 - 9.95	SPT (C)	N=14 (2,3/2,3,4,5) Hammer SN = 0197 Strong flow at 9.50m	9.50	3.60	-4.98	9.70		Medium dense grey sandy subrounded fine to medium GRAVEL. Sand is fine to coarse.		
9.70 - 11.00	B28									
11.00	D29									
11.00 - 11.45	SPT (C)	N=23 (3,4/5,5,6,7) Hammer SN = 0197	11.0	4.90						
11.50 - 12.50	B30									
12.50	D31				-7.78	12.50				
12.50 - 12.95	SPT (C)	N=29 (4,4/6,7,7,9) Hammer SN = 0197	12.5	5.50				Medium dense to dense grey sandy subrounded fine to medium GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded.		
13.00 - 14.00	B34									
14.00	D35									
14.00 - 14.45	SPT (C)	N=31 (4,5/7,7,8,9) Hammer SN = 0197	14.0	6.30						

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.35	0.35		
4.30	4.30	20	3.90
9.50	9.50	20	3.60

Casing Details

To (m)	Diameter
13.50	250
23.50	200

Water Added

From (m)	To (m)
4.50	23.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit machine excavated to 1.50m.
Blowing sands from 8.00m to 9.70m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH122
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 3000	1.50	23.50	719630.45 E
				733425.20 N

Final Depth:	23.50 m	Start Date:	18/11/2022	Driller:	CC	Sheet 3 of 4
						Scale: 1:40
Elevation:	4.72 mOD	End Date:	20/11/2022	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
15.50	B36							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	D37									
15.50 - 15.95	SPT (C)	N=33 (2,4/6,7,9,11) Hammer SN = 0197	15.5	7.90						
17.00	D39									
17.00 - 17.45	SPT (C)	N=13 (1,2/3,3,3,4) Hammer SN = 0197	17.0	9.20	-12.38	17.10		Medium dense brown silty fine SAND.		
17.10 - 18.50	B38									
18.50 - 18.95	U32	Ublow=21 100% Recovery	18.5	10.1	-13.78	18.50		Stiff grey silty CLAY.		
18.50 - 19.50	B40									
19.00	D41									
20.00	D43									
20.00 - 21.00	B42									
20.00 - 20.45	SPT (S)	N=18 (2,3/3,4,5,6) Hammer SN = 0197	20.0	1.60						
21.50 - 21.95	U33									

15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.35	0.35		
4.30	4.30	20	3.90
9.50	9.50	20	3.60

Casing Details

To (m)	Diameter
13.50	250
23.50	200

Water Added

From (m)	To (m)
4.50	23.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit machine excavated to 1.50m.
Blowing sands from 8.00m to 9.70m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH122
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 4 of 4
Inspection Pit	3T Excavator	0.00	1.50		23.50 m	18/11/2022	CC	Scale: 1:40
Cable Percussion	Dando 3000	1.50	23.50	719630.45 E				
				733425.20 N	Elevation: 4.72 mOD	End Date: 20/11/2022	Logger: RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
22.00	D44							Stiff grey silty CLAY.		
22.00 - 23.00	B45									
23.00	D46									
23.00 - 23.45	SPT (S)	N=22 (3,4/5,5,6,6) Hammer SN = 0197	23.0	4.70						
					-18.78	23.50		End of Borehole at 23.50m		

22.0 22.5 23.0 23.5 24.0 24.5 25.0 25.5 26.0 26.5 27.0 27.5 28.0 28.5 29.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.35	0.35		
4.30	4.30	20	3.90
9.50	9.50	20	3.60

Casing Details

To (m)	Diameter
13.50	250
23.50	200

Water Added

From (m)	To (m)
4.50	23.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)

Remarks

Inspection pit machine excavated to 1.50m.
Blowing sands from 8.00m to 9.70m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH123
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	1.50	
Cable Percussion	Dando 2000	1.50	27.50	719615.17 E
Rotary Coring	Beretta T44	27.50	41.00	733351.40 N

Final Depth:	41.00 m	Start Date:	18/11/2022	Driller:	BM+GT	Sheet 1 of 5
Elevation:	4.58 mOD	End Date:	10/01/2023	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					4.43	0.15		MADE GROUND: Grey very sandy very silty subangular fine to coarse GRAVEL. Sand is fine to coarse.		
					4.38	0.20		CONCRETE		
		Slow seepage at 0.30m								
0.50	ES1							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.		
0.50		PID = 1.10ppm								
1.00	B4									
1.00	ES2									
1.00		PID = 0.10ppm								
1.50	ES3				3.08	1.50		MADE GROUND: Stiff greyish black SILT with fragments of wood and plastic.		
1.80 - 2.00	B14									
2.00	D21									
2.00	ES5									
2.00 - 2.45	SPT (C)	N=16 (2,5/7,4,3,2) Hammer SN = 1386	2.00	Dry						
2.00		PID = 3.40ppm								
2.50	ES6									
2.50		PID = 0.60ppm								
2.80 - 3.00	B15									
3.00	D22									
3.00	ES7									
3.00 - 3.45	SPT (C)	N=21 (2,2/3,8,5,5) Hammer SN = 1386	3.00	Dry						
3.00		PID = 15.00ppm								
3.50	ES8									
3.50		PID = 11.00ppm								
3.80 - 4.00	B16				0.28	4.30		Medium dense greyish gravelly fine to coarse SAND with shell fragments. Gravel is subangular to subrounded fine to coarse.		
4.00	D23									
4.00	ES9									
4.00 - 4.45	SPT (C)	N=18 (2,3/3,3,7,5) Hammer SN = 1386	4.00	Dry						
4.00		PID = 11.40ppm								
4.09	EW1									
		Slow seepage at 4.30m								
4.50	ES10									
4.50		PID = 2.94ppm								
4.80 - 5.00	B17									
5.00	D24									
5.00	ES11									
5.00 - 5.45	SPT (C)	N=16 (3,4/3,4,4,5) Hammer SN = 1386	5.00	4.60						
5.00		PID = 4.70ppm								
5.50	ES12				-2.12	6.70		Medium dense becoming dense grey sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
5.50		PID = 72.00ppm								
5.80 - 6.00	B18									
6.00	D25									
6.00	ES13									
6.00 - 6.45	SPT (C)	N=18 (3,4/4,5,4,5) Hammer SN = 1386	6.00	4.90						
6.00		PID = 66.00ppm								
6.80 - 7.30	B19									
7.50	D26									
7.50 - 7.95	SPT (C)	N=30 (6,6/7,7,8,8) Hammer SN = 1386	7.50	5.30						
8.80 - 9.00	B20									
9.00	D27									
9.00 - 9.45	SPT (C)	N=25 (6,6/6,6,7,6) Hammer SN = 1386	9.00	4.80						

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.30	0.30		
4.30	4.30		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
10.50	13.50	03:00

Casing Details

To (m)	Diam (mm)
15.00	250
27.50	200
41.00	145

Water Added

From (m)	To (m)
4.30	27.50

Remarks

Inspection pit machine excavated to 1.50m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH123
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	1.50	
Cable Percussion	Dando 2000	1.50	27.50	719615.17 E
Rotary Coring	Beretta T44	27.50	41.00	733351.40 N

Final Depth:	41.00 m	Start Date:	18/11/2022	Driller:	BM+GT	Sheet 2 of 5
Elevation:	4.58 mOD	End Date:	10/01/2023	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
10.30 - 10.50	B28									
10.50	D29									
10.50 - 10.95	SPT (C)	N=26 (5,6/6,7,6,7) Hammer SN = 1386	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) Hammer SN = 1386	12.0	3.40						
13.30 - 13.50	B31									
13.50	D33				-8.92	13.50				
13.50 - 13.95	SPT (C)	N=27 (6,7/6,7,7,7) Hammer SN = 1386	13.5	5.20				Medium dense becoming dense grey subangular fine to coarse GRAVEL.		
14.50 - 15.00	B36									
15.00	D37									
15.00 - 15.45	SPT (C)	N=29 (7,7/7,7,7,8) Hammer SN = 1386		5.10						
16.00 - 16.50	B38									
16.50	D39									
16.50 - 16.95	SPT (C)	N=30 (6,7/8,7,7,8) Hammer SN = 1386		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% Recovery								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.30	0.30		
4.30	4.30		

Casing Details

To (m)	Diam (mm)
15.00	250
27.50	200
41.00	145

Water Added

From (m)	To (m)
4.30	27.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)
10.50	13.50	03:00

Remarks

Inspection pit machine excavated to 1.50m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH123
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	1.50	
Cable Percussion	Dando 2000	1.50	27.50	719615.17 E
Rotary Coring	Beretta T44	27.50	41.00	733351.40 N

Final Depth:	41.00 m	Start Date:	18/11/2022	Driller:	BM+GT	Sheet 3 of 5
Elevation:	4.58 mOD	End Date:	10/01/2023	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
19.50	D42									
19.50 - 20.00	B41									
19.50 - 19.95	SPT (C)	N=30 (4,5/6,8,8,8) Hammer SN = 1386		15.8						
21.00 - 21.45	35	Ublow=50 70% Recovery								
								Very stiff dark greyish black sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
22.00 - 23.00	B43									
23.00	D44									
23.00 - 23.45	SPT (S)	N=32 (6,6/7,8,8,9) Hammer SN = 1386	22.0	18.0						
24.00 - 25.00	B45									
25.00 - 25.45	U48	Ublow=50 60% Recovery								
26.00 - 27.00	B47									
27.00	D46									
27.00 - 27.45	SPT (S)	N=37 (6,8/8,9,10,10) Hammer SN = 1386	22.0	24.0						
					-22.92	27.50				
					-22.92			Very stiff dark greyish brown slightly sandy CLAY. Sand is fine to medium.		

TCR | SCR | RQD | FI

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.30	0.30		
4.30	4.30		

Casing Details

To (m)	Diam (mm)
15.00	250
27.50	200
41.00	145

Water Added

From (m)	To (m)
4.30	27.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)
10.50	13.50	03:00

Remarks

Inspection pit machine excavated to 1.50m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH123
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Inspection Pit	3t Excavator	0.00	1.50
Cable Percussion	Dando 2000	1.50	27.50
Rotary Coring	Beretta T44	27.50	41.00

Coordinates: 719615.17 E, 733351.40 N

Final Depth: 41.00 m | Start Date: 18/11/2022 | Driller: BM+GT | Sheet 4 of 5 | Scale: 1:50

Elevation: 4.58 mOD | End Date: 10/01/2023 | Logger: RS+CMc | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		100	0	0	N/A				(1.40)		Very stiff dark greyish brown slightly sandy CLAY. Sand is fine to medium.		
29.00								-24.32	28.90				
29.00 - 29.45	SPT(C) N=31 (6,7/8,8,7,8) Hammer SN = 0208	100	0	0							Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of predominantly dark grey limestone.		
30.50					N/A				(3.10)				
30.50 - 30.95	SPT(C) N=34 (7,8/9,8,8,9) Hammer SN = 0208	90	0	0									
32.00								-27.42	32.00		Dense dark grey slightly sandy slightly clayey subangular fine to coarse GRAVEL of predominantly dark grey limestone. Sand is fine to coarse.		
		50	0	0	N/A				(1.50)		32.75-33.50m: AZCL (Possibly due to fines and gravel being washed out with flush).		
33.50								-28.92	33.50		Dense dark greyish brown slightly sandy clayey subangular fine to coarse GRAVEL of dark grey limestone. Sand is fine to coarse.		
					N/A				(0.75)		Dense dark greyish brown slightly gravelly clayey fine to coarse SAND. Gravel is subangular fine to coarse of dark grey limestone.		
		95	0	0				-29.67	34.25		Very stiff dark greyish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of predominantly dark grey limestone. Cobbles are subangular of dark grey limestone.		
					N/A				(0.75)		35.00-35.40m: Dark brownish grey slightly sandy slightly clayey subangular fine to coarse gravel.		
35.00								-30.42	35.00		Medium strong thinly to thickly laminated dark grey LIMESTONE. Slightly weathered: slightly reduced strength, slightly closer fracture spacing, clay infill on some fracture surfaces within top 40cm of stratum.		
35.00 - 35.15	SPT(C) 50 (25 for 68mm/50 for 79mm) Hammer SN = 0208										Discontinuities:		
		95	0	0	N/A				(2.00)		1. 35-55 degree bedding fractures, closely spaced (30/165/540), planar, predominanatly smooth, clay infill on some fracture surfaces (up to 20mm thick).		
36.50											2. 70-90 degree joints from 37.40-37.70 and 38.75-38.90m and 39.50-39.70m, planar to undulating, rough, clay infill on joint from 37.40-37.70m (up to 25mm thick).		
								-32.42	37.00		3. 10-30 degree joints, medium spaced (140/570/1400), planar, rough.		
											37.00-37.40m: Moderately weak from 37.00-37.40m, clay infill on most fracture surfaces.		
		TCR	SCR	RQD	FI								

28.0 28.5 29.0 29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0 36.5 37.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.30	0.30		
4.30	4.30		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
10.50	13.50	03:00

Casing Details

To (m)	Diam (mm)
15.00	250
27.50	200
41.00	145

Water Added

From (m)	To (m)
4.30	27.50

Remarks

Inspection pit machine excavated to 1.50m.

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH123
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Inspection Pit	3t Excavator	0.00	1.50
Cable Percussion	Dando 2000	1.50	27.50
Rotary Coring	Beretta T44	27.50	41.00

Coordinates: 719615.17 E, 733351.40 N

Final Depth:	41.00 m	Start Date:	18/11/2022	Driller:	BM+GT	Sheet 5 of 5
Elevation:	4.58 mOD	End Date:	10/01/2023	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
37.70 - 37.80	C1	100	43	10							Medium strong thinly to thickly laminated dark grey LIMESTONE. Slightly weathered: slightly reduced strength, slightly closer fracture spacing, clay infill on some fracture surfaces within top 40cm of stratum.		
37.80 - 37.90	C2												
38.00											Discontinuities:		
38.40	C3	100	100	90	9				(4.00)		1. 35-55 degree bedding fractures, closely spaced (30/165/540), planar, predominanatly smooth, clay infill on some fracture surfaces (up to 20mm thick).		
											2. 70-90 degree joints from 37.40-37.70 and 38.75-38.90m and 39.50-39.70m, planar to undulating, rough, clay infill on joint from 37.40-37.70m (up to 25mm thick).		
39.50													
39.50 - 39.70	C4	100	100	83							3. 10-30 degree joints, medium spaced (140/570/1400), planar, rough.		
39.70 - 39.90	C5												
41.00								-36.42	41.00		End of Borehole at 41.00m		

TCR	SCR	RQD	FI

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.30	0.30		
4.30	4.30		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
10.50	13.50	03:00

Remarks

Inspection pit machine excavated to 1.50m.

Casing Details

To (m)	Diam (mm)
15.00	250
27.50	200
41.00	145

Water Added

From (m)	To (m)
4.30	27.50

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH124
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 2000	1.50	20.50	719512.78 E
Rotary Coring	Comacchio 601	20.50	40.00	733376.20 N

Final Depth:	40.00 m	Start Date:	18/11/2022	Driller:	BM+JG	Sheet 1 of 5
Elevation:	4.75 mOD	End Date:	18/11/2022	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
0.50	ES1							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.
0.50		PID = 3.00ppm Seepage at 0.80m						
1.00	B4							
1.00	ES2							
1.00		PID = 0.20ppm						
1.50	ES3				3.25	1.50		
1.50		PID = 0.10ppm						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.
1.80 - 2.00	B5							
2.00	D7							
2.00	ES6							
2.00 - 2.45	SPT (C)	N=36 (3,7/7,15,8,6) Hammer SN = 1386	2.00	Dry				
2.00		PID = 0.30ppm						
2.50	ES9							
2.50		PID = 1.10ppm						
2.80 - 3.00	B8				1.75	3.00		
3.00	D10							MADE GROUND: Very stiff greyish black sandy gravelly SILT with fragments of wood, plastic and glass. Sand is fine to coarse. Gravel is subrounded fine to coarse.
3.00	ES11							
3.00 - 3.45	SPT (C)	N=50 (2,2/12,14,19,5) Hammer SN = 1386	3.00	Dry				
3.00		PID = 1.80ppm						
3.50	ES13							
3.50		PID = 5.50ppm						
3.80 - 4.00	B12							
4.00	D14							
4.00	ES16							
4.00 - 4.45	SPT (C)	N=19 (5,7/7,4,4,4) Hammer SN = 1386	4.00	Dry				
4.00		PID = 1.50ppm						
4.50	ES19				-0.35	5.10		Medium dense grey gravelly fine to coarse SAND with shell fragments. Gravel is subrounded fine to coarse.
4.50		PID = 12.00ppm						
4.80 - 5.00	B15							
5.00	D17							
5.00	ES22							
5.00 - 5.45	SPT (C)	N=14 (3,5/3,3,4,4) Hammer SN = 1386	5.00	4.70				
5.00		PID = 12.90ppm						
5.50	ES25							
5.50		PID = 2.10ppm						
5.80 - 6.00	B18							
6.00	D20							
6.00	ES28				-2.25	7.00		Medium dense becoming dense grey sandy subangular fine to coarse GRAVEL.
6.00 - 6.45	SPT (C)	N=18 (3,4/5,4,4,5) Hammer SN = 1386	6.00	4.50				
6.00		PID = 1.90ppm						
6.80 - 7.00	B21							
7.50	D23							
7.50 - 7.95	SPT (C)	N=25 (5,6/6,6,6,7) Hammer SN = 1386	7.50	5.10				
8.80 - 9.00	B24							
9.00	D26							
9.00 - 9.45	SPT (C)	N=27 (5,6/7,6,7,7) Hammer SN = 1386	9.00	4.60				

Water | Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.80	0.80		

Casing Details

To (m)	Diam (mm)
15.00	250
20.50	200
40.00	145

Water Added

From (m)	To (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
12.00	15.00	00:41

Remarks

Inspection pit machine excavated to 1.50m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH124
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 2000	1.50	20.50	719512.78 E
Rotary Coring	Comacchio 601	20.50	40.00	733376.20 N

Final Depth:	40.00 m	Start Date:	18/11/2022	Driller:	BM+JG	Sheet 2 of 5
Elevation:	4.75 mOD	End Date:	18/11/2022	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
10.00 - 10.50	B27									
10.50	D29									
10.50 - 10.95	SPT (C)	N=29 (5,6/7,7,7,8) Hammer SN = 1386	10.5	5.30						
12.00 - 12.45	SPT (C)	N=30 (5,6/7,8,7,8) Hammer SN = 1386	12.0	6.10						
13.50	B42									
13.50	D43									
13.50 - 13.95	SPT (C)	N=31 (6,7/8,7,8,8) Hammer SN = 1386	13.5	8.10						
15.00	B44				-10.25	15.00				
15.00	D45							Dense grey subangular fine to coarse GRAVEL.		
15.00 - 15.45	SPT (C)	N=31 (6,6/7,8,8,8) Hammer SN = 1386	15.0	9.50						
16.50	B30				-11.55	16.30				
16.50 - 16.95	U36	Ublow=40 60% Recovery						Stiff becoming very stiff grey sandy CLAY. Sand is fine to coarse.		
18.00	B31									
18.00	D34									
18.00 - 18.45	SPT (S)	N=23 (5,5/5,6,6,6) Hammer SN = 1386	18.0	11.2						

9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.80	0.80		

Casing Details

To (m)	Diam (mm)
15.00	250
20.50	200
40.00	145

Water Added

From (m)	To (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
12.00	15.00	00:41

Remarks

Inspection pit machine excavated to 1.50m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH124
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 2000	1.50	20.50	719512.78 E
Rotary Coring	Comacchio 601	20.50	40.00	733376.20 N

Final Depth:	40.00 m	Start Date:	18/11/2022	Driller:	BM+JG	Sheet 3 of 5 Scale: 1:50
Elevation:	4.75 mOD	End Date:	18/11/2022	Logger:	RS+CMc	DRAFT

Depth (m)	Sample / Tests	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
20.00 20.00 - 20.45	B32 U37	Ublow=50 80% Recovery												
			45	0	0	AZCL			-15.75	20.50		Very stiff dark brown slightly sandy CLAY Sand is fine.		
22.00 22.00 22.00 - 22.45	B33 D35 SPT(S) N=29 (5,6/7,7,7,8) Hammer SN = 1387					N/A	22.0	12.0						
23.50			30	0	0	AZCL				(6.30)				
24.00 24.00 - 24.45	B39 U38Ublow=50 50% Recovery					N/A								
25.00			30	0	0	AZCL								
26.00 26.00 26.00 - 26.45 26.50	B40 D41 SPT(S) N=30 (6,7/8,6,6,10) Hammer SN = 1387					N/A	23.0	14.0						
			40	0	0	AZCL			-22.05	26.80		Dense 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.		
						N/A								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.80	0.80		

Casing Details

To (m)	Diam (mm)
15.00	250
20.50	200
40.00	145

Water Added

From (m)	To (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
12.00	15.00	00:41

Remarks

Inspection pit machine excavated to 1.50m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH124
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Inspection Pit	3T Excavator	0.00	1.50
Cable Percussion	Dando 2000	1.50	20.50
Rotary Coring	Comacchio 601	20.50	40.00

Coordinates: 719512.78 E, 733376.20 N

Final Depth: 40.00 m | Start Date: 18/11/2022 | Driller: BM+JG | Sheet 4 of 5 | Scale: 1:50

Elevation: 4.75 mOD | End Date: 18/11/2022 | Logger: RS+CMc | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
28.00													
		53	0	0	AZCL				(2.70)		Dense 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.		
					N/A								
29.50								-24.75	29.50				
		50	0	0	AZCL				(0.50)		Dark brownish grey slightly clayey fine to coarse SAND.		
					N/A			-25.25	30.00		Dark grey slightly sandy slightly clayey subangular fine to coarse GRAVEL of dark grey limestone. Sand is fine to coarse.		
31.00													
31.00	C1	43	0	0	AZCL				(2.50)				
					N/A								
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.		
					N/A				(1.35)				
34.00		33	0	0	AZCL			-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.		
					N/A								
35.50		33	0	0	AZCL				(3.75)				
37.00													
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.80	0.80		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
12.00	15.00	00:41

Casing Details

To (m)	Diam (mm)
15.00	250
20.50	200
40.00	145

Water Added

From (m)	To (m)

Remarks

Inspection pit machine excavated to 1.50m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH124
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Inspection Pit	3T Excavator	0.00	1.50
Cable Percussion	Dando 2000	1.50	20.50
Rotary Coring	Comacchio 601	20.50	40.00

Coordinates
719512.78 E
733376.20 N

Final Depth: 40.00 m | **Start Date:** 18/11/2022 | **Driller:** BM+JG
Elevation: 4.75 mOD | **End Date:** 18/11/2022 | **Logger:** RS+CMc

Sheet 5 of 5
Scale: 1:50
DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		87	23	10	N/A			-32.85	37.60 (0.65)		Dark brownish grey slightly sandy slightly clayey subangular fine to coarse GRAVEL of dark grey limestone. Sand is fine to coarse.		
											Very stiff thickly laminated brown slightly gravelly slightly sandy CLAY (highly to completely weathered calcareous mudstone bedrock). Sand is fine to coarse. Gravel is angular fine to coarse.		
38.50					5			-33.50	38.25 (0.55)		Weak dark greyish brown bioclastic LIMESTONE. Distinctly weathered: significantly reduced strength.		
		100	20	10	NI			-34.05	38.80 (1.20)		Discontinuities: 1. 75-85 degree joint from 38.30-38.50m, planar, rough. 2. 0-5 degree bedding fractures at 38.85m and 38.65m, planar, rough.		
											Very stiff brown and light brownish grey slightly gravelly CLAY (highly to completely weathered mudstone). Sand is fine to coarse. Gravel is angular fine to coarse of mudstone.		
40.00								-35.25	40.00		End of Borehole at 40.00m		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.80	0.80		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
12.00	15.00	00:41

Remarks
Inspection pit machine excavated to 1.50m

Casing Details

To (m)	Diam (mm)
15.00	250
20.50	200
40.00	145

Water Added

From (m)	To (m)

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH125
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.70	
Cable Percussion	Dando 2000	1.70	21.50	719510.27 E
Rotary Drilling	Comacchio 601	21.50	35.00	733450.28 N

Final Depth:	36.50 m	Start Date:	01/12/2022	Driller:	BM+JG	Sheet 1 of 4
Elevation:	4.94 mOD	End Date:	17/01/2023	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description
0.50	ES1							MADE GROUND: Brownish grey very sandy very clayey subrounded fine to coarse GRAVEL with high cobble content and cobble sized fragments of tar and red brick. Sand is fine to coarse. Cobbles are subrounded.
0.50		PID = 1.70ppm						
1.00	B4							
1.00	ES2							
1.00		PID = 10.00ppm						
1.50	ES3							
1.50		PID = 3.30ppm			3.24	1.70		
1.80 - 2.00	B5							MADE GROUND: Stiff dark greyish black sandy gravelly SILT with fragments of wood, plastic and cloth. Sand is fine to coarse. Gravel is subrounded fine to coarse.
2.00	D16							
2.00	ES9							
2.00 - 2.45	SPT (C)	N=19 (2,5/9,5,3,2) Hammer SN = 1386	2.00	Dry				
2.00		PID = 11.80ppm						
2.50	ES10							
2.50 - 21.00	B41							
2.50		PID = 2.30ppm						
2.80 - 3.00	B6							
3.00	D17							
3.00	ES11							
3.00 - 3.45	SPT (C)	N=17 (2,2/3,3,5,6) Hammer SN = 1386	3.00	Dry				
3.00		PID = 30.30ppm						
3.50	ES12							
3.50		PID = 7.30ppm						
3.80 - 4.00	B7							
4.00	D18							
4.00	ES13							
4.00 - 4.45	SPT (C)	N=26 (3,4/13,8,2,3) Hammer SN = 1386	4.00	Dry				
4.00		PID = 10.70ppm			-0.06	5.00		Medium dense grey gravelly fine to coarse SAND with shell fragments. Gravel is subangular fine to coarse.
4.46	EW1							
4.50	ES14							
4.50		PID = 5.50ppm Slow seepage at 4.70m						
4.80 - 5.00	B8							
5.00	D19							
5.00	ES15							
5.00 - 5.45	SPT (C)	N=17 (4,5/4,4,4,5) Hammer SN = 1386	5.00	4.50				
5.00		PID = 18.90ppm						
5.50	ES24							
5.80 - 6.00	B20							
6.00	D26				-2.16	7.10		Medium dense grey sandy subangular fine to coarse GRAVEL.
6.00	ES25							
6.00 - 6.45	SPT (C)	N=17 (3,3/4,4,4,5) Hammer SN = 1386	6.00	4.60				
6.00		PID = 13.40ppm						
7.30 - 7.50	B21							
7.50	D27							
7.50 - 7.95	SPT (C)	N=20 (4,4/4,5,5,6) Hammer SN = 1386	7.50	5.20				
9.00	D28							
9.00 - 9.45	SPT (C)	N=25 (5,6/6,6,6,7) Hammer SN = 1386	9.00	4.70				

Water

Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.70	4.70		

Casing Details

To (m)	Diam (mm)
15.00	250
26.00	200
35.00	150

Water Added

From (m)	To (m)
5.00	21.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)
12.00	15.00	03:00

Remarks

Inspection pit machine excavated to 1.70m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH125
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.70	
Cable Percussion	Dando 2000	1.70	21.50	719510.27 E
Rotary Drilling	Comacchio 601	21.50	35.00	733450.28 N

Final Depth:	36.50 m	Start Date:	01/12/2022	Driller:	BM+JG	Sheet 2 of 4
Elevation:	4.94 mOD	End Date:	17/01/2023	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
10.30 - 10.50	B22									
10.50	D29									
10.50 - 10.95	SPT (C)	N=28 (5,6/7,7,7,7) Hammer SN = 1386	10.5	8.10						
11.00 - 12.00	B23									
12.00	D30				-7.06	12.00				
12.00 - 12.45	SPT (C)	N=30 (5,6/7,7,7,9) Hammer SN = 1386		4.70				Medium dense to dense grey silty subrounded fine to coarse GRAVEL.		
13.00 - 13.50	B32									
13.50	D33									
13.50 - 13.95	SPT (C)	N=28 (6,6/6,7,7,8) Hammer SN = 1386	13.5	5.10						
14.50 - 15.00	B34									
15.00	D35									
15.00 - 15.45	SPT (C)	N=29 (6,6/7,7,7,8) Hammer SN = 1386	15.0	6.20						
					-10.76	15.70		Very stiff dark greyish black sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
16.00 - 16.50	B36									
16.50	D37									
16.50 - 16.95	SPT (S)	N=31 (6,7/8,7,8,8) Hammer SN = 1386	16.5	9.10						
17.50 - 18.00	B38									
18.00	D39									
18.00 - 18.45	SPT (S)	N=31 (5,7/8,8,7,8) Hammer SN = 1386	18.0	1.50						

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.70	4.70		

Casing Details

To (m)	Diam (mm)
15.00	250
26.00	200
35.00	150

Water Added

From (m)	To (m)
5.00	21.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)
12.00	15.00	03:00

Remarks

Inspection pit machine excavated to 1.70m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH125
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.70	
Cable Percussion	Dando 2000	1.70	21.50	719510.27 E
Rotary Drilling	Comacchio 601	21.50	35.00	733450.28 N

Final Depth:	36.50 m	Start Date:	01/12/2022	Driller:	BM+JG	Sheet 3 of 4
Elevation:	4.94 mOD	End Date:	17/01/2023	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
19.00 - 19.50	B40													
19.50 - 19.95	U31	Ublow=50 70% Recovery					19.5	15.4						
21.00	D44													
21.00 - 21.45	SPT (S)	N=29 (5,5/6,7,8,8) Hammer SN = 1386					21.0	4.50						
									-16.56	21.50		Very stiff often thinly to thickly laminated dark brown slightly sandy slightly silty CLAY. Sand is fine.		
22.50 - 23.00	B43		54	0	0							22.30-23.00m: AZCL (Possibly due to fines being washed out with flush).		
23.00														
23.00 - 23.45	U42Ublow=50 70% Recovery		100	0	0									
24.50														
24.50 - 25.00	B45									(9.30)				
25.00	D46						25.0	12.4						
25.00 - 25.45	SPT(S) N=34 (6,7/8,9,8,9) Hammer SN = 1387		63	0	0							25.45-26.00m: AZCL (Possibly due to fines being washed out with flush).		
26.00														
			100	0	0									
27.50								Dry						
27.50 - 27.95	SPT(C) N=32 (5,5/7,8,8,9) Hammer SN = 1387													

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.70	4.70		

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
12.00	15.00	03:00

Casing Details	
To (m)	Diam (mm)
15.00	250
26.00	200
35.00	150

Water Added	
From (m)	To (m)
5.00	21.50

Remarks

Inspection pit machine excavated to 1.70m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH125
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Inspection Pit	3T Excavator	0.00	1.70
Cable Percussion	Dando 2000	1.70	21.50
Rotary Drilling	Comacchio 601	21.50	35.00

Coordinates: 719510.27 E, 733450.28 N

Final Depth: 36.50 m | Start Date: 01/12/2022 | Driller: BM+JG | Sheet 4 of 4 | Scale: 1:50

Elevation: 4.94 mOD | End Date: 17/01/2023 | Logger: RS+CMc | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		41	0	0							Very stiff often thinly to thickly laminated dark brown slightly sandy slightly silty CLAY. Sand is fine. *28.15-29.00m: AZCL (Possibly due to fines being washed out with flush).*		
29.00							Dry						
29.00 - 29.45	SPT(C) N=37 (4,6/8,9,9,11) Hammer SN = 1387	30	0	0							*29.40-30.50m: AZCL (Possibly due to fines being washed out with flush).*		
30.50							Dry						
30.50 - 30.95	SPT(C) N=34 (5,6/8,8,9,9) Hammer SN = 1387	47	0	0	N/A			-25.86	30.80		Dense dark grey slightly sandy slightly clayey angular to subangular fine to coarse GRAVEL of dark grey limestone with low cobble content. Cobbles are subangular of dark grey limestone. Sand is fine to coarse.		
									(1.20)		*31.05-32.00m AZCL (Possibly due to fines and gravel being washed out with flush).*		
32.00							Dry	-27.06	32.00		Stiff slightly sandy slightly silty CLAY. Sand is fine.		
32.00 - 32.30	SPT(C) 50 (7,13/50 for 150mm) Hammer SN = 1387	50	0	0					(0.50)				
								-27.56	32.50		Dense dark grey slightly sandy slightly clayey predominantly 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.		
33.50							Dry				*32.75-33.50m: AZCL (Possibly due to fines and gravel being washed out with flush).*		
33.50 - 33.80	SPT(C) 50 (5,18/50 for 150mm) Hammer SN = 1387	100	15	7					(2.20)				
								-29.76	34.70		Medium strong, locally moderately weak, thickly laminated to thinly bedded dark grey LIMESTONE. Moderately weathered: slightly reduced strength, locally reduced strength, closer fracture spacing, patchy brown staining on most fracture surfaces, clay infill on one joint surface.		
35.00							Dry						
35.00 - 35.18	SPT(C) N=50 (25 for 65mm/50 for 115mm) Hammer SN = 1387	100	86	52	14				(1.80)		Discontinuities: 1. 5-10 degree bedding fractures, closely spaced (15/75/420), planar, smooth, pathcy brown staining on most joint surfaces. 2. 75-90 degree joint from 35.10-35.60m, undulating, rough, patchy brown staining on joint surface. 3. 60-75 degree joint from 35.90-36.05, planar, rough, clay infill on joint surface (up to 15mm thick).		
36.50								-31.56	36.50		End of Borehole at 36.50m		
		TCR	SCR	RQD	FI								

28.0 28.5 29.0 29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0 36.5 37.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.70	4.70		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
12.00	15.00	03:00

Casing Details

To (m)	Diam (mm)
15.00	250
26.00	200
35.00	150

Water Added

From (m)	To (m)
5.00	21.50

Remarks

Inspection pit machine excavated to 1.70m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH126
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	1.50	719396.11 E 733443.52 N

Final Depth:	1.50 m	Start Date:	23/11/2022	Driller:	RS	Sheet 1 of 1 Scale: 1:50
Elevation:	4.89 mOD	End Date:	01/12/2022	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 1.00	U5	Ublow=94 70% Recovery			4.64	0.25		MADE GROUND: Grey sandy very silty subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
0.50	ES1				4.49	0.40		MADE GROUND: Grey slightly sandy very silty subangular fine to coarse GRAVEL with high cobble content. Sand is fine to coarse. Cobbles are angular.		
0.50		PID = 2.30ppm						MADE GROUND: Very dense dark grey slightly sandy very silty angular fine to coarse GRAVEL with low cobble content and cobble sized fragments of wood, red brick and concrete, course gravel sized fragments of steel and glass and a hydrocarbon odour. Sand is fine to coarse. Cobbles are subangular.		
1.00	B4							*0.40 - 0.40 Terram at 0.40m*		
1.00	ES2									
1.00 - 1.08	SPT (C)	50 (25 for 75mm/50 for 0mm) Hammer SN = AI2								
1.00		PID = 9.70ppm			3.39	1.50		End of Borehole at 1.50m		
1.50	ES3									
1.50		PID = 1.40ppm								

Water Strikes				Casing Details	
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	To (m)	Diameter

Remarks

Inspection pit machine excavated to 1.50m.
No groundwater encountered.

Termination Reason	Last Updated
Terminated on refusal.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH126A
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Dynamic Sampling	Premier 110	0.00	1.50	719395.11 E 733444.52 N

Final Depth:	Start Date:	Driller:	Sheet 1 of 1
1.50 m	01/12/2022	JM	Scale: 1:50
Elevation: 4.89 mOD	**End Date:** 01/12/2022	**Logger:** RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 1.00	U1	Ublow=129 60% Recovery			4.09	0.80		MADE GROUND: Dark greyish black angular fine to coarse GRAVEL with cobbles and fragments of glass and plastic. Cobbles are subangular.		
1.00 - 1.45	SPT (C)	N=22 (1,1/2,10,4,6) Hammer SN = AI2		Dry	3.79	1.10		CONCRETE		
1.45 - 1.68	SPT (C)	50 (9,16/50 for 75mm) Hammer SN = AI2		Dry	3.39	1.50		MADE GROUND: Dense greenish grey COBBLES with some clay.		
								End of Borehole at 1.50m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details

To (m)	Diameter

Remarks

Hand dug inspection pit excavated to 1.20m.
No groundwater encountered.

Termination Reason

Terminated on refusal.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH127
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Dynamic Sampling	Premier 110	0.00	3.00	719342.16 E 733389.93 N

Final Depth:	Start Date:	Driller:	Sheet 1 of 1
3.00 m	01/12/2022	JM	Scale: 1:50
Elevation: 4.65 mOD	**End Date:** 01/12/2022	**Logger:** RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00	B7				4.35	0.30		MADE GROUND: Dark greyish black angular fine to coarse GRAVEL with fragments of glass.		
					4.25	0.40		MADE GROUND: Large COBBLE		
0.50	ES1							MADE GROUND: Dark greyish black ASH with fragments of red brick, plastic and timber.		
0.50		PID = 2.70ppm								
					3.75	0.90		MADE GROUND: Very soft dark greyish black slightly sandy gravelly CLAY with fragments of timber and red brick. Sand is fine to coarse. Gravel is subangular fine to coarse.		
1.00	B8									
1.00	ES2									
1.00 - 1.45	SPT (C)	N=4 (1,0/1,0,1,2) Hammer SN = AI2								
1.00		PID = 2.70ppm								
1.50	ES3									
1.50		PID = 6.40ppm								
2.00	B9				2.65	2.00		MADE GROUND: Medium dense grey very sandy silty subangular fine to coarse GRAVEL. Sand is fine to coarse.		
2.00	ES4									
2.00 - 2.45	SPT (C)	N=17 (1,2/3,3,6,5) Hammer SN = AI2								
2.50	ES5									
3.00	ES6				1.65	3.00		End of Borehole at 3.00m		
3.00 - 3.45	SPT (C)	N=16 (0,1/9,5,1,1) Hammer SN = AI2								
		Water strike at 3.00m								
3.45 - 3.90	SPT (C)	N=50 (2,6/12,16,11,11) Hammer SN = AI2								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.00	3.00	20	2.50

Casing Details

To (m)	Diameter

Remarks

Hand dug inspection pit excavated to 1.20m.

Termination Reason

Terminated on refusal.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH128
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	1.50	
Dynamic Sampling	Premier 110	1.50	2.60	719373.75 E
				733462.43 N

Final Depth:	2.60 m	Start Date:	23/11/2022	Driller:	JM	Sheet 1 of 1
						Scale: 1:50
Elevation:	4.71 mOD	End Date:	01/12/2022	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.50	ES1							MADE GROUND: Grey sandy very silty angular fine to coarse GRAVEL. Sand is fine to coarse.		
0.50		PID = 0.40ppm			4.06	0.65				
1.00	B4							MADE GROUND: Loose dark grey very sandy silty subrounded fine to coarse GRAVEL with coarse gravel sized fragments of wood. Sand is fine to coarse.		
1.00	ES2									
1.00 - 1.45	SPT (C)	N=9 (1,2/2,2,3,2) Hammer SN = AI2								
1.00		PID = 2.40ppm			3.21	1.50		MADE GROUND: Very stiff grey sandy gravelly CLAY with fragments of timber and glass. Sand is fine to coarse. Gravel is subangular fine to coarse.		
1.50	ES3									
1.50		PID = 0.10ppm								
		Slow flow at 1.50m								
1.64	EW1									
2.00 - 2.45	SPT (C)	N=30 (1,2/12,15,2,1) Hammer SN = AI2								
		Seepage at 2.00m			2.11	2.60		End of Borehole at 2.60m		
2.45 - 2.60	SPT (C)	50 (2,17/50 for 0mm) Hammer SN = AI2								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
1.50			
2.00	2.00		

Casing Details

To (m)	Diameter

Remarks

Machine dug inspection pit excavated to 1.50m.

Termination Reason

Terminated on refusal.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH130
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 3000	1.50	21.00	718897.32 E
				734093.66 N

Final Depth:	21.00 m	Start Date:	05/01/2023	Driller:	CC	Sheet 1 of 3
						Scale: 1:40
Elevation:	3.42 mOD	End Date:	11/01/2023	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					3.35	0.07		BITMAC		
					3.17	0.25		CONCRETE		
0.50	B1							MADE GROUND: Brownish grey gravelly very silty fine to coarse SAND with cobble content. Gravel is subrounded. Cobbles are rounded.		
0.50	ES2									
0.50		PID = 1.00ppm								
1.00	B3									
1.00	ES4									
1.00		PID = 1.70ppm								
					2.12	1.30		MADE GROUND: Grey gravelly very silty fine to coarse SAND with low cobble content. Gravel is subrounded. Cobbles are rounded.		
1.50	B5				1.92	1.50		MADE GROUND: Medium dense locally dense brown fine to coarse SAND and subangular fine to coarse GRAVEL with low cobble content and fragments of red brick. Cobbles are subangular.		
1.50	ES6									
1.50 - 2.50	B26									
1.50		PID = 1.90ppm								
2.00	D27									
2.00	ES7									
2.00 - 2.45	SPT (C)	N=36 (3,4/7,9,9,11) Hammer SN = 0197	2.00	1.60						
2.00		PID = 0.10ppm								
2.50	ES8									
2.50		PID = 0.30ppm								
3.00	D28									
3.00	ES9									
3.00 - 4.00	B29									
3.00 - 3.45	SPT (C)	N=21 (2,3/4,5,5,7) Hammer SN = 0197	3.00	1.90						
3.00		PID = 0.30ppm								
3.50	ES10									
3.50		PID = 0.20ppm								
4.00	D30									
4.00	ES11									
4.00 - 5.00	B31									
4.00 - 4.45	SPT (C)	N=12 (2,3/3,3,3,3) Hammer SN = 0197	4.00	2.10						
4.00		PID = 0.20ppm Seepage at 4.40m								
4.50	ES12									
4.50		PID = 0.20ppm								
5.00	D32									
5.00	ES13									
5.00 - 5.45	SPT (C)	N=13 (1,2/3,3,4,3) Hammer SN = 0197	5.00	1.50						
5.00		PID = 0.10ppm								
5.50	ES14									
5.50		PID = 0.20ppm								
5.80 - 7.00	B33									
6.00	ES15									
6.00		PID = 0.10ppm								
6.50	D34									
6.50	ES16									
6.50 - 6.95	SPT (C)	N=10 (1,2/2,2,3,3) Hammer SN = 0197	6.50	3.10						
6.50		PID = 0.30ppm								
7.00	ES17									
7.00		PID = 0.10ppm								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.40	4.40	20	3.00
8.60	8.60	20	2.10

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.50	1.90	01:30

Casing Details

To (m)	Diameter
13.50	250
21.00	200

Water Added

From (m)	To (m)
0.50	21.00

Remarks

Machine dug inspection pit excavated to 1.50m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH130
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 3000	1.50	21.00	718897.32 E
				734093.66 N

Final Depth:	21.00 m	Start Date:	05/01/2023	Driller:	CC	Sheet 2 of 3
Elevation:	3.42 mOD	End Date:	11/01/2023	Logger:	RS	Scale: 1:40
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
7.50	ES18				-4.08	7.50		MADE GROUND: Medium dense locally dense brown fine to coarse SAND and subangular fine to coarse GRAVEL with low cobble content and fragments of red brick. Cobbles are subangular.		
7.50 - 8.50	B35							MADE GROUND: Medium dense brown very sandy slightly silty subangular fine to coarse GRAVEL with fragments of red brick and concrete. Sand is fine to coarse.		
7.50		PID = 0.10ppm								
8.00	D36									
8.00	ES19									
8.00 - 8.45	SPT (C)	N=14 (2,2/3,3,4,4) Hammer SN = 0197	8.00	5.60						
8.00		PID = 0.30ppm								
8.50	ES20									
8.50 - 9.50	B37									
8.50		PID = 0.10ppm Seepage at 8.60m								
9.00	ES21									
9.00		PID = 0.20ppm								
9.50	D38									
9.50	ES22									
9.50 - 9.95	SPT (C)	N=19 (3,3/5,7,4,3) Hammer SN = 0197	9.50	5.10						
9.50		PID = 0.40ppm								
10.00	ES23									
10.00 - 11.00	B39									
10.00		PID = 0.30ppm								
10.50	ES24									
10.50		PID = 0.20ppm								
11.00	D40				-7.58	11.00		MADE GROUND: Medium dense becoming dense grey sandy slightly sitly subangular fine to coarse GRAVEL with low cobble content and fragments of red brick and concrete. Sand is fine to coarse. Cobbles are subrounded.		
11.00	ES25									
11.00 - 12.00	B53									
11.00 - 11.45	SPT (C)	N=23 (3,4/4,5,6,8) Hammer SN = 0197	11.0	4.70						
11.00		PID = 0.30ppm								
11.50	ES41									
12.00	ES42									
12.50	D54									
12.50	ES43									
12.50 - 12.95	SPT (C)	N=29 (4,5/7,9,7,6) Hammer SN = 0197	12.5	5.60						
13.00	ES44									
13.00 - 14.00	B55									
13.50	ES45									
14.00	D56									
14.00	ES46									
14.00 - 14.45	SPT (C)	N=32 (6,7/7,9,11,5) Hammer SN = 0197	14.0	7.60						
14.50	ES47									

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.40	4.40	20	3.00
8.60	8.60	20	2.10

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.50	1.90	01:30

Casing Details

To (m)	Diameter
13.50	250
21.00	200

Water Added

From (m)	To (m)
0.50	21.00

Remarks

Machine dug inspection pit excavated to 1.50m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH130
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 3000	1.50	21.00	718897.32 E
				734093.66 N

Final Depth:	21.00 m	Start Date:	05/01/2023	Driller:	CC	Sheet 3 of 3
						Scale: 1:40
Elevation:	3.42 mOD	End Date:	11/01/2023	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
15.00	ES48							MADE GROUND: Medium dense becoming dense grey sandy slightly sitly subangular fine to coarse GRAVEL with low cobble content and fragments of red brick and concrete. Sand is fine to coarse. Cobbles are subrounded.		
15.00 - 15.80	B57									
15.50	D58									
15.50	ES49									
15.50 - 15.95	SPT (C)	N=9 (4,5/3,2,2,2) Hammer SN = 0197	15.5	2.10	-12.38	15.80				
15.80 - 17.00	B59							Firm grey SILT.		
16.00	ES50									
16.50	ES51									
17.00	D60									
17.00	ES52				-13.68	17.10				
17.00 - 17.45	SPT (C)	N=19 (1,3/4,5,5,5) Hammer SN = 0197	17.0	4.70				Medium dense grey gravelly fine to coarse SAND. Gravel is subrounded fine.		
17.10 - 18.00	B61									
18.50	D62									
18.50 - 18.95	SPT (C)	N=23 (2,2/4,6,6,7) Hammer SN = 0197	18.5	5.30						
					-15.48	18.90		Stiff grey silty CLAY.		
19.50 - 19.95	U63	Ublow=21 100% Recovery	19.5	7.60						
21.00 - 21.45	SPT (S)	N=21 (3,4/5,5,5,6) Hammer SN = 0197	21.0	9.10	-17.58	21.00		End of Borehole at 21.00m		

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.40	4.40	20	3.00
8.60	8.60	20	2.10

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.50	1.90	01:30

Casing Details

To (m)	Diameter
13.50	250
21.00	200

Water Added

From (m)	To (m)
0.50	21.00

Remarks

Machine dug inspection pit excavated to 1.50m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH131
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3T Excavator	0.00	1.50	
Cable Percussion	Dando 3000	1.50	17.00	718910.51 E
				734091.75 N

Final Depth:	17.00 m	Start Date:	09/01/2023	Driller:	CC	Sheet 1 of 3
Elevation:	3.41 mOD	End Date:	17/01/2023	Logger:	RS	Scale: 1:40
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					3.34	0.07		BITMAC		
								CONCRETE		
					3.11	0.30				
					3.01	0.40		MADE GROUND: Brownish yellow gravelly silty very fine to coarse SAND. Gravel is rounded fine to coarse.		
0.50	B1									
0.50	ES2							MADE GROUND: Brown gravelly silty fine to coarse SAND with low cobble content. Gravel is rounded fine to coarse. Cobbles are rounded.		
0.50		PID = 6.00ppm								
1.00	B3									
1.00	ES4									
1.00		PID = 4.50ppm								
1.50	B5				1.91	1.50				
1.50	ES6							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.		
1.50 - 2.50	ES19									
1.50		PID = 1.10ppm								
2.00	D20									
2.00	ES7									
2.00 - 2.45	SPT (C)	N=49 (4,6/9,11,13,16) Hammer SN = 0197	2.00	1.00						
2.00		PID = 0.60ppm								
2.50	ES8									
2.50		PID = 0.30ppm								
3.00	D22									
3.00	ES9									
3.00 - 4.00	B21									
3.00 - 3.45	SPT (C)	N=42 (7,8/9,9,11,13) Hammer SN = 0197	3.00	2.30						
3.00		PID = 0.10ppm								
3.50	ES10									
3.50		PID = 0.10ppm								
4.00	D23									
4.00	ES11									
4.00 - 5.00	B24									
4.00 - 4.45	SPT (C)	N=23 (2,3/4,6,6,7) Hammer SN = 0197	4.00	2.60						
4.00		PID = 0.10ppm								
4.50	ES12									
4.50		PID = 0.70ppm								
5.00	D25									
5.00	ES13									
5.00 - 5.45	SPT (C)	N=30 (4,6/9,6,7,8) Hammer SN = 0197	5.00	1.00						
5.00		PID = 0.20ppm								
5.50	ES14									
5.50 - 6.50	B26									
5.50		PID = 0.10ppm								
6.00		PID = 0.10ppm								
6.50	D27									
6.50	ES15									
6.50 - 6.95	SPT (C)	N=20 (3,4/4,5,6,5) Hammer SN = 0197	6.50	1.80						
6.50		PID = 0.20ppm								
7.00	ES16									
7.00 - 8.00	B28									
7.00		PID = 0.10ppm								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
6.30	6.30	20	1.70

Chiselling Details

From (m)	To (m)	Time (hh:mm)
7.60	8.00	01:00

Casing Details

To (m)	Diameter

Water Added

From (m)	To (m)

Remarks

Machine dug inspection pit excavated to 1.50m.

Termination Reason

Terminated on refusal.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH131
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 2 of 3
Inspection Pit	3T Excavator	0.00	1.50		17.00 m	09/01/2023	CC	Scale: 1:40
Cable Percussion	Dando 3000	1.50	17.00	718910.51 E				
				734091.75 N	Elevation: 3.41 mOD	End Date: 17/01/2023	Logger: RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
7.50	ES17							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.		
7.50		PID = 0.10ppm								
8.00	D29				-4.59	8.00				
8.00	ES18							MADE GROUND: Medium dense to dense brownish grey gravelly very sandy slightly silty subangular fine to coarse GRAVEL with low cobble content and fragments of red brick and concrete. Sand is fine to coarse. Cobbles are subrounded.		
8.00 - 8.45	SPT (C)	N=20 (2,4/5,6,4,5) Hammer SN = 0197	8.00	2.30						
8.00		PID = 0.10ppm								
8.50	ES30									
8.50 - 9.50	B43									
8.50		PID = 0.20ppm								
9.00	ES31									
9.00		PID = 0.00ppm								
9.50	D44									
9.50	ES32									
9.50 - 9.95	SPT (C)	N=37 (6,6/7,9,10,11) Hammer SN = 0197	9.50	4.70						
9.50		PID = 0.10ppm								
10.00	ES33									
10.00 - 11.00	B45									
10.00		PID = 0.00ppm								
10.50	ES34									
10.50		PID = 0.00ppm								
11.00	D46									
11.00	ES35									
11.00 - 11.45	SPT (C)	N=20 (7,6/6,5,5,4) Hammer SN = 0197	11.0	6.10						
11.00		PID = 0.10ppm								
11.50	ES36									
11.50 - 12.50	B47									
11.50		PID = 0.00ppm								
12.00		PID = 0.10ppm								
12.50	D48									
12.50	ES37									
12.50 - 12.95	SPT (C)	N=29 (8,9/9,10,5,5) Hammer SN = 0197	12.5	7.00						
12.50		PID = 0.30ppm								
13.00	ES38									
13.00 - 14.00	B49									
13.00		PID = 0.00ppm								
13.50	ES39									
13.50		PID = 0.20ppm								
14.00	D50									
14.00	ES40									
14.00 - 14.45	SPT (C)	N=26 (3,4/5,5,7,9) Hammer SN = 0197	14.0	7.30						
14.00		PID = 0.10ppm								
14.50	ES41									
14.50		PID = 0.10ppm								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
6.30	6.30	20	1.70

Chiselling Details

From (m)	To (m)	Time (hh:mm)
7.60	8.00	01:00

Casing Details

To (m)	Diameter

Water Added

From (m)	To (m)

Remarks

Machine dug inspection pit excavated to 1.50m.

Termination Reason

Terminated on refusal.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	BH131
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 3 of 3
Inspection Pit	3T Excavator	0.00	1.50					Scale: 1:40
Cable Percussion	Dando 3000	1.50	17.00	718910.51 E	17.00 m	09/01/2023	CC	
				734091.75 N	Elevation: 3.41 mOD	End Date: 17/01/2023	Logger: RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
15.00	ES42							MADE GROUND: Medium dense to dense brownish grey gravelly very sandy slightly silty subangular fine to coarse GRAVEL with low cobble content and fragments of red brick and concrete. Sand is fine to coarse. Cobbles are subrounded.		
15.00		PID = 0.00ppm								
					-11.99	15.40				
15.50	D55							Dense grey sandy subrounded fine to medium GRAVEL. Sand is fine to coarse.		
15.50	ES51									
15.50 - 16.50	B54									
15.50 - 15.95	SPT (C)	N=44 (5,7/9,11,11,13) Hammer SN = 0197	15.5	3.30						
15.50		PID = 0.10ppm								
16.00	ES52									
16.00		PID = 0.20ppm								
16.50	ES53									
16.50		PID = 0.20ppm								
17.00	D56				-13.59	17.00		End of Borehole at 17.00m		
17.00 - 17.45	SPT (C)	N=45 (4,5/8,12,13,12) Hammer SN = 0197	17.0	4.70						

15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
6.30	6.30	20	1.70

Casing Details

To (m)	Diameter

Water Added

From (m)	To (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
7.60	8.00	01:00

Remarks

Machine dug inspection pit excavated to 1.50m.

Termination Reason

Terminated on refusal.

Last Updated

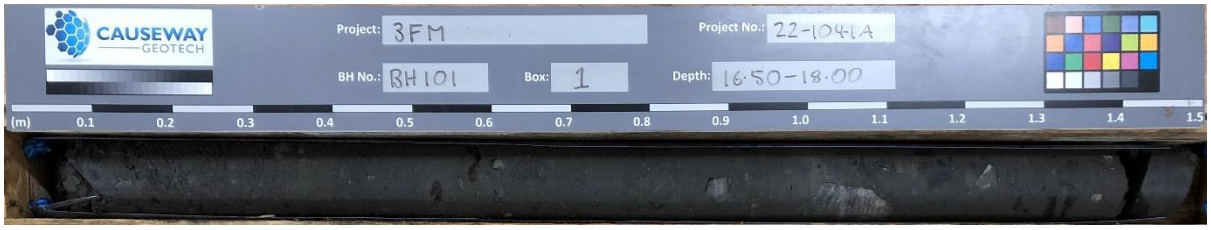
12/06/2023

AGS

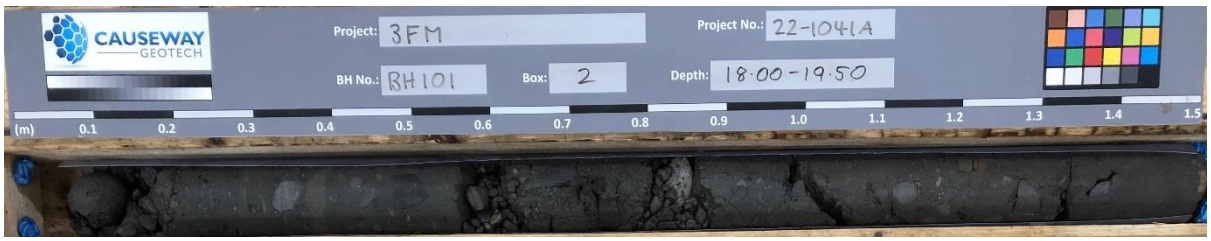
CAUSEWAY GEOTECH

APPENDIX C

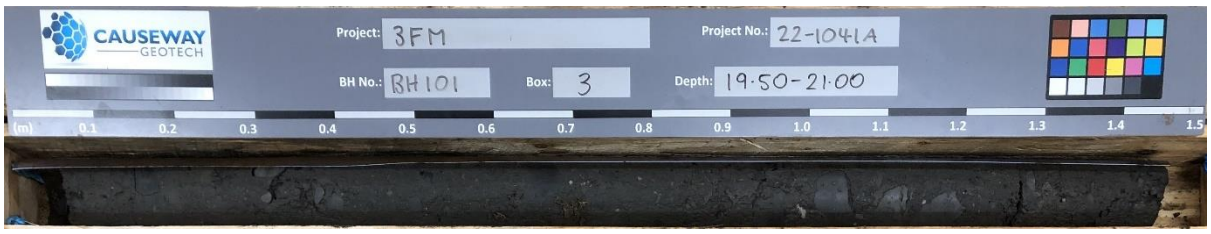
CORE PHOTOGRAPHS



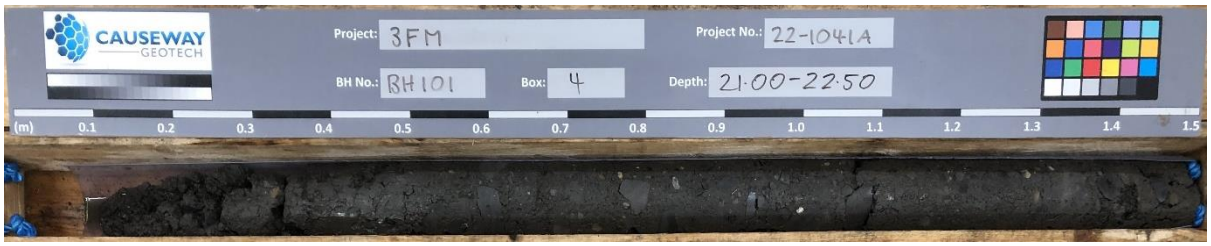
BH101 Box 1: 16.50-18.00m



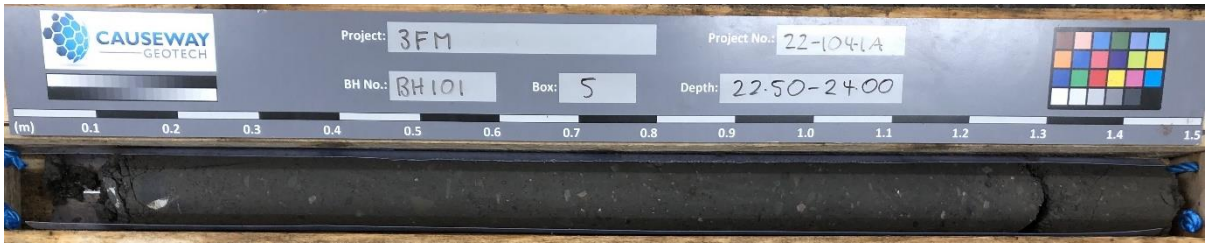
BH101 Box 2: 18.00-19.50m



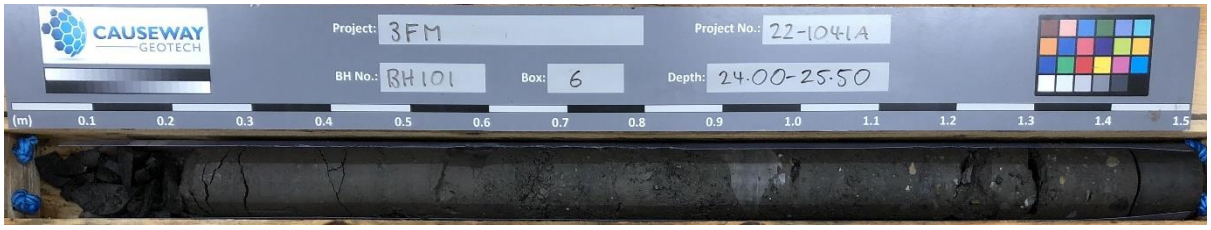
BH101 Box 3: 19.50-21.00m



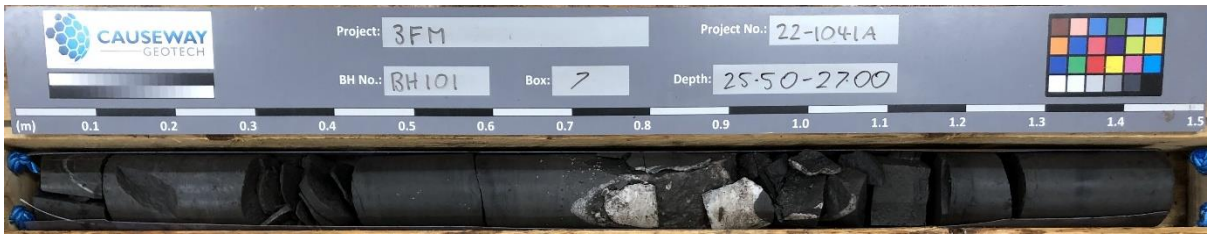
BH101 Box 4: 22.00-22.50m



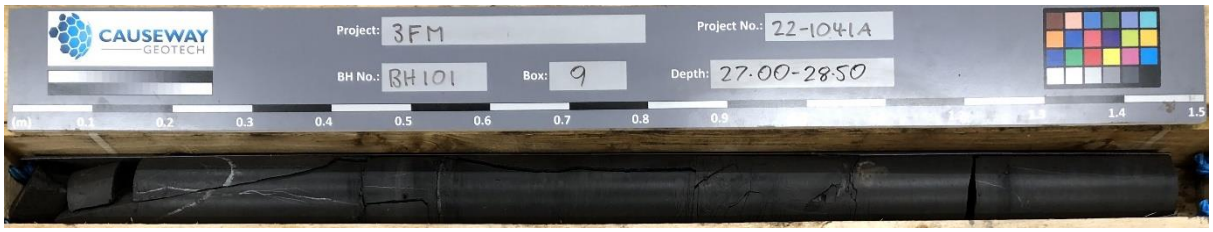
BH101 Box 5: 22.50-24.00m



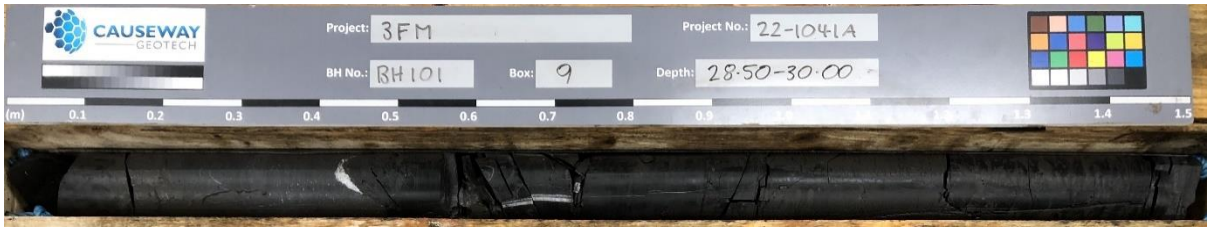
BH101 Box 6: 24.00-25.50m



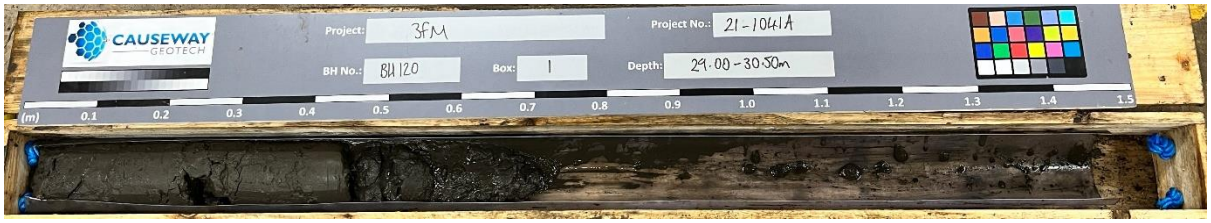
BH101 Box 7: 25.50-27.00m



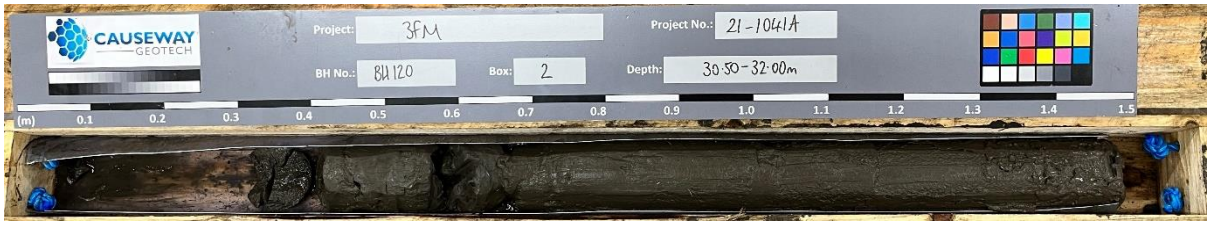
BH101 Box 8: 27.00-28.50m



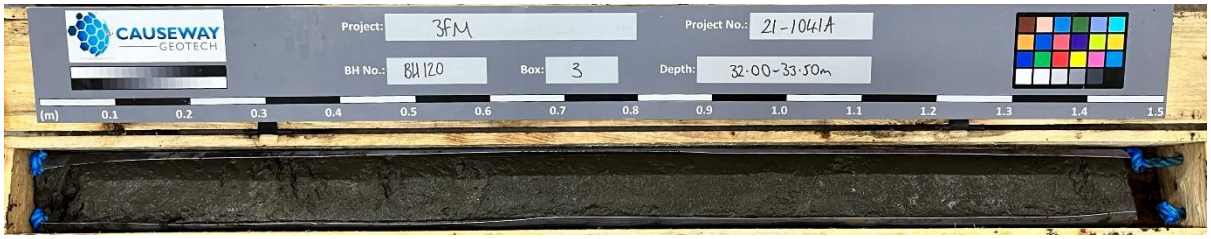
BH101 Box 9: 28.50-30.00m



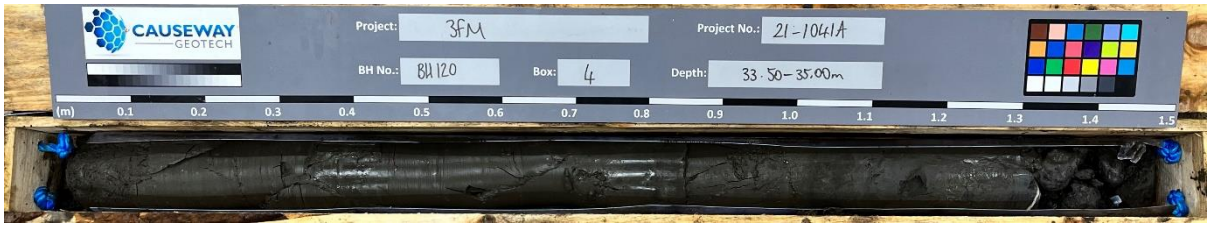
BH120 Box 1: 29.00-30.50m



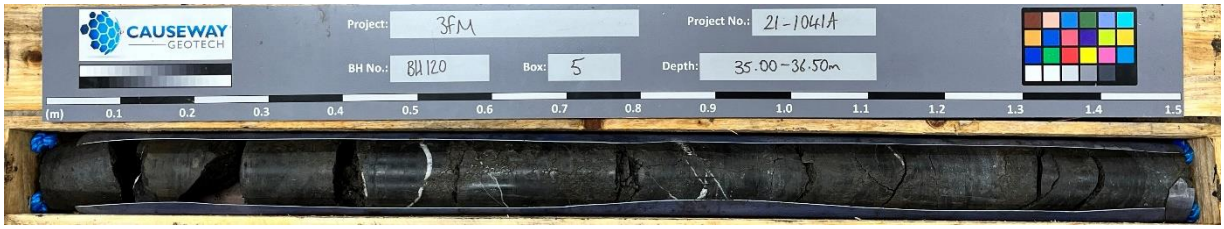
BH120 Box 2: 30.50-32.00m



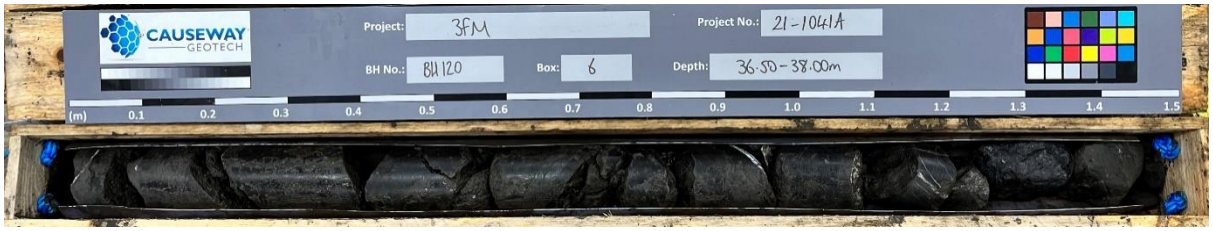
BH120 Box 3: 32.00-33.50m



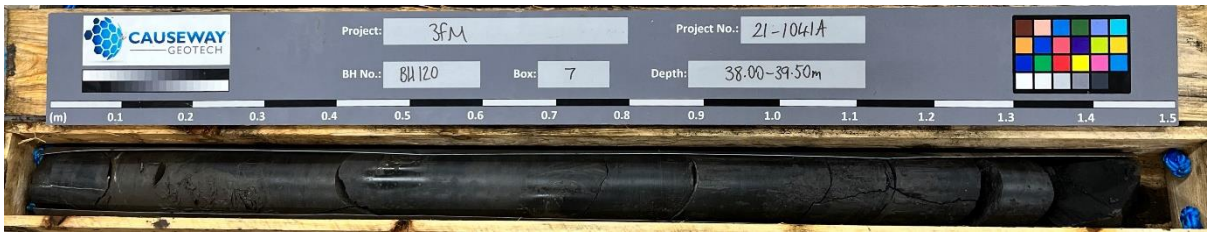
BH120 Box 4: 33.50-35.00m



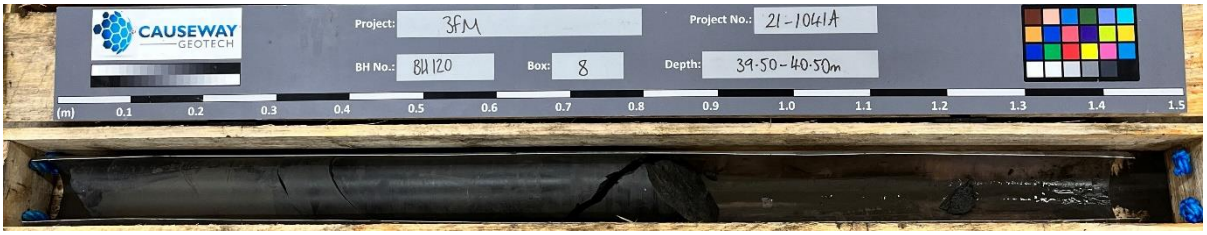
BH120 Box 5: 35.00-36.50m



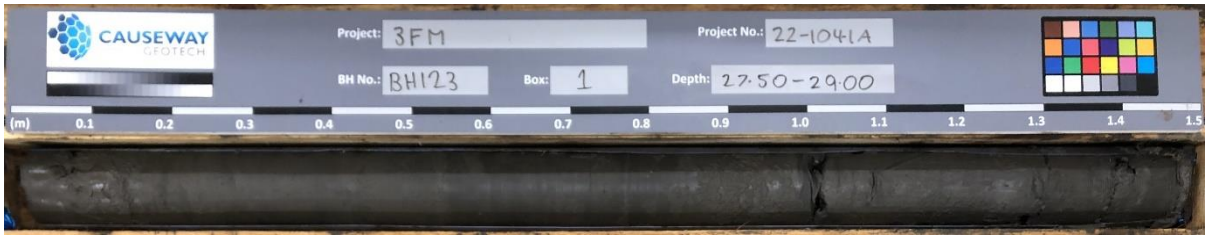
BH120 Box 1: 36.50-38.00m



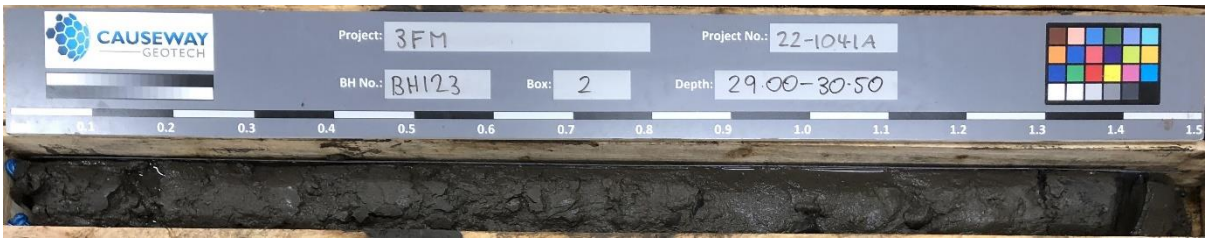
BH120 Box 7: 38.00-39.50m



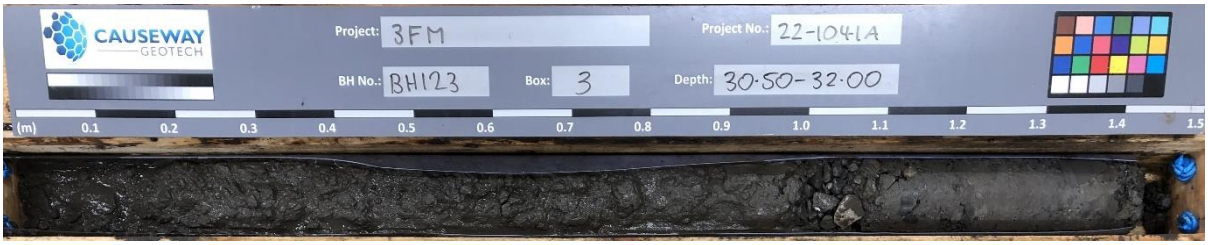
BH120 Box 8: 39.50-40.50m



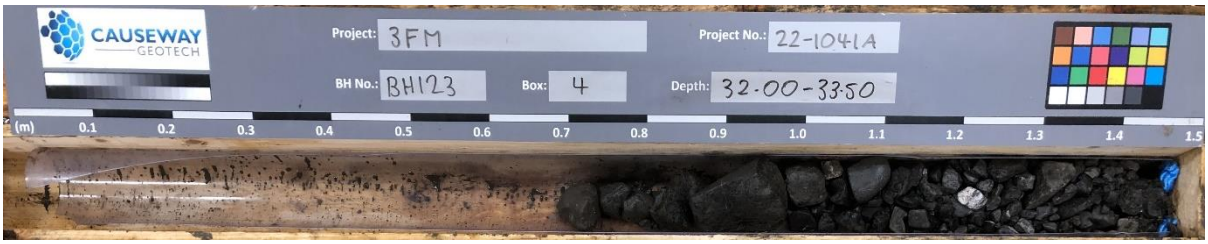
BH123 Box 1: 27.50-29.00m



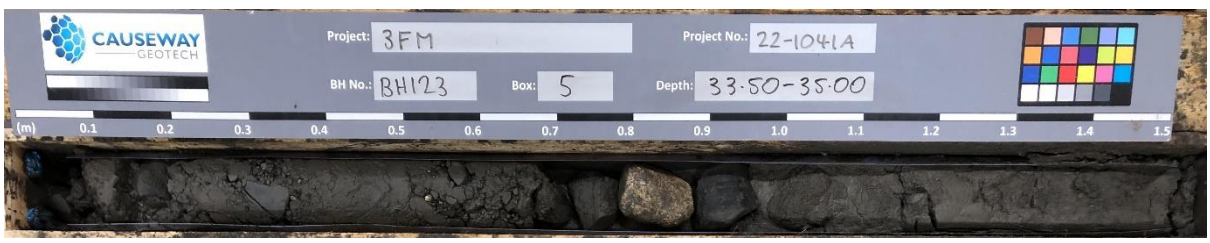
BH123 Box 2: 29.00-30.50m



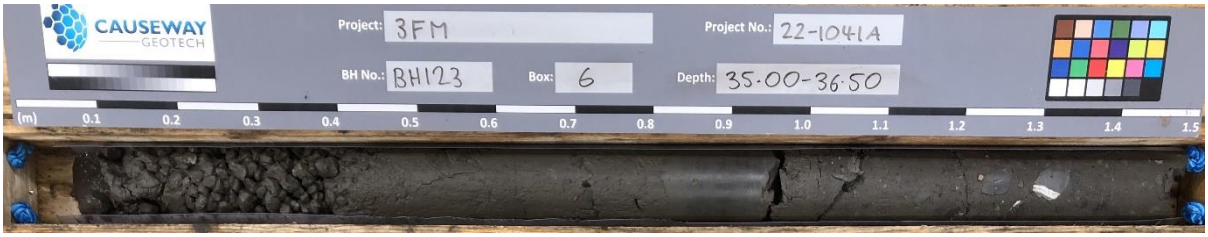
BH123 Box 3: 30.50-32.00m



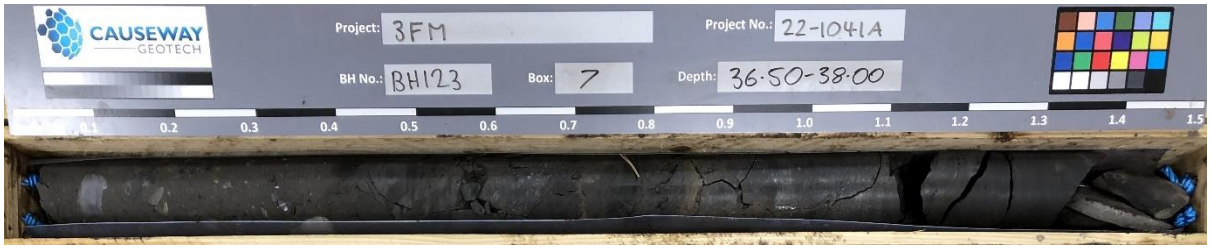
BH123 Box 4: 32.00-33.50m



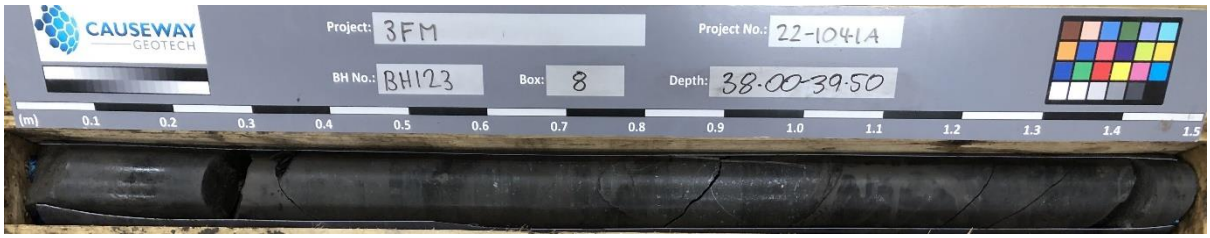
BH123 Box 1: 33.50-35.00m



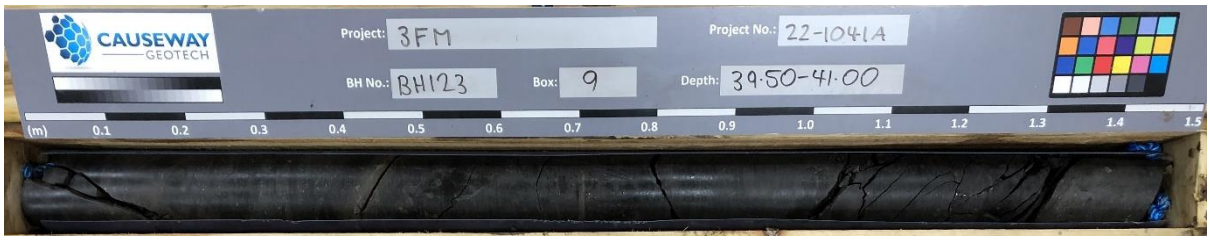
BH123 Box 1: 35.00-36.50m



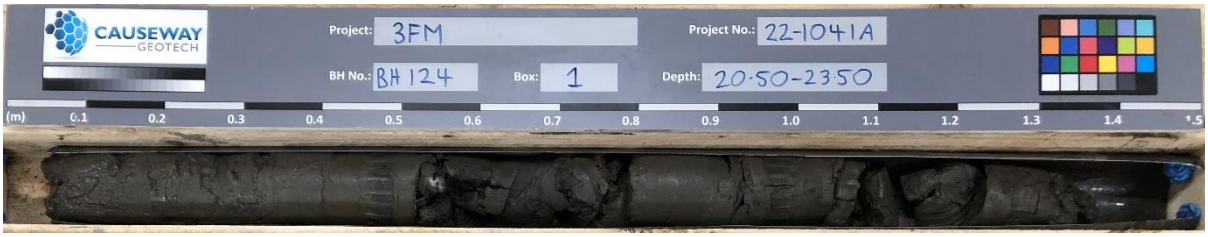
BH123 Box 7: 36.50-38.00m



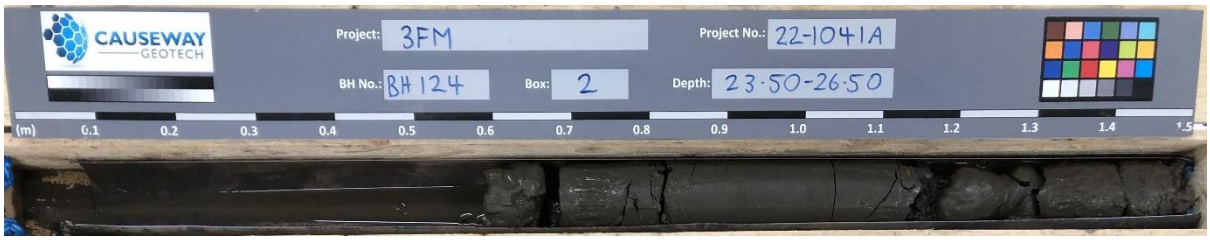
BH123 Box 8: 38.00-39.50m



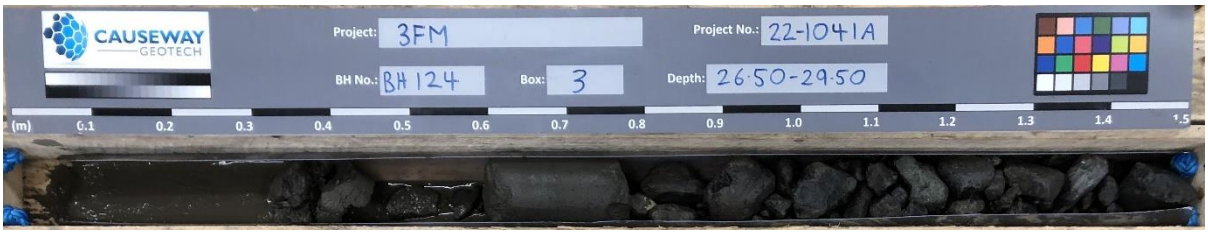
BH123 Box 9: 39.50-41.00m



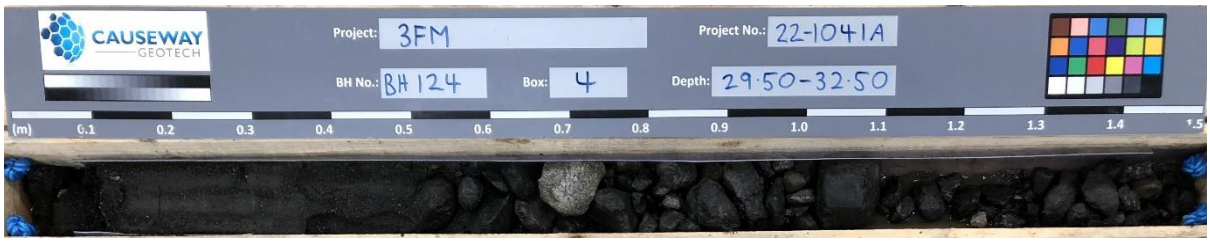
BH124 Box 1: 20.50-23.50m



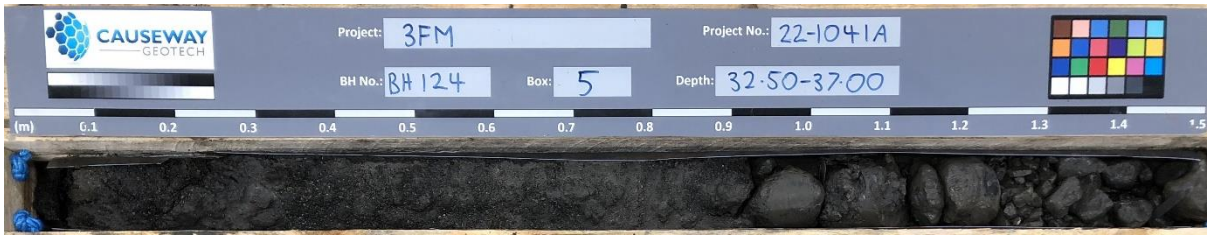
BH124 Box 2: 23.50-26.50m



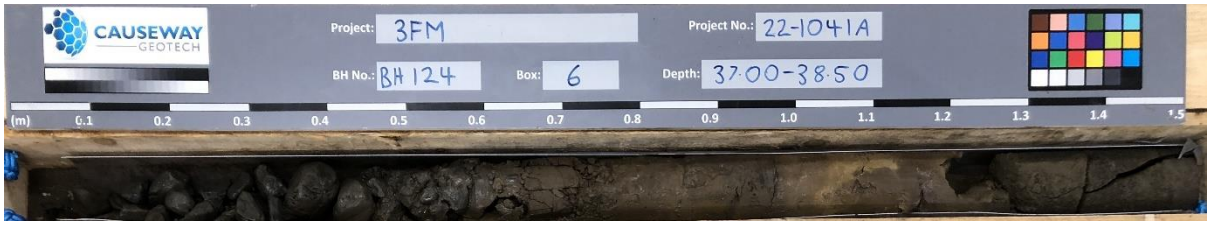
BH124 Box 3: 26.50-29.50m



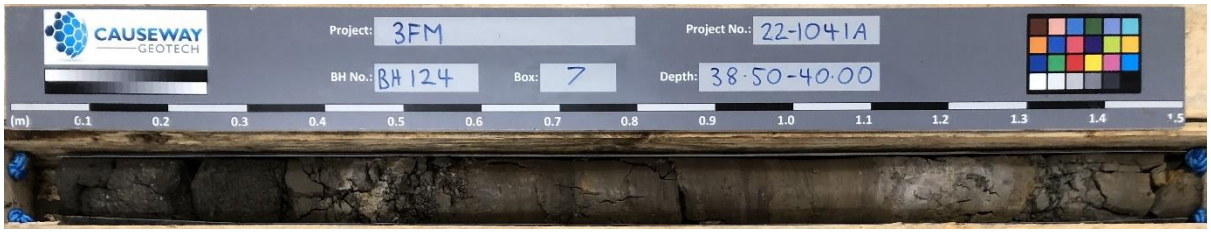
BH124 Box 4: 29.50-32.50m



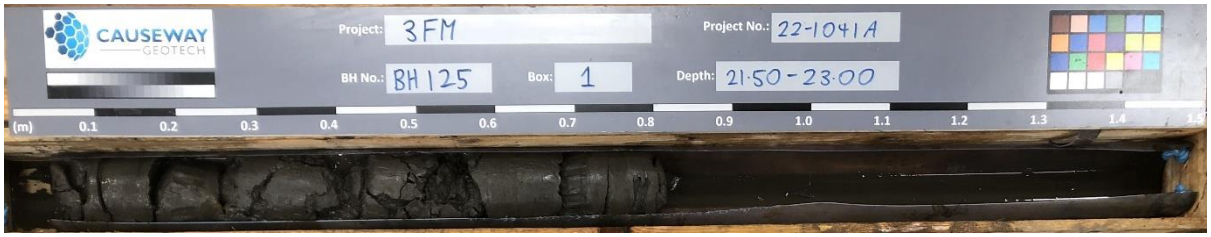
BH124 Box 5: 32.50-37.00m



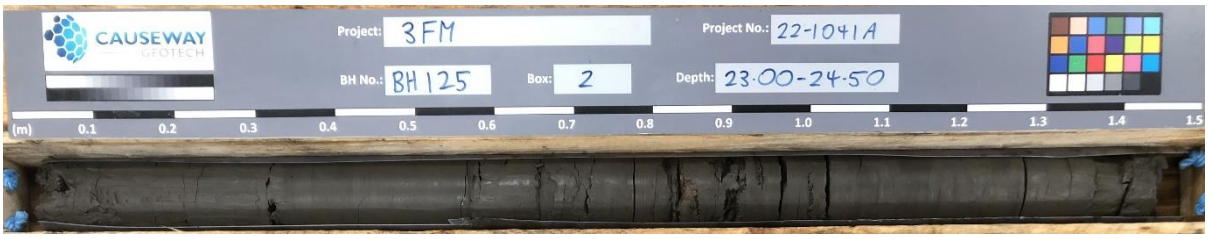
BH124 Box 6: 37.00-38.50m



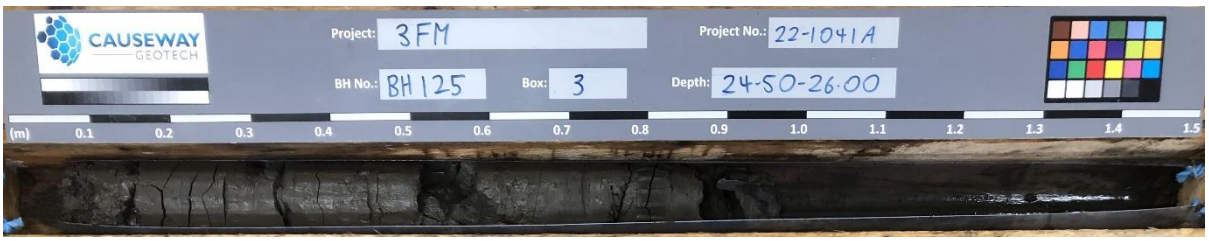
BH124 Box 7: 38.50-40.00m



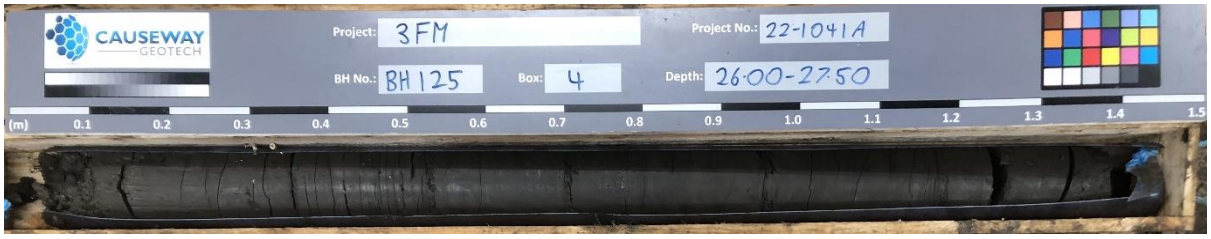
BH125 Box 1: 21.50-23.00m



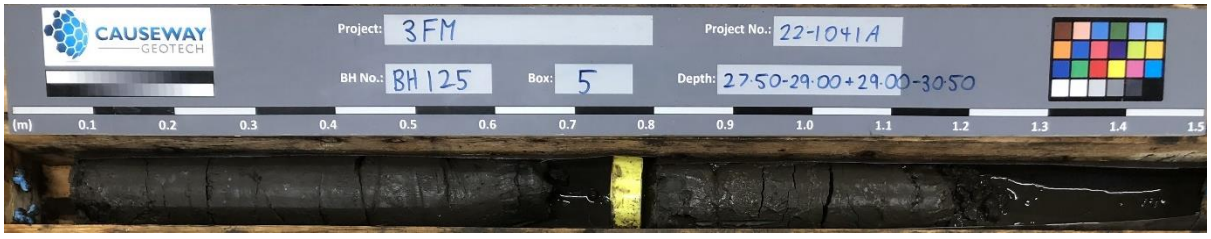
BH125 Box 2: 23.00-24.50m



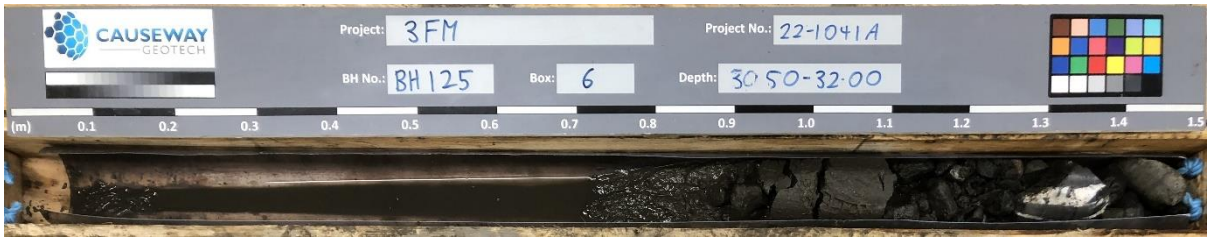
BH125 Box 3: 24.50-26.00m



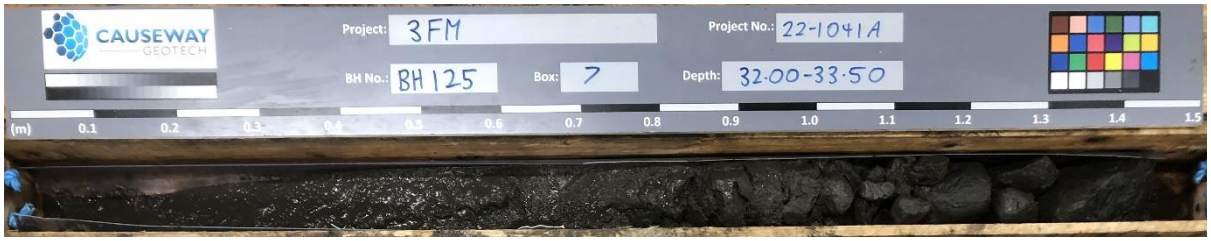
BH125 Box 4: 26.00-27.50m



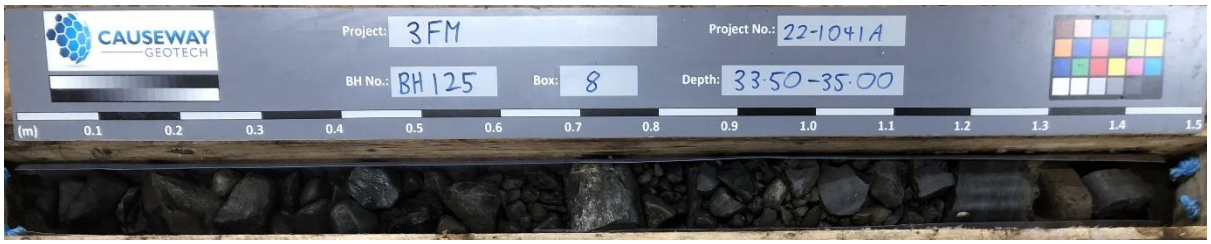
BH125 Box 5: 27.50-29.00m & 29.00-30.50m



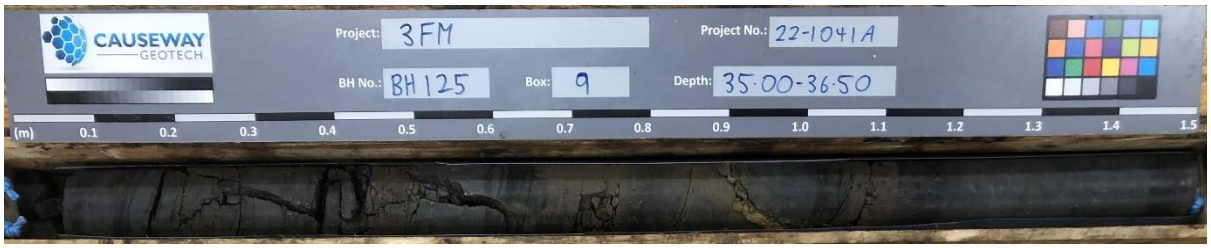
BH125 Box 6: 30.50-32.00m



BH125 Box 7: 32.00-33.50m



BH125 Box 8: 33.50-35.00m



BH125 Box 9: 35.00-36.50m

CAUSEWAY GEOTECH

APPENDIX D

SLIT TRENCH LOGS AND DRAWINGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Trial Pit ID
22-1041A	3FM Planning Design GI - Lot A DPC Lands	ST102
Coordinates	**Client:**	
719222.99 E 733709.48 N	Dublin Port Company (DPC)	
Method: Slit Trenching	**Client's Representative:** RPS	Sheet 1 of 1 Scale: 1:25
Plant: 3t Tracked Excavator	**Elevation** 4.17 mOD / **Date:** 07/02/2023 / **Logger:** RS	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.50 - 0.50 0.50 - 0.50 0.50	B4 ES1	PID = 0.10ppm				MADE GROUND: Dark brownish grey sandy silty rounded fine to coarse GRAVEL with frequent fragments of red brick and concrete. Sand fine to coarse.	
1.00 - 1.00 1.00 - 1.00 1.00	B5 ES2	PID = 0.00ppm					
1.50 - 1.50 1.50 - 1.50 1.50	B6 ES3	PID = 0.10ppm	2.67	1.50		End of trial pit at 1.50m	

Water Strikes	
Struck at (m)	Remarks

Depth: 1.50
Width: 0.60
Length: 3.55

Remarks:
No groundwater encountered.

Stability:
Unstable

Termination Reason
Terminated at maximum reach of excavator.

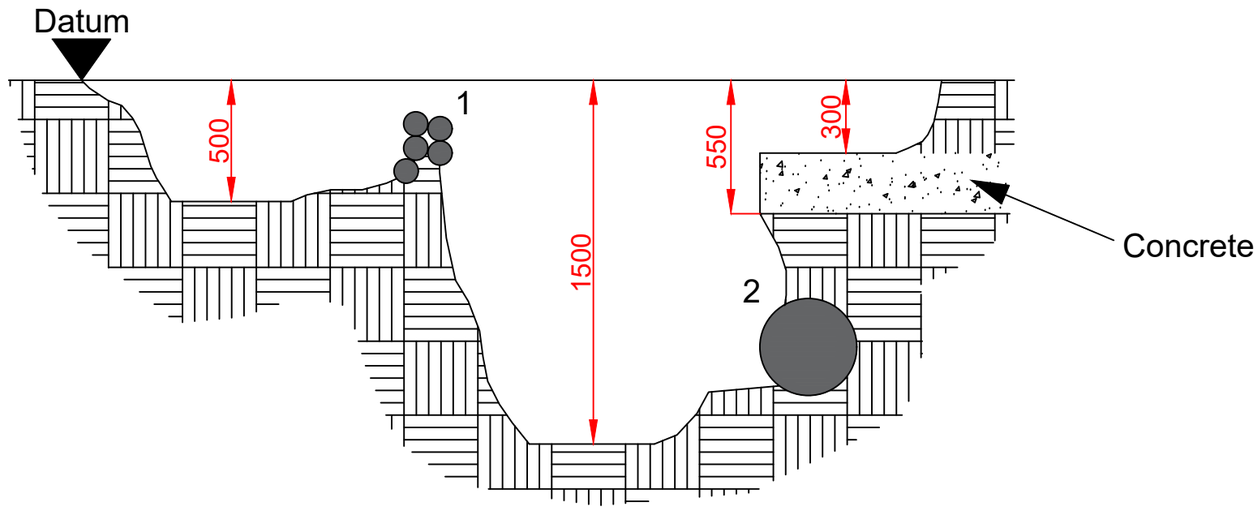
Last Updated
14/04/2023

AGS

JOB NUMBER: 22-1041A	JOB NAME: 3FM Planning Design GI - Lot A DPC Lands	LOCATION: ST102

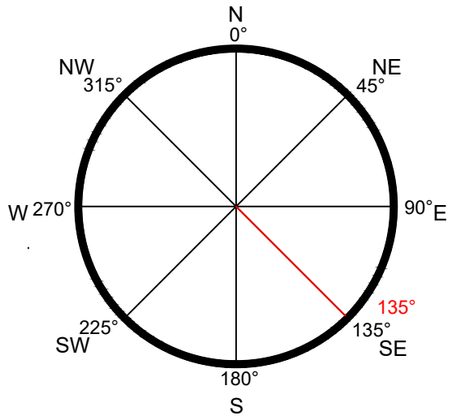
CLIENT: Dublin Port Company (DPC)	CLIENTS REPRESENTATIVE: RPS	CREW: RS	PLANT & EQUIPMENT 3 Tonne Excavator & Hand Tools

TRENCH: (SECTION & PLAN)



No:	Type of Service:	Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	Details/Comments
01	Unknown	100	0.13 - 0.15 - 0.30	1.34 - 1.38 -1.48	5x100mm Grey Ducts
02	Unknown	400	0.90	2.80	400mm Steel Pipe
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					

TRENCH - ORIENTATION



TRENCH ORIENTATED : 135° FROM NORTH

COORDINATES: DATUM

EASTING:	-	719223.986
NORTHING:	-	7330709.476
ELEVATION:	-	4.171

TRENCH LENGTH (m) :	3.65
TRENCH DEPTH (m) :	1.50
TRENCH WIDTH (m) :	0.60

STABILITY:	Unstable
GROUNDWATER:	Dry

SCALE:	NTS@A3
DRAWN:	BS
CHECKED:	CH
DATE EXCAVATED:	07/02/2023

CAUSEWAY GEOTECH

CAUSEWAY GEOTECH

Project No. 22-1041A	**Project Name:** 3FM Planning Design GI - Lot A DPC Lands		**Trial Pit ID** ST104
Coordinates 719410.72 E 733851.66 N	**Client:** Dublin Port Company (DPC)		
Method: Slit Trenching	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3t Tracked Excavator	**Elevation** 4.58 mOD	**Date:** 08/12/2022	**Logger:** RS	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			4.48	0.10		MADE GROUND: Grey sandy very silty angular fine to coarse GRAVEL. Sand is fine to coarse.	
						MADE GROUND: Grey sandy silty angular fine to coarse GRAVEL with high cobble content and fragments of concrete and red brick. Sand is fine to coarse.	
			4.13	0.45		MADE GROUND: Soft brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is subrounded fine to coarse.	
0.50 - 0.50	B1						
0.50 - 0.50	ES2						
0.50		PID = 0.50ppm					
1.00 - 1.00	B4						
1.00 - 1.00	ES3						
1.00		PID = 0.30ppm					
1.50 - 1.50	B6						
1.50 - 1.50	ES5						
1.50		PID = 0.50ppm	2.98	1.60		End of trial pit at 1.60m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 1.60
Width: 0.50
Length: 3.35

Remarks:
No groundwater encountered.

Stability:
Unstable

Termination Reason
Terminated on pit wall collapse.

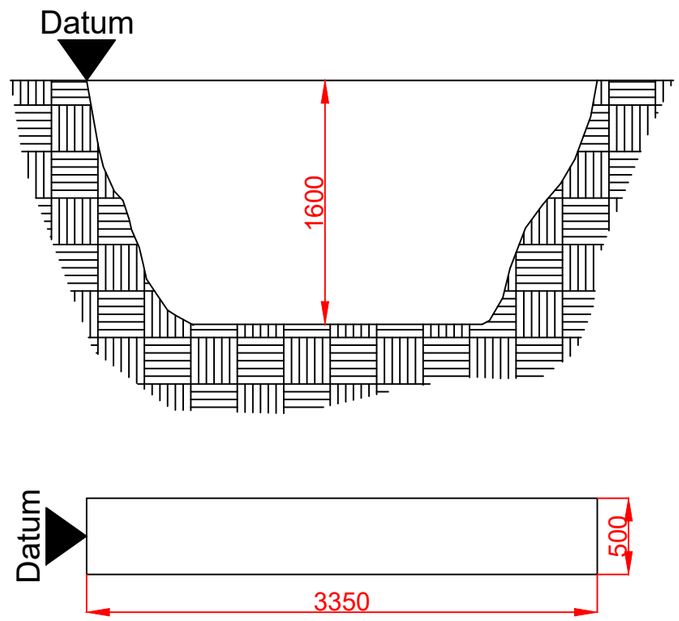
Last Updated
14/04/2023

AGS

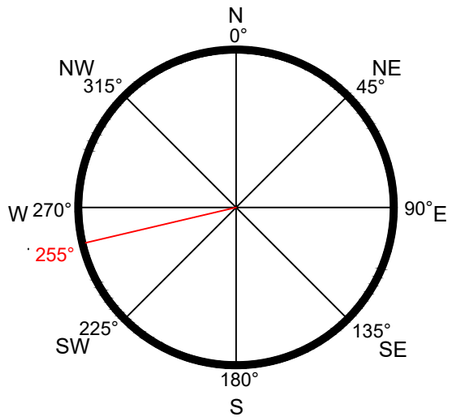
JOB NUMBER: 22-1041A	JOB NAME: 3FM Planning Design GI - Lot A DPC Lands	LOCATION: ST104

CLIENT: Dublin Port Company (DPC)	CLIENTS REPRESENTATIVE: RPS	CREW: RS	PLANT & EQUIPMENT 3 Tonne Excavator & Hand Tools

TRENCH: (SECTION & PLAN)



TRENCH - ORIENTATION



TRENCH ORIENTATED : 255° FROM NORTH

COORDINATES: DATUM

EASTING:	-	719410.716
NORTHING:	-	733851.662
ELEVATION:	-	4.578

TRENCH LENGTH (m) :	3.35
TRENCH DEPTH (m) :	1.60
TRENCH WIDTH (m) :	0.50

STABILITY:	Unstable
GROUNDWATER:	Dry

SCALE:	NTS@A3
DRAWN:	BS
CHECKED:	CH
DATE EXCAVATED:	08/12/2022

No:	Type of Service:	Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	Details/Comments
01					No Services Found
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					

CAUSEWAY GEOTECH

CAUSEWAY GEOTECH

APPENDIX E

SLIT TRENCH PHOTOGRAPHS

ST102

ST102

ST102

ST102

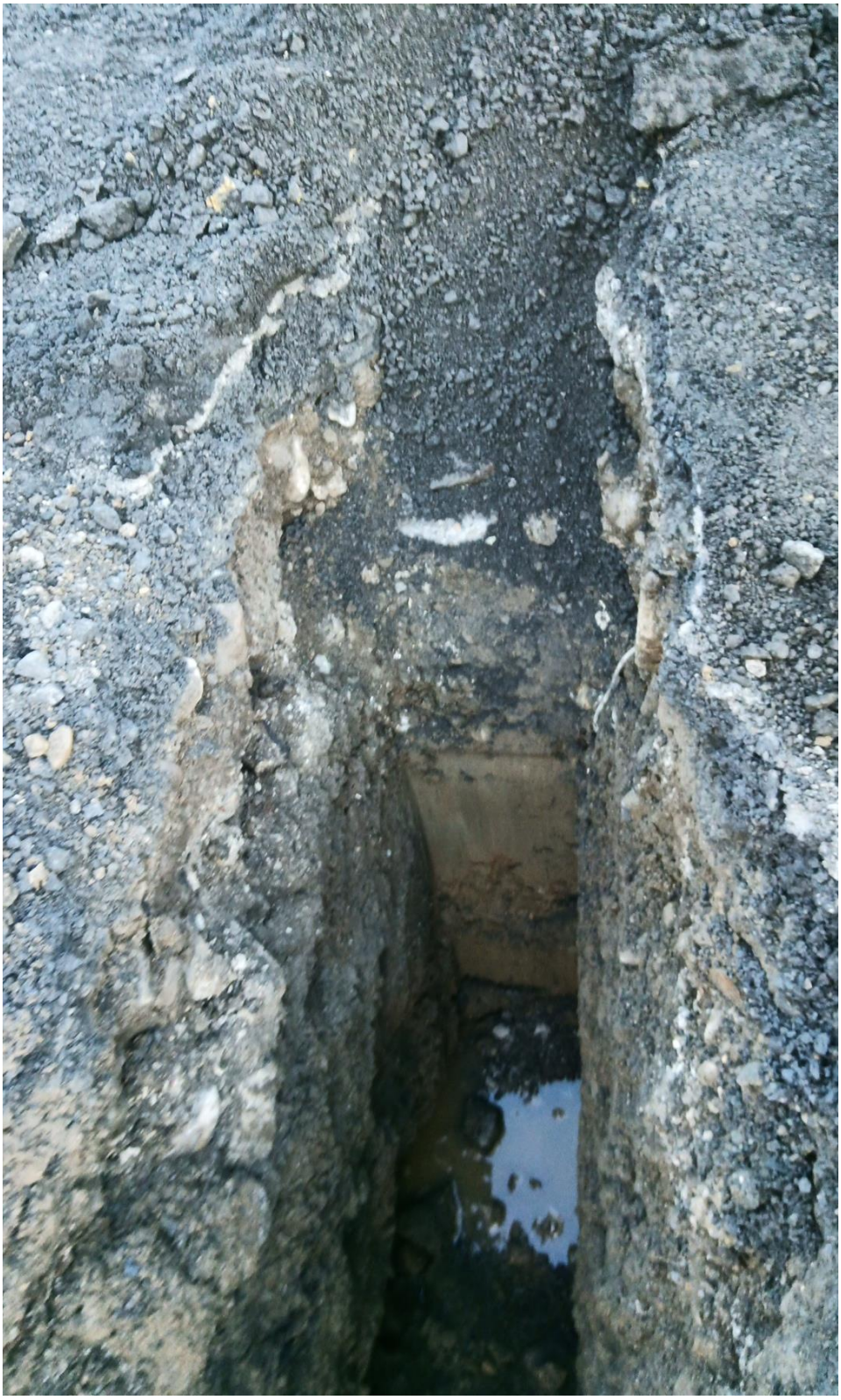
ST102

ST102

ST102

ST104

ST104



ST104

ST104

ST104

ST104

ST104

ST104

CAUSEWAY GEOTECH

APPENDIX F

INDIRECT IN-SITU CBR TESTS

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

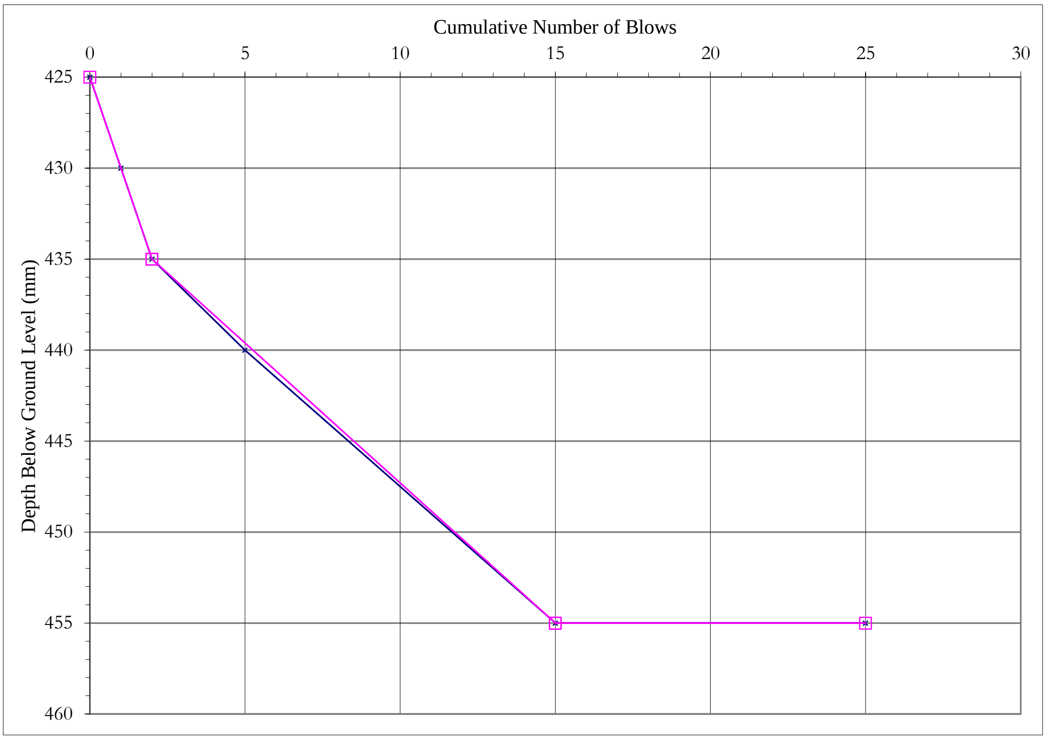
Project Number	22-1041A
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

CAUSEWAY 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



top / base of layer (mm)	mm/ blow	CBR (%)
425 435	5	55
435 455	1.5	>100

CBR Range	Min: #NUM! Max: >100	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; 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	[signature]	January 2023

UKAS TESTING 10122

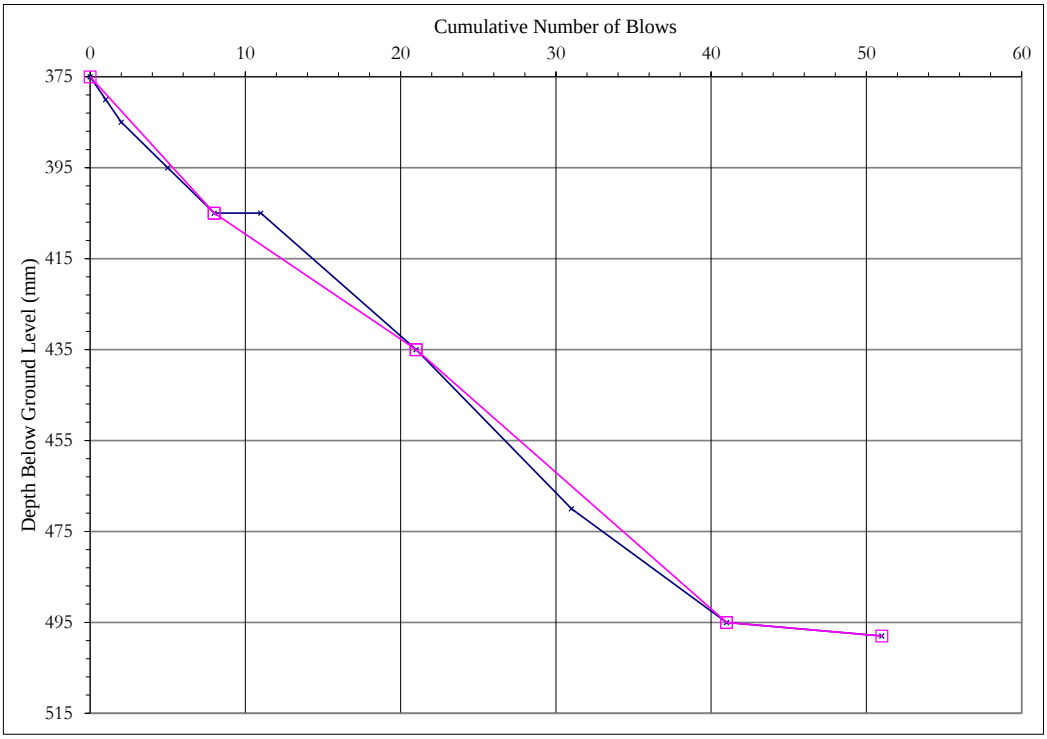
Dynamic Cone Penetrometer (DCP) test results and estimated CBR

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

Test Number	3FM-RC104	**Date Tested**	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



top / base of layer (mm)	mm/ blow	CBR (%)
375	3.8	75
405		
405	2.3	>100
435		
435	3	95
495		
495	0.3	>100
498		

CBR Range	Min: 75 Max: >100	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; 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		April 2023

CAUSEWAY GEOTECH

APPENDIX G

PAVEMENT CORES

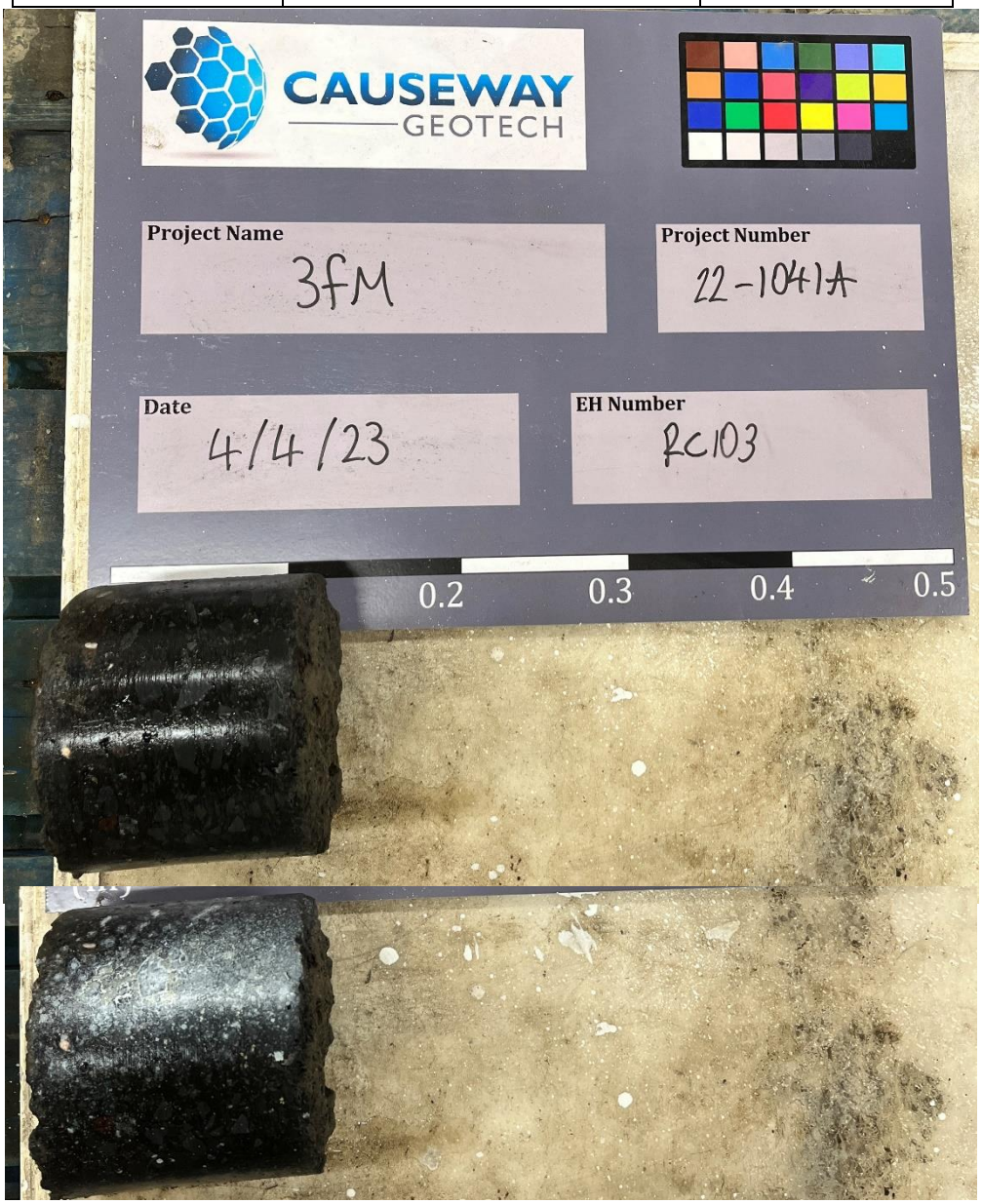
RC101		
Easting	**Northing**	**Elevation**
718186.96	734903.82	3.68mOD

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

RC102		
Easting	**Northing**	**Elevation**
719243.21	733579.44	4.18mOD

Layer	Depth	Thickness (mm)	Description	PAK Spray 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	**Northing**	**Elevation**
719312.88	733516.65	4.08mOD



Layer	Depth	Thickness (mm)	Description	PAK Spray 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

RC104		
Easting	**Northing**	**Elevation**
719365.73	733529.38	3.93mOD

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

CAUSEWAY GEOTECH

APPENDIX H

GEOTECHNICAL LABORATORY TEST RESULTS

HEAD OFFICE
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Registered in Northern Ireland.
Company Number: NI610766

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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.

Stephen Watson

Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd

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 measurement	Standard specifications	No. of results included in 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 sub-contracting 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

Summary of Classification Test Results

Project No.	Project Name
22-1041A	3FM Planning Design GI - Lot A DPC Lands

Hole No.	Sample				Specimen Description	Density bulk / dry Mg/m3		*w* %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
	Ref	Top	Base	Type										
BH101	15	5.00		D	Grey sandy slightly gravelly silty CLAY.			16	37	24 -1pt	17	7		CL
BH101	2	19.50	21.00	C	Grey sandy slightly gravelly silty CLAY.			9.4	62	29	14	15		CL
BH101	4	22.50	24.00	C	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		MH
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		MH
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		CI
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
wi - immersion in water	1pt - single point test	

Date Printed

30/03/2023

Approved By

Stephen Watson

UKAS TESTING

10122

CAUSEWAY GEOTECH

Summary of Classification Test Results

Project No.: 22-1041A

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

Hole No.	Sample Ref	Top	Base	Type	Specimen Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH124	17	5.00		D	Greyish brown sandy slightly gravelly clayey SILT.			81						
BH125	18	4.00		D	Greyish brown sandy slightly gravelly clayey SILT.			89	57	56 -1pt	38	18		MH
BH125	46	25.00		D	Greyish brown sandy slightly gravelly silty CLAY.			25	100	42	22	20		CI
BH130	36	8.00		D	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL.			5.6	17	26 -1pt	15	11		CL
BH131	23	4.00		D	Greyish brown sandy slightly gravelly silty CLAY.			10	17	32 -1pt	23	9		ML/CL
BH131	44	9.50		D	Greyish brown sandy slightly gravelly silty CLAY.			11						

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

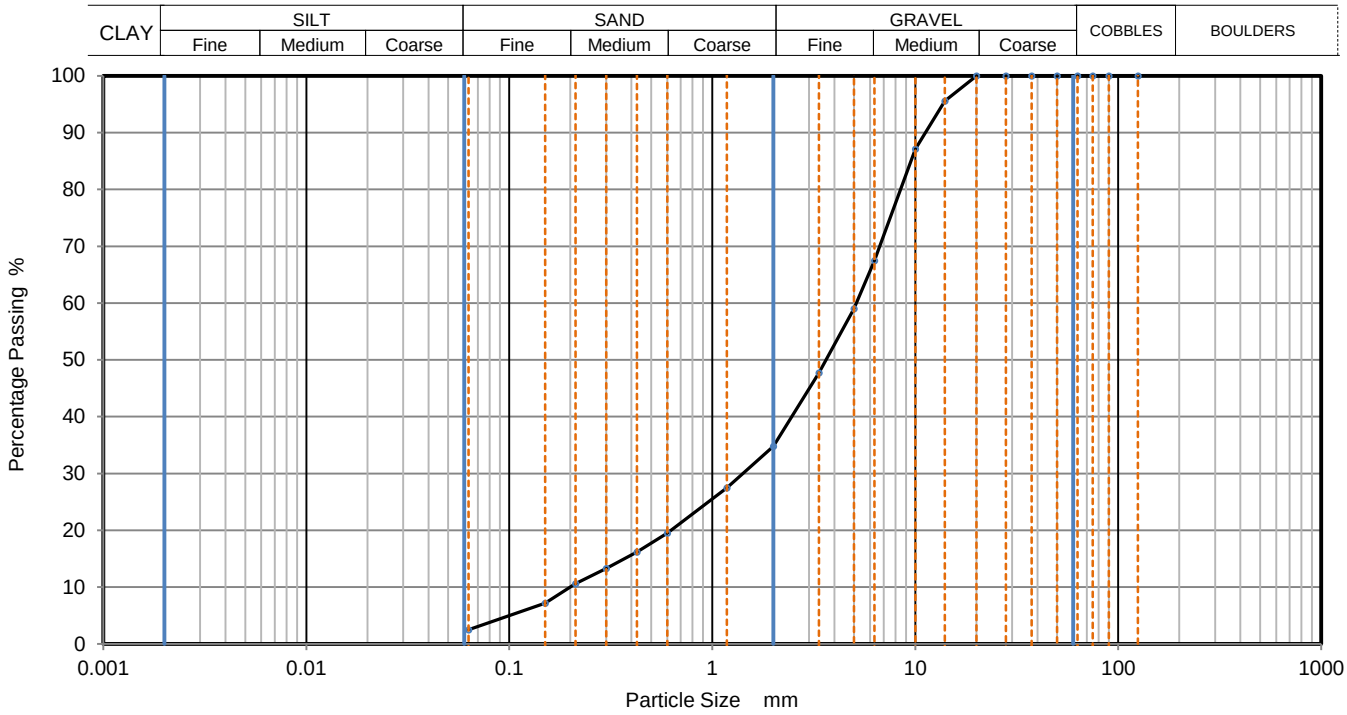
wi - immersion in water | 1pt - single point test

Date Printed: 30/03/2023

Approved By: Stephen Watson

UKAS TESTING 10122

CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION				Job Ref		22-1041A
					Borehole/Pit No.		BH101
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		20
Specimen Description	Grey slightly gravelly slightly silty fine to coarse SAND.				Sample Depth (m)	Top	8.50
						Base	9.50
Specimen Reference	3	Specimen Depth	8.5	m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2				KeyLAB ID		Caus2023030872



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	87		
6.3	68		
5	59		
3.35	48		
2	35		
1.18	28		
0.6	20		
0.425	16		
0.3	13		
0.212	11		
0.15	7		
0.063	3		

Dry Mass of sample, g	509

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	65.2
Sand	32.2
Fines <0.063mm	3.0

Grading Analysis		
D100	mm	
D60	mm	5.14
D30	mm	1.42
D10	mm	0.199
Uniformity Coefficient		26
Curvature Coefficient		2

Remarks

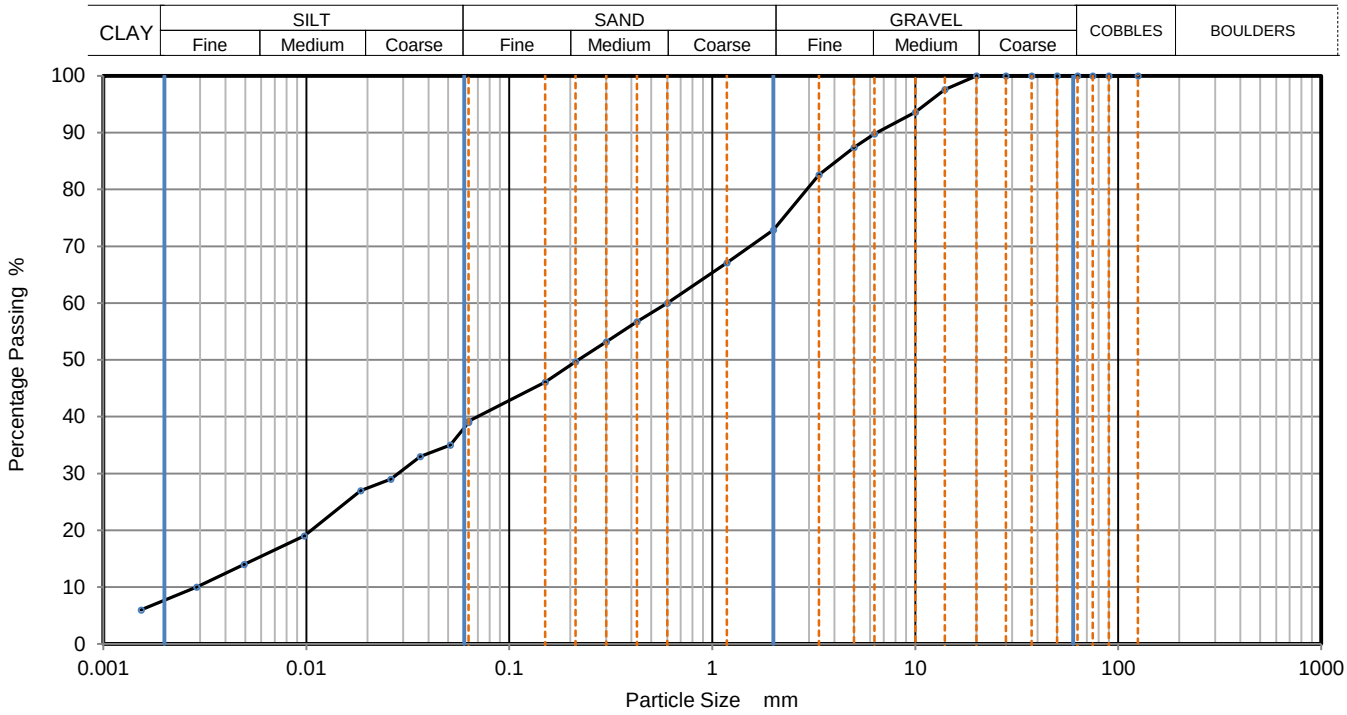
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen Watson

LAB 05R - Version 6

UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**22-1041A**
				Borehole/Pit No.	BH101
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	5
Specimen Description	Grey sandy slightly gravelly silty CLAY.			Sample Depth (m) Top	24.00
				Sample Depth (m) Base	25.50
Specimen Reference	3	Specimen Depth	24 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2023030878



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	39
90	100	0.05121	35
75	100	0.03642	33
63	100	0.02606	29
50	100	0.01853	27
37.5	100	0.00979	19
28	100	0.00495	14
20	100	0.00289	10
14	98	0.00153	6
10	94		
6.3	90		
5	87		
3.35	83		
2	73		
1.18	67		
0.6	60	Particle density	(assumed)
0.425	57	2.65	Mg/m3
0.3	53		
0.212	50		
0.15	46		
0.063	39		

Dry Mass of sample, g	505

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	27.1
Sand	33.7
Silt	31.3
Clay	7.9

Grading Analysis		
D100	mm	
D60	mm	0.601
D30	mm	0.0285
D10	mm	0.00275
Uniformity Coefficient		220
Curvature Coefficient		0.49

Remarks

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UKAS TESTING

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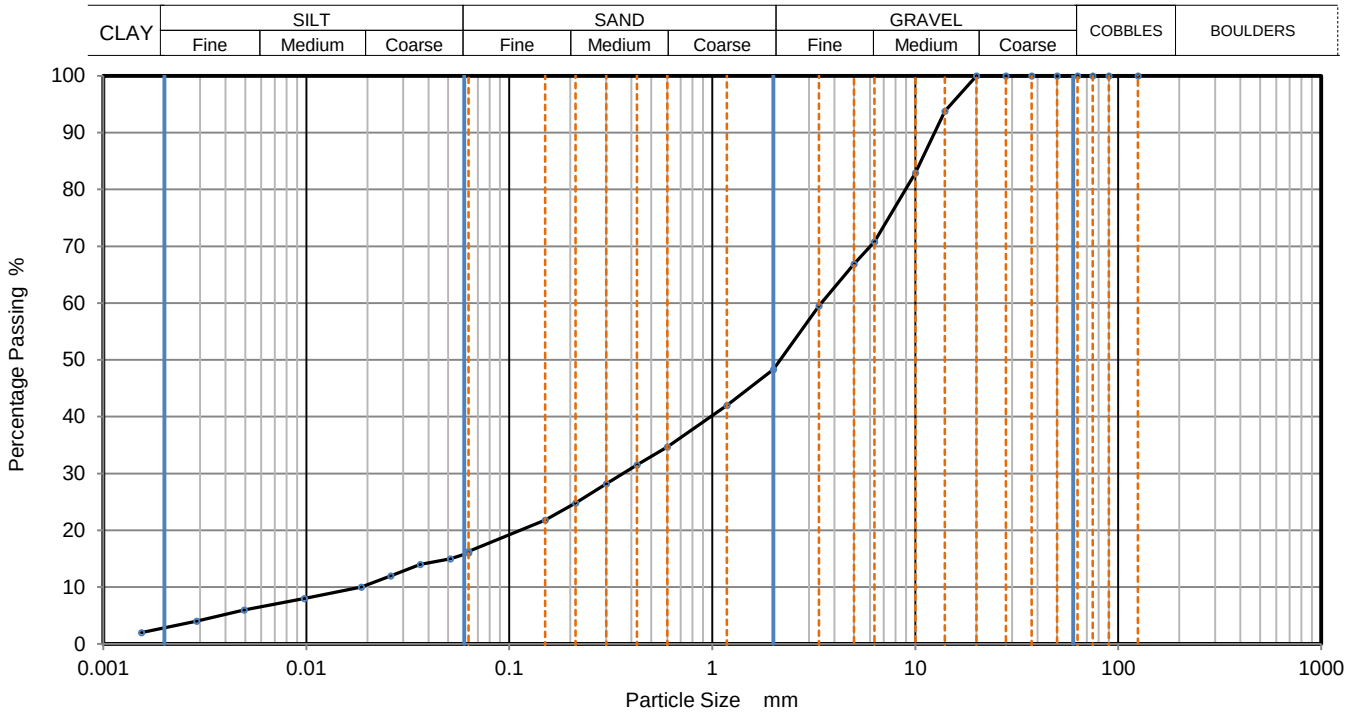
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION				Job Ref		22-1041A
					Borehole/Pit No.		BH102
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		8
Specimen Description	Grey sandy gravelly silty CLAY.				Sample Depth (m)	Top	1.20
						Base	2.00
Specimen Reference	3	Specimen Depth	1.2	m	Sample Type		B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5				KeyLAB ID		Caus2023030880



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	16
90	100	0.05121	15
75	100	0.03642	14
63	100	0.02606	12
50	100	0.01864	10
37.5	100	0.00979	8
28	100	0.00495	6
20	100	0.00289	4
14	94	0.00154	2
10	83		
6.3	71		
5	67		
3.35	60		
2	48		
1.18	42		
0.6	35	Particle density	(assumed)
0.425	32	2.65	Mg/m3
0.3	28		
0.212	25		
0.15	22		
0.063	16		

Dry Mass of sample, g: 502

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	51.7
Sand	32.0
Silt	13.5
Clay	2.8

Grading Analysis		
D100	mm	
D60	mm	3.44
D30	mm	0.363
D10	mm	0.0173
Uniformity Coefficient		200
Curvature Coefficient		2.2

Remarks

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

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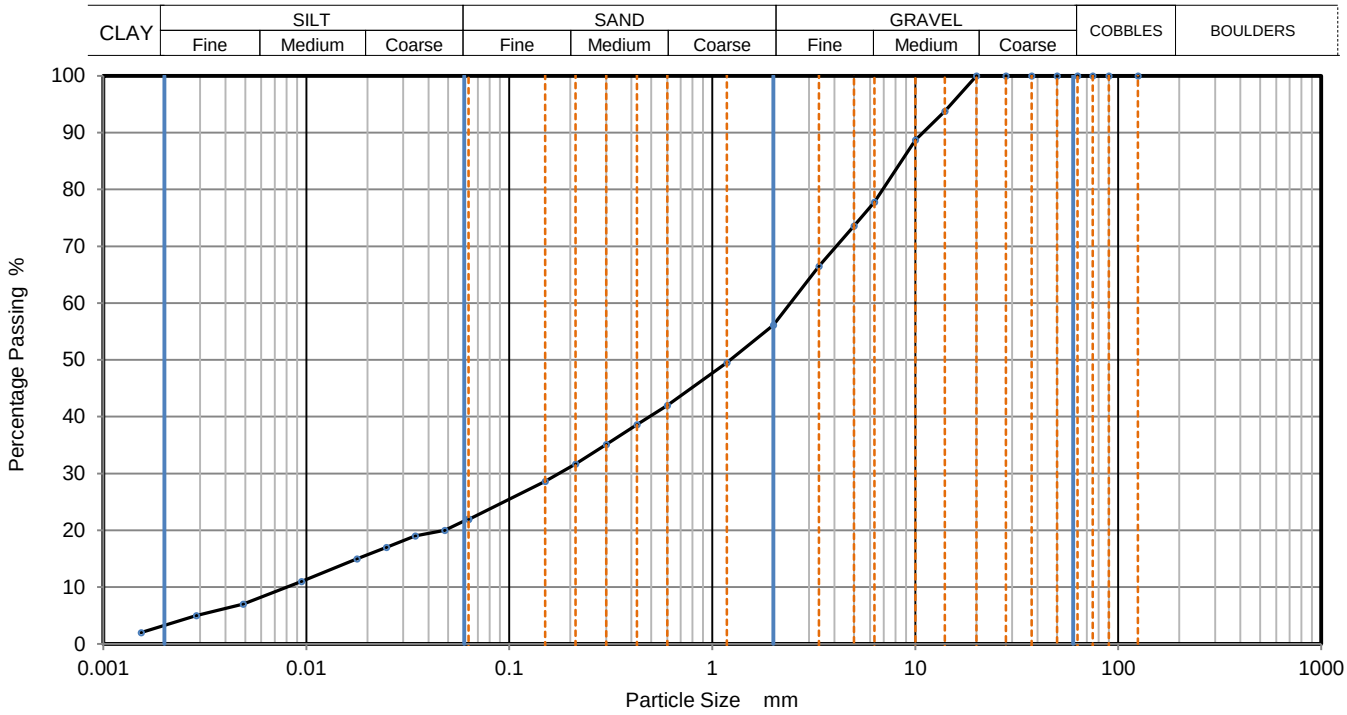
CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**22-1041A**
				Borehole/Pit No.	BH105
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	4
Specimen Description	Grey sandy slightly gravelly silty CLAY.			Sample Depth (m) Top	1.00
				Sample Depth (m) Base	1.00
Specimen Reference	3	Specimen Depth	1 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2023030885



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	22
90	100	0.04803	20
75	100	0.03443	19
63	100	0.02482	17
50	100	0.01778	15
37.5	100	0.00946	11
28	100	0.00489	7
20	100	0.00287	5
14	94	0.00153	2
10	89		
6.3	78		
5	74		
3.35	67		
2	56		
1.18	50		
0.6	42	Particle density	(assumed)
0.425	39	2.65	Mg/m3
0.3	35		
0.212	32		
0.15	29		
0.063	22		

Dry Mass of sample, g	312

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	43.9
Sand	34.2
Silt	18.7
Clay	3.2

Grading Analysis		
D100	mm	
D60	mm	2.43
D30	mm	0.176
D10	mm	0.0078
Uniformity Coefficient		310
Curvature Coefficient		1.6

Remarks

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

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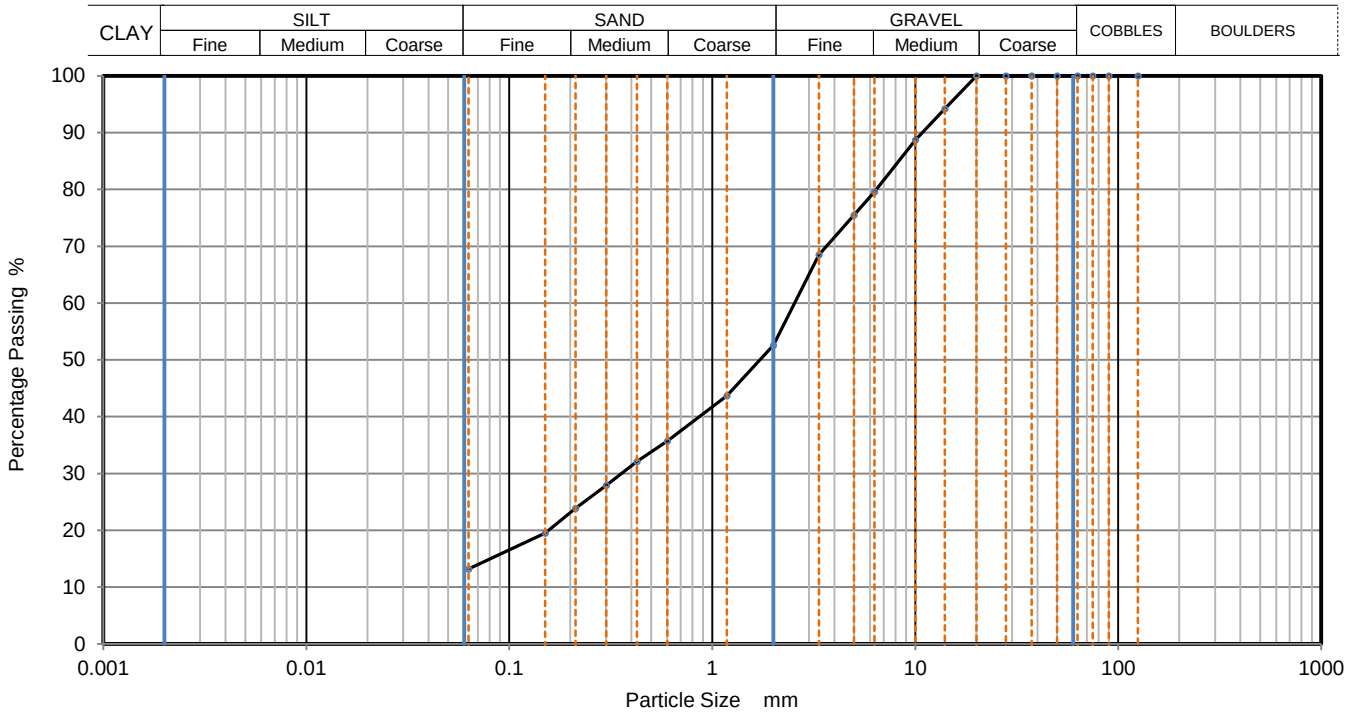
CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**22-1041A**
				Borehole/Pit No.	BH112
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	7
Specimen Description	Greyish brown slightly gravelly slightly silty fine to coarse SAND.			Sample Depth (m) Top	2.00
				Sample Depth (m) Base	4.00
Specimen Reference	3	Specimen Depth	2 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2023030890



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	94		
10	89		
6.3	80		
5	76		
3.35	69		
2	53		
1.18	44		
0.6	36		
0.425	32		
0.3	28		
0.212	24		
0.15	20		
0.063	13		

Dry Mass of sample, g	506

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	47.4
Sand	39.4
Fines <0.063mm	13.0

Grading Analysis		
D100	mm	
D60	mm	2.54
D30	mm	0.356
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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

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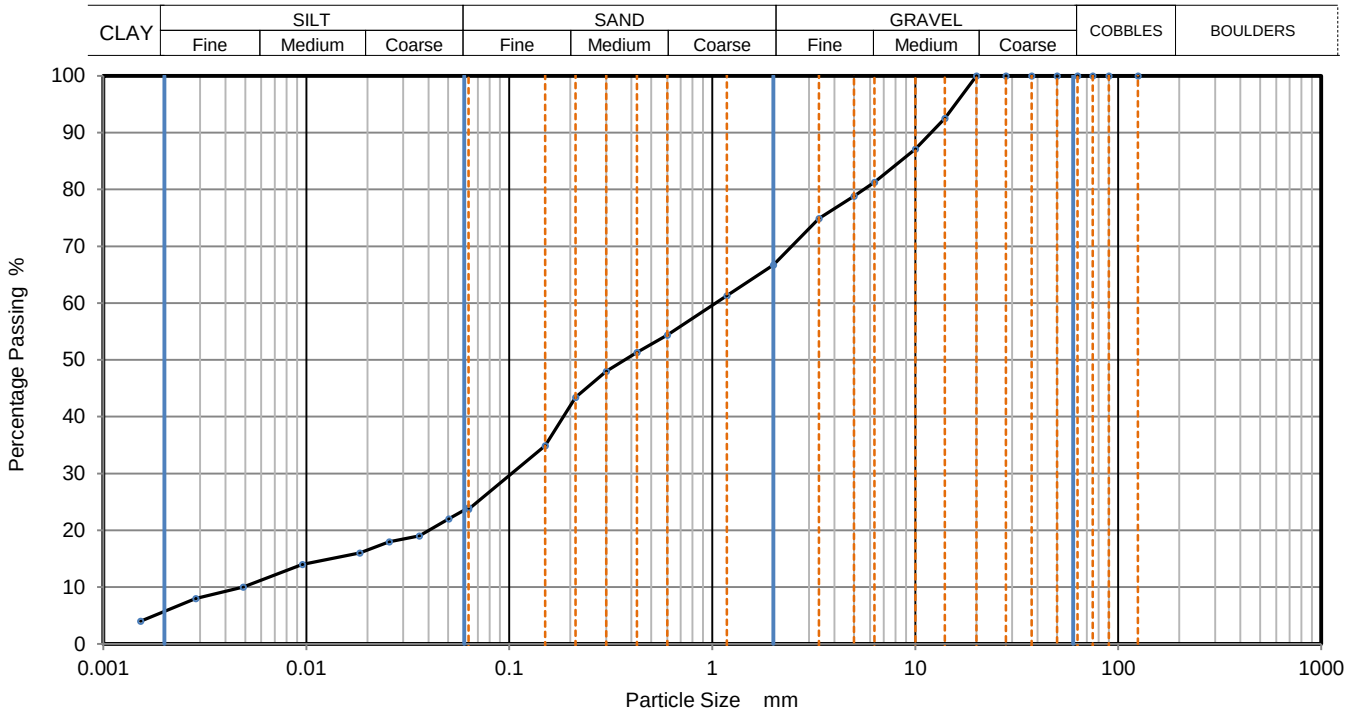
CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**22-1041A**
				Borehole/Pit No.	BH119
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	8
Specimen Description	Grey sandy gravelly silty CLAY.			Sample Depth (m) Top	1.50
				Base	2.50
Specimen Reference	3	Specimen Depth	1.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2023030895



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	24
90	100	0.05028	22
75	100	0.03599	19
63	100	0.02560	18
50	100	0.01832	16
37.5	100	0.00957	14
28	100	0.00489	10
20	100	0.00286	8
14	93	0.00153	4
10	87		
6.3	81		
5	79		
3.35	75		
2	67		
1.18	61		
0.6	54	Particle density	(assumed)
0.425	51	2.65	Mg/m3
0.3	48		
0.212	43		
0.15	35		
0.063	24		

Dry Mass of sample, g	2775

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	33.3
Sand	43.0
Silt	18.0
Clay	5.7

Grading Analysis		
D100	mm	
D60	mm	1.04
D30	mm	0.103
D10	mm	0.00513
Uniformity Coefficient		200
Curvature Coefficient		2

Remarks

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

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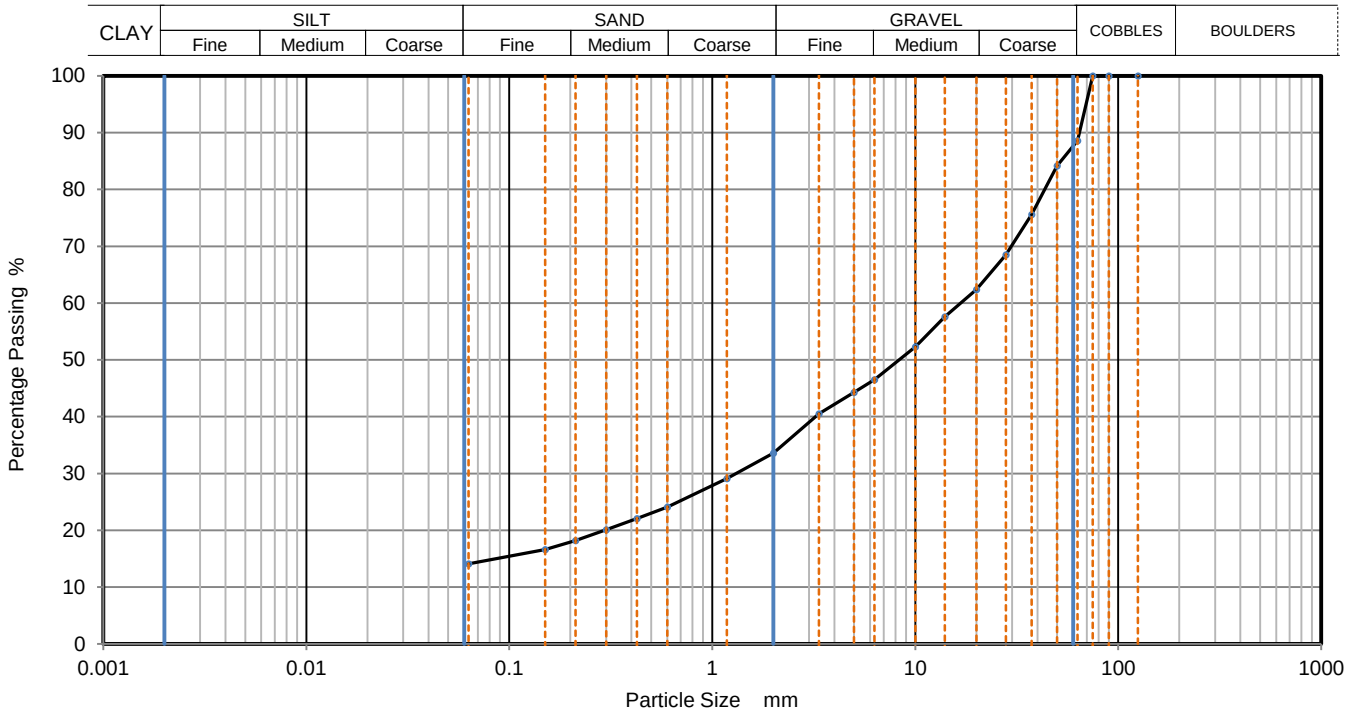
CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**22-1041A**
				Borehole/Pit No.	BH120
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	21
Specimen Description	Greyish brown sandy clayey subangular fine to coarse GRAVEL with some cobbles.			Sample Depth (m) Top	3.50
				Base	4.50
Specimen Reference	3	Specimen Depth	3.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus2023030899



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	89		
50	84		
37.5	76		
28	69		
20	62		
14	58		
10	52		
6.3	47		
5	44		
3.35	41		
2	34		
1.18	29		
0.6	24		
0.425	22		
0.3	20		
0.212	18		
0.15	17		
0.063	14		

Dry Mass of sample, g	9963

Sample Proportions	% dry mass
Cobbles	11.4
Gravel	55.0
Sand	19.5
Fines <0.063mm	14.0

Grading Analysis		
D100	mm	
D60	mm	16.7
D30	mm	1.31
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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

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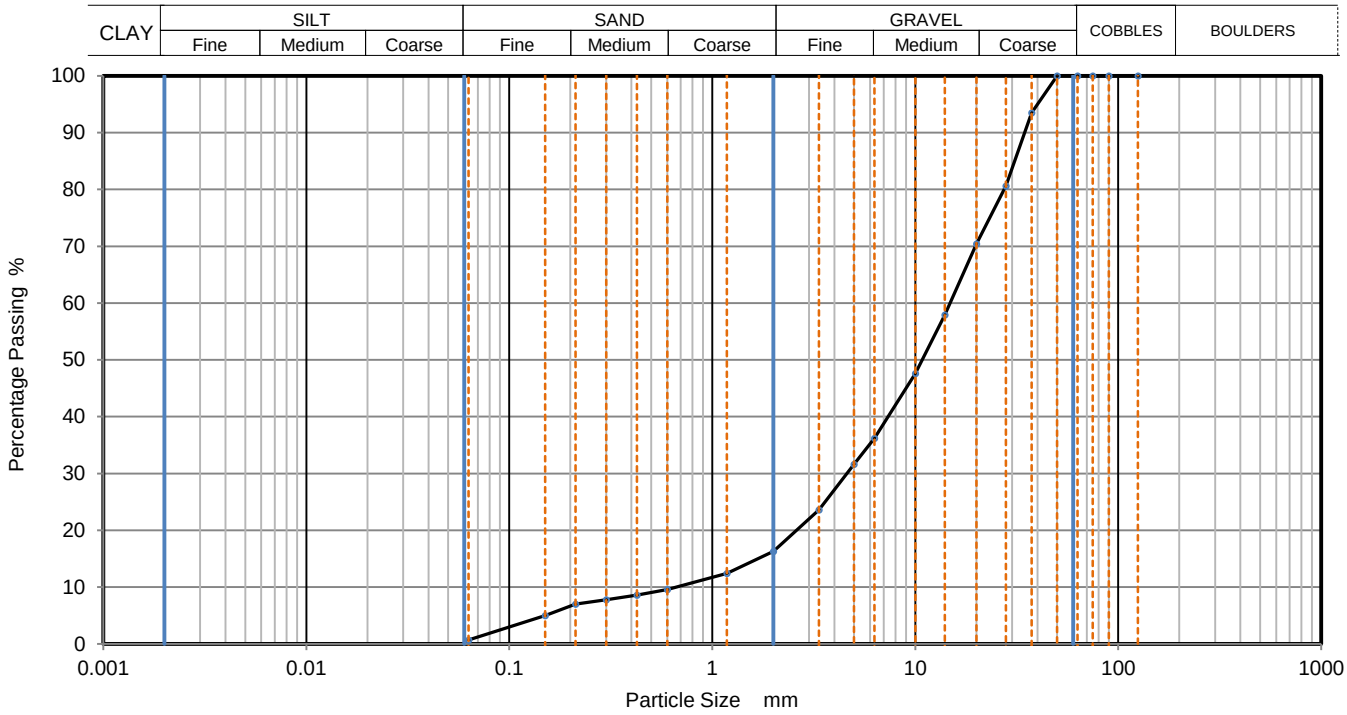
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION				Job Ref		22-1041A
					Borehole/Pit No.		BH120
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		26
Specimen Description	Grey slightly sandy slightly silty subangular fine to coarse GRAVEL.				Sample Depth (m)	Top	6.50
						Base	7.50
Specimen Reference	3	Specimen Depth	6.5	m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2				KeyLAB ID		Caus20230308100



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	94		
28	81		
20	70		
14	58		
10	48		
6.3	36		
5	32		
3.35	24		
2	16		
1.18	12		
0.6	10		
0.425	9		
0.3	8		
0.212	7		
0.15	5		
0.063	1		

Dry Mass of sample, g	4750

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	83.7
Sand	15.6
Fines <0.063mm	1.0

Grading Analysis		
D100	mm	
D60	mm	14.9
D30	mm	4.62
D10	mm	0.654
Uniformity Coefficient		23
Curvature Coefficient		2.2

Remarks

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

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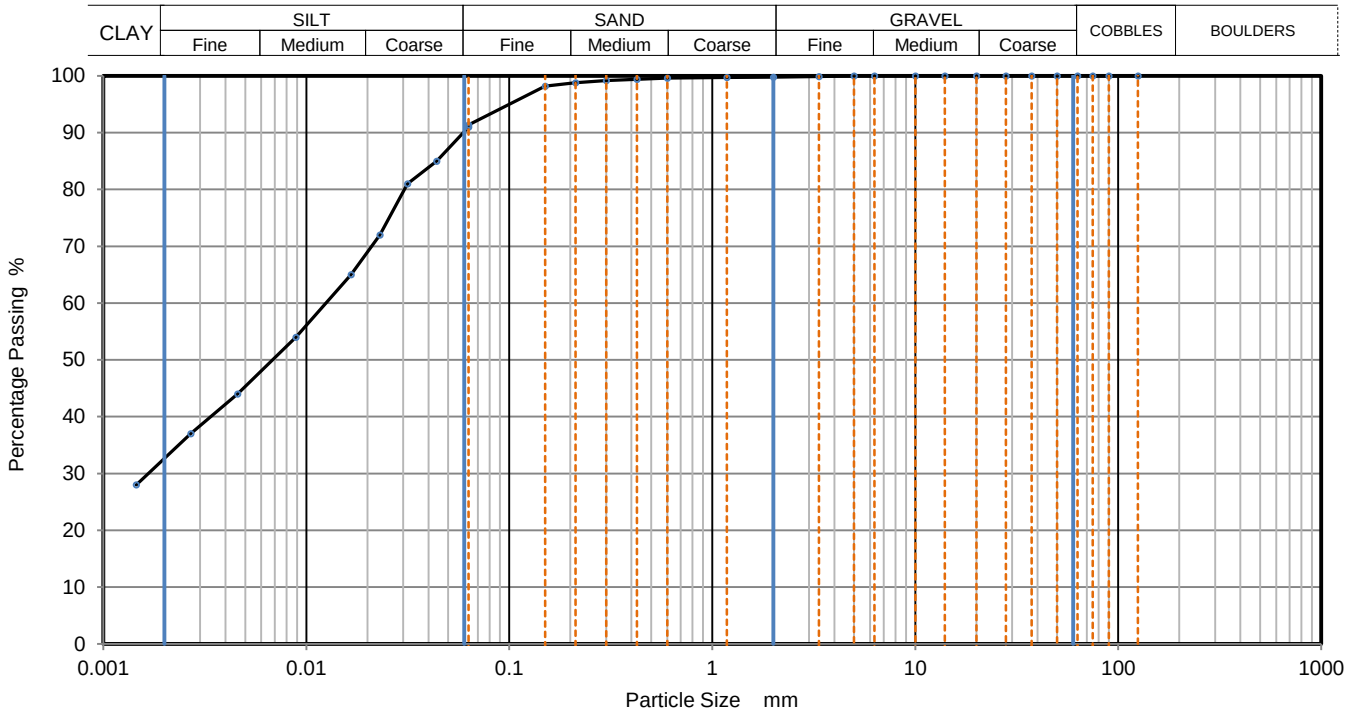
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION			Job Ref		22-1041A
				Borehole/Pit No.		BH120
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.		2
Specimen Description	Grey slightly sandy silty CLAY.			Sample Depth (m)	Top	20.00
					Base	
Specimen Reference	3	Specimen Depth	20 m	Sample Type		C
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID		Caus20230308102



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	91
90	100	0.04393	85
75	100	0.03156	81
63	100	0.02301	72
50	100	0.01663	65
37.5	100	0.00889	54
28	100	0.00459	44
20	100	0.00270	37
14	100	0.00145	28
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density	(assumed)
0.425	99	2.65	Mg/m3
0.3	99		
0.212	99		
0.15	98		
0.063	91		

Dry Mass of sample, g	504

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	0.2
Sand	8.5
Silt	58.5
Clay	32.8

Grading Analysis		
D100	mm	
D60	mm	0.0123
D30	mm	0.00164
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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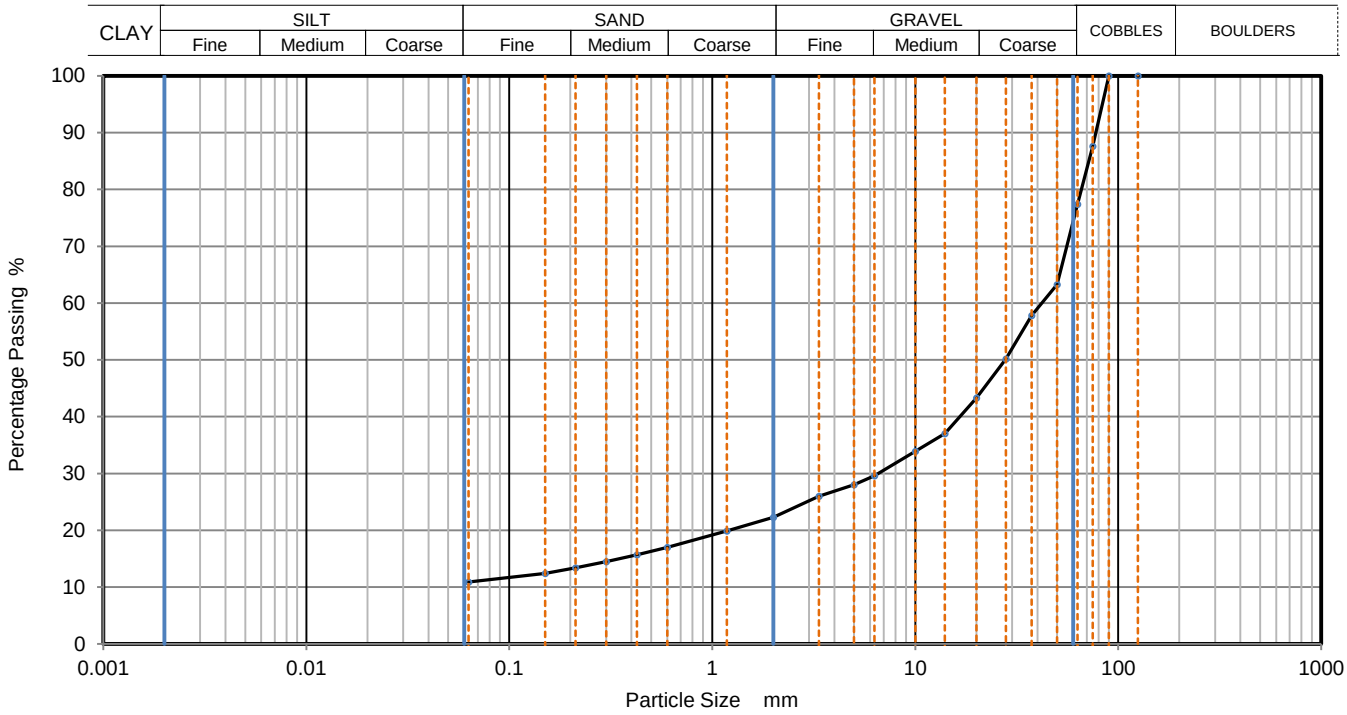
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION			Job Ref		22-1041A
				Borehole/Pit No.		BH121
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.		24
Specimen Description	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL wth cobbles.			Sample Depth (m)	Top	3.00
					Base	4.00
Specimen Reference	3	Specimen Depth	3 m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID		Caus20230308105



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	88		
63	77		
50	63		
37.5	58		
28	50		
20	43		
14	37		
10	34		
6.3	30		
5	28		
3.35	26		
2	22		
1.18	20		
0.6	17		
0.425	16		
0.3	15		
0.212	13		
0.15	12		
0.063	11		

Dry Mass of sample, g	13759

Sample Proportions	% dry mass
Cobbles	22.6
Gravel	55.1
Sand	11.5
Fines <0.063mm	11.0

Grading Analysis		
D100	mm	
D60	mm	42.1
D30	mm	6.55
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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

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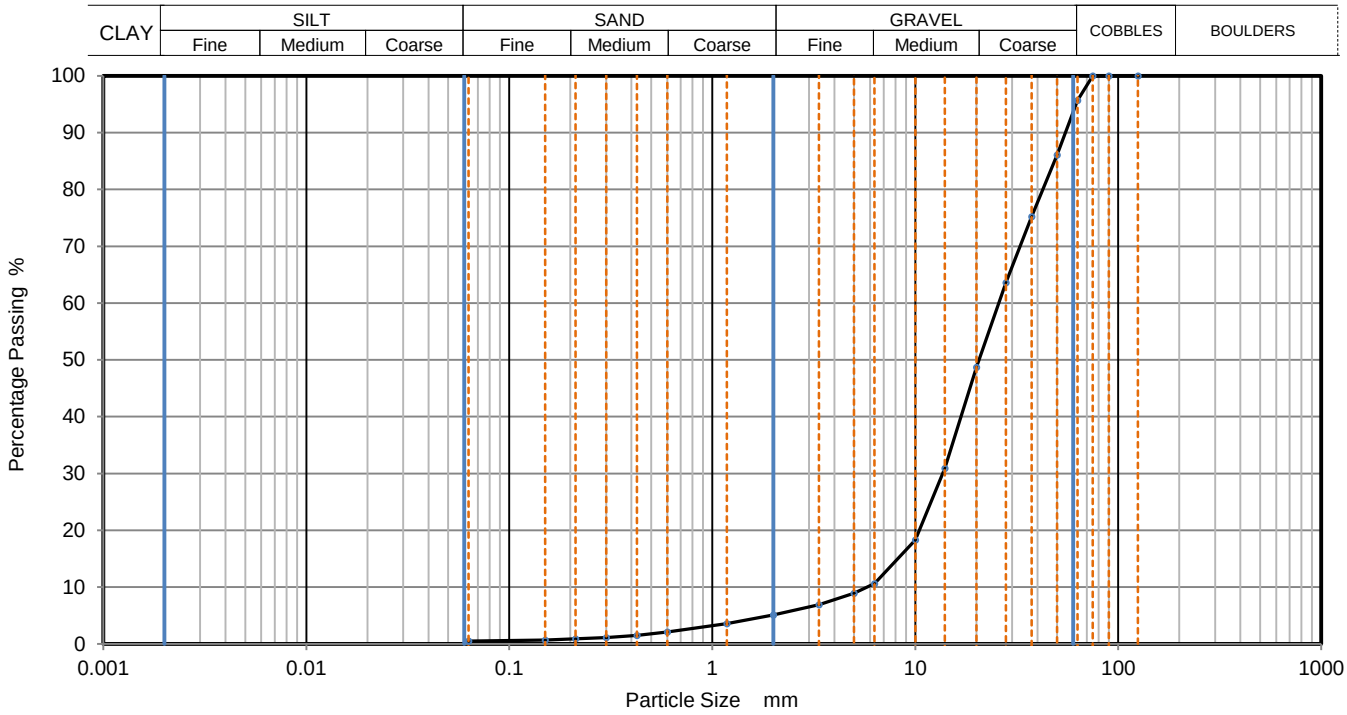
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION				Job Ref		22-1041A
					Borehole/Pit No.		BH121
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		43
Specimen Description	Greyish brown slightly sandy subangular fine to coarse GRAVEL.				Sample Depth (m)	Top	14.00
						Base	15.00
Specimen Reference	3	Specimen Depth	14	m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2				KeyLAB ID		Caus20230308108



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	96		
50	86		
37.5	75		
28	64		
20	49		
14	31		
10	18		
6.3	11		
5	9		
3.35	7		
2	5		
1.18	4		
0.6	2		
0.425	2		
0.3	1		
0.212	1		
0.15	1		
0.063	1		

Dry Mass of sample, g	16754

Sample Proportions	% dry mass
Cobbles	4.3
Gravel	90.6
Sand	4.6
Fines <0.063mm	0.0

Grading Analysis		
D100	mm	
D60	mm	25.8
D30	mm	13.7
D10	mm	5.8
Uniformity Coefficient		4.5
Curvature Coefficient		1.2

Remarks

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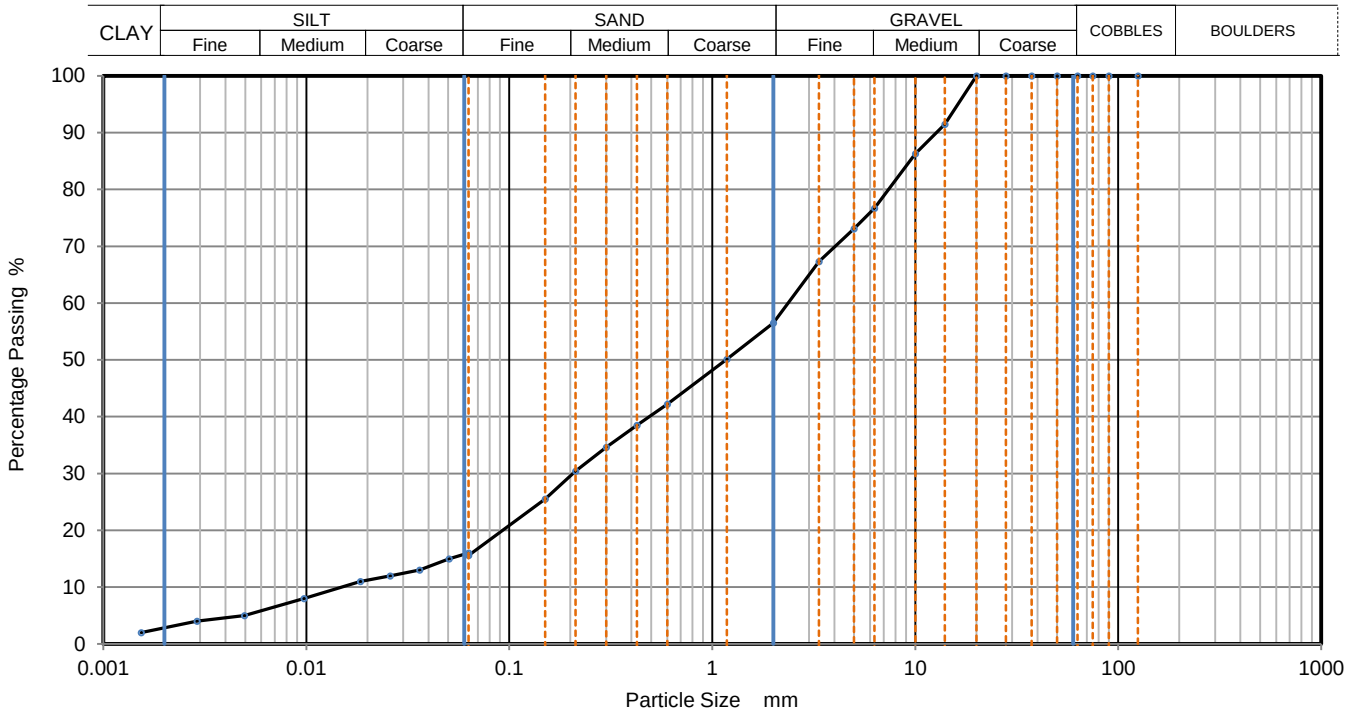
UKAS TESTING 10122

CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION			Job Ref		22-1041A
				Borehole/Pit No.		BH122
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.		6
Specimen Description	Greyish brown sandy slightly gravelly silty CLAY.			Sample Depth (m)	Top	2.00
					Base	3.00
Specimen Reference	3	Specimen Depth	2 m	Sample Type		B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID		Caus20230308115



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	16
90	100	0.05058	15
75	100	0.03621	13
63	100	0.02592	12
50	100	0.01844	11
37.5	100	0.00975	8
28	100	0.00495	5
20	100	0.00289	4
14	92	0.00154	2
10	86		
6.3	77		
5	73		
3.35	67		
2	57		
1.18	50		
0.6	42	Particle density	(assumed)
0.425	39	2.65	Mg/m3
0.3	35		
0.212	30		
0.15	26		
0.063	16		

Dry Mass of sample, g: 502

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	43.5
Sand	40.9
Silt	12.6
Clay	3.0

Grading Analysis		
D100	mm	
D60	mm	2.36
D30	mm	0.206
D10	mm	0.0153
Uniformity Coefficient		150
Curvature Coefficient		1.2

Remarks

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

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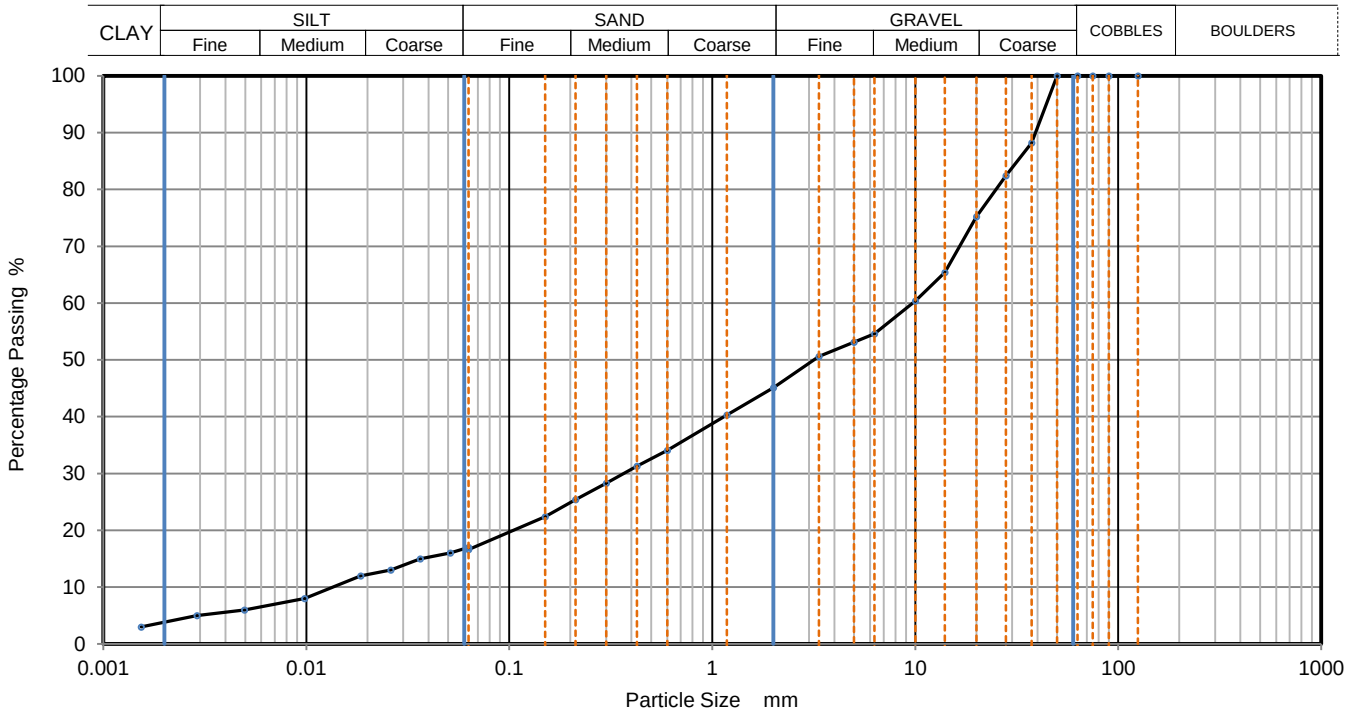
UKAS TESTING 10122

CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION				Job Ref		22-1041A
					Borehole/Pit No.		BH124
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		5
Specimen Description	Greyish brown sandy gravelly silty CLAY.				Sample Depth (m)	Top	1.80
						Base	2.00
Specimen Reference	3	Specimen Depth	1.8	m	Sample Type		B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5				KeyLAB ID		Caus20230308129



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	17
90	100	0.05122	16
75	100	0.03644	15
63	100	0.02608	13
50	100	0.01855	12
37.5	88	0.00980	8
28	82	0.00495	6
20	75	0.00289	5
14	65	0.00154	3
10	60		
6.3	55		
5	53		
3.35	51		
2	45		
1.18	40		
0.6	34	Particle density	(assumed)
0.425	31	2.65	Mg/m3
0.3	28		
0.212	25		
0.15	22		
0.063	17		

Dry Mass of sample, g: 2797

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	54.9
Sand	28.5
Silt	13.1
Clay	3.5

Grading Analysis		
D100	mm	
D60	mm	9.66
D30	mm	0.366
D10	mm	0.0131
Uniformity Coefficient		730
Curvature Coefficient		1.1

Remarks

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

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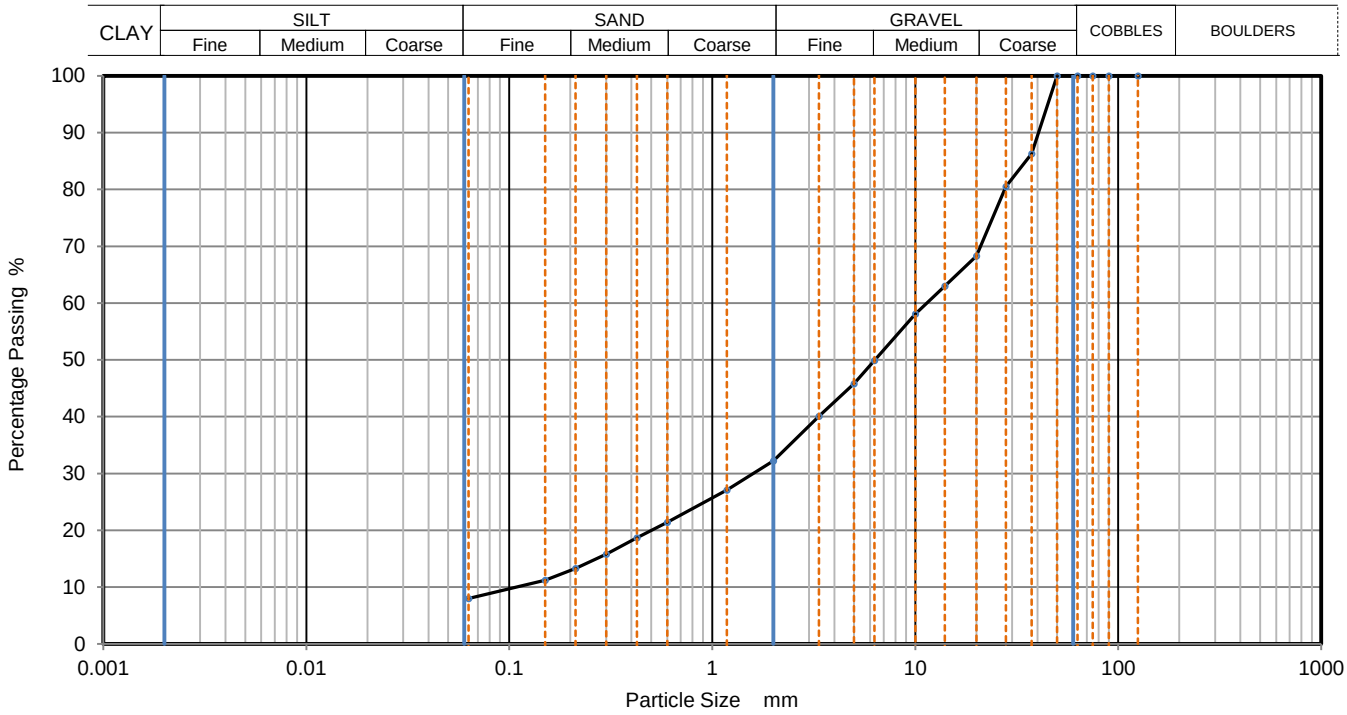
UKAS TESTING 10122

CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**22-1041A**
				Borehole/Pit No.	BH127
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	9
Specimen Description	Greyish brown gravelly silty fine to coarse SAND.			Sample Depth (m) Top	2.00
				Sample Depth (m) Base	
Specimen Reference	3	Specimen Depth	2 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus20230308141



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	86		
28	81		
20	68		
14	63		
10	58		
6.3	50		
5	46		
3.35	40		
2	32		
1.18	27		
0.6	21		
0.425	19		
0.3	16		
0.212	13		
0.15	11		
0.063	8		

Dry Mass of sample, g	1317

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	67.8
Sand	24.1
Fines <0.063mm	8.0

Grading Analysis		
D100	mm	
D60	mm	11.4
D30	mm	1.59
D10	mm	0.107
Uniformity Coefficient		110
Curvature Coefficient		2.1

Remarks

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

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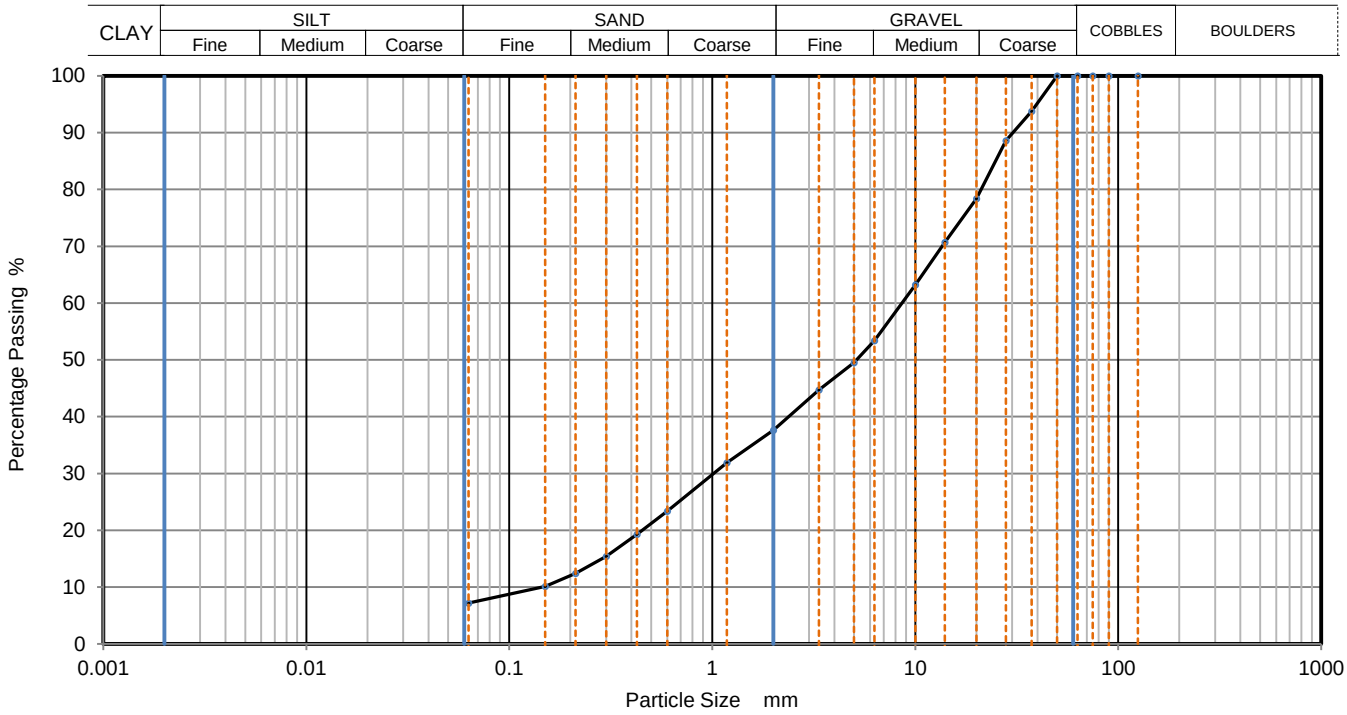
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION				Job Ref		22-1041A
					Borehole/Pit No.		BH128
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		4
Specimen Description	Greyish brown gravelly silty fine to coarse SAND.				Sample Depth (m)	Top	1.00
						Base	1.00
Specimen Reference	3	Specimen Depth	1	m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2				KeyLAB ID		Caus20230308142



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	94		
28	89		
20	78		
14	71		
10	63		
6.3	53		
5	50		
3.35	45		
2	38		
1.18	32		
0.6	23		
0.425	19		
0.3	15		
0.212	12		
0.15	10		
0.063	7		

Dry Mass of sample, g	2919

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	62.4
Sand	30.4
Fines <0.063mm	7.0

Grading Analysis		
D100	mm	
D60	mm	8.62
D30	mm	1.01
D10	mm	0.144
Uniformity Coefficient		60
Curvature Coefficient		0.83

Remarks

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

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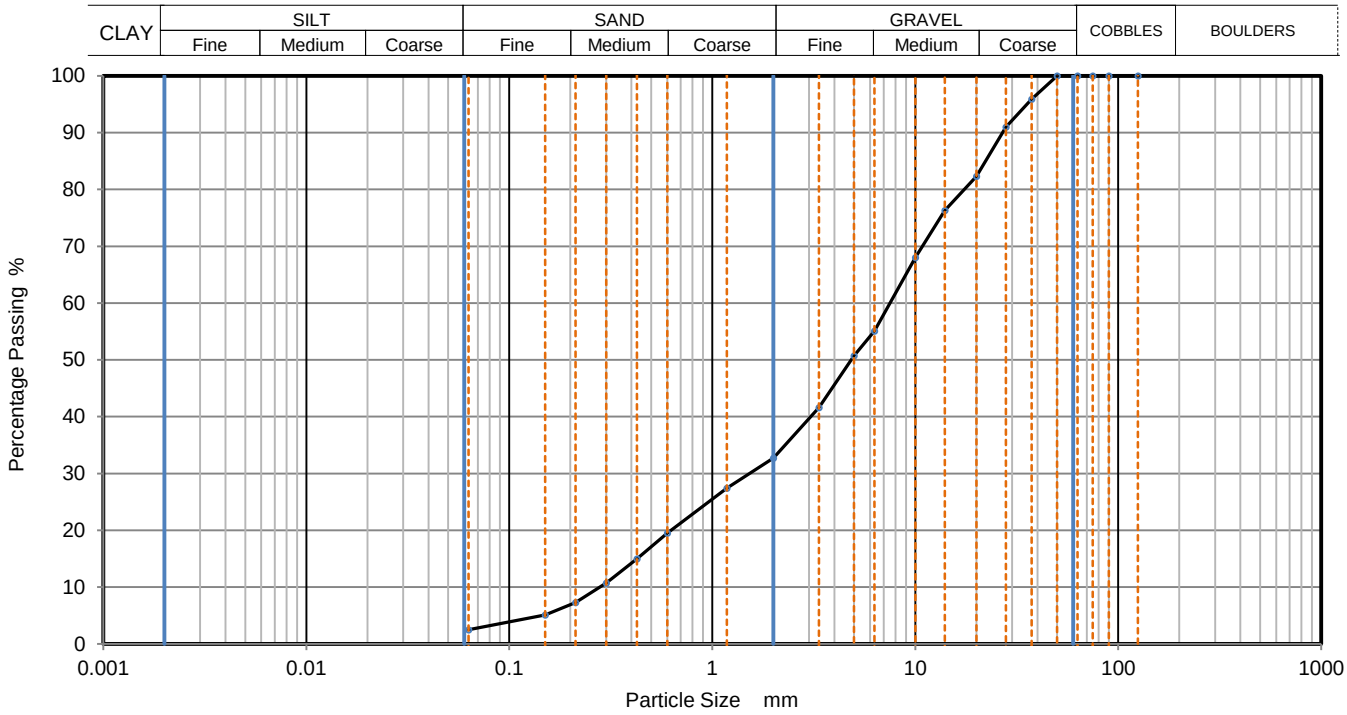
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION				Job Ref		22-1041A
					Borehole/Pit No.		BH130
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		37
Specimen Description	Greyish brown gravelly fine to coarse SAND.				Sample Depth (m)	Top	8.50
						Base	9.50
Specimen Reference	3	Specimen Depth	8.5	m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2				KeyLAB ID		Caus20230308146



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	96		
28	91		
20	82		
14	76		
10	68		
6.3	55		
5	51		
3.35	42		
2	33		
1.18	27		
0.6	20		
0.425	15		
0.3	11		
0.212	7		
0.15	5		
0.063	3		

Dry Mass of sample, g	3100

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	67.3
Sand	30.2
Fines <0.063mm	3.0

Grading Analysis		
D100	mm	
D60	mm	7.5
D30	mm	1.53
D10	mm	0.28
Uniformity Coefficient		27
Curvature Coefficient		1.1

Remarks

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

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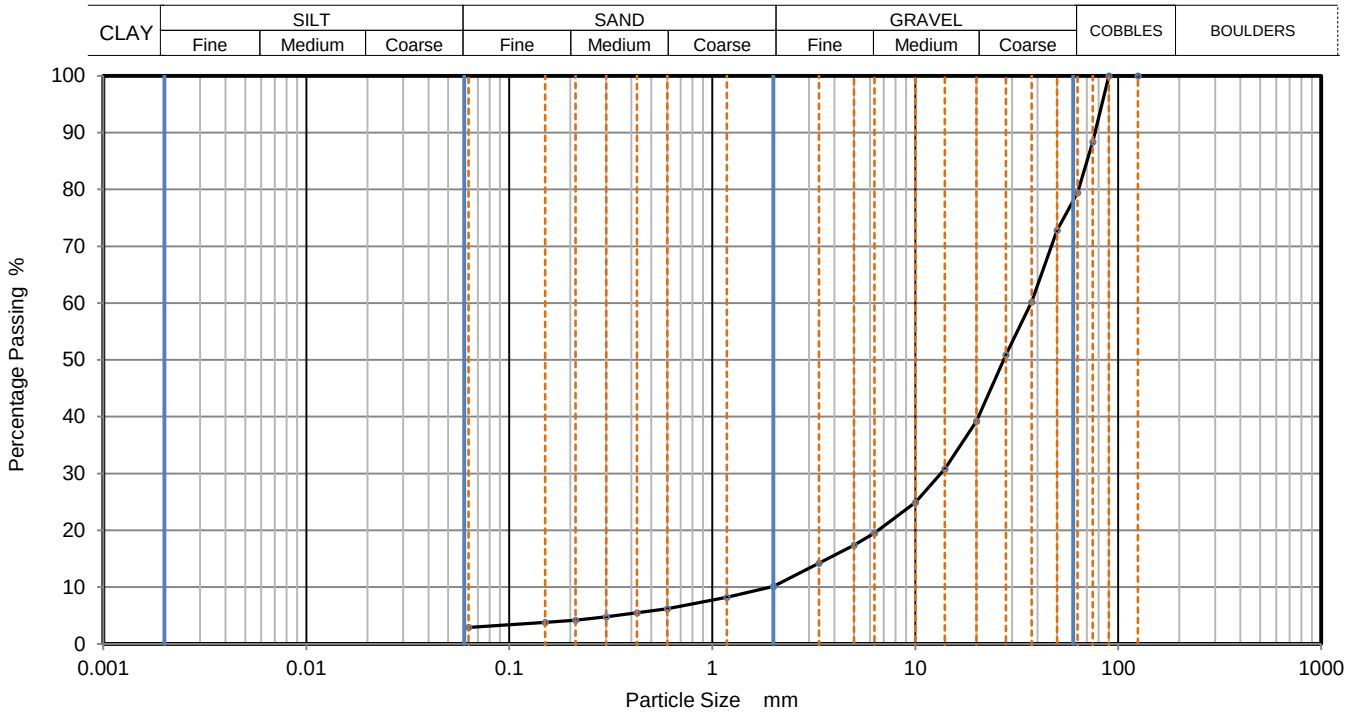
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION			Job Ref		22-1041A
				Borehole/Pit No.		BH130
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.		55
Specimen Description	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL with cobbles.			Sample Depth (m)	Top	13.00
					Base	14.00
Specimen Reference	3	Specimen Depth	13 m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID		Caus20230308148



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	88		
63	79		
50	73		
37.5	60		
28	51		
20	39		
14	31		
10	25		
6.3	20		
5	17		
3.35	14		
2	10		
1.18	8		
0.6	6		
0.425	6		
0.3	5		
0.212	4		
0.15	4		
0.063	3		

Dry Mass of sample, g: 14788

Sample Proportions	% dry mass
Cobbles	20.6
Gravel	69.3
Sand	7.3
Fines <0.063mm	3.0

Grading Analysis		
D100	mm	
D60	mm	37.3
D30	mm	13.4
D10	mm	1.94
Uniformity Coefficient		19
Curvature Coefficient		2.5

Remarks

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

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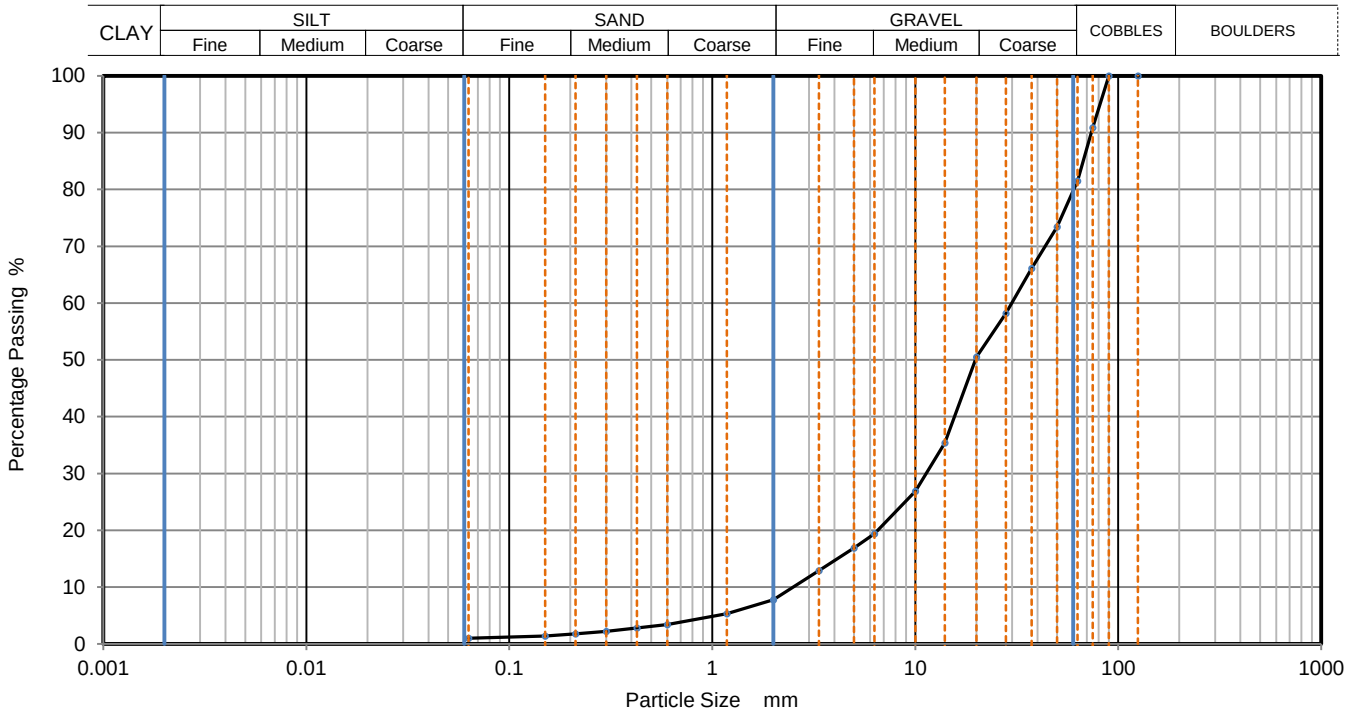
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION			Job Ref		22-1041A
				Borehole/Pit No.		BH131
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.		21
Specimen Description	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL with cobbles.			Sample Depth (m)	Top	3.00
					Base	4.00
Specimen Reference	3	Specimen Depth	3 m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID		Caus20230308152



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	91		
63	82		
50	73		
37.5	66		
28	58		
20	51		
14	35		
10	27		
6.3	19		
5	17		
3.35	13		
2	8		
1.18	5		
0.6	3		
0.425	3		
0.3	2		
0.212	2		
0.15	1		
0.063	1		

Dry Mass of sample, g	13551

Sample Proportions	% dry mass
Cobbles	18.5
Gravel	73.7
Sand	6.8
Fines <0.063mm	1.0

Grading Analysis		
D100	mm	
D60	mm	29.9
D30	mm	11.3
D10	mm	2.5
Uniformity Coefficient		12
Curvature Coefficient		1.7

Remarks

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

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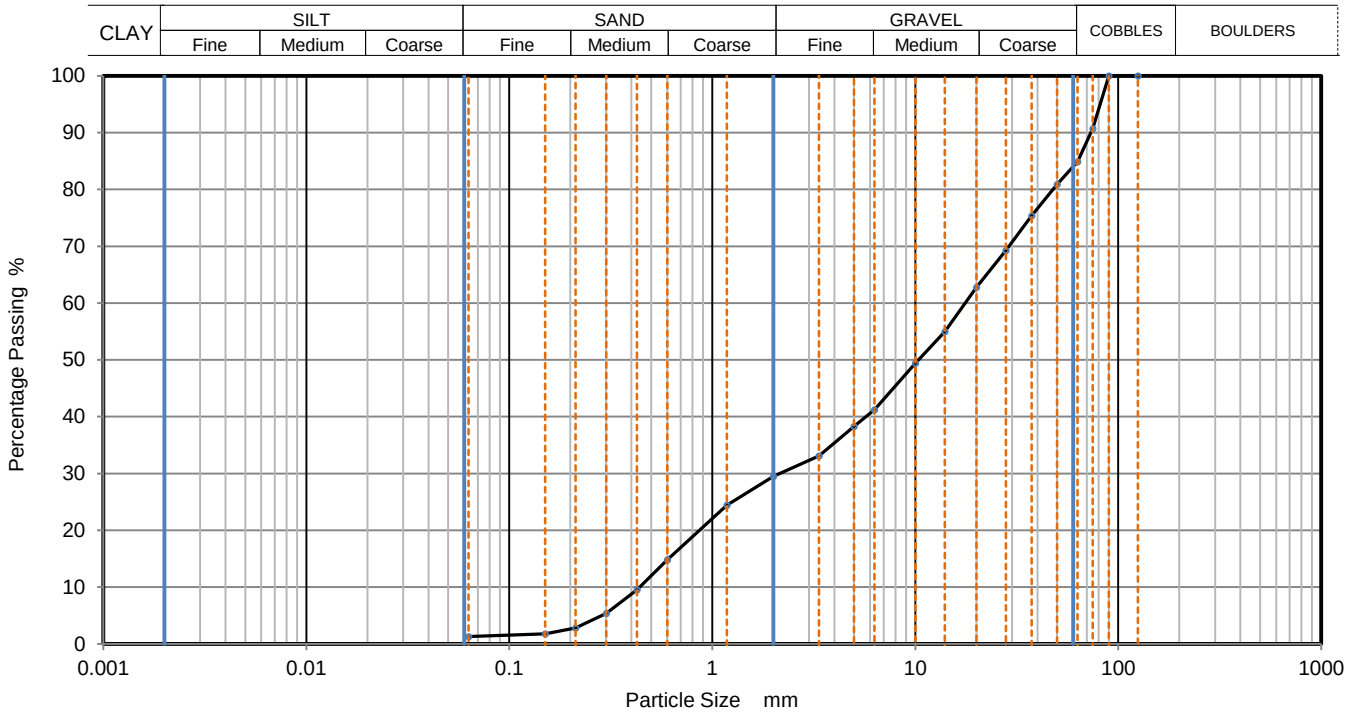
CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**22-1041A**
				Borehole/Pit No.	BH131
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	47
Specimen Description	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL with cobbles.			Sample Depth (m) Top	11.50
				Base	12.50
Specimen Reference	3	Specimen Depth	11.5 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus20230308155



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	91		
63	85		
50	81		
37.5	75		
28	69		
20	63		
14	55		
10	49		
6.3	41		
5	38		
3.35	33		
2	30		
1.18	24		
0.6	15		
0.425	10		
0.3	5		
0.212	3		
0.15	2		
0.063	1		

Dry Mass of sample, g	9141

Sample Proportions	% dry mass
Cobbles	15.1
Gravel	55.4
Sand	28.2
Fines <0.063mm	1.0

Grading Analysis		
D100	mm	
D60	mm	17.6
D30	mm	2.14
D10	mm	0.44
Uniformity Coefficient		40
Curvature Coefficient		0.59

Remarks

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

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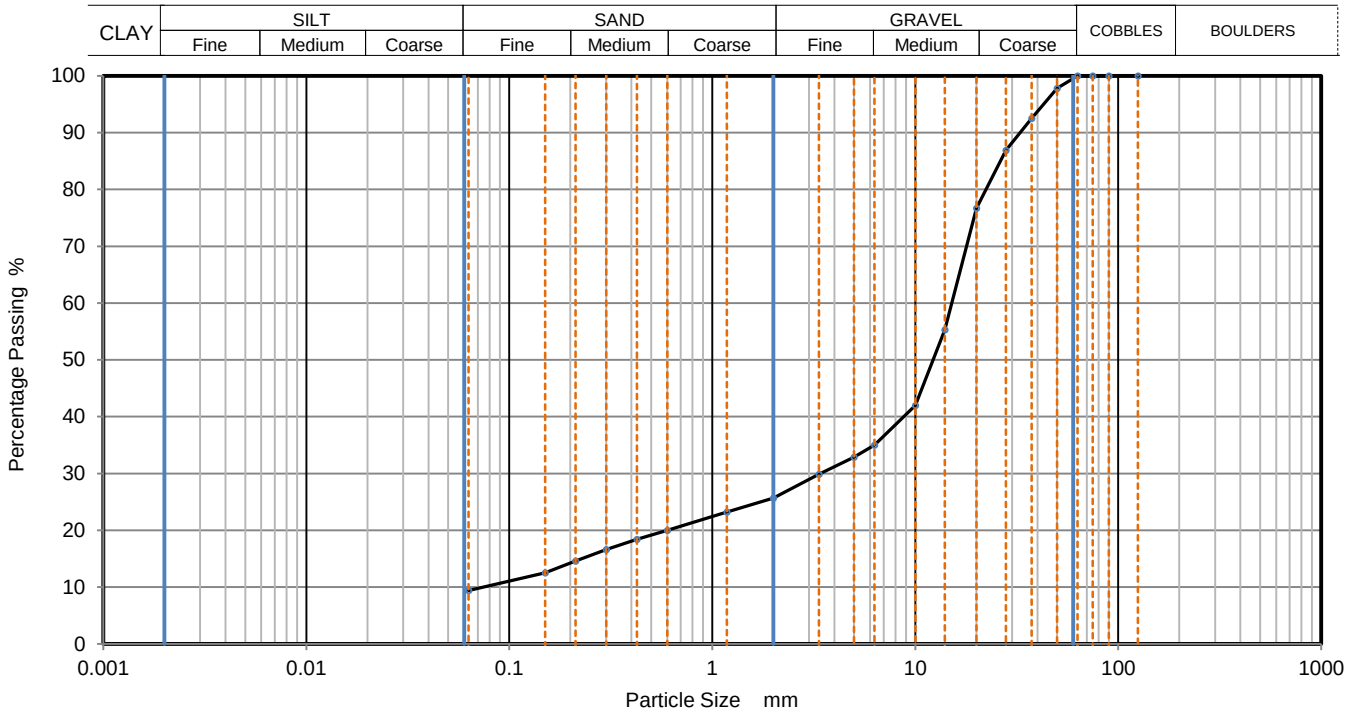
CAUSEWAY GEOTECH	PARTICLE SIZE DISTRIBUTION				Job Ref		22-1041A
					Borehole/Pit No.		ST102
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		5
Specimen Description	Dark brownish grey very gravelly very silty fine to coarse SAND.				Sample Depth (m)	Top	1.00
						Base	1.00
Specimen Reference	3	Specimen Depth	1	m	Sample Type		B
Test Method	BS1377:Part 2:1990, clause 9.2				KeyLAB ID		Caus20230308159



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	98		
37.5	93		
28	87		
20	77		
14	55		
10	42		
6.3	35		
5	33		
3.35	30		
2	26		
1.18	23		
0.6	20		
0.425	18		
0.3	17		
0.212	15		
0.15	13		
0.063	9		

Dry Mass of sample, g	7083

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	74.3
Sand	16.2
Fines <0.063mm	9.0

Grading Analysis		
D100	mm	
D60	mm	15.1
D30	mm	3.38
D10	mm	0.0739
Uniformity Coefficient		200
Curvature Coefficient		10

Remarks

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

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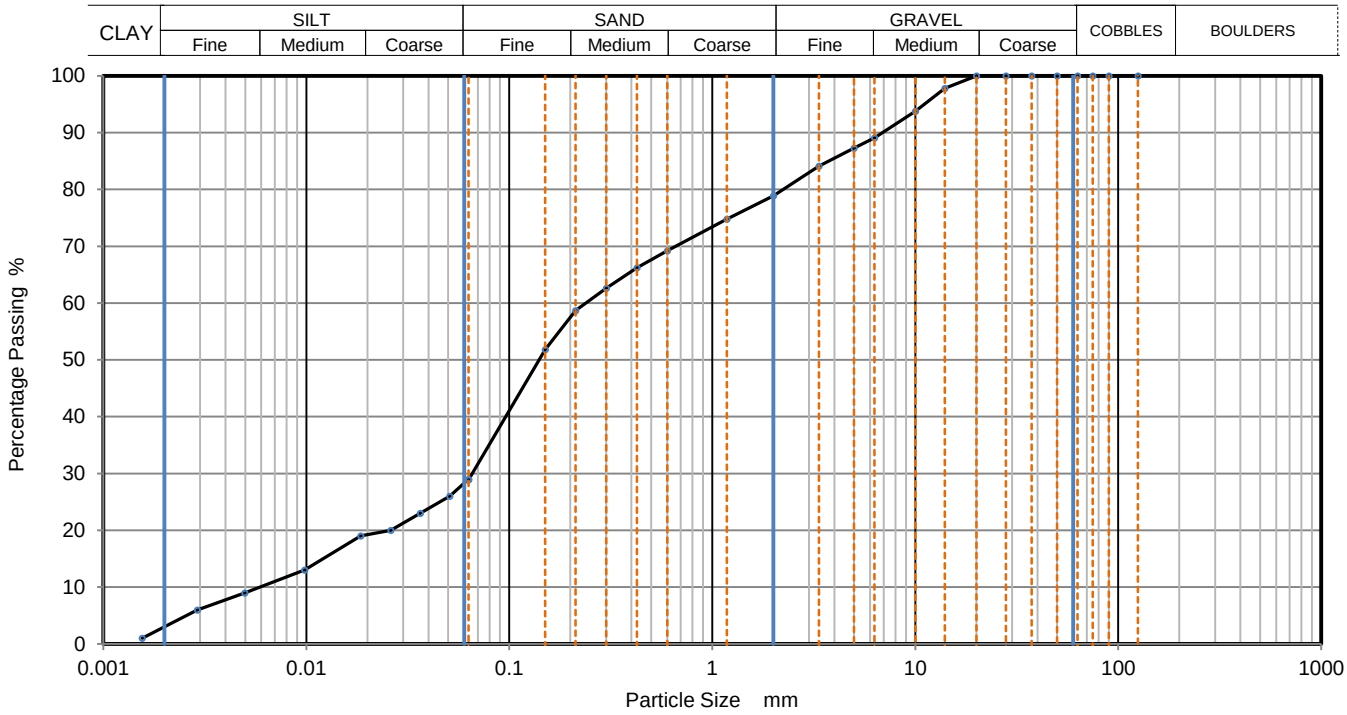
CAUSEWAY GEOTECH	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**22-1041A**
				Borehole/Pit No.	ST104
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	4
Specimen Description	Greyish brown slightly gravelly silty fine to coarse SAND.			Sample Depth (m) Top	1.00
				Sample Depth (m) Base	1.00
Specimen Reference	3	Specimen Depth	1 m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus20230308161



Sieving		Sedimentation	
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		

Dry Mass of sample, g	502

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

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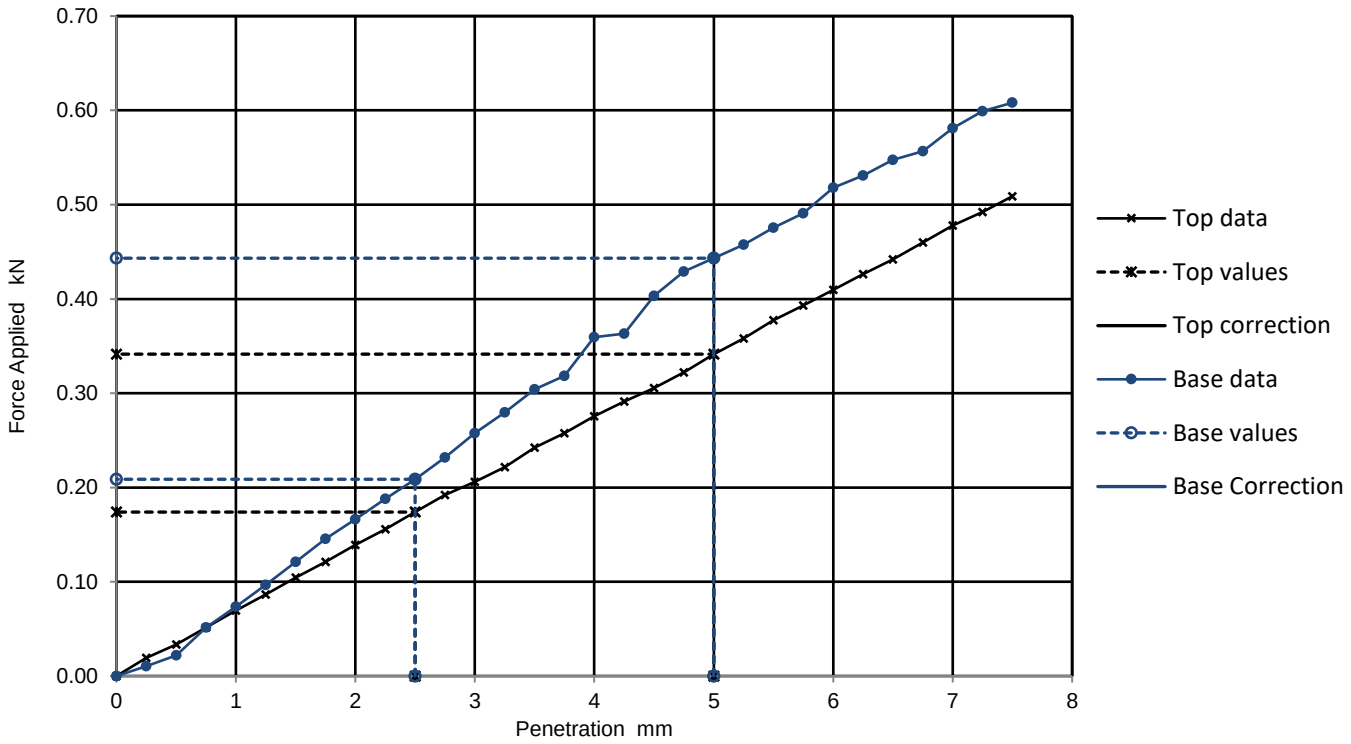
CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	22-1041A
				Borehole/Pit No.	BH102
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	3
Soil Description	Brown gravelly clayey fine to coarse SAND.			Depth m	0.30
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown gravelly clayey fine to coarse SAND.			KeyLAB ID	Caus2023030879
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		26	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.10	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.81	Mg/m3		3	kPa
	Moisture content	16	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	1.3	1.7	1.7		16
BASE	No	1.6	2.2	2.2		17

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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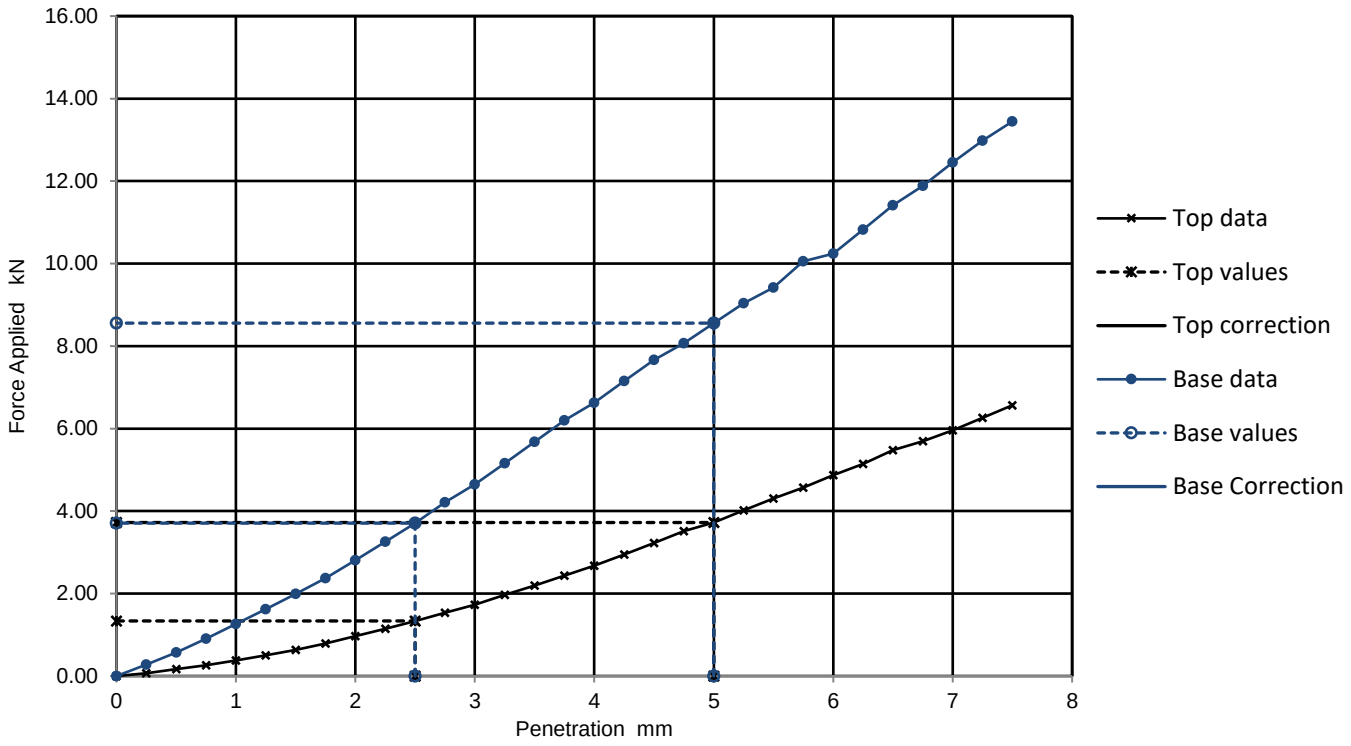
CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	22-1041A
				Borehole/Pit No.	BH103
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	3
Soil Description	Brown gravelly clayey fine to coarse SAND.			Depth m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown gravelly clayey fine to coarse SAND.			KeyLAB ID	Caus2023030881
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		22	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.33	Mg/m3	Surcharge applied	4.5	kg
	Dry density	2.12	Mg/m3		3	kPa
	Moisture content	9.9	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	10.0	19.0	19.0		9.9
BASE	No	28.0	43.0	43.0		9.5

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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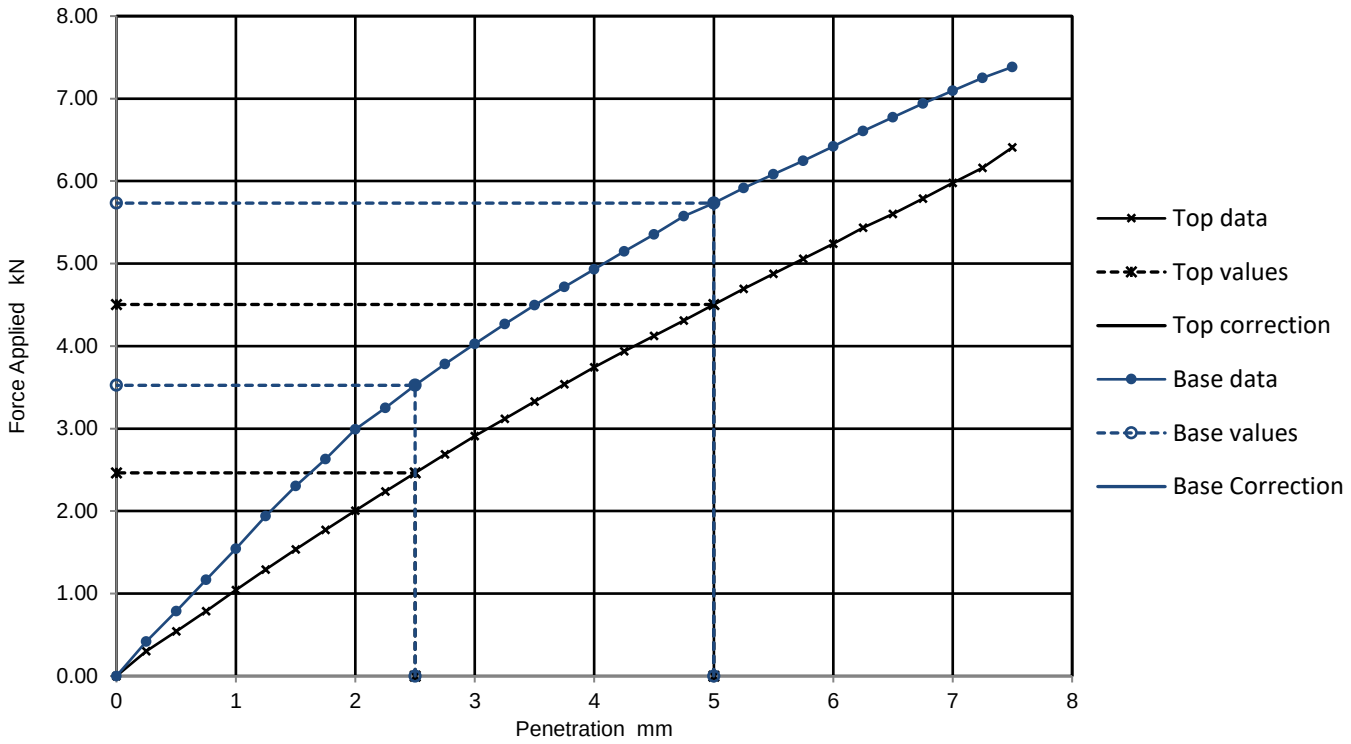
CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	22-1041A
				Borehole/Pit No.	BH105
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	2
Soil Description	Brown gravelly clayey fine to coarse SAND.			Depth m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown gravelly clayey fine to coarse SAND.			KeyLAB ID	Caus2023030884
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		19	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.22	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.97	Mg/m3		3	kPa
	Moisture content	13	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	19.0	23.0	23.0		13
BASE	No	27.0	29.0	29.0		11

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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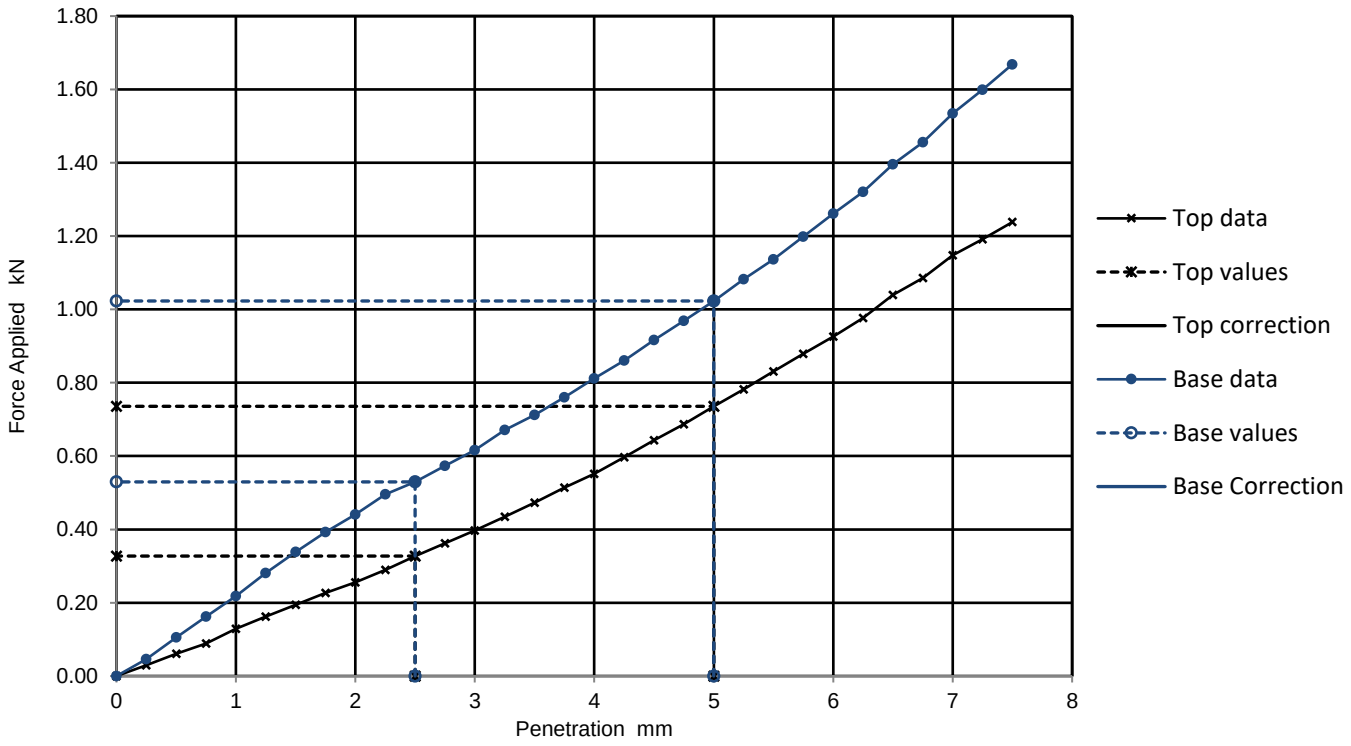
CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	22-1041A
				Borehole/Pit No.	BH112
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	6
Soil Description	Brown gravelly clayey fine to coarse SAND.			Depth m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown gravelly clayey fine to coarse SAND.			KeyLAB ID	Caus2023030888
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		14	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.09	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.80	Mg/m3		3	kPa
	Moisture content	16	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	2.5	3.7	3.7		16
BASE	No	4.0	5.1	5.1		16

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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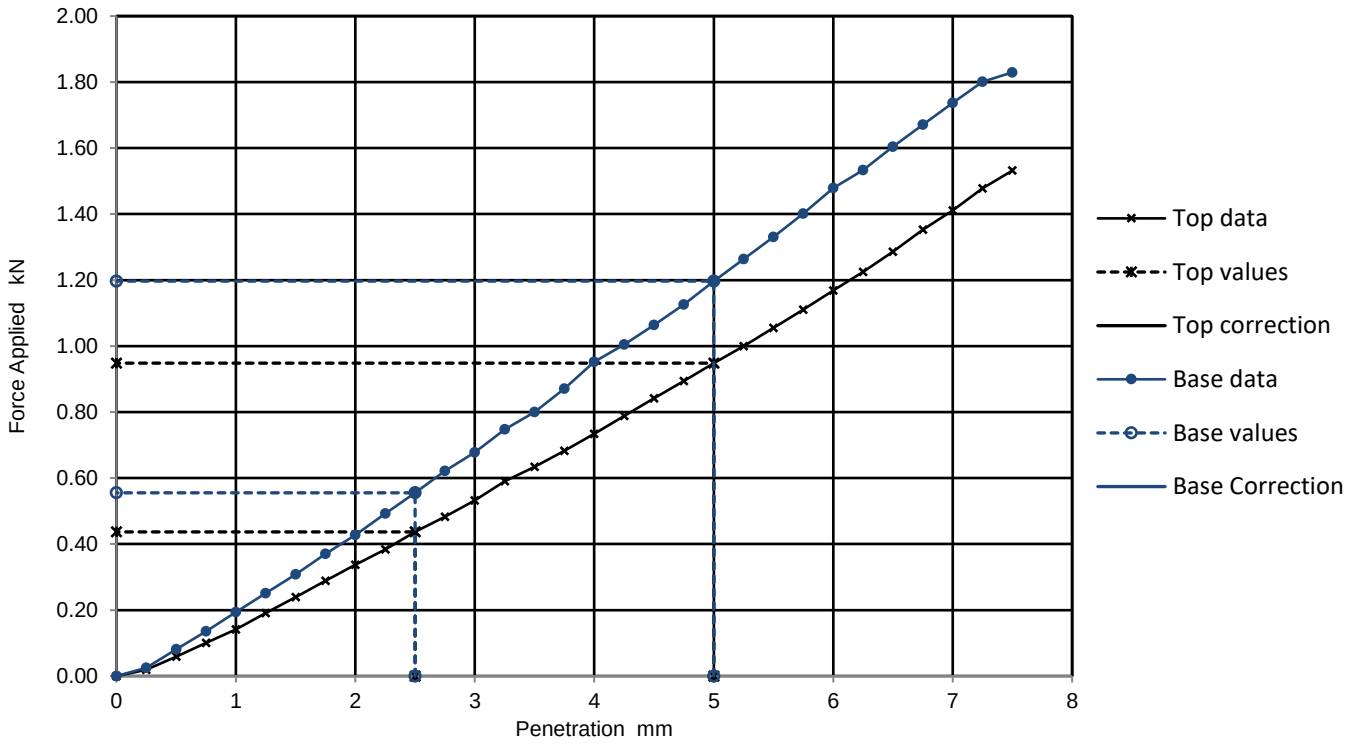
California Bearing Ratio (CBR)

				Job Ref	22-1041A
				Borehole/Pit No.	BH117
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	3
Soil Description	Brown gravelly clayey fine to coarse SAND.			Depth m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown gravelly clayey fine to coarse SAND.			KeyLAB ID	Caus2023030892
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		24	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.21	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.97	Mg/m3		3	kPa
	Moisture content	12	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP	No	3.3	4.7	4.7		12
BASE	No	4.2	6.0	6.0		12

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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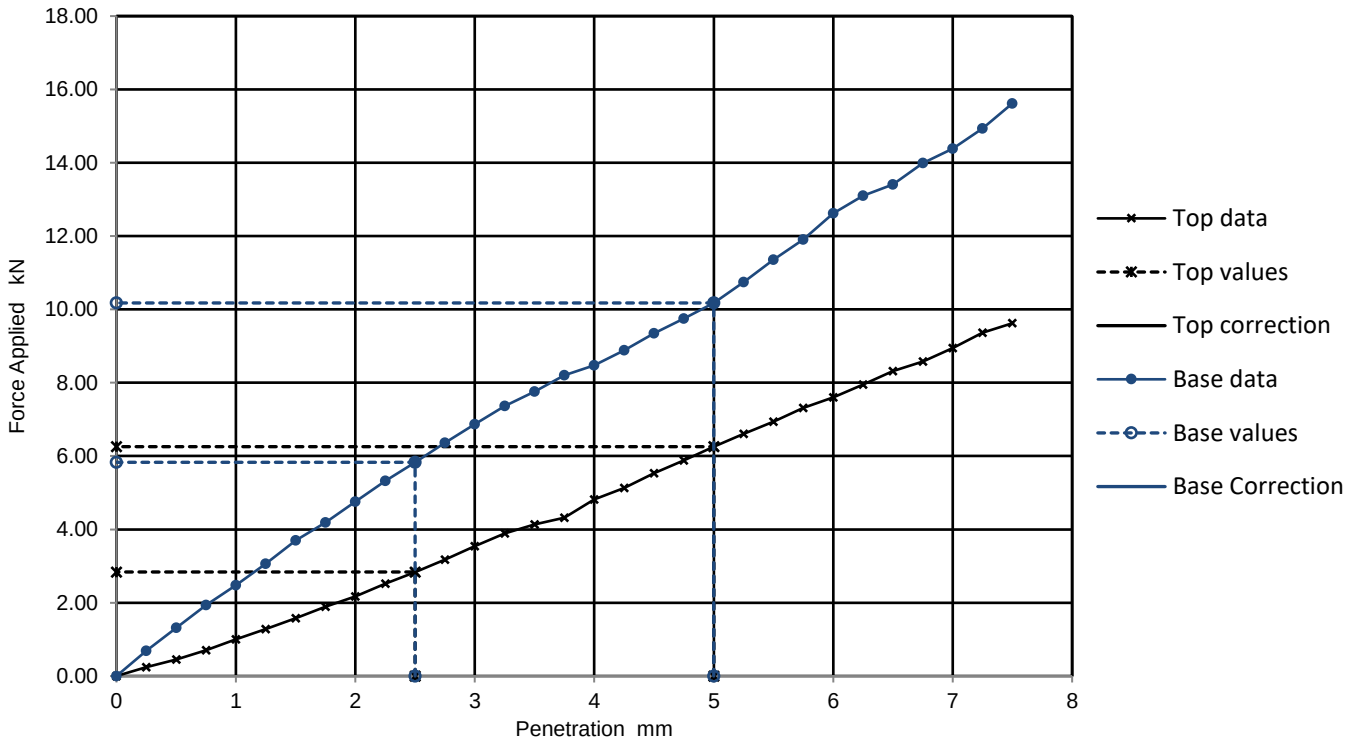
CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	22-1041A
				Borehole/Pit No.	BH119
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	3
Soil Description	Brown gravelly clayey fine to coarse SAND.			Depth m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown gravelly clayey fine to coarse SAND.			KeyLAB ID	Caus2023030893
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		32	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.07	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.90	Mg/m3		3	kPa
	Moisture content	8.7	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	22.0	31.0	31.0		8.7
BASE	No	44.0	51.0	51.0		8.8

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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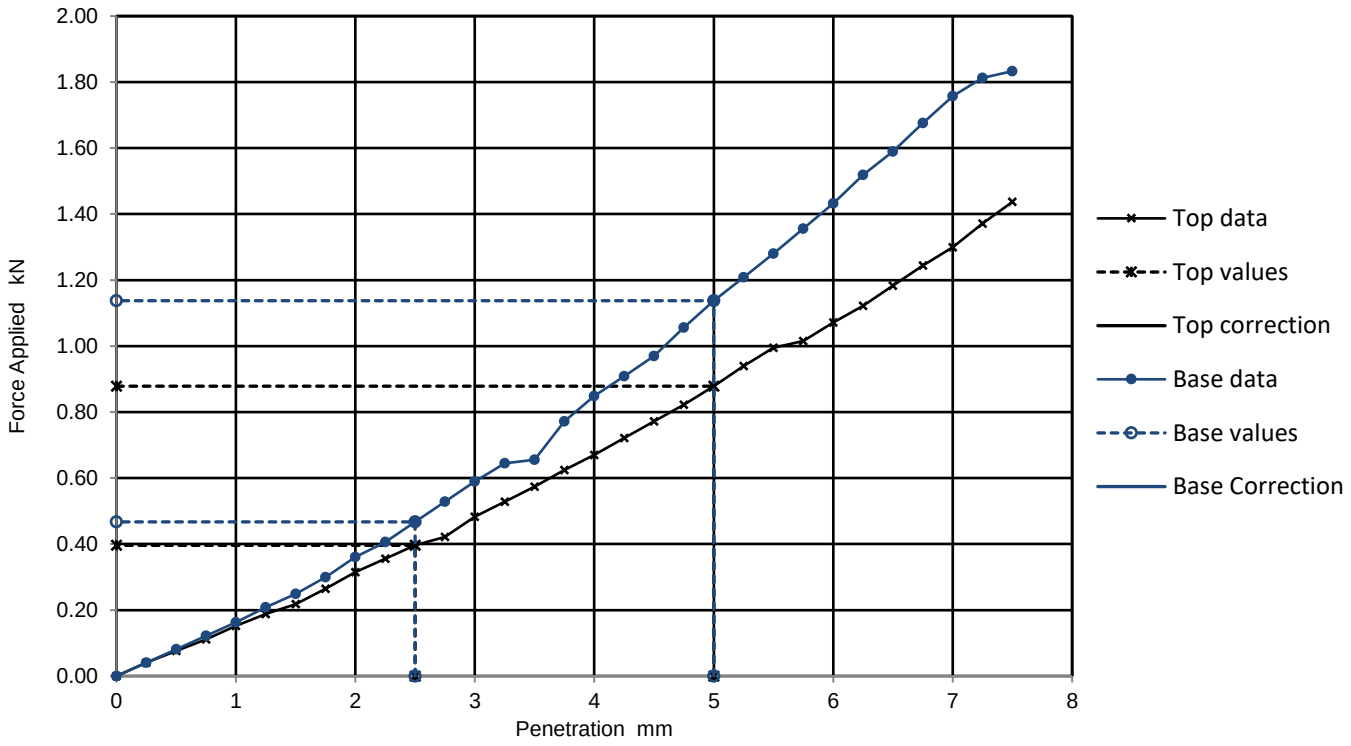
California Bearing Ratio (CBR)

				Job Ref	22-1041A
				Borehole/Pit No.	BH120
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	16
Soil Description	Brown gravelly clayey fine to coarse SAND.			Depth m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown gravelly clayey fine to coarse SAND.			KeyLAB ID	Caus2023030897
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		46	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.10	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.81	Mg/m3		3	kPa
	Moisture content	16	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	3.0	4.4	4.4		16
BASE	No	3.5	5.7	5.7		14

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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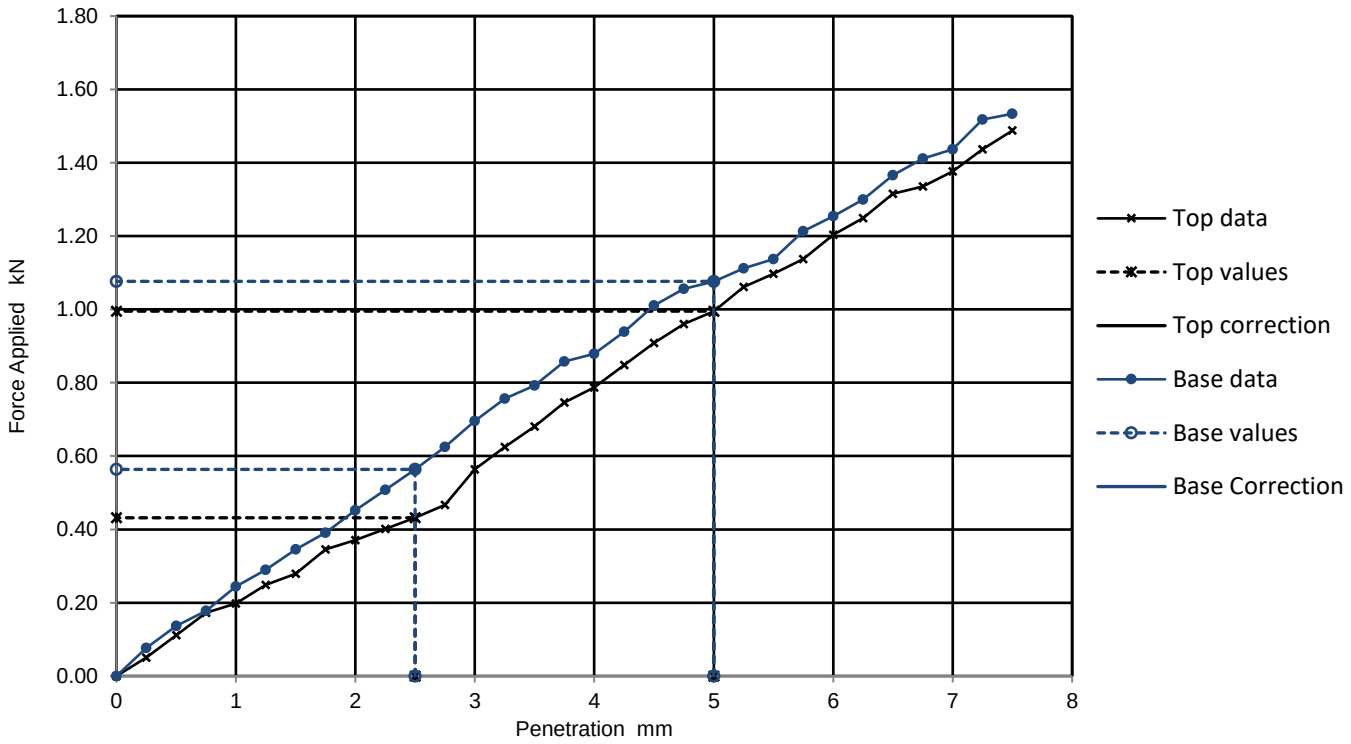
CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	22-1041A
				Borehole/Pit No.	ST102
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	4
Soil Description	Brown gravelly clayey fine to coarse SAND.			Depth m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Brown gravelly clayey fine to coarse SAND.			KeyLAB ID	Caus20230308158
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		27	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.02	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.78	Mg/m3		3	kPa
	Moisture content	13	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	3.3	5.0	5.0	5.2	13
BASE	No	4.3	5.4	5.4		13

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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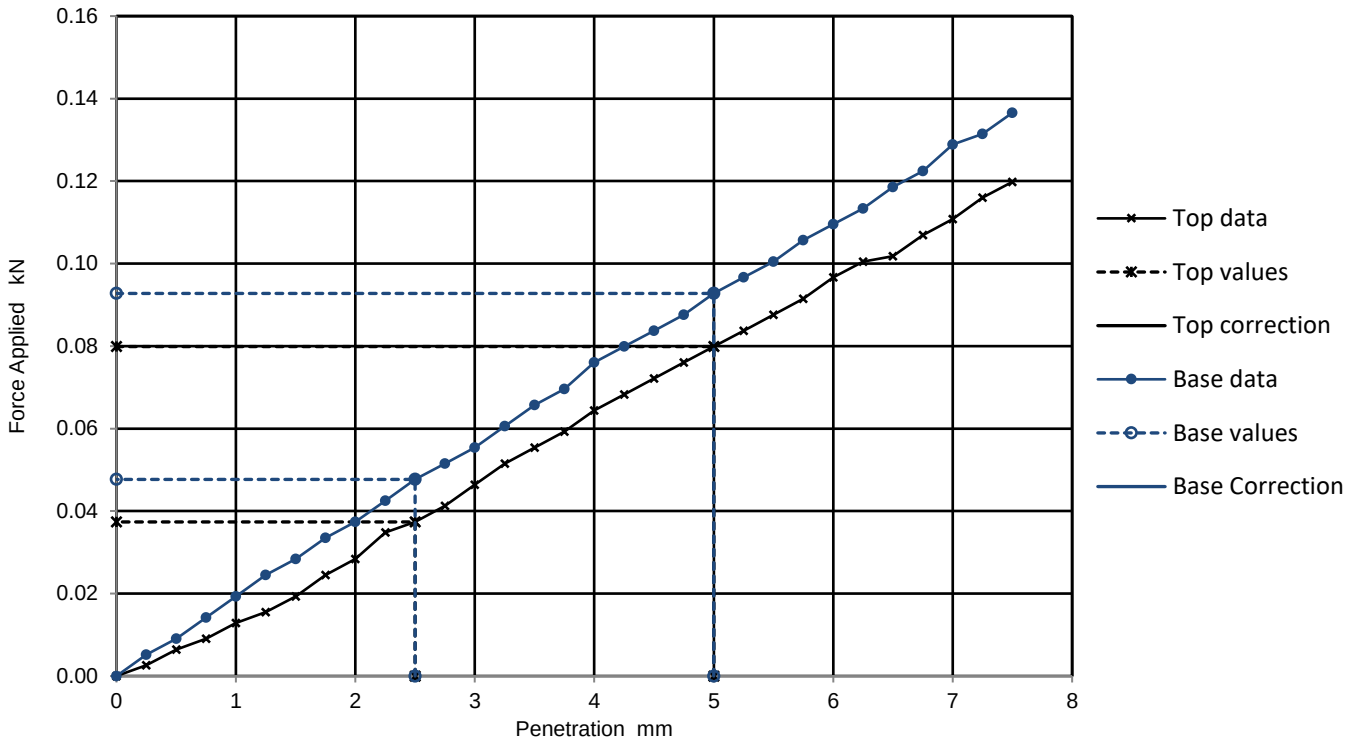
CAUSEWAY GEOTECH	**California Bearing Ratio (CBR)**			Job Ref	22-1041A
				Borehole/Pit No.	ST104
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	1
Soil Description	Grey sandy slightly gravelly silty CLAY.			Depth m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description	Grey sandy slightly gravelly silty CLAY.			KeyLAB ID	Caus20230308160
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		13	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	1.95	Mg/m3	Surcharge applied	4.5	kg
	Dry density	1.58	Mg/m3		3	kPa
	Moisture content	23	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	No	0.3	0.4	0.4	0.4	23
BASE	No	0.4	0.5	0.5		23

General remarks	Test specific remarks	Approved
Tested at natural moisture content.	Average result may be reported if within 10% of the mean CBR value of top and base.	Stephen Watson

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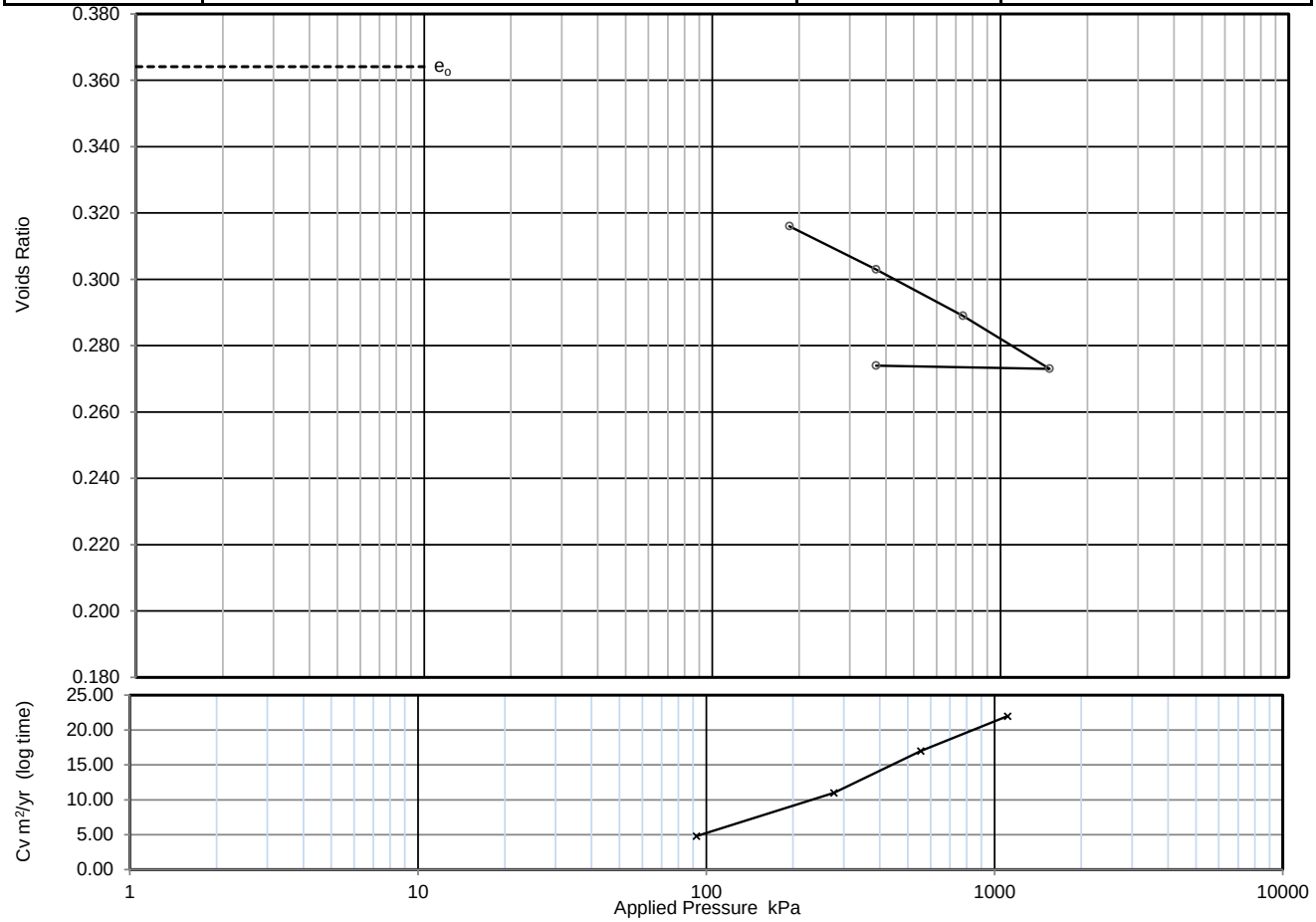
CAUSEWAY GEOTECH	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3				Job Ref		22-1041A
					Borehole/Pit No.		BH121
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		31
Soil Description	Grey sandy slightly gravelly silty CLAY.				Sample Depth (m)	Top	18.50
						Bottom	18.95
Specimen Reference	5	Specimen Depth	18.55	m	Sample Type		U
Specimen Description	Grey sandy slightly gravelly silty CLAY.				KeyLAB ID		Caus20230308110
Test Method	BS1377:Part 5:1990, clause 3				Date started		21/03/2023



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.364	-	-	-	-
185	0.316	0.19	4.8	5	0.00065
370	0.303	0.052	11	19	0.0007
740	0.289	0.029	17	27	0.00097
1,480	0.273	0.017	22	34	0.001
370	0.274	0.00018			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	18.67	mm
Moisture Content	14.0	17.0	%
Bulk density	2.21	2.43	Mg/m3
Dry density	1.94	2.08	Mg/m3
Voids Ratio	0.364	0.274	
Saturation	102	165	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen Watson

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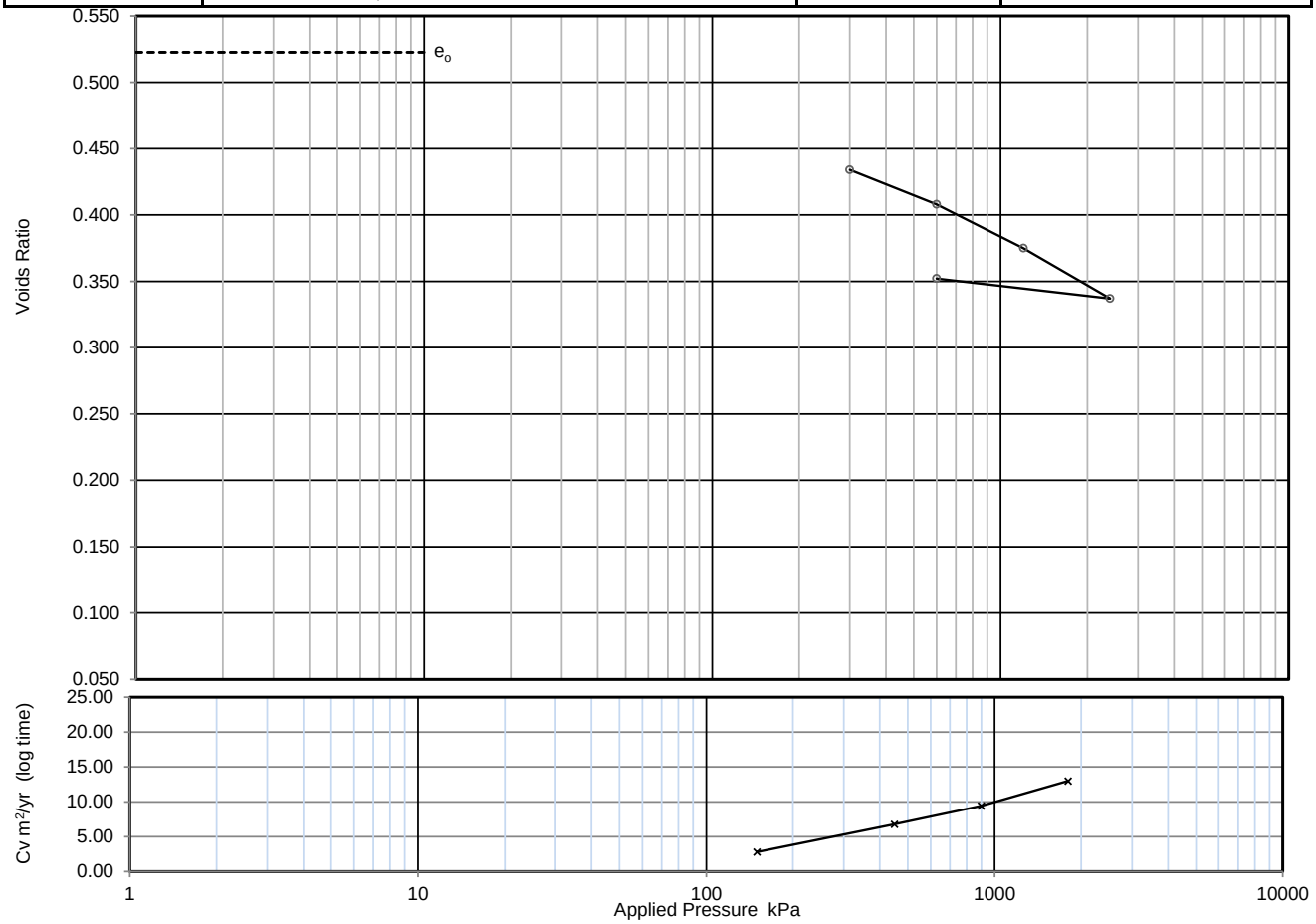
UKAS TESTING 10122

CAUSEWAY GEOTECH	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3				Job Ref		22-1041A
					Borehole/Pit No.		BH121
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		60
Soil Description	Grey sandy slightly gravelly silty CLAY.				Sample Depth (m)	Top	30.50
						Bottom	30.95
Specimen Reference	5	Specimen Depth	30.55	m	Sample Type		U
Specimen Description	Grey sandy slightly gravelly silty CLAY.				KeyLAB ID		Caus20230308114
Test Method	BS1377:Part 5:1990, clause 3				Date started		23/03/2023



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.523	-	-	-	-
300	0.434	0.19	2.8	2.9	0.0014
600	0.408	0.06	6.8	8.9	0.0017
1,200	0.375	0.038	9.4	11	0.0022
2,400	0.337	0.023	13	14	0.0029
600	0.352	0.0065			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	17.76	mm
Moisture Content	19.0	25.0	%
Bulk density	2.07	2.45	Mg/m3
Dry density	1.74	1.96	Mg/m3
Voids Ratio	0.523	0.352	
Saturation	96	188	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen Watson

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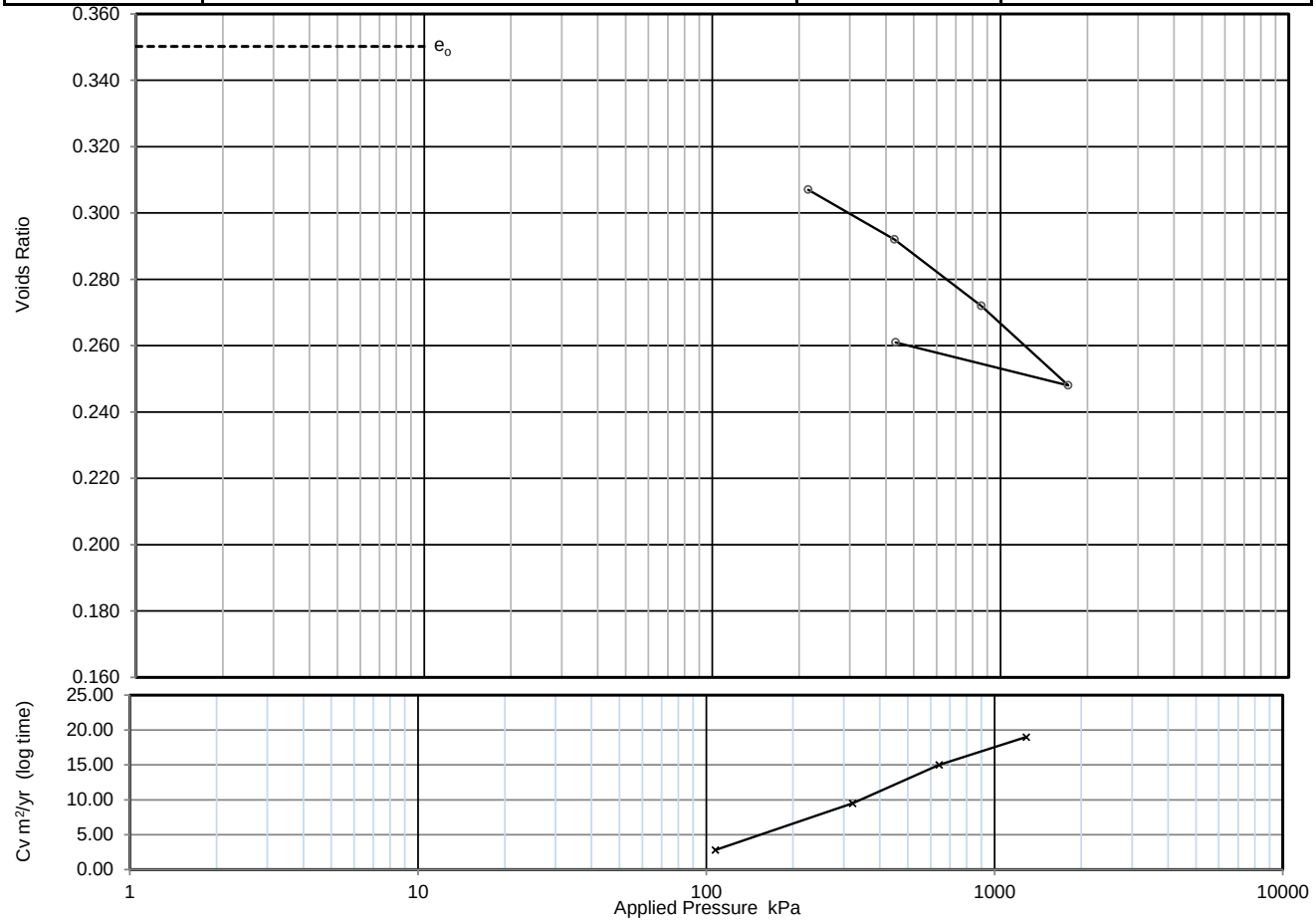
CAUSEWAY GEOTECH	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3				Job Ref		22-1041A
					Borehole/Pit No.		BH122
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		33
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Sample Depth (m)	Top	21.50
						Bottom	21.95
Specimen Reference	5	Specimen Depth	21.55	m	Sample Type		U
Specimen Description	Greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID		Caus20230308120
Test Method	BS1377:Part 5:1990, clause 3				Date started		23/03/2023



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.350	-	-	-	-
215	0.307	0.15	2.8	2.2	0.00056
428	0.292	0.055	9.5	16	0.00091
858	0.272	0.036	15	47	0.0011
1,718	0.248	0.022	19	31	0.0013
432	0.261	0.0081			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	18.68	mm
Moisture Content	14.0	15.0	%
Bulk density	2.23	2.42	Mg/m3
Dry density	1.96	2.10	Mg/m3
Voids Ratio	0.350	0.261	
Saturation	103	152	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen Watson

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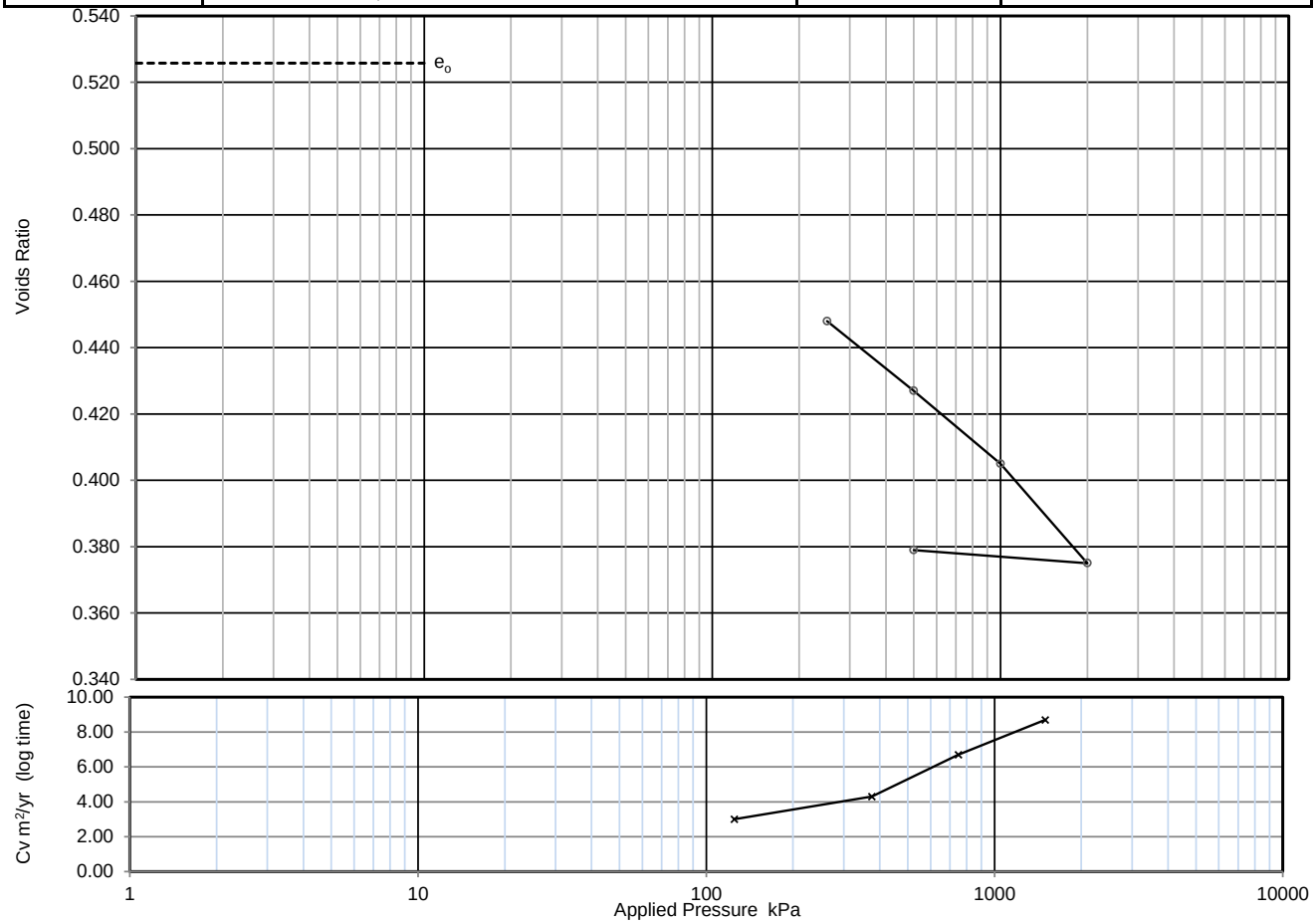
CAUSEWAY GEOTECH	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3				Job Ref		22-1041A
					Borehole/Pit No.		BH123
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		48
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Sample Depth (m)	Top	25.00
						Bottom	25.45
Specimen Reference	5	Specimen Depth	25.05	m	Sample Type		U
Specimen Description	Greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID		Caus20230308128
Test Method	BS1377:Part 5:1990, clause 3				Date started		21/03/2023



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.526	-	-	-	-
250	0.448	0.2	3	3.1	0.0016
500	0.427	0.058	4.3	5.7	0.0017
1,000	0.405	0.031	6.7	8.6	0.0019
2,000	0.375	0.021	8.7	12	0.0022
500	0.379	0.0015			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	18.07	mm
Moisture Content	20.0	27.0	%
Bulk density	2.08	2.44	Mg/m3
Dry density	1.74	1.92	Mg/m3
Voids Ratio	0.526	0.379	
Saturation	100	189	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen Watson

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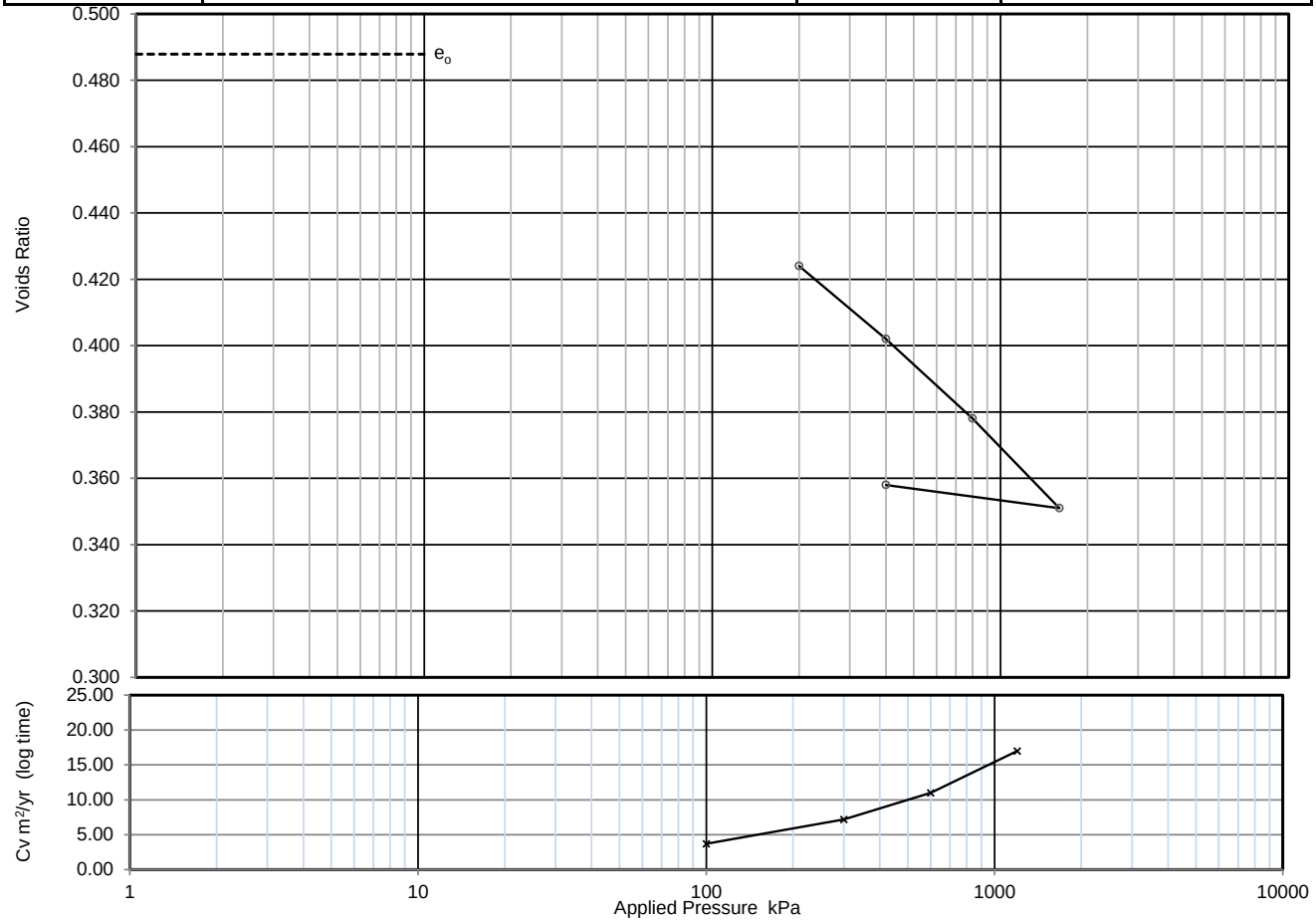
CAUSEWAY GEOTECH	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3				Job Ref		22-1041A
					Borehole/Pit No.		BH124
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		37
Soil Description	Grey sandy slightly gravelly silty CLAY.				Sample Depth (m)	Top	20.00
						Bottom	20.45
Specimen Reference	5	Specimen Depth	20.05	m	Sample Type		U
Specimen Description	Grey sandy slightly gravelly silty CLAY.				KeyLAB ID		Caus20230308135
Test Method	BS1377:Part 5:1990, clause 3				Date started		21/03/2023



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.488	-	-	-	-
200	0.424	0.21	3.7	4.2	0.00093
400	0.402	0.076	7.2	9.3	0.001
800	0.378	0.043	11	14	0.0013
1,600	0.351	0.025	17	16	0.0016
400	0.358	0.0047			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	18.26	mm
Moisture Content	19.0	24.0	%
Bulk density	2.12	2.42	Mg/m3
Dry density	1.78	1.95	Mg/m3
Voids Ratio	0.488	0.358	
Saturation	103	178	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen Watson

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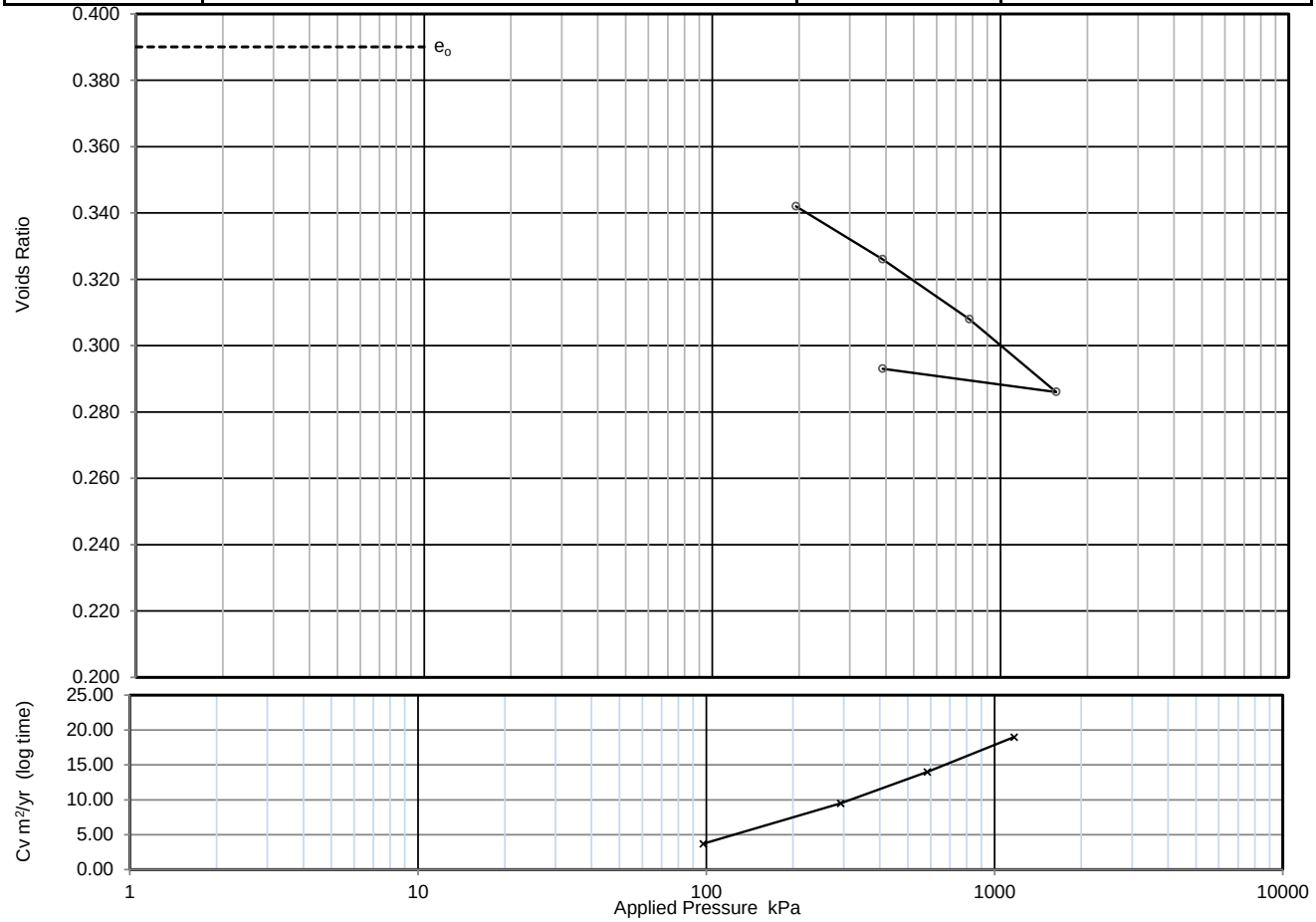
CAUSEWAY GEOTECH	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3				Job Ref		22-1041A
					Borehole/Pit No.		BH125
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		31
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Sample Depth (m)	Top	19.50
						Bottom	19.95
Specimen Reference	5	Specimen Depth	19.55	m	Sample Type		U
Specimen Description	Greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID		Caus20230308139
Test Method	BS1377:Part 5:1990, clause 3				Date started		23/03/2023



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.390	-	-	-	-
195	0.342	0.18	3.7	3.8	0.00077
390	0.326	0.058	9.5	12	0.00094
780	0.308	0.035	14	19	0.0011
1,560	0.286	0.022	19	27	0.0014
390	0.293	0.0047			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	74.90	-	mm
Height	19.90	18.51	mm
Moisture Content	15.0	18.0	%
Bulk density	2.20	2.42	Mg/m3
Dry density	1.91	2.05	Mg/m3
Voids Ratio	0.390	0.293	
Saturation	103	163	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%
Remarks			

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen Watson

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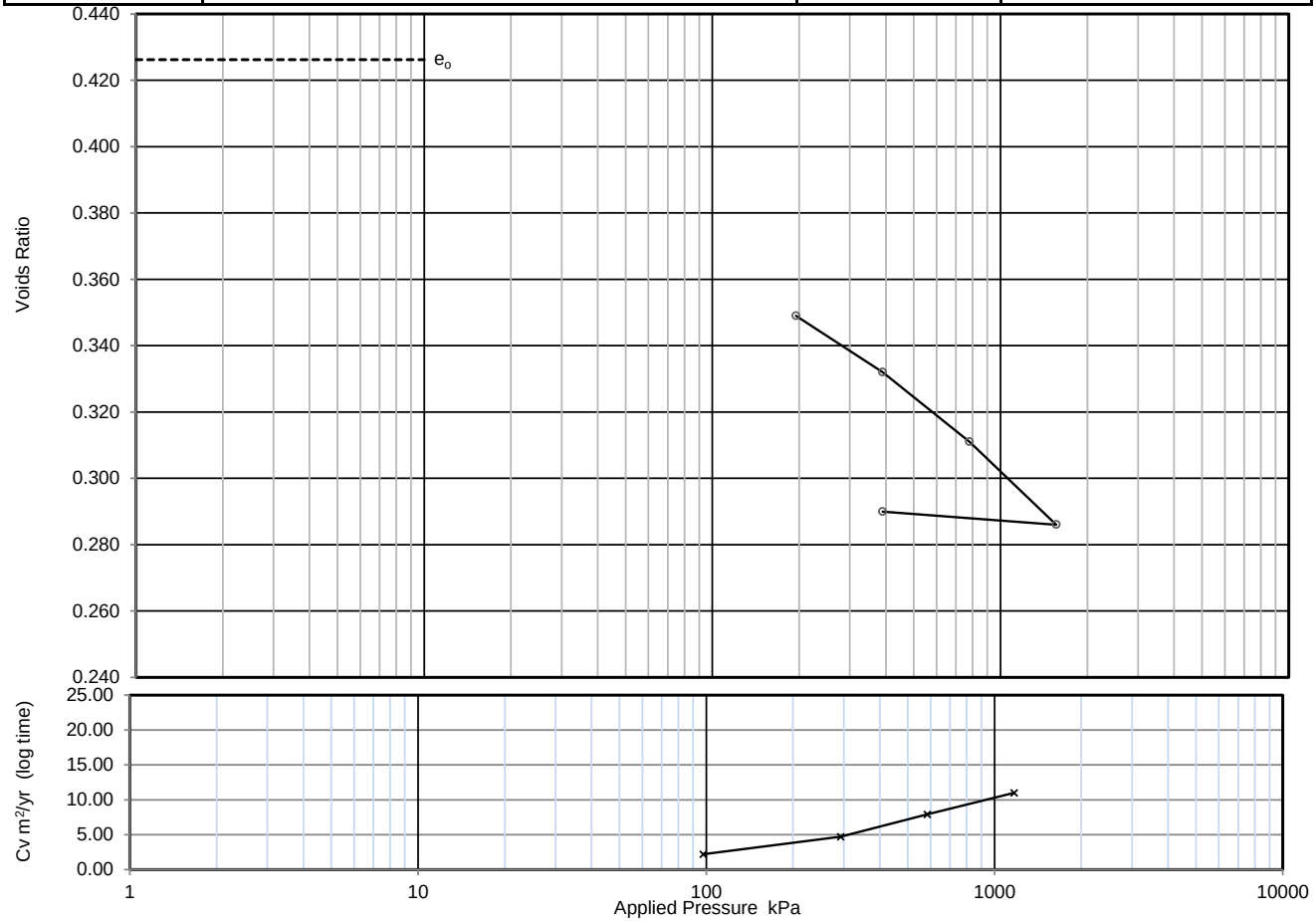
CAUSEWAY GEOTECH	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3				Job Ref		22-1041A
					Borehole/Pit No.		BH130
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.		63
Soil Description	Grey sandy slightly gravelly silty CLAY.				Sample Depth (m)	Top	19.50
						Bottom	19.95
Specimen Reference	5	Specimen Depth	19.55	m	Sample Type		U
Specimen Description	Grey sandy slightly gravelly silty CLAY.				KeyLAB ID		Caus20230308150
Test Method	BS1377:Part 5:1990, clause 3				Date started		21/03/2023



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.426	-	-	-	-
195	0.349	0.28	2.2	2	0.00095
390	0.332	0.065	4.7	6.2	0.001
780	0.311	0.041	7.9	9.5	0.0014
1,560	0.286	0.025	11	14	0.0017
390	0.290	0.0029			

Preparation

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	18.10	mm
Moisture Content	17.0	23.0	%
Bulk density	2.17	2.53	Mg/m3
Dry density	1.86	2.05	Mg/m3
Voids Ratio	0.426	0.290	
Saturation	104	210	%
Average temperature for test	20.0		oC
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Final values should be used with caution

Cv plotted at mid point of load increments

Cv corrected to 20oC

Approved: Stephen Watson

Printed : 30/03/2023 11:40

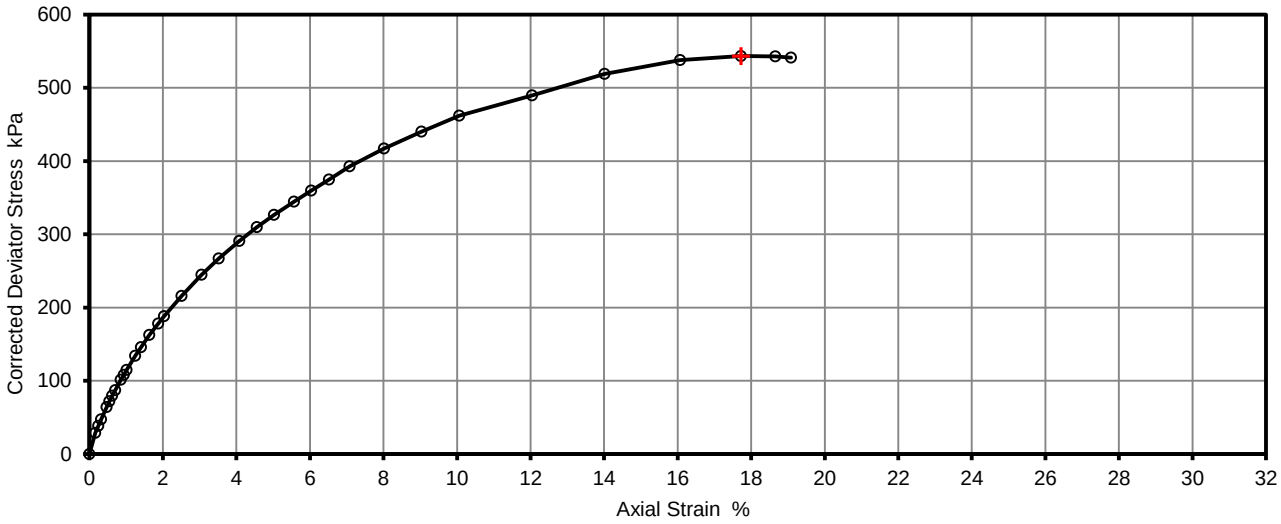
LAB 13R - Version 6

UKAS TESTING 10122

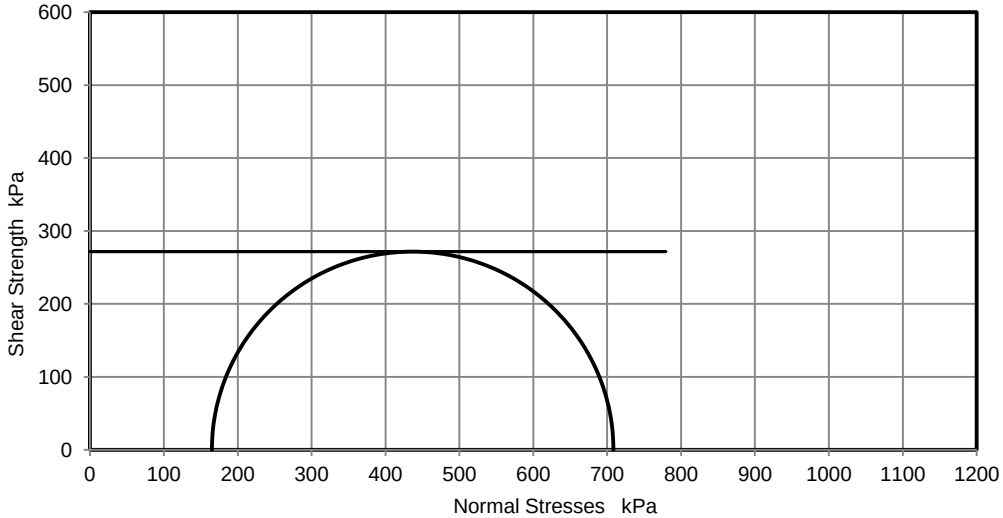
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	22-1041A
					Borehole/Pit No.	BH101
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.	1
Soil Description	Grey sandy slightly gravelly silty CLAY.				Depth	16.50
Specimen Reference	5	Specimen Depth	16.55	m	Sample Type	C
Specimen Description	Stiff grey sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus2023030874
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	14/03/2023

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		105.0	mm
Bulk Density		2.45	Mg/m3
Moisture Content		9.5	%
Dry Density		2.24	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		165	kPa
At failure	Axial Strain	17.7	%
	Deviator Stress, (σ1 - σ3)f	543	kPa
	Undrained Shear Strength, cu	272	kPa ½(σ1 - σ3)f
	Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks

Approved	Printed
Stephen Watson	30/03/2023 11:41

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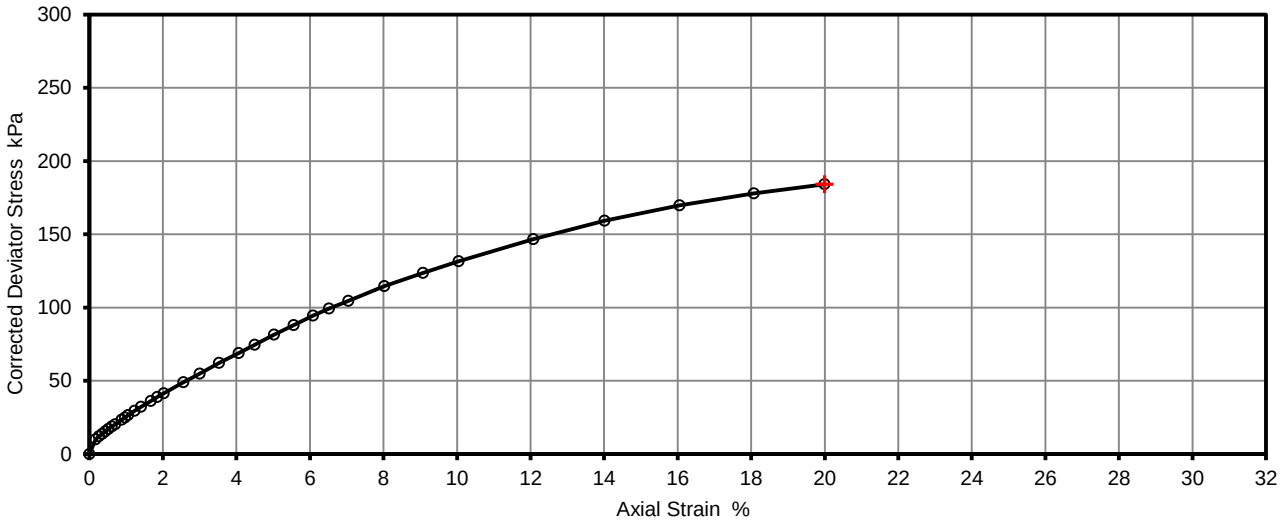
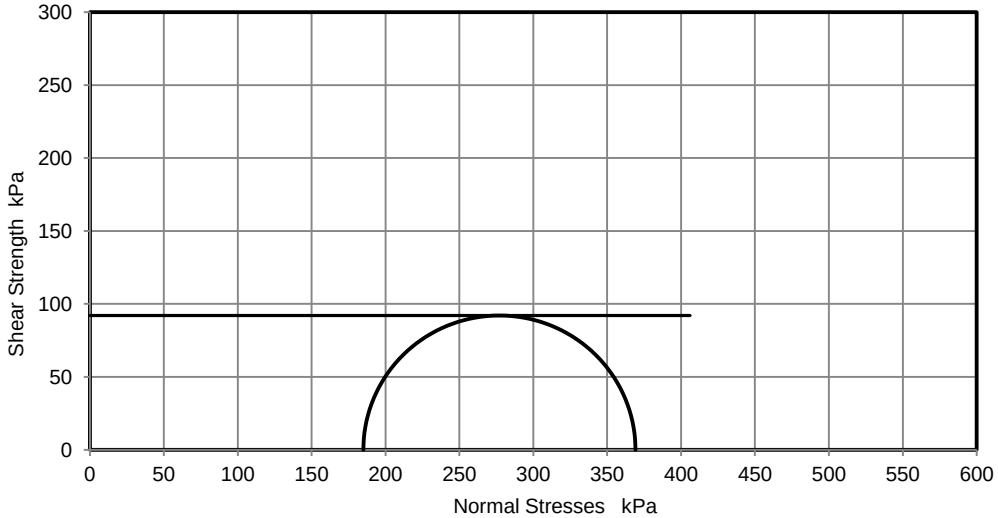
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	22-1041A
					Borehole/Pit No.	BH121
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.	31
Soil Description	Grey sandy slightly gravelly silty CLAY.				Depth	18.50
Specimen Reference	6	Specimen Depth	18.55	m	Sample Type	U
Specimen Description	Stiff grey sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus20230308110
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	14/03/2023

Sample Condition		UNDISTURBED	
Test Number		1	
Length		188.6	mm
Diameter		105.5	mm
Bulk Density		2.12	Mg/m3
Moisture Content		16	%
Dry Density		1.83	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		185	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	184	kPa
	Undrained Shear Strength, cu	92	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks

No failure defined. Testing terminated at 20% axial strain.

Approved: Stephen Watson

Printed: 30/03/2023 11:41

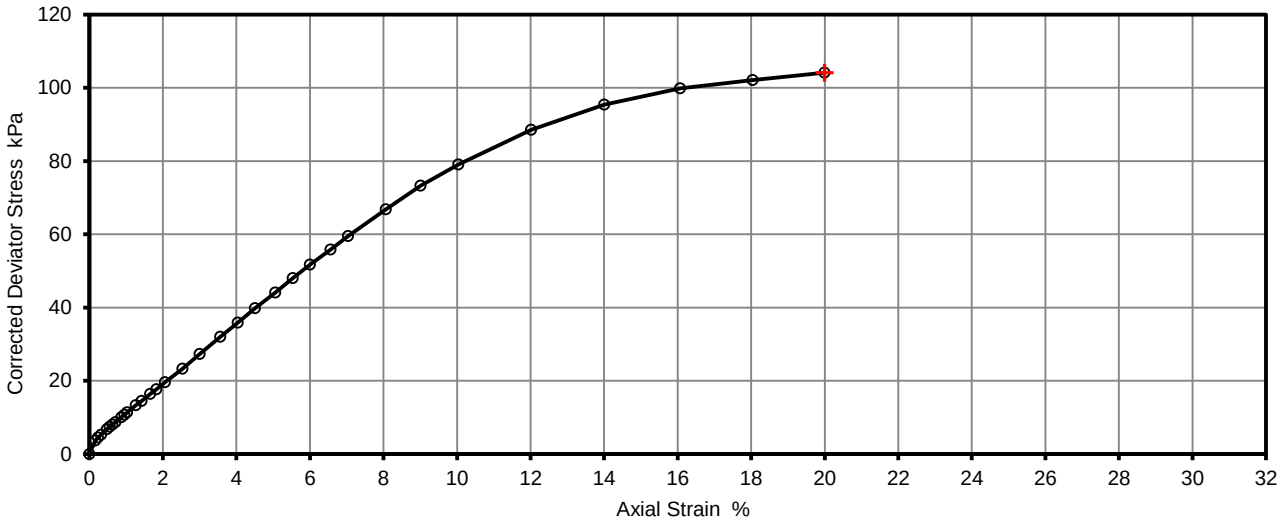
LAB 15R - Version 6

UKAS TESTING
10122

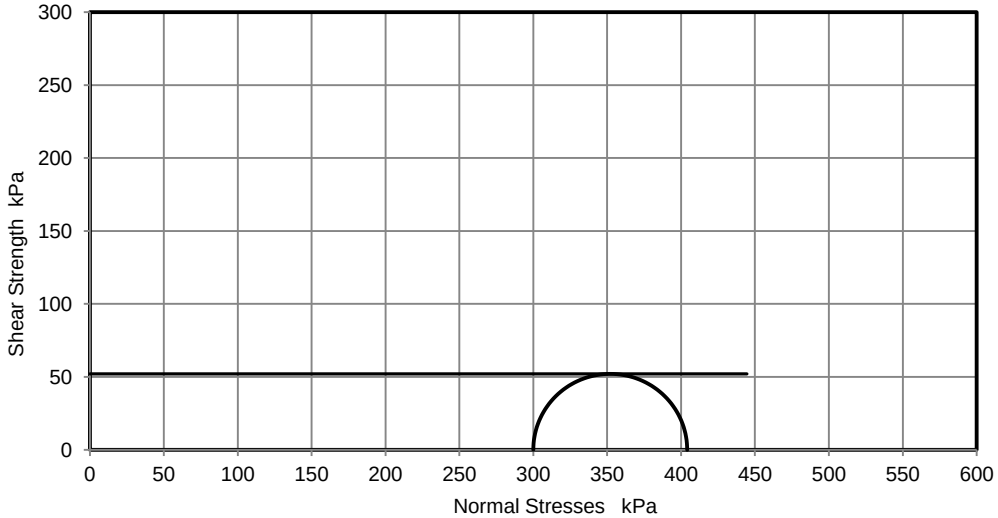
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	22-1041A
					Borehole/Pit No.	BH121
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.	60
Soil Description	Grey sandy slightly gravelly silty CLAY.				Depth	30.50
Specimen Reference	6	Specimen Depth	30.55	m	Sample Type	U
Specimen Description	Firm grey sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus20230308114
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	15/03/2023

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		105.4	mm
Bulk Density		2.01	Mg/m3
Moisture Content		23	%
Dry Density		1.63	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		300	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	104	kPa
	Undrained Shear Strength, cu	52	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks

No failure defined. Testing terminated at 20% axial strain.

Approved: Stephen Watson

Printed: 30/03/2023 11:41

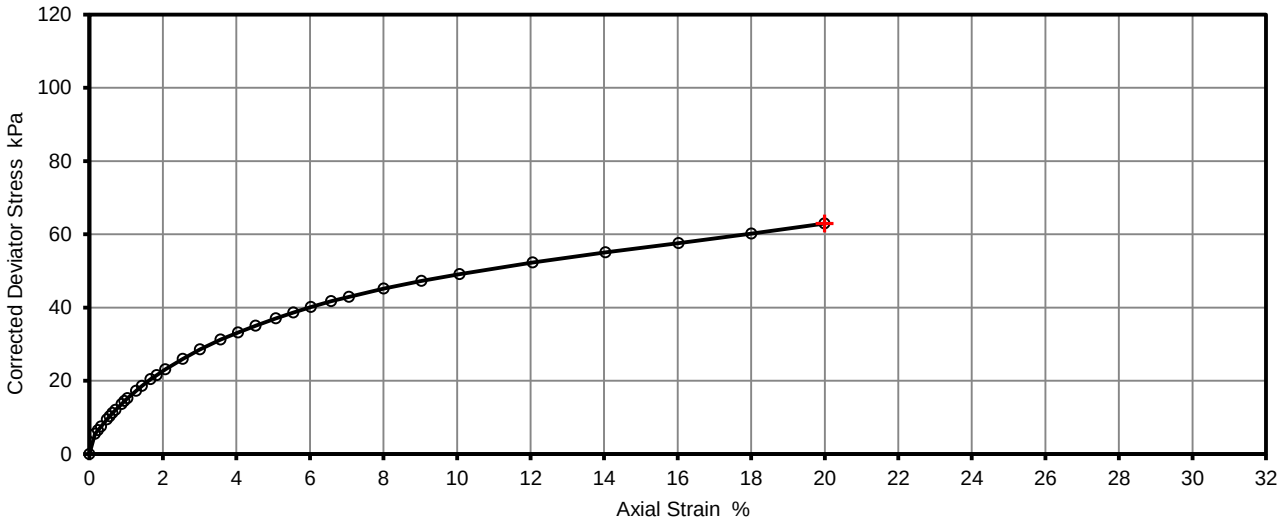
LAB 15R - Version 6

UKAS TESTING
10122

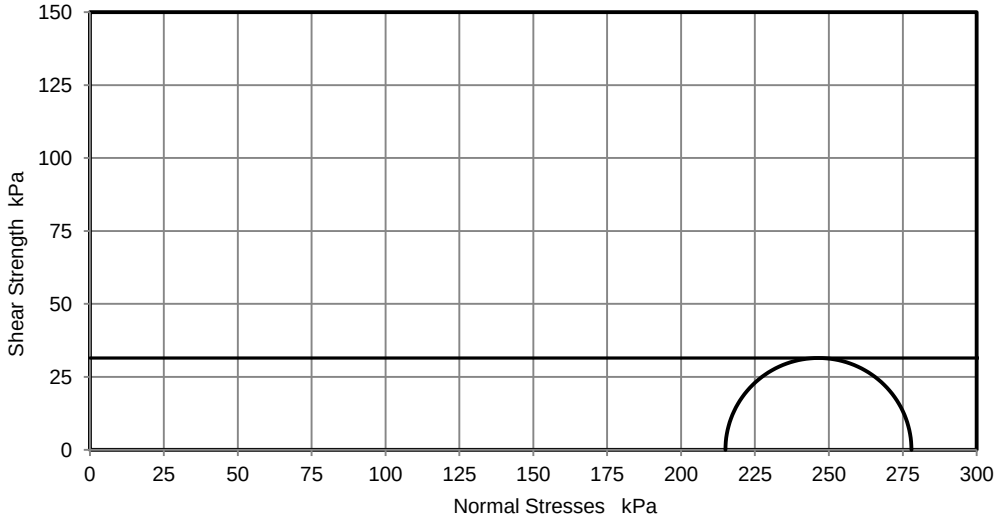
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	22-1041A
					Borehole/Pit No.	BH122
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.	33
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth	21.50
Specimen Reference	6	Specimen Depth	21.55	m	Sample Type	U
Specimen Description	Soft greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus20230308120
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	15/03/2023

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		106.7	mm
Bulk Density		2.10	Mg/m3
Moisture Content		19	%
Dry Density		1.76	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		215	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	63	kPa
	Undrained Shear Strength, cu	31	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks

No failure defined. Testing terminated at 20% axial strain.

Approved: Stephen Watson

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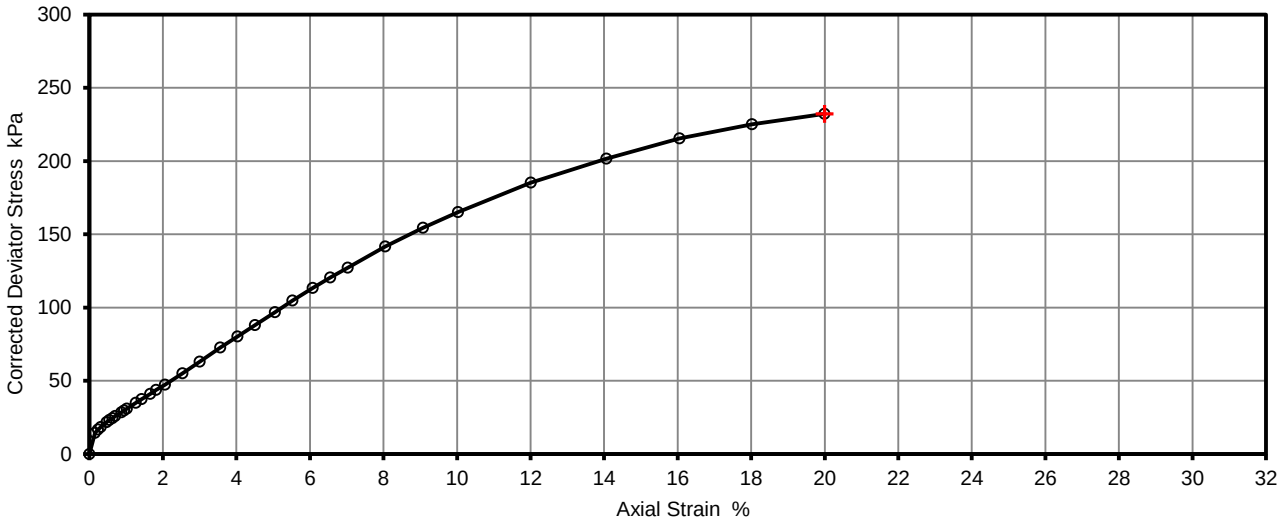
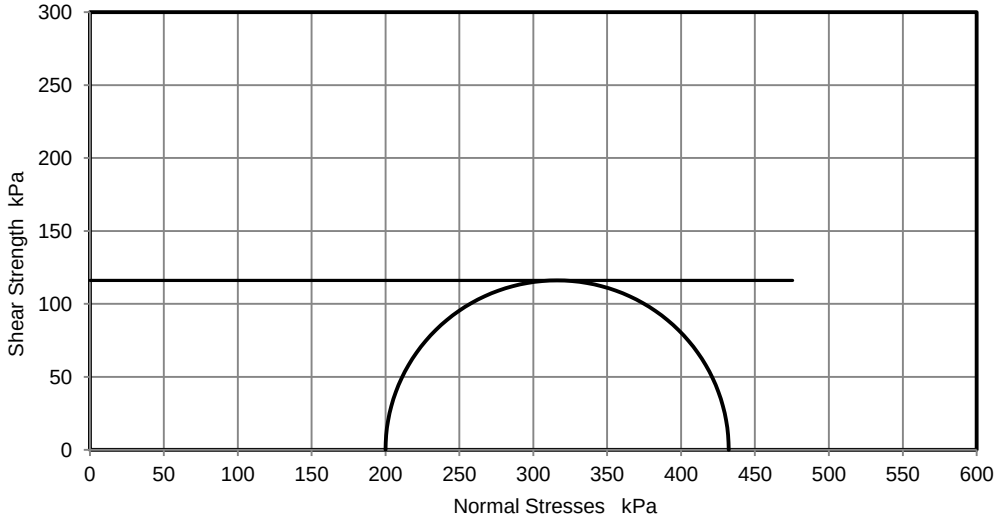
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	22-1041A
					Borehole/Pit No.	BH124
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.	37
Soil Description	Grey sandy slightly gravelly silty CLAY.				Depth	20.00
Specimen Reference	6	Specimen Depth	20.05	m	Sample Type	U
Specimen Description	Stiff grey sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus20230308135
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	16/03/2023

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		104.8	mm
Bulk Density		2.10	Mg/m3
Moisture Content		26	%
Dry Density		1.66	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		200	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	232	kPa
	Undrained Shear Strength, cu	116	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks

No failure defined. Testing terminated at 20% axial strain.

Approved: Stephen Watson

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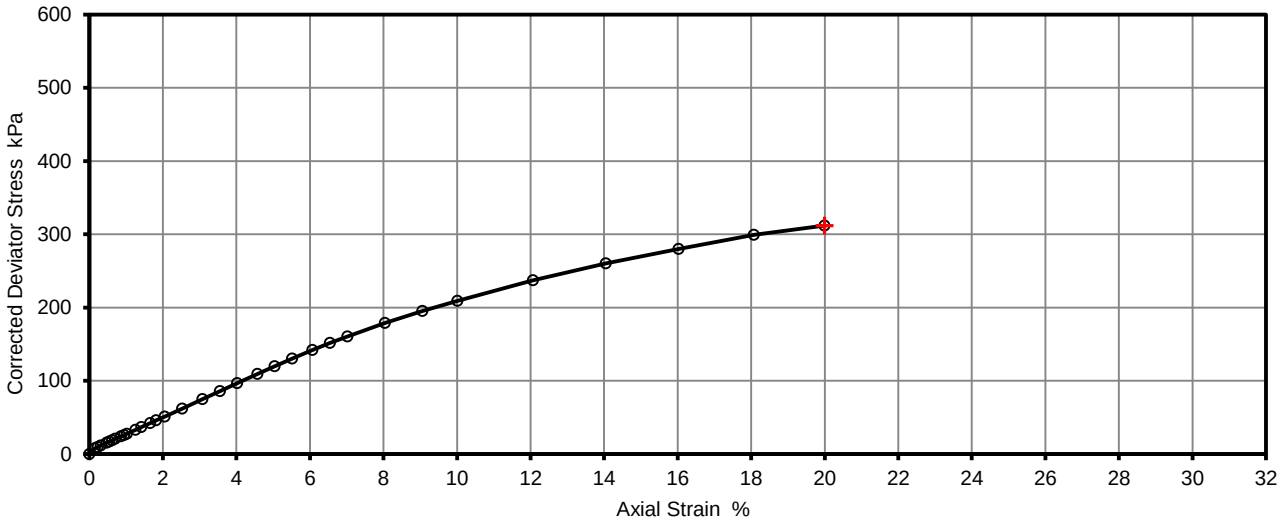
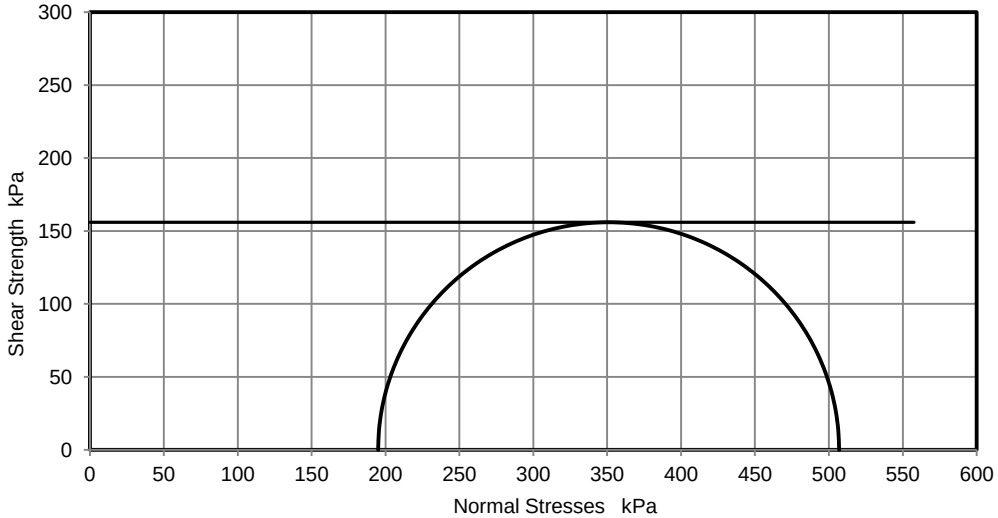
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	22-1041A
					Borehole/Pit No.	BH125
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.	31
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth	19.50
Specimen Reference	6	Specimen Depth	19.55	m	Sample Type	U
Specimen Description	Stiff greyish brown sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus20230308139
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	16/03/2023

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.1	mm
Diameter		105.6	mm
Bulk Density		2.18	Mg/m3
Moisture Content		18	%
Dry Density		1.84	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		195	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	312	kPa
	Undrained Shear Strength, cu	156	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks

No failure defined. Testing terminated at 20% axial strain.

Approved: Stephen Watson

Printed: 30/03/2023 11:41

LAB 15R - Version 6

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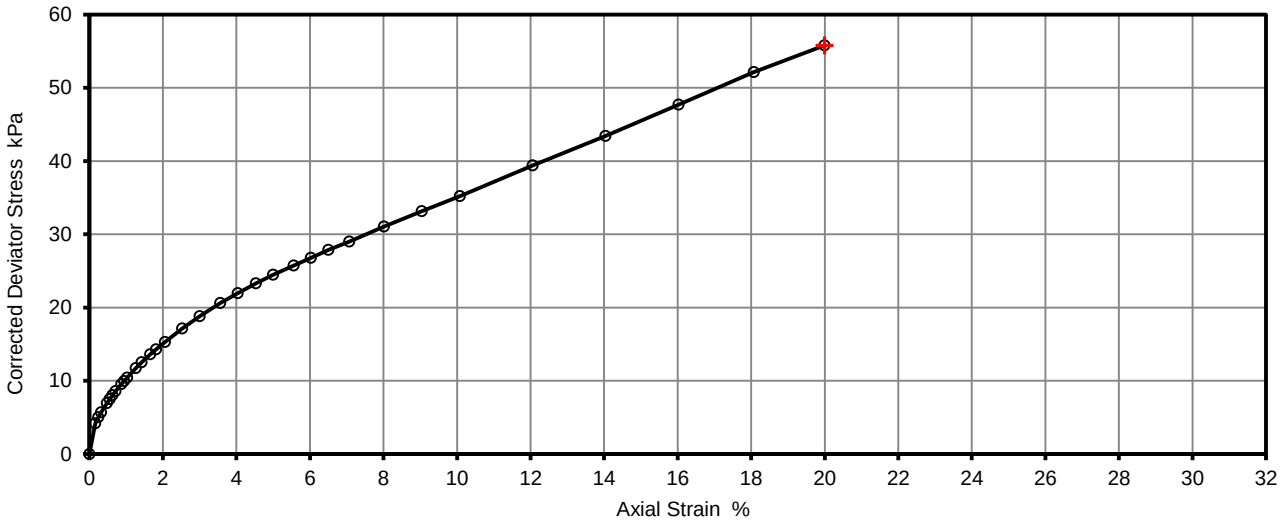
10122

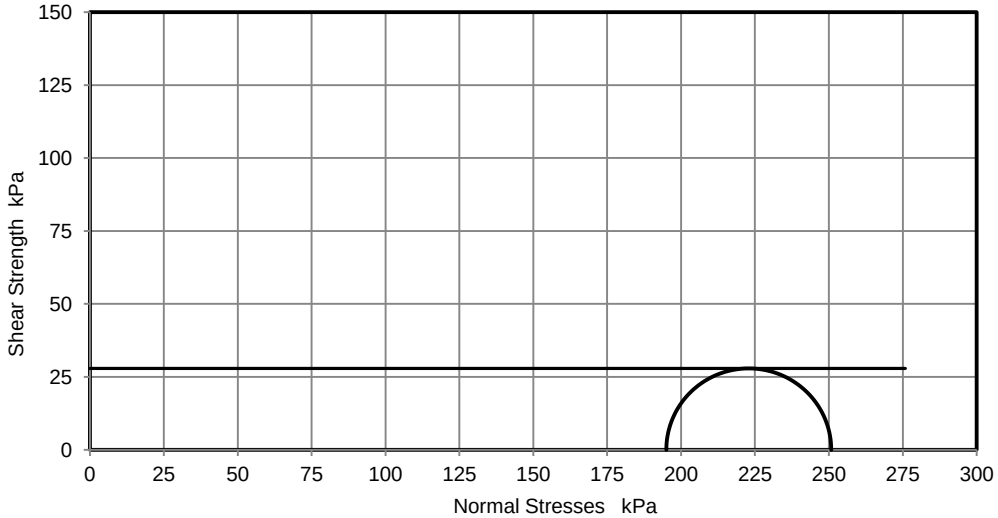
CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**				Job Ref	22-1041A
					Borehole/Pit No.	BH130
Site Name	3FM Planning Design GI - Lot A DPC Lands				Sample No.	63
Soil Description	Grey sandy slightly gravelly silty CLAY.				Depth	19.50
Specimen Reference	6	Specimen Depth	19.55	m	Sample Type	U
Specimen Description	Soft grey sandy slightly gravelly silty CLAY.				KeyLAB ID	Caus20230308150
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				Date of test	20/03/2023

Sample Condition		UNDISTURBED	
Test Number		1	
Length		210.0	mm
Diameter		105.7	mm
Bulk Density		2.11	Mg/m3
Moisture Content		20	%
Dry Density		1.75	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		195	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	56	kPa
	Undrained Shear Strength, cu	28	kPa ½(σ1 - σ3)f
	Mode of Failure		

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks

No failure defined. Testing terminated at 20% axial strain.

Approved: Stephen Watson

Printed: 30/03/2023 11:41

LAB 15R - Version 6

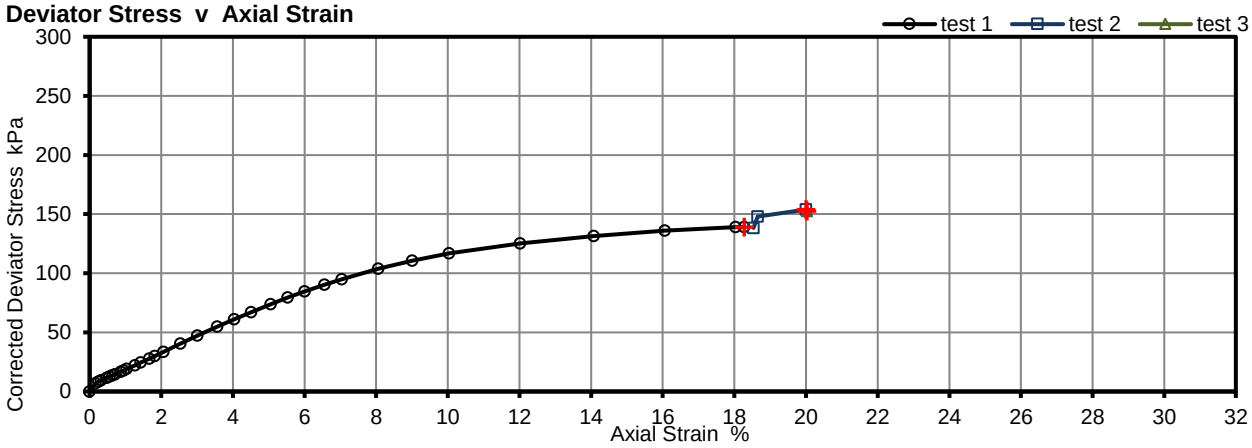
UKAS TESTING
10122

CAUSEWAY GEOTECH	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - Multistage test**			Job Ref	22-1041A
				Borehole/Pit No.	BH123
Site Name	3FM Planning Design GI - Lot A DPC Lands			Sample No.	48
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Sample Depth (m) Top	25.00
				Sample Depth (m) Base	25.45
Specimen Reference	6	Specimen Depth	25.05 m	Sample Type	U
Specimen Description	Stiff greyish brown sandy slightly gravelly silty CLAY.			KeyLAB ID	Caus20230308128
Test Method	BS1377:Part 7:1990, clause 9, multistage test on a single spe			Date of test	15/03/2023

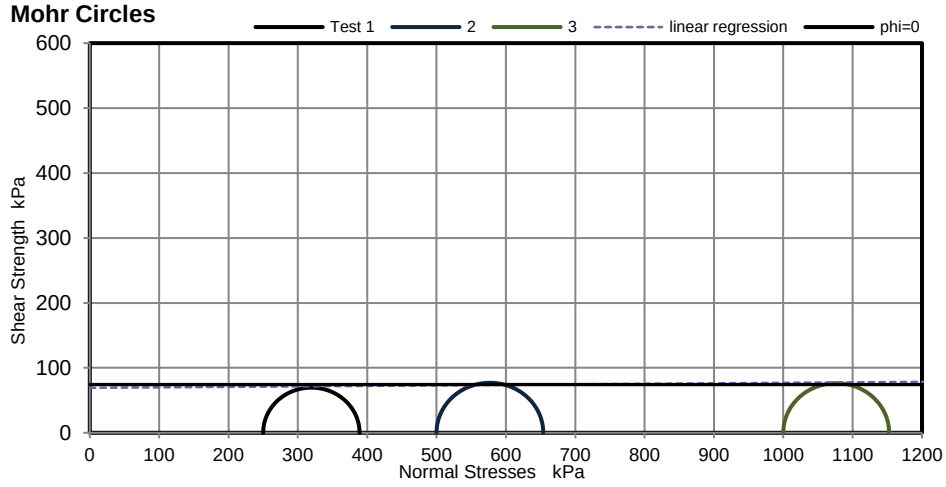
Sample Condition		UNDISTURBED
Length	mm	210.1
Diameter	mm	105.8
Bulk Density	Mg/m3	1.95
Moisture Content	%	25.0
Dry Density	Mg/m3	1.57

Rate of Strain		%/min	2.00		
Stage Number			1	2	3
Cell Pressure		kPa	250	500	1000
End of stage	Axial Strain	%	18.3	20.0	20.0
	Deviator Stress, (σ1 - σ3) corrected for area and membrane	kPa	139.0	153.9	152.6
	Shear strength, cu	kPa	69.5	76.9	76.3
	Mode of failure				

Deviator Stress v Axial Strain



Mohr Circles



ϕu = 0
Average cu 74 kPa

Linear Regression
ϕu 0.4 °
cu 69 kPa

Mohr circles and their interpretation is not covered by BS1377-7: 1990. These are provided for information only.

Remarks

No failure defined. Testing terminated at 20% axial strain.

Approved: Stephen Watson

Printed: 30/03/2023 11:42

LAB 16R - Version 6

UKAS TESTING 10122

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH101	Sample Reference	18	
Depth (m)	7.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed
Description	Grey slightly gravelly slightly silty fine to coarse SAND.			
Sample Preparation	Sample is recompacted using material passing 2mm test sieve			

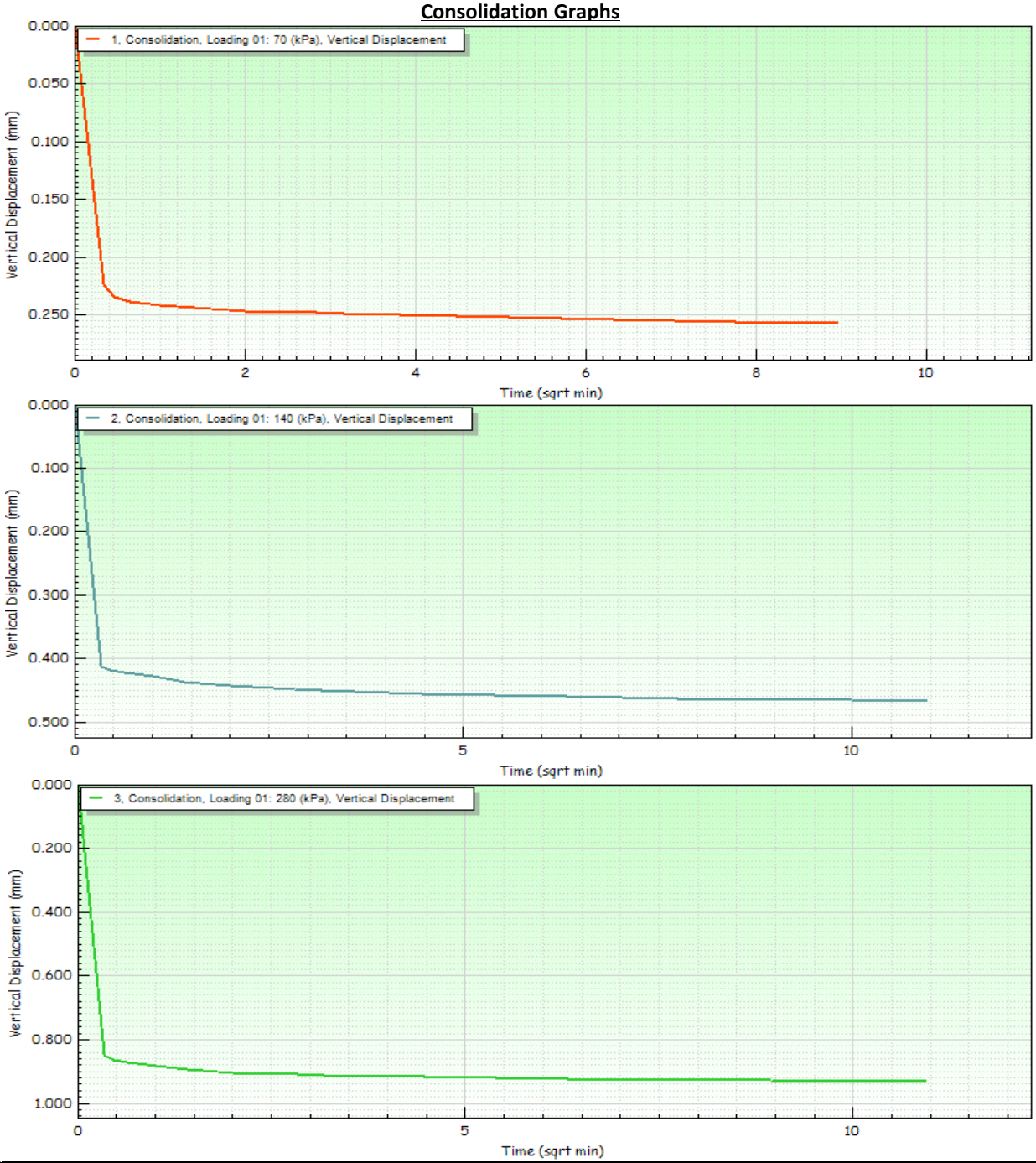
Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	9.1	9.1	9.1
Bulk Density (Mg/m^3)	1.68	1.72	1.71
Dry Density (Mg/m^3)	1.54	1.58	1.57
Voids Ratio	0.724	0.680	0.692
Consolidation			
Normal Pressure (kPa)	70	140	280
Vertical Displacement (mm)	0.257	0.467	0.931
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak Shear Stress (kPa)	53.6	119.5	187.0
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	10.083	3.603	2.403
Final Conditions			
Water Content (%)	21.0	22.0	22.0
Dry Density (Mg/m^3)	1.55	1.64	1.72
Voids Ratio	0.706	0.634	0.596

	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH101	Sample Reference	18	
Depth (m)	7.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs

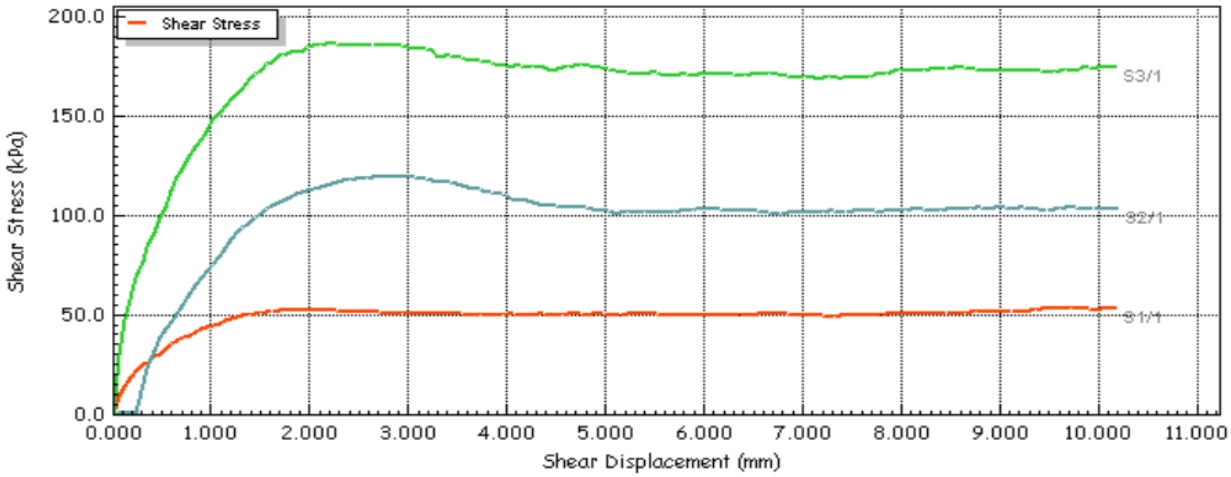


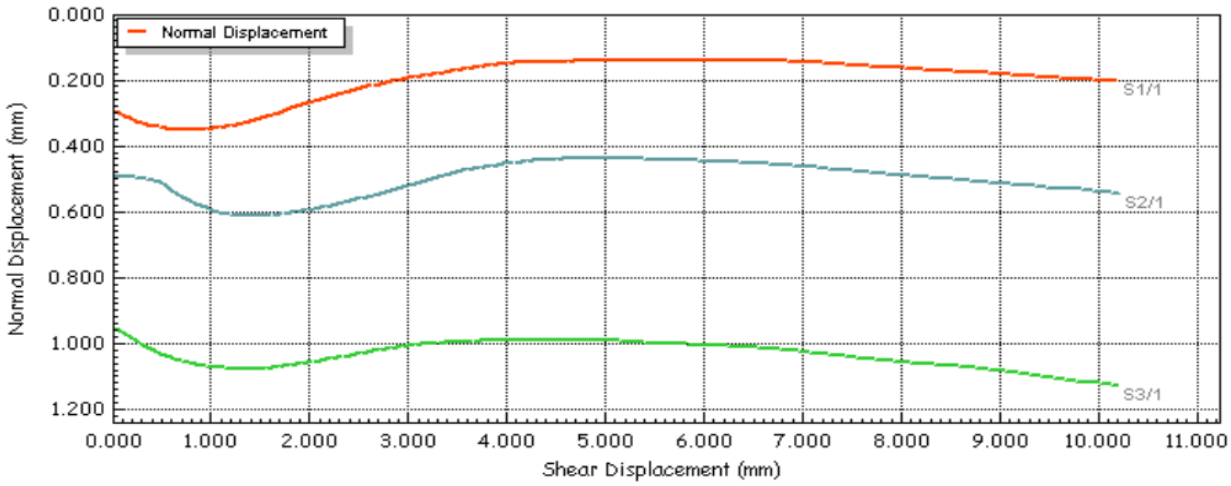
	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH101	Sample Reference		18	
Depth (m)	7.00	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage



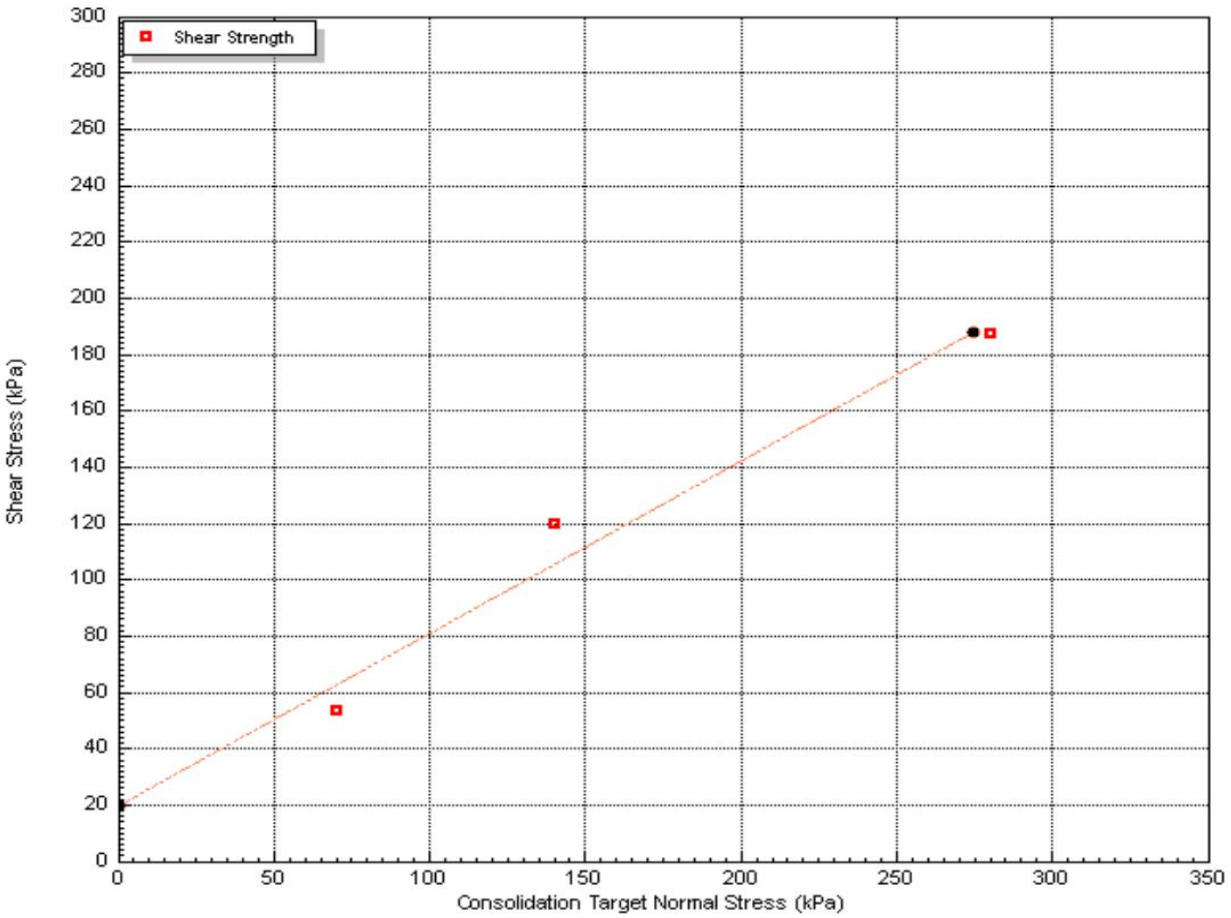


	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH101	Sample Reference	18	
Depth (m)	7.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	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		



	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH120	Sample Reference	1	
Depth (m)	10.00	Sample Submerged?	Yes	~~No~~
Sample Type	C	Particle Density (Mg/m^3)	2.65	Assumed
Description	Greyish brown slightly gravelly silty fine to coarse SAND.			
Sample Preparation	Sample is recompacted using material passing 2mm test sieve			

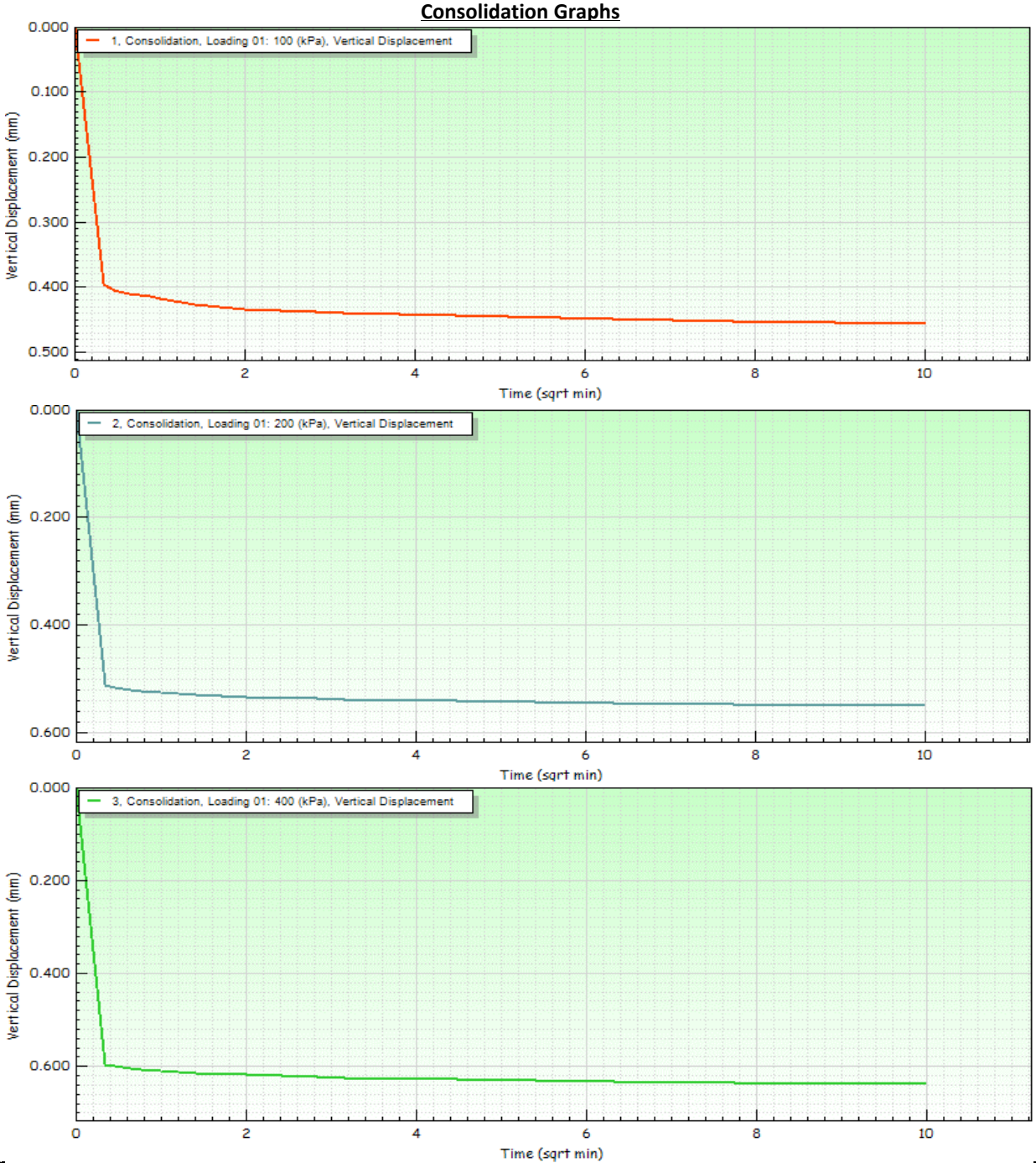
Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	8.4	8.4	8.4
Bulk Density (Mg/m^3)	1.73	1.73	1.76
Dry Density (Mg/m^3)	1.60	1.60	1.62
Voids Ratio	0.660	0.656	0.633
Consolidation			
Normal Pressure (kPa)	100	200	400
Vertical Displacement (mm)	0.456	0.549	0.638
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak Shear Stress (kPa)	82.7	154.1	326.8
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	2.163	2.463	2.637
Final Conditions			
Water Content (%)	20.0	20.0	20.0
Dry Density (Mg/m^3)	1.62	1.68	1.71
Voids Ratio	0.606	0.601	0.575

	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

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

Consolidation Graphs

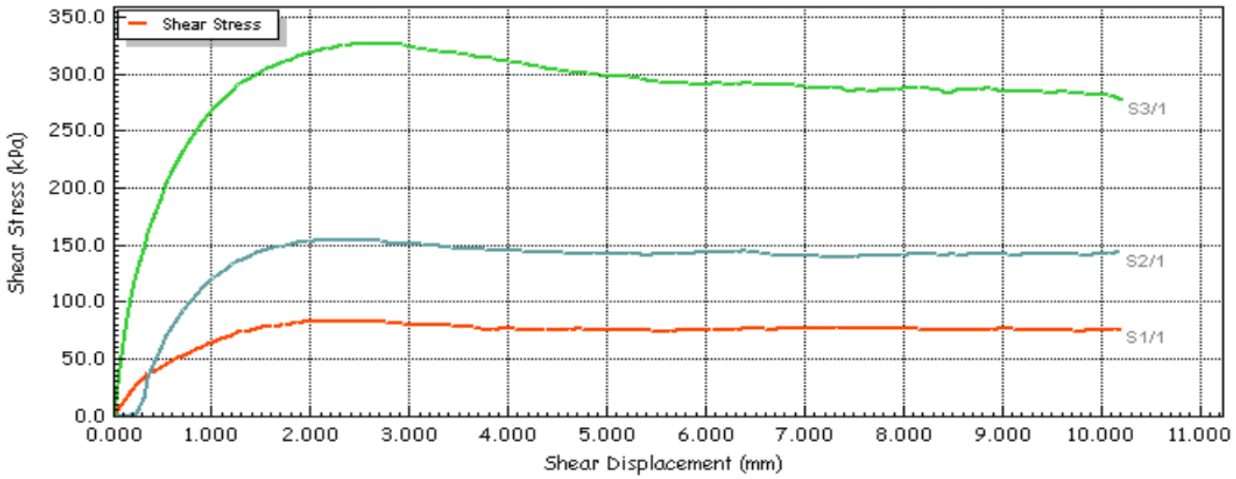


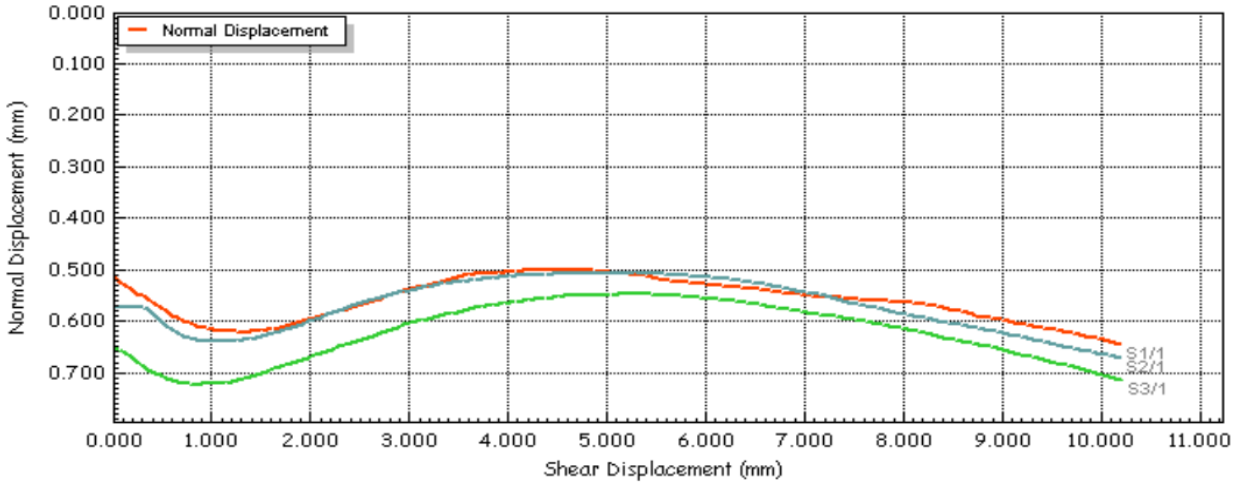
	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

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

Shear Stage



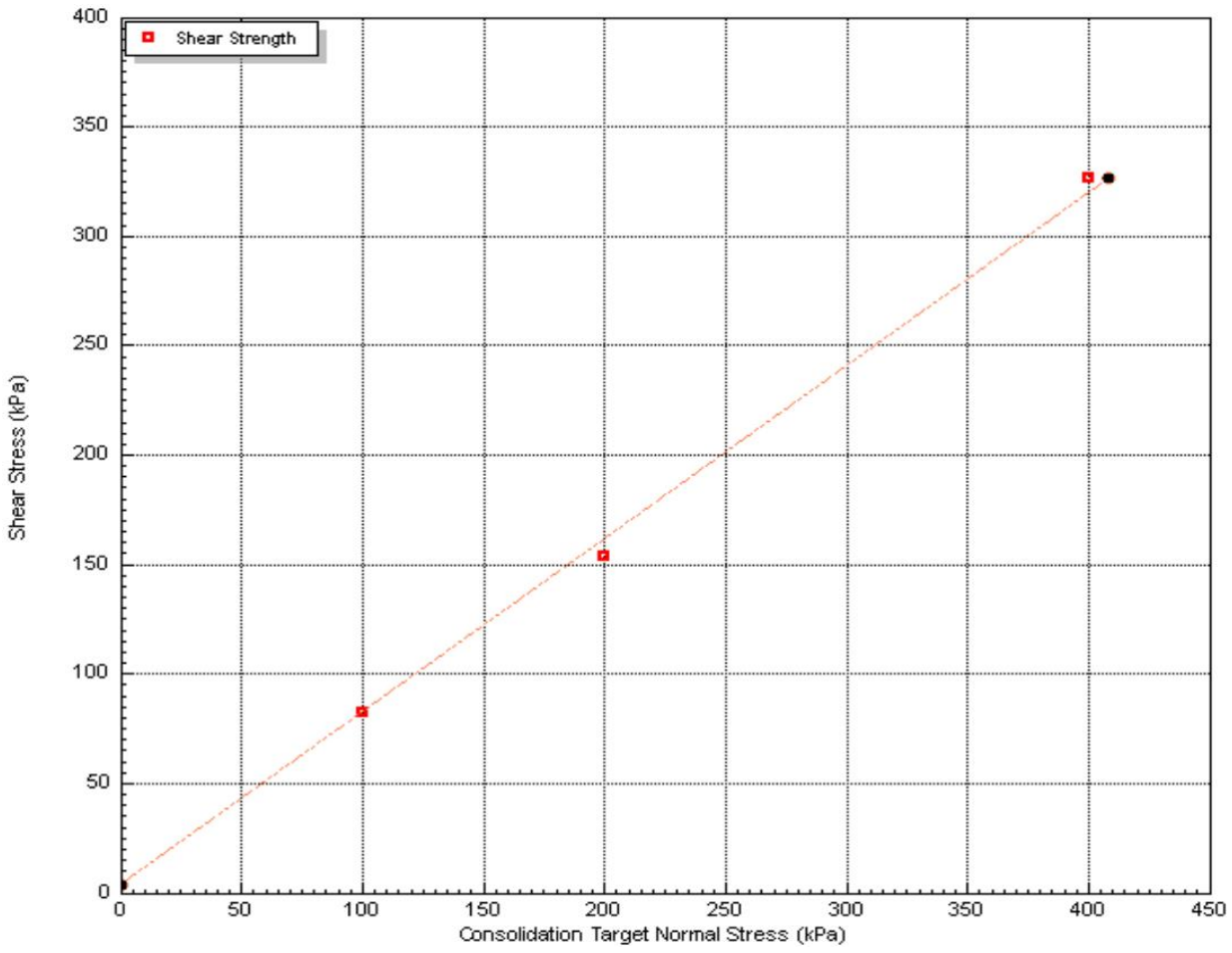


	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH120	Sample Reference	1	
Depth (m)	10.00	Sample Submerged?	Yes	~~No~~
Sample Type	C	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		



	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH120	Sample Reference		2	
Depth (m)	20.00	Sample Submerged?		Yes	~~No~~
Sample Type	C	Particle Density (Mg/m^3)		2.65	Assumed
Description	Grey slightly sandy silty CLAY.				
Sample Preparation	Sample is recompacted using material passing 2mm test sieve				

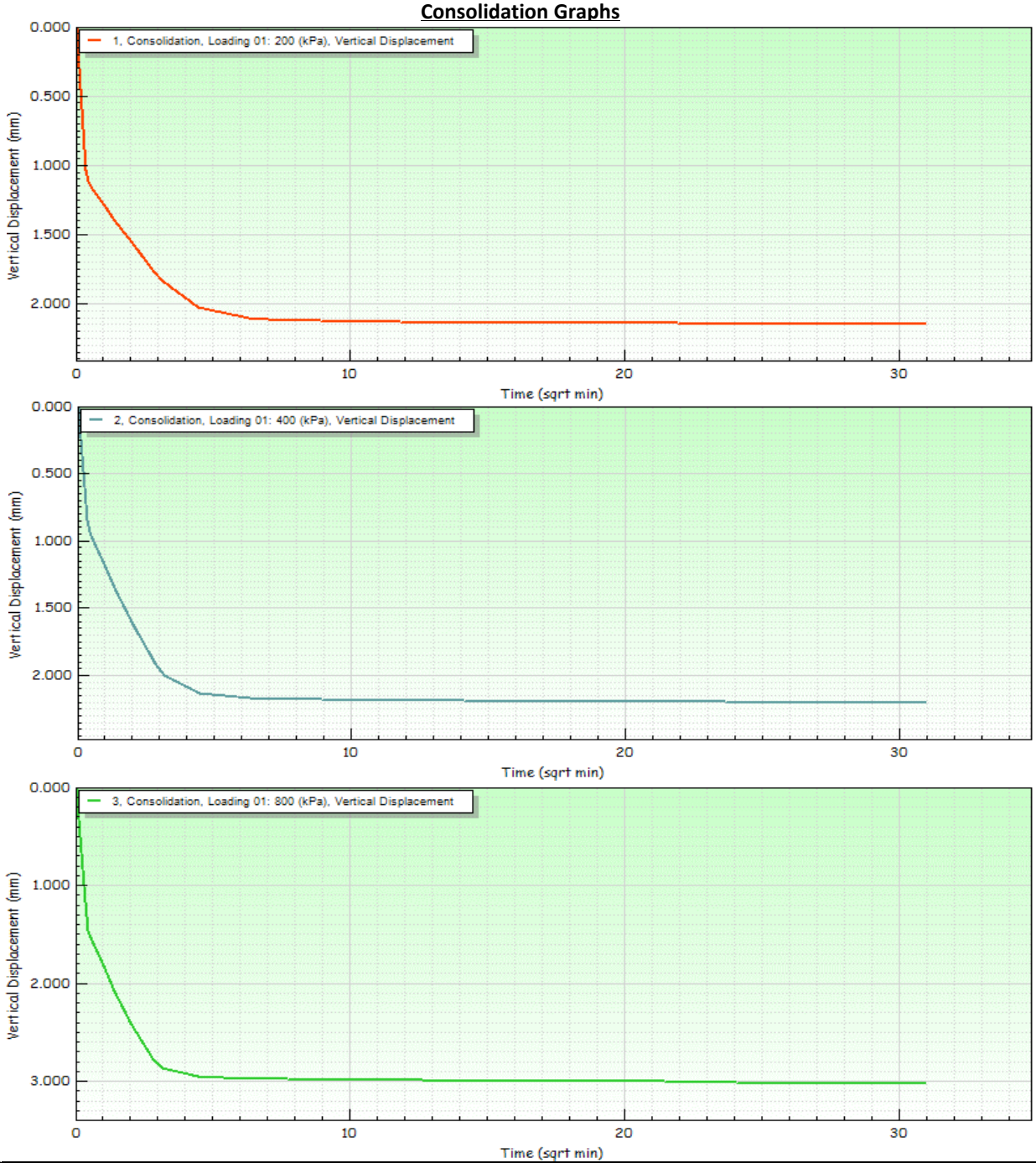
Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	21.0	21.0	21.0
Bulk Density (Mg/m^3)	2.09	2.06	2.10
Dry Density (Mg/m^3)	1.74	1.71	1.74
Voids Ratio	0.527	0.550	0.520
Consolidation			
Normal Pressure (kPa)	200	400	800
Vertical Displacement (mm)	2.147	2.204	3.023
Shearing			
Rate of Strain (mm/min)	0.062	0.062	0.062
Peak Shear Stress (kPa)	131.9	247.4	489.9
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	7.431	4.323	4.857
Final Conditions			
Water Content (%)	24.0	23.0	24.0
Dry Density (Mg/m^3)	2.13	2.17	2.38
Voids Ratio	0.344	0.357	0.264

	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

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

Consolidation Graphs

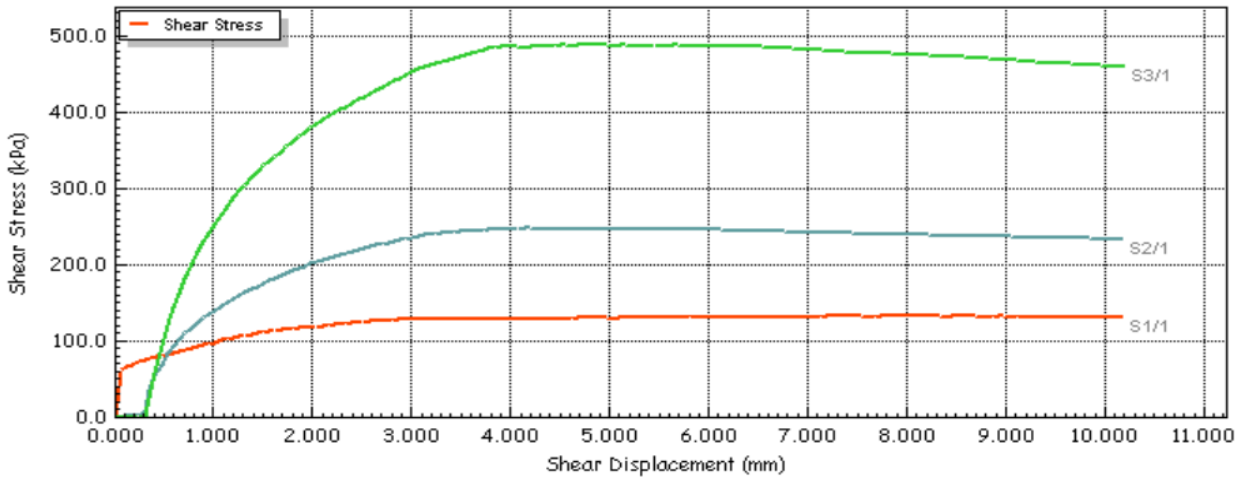


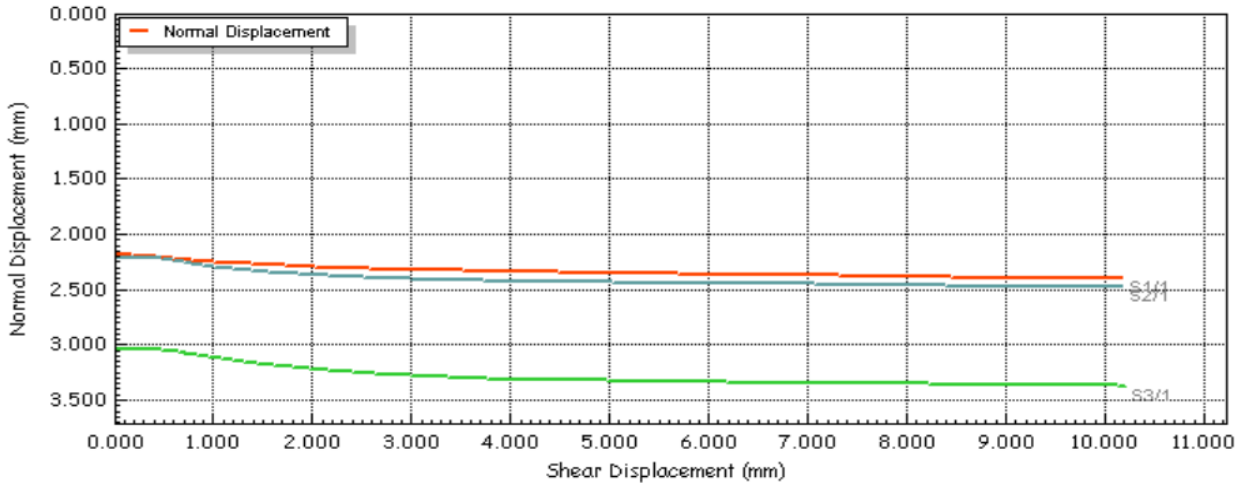
	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

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

Shear Stage





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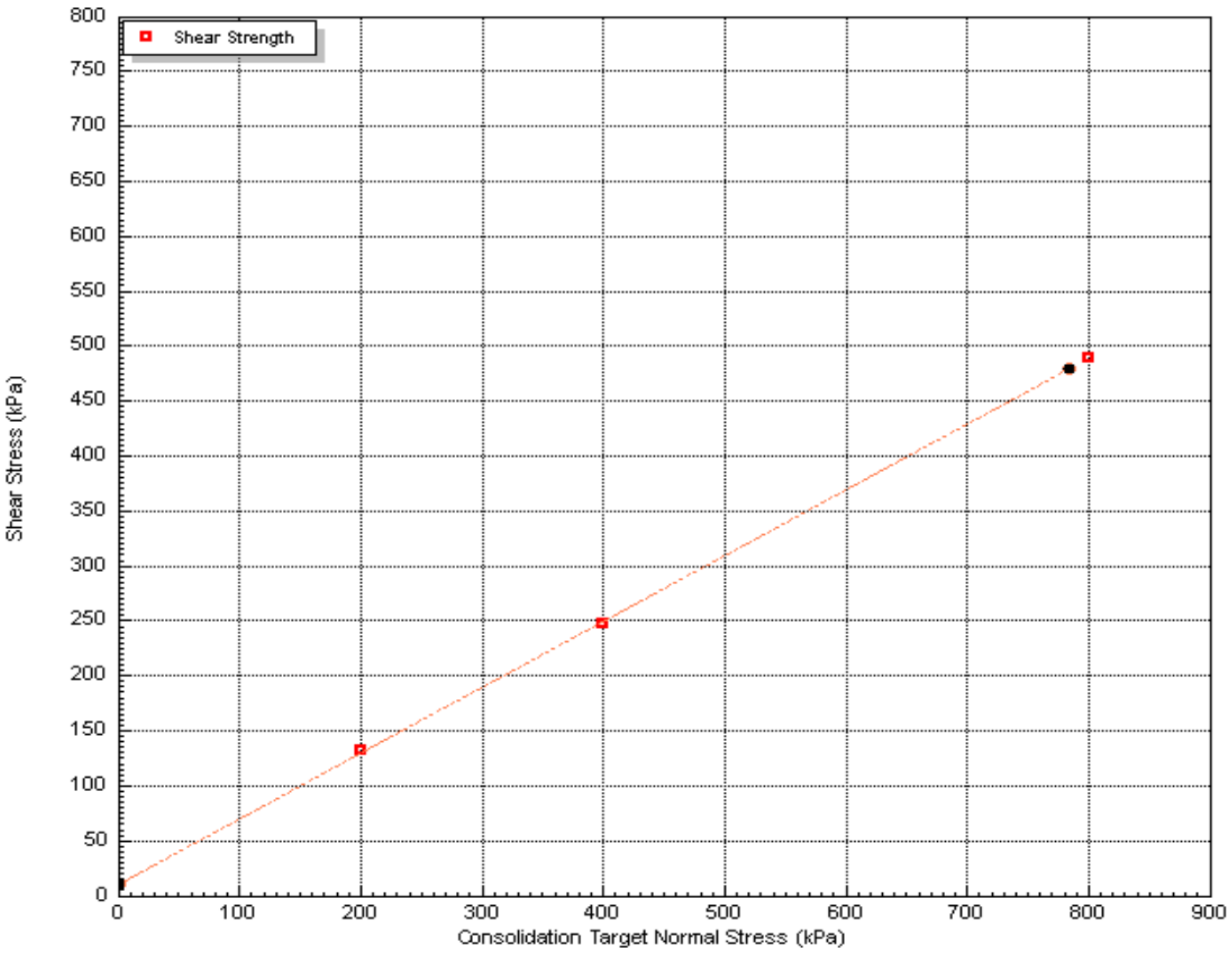
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

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

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



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UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH121	Sample Reference		15	
Depth (m)	8.50	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Greyish brown slightly sandy subangular fine to coarse GRAVEL.				
Sample Preparation	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 (%)	6.6	6.6	6.6
Bulk Density (Mg/m^3)	1.72	1.68	1.73
Dry Density (Mg/m^3)	1.61	1.58	1.62
Voids Ratio	0.646	0.681	0.631
Consolidation			
Normal Pressure (kPa)	85	170	340
Vertical Displacement (mm)	0.291	0.460	0.856
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak Shear Stress (kPa)	75.9	137.4	250.3
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	2.223	3.363	2.637
Final Conditions			
Water Content (%)	19.0	19.0	19.0
Dry Density (Mg/m^3)	1.61	1.66	1.71
Voids Ratio	0.622	0.553	0.637

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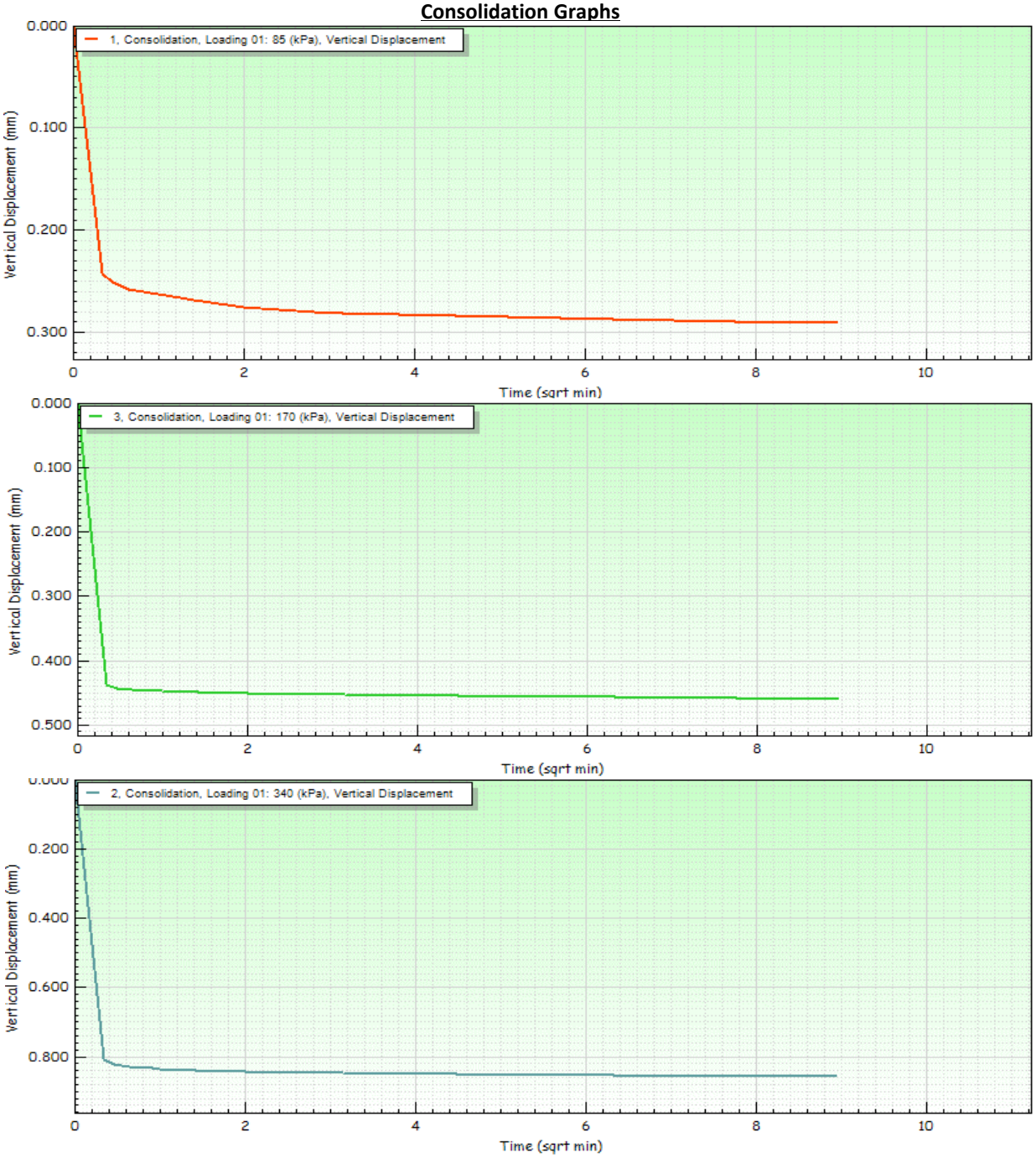
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH121	Sample Reference	15	
Depth (m)	8.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs



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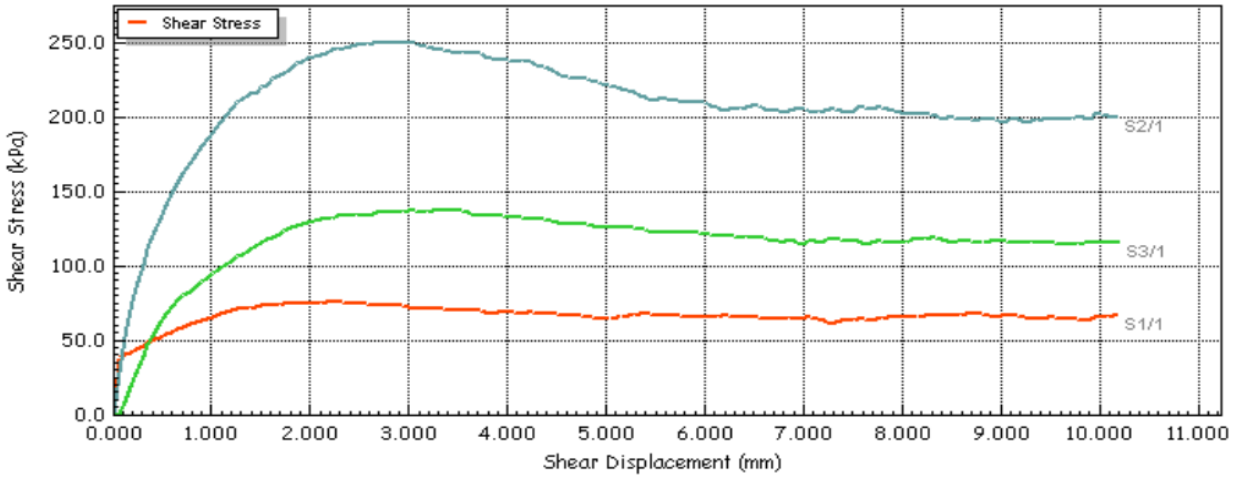
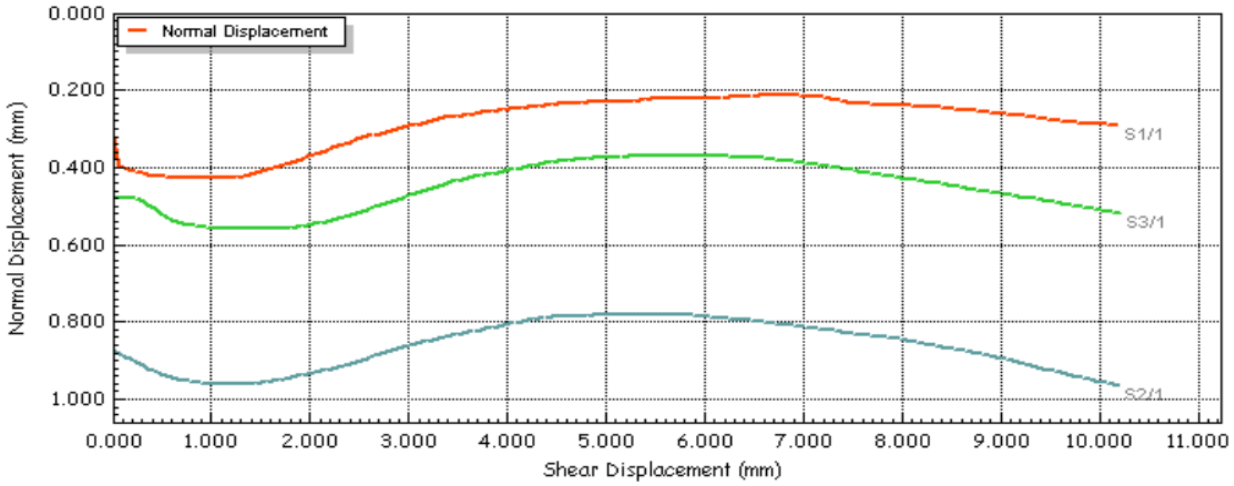
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH121	Sample Reference		15	
Depth (m)	8.50	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage



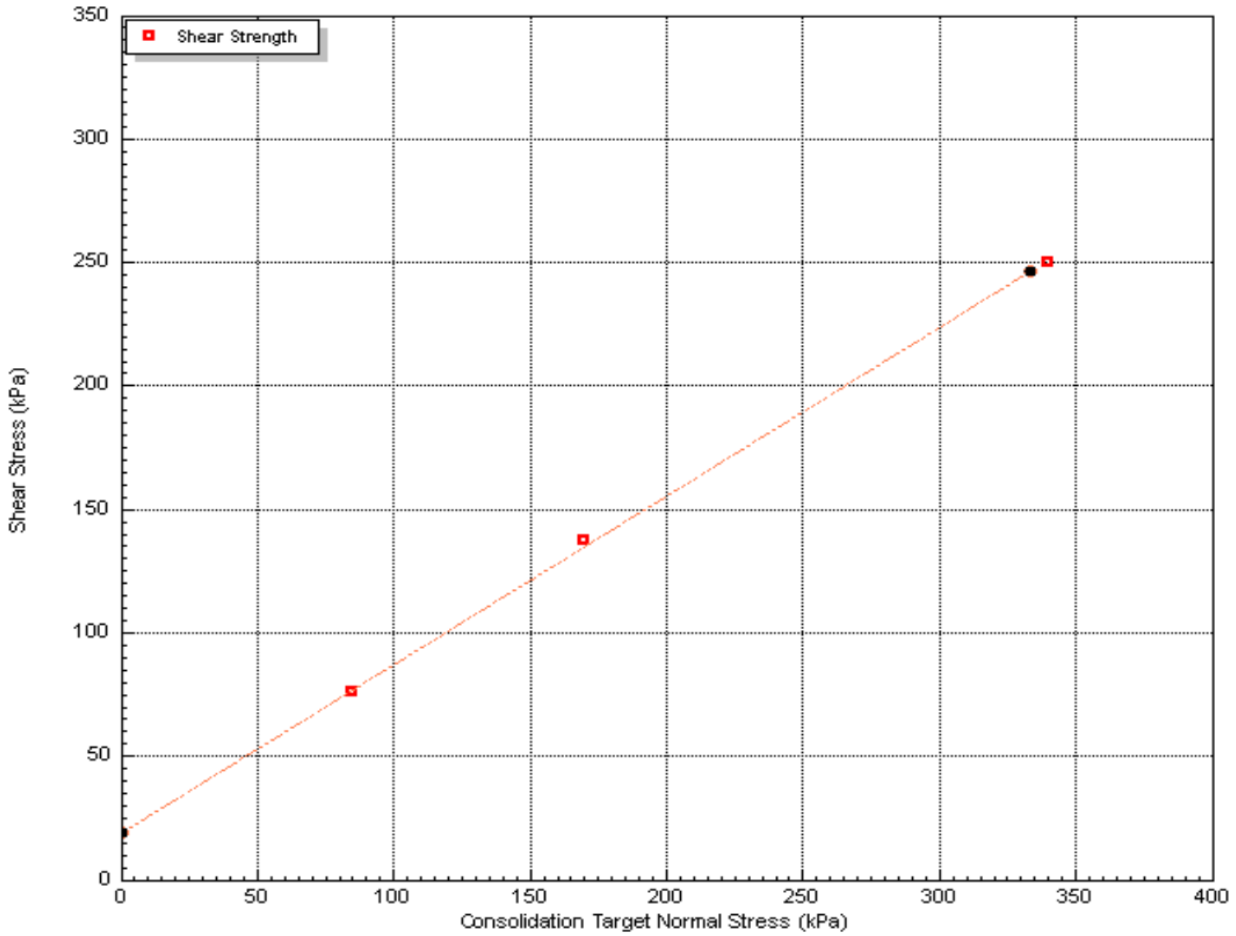


	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH121	Sample Reference	15	
Depth (m)	8.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

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



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UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH121	Sample Reference		41	
Depth (m)	15.60	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Brown gravelly slightly silty fine to coarse SAND.				
Sample Preparation	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 (%)	5.9	5.9	5.9
Bulk Density (Mg/m^3)	1.59	1.60	1.59
Dry Density (Mg/m^3)	1.50	1.51	1.50
Voids Ratio	0.768	0.755	0.766
Consolidation			
Normal Pressure (kPa)	160	320	640
Vertical Displacement (mm)	0.492	0.444	0.891
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak Shear Stress (kPa)	148.3	265.4	503.3
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	4.563	3.117	4.803
Final Conditions			
Water Content (%)	24.0	22.0	22.0
Dry Density (Mg/m^3)	1.51	1.53	1.52
Voids Ratio	0.741	0.722	0.674

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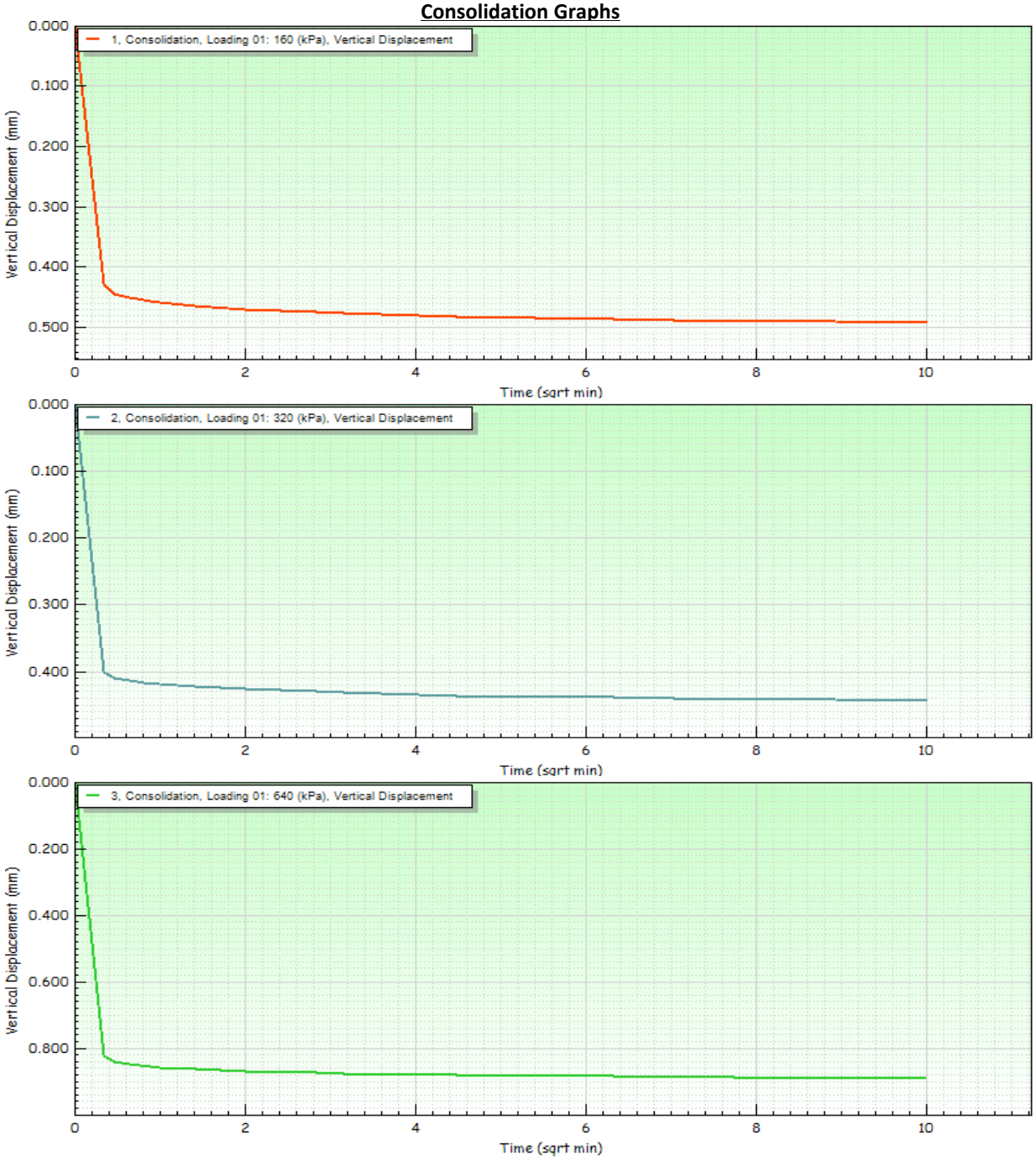
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH121	Sample Reference	41	
Depth (m)	15.60	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs



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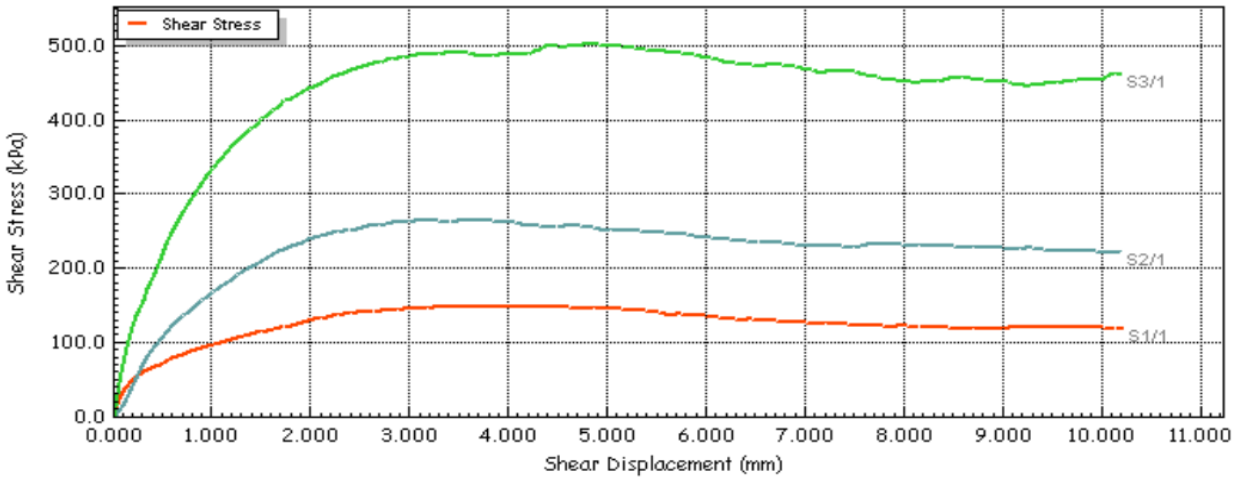
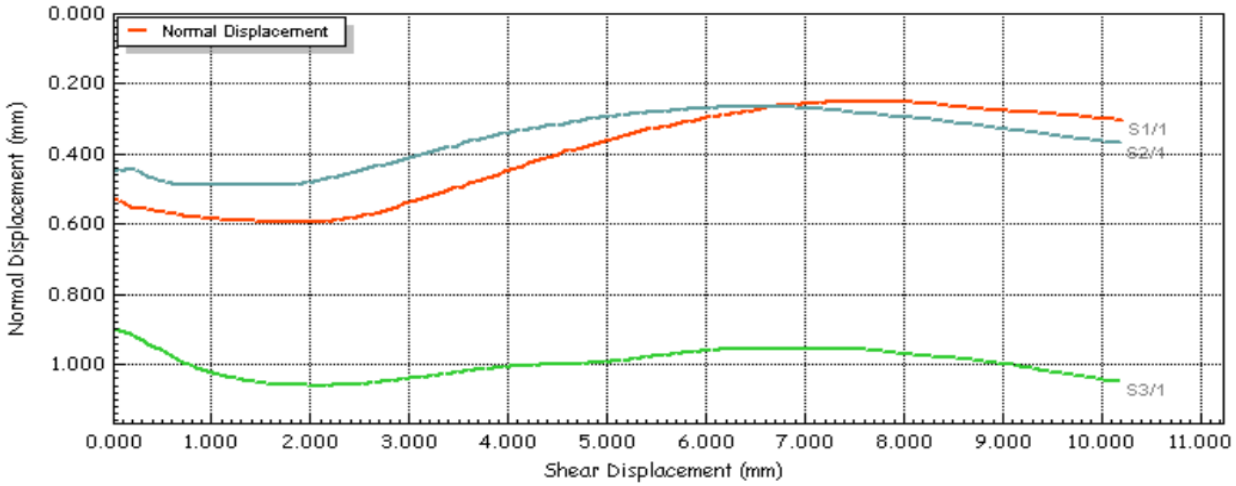
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH121	Sample Reference		41	
Depth (m)	15.60	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage





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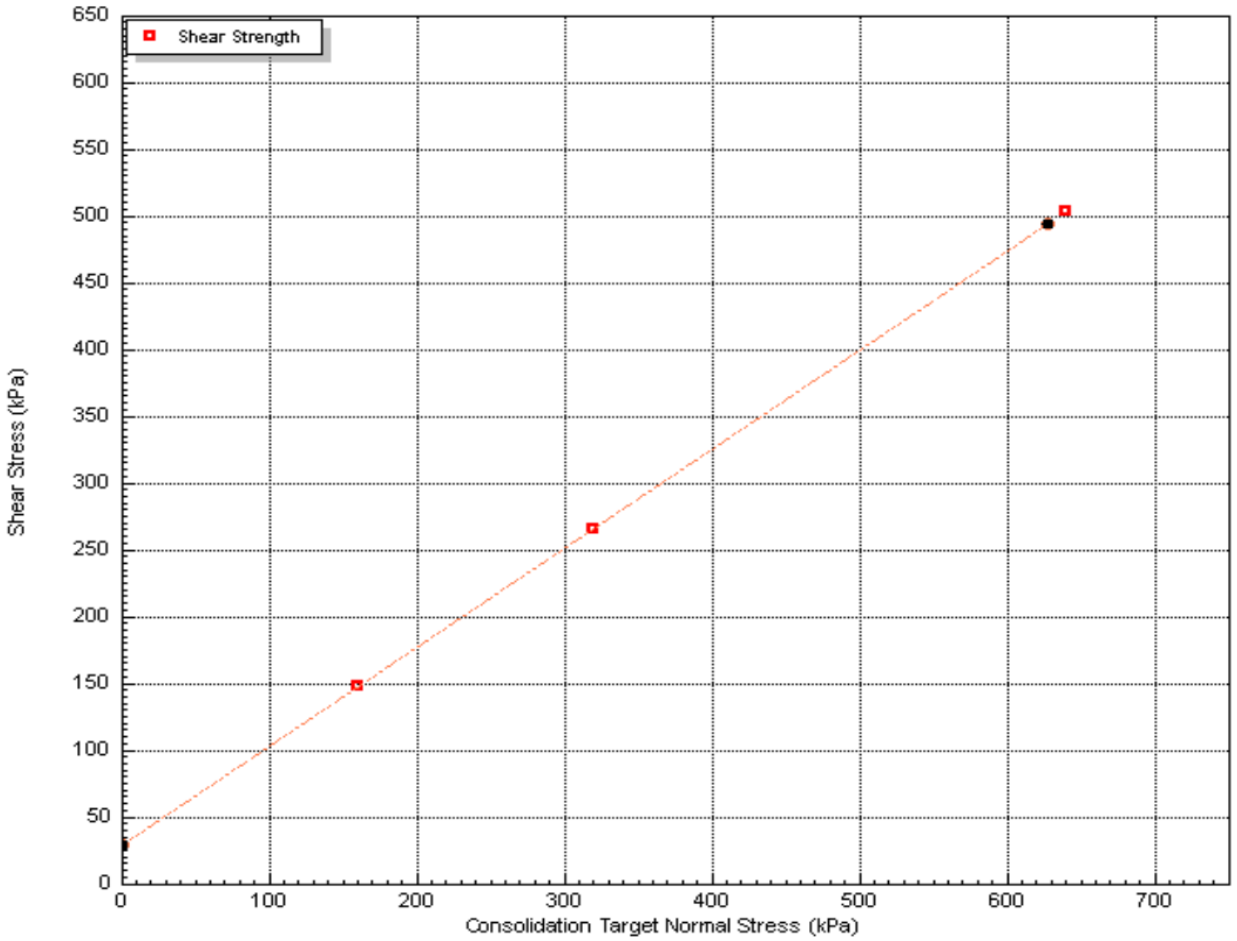
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH121	Sample Reference	41	
Depth (m)	15.60	Sample Submerged?	Yes	~~No~~
Sample Type	B	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		



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Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH122	Sample Reference		15	
Depth (m)	8.50	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Grey gravelly slightly silty fine to coarse SAND.				
Sample Preparation	Sample is recompacted using material passing 2mm test sieve				

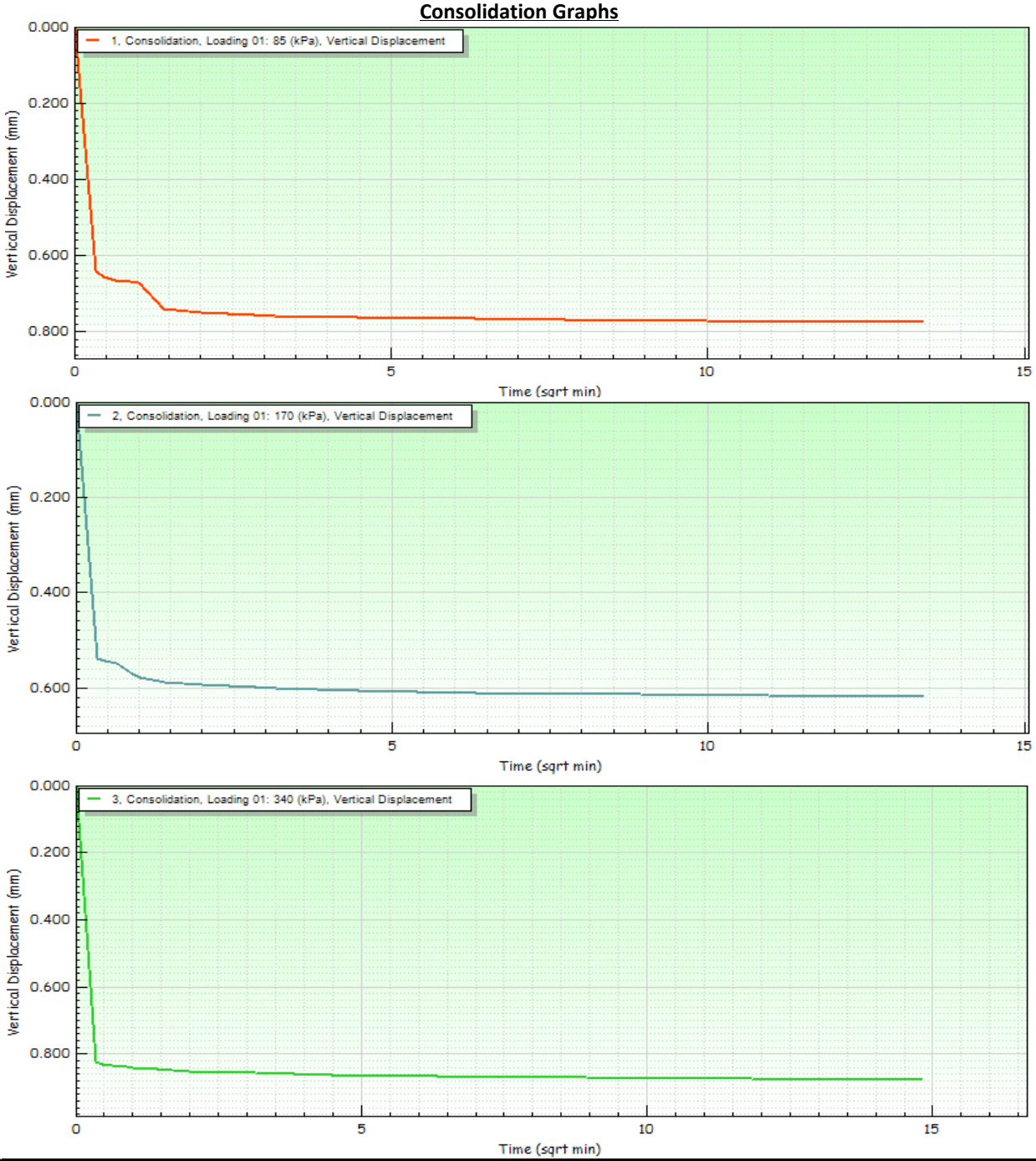
Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	8.6	8.6	8.6
Bulk Density (Mg/m^3)	1.73	1.71	1.71
Dry Density (Mg/m^3)	1.60	1.57	1.57
Voids Ratio	0.659	0.687	0.687
Consolidation			
Normal Pressure (kPa)	85	170	340
Vertical Displacement (mm)	0.775	0.619	0.877
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak 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			
Water Content (%)	23.0	22.0	22.0
Dry Density (Mg/m^3)	1.68	1.67	1.74
Voids Ratio	0.577	0.608	0.586

	Tested	Approved
UKAS TESTING 10122 CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH122	Sample Reference	15	
Depth (m)	8.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs



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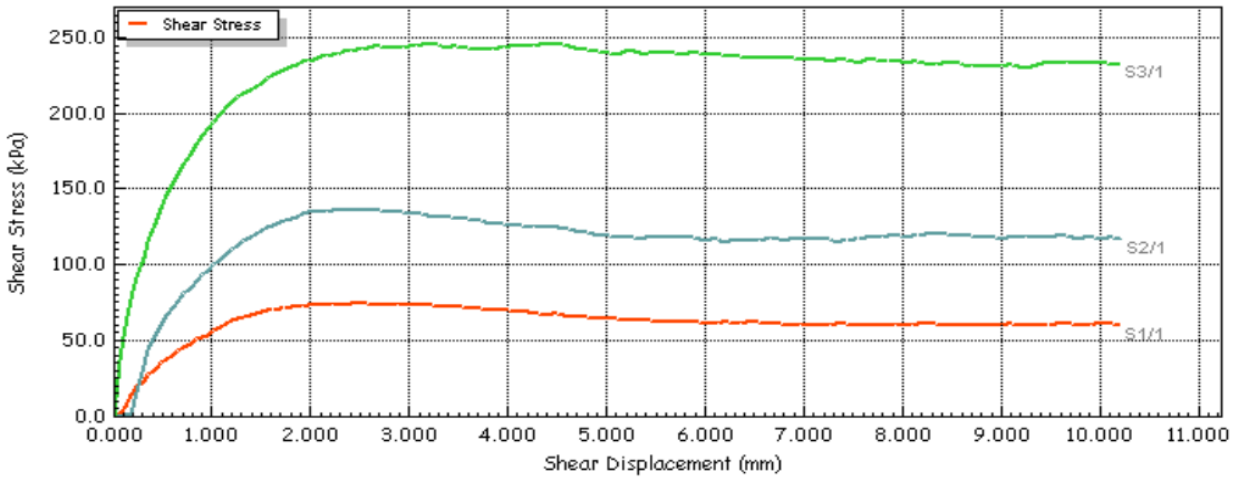
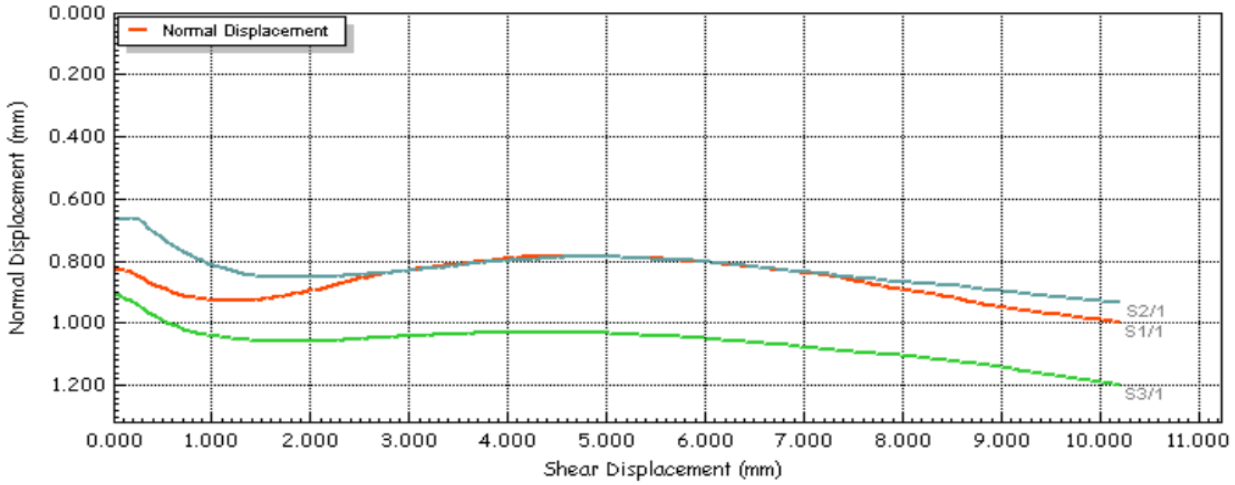
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH122	Sample Reference		15	
Depth (m)	8.50	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage





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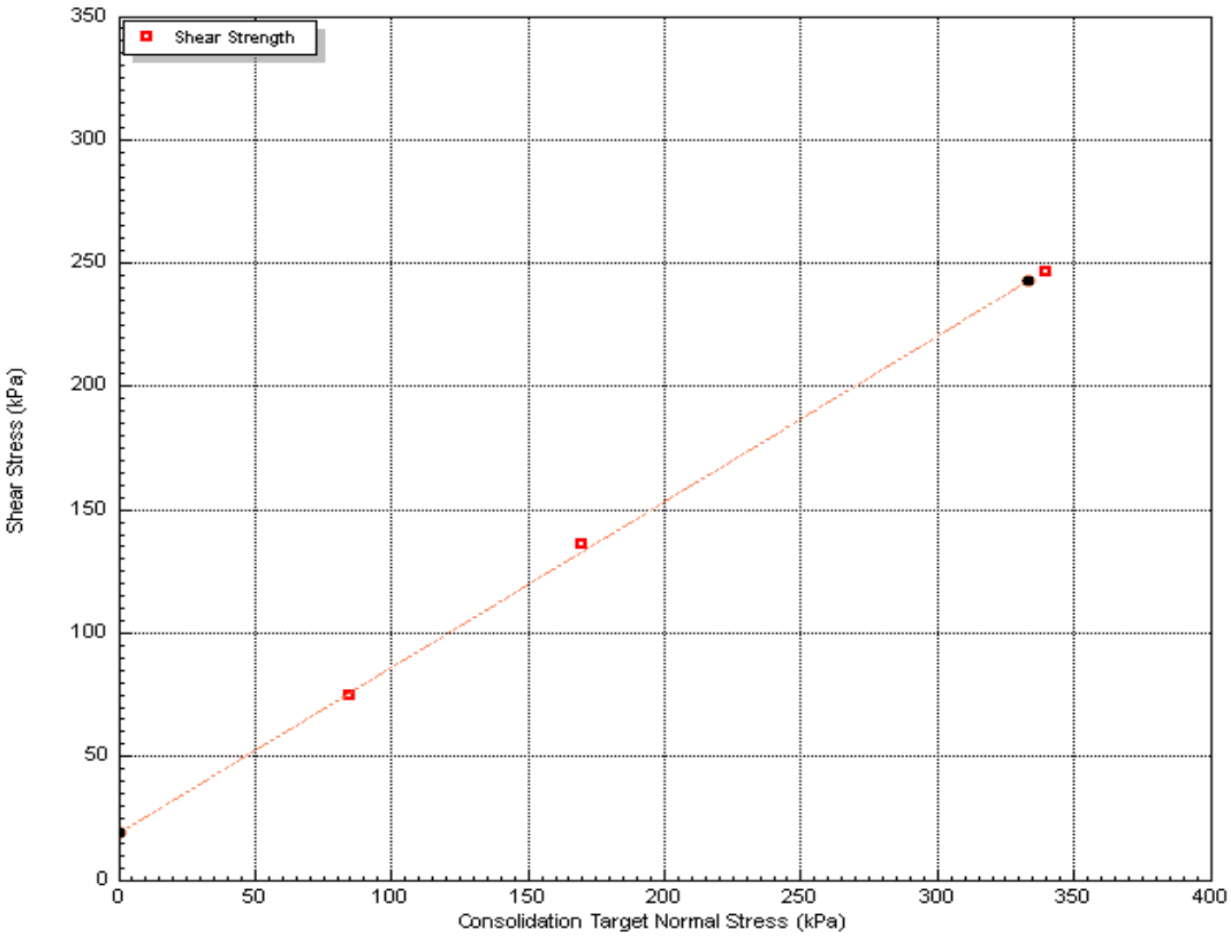
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH122	Sample Reference	15	
Depth (m)	8.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	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		



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UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH122	Sample Reference		30	
Depth (m)	11.50	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Grey slightly sandy slightly silty subrounded fine to medium GRAVEL.				
Sample Preparation	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 (%)	5.7	5.7	5.7
Bulk Density (Mg/m^3)	1.62	1.62	1.64
Dry Density (Mg/m^3)	1.53	1.53	1.56
Voids Ratio	0.733	0.731	0.703
Consolidation			
Normal Pressure (kPa)	115	230	460
Vertical Displacement (mm)	0.601	0.659	1.381
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak Shear Stress (kPa)	93.6	183.6	326.5
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	3.123	3.178	2.877
Final Conditions			
Water Content (%)	21.0	21.0	21.0
Dry Density (Mg/m^3)	1.57	1.61	1.78
Voids Ratio	0.676	0.670	0.559

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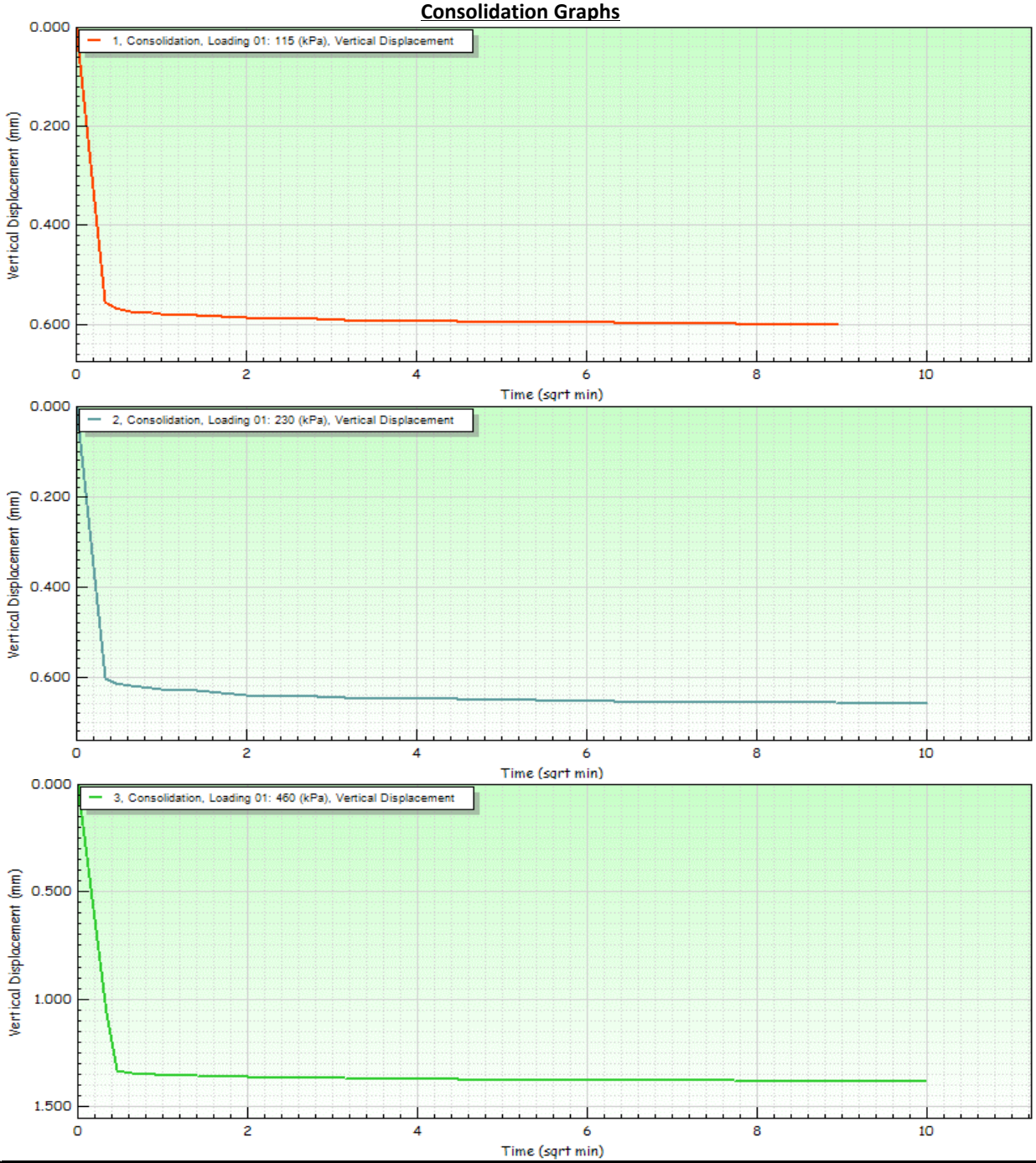
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH122	Sample Reference	30	
Depth (m)	11.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs



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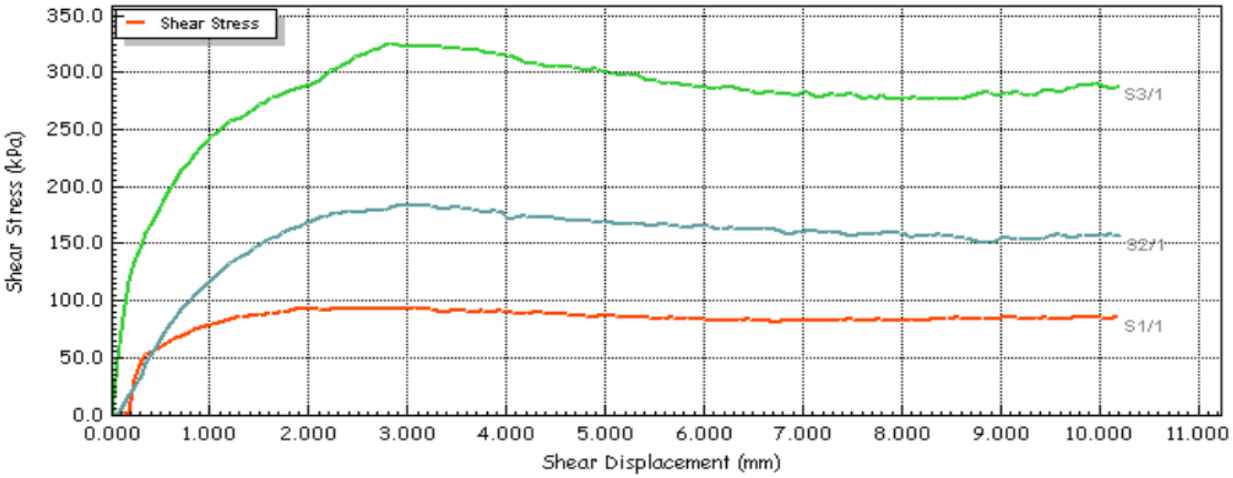
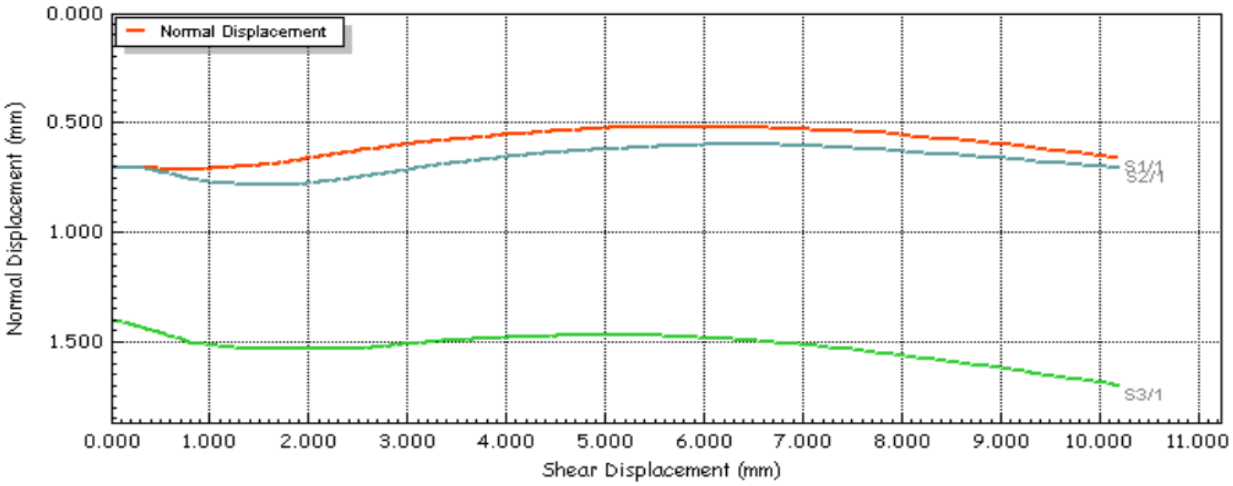
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH122	Sample Reference		30	
Depth (m)	11.50	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage





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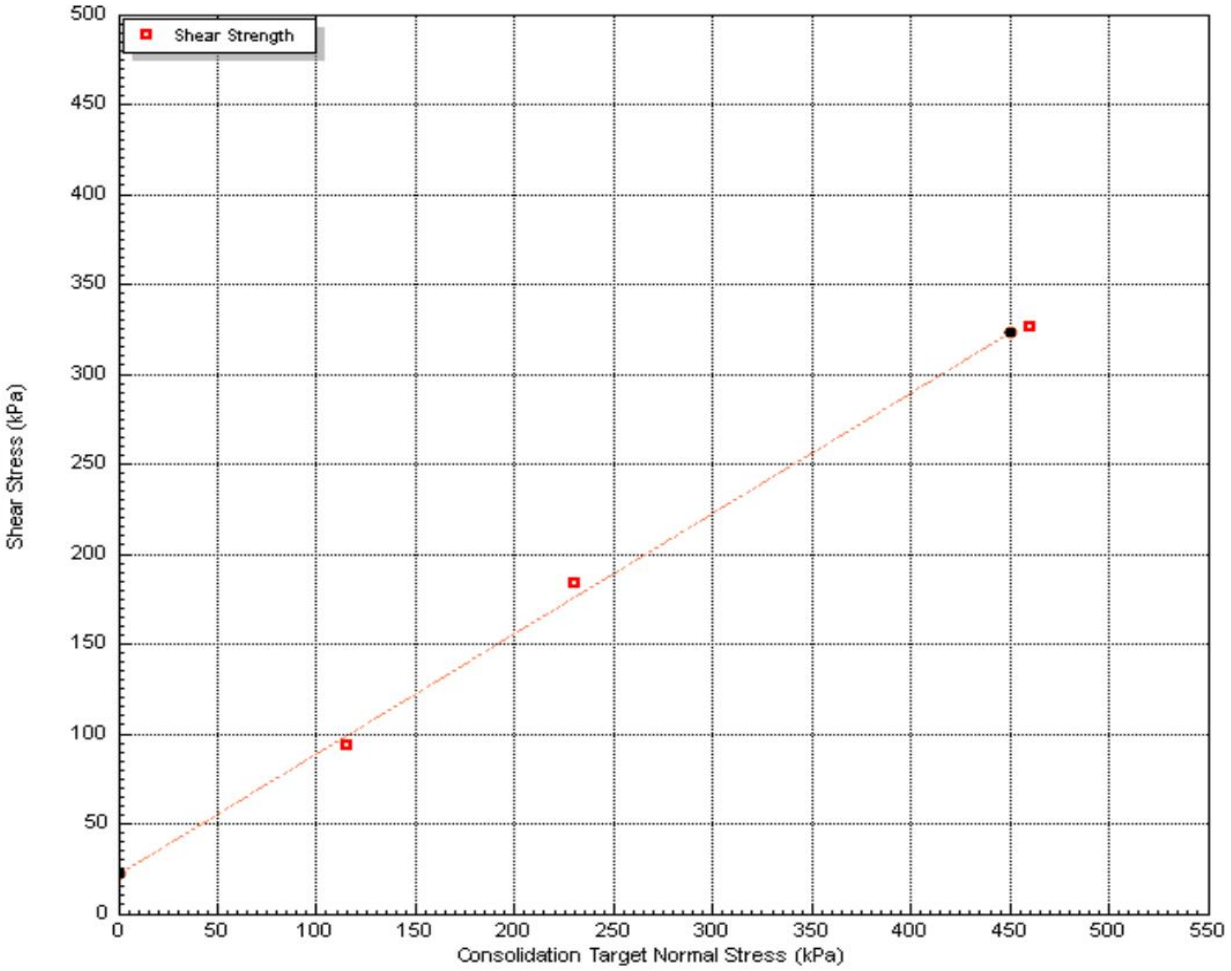
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH122	Sample Reference	30	
Depth (m)	11.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	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		



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10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH123	Sample Reference		18	
Depth (m)	5.80	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Greyish brown gravelly slightly silty fine to medium SAND containing shell fragments.				
Sample Preparation	Sample is recompacted using material passing 2mm test sieve				

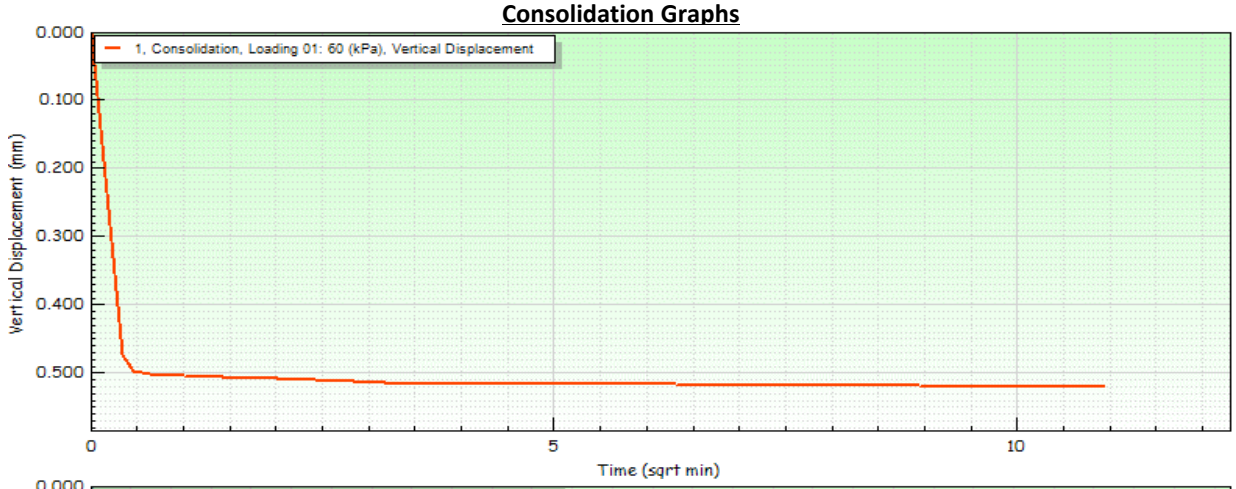
Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	26.0	26.0	26.0
Bulk Density (Mg/m^3)	1.80	1.77	1.77
Dry Density (Mg/m^3)	1.43	1.41	1.41
Voids Ratio	0.852	0.881	0.885
Consolidation			
Normal Pressure (kPa)	60	120	240
Vertical Displacement (mm)	0.520	0.472	0.611
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak Shear Stress (kPa)	47.2	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			
Water Content (%)	29.0	30.0	30.0
Dry Density (Mg/m^3)	1.43	1.40	1.44
Voids Ratio	0.822	0.849	0.827

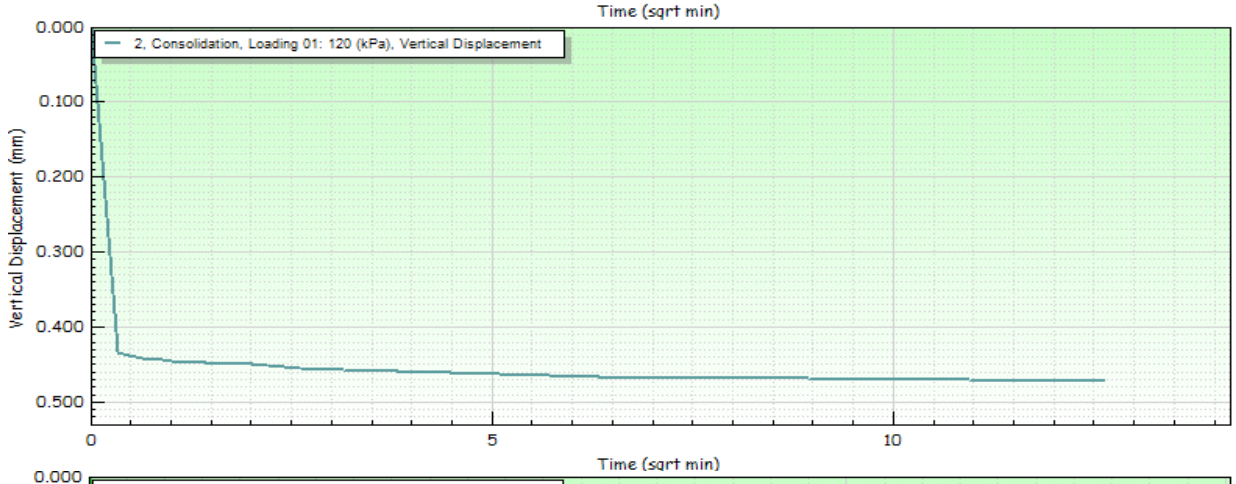
	Tested	Approved
UKAS TESTING 10122 CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

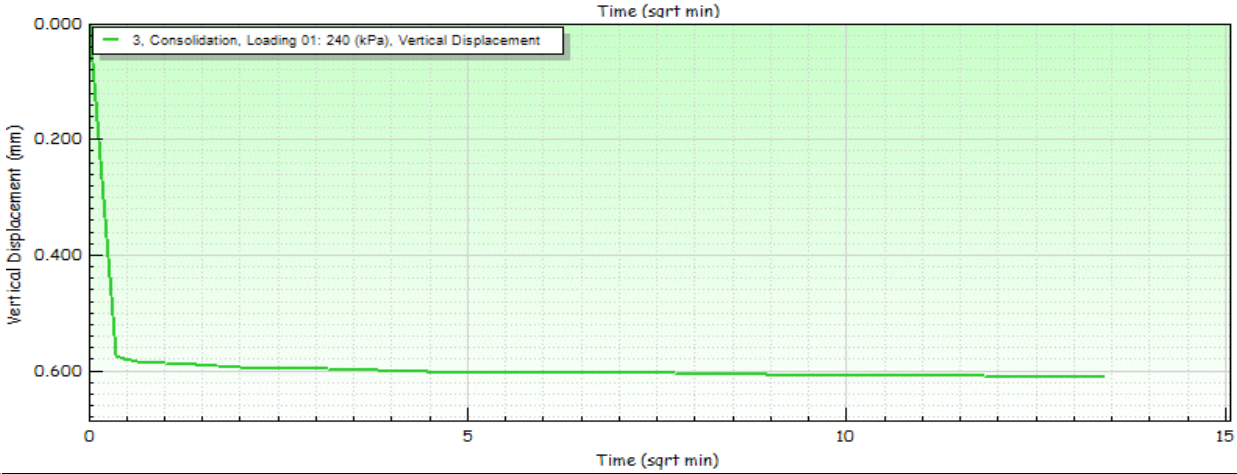
Lab Sheet Reference : LAB25R - Version 4

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

Consolidation Graphs







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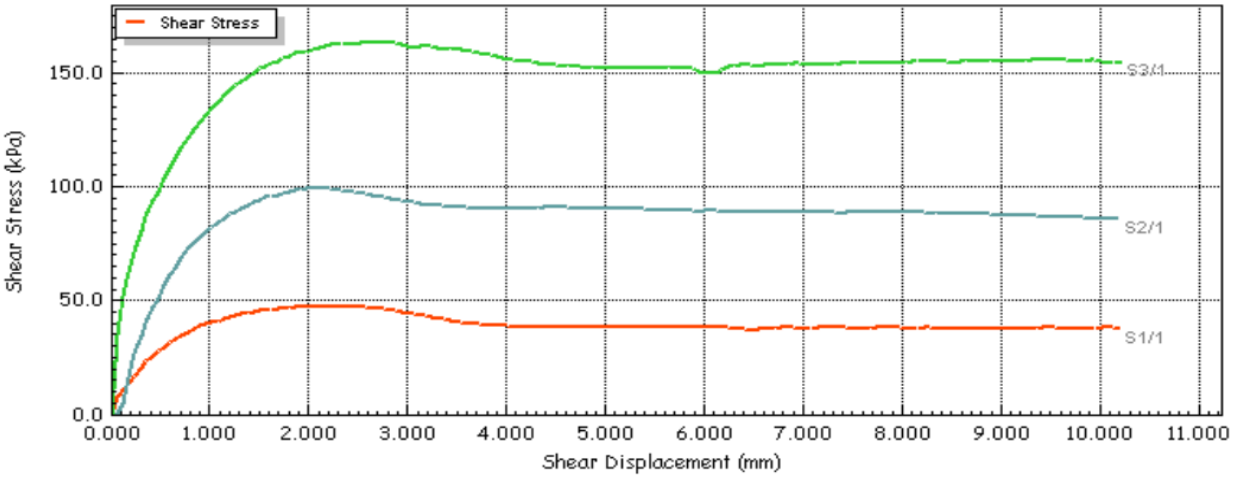
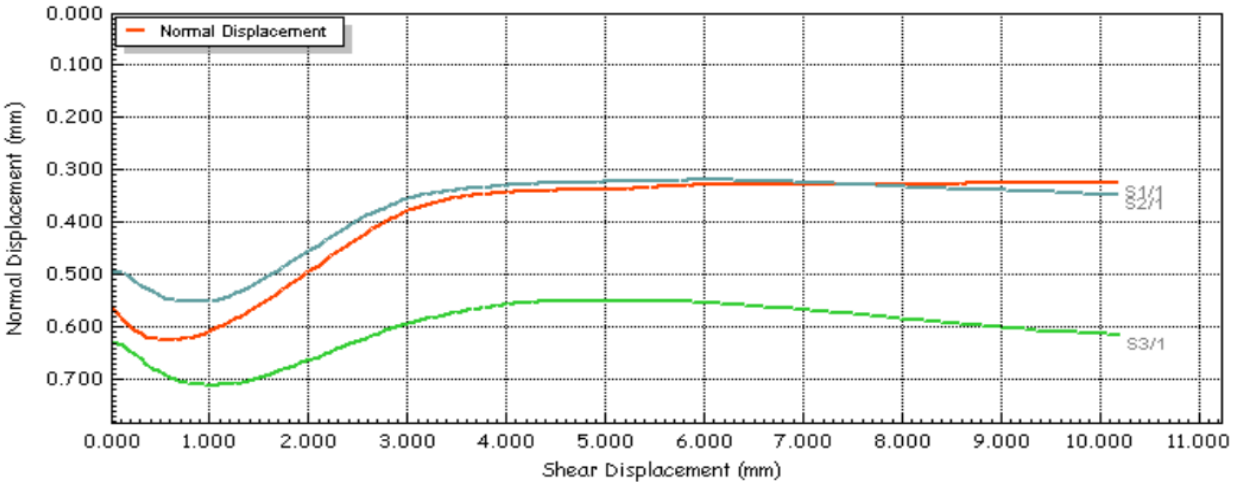
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

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

Shear Stage





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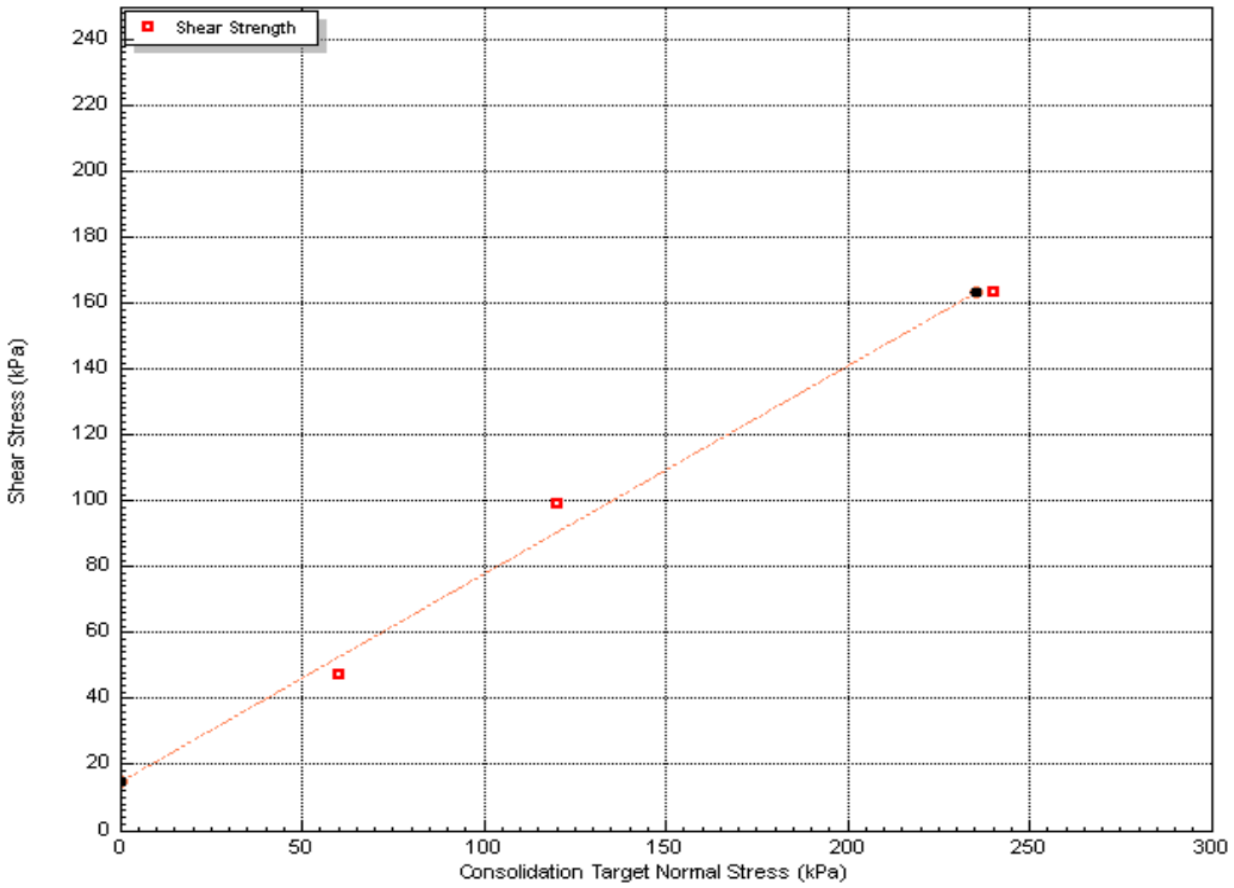
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH123	Sample Reference	18	
Depth (m)	5.80	Sample Submerged?	Yes	~~No~~
Sample Type	B	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		



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Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH124	Sample Reference		18	
Depth (m)	5.80	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Brownish grey sandysubangular ĮneĮ to coarse GRAVEL.				
Sample Preparation	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 (%)	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			
Normal Pressure (kPa)	60	120	240
Vertical Displacement (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			
Water Content (%)	29.0	29.0	29.0
Dry Density (Mg/m^3)	1.37	1.46	1.49
Voids Ratio	0.876	0.818	0.802

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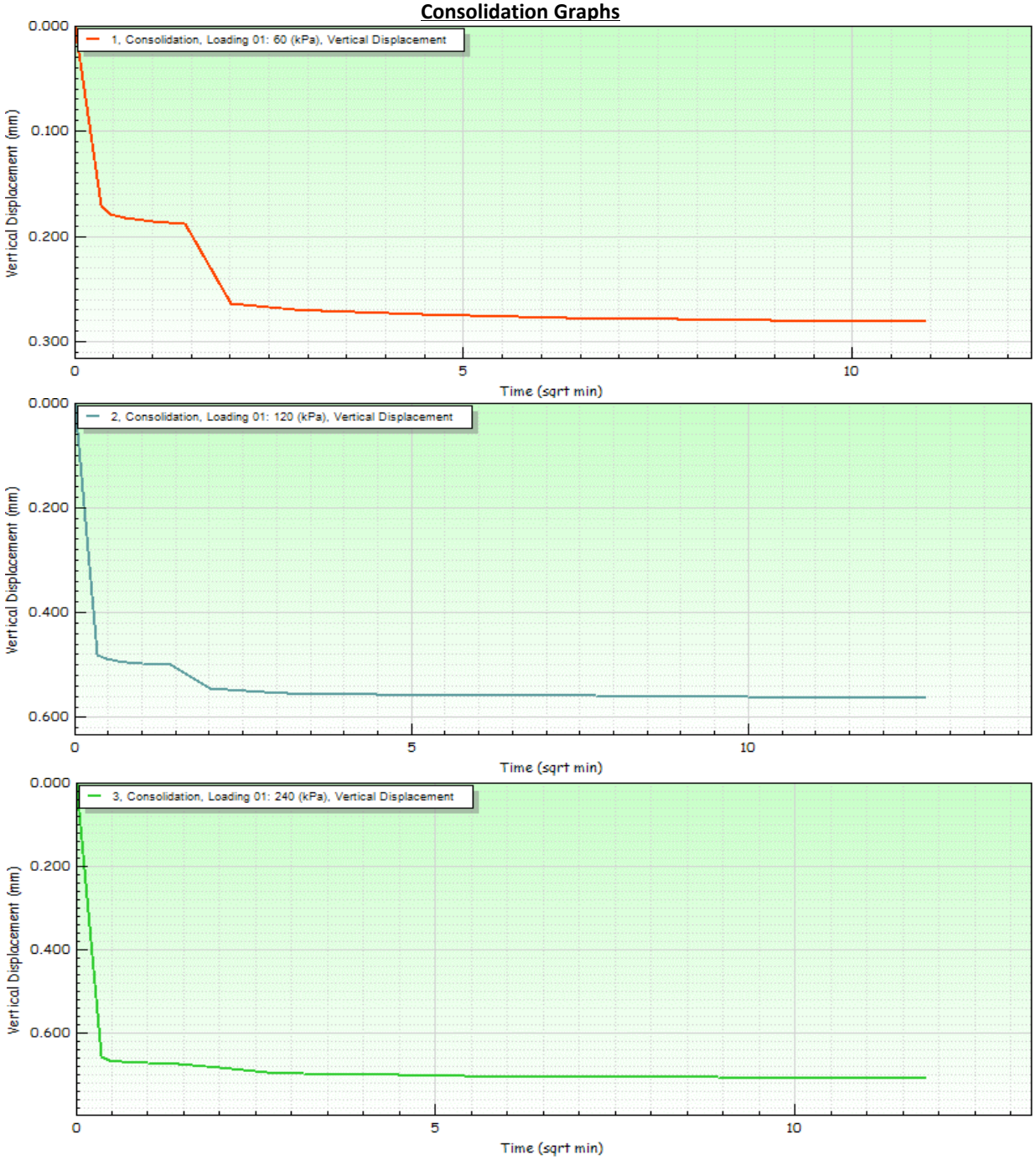
Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH124	Sample Reference	18	
Depth (m)	5.80	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs



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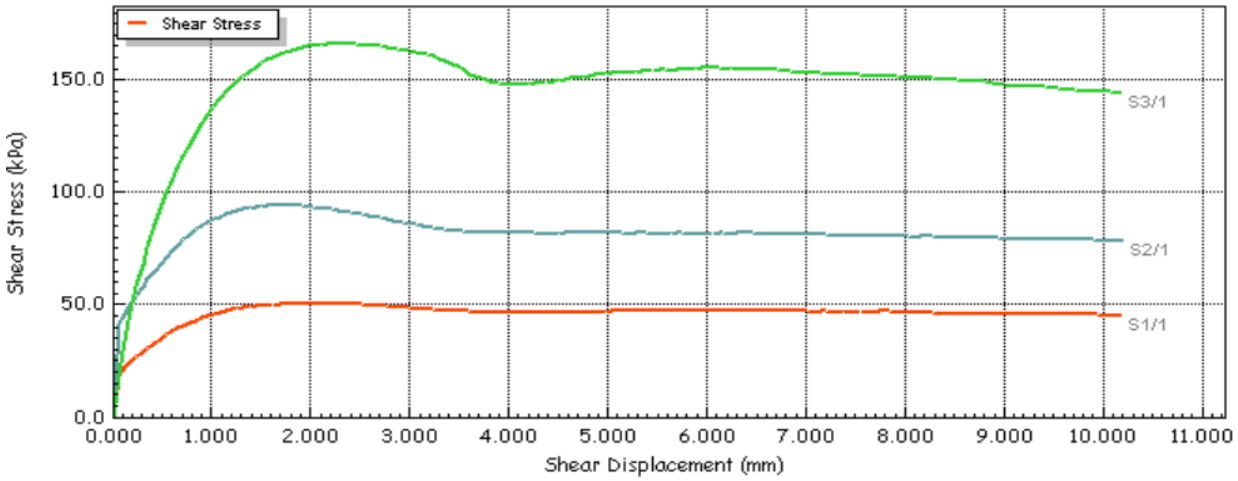
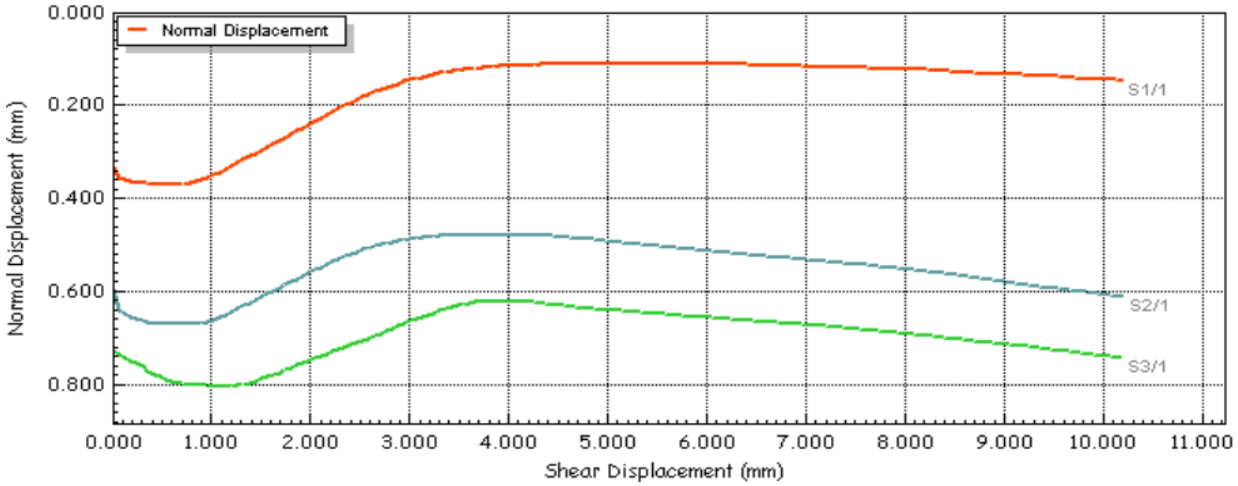
Lab Sheet Reference : LAB25R - Version 4

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

Shear Stage





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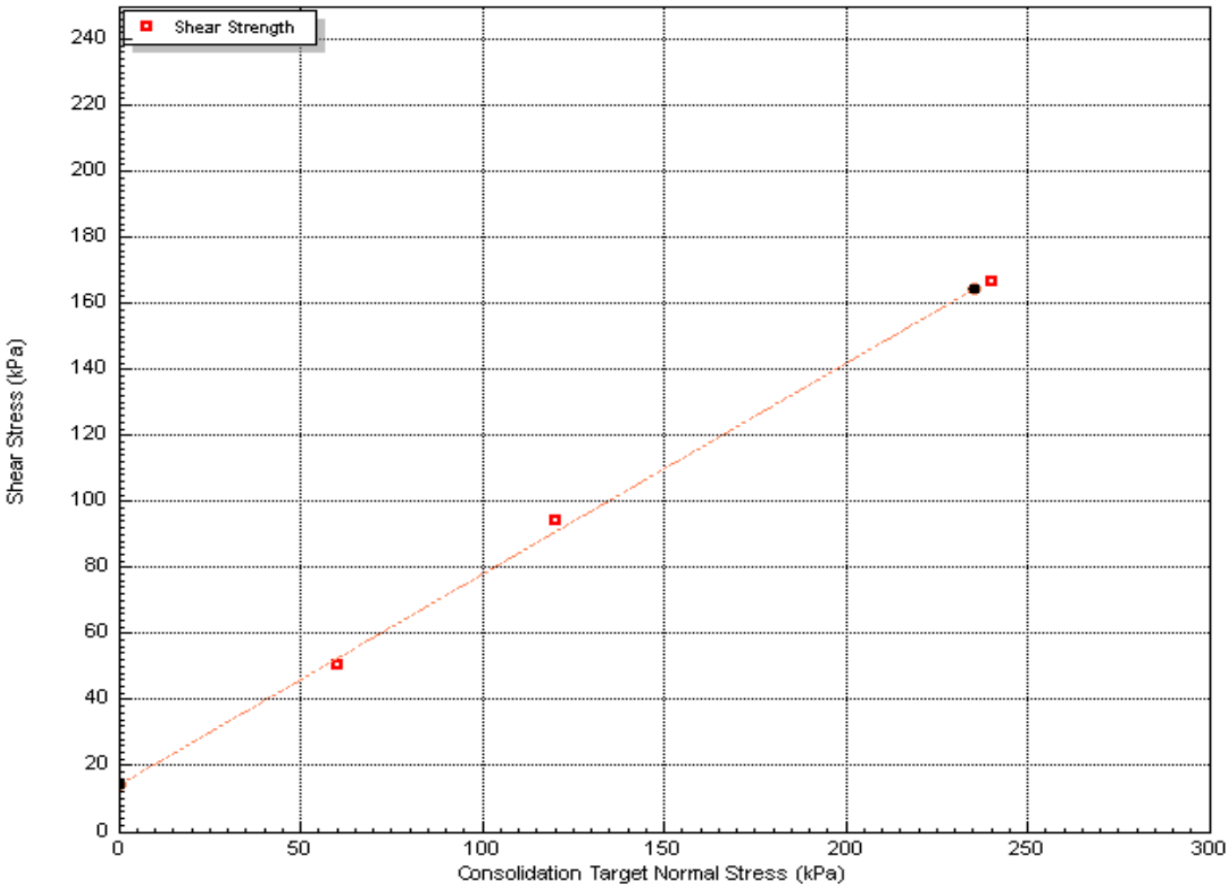
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH124	Sample Reference	18	
Depth (m)	5.80	Sample Submerged?	Yes	~~No~~
Sample Type	B	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		



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Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH124	Sample Reference		42	
Depth (m)	13.50	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL.				
Sample Preparation	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
Dry Density (Mg/m^3)	1.68	1.69	1.67
Voids Ratio	0.582	0.568	0.583
Consolidation			
Normal Pressure (kPa)	135	270	540
Vertical Displacement (mm)	0.465	0.740	1.170
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak 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)	3.003	3.477	4.563
Final Conditions			
Water Content (%)	15.0	15.0	16.0
Dry Density (Mg/m^3)	1.77	1.83	1.92
Voids Ratio	0.530	0.496	0.469

	Tested	Approved
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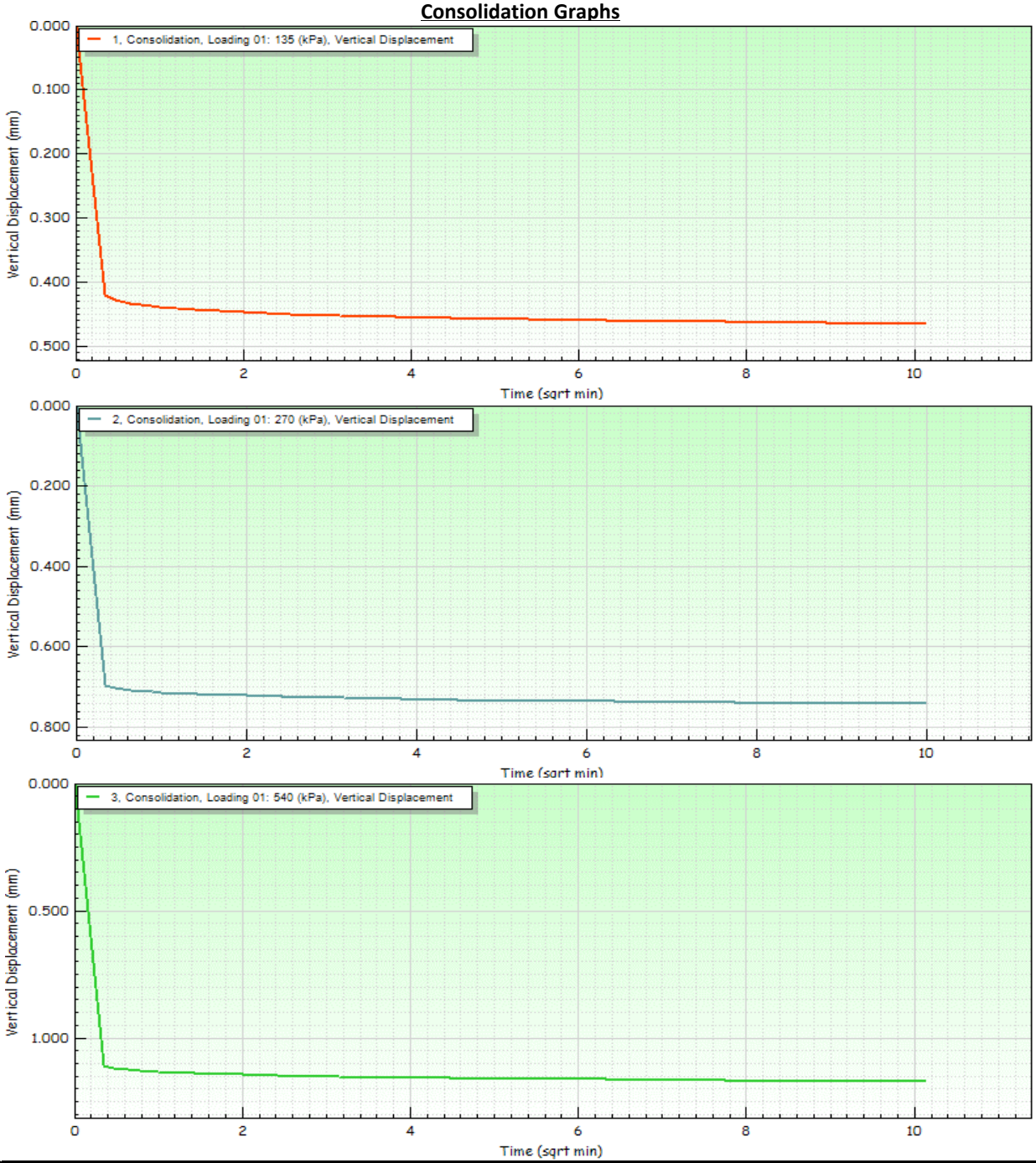
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH124	Sample Reference	42	
Depth (m)	13.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs



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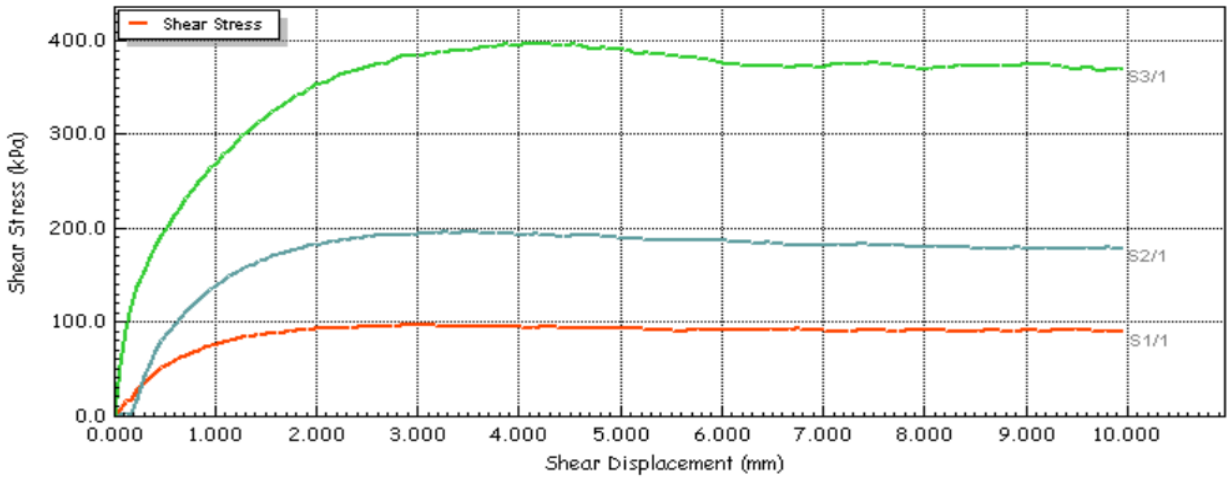
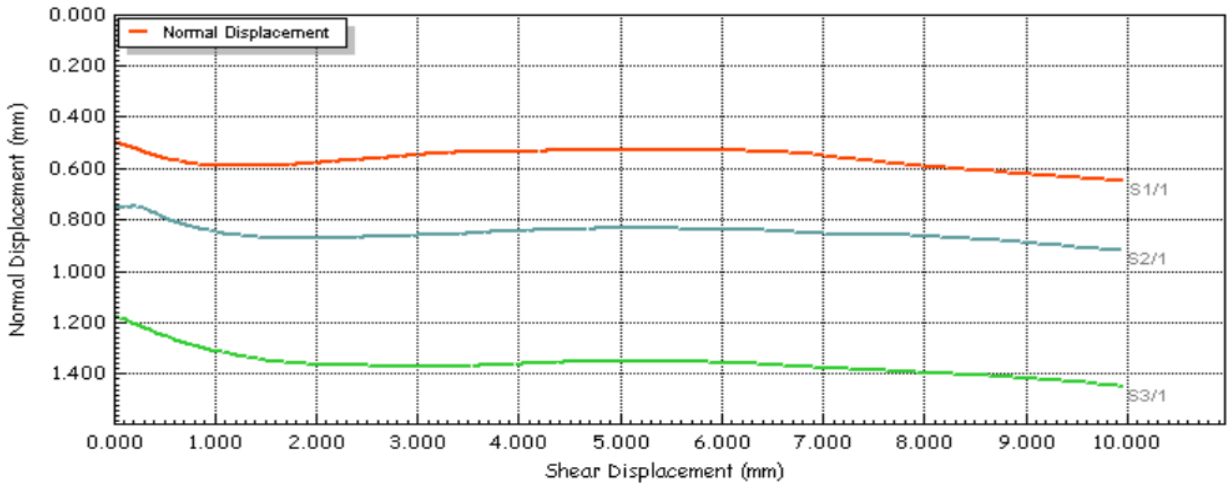
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH124	Sample Reference		42	
Depth (m)	13.50	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage





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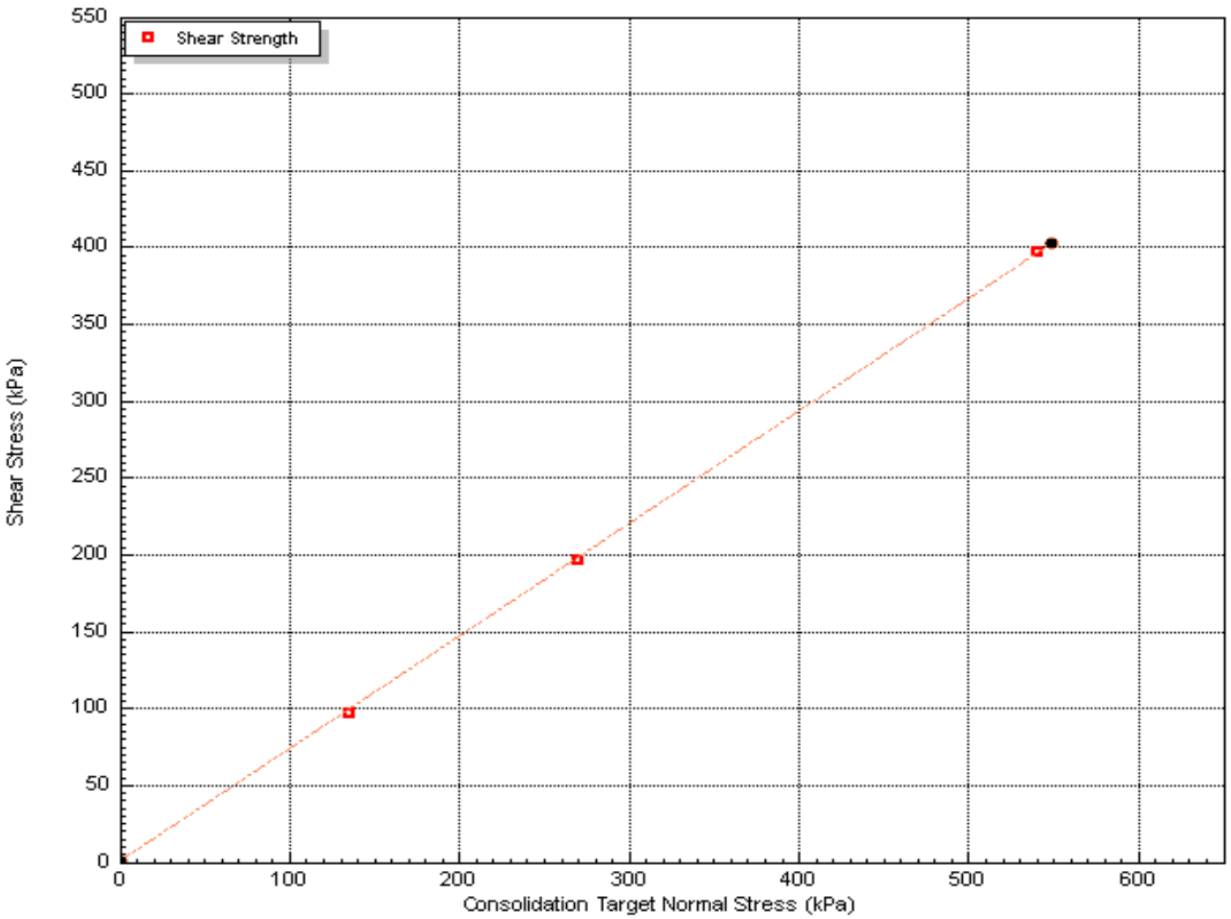
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH124	Sample Reference	42	
Depth (m)	13.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

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



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Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH124	Sample Reference	1	
Depth (m)	31.00	Sample Submerged?	Yes	~~No~~
Sample Type	C	Particle Density (Mg/m^3)	2.65	Assumed
Description	Dark grey slightly sandy slightly clayey subangular fine to coarse GRAVEL.			
Sample Preparation	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 (%)	18.0	18.0	18.0
Bulk Density (Mg/m^3)	1.90	1.91	1.89
Dry Density (Mg/m^3)	1.61	1.62	1.60
Voids Ratio	0.642	0.633	0.653
Consolidation			
Normal Pressure (kPa)	300	600	1200
Vertical Displacement (mm)	1.006	1.263	1.759
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak Shear Stress (kPa)	253.1	498.6	869.8
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	3.417	4.323	5.643
Final Conditions			
Water Content (%)	20.0	20.0	19.0
Dry Density (Mg/m^3)	1.77	1.86	1.96
Voids Ratio	0.555	0.491	0.457

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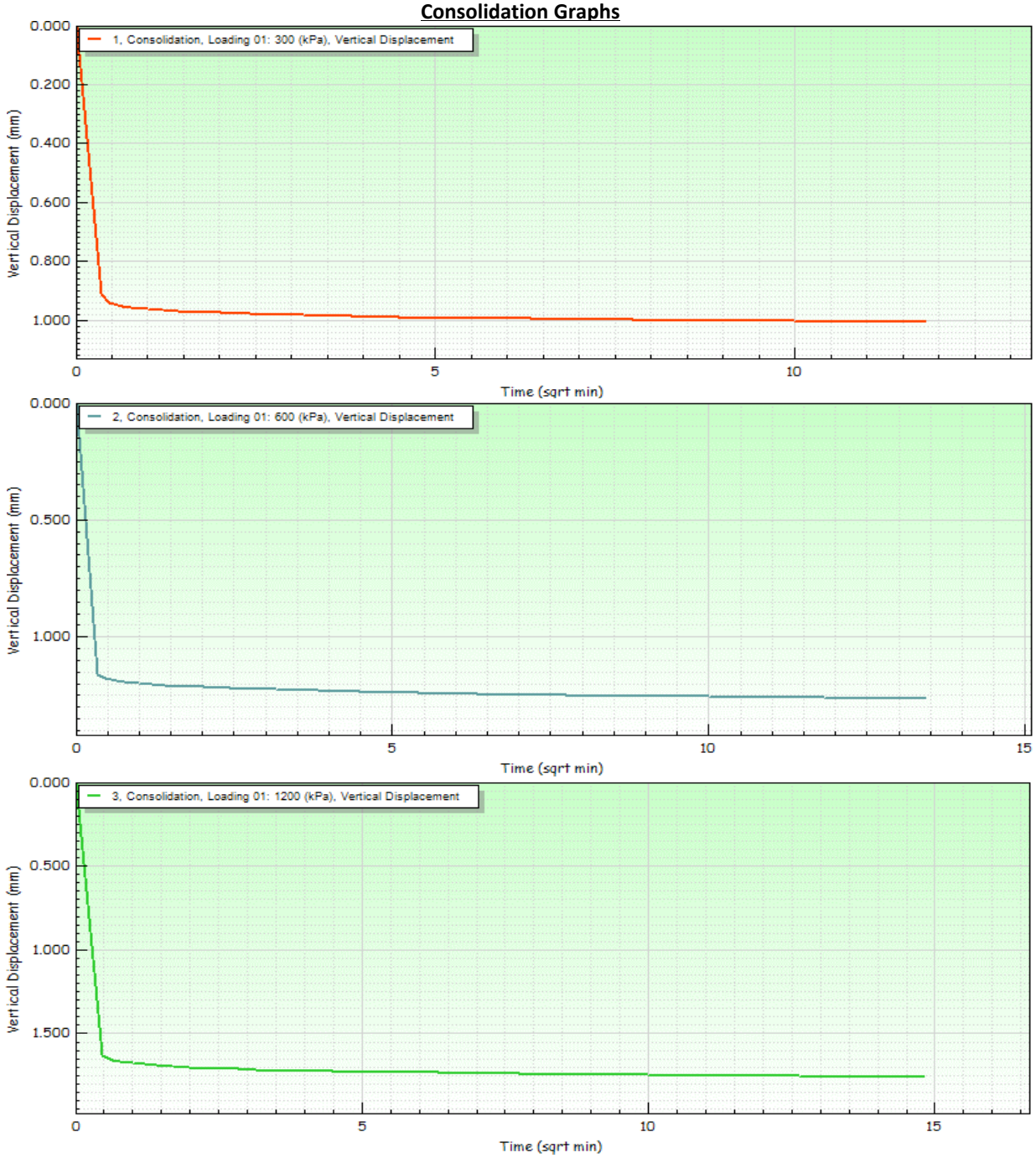
Lab Sheet Reference : LAB25R - Version 4

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

Consolidation Graphs



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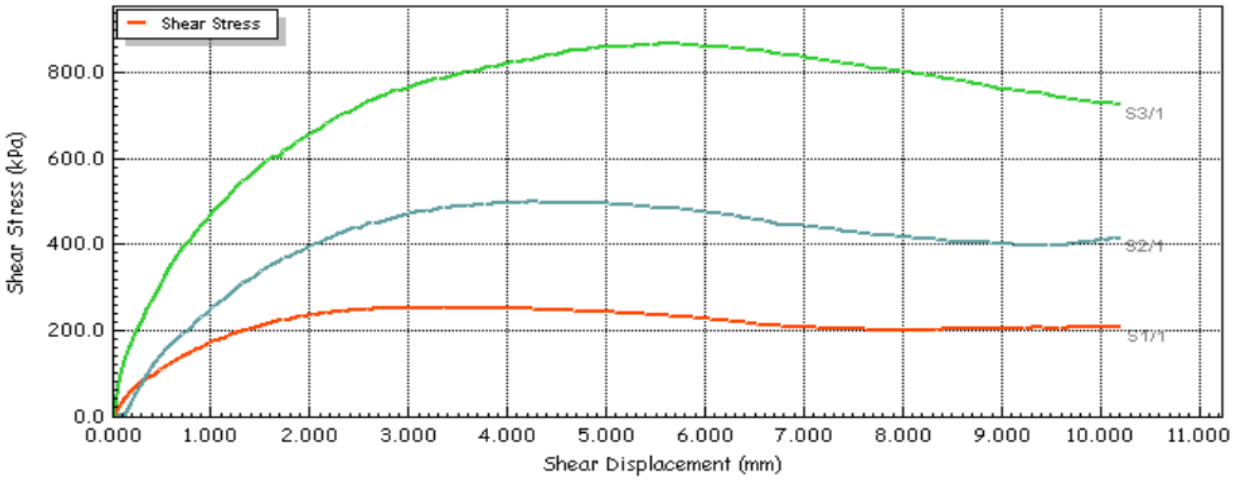
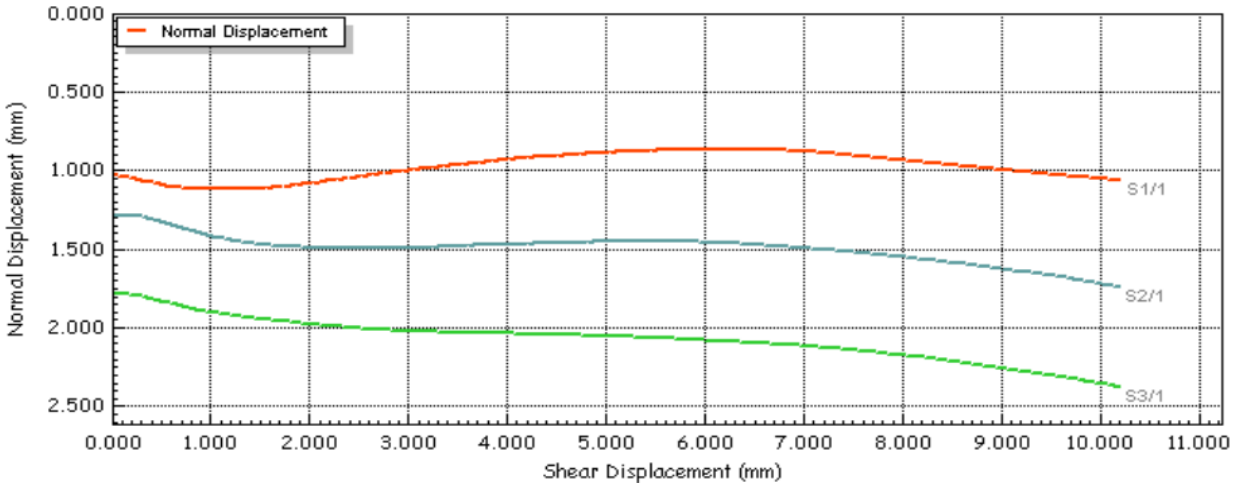
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

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

Shear Stage





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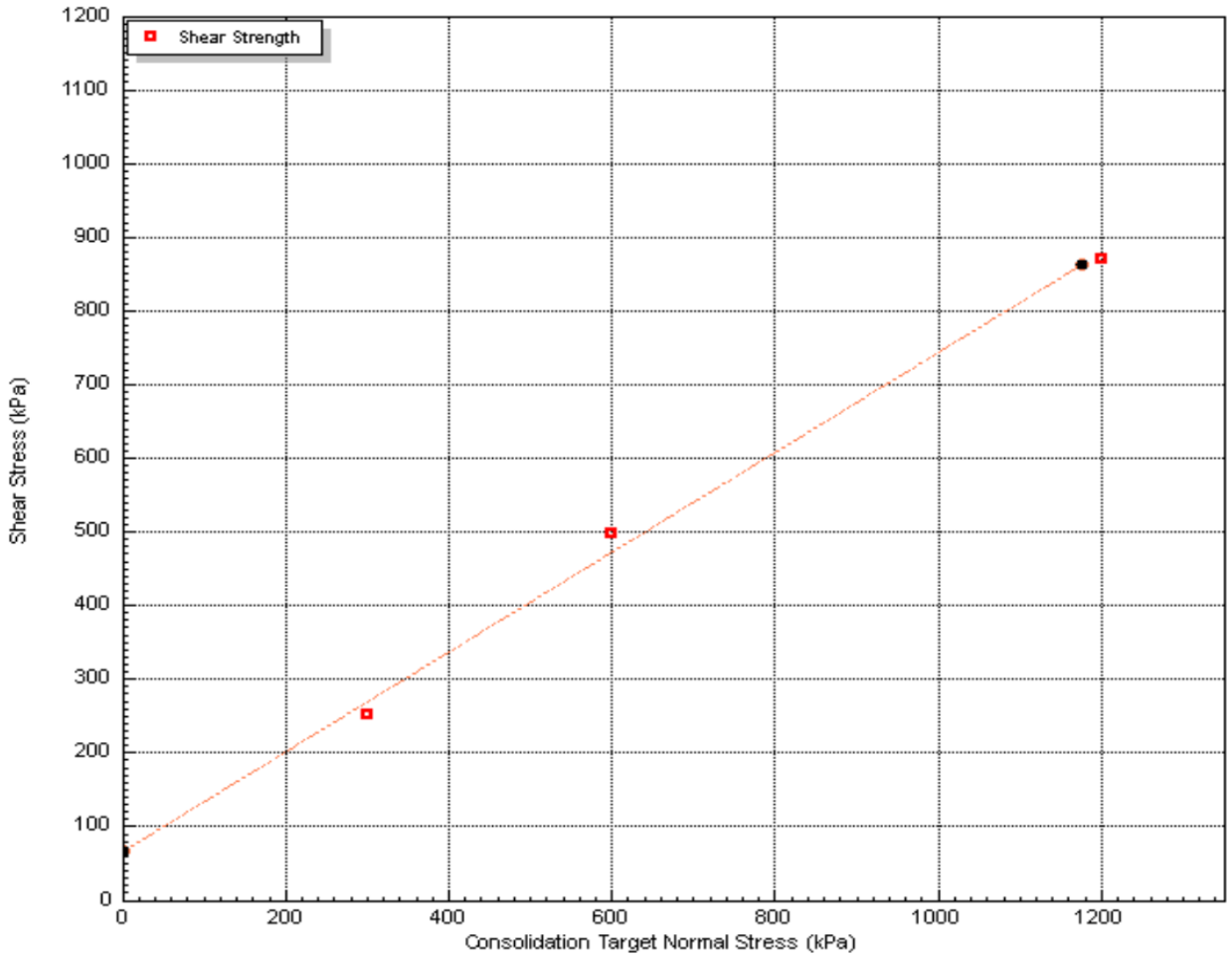
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH124	Sample Reference	1	
Depth (m)	31.00	Sample Submerged?	Yes	~~No~~
Sample Type	C	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		



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Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH130	Sample Reference		29	
Depth (m)	3.00	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Greyish brown gravelly fine to coarse SAND.				
Sample Preparation	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 (%)	11.0	11.0	11.0
Bulk Density (Mg/m^3)	1.76	1.71	1.74
Dry Density (Mg/m^3)	1.58	1.54	1.56
Voids Ratio	0.679	0.726	0.696
Consolidation			
Normal Pressure (kPa)	30	60	120
Vertical Displacement (mm)	0.183	0.276	0.573
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak 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			
Water Content (%)	23.0	23.0	22.0
Dry Density (Mg/m^3)	1.56	1.54	1.63
Voids Ratio	0.682	0.689	0.646

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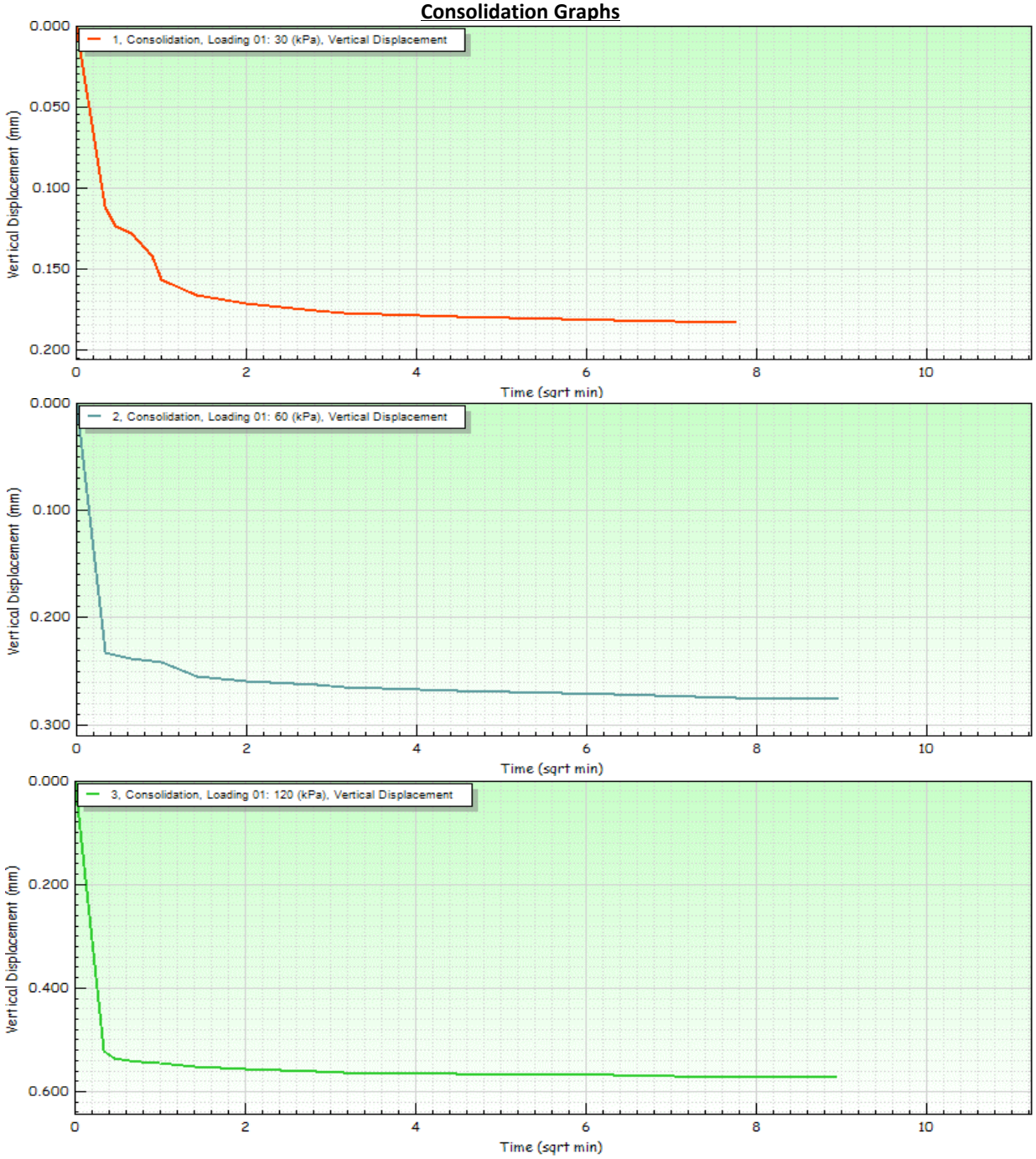
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH130	Sample Reference	29	
Depth (m)	3.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs



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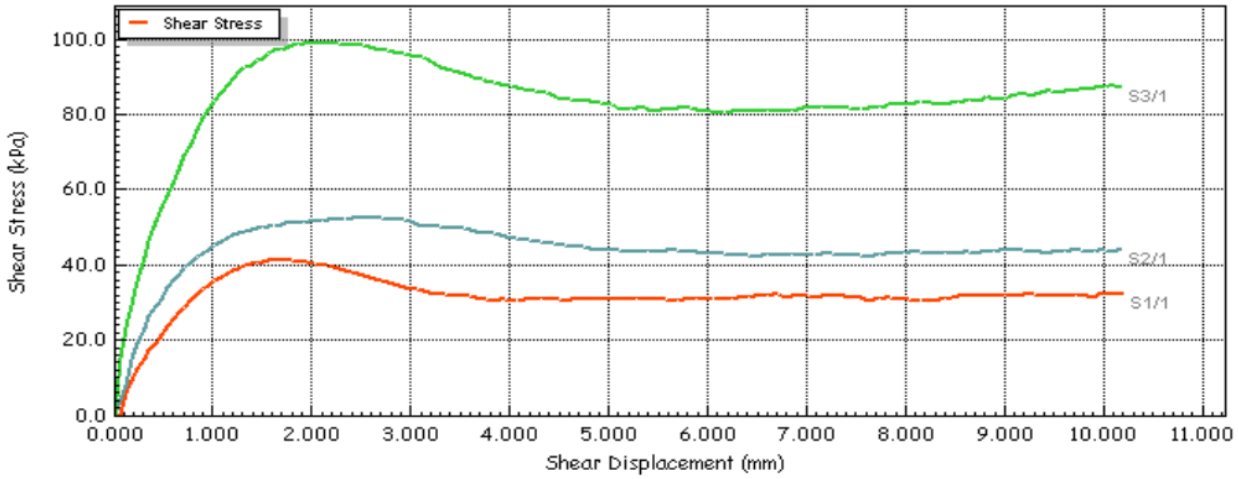
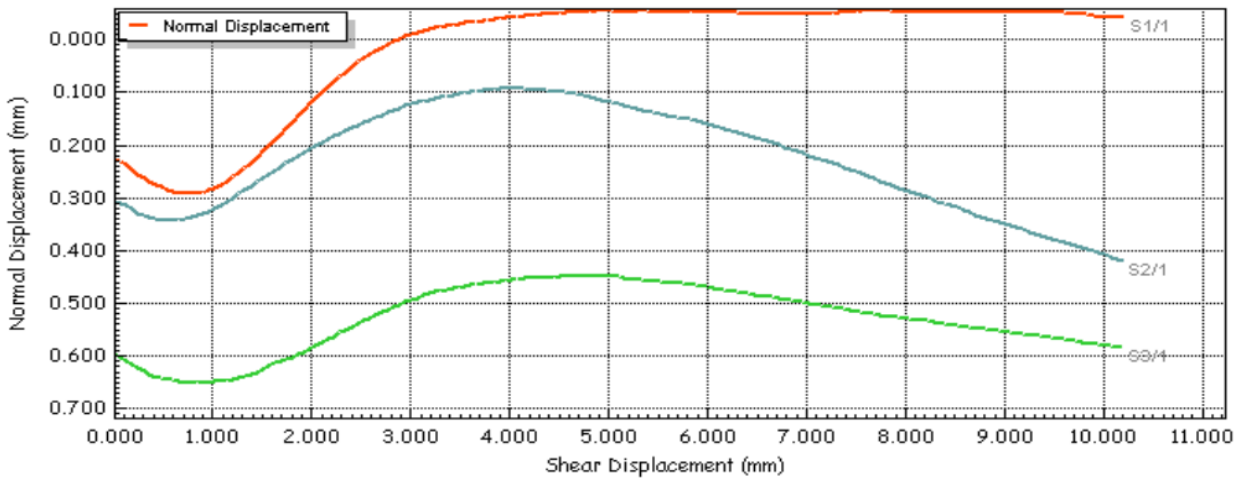
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH130	Sample Reference		29	
Depth (m)	3.00	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage





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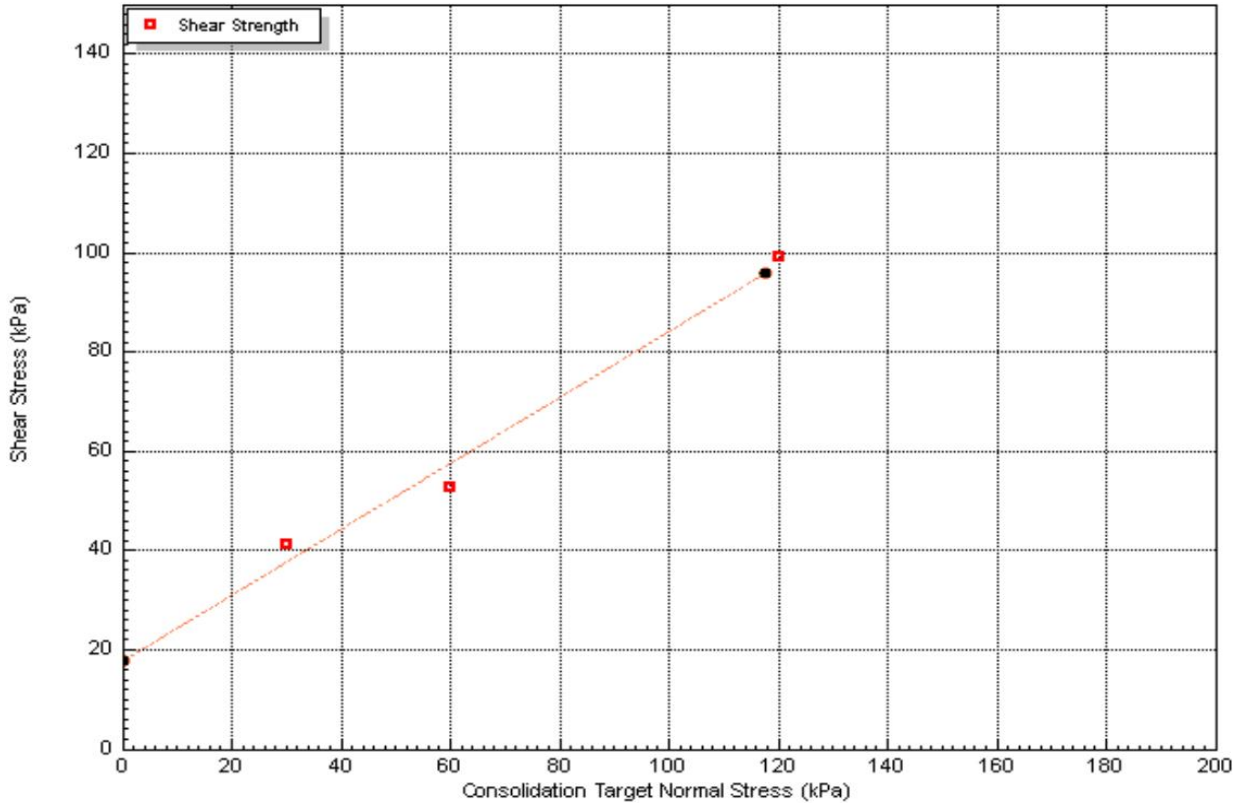
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH130	Sample Reference	29	
Depth (m)	3.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

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



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Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH130	Sample Reference		39	
Depth (m)	10.00	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Greyish brown gravelly fine to coarse SAND.				
Sample Preparation	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 (%)	8.4	8.4	8.4
Bulk Density (Mg/m^3)	1.73	1.74	1.75
Dry Density (Mg/m^3)	1.60	1.60	1.61
Voids Ratio	0.659	0.653	0.641
Consolidation			
Normal Pressure (kPa)	100	200	400
Vertical Displacement (mm)	0.358	0.740	1.178
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak 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			
Water Content (%)	23.0	23.0	22.0
Dry Density (Mg/m^3)	1.61	1.71	1.80
Voids Ratio	0.644	0.574	0.536

	Tested	Approved
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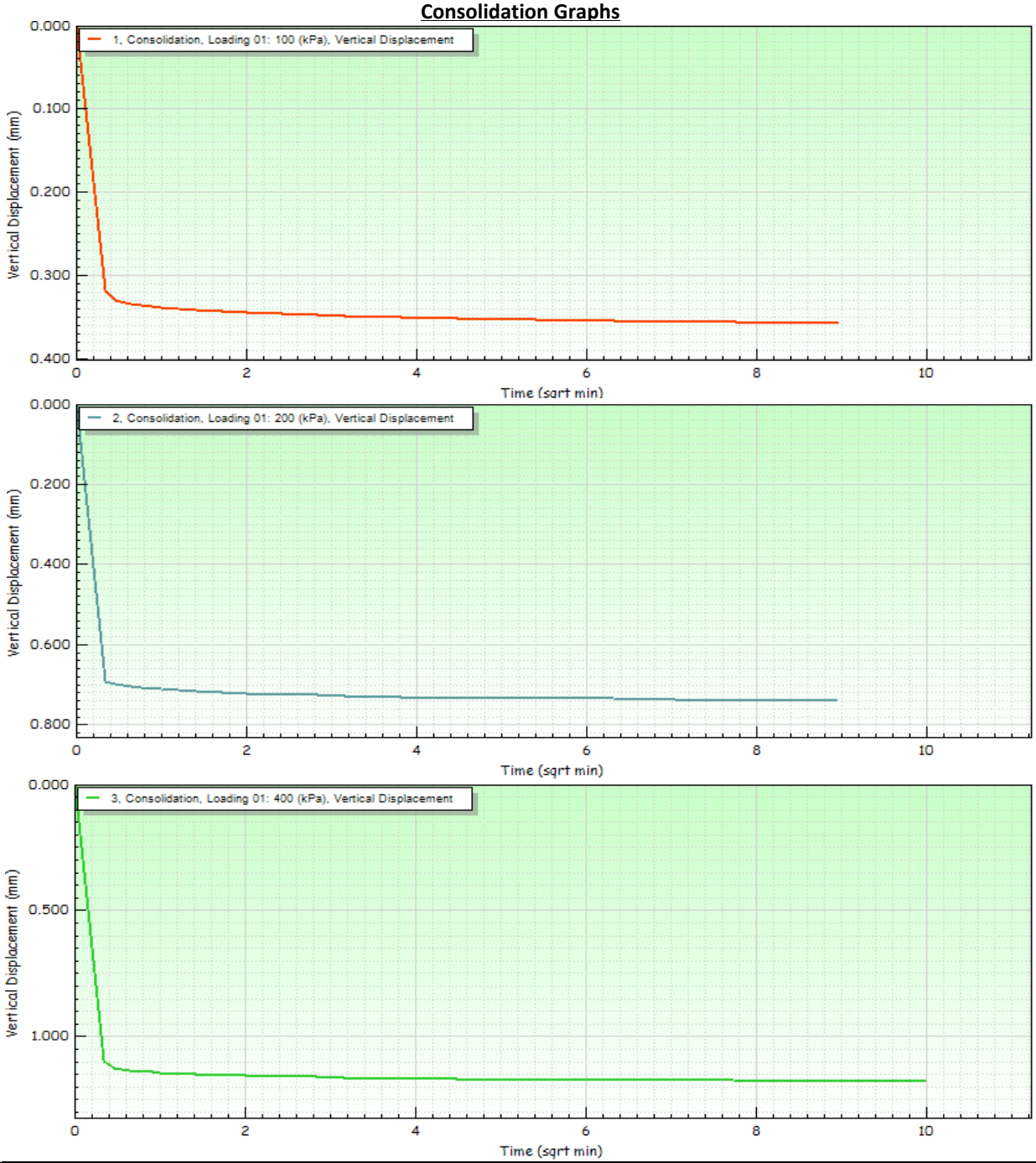
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH130	Sample Reference	39	
Depth (m)	10.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs



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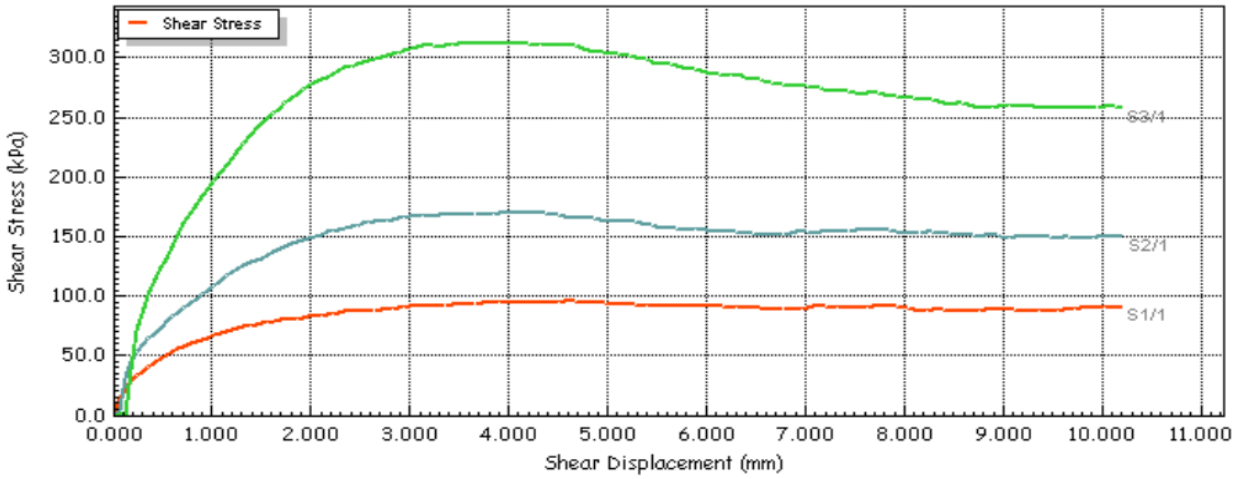
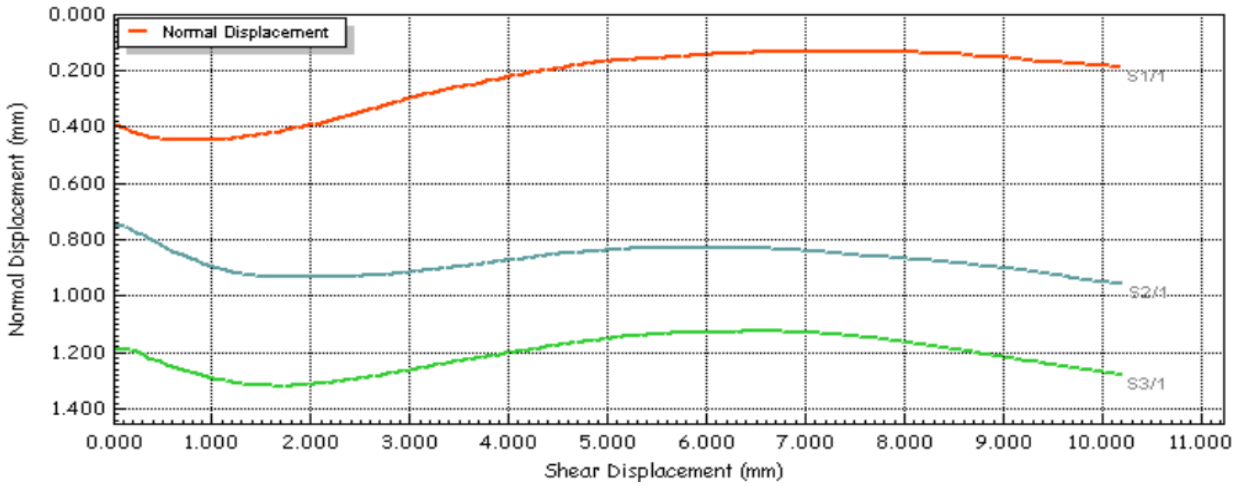
Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH130	Sample Reference		39	
Depth (m)	10.00	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage



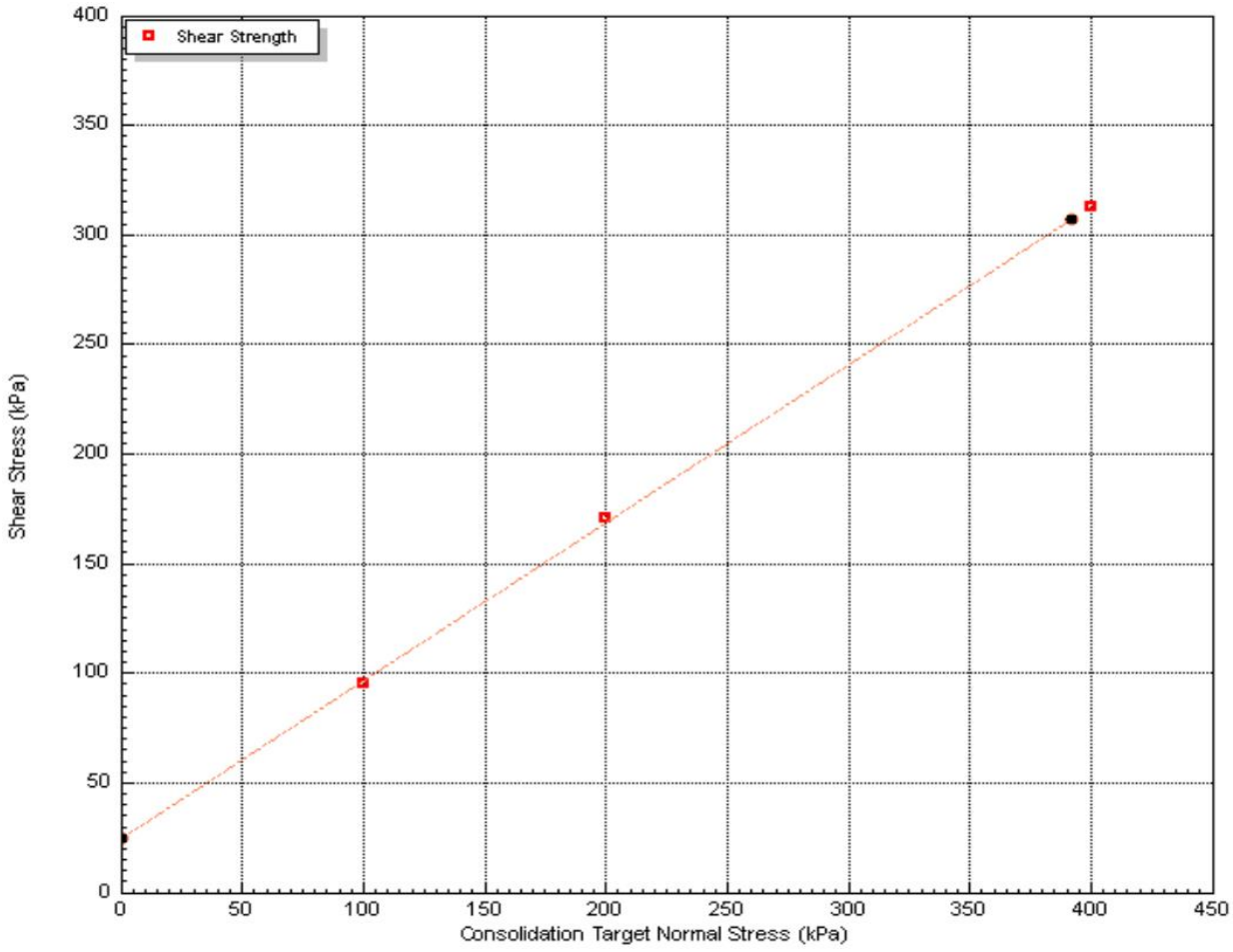


	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH130	Sample Reference	39	
Depth (m)	10.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	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		



	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH130	Sample Reference		57	
Depth (m)	15.00	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed
Description	Greyish brown slightly sandy slightly silty subangular fine to coarse GRAVEL.				
Sample Preparation	Sample is recompacted using material passing 2mm test sieve				

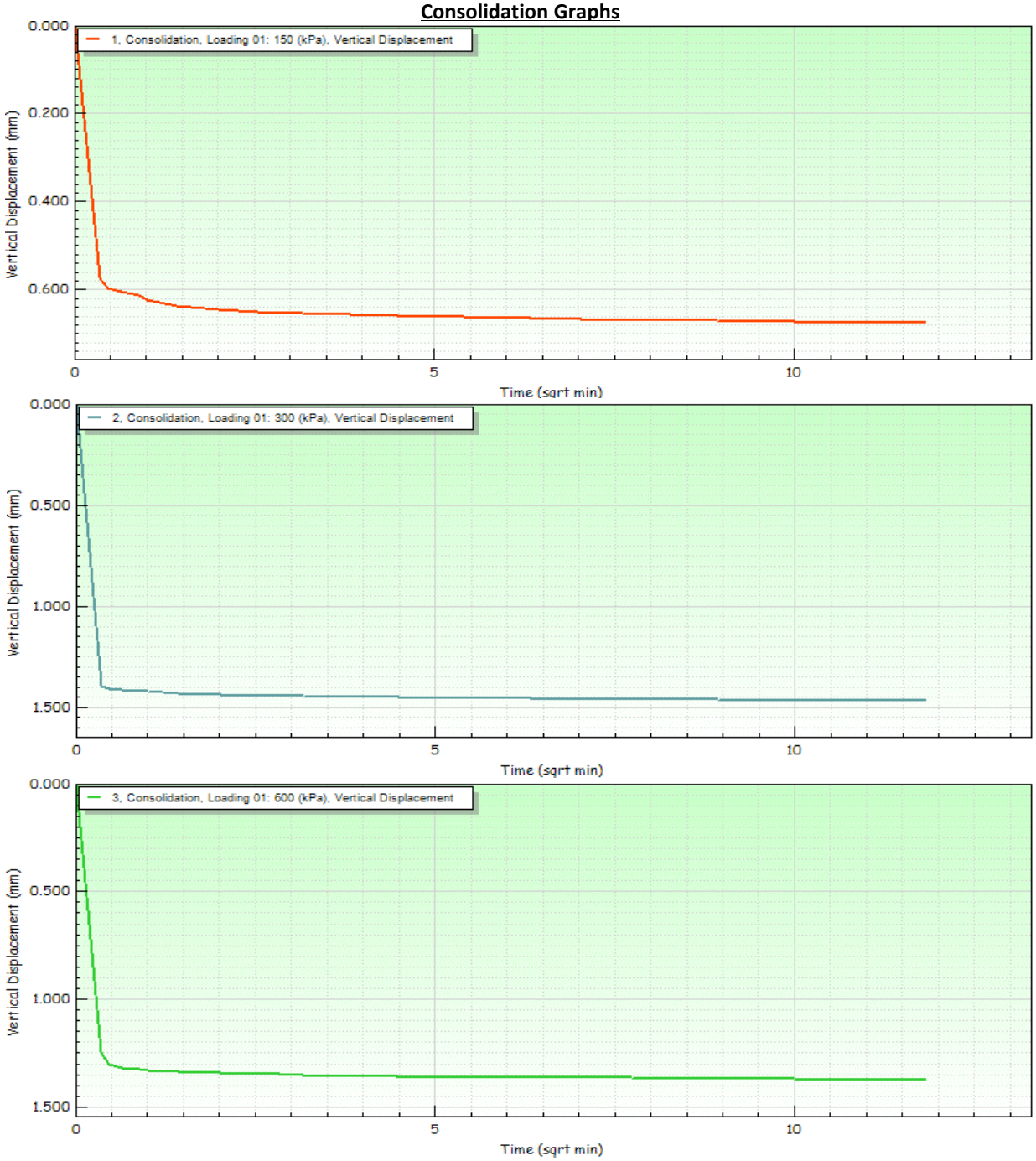
Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	11.0	11.0	11.0
Bulk Density (Mg/m^3)	1.76	1.72	1.77
Dry Density (Mg/m^3)	1.58	1.55	1.58
Voids Ratio	0.682	0.713	0.672
Consolidation			
Normal Pressure (kPa)	150	300	600
Vertical Displacement (mm)	0.675	1.468	1.374
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak 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			
Water Content (%)	20.0	21.0	20.0
Dry Density (Mg/m^3)	1.72	1.86	1.88
Voids Ratio	0.605	0.558	0.519

	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH130	Sample Reference	57	
Depth (m)	15.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs

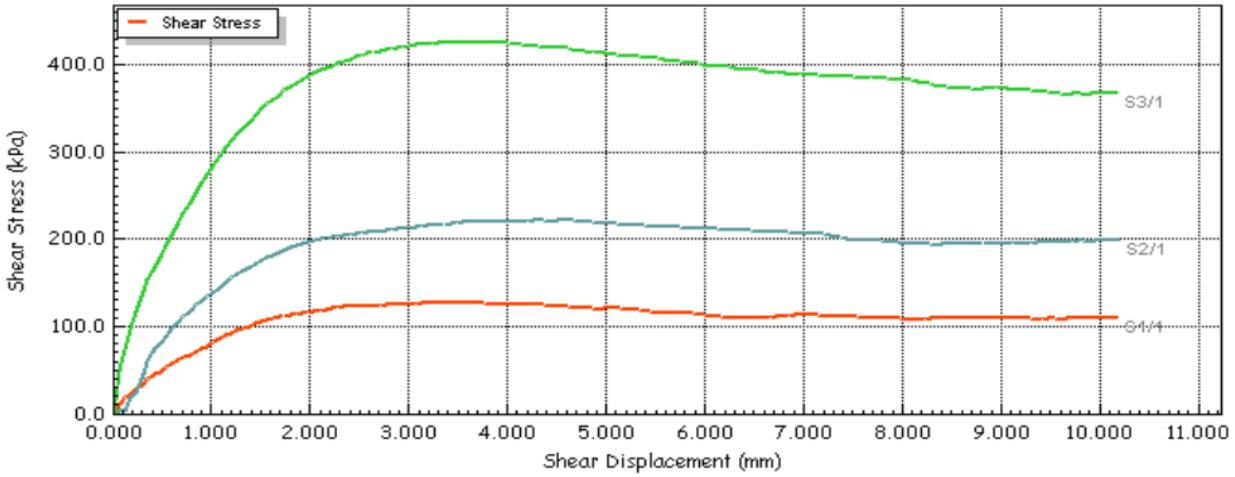


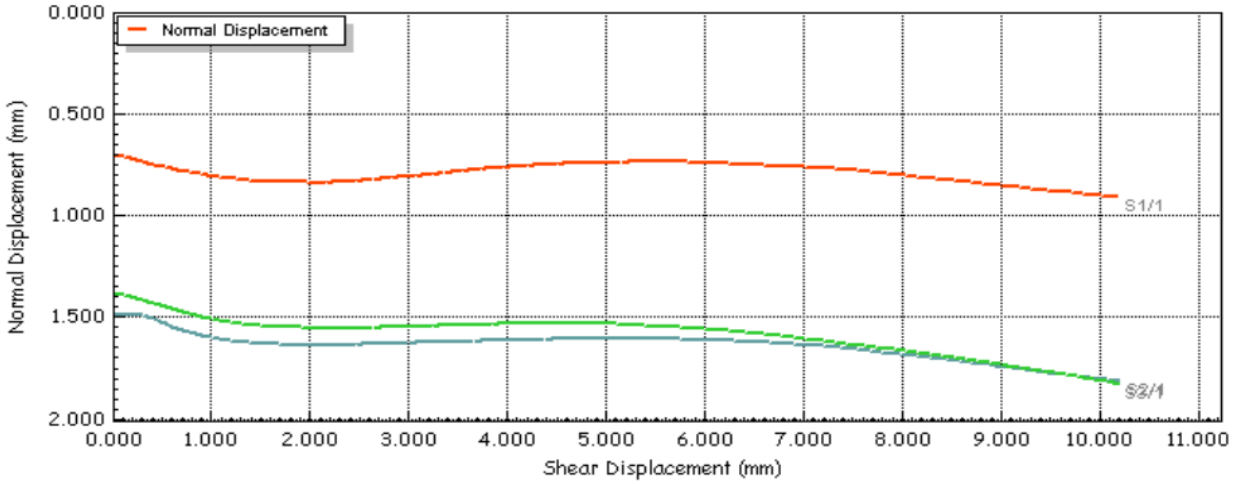
	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A		
Location Number	BH130	Sample Reference		57	
Depth (m)	15.00	Sample Submerged?		Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)		2.65	Assumed

Shear Stage



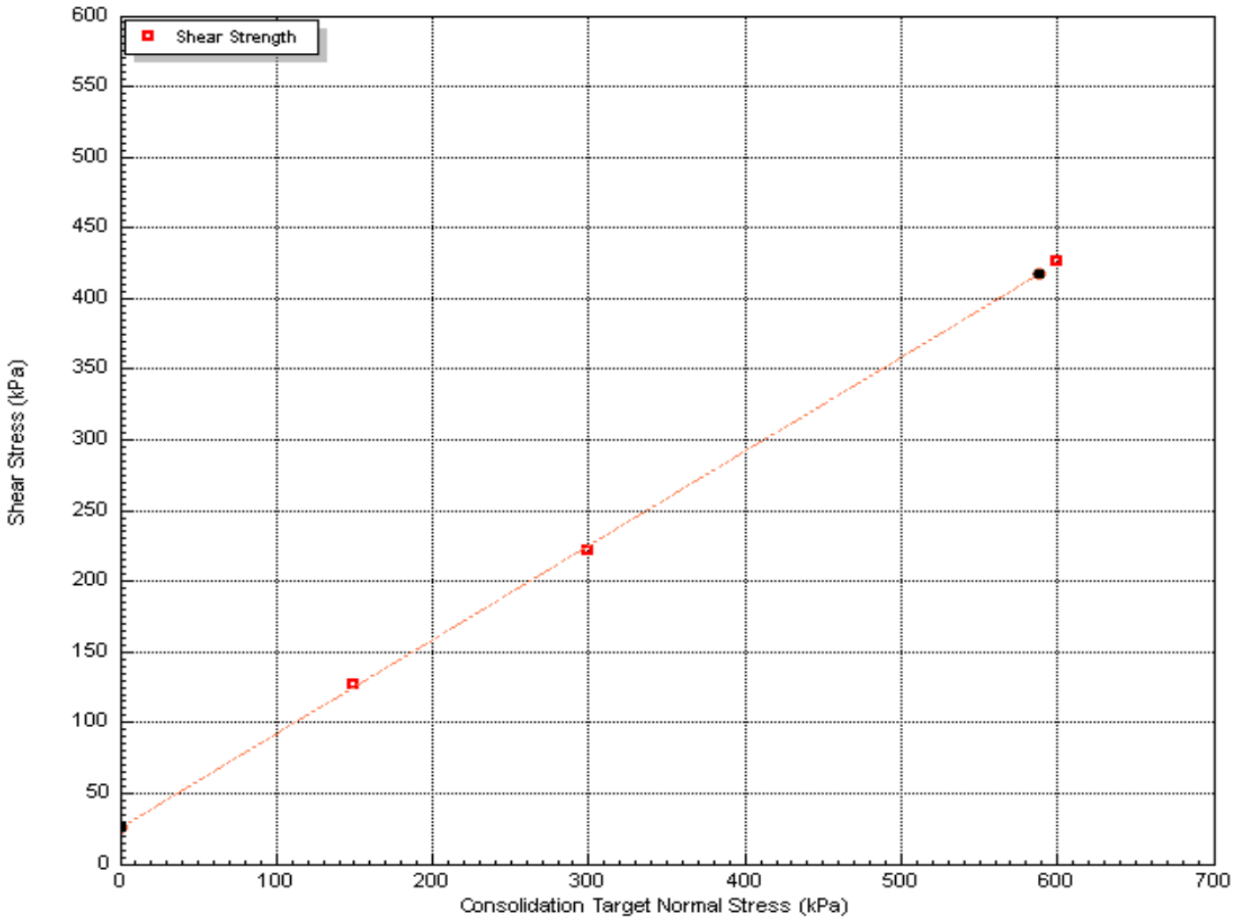


	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH130	Sample Reference	57	
Depth (m)	15.00	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

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



	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH131	Sample Reference	54	
Depth (m)	15.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed
Description	Brownish grey slightly sandy subangular fine to coarse GRAVEL.			
Sample Preparation	Sample is recompacted using material passing 2mm test sieve			

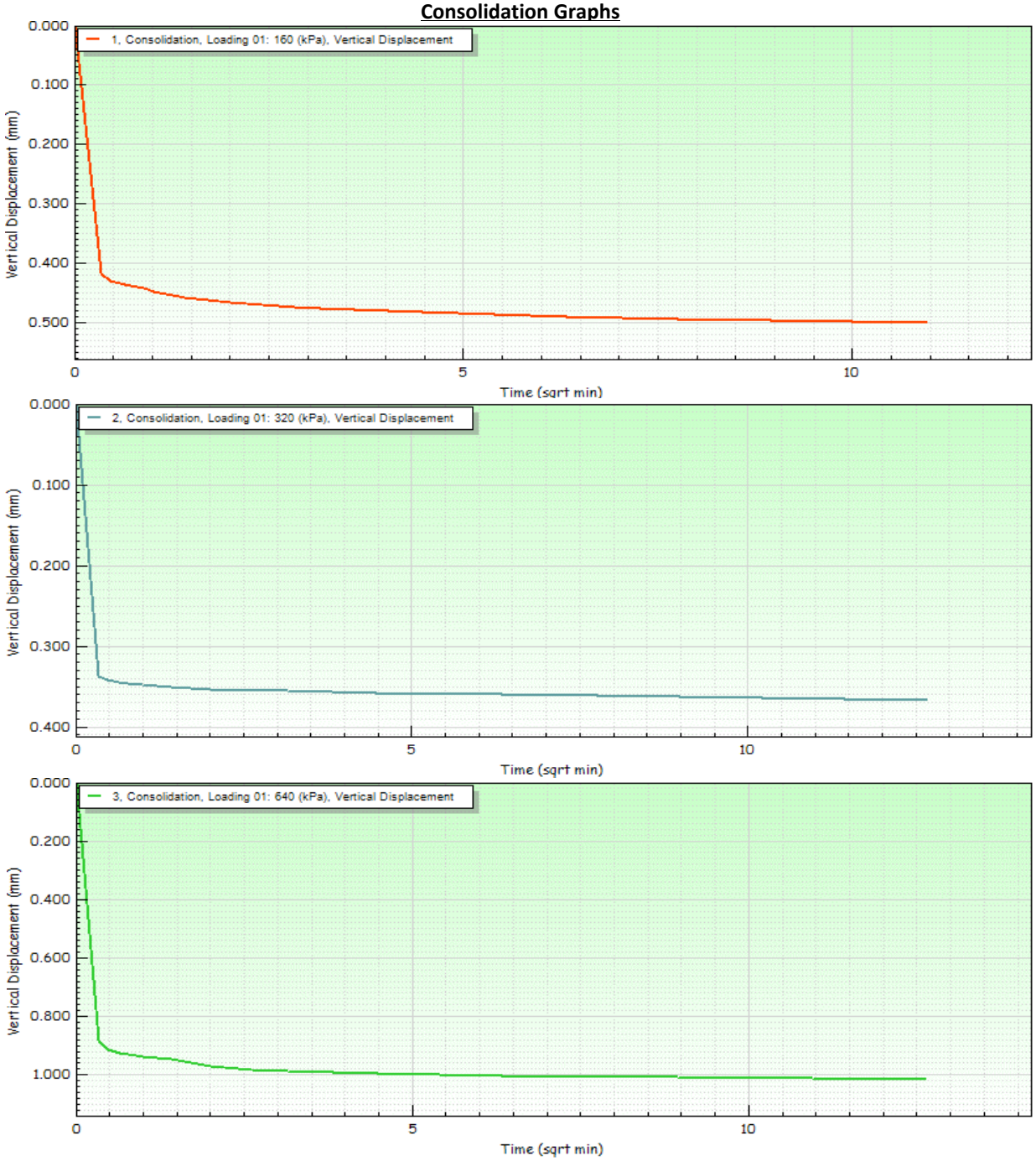
Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	6.1	6.1	6.1
Bulk Density (Mg/m^3)	1.61	1.72	1.63
Dry Density (Mg/m^3)	1.52	1.62	1.54
Voids Ratio	0.748	0.639	0.725
Consolidation			
Normal Pressure (kPa)	160	320	640
Vertical Displacement (mm)	0.500	0.367	1.015
Shearing			
Rate of Strain (mm/min)	0.600	0.600	0.600
Peak Shear Stress (kPa)	138.7	254.0	476.0
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	5.157	3.903	6.957
Final Conditions			
Water Content (%)	23.0	21.0	22.0
Dry Density (Mg/m^3)	1.59	1.54	1.82
Voids Ratio	0.677	0.636	0.587

	Tested	Approved
UKAS TESTING 10122 CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH131	Sample Reference	54	
Depth (m)	15.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs

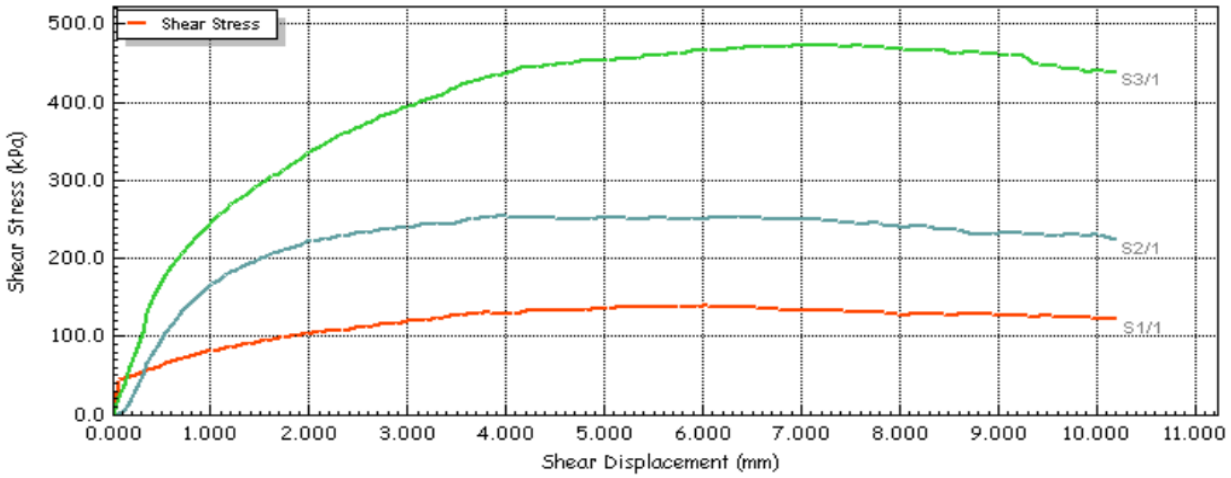


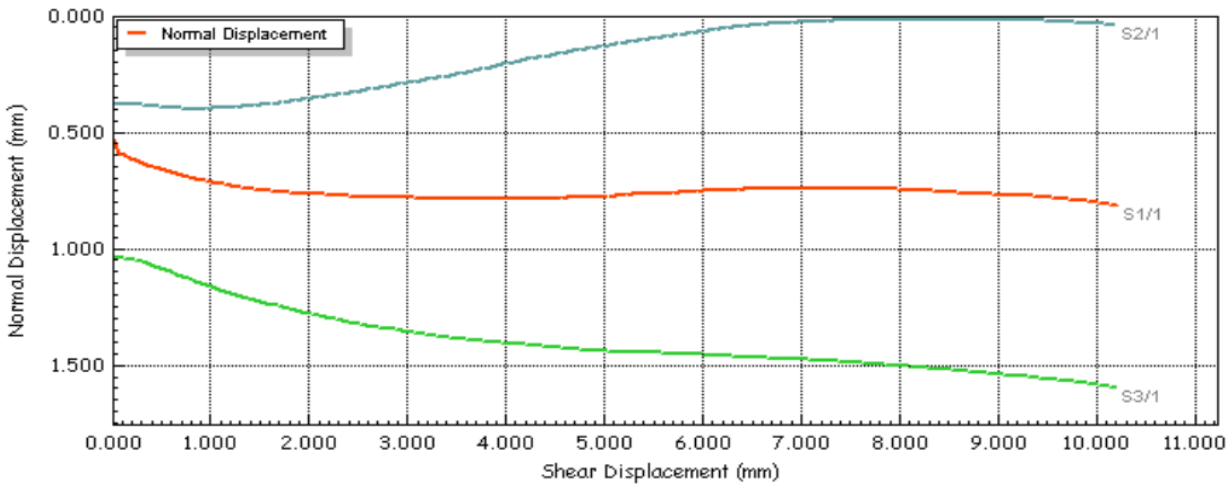
	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project		
Location Number	BH131	Sample Reference	54	
Depth (m)	15.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

Shear Stage



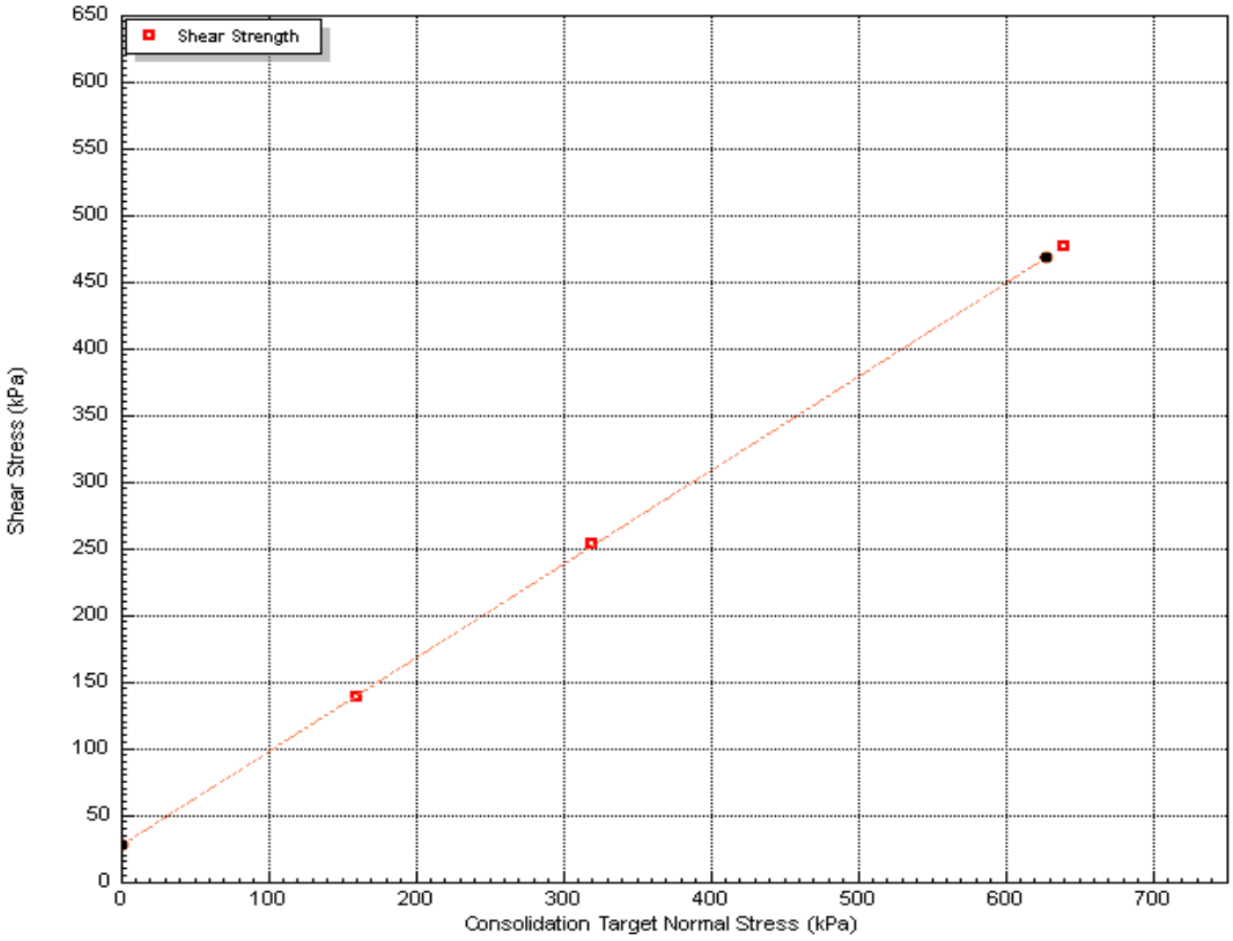


	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	22-1041A	Project	3FM Planning Design GI - Lot A	
Location Number	BH131	Sample Reference	54	
Depth (m)	15.50	Sample Submerged?	Yes	~~No~~
Sample Type	B	Particle Density (Mg/m^3)	2.65	Assumed

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



	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

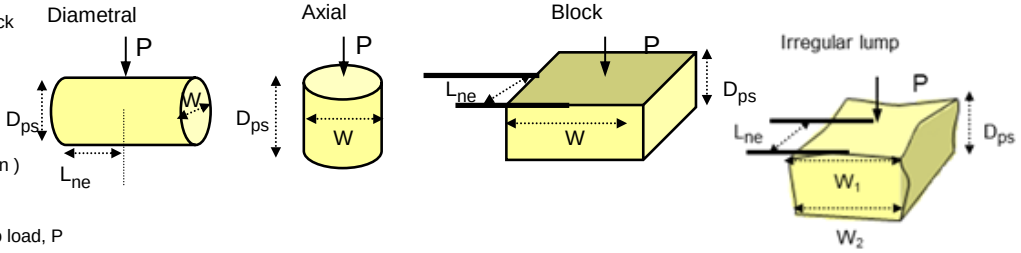
CAUSEWAY GEOTECH

Point Load Strength Index Tests
Summary of Results

Project No.	Project Name
22-1041A	3FM Planning Design GI - Lot A DPC Lands

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth	Ref.	Type	Ref.	Depth		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m				m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BH101	26.70	1	C	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	C	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	C	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	C	1	28.40	LIMESTONE	A	U	NO		101.8	84.0	81.0	26.7	102.5	2.5	3.5	
BH101	28.60	5	C	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	C	1	28.80	LIMESTONE	A	U	YES		101.8	96.0	94.0	24.9	110.4	2.0	2.9	
BH120	35.40	1	C	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	C	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	C	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	C	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	C	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	C	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	C	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	C	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	C	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	C	1	37.80	LIMESTONE	A	U	YES		101.6	67.0	61.0	10.8	88.8	1.4	1.8	
BH123	39.50	4	C	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	C	1	39.70	LIMESTONE	A	U	YES		101.6	35.0	32.0	2.6	64.3	0.6	0.7	

Test Type
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



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise

Detailed legend for test and dimensions, based on ISRM, is shown above.

Size factor, F = (De/50)0.45 for all tests.

LAB 17R - Version 5

Date Printed: 04/03/2023 00:00

Approved By: Stephen Watson

UKAS TESTING 10122

LABORATORY TEST CERTIFICATE

MATtest Limited
materials testing & consultancy

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

Tel: 0141 774 4032

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

Certificate No : **23/334 - 01-1**

To : **Stephen Watson**

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

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

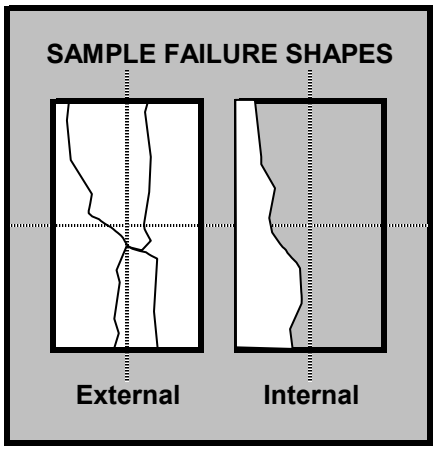
Approved for Issue

T McLelland (Director)

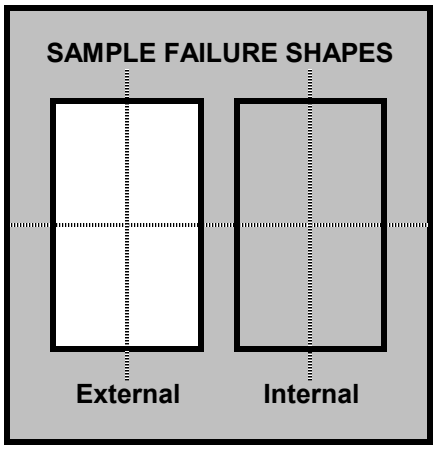
Date 29/03/2023

UKAS TESTING
2643

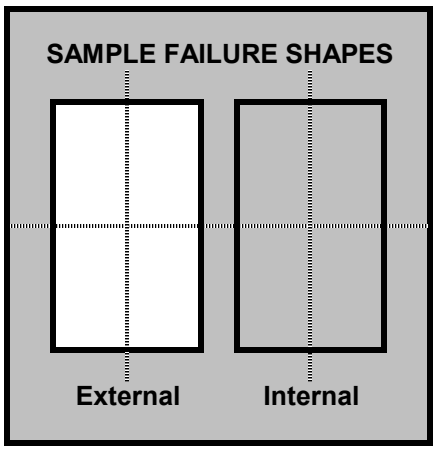
BOREHOLE		**BH123**
SAMPLE		**C3**
DEPTH	m	**38.40-38.90**
SAMPLE DIAMETER	mm	**101.90**
SAMPLE HEIGHT	mm	**206.75**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**1.2**
TEST DURATION	min.sec	**4.10**
DATE OF TESTING		**28/03/2023**
LOAD FRAME USED		**2000kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY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



BOREHOLE		
SAMPLE		
DEPTH	m	
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)	%	
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

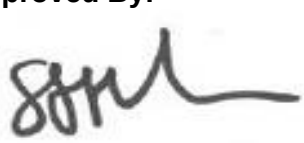
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

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:



Details: Stuart Henderson, Technical Manager

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

Results - Soil

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

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765
Quotation No.:			**Chemtest Sample ID.:**		1607653	1607654	1607655	1607656	1607657	1607658	1607659	1607660	1607661
Order No.:			Client Sample Ref.:		10	17	24	3	7	5	1	9	10
			Sample Location:		BH101	BH101	BH101	BH101	BH103	BH105	BH112	BH119	BH119
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	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	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Moisture	N	2030	%	0.020	12	20	15	11	17	9.0	22	18	14
pH	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

Results - Soil

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

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765	23-08765
Quotation No.:			**Chemtest Sample ID.:**		1607662	1607663	1607664	1607665	1607666	1607667	1607668	1607669	1607670
Order No.:			Client Sample Ref.:		20	2	25	14	37	7	46	21	34
			Sample Location:		BH120	BH120	BH121	BH121	BH121	BH122	BH122	BH123	BH124
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	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	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Moisture	N	2030	%	0.020	20	17	16	3.0	16	22	15	21	15
pH	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

Results - Soil

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.:			**Chemtest Sample ID.:**		1607671	1607672	1607673	1607674
Order No.:			Client Sample Ref.:		17	28	22	48
			Sample Location:		BH125	BH130	BH131	BH131
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		3.0	3.0	3.0	12.5
			Date Sampled:		14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Moisture	N	2030	%	0.020	22	11	10	10
pH	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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

LABORATORY RESTRICTION REPORT

Project Reference	22-1041A	To	Colm Hurley
Project Name	3FM Planning Design GI - Lot A DPC Lands	Position	Project Manager
TR reference	22-1041A / G01	From	Joseph Nicholl
		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 Number	Sample			Test Type	Reason for Restriction	Required Action
	Number	Depth (m)	Type			
BH102	3	0.30	B	CBR	>25% retained on 20mm test sieve	CANCEL
BH112	2	0.50	B	CBR	Unsuitable material for test - GRAVEL	CANCEL
BH116	3	1.00	B	CBR	>25% retained on 20mm test sieve	CANCEL
BH119	3	1.00	B	CBR	>25% retained on 20mm test sieve	CANCEL
BH120	16	0.50	B	CBR	>25% retained on 20mm test sieve	CANCEL
BH120	3	32.00	C	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	B	CBR	>25% retained on 20mm test sieve	CANCEL
BH101	1	16.50	C	UU Triaxial, Oedometer	Material was too granular to obtain test specimen	CANCEL

For electronic reporting a form of electronic signature or printed name is acceptable

Laboratory Signature	Project Manager Signature
Joseph Nicholl	Colm Hurley
Date	Date
20 March 2023	

CAUSEWAY GEOTECH

APPENDIX I

ENVIRONMENTAL LABORATORY TEST RESULTS

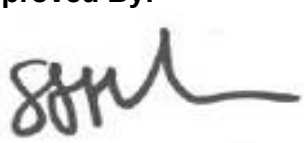
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

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 GI

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:



Details: Stuart Henderson, Technical Manager

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

Results - Soil

Project: 22-1041 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-43309
Quotation No.: Q21-25198			**Chemtest Sample ID.:**		1543231
			Sample Location:		BH116
			Sample Type:		SOIL
			Top Depth (m):		0.50
			Date Sampled:		08-Nov-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	U	2192		N/A	Fibres/Clumps
Asbestos Identification	U	2192		N/A	Chrysotile
Moisture	N	2030	%	0.020	9.6
pH	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
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

Results - Soil

Project: 22-1041 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-43309
Quotation No.: Q21-25198			**Chemtest Sample ID.:**		1543231
			Sample Location:		BH116
			Sample Type:		SOIL
			Top Depth (m):		0.50
			Date Sampled:		08-Nov-2022
			Asbestos Lab:		DURHAM
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	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	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	µg/kg	0.20	< 0.20

Results - Soil

Project: 22-1041 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-43309
Quotation No.: Q21-25198			**Chemtest Sample ID.:**		1543231
			Sample Location:		BH116
			Sample Type:		SOIL
			Top Depth (m):		0.50
			Date Sampled:		08-Nov-2022
			Asbestos Lab:		DURHAM
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	mg/kg	0.050	< 0.050

Results - Soil

Project: 22-1041 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-43309
Quotation No.: Q21-25198			**Chemtest Sample ID.:**		1543231
			Sample Location:		BH116
			Sample Type:		SOIL
			Top Depth (m):		0.50
			Date Sampled:		08-Nov-2022
			Asbestos 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

Results - Soil

Project: 22-1041 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-43309
Quotation No.: Q21-25198			**Chemtest Sample ID.:**		1543231
			Sample Location:		BH116
			Sample Type:		SOIL
			Top Depth (m):		0.50
			Date Sampled:		08-Nov-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
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	1.5
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	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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

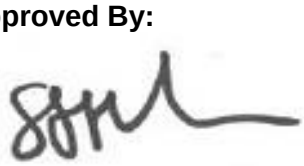
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-44367-1
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:



Details: Stuart Henderson, Technical Manager

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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44367
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1548481
				Sample Location:		BH121
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		15-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
pH	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44367
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1548481
				Sample Location:		BH121
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		15-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44367
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1548481
				Sample Location:		BH121
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		15-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	N	1790	10:1	µg/l	0.050	< 0.050

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44367
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1548481
				Sample Location:		BH121
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		15-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44367
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1548481
				Sample Location:		BH121
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		15-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	N	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44367
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1548481
				Sample Location:		BH121
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		15-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
2,3,4-Trichlorophenol	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44367	22-44367
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1548480	1548491
			Sample Location:		BH121	BH121
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.5	6
			Date Sampled:		15-Nov-2022	15-Nov-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	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	N	2040		N/A	Sand	Sand
pH	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/kg	0.10	< 0.10	< 0.10

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44367	22-44367
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1548480	1548491
			Sample Location:		BH121	BH121
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.5	6
			Date Sampled:		15-Nov-2022	15-Nov-2022
			Asbestos 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	N	2760	µg/kg	0.20	< 0.20	< 0.20

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44367	22-44367
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1548480	1548491
			Sample Location:		BH121	BH121
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.5	6
			Date Sampled:		15-Nov-2022	15-Nov-2022
			Asbestos 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	mg/kg	0.050	< 0.050	< 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44367	22-44367
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1548480	1548491
			Sample Location:		BH121	BH121
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.5	6
			Date Sampled:		15-Nov-2022	15-Nov-2022
			Asbestos 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	N	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	N	2790	mg/kg	0.050	0.21	0.054

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44367	22-44367
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1548480	1548491
			Sample Location:		BH121	BH121
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.5	6
			Date Sampled:		15-Nov-2022	15-Nov-2022
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Carbazole	N	2790	mg/kg	0.050	0.083	< 0.050
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	0.90	0.31
Fluoranthene	N	2790	mg/kg	0.050	1.8	0.28
Pyrene	N	2790	mg/kg	0.050	1.5	< 0.050
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050	0.13
Benzo[a]anthracene	N	2790	mg/kg	0.050	0.83	0.16
Chrysene	N	2790	mg/kg	0.050	0.88	< 0.050
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	8.1	< 0.050
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	1.1	0.16
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	0.42	0.054
Benzo[a]pyrene	N	2790	mg/kg	0.050	0.90	0.13
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	0.46	0.065
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	0.13	< 0.050
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	0.55	0.098
4-Nitrophenol	N	2790	mg/kg	0.050	< 0.050	< 0.050
Naphthalene	N	2800	mg/kg	0.010	0.37	< 0.010
Acenaphthylene	N	2800	mg/kg	0.010	0.14	< 0.010
Acenaphthene	N	2800	mg/kg	0.010	0.16	< 0.010
Fluorene	N	2800	mg/kg	0.010	0.20	< 0.010
Phenanthrene	N	2800	mg/kg	0.010	1.2	0.26
Anthracene	N	2800	mg/kg	0.010	0.33	< 0.010
Fluoranthene	N	2800	mg/kg	0.010	1.9	0.36
Pyrene	N	2800	mg/kg	0.010	1.7	0.25
Benzo[a]anthracene	N	2800	mg/kg	0.010	1.0	< 0.010
Chrysene	N	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	N	2800	mg/kg	0.010	0.45	< 0.010
Benzo[a]pyrene	N	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	N	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	mg/kg	0.020	< 0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44367	22-44367
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1548480	1548491
			Sample Location:		BH121	BH121
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.5	6
			Date Sampled:		15-Nov-2022	15-Nov-2022
			Asbestos 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	pH	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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

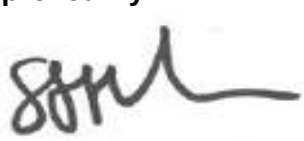
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-44935-1
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

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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44935
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1550635
				Sample Location:		BH125
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		18-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
pH	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)	N	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)	N	1455	10:1	µg/l	5.0	19
Low-Level Chromium (Hexavalent)	N	1495	10:1	µg/l	0.10	0.34
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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44935
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1550635
				Sample Location:		BH125
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		18-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44935
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1550635
				Sample Location:		BH125
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		18-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	N	1790	10:1	µg/l	0.050	< 0.050

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44935
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1550635
				Sample Location:		BH125
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		18-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44935
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1550635
				Sample Location:		BH125
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		18-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	N	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	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	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	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	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-44935
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1550635
				Sample Location:		BH125
				Sample Type:		SOIL
				Top Depth (m):		1
				Date Sampled:		18-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
2,3,4-Trichlorophenol	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44935	22-44935	22-44935	22-44935
Quotation No.: Q22-28455			**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 Sampled:		18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbestos Lab:		NEW-ASB	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	No Asbestos Detected
Moisture	N	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
pH	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	%	0.010	0.067	0.055	0.076	0.088
Sulphur (Elemental)	U	2180	mg/kg	1.0	13	49	20	43
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	0.50	< 0.50
Thiocyanate	U	2300	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)	N	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	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44935	22-44935	22-44935	22-44935
Quotation No.: Q22-28455			**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 Sampled:		18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbestos Lab:		NEW-ASB	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	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	830	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	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	N	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	N	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	N	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	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	190	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0	1000	< 2.0	< 2.0
Dichlorodifluoromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Chloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Vinyl Chloride	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
cis 1,2-Dichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Bromochloromethane	N	2760	µg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Tetrachloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzene	N	2760	µg/kg	0.20	0.39	< 0.20	< 0.20	< 0.20
1,2-Dichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,2-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibromomethane	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Toluene	N	2760	µg/kg	0.20	0.70	0.55	0.82	0.60
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44935	22-44935	22-44935	22-44935
Quotation No.: Q22-28455			**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 Sampled:		18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Tetrachloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane	N	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	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,2,3-Trichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
N-Propylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Chlorotoluene	N	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	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44935	22-44935	22-44935	22-44935
Quotation No.: Q22-28455			**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 Sampled:		18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbestos Lab:		NEW-ASB	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	< 0.050
Hexachloroethane	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine	N	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	mg/kg	0.050	0.57	0.18	0.072	0.068
4-Chloroaniline	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobutadiene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylnaphthalene	N	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44935	22-44935	22-44935	22-44935
Quotation No.: Q22-28455			**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 Sampled:		18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**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	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	mg/kg	0.050	3.6	1.6	0.53	0.93
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	1.7	0.70	0.26	0.48
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	< 0.050	0.22	< 0.050	0.11
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	2.0	0.96	0.35	0.55
4-Nitrophenol	N	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
Benzo[a]pyrene	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
Xylenols	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
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-44935	22-44935	22-44935	22-44935
Quotation No.: Q22-28455			**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 Sampled:		18-Nov-2022	18-Nov-2022	18-Nov-2022	18-Nov-2022
			Asbestos 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	pH	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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

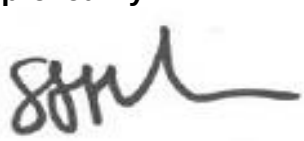
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-45125-1
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 Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45125
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1551502
				Sample Location:		BH120
				Sample Type:		SOIL
				Top Depth (m):		1.00
				Date Sampled:		21-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
pH	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45125
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1551502
				Sample Location:		BH120
				Sample Type:		SOIL
				Top Depth (m):		1.00
				Date Sampled:		21-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45125
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1551502
				Sample Location:		BH120
				Sample Type:		SOIL
				Top Depth (m):		1.00
				Date Sampled:		21-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	N	1790	10:1	µg/l	0.050	< 0.050

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45125
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1551502
				Sample Location:		BH120
				Sample Type:		SOIL
				Top Depth (m):		1.00
				Date Sampled:		21-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45125
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1551502
				Sample Location:		BH120
				Sample Type:		SOIL
				Top Depth (m):		1.00
				Date Sampled:		21-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	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	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45125
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1551502
				Sample Location:		BH120
				Sample Type:		SOIL
				Top Depth (m):		1.00
				Date Sampled:		21-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
2,3,4-Trichlorophenol	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45125	22-45125	22-45125
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1551499	1551501	1551513
			Sample Location:		BH119	BH120	BH120
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	0.50	6.50
			Date Sampled:		21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	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	N	2030	%	0.020	10	9.7	9.5
Natural Moisture Content	N	2030	%	0.020	11	11	10
Soil Colour	N	2040		N/A	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Gravel	Sand	Sand
pH	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)	N	2430	mg/kg	100	3200	4200	1600
Iron (Total)	N	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/kg	0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45125	22-45125	22-45125
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1551499	1551501	1551513
			Sample Location:		BH119	BH120	BH120
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	0.50	6.50
			Date Sampled:		21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbestos 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	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	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	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45125	22-45125	22-45125
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1551499	1551501	1551513
			Sample Location:		BH119	BH120	BH120
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	0.50	6.50
			Date Sampled:		21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Trans-1,3-Dichloropropene	N	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
Tetrachloroethene	N	2760	µg/kg	0.20	0.21	< 0.20	< 0.20
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Chlorobenzene	N	2760	µg/kg	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
Ethylbenzene	N	2760	µg/kg	0.20	< 0.20	0.29	< 0.20
m & p-Xylene	N	2760	µg/kg	0.20	0.28	0.35	0.60
o-Xylene	N	2760	µg/kg	0.20	< 0.20	0.40	0.30
Styrene	N	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	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tert-Butylbenzene	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,4-Dichlorobenzene	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Hexachlorobutadiene	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
N-Nitrosodimethylamine	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45125	22-45125	22-45125
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1551499	1551501	1551513
			Sample Location:		BH119	BH120	BH120
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	0.50	6.50
			Date Sampled:		21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbestos 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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45125	22-45125	22-45125
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1551499	1551501	1551513
			Sample Location:		BH119	BH120	BH120
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	0.50	6.50
			Date Sampled:		21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Phenanthrene	N	2790	mg/kg	0.050	0.13	1.5	< 0.050
Anthracene	N	2790	mg/kg	0.050	< 0.050	0.48	< 0.050
Carbazole	N	2790	mg/kg	0.050	< 0.050	0.12	< 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	0.18	3.1	< 0.050
Pyrene	N	2790	mg/kg	0.050	0.16	2.8	< 0.050
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Benzo[a]anthracene	N	2790	mg/kg	0.050	0.078	1.5	< 0.050
Chrysene	N	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	N	2790	mg/kg	0.050	< 0.050	1.7	< 0.050
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	< 0.050	0.69	< 0.050
Benzo[a]pyrene	N	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	N	2790	mg/kg	0.050	< 0.050	0.82	< 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	0.38	0.12
Acenaphthylene	N	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	N	2800	mg/kg	0.010	< 0.010	0.22	< 0.010
Phenanthrene	N	2800	mg/kg	0.010	< 0.010	1.5	0.34
Anthracene	N	2800	mg/kg	0.010	< 0.010	0.34	0.12
Fluoranthene	N	2800	mg/kg	0.010	< 0.010	1.9	0.37
Pyrene	N	2800	mg/kg	0.010	< 0.010	1.7	0.36
Benzo[a]anthracene	N	2800	mg/kg	0.010	< 0.010	0.88	< 0.010
Chrysene	N	2800	mg/kg	0.010	< 0.010	0.71	< 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	< 0.010	0.93	< 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	< 0.010	0.42	< 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	< 0.010	0.59	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45125	22-45125	22-45125
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1551499	1551501	1551513
			Sample Location:		BH119	BH120	BH120
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	0.50	6.50
			Date Sampled:		21-Nov-2022	21-Nov-2022	21-Nov-2022
			Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
1-Naphthol	N	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	pH	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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

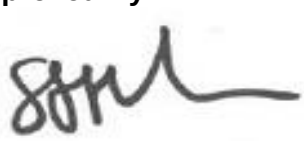
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-45332-1
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 Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1552425
				Sample Location:		BH123
				Sample Type:		SOIL
				Top Depth (m):		4.0
				Date Sampled:		22-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
pH	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1552425
				Sample Location:		BH123
				Sample Type:		SOIL
				Top Depth (m):		4.0
				Date Sampled:		22-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1552425
				Sample Location:		BH123
				Sample Type:		SOIL
				Top Depth (m):		4.0
				Date Sampled:		22-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
Bromobenzene	N	1760	10:1	µg/l	0.10	[B] < 0.10
1,2,3-Trichloropropane	N	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	N	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	N	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	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	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	N	1790	10:1	µg/l	0.050	< 0.050

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1552425
				Sample Location:		BH123
				Sample Type:		SOIL
				Top Depth (m):		4.0
				Date Sampled:		22-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1552425
				Sample Location:		BH123
				Sample Type:		SOIL
				Top Depth (m):		4.0
				Date Sampled:		22-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	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	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1552425
				Sample Location:		BH123
				Sample Type:		SOIL
				Top Depth (m):		4.0
				Date Sampled:		22-Nov-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
2,3,4-Trichlorophenol	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1552424
			Sample Location:		BH123
			Sample Type:		SOIL
			Top Depth (m):		3.5
			Date Sampled:		22-Nov-2022
			Asbestos Lab:		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	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
pH	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	N	2680	mg/kg	0.010	[B] < 0.010
Aliphatic TPH >C6-C8	N	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1552424
			Sample Location:		BH123
			Sample Type:		SOIL
			Top Depth (m):		3.5
			Date Sampled:		22-Nov-2022
			Asbestos 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	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	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	µg/kg	0.20	[B] < 0.20

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1552424
			Sample Location:		BH123
			Sample Type:		SOIL
			Top Depth (m):		3.5
			Date Sampled:		22-Nov-2022
			Asbestos 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	2760	µg/kg	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
2-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20	[B] 0.25
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	[B] 0.55
Sec-Butylbenzene	N	2760	µg/kg	0.20	[B] 0.55
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	[B] 0.25
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	[B] 25
N-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dibromo-3-Chloropropane	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	µg/kg	0.20	[B] < 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	[B] < 0.20
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	[B] < 0.050
Phenol	N	2790	mg/kg	0.050	[B] < 0.050
2-Chlorophenol	N	2790	mg/kg	0.050	[B] < 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	[B] < 0.050
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	[B] 2.6

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1552424
			Sample Location:		BH123
			Sample Type:		SOIL
			Top Depth (m):		3.5
			Date Sampled:		22-Nov-2022
			Asbestos Lab:		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
2-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050
Bis(2-Chloroisopropyl)Ether	N	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] 0.63
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] 0.31
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] 0.33
2-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050
Acenaphthylene	N	2790	mg/kg	0.050	[B] 0.10
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] 0.35
3-Nitroaniline	N	2790	mg/kg	0.050	[B] < 0.050
Dibenzofuran	N	2790	mg/kg	0.050	[B] 0.29
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] 0.44
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] 3.0

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1552424
			Sample Location:		BH123
			Sample Type:		SOIL
			Top Depth (m):		3.5
			Date Sampled:		22-Nov-2022
			Asbestos Lab:		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Anthracene	N	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	N	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	2790	mg/kg	0.050	[B] 1.4
Benzo[a]pyrene	N	2790	mg/kg	0.050	[B] 3.1
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	[B] 1.3
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] 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	N	2800	mg/kg	0.010	4.5
Benzo[b]fluoranthene	N	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	mg/kg	0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45332
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1552424
			Sample Location:		BH123
			Sample Type:		SOIL
			Top Depth (m):		3.5
			Date Sampled:		22-Nov-2022
			Asbestos 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	B	Amber Glass 250ml
1552424			BH123	22-Nov-2022	B	Amber Glass 60ml
1552424			BH123	22-Nov-2022	B	Plastic Tub 500g
1552425			BH123	22-Nov-2022	B	Amber Glass 250ml
1552425			BH123	22-Nov-2022	B	Amber Glass 60ml
1552425			BH123	22-Nov-2022	B	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

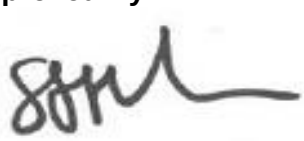
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-45548-1
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 Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos 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
pH	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)	N	2430	mg/kg	100	5200	7100	8300
Iron (Total)	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos 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	N	2760	µg/kg	0.20	2.5	< 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	< 0.20	< 0.20	0.76
1,2-Dichloroethane	N	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	N	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Tetrachloroethene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,3-Dichloropropane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,2-Dibromoethane	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Chlorobenzene	N	2760	µg/kg	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
Ethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
m & p-Xylene	N	2760	µg/kg	0.20	0.34	< 0.20	< 0.20
o-Xylene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Styrene	N	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	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Tert-Butylbenzene	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
1,4-Dichlorobenzene	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
Hexachlorobutadiene	N	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	N	2760	µg/kg	0.20	< 0.20	< 0.20	< 0.20
N-Nitrosodimethylamine	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos 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	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	< 0.050	< 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	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	< 0.050	< 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	N	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	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	< 0.050	< 0.050
Phenanthrene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050
Anthracene	N	2790	mg/kg	0.050	< 0.050	< 0.050	< 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos 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	N	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/kg	0.020	< 0.020	< 0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos 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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

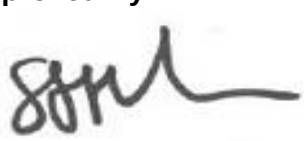
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-45743-1
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 Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45743
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1554176
			Sample Location:		BH119
			Sample Type:		SOIL
			Top Depth (m):		2.5
			Date Sampled:		24-Nov-2022
			Asbestos Lab:		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	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
pH	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)	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45743
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1554176
			Sample Location:		BH119
			Sample Type:		SOIL
			Top Depth (m):		2.5
			Date Sampled:		24-Nov-2022
			Asbestos 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	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	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	190
Aromatic TPH >C35-C44	N	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	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	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	N	2760	µg/kg	0.20	1.1
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	< 0.20

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45743
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1554176
			Sample Location:		BH119
			Sample Type:		SOIL
			Top Depth (m):		2.5
			Date Sampled:		24-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	0.33
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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45743
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1554176
			Sample Location:		BH119
			Sample Type:		SOIL
			Top Depth (m):		2.5
			Date Sampled:		24-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	1.0
Anthracene	N	2790	mg/kg	0.050	0.29

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45743
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1554176
			Sample Location:		BH119
			Sample Type:		SOIL
			Top Depth (m):		2.5
			Date Sampled:		24-Nov-2022
			Asbestos 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	mg/kg	0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-45743
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1554176
			Sample Location:		BH119
			Sample Type:		SOIL
			Top Depth (m):		2.5
			Date Sampled:		24-Nov-2022
			Asbestos 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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

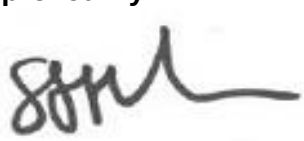
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-46669-1
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

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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos Lab:		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	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
pH	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
Zinc	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos Lab:		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic TPH >C12-C16	N	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	N	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	N	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aromatic TPH >C7-C8	N	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	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10	[B] 18
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	[B] < 0.10	[B] 430
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	[B] < 1.0	[B] 450
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	[B] < 2.0	[B] 540
Dichlorodifluoromethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Chloromethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Vinyl Chloride	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromomethane	N	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	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloroethene	N	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	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
cis 1,2-Dichloroethene	N	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] 0.68	[B] 0.56
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tetrachloromethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Benzene	N	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	N	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	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos Lab:		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
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] 1.0	[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] 0.55	[B] < 0.20
m & p-Xylene	N	2760	µg/kg	0.20	[B] 2.1	[B] < 0.20
o-Xylene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Styrene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tribromomethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Isopropylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
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] < 0.20
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] < 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20	[B] 0.55	[B] < 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Sec-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	[B] 0.55	[B] < 0.20
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] < 0.20
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	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Phenol	N	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	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	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos Lab:		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
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] < 0.050
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	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] 0.10	[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] < 0.050
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] < 0.050
Fluorene	N	2790	mg/kg	0.050	[B] 0.10	[B] < 0.050
Diethyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
4-Nitroaniline	N	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	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	mg/kg	0.050	[B] 0.49	[B] 0.61

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos Lab:		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Anthracene	N	2790	mg/kg	0.050	[B] 0.14	[B] 0.34
Carbazole	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Fluoranthene	N	2790	mg/kg	0.050	[B] 0.94	[B] 1.9
Pyrene	N	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	N	2790	mg/kg	0.050	[B] 0.56	[B] 1.1
Chrysene	N	2790	mg/kg	0.050	[B] 0.56	[B] 1.0
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Di-N-Octyl Phthalate	N	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	N	2790	mg/kg	0.050	[B] 0.22	[B] 0.42
Benzo[a]pyrene	N	2790	mg/kg	0.050	[B] 0.57	[B] 1.1
Indeno(1,2,3-c,d)Pyrene	N	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	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Naphthalene	N	2800	mg/kg	0.010	0.28	1.0
Acenaphthylene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Acenaphthene	N	2800	mg/kg	0.010	0.26	< 0.010
Fluorene	N	2800	mg/kg	0.010	0.28	< 0.010
Phenanthrene	N	2800	mg/kg	0.010	1.7	2.0
Anthracene	N	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	N	2800	mg/kg	0.010	0.79	1.6
Benzo[b]fluoranthene	N	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	mg/kg	0.020	< 0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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
			Asbestos Lab:		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
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	B	Amber Glass 250ml
1558444			BH125	01-Dec-2022	B	Amber Glass 60ml
1558444			BH125	01-Dec-2022	B	Plastic Tub 500g
1558447			BH127	01-Dec-2022	B	Amber Glass 250ml
1558447			BH127	01-Dec-2022	B	Amber Glass 60ml
1558447			BH127	01-Dec-2022	B	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

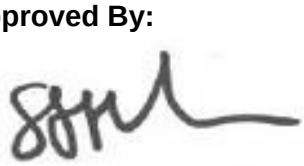
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-46675-1
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

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

Results - Soil

Project: 21-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-46675
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1558607
			Sample Location:		BH101
			Sample Type:		SOIL
			Top Depth (m):		3.0
			Date Sampled:		25-Nov-2022
			Asbestos Lab:		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	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
pH	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	mg/kg	0.10	< 0.10

Results - Soil

Project: 21-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-46675
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1558607
			Sample Location:		BH101
			Sample Type:		SOIL
			Top Depth (m):		3.0
			Date Sampled:		25-Nov-2022
			Asbestos 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	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	0.95
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	µg/kg	0.20	< 0.20

Results - Soil

Project: 21-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-46675
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1558607
			Sample Location:		BH101
			Sample Type:		SOIL
			Top Depth (m):		3.0
			Date Sampled:		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	mg/kg	0.050	< 0.050

Results - Soil

Project: 21-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-46675
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1558607
			Sample Location:		BH101
			Sample Type:		SOIL
			Top Depth (m):		3.0
			Date Sampled:		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	mg/kg	0.050	0.18

Results - Soil

Project: 21-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-46675
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1558607
			Sample Location:		BH101
			Sample Type:		SOIL
			Top Depth (m):		3.0
			Date Sampled:		25-Nov-2022
			Asbestos 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	0.62
Pyrene	N	2790	mg/kg	0.050	0.47
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	< 0.050
Benzo[a]anthracene	N	2790	mg/kg	0.050	0.24
Chrysene	N	2790	mg/kg	0.050	0.26
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	0.28
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	0.11
Benzo[a]pyrene	N	2790	mg/kg	0.050	0.22
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	0.089
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.050	< 0.050
Benzo[g,h,i]perylene	N	2790	mg/kg	0.050	0.11
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	0.074
Acenaphthene	N	2800	mg/kg	0.010	0.14
Fluorene	N	2800	mg/kg	0.010	0.14
Phenanthrene	N	2800	mg/kg	0.010	0.56
Anthracene	N	2800	mg/kg	0.010	0.29
Fluoranthene	N	2800	mg/kg	0.010	0.79
Pyrene	N	2800	mg/kg	0.010	0.57
Benzo[a]anthracene	N	2800	mg/kg	0.010	0.28
Chrysene	N	2800	mg/kg	0.010	0.20
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	0.22
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	0.092
Benzo[a]pyrene	N	2800	mg/kg	0.010	0.41
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	0.23
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	0.14
Total Of 16 PAH's	N	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	N	2920	mg/kg	0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020

Results - Soil

Project: 21-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-46675
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1558607
			Sample Location:		BH101
			Sample Type:		SOIL
			Top Depth (m):		3.0
			Date Sampled:		25-Nov-2022
			Asbestos 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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

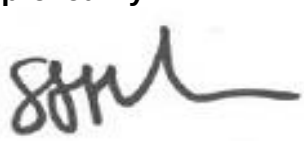
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-47580-1
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 Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-47580
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1562826
			Sample Location:		BH124
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		07-Dec-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	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
pH	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)	N	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	N	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/kg	0.10	[B] < 0.10

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-47580
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1562826
			Sample Location:		BH124
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		07-Dec-2022
			Asbestos 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
Trichloromethane	N	2760	µg/kg	0.20	[B] < 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Tetrachloromethane	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	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] < 0.20
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-47580
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1562826
			Sample Location:		BH124
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		07-Dec-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
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] 1.6
1,2-Dibromoethane	N	2760	µg/kg	0.20	[B] < 0.20
Chlorobenzene	N	2760	µg/kg	0.20	[B] 1.1
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Ethylbenzene	N	2760	µg/kg	0.20	[B] 0.26
m & p-Xylene	N	2760	µg/kg	0.20	[B] 0.79
o-Xylene	N	2760	µg/kg	0.20	[B] 0.60
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] < 0.20
Bromobenzene	N	2760	µg/kg	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] < 0.20
2-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
Sec-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	[B] < 0.20
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
N-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dibromo-3-Chloropropane	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	µg/kg	0.20	[B] < 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	[B] < 0.20
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	[B] < 0.050
Phenol	N	2790	mg/kg	0.050	[B] < 0.050
2-Chlorophenol	N	2790	mg/kg	0.050	[B] < 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	[B] < 0.050
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
2-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-47580
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1562826
			Sample Location:		BH124
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		07-Dec-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Bis(2-Chloroisopropyl)Ether	N	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	mg/kg	0.050	[B] < 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-47580
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1562826
			Sample Location:		BH124
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		07-Dec-2022
			Asbestos 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	< 0.010
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	< 0.010
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	N	2920	mg/kg	0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-47580
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1562826
			Sample Location:		BH124
			Sample Type:		SOIL
			Top Depth (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	B	Amber Glass 250ml
1562826			BH124	07-Dec-2022	B	Amber Glass 60ml
1562826			BH124	07-Dec-2022	B	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

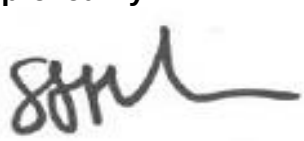
eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

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:



Details: Stuart Henderson, Technical Manager

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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1566614
				Sample Location:		BH122
				Sample Type:		SOIL
				Top Depth (m):		2.0
				Date Sampled:		14-Dec-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
pH	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1566614
				Sample Location:		BH122
				Sample Type:		SOIL
				Top Depth (m):		2.0
				Date Sampled:		14-Dec-2022
Determinand	**Accred.**	**SOP**	**Type**	**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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1566614
				Sample Location:		BH122
				Sample Type:		SOIL
				Top Depth (m):		2.0
				Date Sampled:		14-Dec-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	N	1790	10:1	µg/l	0.050	< 0.050

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1566614
				Sample Location:		BH122
				Sample Type:		SOIL
				Top Depth (m):		2.0
				Date Sampled:		14-Dec-2022
Determinand	**Accred.**	**SOP**	**Type**	**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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1566614
				Sample Location:		BH122
				Sample Type:		SOIL
				Top Depth (m):		2.0
				Date Sampled:		14-Dec-2022
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	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	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1566614
				Sample Location:		BH122
				Sample Type:		SOIL
				Top Depth (m):		2.0
				Date Sampled:		14-Dec-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
2,3,4-Trichlorophenol	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1566621
			Sample Location:		BH122
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		14-Dec-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	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	N	2040		N/A	Sand
pH	M	2010		4.0	8.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.58
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.10
Total Sulphur	M	2175	%	0.010	0.089
Sulphur (Elemental)	M	2180	mg/kg	1.0	38
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50
Thiocyanate	M	2300	mg/kg	5.0	< 5.0
Aluminium (Total)	N	2430	mg/kg	100	3000
Iron (Total)	N	2430	mg/kg	100	5400
Arsenic	M	2455	mg/kg	0.5	2.7
Barium	M	2455	mg/kg	0	32
Beryllium	U	2455	mg/kg	0.5	< 0.5
Cadmium	M	2455	mg/kg	0.10	< 0.10
Chromium	M	2455	mg/kg	0.5	5.4
Manganese	M	2455	mg/kg	1.0	140
Copper	M	2455	mg/kg	0.50	11
Mercury	M	2455	mg/kg	0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	5.1
Lead	M	2455	mg/kg	0.50	6.2
Selenium	M	2455	mg/kg	0.25	< 0.25
Vanadium	U	2455	mg/kg	0.5	5.9
Zinc	M	2455	mg/kg	0.50	44
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	M	2625	%	0.40	1.2
Total Organic Carbon	M	2625	%	0.20	0.72
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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1566621
			Sample Location:		BH122
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		14-Dec-2022
			Asbestos 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	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	0.55
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	< 0.20
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	< 0.20

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-48476
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1566621
			Sample Location:		BH122
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		14-Dec-2022
			Asbestos Lab:		DURHAM
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	2.6
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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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			Asbestos 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	< 0.050
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	< 0.050
Anthracene	N	2790	mg/kg	0.050	< 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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			Sample Location:		BH122
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		14-Dec-2022
			Asbestos Lab:		DURHAM
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	< 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	N	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	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	< 0.010
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	M	2920	mg/kg	0.020	< 0.020
Phenol	M	2920	mg/kg	0.020	< 0.020
Cresols	M	2920	mg/kg	0.020	< 0.020
Xylenols	M	2920	mg/kg	0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		22-48476
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			Sample Location:		BH122
			Sample Type:		SOIL
			Top Depth (m):		5.5
			Date Sampled:		14-Dec-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Total Phenols	M	2920	mg/kg	0.10	< 0.10

Results - Single Stage WAC

Project: 22-1041A 3FM Planning Design GI

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-48476						
Chemtest Sample ID:	1566615						
Sample Ref:							
Sample ID:							
Sample Location:	BH122						
Top Depth(m):	2.5						
Bottom Depth(m):							
Sampling Date:	14-Dec-2022						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	9.1	3	5	6
Loss On Ignition	2610	M	%	8.3	--	--	10
Total BTEX	2760	M	mg/kg	0.015	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	150	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0056	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.

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
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	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES

Test Methods

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

Test Methods

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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

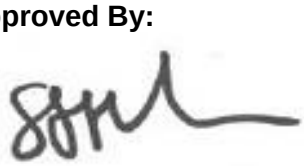
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	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

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Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		0.5	2.0
			Date Sampled:		04-Jan-2023	04-Jan-2023
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	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
pH	U	2010		4.0	9.4	9.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	3.2	3.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.34	0.26
Total Sulphur	U	2175	%	0.010	0.12	0.14
Sulphur (Elemental)	U	2180	mg/kg	1.0	91	68
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50
Thiocyanate	U	2300	mg/kg	5.0	[B] < 5.0	[B] < 5.0
Aluminium (Total)	N	2430	mg/kg	100	7600	8600
Iron (Total)	N	2430	mg/kg	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)	N	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	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] 170
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		0.5	2.0
			Date Sampled:		04-Jan-2023	04-Jan-2023
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic TPH >C12-C16	N	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	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
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] 170
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	[B] < 0.010	[B] < 0.010
Aromatic TPH >C7-C8	N	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	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	[B] < 0.10	[B] < 0.10
Total Aromatic Hydrocarbons	N	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	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Chloromethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Vinyl Chloride	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Bromomethane	N	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	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloroethene	N	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	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
cis 1,2-Dichloroethene	N	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	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Tetrachloromethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
1,1-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Benzene	N	2760	µg/kg	0.20	[B] < 0.20	[B] 0.39
1,2-Dichloroethane	N	2760	µg/kg	0.20	[B] < 0.20	[B] < 0.20
Trichloroethene	N	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	N	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	µg/kg	0.20	[B] 0.79	[B] 10

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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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 Depth (m):		0.5	2.0
			Date Sampled:		04-Jan-2023	04-Jan-2023
			Asbestos 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	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Phenol	N	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	mg/kg	0.050	[B] < 0.050	[B] < 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		0.5	2.0
			Date Sampled:		04-Jan-2023	04-Jan-2023
			Asbestos 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	N	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	mg/kg	0.050	[B] < 0.050	[B] < 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		0.5	2.0
			Date Sampled:		04-Jan-2023	04-Jan-2023
			Asbestos Lab:		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
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	mg/kg	0.050	[B] 0.41	[B] 0.30
Anthracene	N	2790	mg/kg	0.050	[B] 0.098	[B] 0.054
Carbazole	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] 0.12
Fluoranthene	N	2790	mg/kg	0.050	[B] 0.53	[B] 0.36
Pyrene	N	2790	mg/kg	0.050	[B] 0.46	[B] 0.35
Butylbenzyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Benzo[a]anthracene	N	2790	mg/kg	0.050	[B] 0.27	[B] 0.17
Chrysene	N	2790	mg/kg	0.050	[B] 0.28	[B] 0.21
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.050	[B] 0.11	[B] 0.21
Di-N-Octyl Phthalate	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Benzo[b]fluoranthene	N	2790	mg/kg	0.050	[B] 0.34	[B] 0.29
Benzo[k]fluoranthene	N	2790	mg/kg	0.050	[B] 0.14	[B] 0.11
Benzo[a]pyrene	N	2790	mg/kg	0.050	[B] 0.31	[B] 0.22
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.050	[B] 0.14	[B] 0.11
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] 0.20	[B] 0.16
4-Nitrophenol	N	2790	mg/kg	0.050	[B] < 0.050	[B] < 0.050
Naphthalene	N	2800	mg/kg	0.010	0.95	1.0
Acenaphthylene	N	2800	mg/kg	0.010	0.26	0.27
Acenaphthene	N	2800	mg/kg	0.010	2.7	1.8
Fluorene	N	2800	mg/kg	0.010	2.6	2.0
Phenanthrene	N	2800	mg/kg	0.010	19	16
Anthracene	N	2800	mg/kg	0.010	4.0	3.5
Fluoranthene	N	2800	mg/kg	0.010	23	20
Pyrene	N	2800	mg/kg	0.010	18	16
Benzo[a]anthracene	N	2800	mg/kg	0.010	9.1	8.2
Chrysene	N	2800	mg/kg	0.010	11	9.6
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	12	9.8
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	4.0	3.3
Benzo[a]pyrene	N	2800	mg/kg	0.010	9.5	8.3
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	5.8	4.6
Dibenz(a,h)Anthracene	N	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		0.5	2.0
			Date Sampled:		04-Jan-2023	04-Jan-2023
			Asbestos 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	N	2920	mg/kg	0.020	< 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	B	Amber Glass 250ml
1571052	1		BH102	04-Jan-2023	B	Amber Glass 60ml
1571052	1		BH102	04-Jan-2023	B	Plastic Tub 500g
1571055	4		BH102	04-Jan-2023	B	Amber Glass 250ml
1571055	4		BH102	04-Jan-2023	B	Amber Glass 60ml
1571055	4		BH102	04-Jan-2023	B	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

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

Final Report

Report No.:	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:

Details: Stuart Henderson, Technical Manager

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-00855
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1572934
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		09-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	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
pH	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)	N	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	N	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/kg	0.10	[B] < 0.10

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-00855
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1572934
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		09-Jan-2023
			Asbestos 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
Trichloromethane	N	2760	µg/kg	0.20	[B] < 0.20
1,1,1-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Tetrachloromethane	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	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] 1.4
Trans-1,3-Dichloropropene	N	2760	µg/kg	0.20	[B] < 0.20
1,1,2-Trichloroethane	N	2760	µg/kg	0.20	[B] < 0.20

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-00855
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1572934
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		09-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
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] < 0.20
1,1,1,2-Tetrachloroethane	N	2760	µg/kg	0.20	[B] < 0.20
Ethylbenzene	N	2760	µg/kg	0.20	[B] 0.38
m & p-Xylene	N	2760	µg/kg	0.20	[B] 1.0
o-Xylene	N	2760	µg/kg	0.20	[B] 0.62
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] < 0.20
Bromobenzene	N	2760	µg/kg	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] < 0.20
2-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20
1,3,5-Trimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
4-Chlorotoluene	N	2760	µg/kg	0.20	[B] < 0.20
Tert-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2,4-Trimethylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
Sec-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,3-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
4-Isopropyltoluene	N	2760	µg/kg	0.20	[B] < 0.20
1,4-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
N-Butylbenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
1,2-Dibromo-3-Chloropropane	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	µg/kg	0.20	[B] < 0.20
1,2,3-Trichlorobenzene	N	2760	µg/kg	0.20	[B] < 0.20
Methyl Tert-Butyl Ether	N	2760	µg/kg	0.20	[B] < 0.20
N-Nitrosodimethylamine	N	2790	mg/kg	0.050	[B] < 0.050
Phenol	N	2790	mg/kg	0.050	[B] < 0.050
2-Chlorophenol	N	2790	mg/kg	0.050	[B] < 0.050
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.050	[B] < 0.050
1,3-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
1,4-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
1,2-Dichlorobenzene	N	2790	mg/kg	0.050	[B] < 0.050
2-Methylphenol	N	2790	mg/kg	0.050	[B] < 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-00855
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1572934
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		09-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Bis(2-Chloroisopropyl)Ether	N	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	mg/kg	0.050	[B] < 0.050

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-00855
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1572934
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		09-Jan-2023
			Asbestos 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	N	2920	mg/kg	0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-00855
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1572934
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		09-Jan-2023
			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:
1572934			BH131	09-Jan-2023	B	Amber Glass 250ml
1572934			BH131	09-Jan-2023	B	Amber Glass 60ml
1572934			BH131	09-Jan-2023	B	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

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

Final Report

Report No.:	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1574943
				Client Sample ID.:		10
				Sample Location:		BH131
				Sample Type:		SOIL
				Top Depth (m):		6.5
				Date Sampled:		13-Jan-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
pH	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1574943
				Client Sample ID.:		10
				Sample Location:		BH131
				Sample Type:		SOIL
				Top Depth (m):		6.5
				Date Sampled:		13-Jan-2023
Determinand	**Accred.**	**SOP**	**Type**	**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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1574943
				Client Sample ID.:		10
				Sample Location:		BH131
				Sample Type:		SOIL
				Top Depth (m):		6.5
				Date Sampled:		13-Jan-2023
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1574943
				Client Sample ID.:		10
				Sample Location:		BH131
				Sample Type:		SOIL
				Top Depth (m):		6.5
				Date Sampled:		13-Jan-2023
Determinand	**Accred.**	**SOP**	**Type**	**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	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

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1574943
				Client Sample ID.:		10
				Sample Location:		BH131
				Sample Type:		SOIL
				Top Depth (m):		6.5
				Date Sampled:		13-Jan-2023
Determinand	**Accred.**	**SOP**	**Type**	**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	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	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	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	N	1900	10:1	µg/l	0.20	< 0.20

Results - Leachate

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455				**Chemtest Sample ID.:**		1574943
				Client Sample ID.:		10
				Sample Location:		BH131
				Sample Type:		SOIL
				Top Depth (m):		6.5
				Date Sampled:		13-Jan-2023
Determinand	**Accred.**	**SOP**	**Type**	**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	N	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1574937
			Client Sample ID.:		3
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		3
			Date Sampled:		13-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	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
pH	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1574937
			Client Sample ID.:		3
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		3
			Date Sampled:		13-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**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	µg/kg	0.20	0.66

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1574937
			Client Sample ID.:		3
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		3
			Date Sampled:		13-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1574937
			Client Sample ID.:		3
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		3
			Date Sampled:		13-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**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	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	0.087
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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1574937
			Client Sample ID.:		3
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		3
			Date Sampled:		13-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-01251
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1574937
			Client Sample ID.:		3
			Sample Location:		BH131
			Sample Type:		SOIL
			Top Depth (m):		3
			Date Sampled:		13-Jan-2023
			Asbestos 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	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
1010	pH Value of Waters	pH	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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

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

Final Report

Report No.:	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:

Details: Stuart Henderson, Technical Manager

Results - Soil

Project: 22-1041A 3PM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-02478
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1580016
			Sample Location:		BH105
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		20-Jan-2023
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	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	N	2040		N/A	Loam
pH	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	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

Results - Soil

Project: 22-1041A 3PM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-02478
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1580016
			Sample Location:		BH105
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		20-Jan-2023
			Asbestos 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	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

Results - Soil

Project: 22-1041A 3PM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-02478
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1580016
			Sample Location:		BH105
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		20-Jan-2023
			Asbestos Lab:		DURHAM
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	mg/kg	0.050	< 0.050

Results - Soil

Project: 22-1041A 3PM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-02478
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1580016
			Sample Location:		BH105
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		20-Jan-2023
			Asbestos 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	mg/kg	0.050	0.19

Results - Soil

Project: 22-1041A 3PM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-02478
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1580016
			Sample Location:		BH105
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		20-Jan-2023
			Asbestos 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	mg/kg	0.020	< 0.020

Results - Soil

Project: 22-1041A 3PM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-02478
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1580016
			Sample Location:		BH105
			Sample Type:		SOIL
			Top Depth (m):		1
			Date Sampled:		20-Jan-2023
			Asbestos 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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

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

Final Report

Report No.:	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		1.0	1.5
			Date Sampled:		27-Jan-2023	27-Jan-2023
			Asbestos Lab:			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	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
pH	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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		1.0	1.5
			Date Sampled:		27-Jan-2023	27-Jan-2023
			Asbestos 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	µg/kg	0.20		< 0.20

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		1.0	1.5
			Date Sampled:		27-Jan-2023	27-Jan-2023
			Asbestos Lab:			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
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	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

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		1.0	1.5
			Date Sampled:		27-Jan-2023	27-Jan-2023
			Asbestos 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	mg/kg	0.050		7.6

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		1.0	1.5
			Date Sampled:		27-Jan-2023	27-Jan-2023
			Asbestos Lab:			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Anthracene	N	2790	mg/kg	0.050		1.9
Carbazole	N	2790	mg/kg	0.050		0.56
Di-N-Butyl Phthalate	N	2790	mg/kg	0.050		< 0.050
Fluoranthene	N	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	N	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	N	2800	mg/kg	0.010		3.5
Phenanthrene	N	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	N	2815	mg/kg	0.0010	< 0.0010	
PCB 118	N	2815	mg/kg	0.0010	0.011	

Results - Soil

Project: 22-1041A 3FM Planning Design GI

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 Depth (m):		1.0	1.5
			Date Sampled:		27-Jan-2023	27-Jan-2023
			Asbestos 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	pH	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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

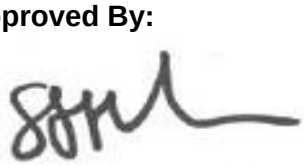
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	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

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

Results - Water

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:			Client Sample Ref.:		1	1	1	1	1	1	1	1
			Sample Location:		BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sampled:		07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
pH	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/l	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

Results - Water

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			Chemtest Job No.:		23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455			Chemtest Sample ID.:		1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:			Client Sample Ref.:		1	1	1	1	1	1	1	1
			Sample Location:		BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sampled:		07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	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

Results - Water

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:			Client Sample Ref.:		1	1	1	1	1	1	1	1
			Sample Location:		BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sampled:		07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	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

Results - Water

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:			Client Sample Ref.:		1	1	1	1	1	1	1	1
			Sample Location:		BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sampled:		07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	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	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitroaniline	N	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

Results - Water

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:			Client Sample Ref.:		1	1	1	1	1	1	1	1
			Sample Location:		BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sampled:		07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	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	N	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	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	[C] < 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	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	N	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	N	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	N	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

Results - Water

Project: 22-1041A 3FM Planning Design GI

Client: Causeway Geotech Ltd			**Chemtest Job No.:**		23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329	23-08329
Quotation No.: Q22-28455			**Chemtest Sample ID.:**		1605673	1605674	1605675	1605676	1605677	1605678	1605679	1605680
Order No.:			Client Sample Ref.:		1	1	1	1	1	1	1	1
			Sample Location:		BH120	BH121	BH123	BH125	BH128	SW1	SW2	SW3
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		4.45	4.15	4.09	4.46	1.64	0.00	0.00	0.00
			Date Sampled:		07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	07-Mar-2023	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	B	Coloured Winchester 1000ml
1605673	1		BH120	07-Mar-2023	B	EPA Vial 40ml
1605673	1		BH120	07-Mar-2023	B	Plastic Bottle 1000ml
1605674	1		BH121	07-Mar-2023	B	Coloured Winchester 1000ml
1605674	1		BH121	07-Mar-2023	B	EPA Vial 40ml
1605674	1		BH121	07-Mar-2023	B	Plastic Bottle 1000ml
1605675	1		BH123	07-Mar-2023	B	Coloured Winchester 1000ml
1605675	1		BH123	07-Mar-2023	B	EPA Vial 40ml
1605675	1		BH123	07-Mar-2023	B	Plastic Bottle 1000ml
1605676	1		BH125	07-Mar-2023	B	Coloured Winchester 1000ml
1605676	1		BH125	07-Mar-2023	B	EPA Vial 40ml
1605676	1		BH125	07-Mar-2023	B	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	B	Coloured Winchester 1000ml
1605678	1		SW1	07-Mar-2023	B	EPA Vial 40ml
1605678	1		SW1	07-Mar-2023	B	Plastic Bottle 1000ml
1605679	1		SW2	07-Mar-2023	B	Coloured Winchester 1000ml
1605679	1		SW2	07-Mar-2023	B	EPA Vial 40ml
1605679	1		SW2	07-Mar-2023	B	Plastic Bottle 1000ml
1605680	1		SW3	07-Mar-2023	B	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	B	EPA Vial 40ml
1605680	1		SW3	07-Mar-2023	B	Plastic Bottle 1000ml

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	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 l-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

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

CAUSEWAY GEOTECH

APPENDIX J

SPT HAMMER ENERGY MEASUREMENT REPORT

Project Number:	22-1041A	
Project Name:	3FM Planning and Design GI Lot A DPC Lands	
BH Location	**Driller**	**SPT Hammer No.**
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

SPT Hammer Energy Test Report

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

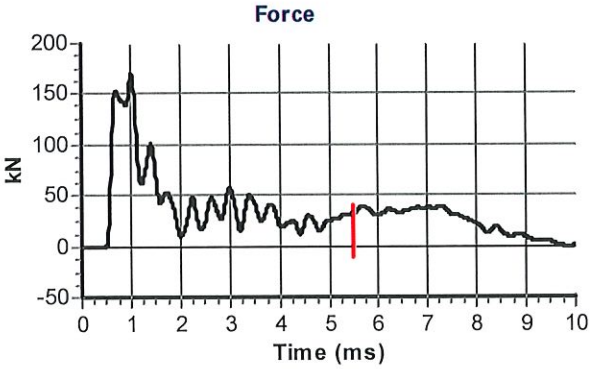
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.7
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

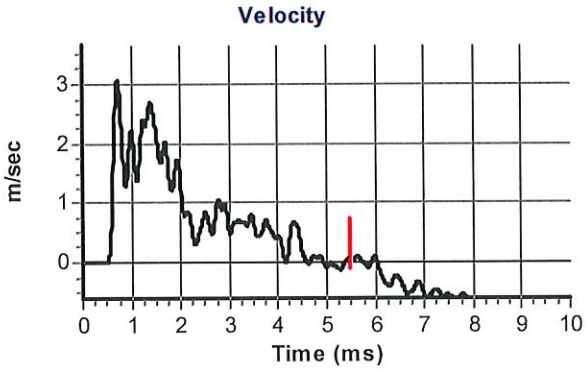
SPT Hammer Information

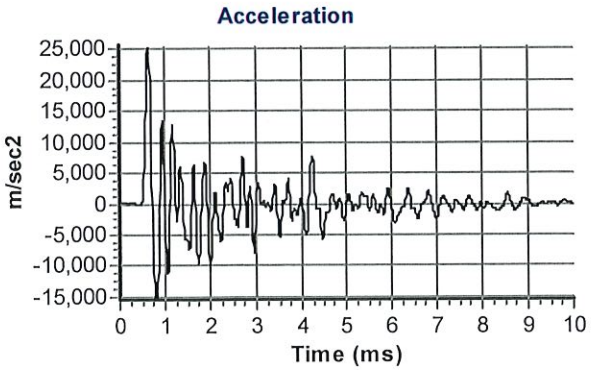
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

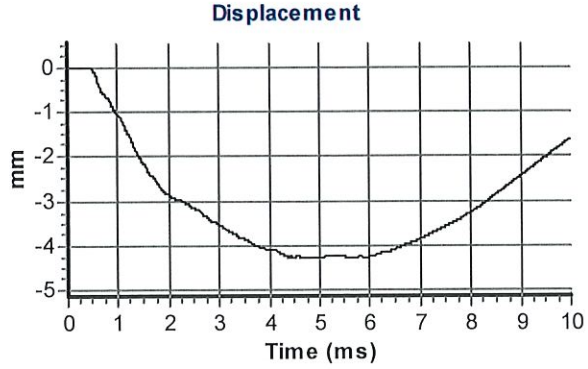
Comments / Location

CAUSEWAY









Calculations

Area of Rod A (mm2):	996
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	327

Energy Ratio E_r (%): **69**

Signed: Bob Stewart

Title: Technician

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref:	0197.
Test Date:	18/02/2023
Report Date:	20/02/2023
File Name:	0197..spt
Test Operator:	RWS

Instrumented Rod Data

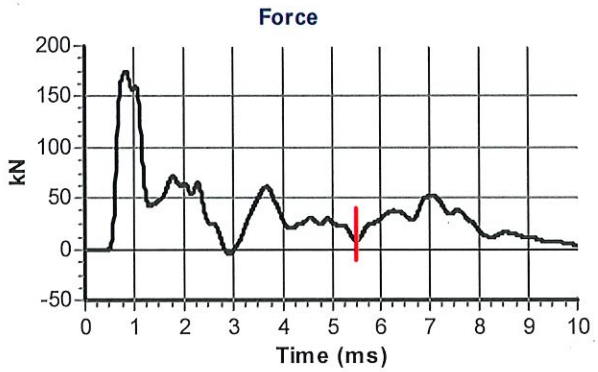
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.7
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

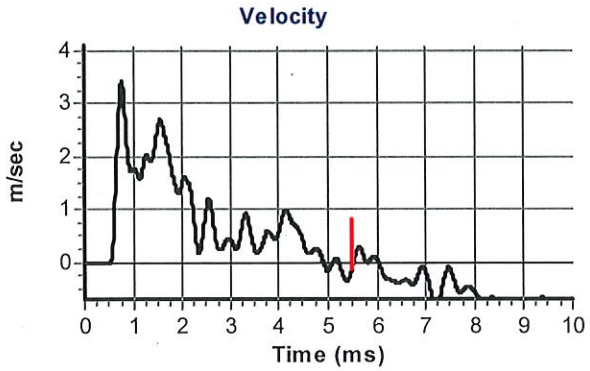
SPT Hammer Information

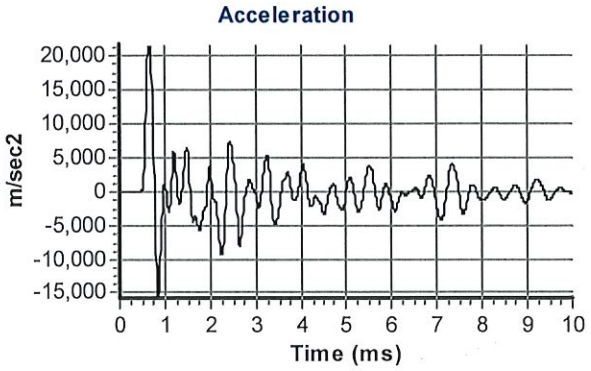
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

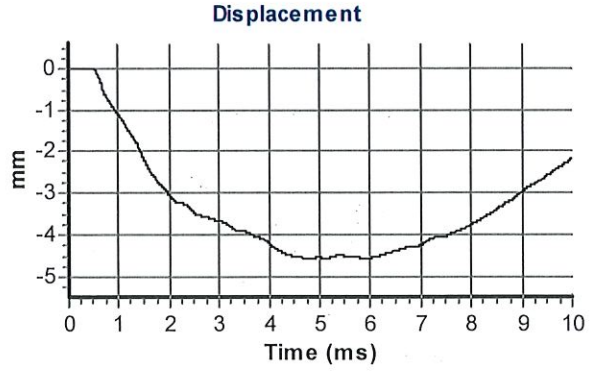
Comments / Location

CAUSEWAY









Calculations

Area of Rod A (mm2):	996
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	356

Energy Ratio E_r (%): **75**

Signed: Bob Stewart

Title: Technician

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

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:	18/02/2023
Report Date:	20/02/2023
File Name:	0208..spt
Test Operator:	RWS

Instrumented Rod Data

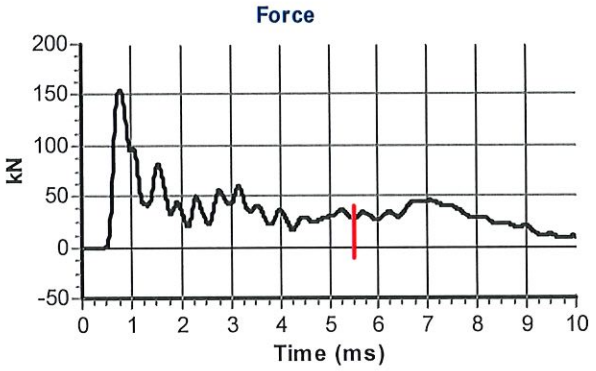
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.7
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

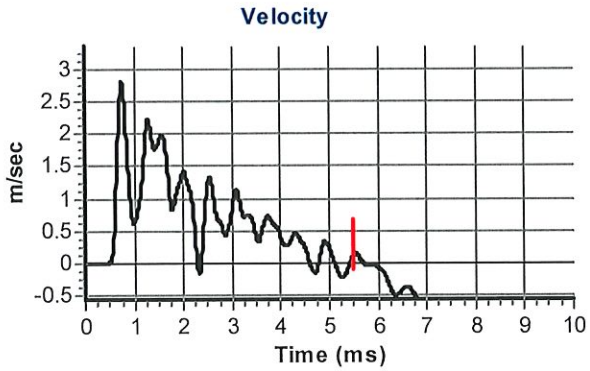
SPT Hammer Information

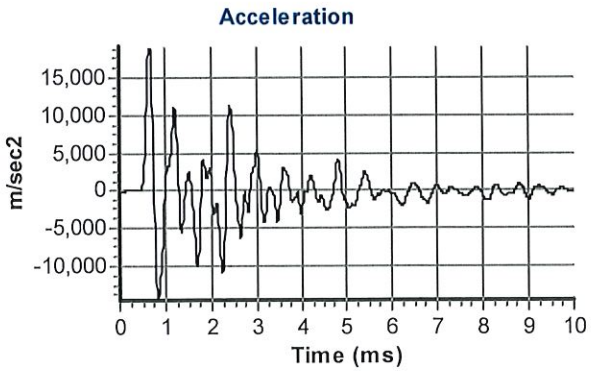
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

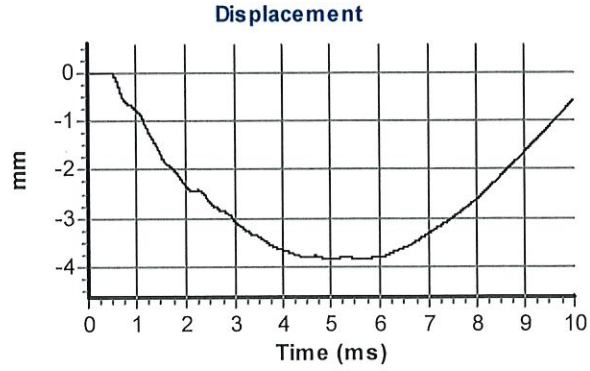
Comments / Location

CAUSEWAY









Calculations

Area of Rod A (mm2):	996
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	244

Energy Ratio E_r (%): **52**

Signed: Bob Stewart

Title: Technician

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref:	T7.
Test Date:	18/02/2023
Report Date:	20/02/2023
File Name:	T7..spt
Test Operator:	RWS

Instrumented Rod Data

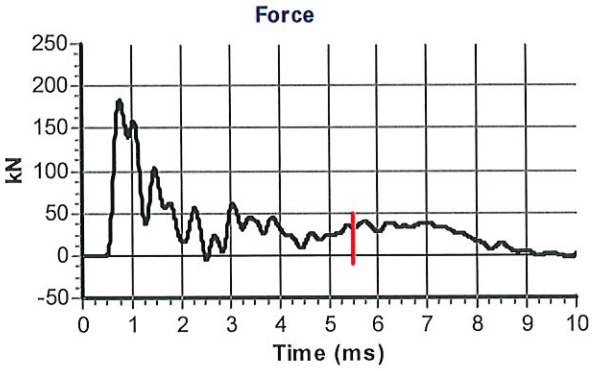
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.7
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

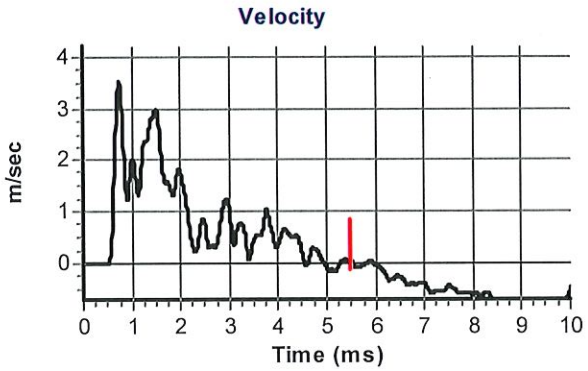
SPT Hammer Information

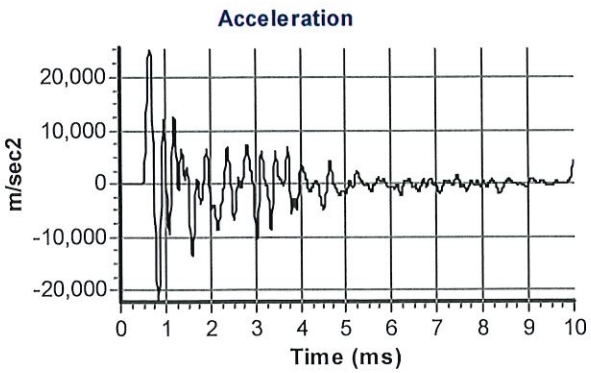
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

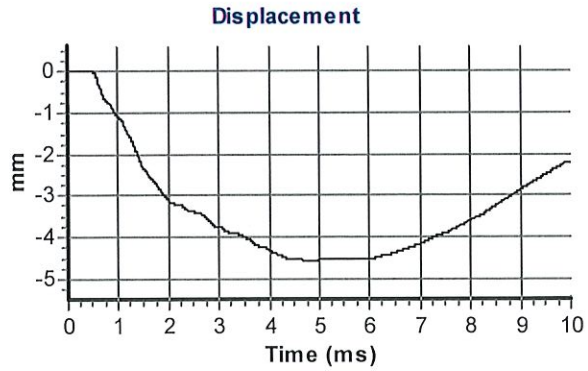
Comments / Location

CAUSEWAY









Calculations

Area of Rod A (mm2):	996
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	354

Energy Ratio E_r (%): **75**

Signed: Bob Stewart

Title: Technician

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref:	1386.
Test Date:	18/02/2023
Report Date:	20/02/2023
File Name:	1386..spt
Test Operator:	RWS

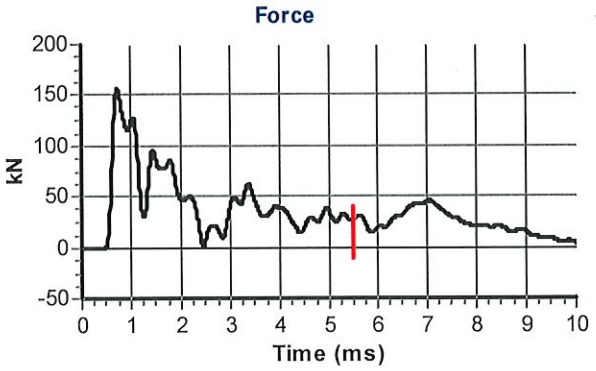
Instrumented Rod Data

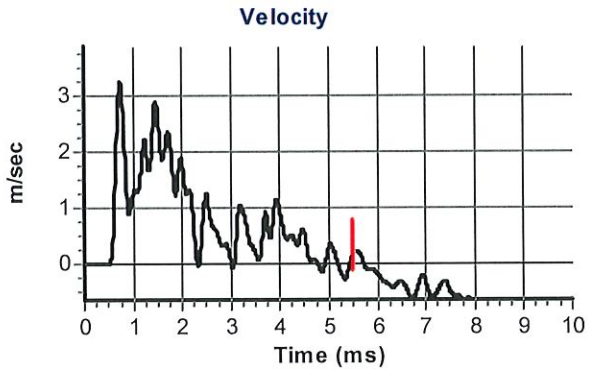
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.7
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	64786
Accelerometer No.2:	64789

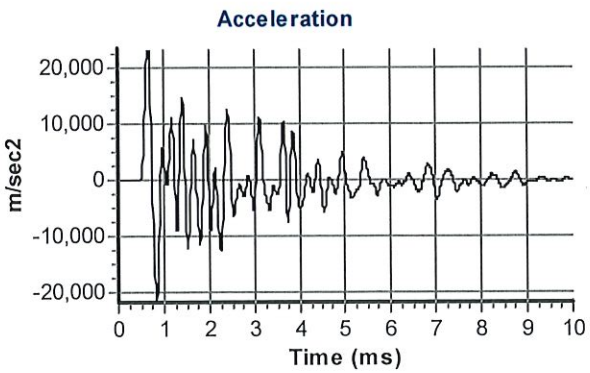
SPT Hammer Information

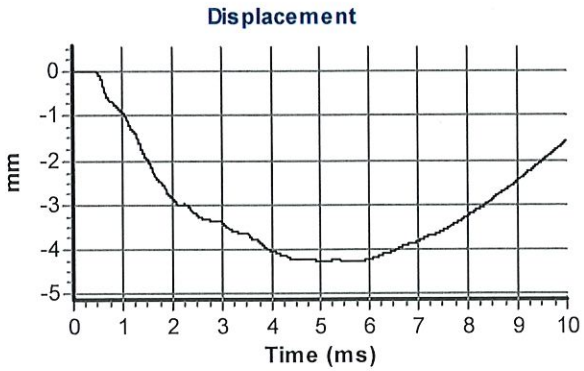
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

Comments / Location
CAUSEWAY









Calculations

Area of Rod A (mm2):	996
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	306

Energy Ratio E_r (%): **65**

Signed: Bob Stewart
Title: Technician

The recommended calibration interval is 12 months

A&I GEOTECHNICAL

SPT Hammer Energy Test Report

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

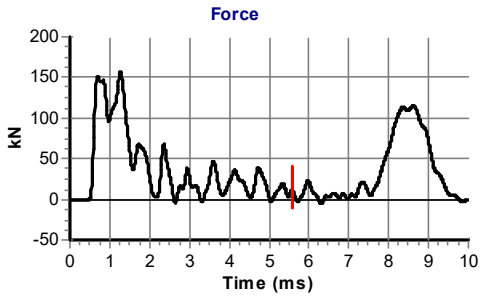
Instrumented Rod Data

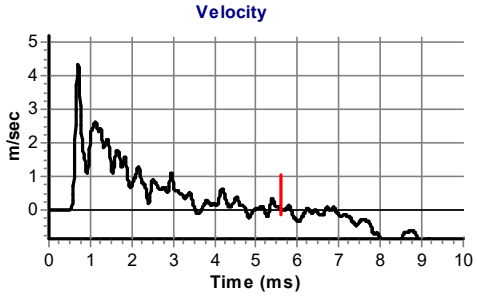
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.5
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	69556
Accelerometer No.2:	69558

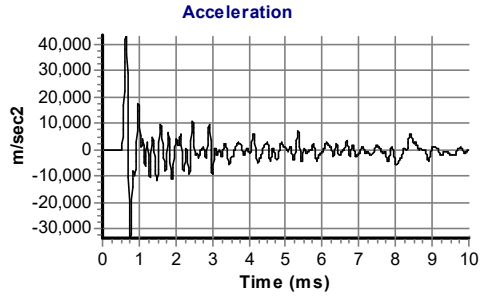
SPT Hammer Information

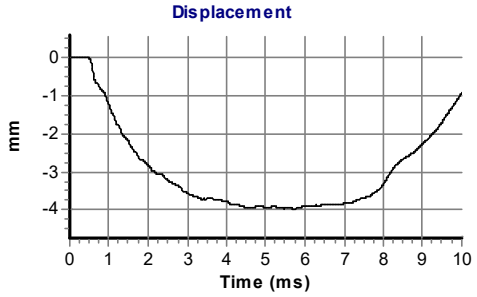
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	17.0

Comments / Location









Calculations

Area of Rod A (mm2):	970
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	352

Energy Ratio E_r (%): 74

Signed: R Cameron

Title: Principal Geotechnical Engineer

CAUSEWAY GEOTECH

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

NA= No Access

Borehole Number	Type	Borehole Elevation (mOD)	Date Installed	Installation Depth Range (mbgl)	Depth to water level (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	Dry	Dry	Dry	Dry	Dry	Dry
BH103	50mm	3.52	06/01/2023	0.50-3.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH105	50mm	3.55	20/01/2023	0.50-2.20	NA	NA	NA	NA	NA	NA	NA	NA	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

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	16/03/2023
Weather:	Dry
Engineer:	RS

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	994	0.0	0.1	21.4	0	0
After:	994	0.0	0.2	21.1	0	0

BH102	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	4.6	15.5	0	0
60	0.0	6.6	12.5	0	0
90	0.0	6.2	13.0	0	0
120	0.0	5.6	13.7	0	0
150	0.0	5.7	13.7	0	0
180	0.0	5.5	13.9	0	0
240	0.0	2.2	14.1	0	0
300	0.0	4.9	14.4	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.1
60	0.2
90	0.2
120	0.2
150	0.2
180	0.2
240	0.2
300	0.2

Groundwater monitoring	**mbgl**
Depth to top of water	Dry

BH103	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH103

BH105	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH105

BH112	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	4.2	15.5	0	0
60	0.0	6.6	12.5	0	0
90	0.0	6.2	13.0	0	0
120	0.0	5.6	13.7	0	0
150	0.0	5.7	13.7	0	0
180	0.0	5.5	13.9	0	0
240	0.0	2.2	14.1	0	0
300	0.0	4.9	14.4	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.1
60	0.2
90	0.2
120	0.2
150	0.2
180	0.2
240	0.2
300	0.2

Groundwater monitoring	**mbgl**
Depth to top of water	Dry

BH120	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.5	0.8	19.1	2	0
60	0.5	0.9	18.8	1	0
90	0.6	1.1	18.4	1	0
120	0.7	1.3	17.9	1	0
150	0.8	1.4	17.5	1	0
180	0.9	1.6	17.2	1	0
240	1.5	2.0	16.5	1	0
300	6.3	2.7	14.4	1	0
400	16.5	3.4	11.6	1	0
500	26.5	4.1	8.9	1	0
600	34.4	4.8	6.6	1	0
700	41.0	5.3	4.8	1	0
800	45.9	5.7	3.5	1	0
900	49.5	6.0	3.2	1	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	-4.7
60	-3.8
90	-3.0
120	-2.4
150	-1.7
180	-1.3
240	-0.4
300	-0.1
400	-0.1
500	0.0
600	0.1
700	0.1
800	0.1
900	0.2

Groundwater monitoring	**mbgl**
Depth to top of water	4.02

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	16/03/2023
Weather:	Dry
Engineer:	RS

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	994	0.0	0.1	21.4	0	0
After:	994	0.0	0.2	21.1	0	0

BH121	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	1.2	14.9	0	0
60	0.0	1.3	14.7	0	0
90	0.0	1.3	14.7	0	0
120	0.0	1.3	14.7	0	0
150	0.0	1.3	14.8	0	0
180	0.0	1.3	14.8	0	0
240	0.0	1.2	14.9	0	0
300	0.0	1.2	15.1	0	0

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

Groundwater monitoring	**mbgl**
Depth to top of water	3.93

BH123	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	6.2	2.1	17.7	1	0
60	5.6	1.9	17.9	0	0
90	5.1	1.7	18.2	0	0
120	4.6	1.5	18.5	0	0
150	4.2	1.4	18.7	0	0
180	4.0	1.3	18.9	0	0
240	3.5	1.1	19.1	0	0
300	3.1	1.0	19.4	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	-15.7
60	-14.5
90	-13.3
120	-12.1
150	-11.2
180	-10.0
240	-8.0
300	-6.2

Groundwater monitoring	**mbgl**
Depth to top of water	3.80

BH124	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	44.8	11.2	0.7	2	0
60	44.7	11.1	0.3	2	0
90	44.9	11.2	0.2	1	0
120	45.3	11.2	0.2	1	0
150	45.6	11.2	0.2	1	0
180	45.7	11.2	0.1	1	0
240	45.9	11.2	0.1	1	0
300	45.9	11.3	0.1	1	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.1
60	0.1
90	0.2
120	0.2
150	0.2
180	0.2
240	0.2
300	0.1

Groundwater monitoring	**mbgl**
Depth to top of water	0.95

BH125	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	0.3	24.4	0	0
60	0.0	0.2	20.9	0	0
90	0.0	0.2	21.1	0	0
120	0.0	0.1	21.2	0	0
150	0.0	0.1	21.2	0	0
180	0.0	0.1	21.2	0	0
240	0.0	0.1	21.3	0	0
300	0.0	0.1	21.3	0	0

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

Groundwater monitoring	**mbgl**
Depth to top of water	2.04

BH126	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH126

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	16/03/2023
Weather:	Dry
Engineer:	RS

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	994	0.0	0.1	21.4	0	0
After:	994	0.0	0.2	21.1	0	0

BH127	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH128

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	14/04/2023
Weather:	Dry
Engineer:	MRG

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	1000	0.0	0.2	21.0	0	0
After:	1000	0.0	0.1	21.1	0	0

BH102	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	0.1	20.8	0	0
60	0.0	0.1	20.7	0	0
90	0.0	0.1	20.7	0	0
120	0.0	0.1	20.7	0	0
150	0.0	0.1	20.7	0	0
180	0.0	0.1	20.7	0	0
240	0.0	0.1	20.7	0	0
300	0.0	0.1	20.7	0	0

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

Groundwater monitoring	**mbgl**
Depth to top of water	Dry

BH103	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH103

BH105	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH105

BH112	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	0.1	20.8	0	0
60	0.0	0.1	20.8	0	0
90	0.0	0.1	20.8	0	0
120	0.0	0.1	20.8	0	0
150	0.0	0.1	20.8	0	0
180	0.0	0.1	20.8	0	0
240	0.0	0.1	20.8	0	0
300	0.0	0.1	20.8	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.2
60	0.2
90	0.1
120	0.1
150	0.1
180	0.1
240	0.1
300	0.1

Groundwater monitoring	**mbgl**
Depth to top of water	Dry

BH120	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	6.9	20.2	0	0
60	59.4	7.2	6.3	0	0
90	40.6	7.3	5.8	0	0
120	42.1	7.6	5.2	0	0
150	43.1	7.7	4.8	0	0
180	43.6	7.8	4.5	0	0
240	43.6	7.8	4.5	0	0
300	43.6	7.8	4.5	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	8.1
60	9.2
90	9.8
120	10.7
150	10.7
180	10.8
240	10.8
300	10.8

Groundwater monitoring	**mbgl**
Depth to top of water	4.64

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	14/04/2023
Weather:	Dry
Engineer:	MRG

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	1000	0.0	0.2	21.0	0	0
After:	1000	0.0	0.1	21.1	0	0

BH121	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	2.1	18.4	0	0
60	0.0	1.8	18.3	0	0
90	0.0	1.9	17.6	0	0
120	0.0	1.5	15.4	0	0
150	0.0	1.5	15.2	0	0
180	0.0	1.5	14.8	0	0
240	0.0	1.5	14.8	0	0
300	0.0	1.5	14.8	0	0

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

Groundwater monitoring	**mbgl**
Depth to top of water	4.10

BH123	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	2.9	1.3	18.7	0	0
60	2.8	1.3	18.7	0	0
90	2.2	1.0	19.0	0	0
120	1.8	0.9	19.3	0	0
150	1.7	0.8	19.3	0	0
180	1.5	0.8	19.3	0	0
240	1.4	0.8	19.3	0	0
300	1.4	0.8	19.3	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	5.2
60	5.6
90	5.7
120	5.7
150	5.7
180	5.7
240	5.7
300	5.7

Groundwater monitoring	**mbgl**
Depth to top of water	3.75

BH124	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	1.5	1.3	19.0	0	0
60	2.2	2.0	17.8	0	0
90	4.7	3.6	15.3	0	0
120	6.2	5.1	12.3	0	0
150	6.8	5.4	11.6	0	0
180	6.8	5.5	11.4	0	0
240	6.9	5.6	11.3	0	0
300	6.8	5.6	11.3	0	0

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

Groundwater monitoring	**mbgl**
Depth to top of water	0.98

BH125	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	0.3	20.3	0	0
60	0.0	0.3	20.3	0	0
90	0.0	0.3	20.3	0	0
120	0.0	0.4	20.1	0	0
150	0.0	0.4	20.1	0	0
180	0.0	0.4	20.1	0	0
240	0.0	0.4	20.1	0	0
300	0.0	0.4	20.1	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	5.2
60	4.1
90	3.8
120	3.5
150	3.6
180	3.4
240	2.8
300	2.5

Groundwater monitoring	**mbgl**
Depth to top of water	4.42

BH126	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH126

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	14/04/2023
Weather:	Dry
Engineer:	MRG

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	1000	0.0	0.2	21.0	0	0
After:	1000	0.0	0.1	21.1	0	0

BH127	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH128

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	14/07/2023
Weather:	Wet
Engineer:	RS

Equipment:		Geotechnical Instruments GA5000				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	1005	0.1	0.0	21.2	1	0
After:	1005	0.1	0.0	21.1	0	0

BH102	Gas readings				
Time (sec)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)
30	0.1	1.0	18.3	1	0
60	0.1	1.0	18.1	1	0
90	0.1	1.0	18.0	1	0
120	0.0	1.0	17.9	0	0
150	0.1	1.1	17.9	1	0
180	0.1	1.1	17.8	0	0
240	0.1	1.1	17.8	0	0
300	0.1	1.1	17.8	0	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.5
60	0.5
90	0.5
120	0.5
150	0.5
180	0.5
240	0.5
300	0.5

Groundwater monitoring	mbgl
Depth to top of water	Dry

BH103	Gas readings				
Time (sec)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH103

BH105	Gas readings				
Time (sec)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH105

BH112	Gas readings				
Time (sec)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)
30					
60					
90					
120					
150					
180					
240					
300					

Flow rates	
Time (sec)	Flow (l/h)
30	
60	
90	
120	
150	
180	
240	
300	

Groundwater monitoring	mbgl
Depth to top of water	

BH120	Gas readings				
Time (sec)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)
30	40.2	14.6	5.3	2	0
60	40.5	14.8	4.7	2	0
90	40.7	14.9	4.5	1	0
120	41.0	14.9	4.4	1	0
150	41.5	15.1	4.2	1	0
180	42.0	15.4	3.9	1	0
240	43.4	15.9	3.4	1	0
300	44.8	16.3	2.9	1	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.6
60	0.7
90	0.7
120	0.6
150	0.6
180	0.6
240	0.6
300	0.6

Groundwater monitoring	mbgl
Depth to top of water	4.47

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	14/07/2023
Weather:	Wet
Engineer:	RS

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	1005	0.1	0.0	21.2	1	0
After:	1005	0.1	0.0	21.1	0	0

BH121	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.1	4.9	7.1	1	0
60	0.1	4.9	7.1	1	0
90	0.1	4.9	7.0	1	0
120	0.1	4.9	6.9	1	0
150	0.1	4.9	6.9	1	0
180	0.1	4.9	6.9	1	0
240	0.1	4.9	6.7	0	0
300	0.1	2.0	6.5	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.5
60	0.5
90	0.5
120	0.5
150	0.5
180	0.5
240	0.5
300	0.5

Groundwater monitoring	**mbgl**
Depth to top of water	4.20

BH123	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	19.5	8.9	11.2	3	0
60	19.1	8.8	11.3	2	0
90	18.9	8.7	11.4	2	0
120	18.7	8.6	11.6	2	0
150	18.0	8.4	11.8	2	0
180	17.0	7.8	12.4	2	0
240	15.2	7.4	13.1	2	0
300	14.8	7.2	13.3	2	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	-19.8
60	-18.9
90	-18.0
120	-16.9
150	-16.0
180	-15.2
240	-13.6
300	-12.2

Groundwater monitoring	**mbgl**
Depth to top of water	3.88

BH124	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	28.1	20.7	0.7	9	2
60	28.5	21.0	0.2	8	3
90	29.1	21.1	0.1	8	3
120	29.3	21.1	0.1	7	3
150	29.4	21.2	0.1	7	3
180	29.5	21.1	0.1	7	3
240	29.3	21.0	0.2	6	3
300	29.7	21.2	0.0	6	3

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.5
60	0.5
90	0.5
120	0.5
150	0.5
180	0.5
240	0.5
300	0.5

Groundwater monitoring	**mbgl**
Depth to top of water	Dry

BH125	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	3.9	13.6	2.8	3	0
60	3.9	13.6	2.8	3	0
90	3.9	13.7	2.9	3	0
120	4.1	14.1	2.5	3	0
150	4.9	15.4	1.9	3	0
180	5.2	16.0	1.6	3	0
240	6.8	18.0	0.6	3	0
300	7.6	18.8	0.2	3	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.5
60	0.5
90	0.5
120	0.6
150	0.6
180	0.6
240	0.6
300	0.6

Groundwater monitoring	**mbgl**
Depth to top of water	4.45

BH126	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH126

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	14/07/2023
Weather:	Wet
Engineer:	RS

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (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)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.1	1.4	20.7	0	0
60	0.0	1.4	20.9	0	0
90	0.0	1.6	20.8	0	0
120	0.0	1.9	20.7	0	0
150	0.0	2.3	20.4	0	0
180	0.0	2.6	20.1	0	0
240	0.0	3.1	19.5	0	0
300	0.1	3.4	19.0	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.5
60	0.5
90	0.5
120	0.5
150	0.5
180	0.5
240	0.5
300	0.5

Groundwater monitoring	**mbgl**
Depth to top of water	1.82

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	08/08/2023
Weather:	Dry; LOW TIDE
Engineer:	EGA

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	1015	0.0	0.0	21.2	1	0
After:	1015	0.0	0.0	21.3	1	0

BH102	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.1	0.0	21.1	1	0
60	0.1	0.0	21.1	1	0
90	0.1	0.0	21.1	1	1
120	0.1	0.1	21.0	1	1
150	0.1	0.1	21.0	0	1
180	0.1	0.1	21.0	1	1
240	0.1	0.1	21.0	1	1
300	0.1	0.1	21.0	1	1

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

Groundwater monitoring	**mbgl**
Depth to top of water	Dry

BH103	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH103

BH105	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH105

BH112	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.1	0.2	20.9	1	0
60	0.1	0.3	20.6	1	0
90	0.1	0.7	20.0	1	0
120	0.1	0.5	20.5	1	0
150	0.1	0.3	20.5	1	0
180	0.1	0.1	20.8	1	0
240	0.1	3.2	18.5	1	0
300	0.0	4.0	15.8	1	1

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

Groundwater monitoring	**mbgl**
Depth to top of water	3.00

BH120	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	27.2	10.3	8.7	2	0
60	27.7	10.5	8.3	2	0
90	28.3	10.7	8.0	2	0
120	28.7	10.8	7.7	2	0
150	29.1	11.0	7.5	2	0
180	29.7	11.2	7.2	2	0
240	31.6	12.0	6.3	2	0
300	33.7	12.8	5.5	1	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	3.3
60	3.8
90	4.1
120	4.3
150	4.6
180	4.7
240	4.8
300	4.8

Groundwater monitoring	**mbgl**
Depth to top of water	4.18

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	08/08/2023
Weather:	Dry; LOW TIDE
Engineer:	EGA

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	1015	0.0	0.0	21.2	1	0
After:	1015	0.0	0.0	21.3	1	0

BH121	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	1.9	13.1	1	0
60	0.0	1.9	13.0	1	0
90	0.0	1.9	13.0	1	0
120	0.0	1.9	13.0	1	0
150	0.0	1.9	13.0	1	0
180	0.0	1.9	13.0	1	0
240	0.0	1.9	13.1	1	0
300	0.0	1.9	13.3	1	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.2
60	0.3
90	0.3
120	0.3
150	0.3
180	0.3
240	0.3
300	0.3

Groundwater monitoring	**mbgl**
Depth to top of water	3.72

BH123	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH123

BH124	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	9.4	3.0	0.4	6	4
60	10.0	3.0	0.2	6	4
90	10.0	3.0	0.2	6	4
120	9.9	3.1	0.2	5	5
150	9.7	3.1	0.2	5	5
180	9.7	3.2	0.1	5	6
240	9.5	3.2	0.1	5	6
300	9.4	3.3	0.1	5	3

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

Groundwater monitoring	**mbgl**
Depth to top of water	0.70

BH125	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	12.0	14.4	6.6	5	0
60	11.7	14.1	6.8	5	0
90	10.7	13.1	7.8	4	0
120	9.2	11.8	9.2	4	0
150	7.7	10.6	10.6	3	0
180	6.4	9.7	11.7	3	0
240	3.7	7.7	14.0	1	0
300	1.8	6.5	15.7	1	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.2
60	0.2
90	0.2
120	0.2
150	0.2
180	0.2
240	0.2
300	0.2

Groundwater monitoring	**mbgl**
Depth to top of water	4.32

BH126	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH126

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	08/08/2023
Weather:	Dry; LOW TIDE
Engineer:	EGA

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (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)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH128

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	09/08/2023
Weather:	Dry; HIGH TIDE
Engineer:	EGA

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	10	0.1	0.0	21.4	1	0
After:	1017	0.0	0.0	21.0	1	0

BH102	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.1	0.9	18.8	0	0
60	0.1	0.9	18.6	0	0
90	0.1	0.9	18.5	0	0
120	0.1	0.9	18.4	0	0
150	0.1	1.0	18.3	0	0
180	0.1	1.0	18.2	0	0
240	0.1	1.0	18.2	0	0
300	0.1	1.0	18.1	0	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.0
60	0.1
90	0.1
120	0.1
150	0.1
180	0.1
240	0.1
300	0.1

Groundwater monitoring	**mbgl**
Depth to top of water	Dry

BH103	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH103

BH105	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH105

BH112	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.1	0.1	20.9	0	0
60	0.1	0.0	20.9	1	0
90	0.1	0.1	20.8	1	0
120	0.1	0.1	20.9	1	0
150	0.1	0.1	20.9	0	0
180	0.1	0.0	20.9	1	0
240	0.0	0.1	20.8	1	0
300	0.1	1.0	20.7	1	1

Flow rates	
Time (sec)	**0**
30	0.0
60	0.0
90	0.0
120	0.0
150	0.0
180	0.0
240	0.0
300	0.0

Groundwater monitoring	**mbgl**
Depth to top of water	3.00

BH120	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	36.4	13.1	5.6	2	0
60	36.4	13.2	5.3	2	0
90	36.5	13.2	5.2	2	0
120	36.7	13.3	5.1	2	0
150	36.9	13.4	4.9	2	0
180	37.3	13.6	4.7	2	0
240	38.7	14.2	4.2	2	0
300	40.1	14.6	3.8	2	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	3.8
60	4.6
90	4.8
120	5.1
150	5.3
180	5.4
240	5.5
300	5.5

Groundwater monitoring	**mbgl**
Depth to top of water	4.40

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	09/08/2023
Weather:	Dry; HIGH TIDE
Engineer:	EGA

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	10	0.1	0.0	21.4	1	0
After:	1017	0.0	0.0	21.0	1	0

BH121	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.0	1.5	16.2	1	0
60	0.0	1.5	16.1	1	0
90	0.0	1.6	15.9	1	0
120	0.0	1.6	15.8	1	0
150	0.0	1.7	15.7	1	0
180	0.0	1.7	15.5	1	0
240	0.0	1.8	15.3	1	0
300	0.0	1.9	14.9	1	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.3
60	0.3
90	0.3
120	0.3
150	0.3
180	0.3
240	0.3
300	0.3

Groundwater monitoring	**mbgl**
Depth to top of water	3.72

BH123	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH123

BH124	**Gas readings**				
Time (sec)	**0.1**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.1	3.9	1.8	2	0
60	0.1	3.9	1.4	2	0
90	0.1	3.9	1.1	1	0
120	0.1	3.9	1.0	1	0
150	0.1	4.0	0.8	1	0
180	0.1	4.0	0.6	1	0
240	0.1	4.0	0.4	1	0
300	0.0	4.0	0.3	1	0

Flow rates	
Time (sec)	**Flow (l/h)**
30	0.8
60	1.7
90	2.3
120	2.6
150	2.8
180	2.9
240	3.0
300	3.1

Groundwater monitoring	**mbgl**
Depth to top of water	0.87

BH125	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	0.5	5.0	16.8	2	0
60	0.6	5.2	15.4	2	0
90	0.6	5.4	14.8	2	0
120	0.7	5.8	14.4	2	0
150	0.8	6.5	12.9	2	0
180	1.1	8.3	10.0	2	0
240	1.1	10.7	7.0	2	0
300	0.4	11.5	5.7	1	0

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

Groundwater monitoring	**mbgl**
Depth to top of water	4.28

BH126	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH126

Groundwater Ground Gas Monitoring

Site:	3FM Planning Design GI Lot A DPC Lands
Project No.:	22-1041A
Date:	09/08/2023
Weather:	Dry; HIGH TIDE
Engineer:	EGA

Equipment:		**Geotechnical Instruments GA5000**				
Ambient Conditions	**Barometric Pressure**	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
Before:	10	0.1	0.0	21.4	1	0
After:	1017	0.0	0.0	21.0	1	0

BH127	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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	**Gas readings**				
Time (sec)	**CH_4 (%)**	**CO_2 (%)**	**O_2 (%)**	**CO (ppm)**	**H_2S (ppm)**
30	-	-	-	-	-
60	-	-	-	-	-
90	-	-	-	-	-
120	-	-	-	-	-
150	-	-	-	-	-
180	-	-	-	-	-
240	-	-	-	-	-
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 BH128

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** **Top of Screen: 6.5 m** **Total Depth: 17.05 m** **Initial Depth to Water: 4.45 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**

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	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 12:35	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 12:36	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	

Low-Flow Test Report:

Test Date / Time: 07/03/2023 15:09:11
Project: 22-1041 3FM Planning Design GI
Operator Name: Martin Gardiner

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	pH	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	

3FM Planning Design and GI
Lot B 3rd Party Lands

Client:	Dublin Port Company (DPC)
Client's Representative:	RPS
Report No.:	22-1041B
Date:	October 2023
Status:	Final for Issue

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CONTENTS

APPENDICES

Document Control Sheet

Report No.:		22-1041B			
Project Title:		3FM Planning Design GI Lot B 3rd Party Lands			
Client:		Dublin Port Company (DPC)			
Client's Representative:		RPS			
Revision:	A02	**Status:**	Final for Issue	**Issue Date:**	2nd October 2023
Prepared by:		**Reviewed by:**		**Approved by:**	
 Rachel White B.A. (Mod.) Geoscience		 Sean Ross BSc MSc PGeo MIEI		 Darren O'Mahony BSc MSc MIEI EurGeol PGeo	

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).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
C	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 strength VR: 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.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating 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 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 2nd of December 2022 and the 10th 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.

Table 1. Pavement core thickness and composition

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

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.

Table 2. Groundwater strikes encountered during the ground investigation.

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	-

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.

CAUSEWAY GEOTECH

APPENDIX A

SITE AND EXPLORATORY HOLE LOCATION PLANS

Project No.:	22-1041B	**Client:**	Dublin Port Company (DPC)
Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	**Client's Representative:**	RPS

Legend Key

Title:

Site Location Plan

Last Revised:	**Scale:**
03/04/2023	1:20000

CAUSEWAY GEOTECH

Project No.:	22-1041B	**Client:**	Dublin Port Company (DPC)
Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	**Client's Representative:**	RPS

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Title:
Exploratory Hole Location Plan - 1

Last Revised:	**Scale:**
19/04/2023	1:1500

CAUSEWAY GEOTECH

Project No.:	22-1041B	**Client:**	Dublin Port Company (DPC)
Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	**Client's Representative:**	RPS

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Title:
Exploratory Hole Location Plan - 2

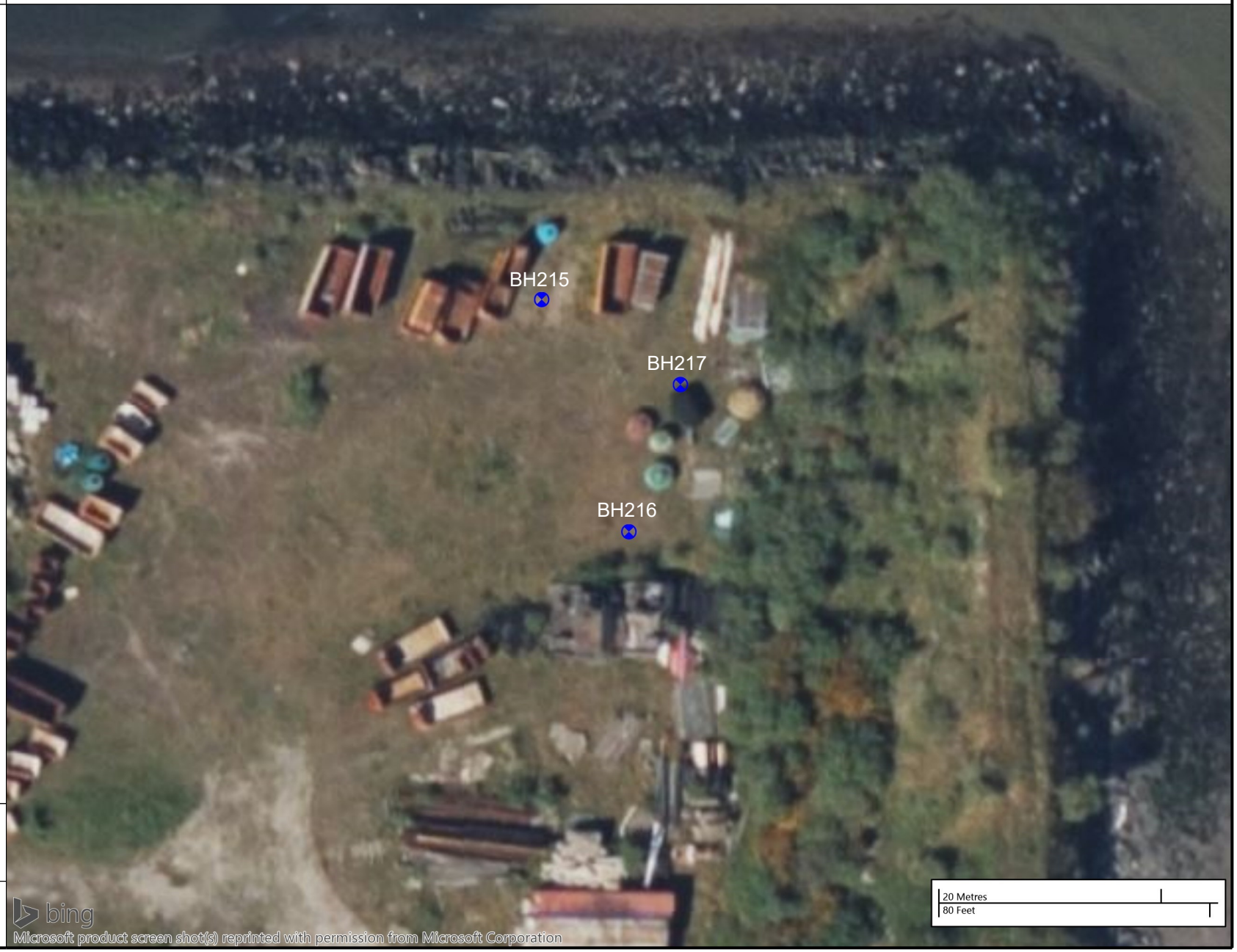
Last Revised:	**Scale:**
19/04/2023	1:2000

CAUSEWAY GEOTECH

Project No.:	22-1041B	**Client:**	Dublin Port Company (DPC)
Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	**Client's Representative:**	RPS

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP



Title:
Exploratory Hole Location Plan - 3

Last Revised:	**Scale:**
19/04/2023	1:500

CAUSEWAY GEOTECH

Project No.:	22-1041B	**Client:**	Dublin Port Company (DPC)
Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	**Client's Representative:**	RPS

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Title:

Exploratory Hole Location Plan - 4

Last Revised:	**Scale:**
19/04/2023	1:1500

CAUSEWAY GEOTECH

Project No.:	22-1041B	**Client:**	Dublin Port Company (DPC)
Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	**Client's Representative:**	RPS

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Title:

Exploratory Hole Location Plan - 5

Last Revised:	**Scale:**
19/04/2023	1:500

CAUSEWAY GEOTECH

Project No.:	22-1041B	**Client:**	Dublin Port Company (DPC)
Project Name:	3FM Planning Design GI - Lot B 3rd Party Lands	**Client's Representative:**	RPS

Legend Key

- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - IP
- Locations By Type - PC
- Locations By Type - TP

Title:

Exploratory Hole Location Plan - 6

Last Revised:	**Scale:**
19/04/2023	1:1000

CAUSEWAY GEOTECH

APPENDIX B

BOREHOLE LOGS

CAUSEWAY GEOTECH	**Project No.** 22-1041B	**Project Name:** 3FM Planning Design GI - Lot B 3rd Party Lands	**Trial Pit ID** BH203
	Coordinates 719778.19 E 733708.66 N	**Client:** Dublin Port Company (DPC)	
Method: Dynamic Sampling		**Client's Representative:** RPS	Sheet 1 of 1 Scale: 1:25
Plant: Premier 110	**Elevation** 4.18 mOD	**Date:** 06/12/2022	**Logger:** RS — DRAFT

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
						BITMAC	
			3.68	0.50		MADE GROUND: Grey slightly sandy angular fine to coarse GRAVEL. Sand is fine to coarse.	
			3.58	0.60		End of trial pit at 0.60m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 0.60
Width: 0.80
Length: 0.80

Remarks:
Hand dug inspection pit excavated to 0.60m.
No groundwater encountered.

Stability:	Termination Reason	Last Updated
Stable	Terminated due to services present.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No. 22-1041B	**Project Name:** 3FM Planning Design GI - Lot B 3rd Party Lands		**Trial Pit ID** BH208
Coordinates 720446.87 E 733769.87 N	**Client:** Dublin Port Company (DPC)		
Method: Inspection Pit	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3t Excavator	**Elevation** 3.75 mOD	**Date:** 18/01/2023	**Logger:** RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			3.55	0.20		MADE GROUND: Brownish yellow very gravelly very silty fine to coarse SAND. Gravel is angular fine to coarse.	
0.50 - 0.50 0.50 - 0.50 0.50	B2 ES1	PID = 0.20ppm				MADE GROUND: Dark greyish black very gravelly very silty fine to coarse SAND with low cobble content and rare brick fragments. Gravel is subrounded fine to coarse. Cobbles are subangular.	
			2.85	0.90		End of trial pit at 0.90m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 0.90
Width: 0.80
Length: 1.80

Remarks:
Machine dug inspection pit excavated to 0.90m.
No groundwater encountered.

Stability:	Termination Reason	Last Updated
Unstable	Terminated on concrete.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No. 22-1041B	**Project Name:** 3FM Planning Design GI - Lot B 3rd Party Lands		**Trial Pit ID** BH208A
Coordinates 720443.47 E 733770.59 N	**Client:** Dublin Port Company (DPC)		
Method: Inspection Pit	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3t Excavator	**Elevation** 3.78 mOD	**Date:** 18/01/2023	**Logger:** RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			3.58	0.20		MADE GROUND: Brownish yellow gravelly very silty fine to coarse SAND. Gravel is subrounded fine to coarse.	
			3.38	0.40		MADE GROUND: Dark greyish black gravelly very silty fine to coarse SAND with fragments of steel. Gravel is subangular fine to coarse.	
						End of trial pit at 0.40m	

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 0.40
Width: 0.60
Length: 2.00

Remarks:
Machine dug inspection pit excavated to 0.40m.
No groundwater encountered.

Stability:	Termination Reason	Last Updated
Unstable	Terminated at refusal on boulders / possible bedrock.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No. 22-1041B	**Project Name:** 3FM Planning Design GI - Lot B 3rd Party Lands		**Trial Pit ID** BH208B
Coordinates 720446.87 E 733767.26 N	**Client:** Dublin Port Company (DPC)		
Method: Inspection Pit	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3t Excavator	**Elevation** 3.73 mOD	**Date:** 18/01/2023	**Logger:** RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
						MADE GROUND: Brownish yellow gravelly very silty fine to coarse SAND. Gravel is subangular fine to coarse.	
			3.48	0.25			
			3.38	0.35		MADE GROUND: Dark greyish black very gravelly very silty fine to coarse SAND. Gravel is subangular fine to coarse.	
						MADE GROUND: Brown very gravelly very silty fine to coarse SAND with low cobble content with rare brick fragments and abundant concrete fragments. Gravel is subangular fine to coarse. Cobbles are subangular.	
			2.93	0.80		End of trial pit at 0.80m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 0.80
Width: 0.90
Length: 1.80

Remarks:
Machine dug inspection pit excavated to 0.80m.
No groundwater encountered.

Stability: Unstable

Termination Reason: Terminated at refusal on concrete.

Last Updated: 12/06/2023

AGS

CAUSEWAY GEOTECH

Project No. 22-1041B	**Project Name:** 3FM Planning Design GI - Lot B 3rd Party Lands		**Trial Pit ID** BH208C
Coordinates 720444.57 E 733760.47 N	**Client:** Dublin Port Company (DPC)		
Method: Inspection Pit	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3t Excavator	**Elevation** 3.79 mOD	**Date:** 18/01/2023	**Logger:** RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			3.74	0.05		MADE GROUND: Grey sandy very silty angular fine to medium GRAVEL. Sand is fine to coarse.	
			3.54	0.25		MADE GROUND: Brownish yellow gravelly silty fine to coarse SAND. Gravel is subrounded fine to coarse.	
			3.34	0.45		MADE GROUND: Dark greyish black gravelly very silty fine to coarse SAND with low cobble content. Gravel is subangular fine to coarse. Cobbles are angular.	
						MADE GROUND: Grey gravelly very silty fine to coarse SAND with low cobble content and rare brick fragments. Gravel is subrounded fine to coarse. Cobbles are rounded.	
			2.99	0.80		End of trial pit at 0.80m	

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 0.80
Width: 0.70
Length: 2.20

Remarks:
Machine dug inspection pit excavated to 0.80m.
No groundwater encountered.
Concrete wall found at south end of pit.

Stability:	Termination Reason	Last Updated
Unstable	Terminated at refusal on concrete	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No. 22-1041B	**Project Name:** 3FM Planning Design GI - Lot B 3rd Party Lands		**Trial Pit ID** BH208D
Coordinates 720423.55 E 733731.98 N	**Client:** Dublin Port Company (DPC)		
Method: Inspection Pit	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3t Excavator	**Elevation** 3.73 mOD	**Date:** 23/01/2023	**Logger:** RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			3.58	0.15		MADE GROUND: Brown very sandy very clayey angular fine to coarse GRAVEL. Sand is fine to coarse.	
						End of trial pit at 0.15m	

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 0.15
Width: 0.35
Length: 4.30

Remarks:
Machine dug inspection pit excavated to 0.15m.
No groundwater encountered.
Could not break concrete due close proximity of GPR detected services.
Steel found within concrete.

Stability: Unstable

Termination Reason: Terminated at refusal on concrete.

Last Updated: 12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH212
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	2.50	
Cable Percussion	Dando 2500	2.50	10.20	721116.74 E
				733828.09 N

Final Depth:	10.20 m	Start Date:	07/02/2023	Driller:	RW	Sheet 1 of 2
Elevation:	2.16 mOD	End Date:	10/02/2023	Logger:	RS	Scale: 1:40
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00		08-02-2023	0.00	0.00				MADE GROUND: Light brown BOULDERS with occasional cobbles and with much sand.		
					1.76	0.40				
0.50	B1							MADE GROUND: Light slightly gravelly slightly silty fine to coarse SAND. Gravel is rounded fine to medium.		
0.50	ES6									
0.50		PID = 0.10ppm								
1.00	B2									
1.00	ES7									
1.00		PID = 0.00ppm								
1.50	B3									
1.50	ES8									
1.50		PID = 0.00ppm Sea water ingress at 1.85m								
2.00	B4									
2.00	ES9									
2.00		PID = 0.10ppm								
2.50	B5				-0.34	2.50				
2.50	ES10							Medium dense brown fine to coarse SAND and subrounded fine to coarse GRAVEL with shell fragments.		
2.50 - 3.00	B1									
2.50		PID = 0.70ppm								
3.00	ES3									
3.00 - 4.00	B6									
3.00 - 3.45	SPT (C)	N=21 (3,3/4,4,6,7) Hammer SN = 1410	3.00	1.50						
3.00		PID = 0.90ppm fast			-1.34	3.50				
3.20	D2							Medium dense brown very gravelly slightly silty fine to coarse SAND. Gravel is subrounded fine to medium.		
3.50	ES4									
3.50		PID = 1.30ppm								
4.00	ES5									
4.00 - 5.00	B8									
4.00 - 4.45	SPT (C)	N=18 (3,5/4,5,5,4) Hammer SN = 1410	4.00	2.60						
4.20	D7									
4.50		PID = 0.50ppm								
5.00 - 6.00	B10				-2.84	5.00				
5.00 - 5.45	SPT (C)	N=24 (4,5/5,6,6,7) Hammer SN = 1410	5.00	2.00				Medium dense grey fine to coarse SAND and subrounded fine to coarse GRAVEL with medium cobble content and shell fragments. Cobbles are subrounded.		
5.20	D9									
5.50		PID = 0.60ppm								
6.00 - 7.00	B12									
6.00 - 6.45	SPT (C)	N=25 (4,5/6,5,7,7) Hammer SN = 1410	6.00	1.80						
6.20	D11									
6.50		PID = 0.70ppm								
7.00 - 8.00	B14									
7.00 - 7.45	SPT (C)	N=20 (3,3/4,4,5,7) Hammer SN = 1410	7.00	2.00						
7.20	D13									

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
1.85			
3.00	3.00	10	1.50

Casing Details

To (m)	Diameter
9.00	250
10.00	200

Water Added

From (m)	To (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
2.00	2.50	01:00

Remarks

Machine dug inspection pit excavated to 1.20m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH212
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Inspection Pit	3t Excavator	0.00	2.50	
Cable Percussion	Dando 2500	2.50	10.20	721116.74 E
				733828.09 N

Final Depth:	10.20 m	Start Date:	07/02/2023	Driller:	RW	Sheet 2 of 2
						Scale: 1:40
Elevation:	2.16 mOD	End Date:	10/02/2023	Logger:	RS	DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
7.50		PID = 0.60ppm						Medium dense grey fine to coarse SAND and subrounded fine to coarse GRAVEL with medium cobble content and shell fragments. Cobbles are subrounded.		
8.00 - 9.00	B16				-5.84	8.00				
8.00 - 8.45	SPT (C)	N=30 (4,4/6,7,8,9) Hammer SN = 1410	8.00	2.10				Medium dense grey very gravelly slightly silty fine to coarse SAND. Gravel is subrounded fine to medium.		
8.20	D15									
8.50		PID = 0.30ppm								
9.00 - 10.00	B18									
9.00 - 9.45	SPT (C)	N=25 (3,4/5,5,7,8) Hammer SN = 1410	9.00	1.90						
9.20	D17									
9.50		PID = 1.20ppm								
10.00 - 10.45	SPT (C)	N=10 (1,3/2,2,3,3) Hammer SN = 1410	10.0	1.50						
10.20	D19				-8.04	10.20		End of Borehole at 10.20m		

7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
1.85			
3.00	3.00	10	1.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)
2.00	2.50	01:00

Casing Details

To (m)	Diameter
9.00	250
10.00	200

Water Added

From (m)	To (m)

Remarks

Machine dug inspection pit excavated to 1.20m.

Termination Reason

Terminated at scheduled depth.

Last Updated

12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH215
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	17.70	
Rotary Drilling	Beretta T44	17.70	20.00	720139.80 E
Rotary Coring	Beretta T44	20.00	40.00	733916.90 N

Final Depth:	40.00 m	Start Date:	02/12/2022	Driller:	GT+CC	Sheet 1 of 5
Elevation:	2.88 mOD	End Date:	06/12/2022	Logger:	DM+RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 0.50	B17							MADE GROUND: Grey slightly sandy angular to subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are angular.		
0.50	ES1				2.38	0.50				
0.50 - 1.50	B18							MADE GROUND: Loose grey slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse.		
0.50		PID = 5.00ppm								
1.00	ES2									
1.00		PID = 0.10ppm								
1.20	D19									
1.20 - 1.65	SPT (S)	N=11 (2,2/2,3,3,3) Hammer SN = 0197	1.20	0.50						
1.50	ES3									
1.50		PID = 0.10ppm								
2.00	D20				0.88	2.00		MADE GROUND: Loose becoming medium dense grey slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse.		
2.00	ES4									
2.00 - 3.00	B21									
2.00 - 2.45	SPT (S)	N=10 (1,1/2,2,3,3) Hammer SN = 0197	2.00	1.00						
2.00		PID = 0.10ppm								
2.50	ES5									
2.50		PID = 0.10ppm								
3.00	D22									
3.00	ES6									
3.00 - 3.45	SPT (S)	N=19 (2,3/4,4,5,6) Hammer SN = 0197	3.00	1.20	-0.82	3.70		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.		
3.00		PID = 0.20ppm								
3.50	ES7									
3.70 - 4.50	B23									
4.00	D24									
4.00	ES8									
4.00 - 4.45	SPT (C)	N=36 (6,9/12,10,7,7) Hammer SN = 0197	4.00	2.10						
4.00		PID = 0.30ppm Strong seepage at 4.30m								
4.50	ES9									
4.50		PID = 0.30ppm								
5.00	D25									
5.00	ES10									
5.00 - 5.45	SPT (C)	N=40 (4,7/9,9,10,12) Hammer SN = 0197	5.00	3.30						
5.00		PID = 0.30ppm								
5.50	ES11									
5.50 - 6.50	B26									
5.50		PID = 0.20ppm								
6.00	ES12									
6.00		PID = 0.30ppm			-3.92	6.80		Firm grey SILT.		
6.50	D27									
6.50	ES13				-4.22	7.10		Grey sandy SILT. Sand is fine to coarse.		
6.50 - 6.95	SPT (C)	N=17 (4,5/7,6,2,2) Hammer SN = 0197	6.50	3.40						
6.50		PID = 0.10ppm								
6.80 - 7.10	B28									
7.00	ES14									
7.10 - 8.00	B29									
7.50	ES15									
8.00	D30									
8.00	ES16									
8.00 - 8.45	SPT (C)	N=10 (2,2/2,3,3,2) Hammer SN = 0197	8.00	1.70	-5.82	8.70		Medium dense grey very sandy slightly clayey subangular to subrounded fine to medium GRAVEL. Sand is fine to coarse.		
8.70 - 10.00	B31									

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.30	4.30	20	2.10

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.70	5.10	01:00
5.90	6.80	01:00
17.60	17.70	01:00

Casing Details

To (m)	Diam (mm)
17.70	200
36.00	150

Water Added

From (m)	To (m)
8.00	12.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH215
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	17.70	
Rotary Drilling	Beretta T44	17.70	20.00	720139.80 E
Rotary Coring	Beretta T44	20.00	40.00	733916.90 N

Final Depth:	40.00 m	Start Date:	02/12/2022	Driller:	GT+CC	Sheet 2 of 5
Elevation:	2.88 mOD	End Date:	06/12/2022	Logger:	DM+RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
9.50	D32									
9.50 - 9.95	SPT (C)	N=27 (4,5/6,6,7,8) Hammer SN = 0197	9.50	2.90						
11.00	D34									
11.00 - 11.45	SPT (C)	N=15 (2,2/3,4,4,4) Hammer SN = 0197	11.0	3.70	-8.32	11.20		Medium dense brown silty fine SAND.		
11.20 - 12.00	B33									
12.50 - 12.95	SPT (C)	N=17 (2,3/3,4,5,5) Hammer SN = 0197	12.5	7.60	-9.62	12.50		Medium dense brown gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse.		
12.70 - 13.20	B35									
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.		
14.00	D37									
14.00 - 14.45	SPT (C)	N=32 (3,4/6,8,9,9) Hammer SN = 0197	14.0	4.10						
14.50 - 15.50	B38									
15.50	D39									
15.50 - 15.95	SPT (C)	N=25 (2,3/5,5,7,8) Hammer SN = 0197	15.5	6.60						
16.00 - 17.00	B40									
17.00	D41									
17.00 - 17.45	SPT (C)	N=32 (3,4/5,7,9,11) Hammer SN = 0197	17.0	8.10						
17.70 - 17.76	SPT (C)	50 (25 for 25mm/50 for 30mm) Hammer SN = 0208	17.7	9.80	-14.82	17.70		Very stiff brown sandy CLAY. (Driller's Description).		

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.30	4.30	20	2.10

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.70	5.10	01:00
5.90	6.80	01:00
17.60	17.70	01:00

Casing Details

To (m)	Diam (mm)
17.70	200
36.00	150

Water Added

From (m)	To (m)
8.00	12.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH215
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	17.70	
Rotary Drilling	Beretta T44	17.70	20.00	720139.80 E
Rotary Coring	Beretta T44	20.00	40.00	733916.90 N

Final Depth:	40.00 m	Start Date:	02/12/2022	Driller:	GT+CC	Sheet 3 of 5
Elevation:	2.88 mOD	End Date:	06/12/2022	Logger:	DM+RS	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
19.50 - 19.64	SPT (C)	50 (25 for 62mm/50 for 78mm) Hammer SN = 0208												
			50						-17.12	20.00		Firm brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is subrounded fine to medium.		
21.50														
21.50	C1													
21.50	D42													
21.50 - 21.95	SPT(S) N=9 (3,2/2,2,3,2) Hammer SN = 0208		70											
22.00 - 22.30	C2													
22.80 - 23.00	C3													
23.00										(6.00)				
23.00	D43													
23.00 - 24.50	C4													
23.00 - 23.45	SPT(S) N=9 (2,2/3,2,2,2) Hammer SN = 0208		60											
24.50														
24.50	D44													
24.50 - 24.95	SPT(S) N=11 (3,3/2,3,3,3) Hammer SN = 0208		45											
26.00									-23.12	26.00		Firm brown slightly sandy CLAY. Sand is fine.		
26.00	D45													
26.00 - 27.50	C5													
26.00 - 26.45	SPT(S) N=12 (2,3/3,3,3,3) Hammer SN = 0208		50											
27.50														
27.50	D46													

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.30	4.30	20	2.10

Casing Details

To (m)	Diam (mm)
17.70	200
36.00	150

Water Added

From (m)	To (m)
8.00	12.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH215
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Cable Percussion	Dando 3000	0.00	17.70
Rotary Drilling	Beretta T44	17.70	20.00
Rotary Coring	Beretta T44	20.00	40.00

Coordinates: 720139.80 E, 733916.90 N

Final Depth: 40.00 m | Start Date: 02/12/2022 | Driller: GT+CC | Sheet 4 of 5 | Scale: 1:50

Elevation: 2.88 mOD | End Date: 06/12/2022 | Logger: DM+RS | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
27.50 - 27.95	SPT(S) N=10 (2,2/3,3,2,2) Hammer SN = 0208	25									Firm brown slightly sandy CLAY. Sand is fine.		
29.00													
29.00	D47												
29.00 - 29.45	SPT(S) N=12 (2,2/3,3,3,3) Hammer SN = 0208	45											
30.50													
30.50	D48												
30.50 - 32.00	C6												
30.50 - 30.95	SPT(S) N=10 (2,3/3,3,2,2) Hammer SN = 0208	65											
31.10 - 31.40	C7												
31.40 - 31.60	C8												
32.00									(10.00)				
32.00 - 32.45	SPT(C) N=11 (3,2/3,3,2,3) Hammer SN = 0208	47			NI								
33.50													
33.50 - 33.95	SPT(C) N=10 (3,2/3,2,3,2) Hammer SN = 0208	65											
35.00													
35.00 - 35.14	SPT(C) 50 (25 for 55mm/50 for 83mm) Hammer SN = 0208	40	20	0							Strong thinly to thickly laminated dark grey LIMESTONE with occasional white calcite veins of up to 15mm thick. Slightly weathered: slightly reduced strength, slight discolouration.		
36.00 - 36.85	C9							-33.12	36.00		Discontinuities: 1. 5-15 degree fractures medium spaced (110/445/950), undulating, rough with some light brown discolouration on fracture surfaces. 2. 40-50 degree fractures at 38.50m, 38.70m, 39.75m and 39.80m, undulating, rough with light brown discolouration on fracture surfaces.		
36.50													
36.50 - 36.50	SPT(C) 50 (25 for 0mm/50 for 0mm) Hammer SN = 0208										*36.00-38.20m: Limestone bedrock recovered as gravel.*		
		TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.30	4.30	20	2.10

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.70	5.10	01:00
5.90	6.80	01:00
17.60	17.70	01:00

Casing Details

To (m)	Diam (mm)
17.70	200
36.00	150

Water Added

From (m)	To (m)
8.00	12.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH215
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Cable Percussion	Dando 3000	0.00	17.70
Rotary Drilling	Beretta T44	17.70	20.00
Rotary Coring	Beretta T44	20.00	40.00

Coordinates: 720139.80 E, 733916.90 N

Final Depth: 40.00 m | Start Date: 02/12/2022 | Driller: GT+CC | Elevation: 2.88 mOD | End Date: 06/12/2022 | Logger: DM+RS

Sheet 5 of 5 | Scale: 1:50 | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
37.60 - 37.80	C10	70	65	10							Strong thinly to thickly laminated dark grey LIMESTONE with occasional white calcite veins of up to 15mm thick. Slightly weathered: slightly reduced strength, slight discolouration.		
38.00											Discontinuities:		
38.80 - 39.00	C11	90	80	65					(4.00)		1. 5-15 degree fractures medium spaced (110/445/950), undulating, rough with some light brown discolouration on fracture surfaces.		
39.00 - 39.20	C12				7						2. 40-50 degree fractures at 38.50m, 38.70m, 39.75m and 39.80m, undulating, rough with light brown discolouration on fracture surfaces.		
39.50													
39.50 - 39.70	C13	97	90	50									
40.00								-37.12	40.00		End of Borehole at 40.00m		

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.30	4.30	20	2.10

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.70	5.10	01:00
5.90	6.80	01:00
17.60	17.70	01:00

Casing Details

To (m)	Diam (mm)
17.70	200
36.00	150

Water Added

From (m)	To (m)
8.00	12.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH216
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	17.50	
Rotary Drilling	Beretta T44	17.50	21.00	720148.19 E
Rotary Coring	Beretta T44	21.00	40.50	733896.11 N

Final Depth:	40.50 m	Start Date:	02/12/2022	Driller:	CC+GT	Sheet 1 of 5
Elevation:	2.98 mOD	End Date:	12/12/2022	Logger:	RS+DM	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 0.60	B11							MADE GROUND: Grey slightly sandy angular to subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are angular.		
0.50	ES1									
0.50		PID = 0.00ppm			2.38	0.60				
0.60 - 1.50	B12							MADE GROUND: Grey gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine to medium.		
1.00	ES2									
1.00		PID = 0.00ppm								
1.50	ES3									
1.50		PID = 0.00ppm								
2.00	D14				0.98	2.00				
2.00	ES4							Loose grey gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine to coarse.		
2.00 - 3.00	B13									
2.00 - 2.45	SPT (S)	N=9 (1,2/2,2,2,3) Hammer SN = 0197	2.00	1.10						
2.00		PID = 0.20ppm								
2.50	ES5									
2.50		PID = 0.40ppm			-0.02	3.00		Loose grey silty fine SAND.		
3.00	ES6									
3.00 - 4.00	B15									
3.00 - 3.45	SPT (S)	N=10 (1,2/3,2,2,3) Hammer SN = 0197	3.00	2.50						
3.00		PID = 0.90ppm								
3.50	ES7									
3.50		PID = 0.00ppm								
4.00	D16									
4.00	ES8									
4.00 - 4.45	SPT (S)	N=11 (1,2/2,3,3,3) Hammer SN = 0197	4.00	2.90						
4.00		PID = 0.00ppm								
4.50	ES9									
4.50 - 5.50	B17									
4.50		PID = 0.10ppm								
5.00	D18									
5.00	ES10									
5.00 - 5.45	SPT (S)	N=11 (2,2/3,2,3,3) Hammer SN = 0197	5.00	1.70	-2.82	5.80		Frim grey sandy SILT. Sand is fine to coarse.		
5.00		PID = 0.00ppm								
5.80 - 6.50	B19									
6.50 - 6.95	U28	Ublow=8 100% Recovery	6.50	5.30						
7.00	D20									
7.50 - 8.30	B21				-4.52	7.50		Loose grey very gravelly silty fine to coarse SAND. Gravel is subrounded fine to medium.		
8.00	D22									
8.00 - 8.45	SPT (S)	N=8 (1,0/1,2,2,3) Hammer SN = 0197	8.00	1.60						
8.30 - 8.90	B23				-5.32	8.30		Loose grey sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
8.90 - 10.00	B24				-5.92	8.90		Loose becoming medium dense brownish grey silty fine SAND.		

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
13.00	13.00	20	1.60

Chiselling Details

From (m)	To (m)	Time (hh:mm)
17.40	17.50	01:00

Casing Details

To (m)	Diam (mm)
17.50	200
36.00	150

Water Added

From (m)	To (m)
1.00	40.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH216
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	17.50	
Rotary Drilling	Beretta T44	17.50	21.00	720148.19 E
Rotary Coring	Beretta T44	21.00	40.50	733896.11 N

Final Depth:	40.50 m	Start Date:	02/12/2022	Driller:	CC+GT	Sheet 2 of 5
Elevation:	2.98 mOD	End Date:	12/12/2022	Logger:	RS+DM	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
9.50 - 9.95	SPT (S)	N=13 (2,2/3,3,3,4) Hammer SN = 0197	9.50	3.10						
11.00	D25									
11.00 - 12.00	B26									
11.00 - 11.45	SPT (S)	N=16 (2,3/3,4,4,5) Hammer SN = 0197	11.0	4.30						
12.50	D27				-9.52	12.50				
12.50 - 12.95	SPT (S)	N=16 (1,3/4,4,4,4) Hammer SN = 0197	12.5	5.70				Medium dense grey silty fine SAND.		
12.90 - 14.00	B29	Strong seepage at 13.00m			-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)	N=25 (4,5/5,6,7,7) Hammer SN = 0197	14.0	2.20						
14.50 - 15.50	B31									
15.50	D32									
15.50 - 15.95	SPT (C)	N=33 (3,6/7,8,8,10) Hammer SN = 0197	15.5	2.60	-12.72	15.70		Gravels and Cobbles (Drillers Description).		
16.00 - 17.00	B33									
17.00	D34									
17.00 - 17.45	SPT (C)	N=48 (5,5/8,11,15,14) Hammer SN = 0197	17.0	3.00						
18.50 - 18.95	SPT (C)	N=43 (8,8/10,10,11,12) Hammer SN = 0208								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
13.00	13.00	20	1.60

Chiselling Details

From (m)	To (m)	Time (hh:mm)
17.40	17.50	01:00

Casing Details

To (m)	Diam (mm)
17.50	200
36.00	150

Water Added

From (m)	To (m)
1.00	40.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH216
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	17.50	
Rotary Drilling	Beretta T44	17.50	21.00	720148.19 E
Rotary Coring	Beretta T44	21.00	40.50	733896.11 N

Final Depth:	40.50 m	Start Date:	02/12/2022	Driller:	CC+GT	Sheet 3 of 5
Elevation:	2.98 mOD	End Date:	12/12/2022	Logger:	RS+DM	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
									-16.52	19.50		Very stiff brown sandy CLAY (Drillers Description).		
20.00 - 20.12	SPT (C)	50 (25 for 45mm/50 for 78mm) Hammer SN = 0208												
									-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.		
21.00 - 21.45	C1													
21.00 - 21.45	SPT(C) N=10 (1,2/2,2,3,3) Hammer SN = 0208	45												
22.50														
22.50 - 22.95	C2													
22.50 - 22.95	SPT(C) N=10 (2,2/3,3,2,2) Hammer SN = 0208	50								(4.50)				
24.00														
24.00 - 24.45	SPT(C) N=9 (3,2/2,3,2,2) Hammer SN = 0208	50												
25.50									-22.52	25.50		Firm dark brown sandy CLAY. Sand is fine to medium.		
25.50 - 25.95	SPT(C) N=10 (1,2/3,3,2,2) Hammer SN = 0208	50												
27.00														
27.00 - 27.45	SPT(C) N=10 (2,2/2,3,2,3) Hammer SN = 0208	65												

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
13.00	13.00	20	1.60

Casing Details

To (m)	Diam (mm)
17.50	200
36.00	150

Water Added

From (m)	To (m)
1.00	40.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH216
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Cable Percussion	Dando 3000	0.00	17.50
Rotary Drilling	Beretta T44	17.50	21.00
Rotary Coring	Beretta T44	21.00	40.50

Coordinates: 720148.19 E, 733896.11 N

Final Depth: 40.50 m | Start Date: 02/12/2022 | Driller: CC+GT | Sheet 4 of 5 | Scale: 1:50

Elevation: 2.98 mOD | End Date: 12/12/2022 | Logger: RS+DM | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
											Firm dark brown sandy CLAY. Sand is fine to medium.		
28.50													
28.50 - 28.95	SPT(C) N=10 (2,2/2,3,3,2) Hammer SN = 0208	25											
30.00													
30.00 - 30.45	SPT(C) N=10 (2,2/2,3,3,2) Hammer SN = 0208	30											
31.50													
31.50 - 31.95	SPT(C) N=9 (3,2/2,2,3,2) Hammer SN = 0208	47			NI				(10.50)				
33.00													
33.00 - 33.45	SPT(C) N=10 (2,2/3,3,2,2) Hammer SN = 0208	40											
34.50													
34.50 - 34.95	SPT(C) N=42 (8,8/10,10,12,10) Hammer SN = 0208	90											
36.00								-33.02	36.00				
36.00 - 36.12	SPT(C) 50 (25 for 48mm/50 for 69mm) Hammer SN = 0208	70	60	0							Strong dark grey thinly to thickly laminated LIMESTONE with occasional white calcite veins up to 10mm thick. Slightly weathered: slight weakening, slight discolouration. Discontinuities: 1. 5-10 degree joints at 39.85m and 40.10m, undulating and rough.		
		TCR	SCR	RQD	FI								

28.0 28.5 29.0 29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0 36.5 37.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
13.00	13.00	20	1.60

Chiselling Details

From (m)	To (m)	Time (hh:mm)
17.40	17.50	01:00

Casing Details

To (m)	Diam (mm)
17.50	200
36.00	150

Water Added

From (m)	To (m)
1.00	40.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH216
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Cable Percussion	Dando 3000	0.00	17.50
Rotary Drilling	Beretta T44	17.50	21.00
Rotary Coring	Beretta T44	21.00	40.50

Coordinates: 720148.19 E, 733896.11 N

Final Depth: 40.50 m | Start Date: 02/12/2022 | Driller: CC+GT | Sheet 5 of 5 | Scale: 1:50

Elevation: 2.98 mOD | End Date: 12/12/2022 | Logger: RS+DM | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
37.30 - 37.50	C4										Strong dark grey thinly to thickly laminated LIMESTONE with occasional white calcite veins up to 10mm thick. Slightly weathered: slight weakening, slight discolouration.		
37.50		70	60	15					(4.50)		Discontinuities:		
38.50 - 38.60	C5										1. 5-10 degree joints at 39.85m and 40.10m, undulating and rough.		
38.60 - 38.80	C6												
39.00													
39.80 - 40.00	C7	55	50	40									
40.00 - 40.20	C8				4								
40.50								-37.52	40.50		End of Borehole at 40.50m		

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
13.00	13.00	20	1.60

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
17.40	17.50	01:00

Casing Details	
To (m)	Diam (mm)
17.50	200
36.00	150

Water Added	
From (m)	To (m)
1.00	40.50

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH217
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	16.20	
Rotary Drilling	Beretta T44	16.20	20.00	720152.56 E
Rotary Coring	Beretta T44	20.00	41.00	733909.53 N

Final Depth:	41.00 m	Start Date:	02/12/2022	Driller:	CC+GT	Sheet 1 of 5
Elevation:	2.96 mOD	End Date:	08/12/2022	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 0.40	B8							MADE GROUND: Grey slightly sandy angular to subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are angular.		
0.30		PID = 0.30ppm			2.56	0.40		MADE GROUND: Grey slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse.		
0.40 - 1.50	B9									
0.50		PID = 0.10ppm								
1.00		PID = 0.00ppm								
1.50		PID = 0.10ppm								
2.00	D11				0.96	2.00		Loose grey slightly gravelly silty fine to coarse SAND. Gravel is subrounded fine.		
2.00 - 3.00	B10									
2.00 - 2.45	SPT (C)	N=8 (1,2/2,2,2,2) Hammer SN = 0197	2.00	0.90						
2.00		PID = 0.20ppm								
2.50	ES1									
2.50		PID = 0.20ppm								
3.00	D12									
3.00	ES2									
3.00 - 3.45	SPT (C)	N=9 (1,1/2,2,2,3) Hammer SN = 0197	3.00	1.70						
3.50	ES3									
3.50 - 4.50	B13									
3.50		PID = 4.00ppm								
4.00	D14									
4.00	ES4									
4.00 - 4.45	SPT (C)	N=6 (1,1/1,2,2,1) Hammer SN = 0197	4.00	2.10						
4.00		PID = 0.10ppm			-1.64	4.60		Soft grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.		
4.50	B5									
4.50		PID = 0.10ppm								
4.60 - 5.50	B15									
5.00	ES6									
5.00 - 5.45	U27	Ublow=11 100% Recovery	5.00	4.40						
5.00		PID = 0.00ppm								
5.50	D16									
5.50	ES7									
5.50		PID = 0.10ppm								
6.00 - 7.00	B17									
6.50	D18									
7.50 - 8.50	B19									
		Water strike at 7.65m								
8.00	D20									
8.00 - 8.45	SPT (S)	N=7 (1,1/1,1,2,3) Hammer SN = 0197	8.00	2.60						
					-5.54	8.50		Stiff grey sandy SILT. Sand is fine to coarse.		
9.00 - 10.00	B21									

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.65			

Chiselling Details

From (m)	To (m)	Time (hh:mm)
14.60	14.90	01:00
16.10	16.20	01:00

Remarks

Hand dug inspection pit excavated to 1.20m

Casing Details

To (m)	Diam (mm)
20.00	200
39.00	150

Water Added

From (m)	To (m)
2.00	41.00

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH217
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	16.20	
Rotary Drilling	Beretta T44	16.20	20.00	720152.56 E
Rotary Coring	Beretta T44	20.00	41.00	733909.53 N

Final Depth:	41.00 m	Start Date:	02/12/2022	Driller:	CC+GT	Sheet 2 of 5
Elevation:	2.96 mOD	End Date:	08/12/2022	Logger:	RS+CMc	Scale: 1:50
						DRAFT

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
9.50	D22									
9.50 - 9.95	SPT (C)	N=16 (2,2/3,4,4,5) Hammer SN = 0197	9.50	4.10						
10.60 - 11.50	B23				-7.64	10.60		Medium dense grey silty fine SAND.		
11.00	D24									
12.50	D25									
12.50 - 12.95	SPT (C)	N=19 (2,3/4,4,5,6) Hammer SN = 0197	12.5	3.10						
13.00 - 14.00	B28									
13.10 - 13.50	B26				-10.14	13.10		Medium dense brownish grey fine to coarse SAND and fine to coarse GRAVEL with low cobble content.		
					-10.54	13.50		Dense brownish grey sandy slightly silty subangular fine to medium GRAVEL. Sand is fine to coarse.		
14.00	D29									
14.00 - 14.45	SPT (C)	N=37 (3,6/7,9,10,11) Hammer SN = 0197	14.0	13.0						
14.50 - 15.50	B30									
15.50 - 15.95	SPT (C)	N=32 (2,4/6,8,8,10) Hammer SN = 0197	15.5	1.90						
16.20	D31				-13.24	16.20		Brown silty fine to coarse SAND and subrounded fine to coarse GRAVEL. (Driller's description)		
16.20 - 16.42	SPT (C)	50 (25 for 65mm/50 for 160mm) Hammer SN = 0197	16.2	2.40						

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.65			

Casing Details

To (m)	Diam (mm)
20.00	200
39.00	150

Water Added

From (m)	To (m)
2.00	41.00

Chiselling Details

From (m)	To (m)	Time (hh:mm)
14.60	14.90	01:00
16.10	16.20	01:00

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH217
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Cable Percussion	Dando 3000	0.00	16.20	
Rotary Drilling	Beretta T44	16.20	20.00	720152.56 E
Rotary Coring	Beretta T44	20.00	41.00	733909.53 N

Final Depth:	41.00 m	Start Date:	02/12/2022	Driller:	CC+GT	Sheet 3 of 5 Scale: 1:50
Elevation:	2.96 mOD	End Date:	08/12/2022	Logger:	RS+CMc	DRAFT

Depth (m)	Sample / Tests	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
19.50 - 19.95	SPT (C)	N=10 (2,2/2,3,3,2) Hammer SN = 0208					19.5	7.65	-16.54	19.50		Firm brown slightly sandy slightly gravelly CLAY. (Driller's description)		
			0			NR				(2.00)				
21.50									-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.		
21.50 - 21.95	SPT(C) N=11 (2,2/3,2,3,3) Hammer SN = 0208					AZCL								
			60	0	0	N/A				(1.50)				
23.00									-20.04	23.00		Stiff dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine of various lithologies.		
23.00 - 23.45	SPT(C) N=10 (2,3/3,2,3,2) Hammer SN = 0208					AZCL								
			33	0	0	N/A				(3.00)				
24.50														
24.50 - 24.95	SPT(C) N=9 (3,2/2,2,2,3) Hammer SN = 0208					AZCL								
			33	0	0	N/A								
26.00									-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.		
26.00 - 26.45	SPT(C) N=13 (4,3/3,4,3,3) Hammer SN = 0208					AZCL								
			50	0	0	N/A				(1.50)				
27.50									-24.54	27.50		Very stiff slightly sandy slightly silty CLAY. Sand is fine.		
27.50 - 27.95	SPT(C) N=11 (3,4/3,2,3,3) Hammer SN = 0208													
			TCR	SCR	RQD	FI								

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.65			

Casing Details

To (m)	Diam (mm)
20.00	200
39.00	150

Water Added

From (m)	To (m)
2.00	41.00

Remarks

Hand dug inspection pit excavated to 1.20m

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH217
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Cable Percussion	Dando 3000	0.00	16.20
Rotary Drilling	Beretta T44	16.20	20.00
Rotary Coring	Beretta T44	20.00	41.00

Coordinates: 720152.56 E, 733909.53 N

Final Depth: 41.00 m | Start Date: 02/12/2022 | Driller: CC+GT | Sheet 4 of 5 | Scale: 1:50

Elevation: 2.96 mOD | End Date: 08/12/2022 | Logger: RS+CMc | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		33	0	0	AZCL						Very stiff slightly sandy slightly silty CLAY. Sand is fine.		
					N/A								
29.00													
29.00 - 29.45	SPT(C) N=10 (3,4/2,3,2,3) Hammer SN = 0208	27	0	0	AZCL								
					N/A								
30.50													
30.50 - 30.95	SPT(C) N=13 (2,3/3,3,3,4) Hammer SN = 0208	37	0	0									
32.00													
32.00 - 32.45	SPT(C) N=14 (3,3/3,3,4,4) Hammer SN = 0208	32	0	0					(9.00)				
33.50													
33.50 - 33.95	SPT(C) N=12 (2,4/3,3,3,3) Hammer SN = 0208	51	0	0	AZCL								
35.00													
35.00 - 35.45	SPT(C) N=16 (3,3/3,4,4,5) Hammer SN = 0208	87	0	0									
36.50								-33.54	36.50				
36.50 - 36.70	SPT(C) 50 (10,15/50 for 55mm) Hammer SN = 0208										Very dense dark brownish grey slightly sandy clayey angular to subangular fine to coarse GRAVEL of dark grey limestone with medium cobble content. Sand is fine to coarse. Cobbles are subangular of dark grey limestone.		
		TCR	SCR	RQD	FI								

28.0 28.5 29.0 29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0 36.5 37.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.65			

Chiselling Details

From (m)	To (m)	Time (hh:mm)
14.60	14.90	01:00
16.10	16.20	01:00

Remarks

Hand dug inspection pit excavated to 1.20m

Casing Details

To (m)	Diam (mm)
20.00	200
39.00	150

Water Added

From (m)	To (m)
2.00	41.00

Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
22-1041B	3FM Planning Design GI - Lot B 3rd Party Lands	BH217
	Client: Dublin Port Company (DPC)	
	Client's Rep: RPS	

Method	Plant Used	Top (m)	Base (m)
Cable Percussion	Dando 3000	0.00	16.20
Rotary Drilling	Beretta T44	16.20	20.00
Rotary Coring	Beretta T44	20.00	41.00

Coordinates: 720152.56 E, 733909.53 N

Final Depth: 41.00 m | Start Date: 02/12/2022 | Driller: CC+GT | Elevation: 2.96 mOD | End Date: 08/12/2022 | Logger: RS+CMc

Sheet 5 of 5 | Scale: 1:50 | DRAFT

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
		100	0	0	N/A						Very dense dark brownish grey slightly sandy clayey angular to subangular fine to coarse GRAVEL of dark grey limestone with medium cobble content. Sand is fine to coarse. Cobbles are subangular of dark grey limestone.		
38.00									(2.55)				
		45	30	30	AZCL								
					N/A			-36.09	39.05				
39.50											Medium strong, locally moderately weak thickly laminated to thinly bedded grey to dark grey LIMESTONE with occasional white calcite veins (up to 10mm thick). Moderately weathered: slightly reduced strength, locally reduced strength, closer fracture spacing, patchy brown discolouration on most fracture surfaces, gravelly clay infill on some fracture surfaces.		
		96	64	46	8				(1.95)		Discontinuities:		
											1. 5-20 degree bedding fractures, closely spaced (15/150/230), planar, predominantly smooth, patchy brown staining on most fracture surfaces, gravelly clay infill on some fracture surfaces.		
41.00								-38.04	41.00		2. 80-90 degree joints from 39.05-39.50m and 40.15-40.45m, undulating, rough, patchy brown staining on joint surfaces.		
											39.50-39.60m: Weathered to light brown slightly gravelly clay.		
											End of Borehole at 41.00m		
		TCR	SCR	RQD	FI								

37.5 38.0 38.5 39.0 39.5 40.0 40.5 41.0 41.5 42.0 42.5 43.0 43.5 44.0 44.5 45.0 45.5 46.0

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.65			

Chiselling Details

From (m)	To (m)	Time (hh:mm)
14.60	14.90	01:00
16.10	16.20	01:00

Remarks

Hand dug inspection pit excavated to 1.20m

Casing Details

To (m)	Diam (mm)
20.00	200
39.00	150

Water Added

From (m)	To (m)
2.00	41.00

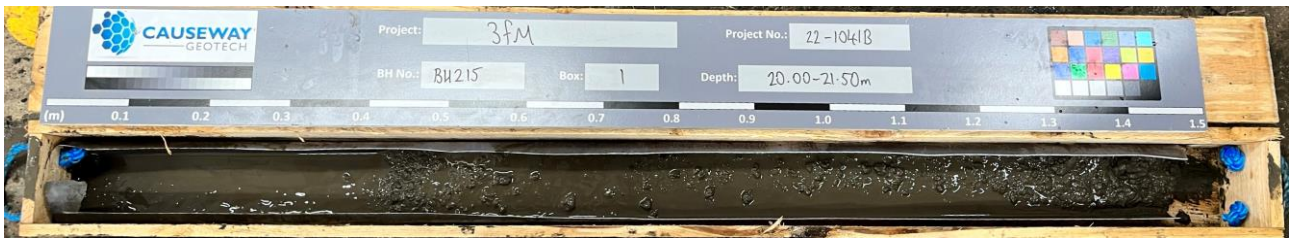
Core Barrel	Flush Type	Termination Reason	Last Updated
SK6L	Water	Terminated at scheduled depth.	12/06/2023

AGS

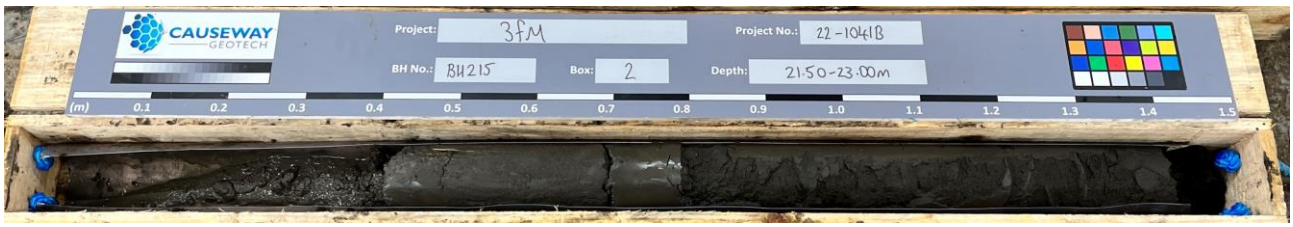
CAUSEWAY GEOTECH

APPENDIX C

CORE PHOTOGRAPHS

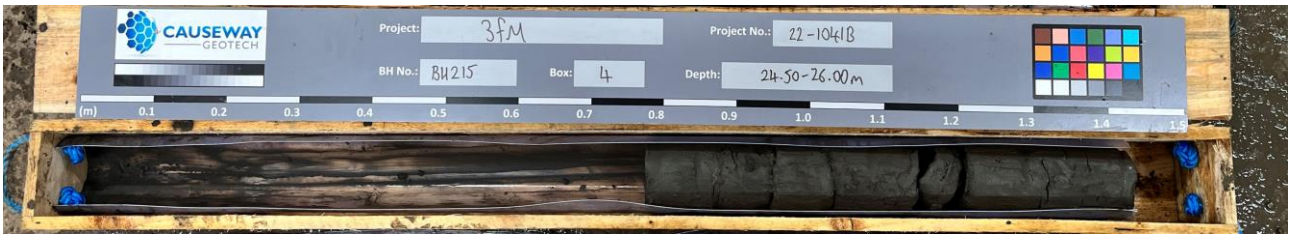


BH215 Box 1 (20.00-21.50m)



BH215 Box 2 (21.50-23.00m)

BH215 Box 3 (23.00-24.50m)

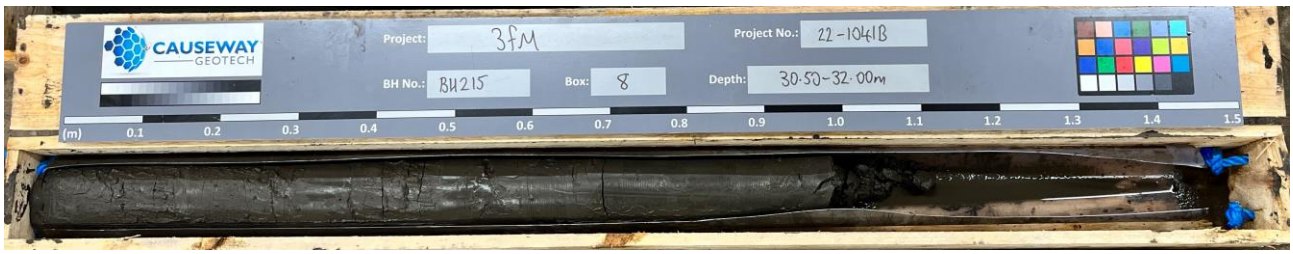


BH215 Box 4 (24.50-26.00m)

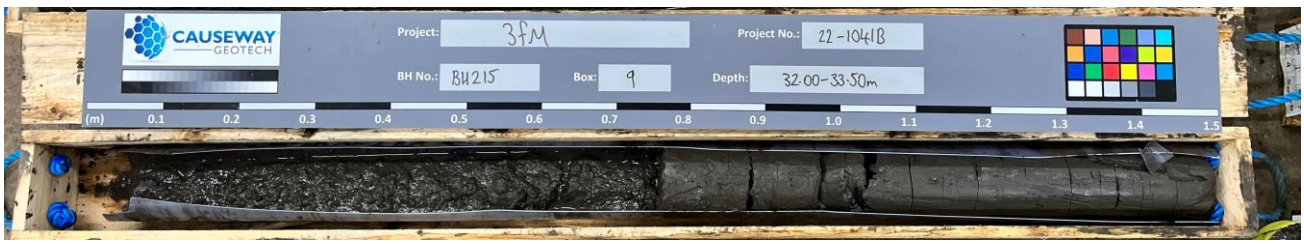
BH215 Box 5 (26.00-27.50m)

BH215 Box 6 (27.50-29.00m)

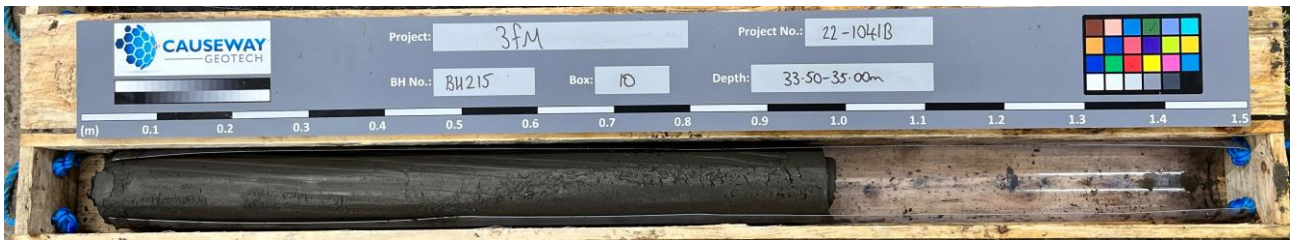
BH215 Box 7 (29.00-30.50m)



BH215 Box 8 (30.50-32.00m)



BH215 Box 9 (32.00-33.50m)



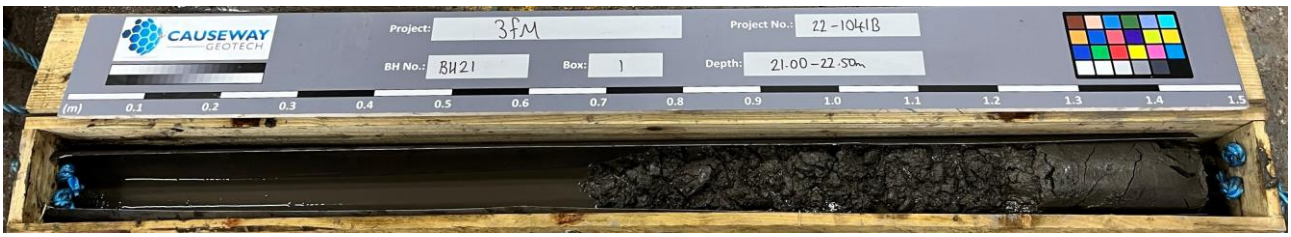
BH215 Box 10 (33.50-35.00m)

BH215 Box 11 (35.00-36.50m)

BH215 Box 12 (36.50-38.00m)

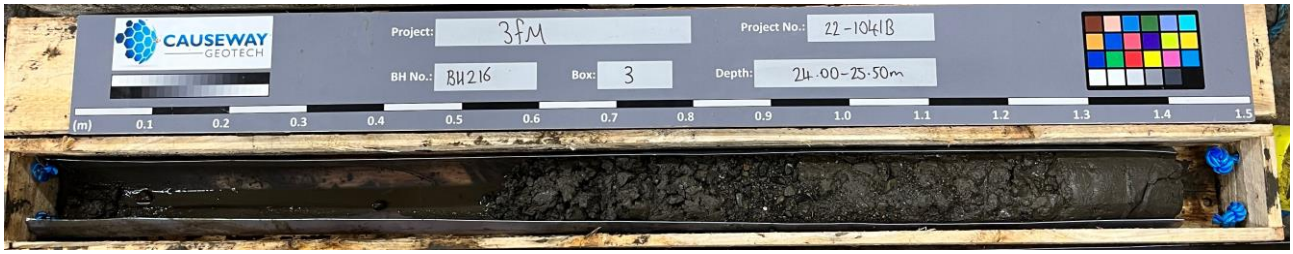
BH215 Box 13 (38.00-39.50m)

BH215 Box 14 (39.50-40.00m)



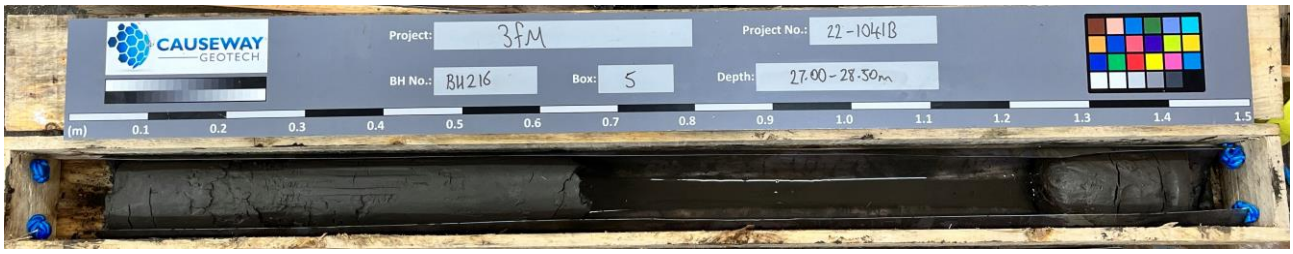
BH216 Box 1 (21.00-22.50m)

BH216 Box 2 (22.50-24.00m)



BH216 Box 3 (24.00-25.50m)

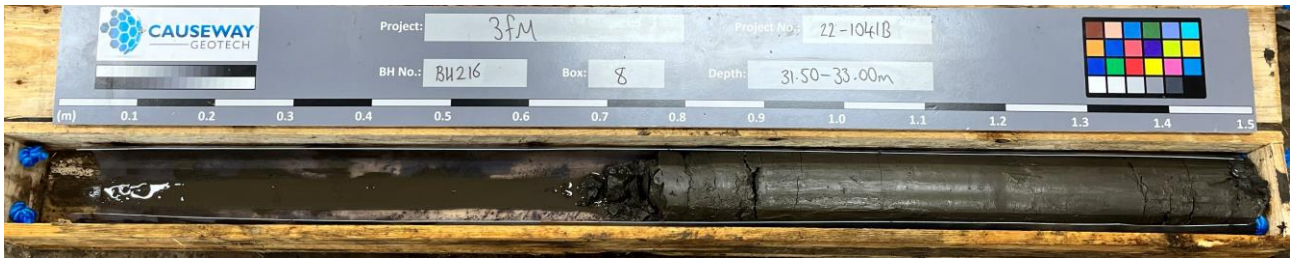
BH216 Box 4 (25.50-27.00m)



BH216 Box 5 (27.00-28.50m)

BH216 Box 6 (28.50-30.00m)

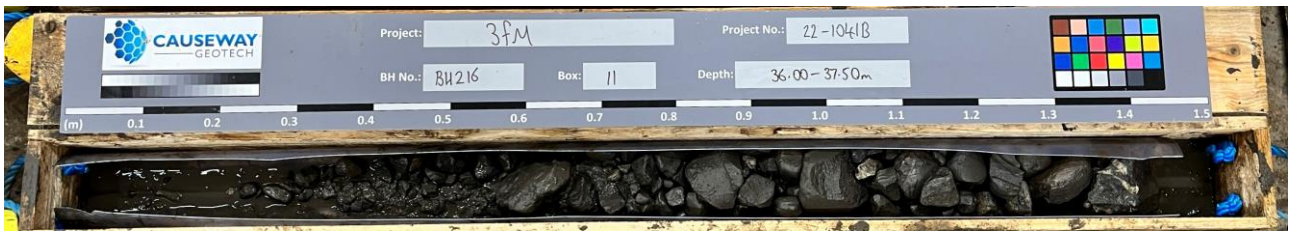
BH216 Box 7 (30.00-31.50m)



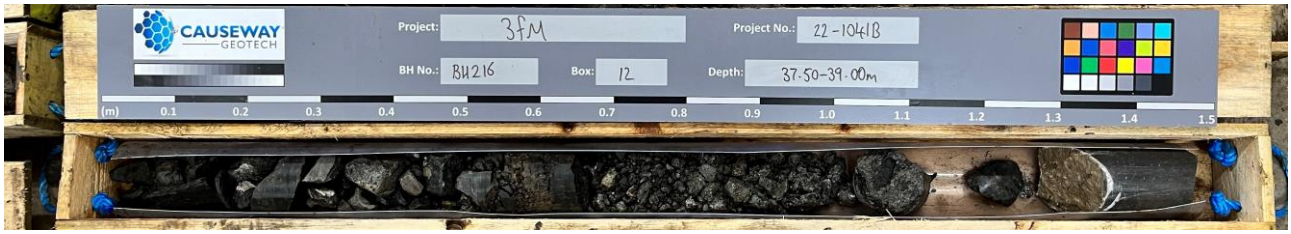
BH216 Box 8 (31.50-33.00m)

BH216 Box 9 (33.00-34.50m)

BH216 Box 10 (34.50-36.00m)

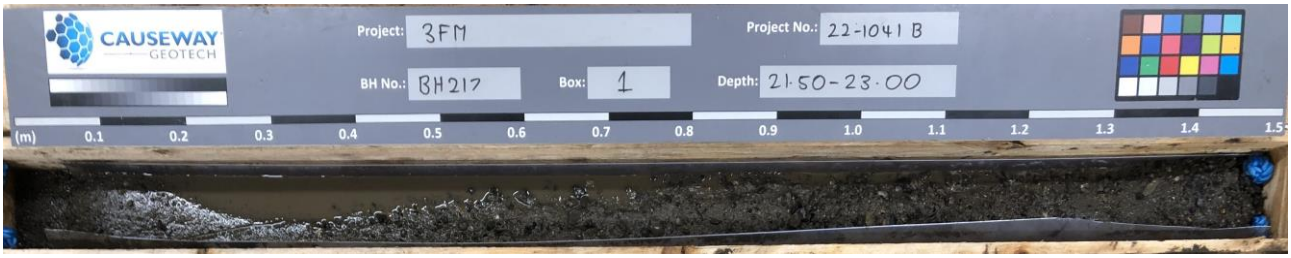


BH216 Box 11 (36.00-37.50m)

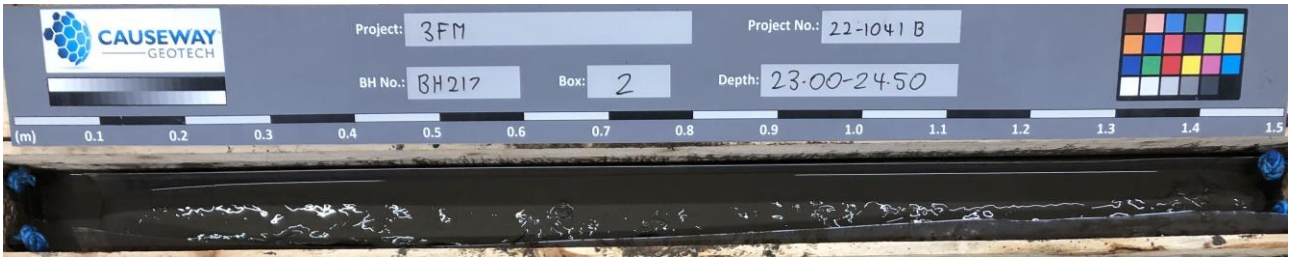


BH216 Box 12 (37.50-39.00m)

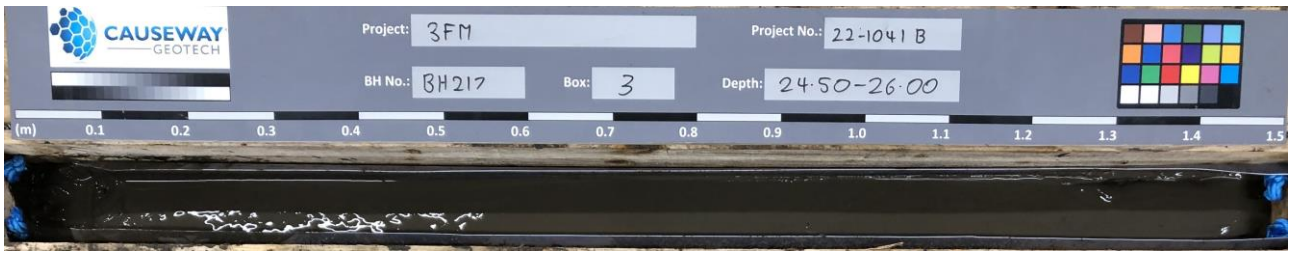
BH216 Box 13 (39.00-40.50m)



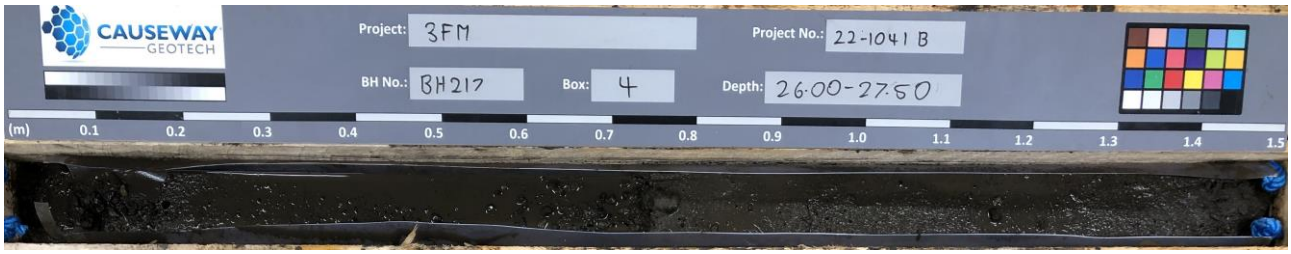
BH217 Box 1 (21.50-23.00m)



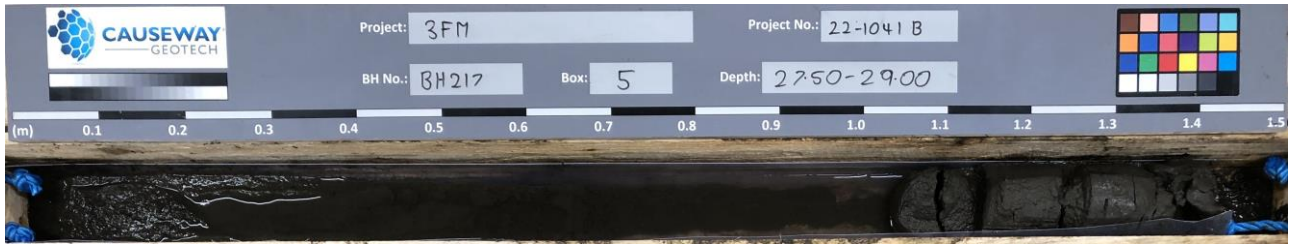
BH217 Box 2 (23.00-24.50m)



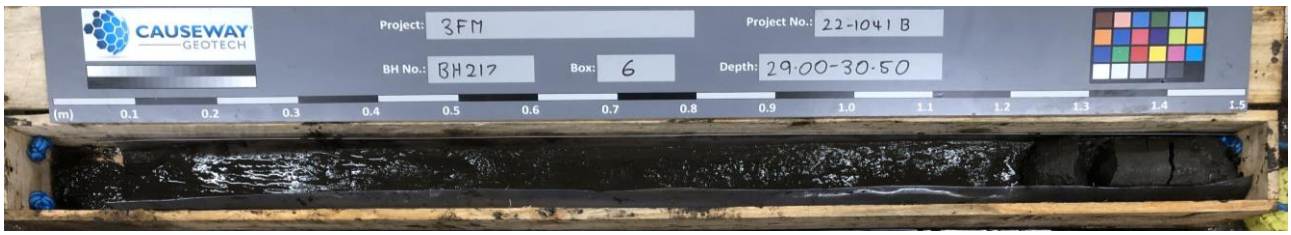
BH217 Box 3 (24.50-26.00m)



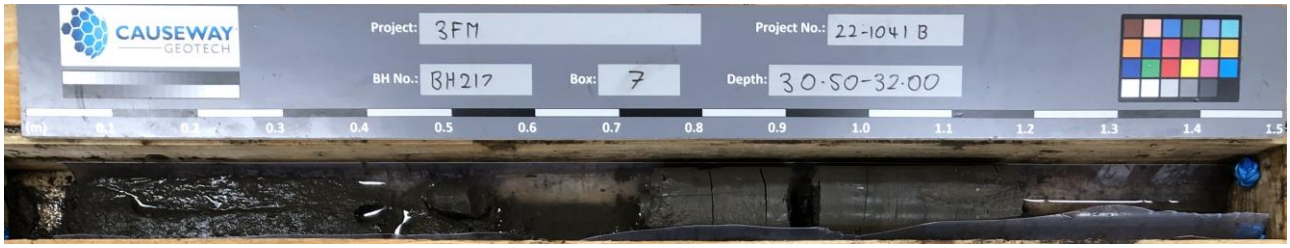
BH217 Box 4 (26.00-27.50m)



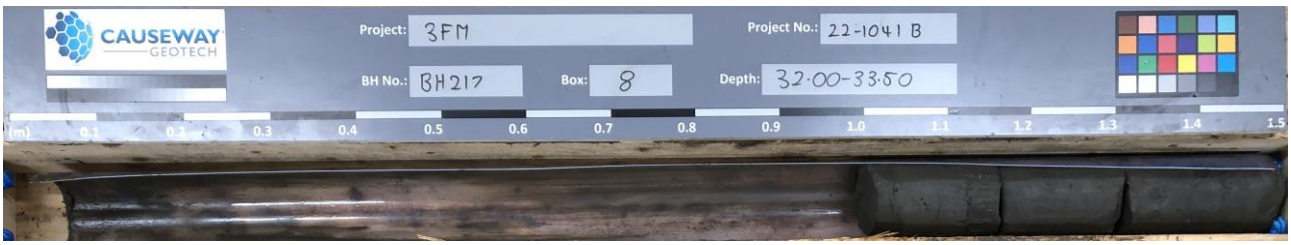
BH217 Box 5 (27.50-29.00m)



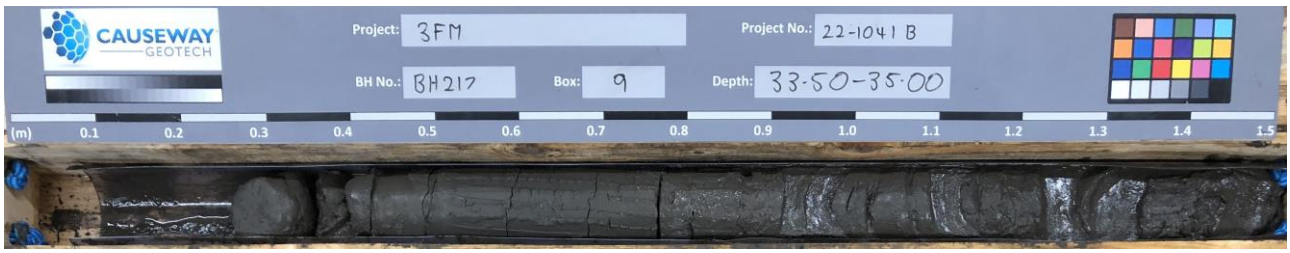
BH217 Box 6 (29.00-30.50m)



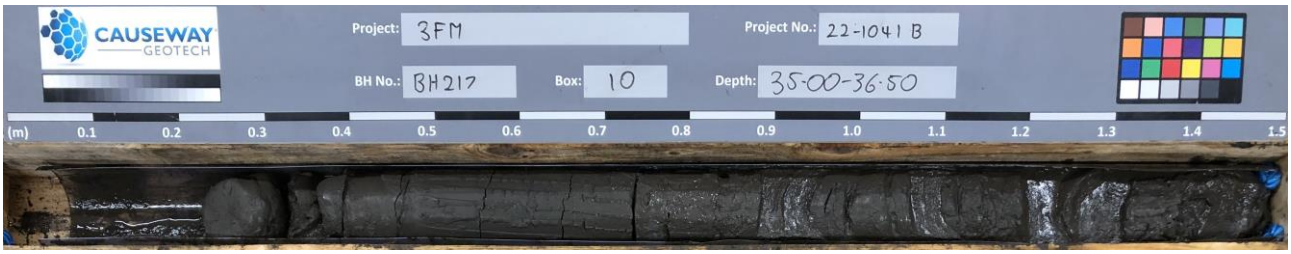
BH217 Box 7 (30.50-32.00m)



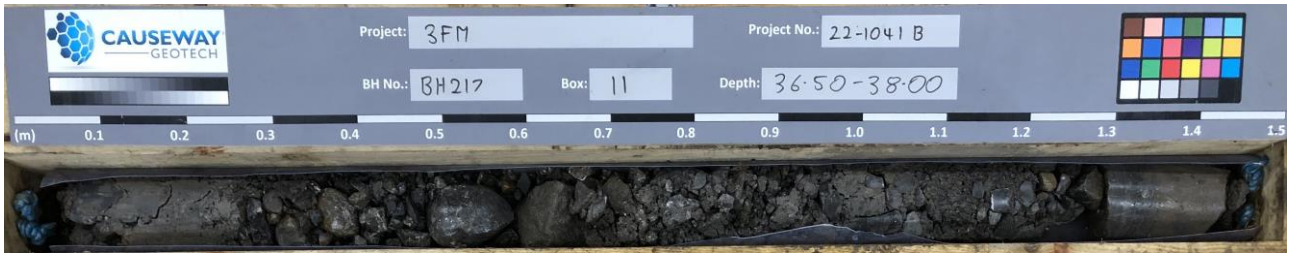
BH217 Box 8 (32.00-33.50m)



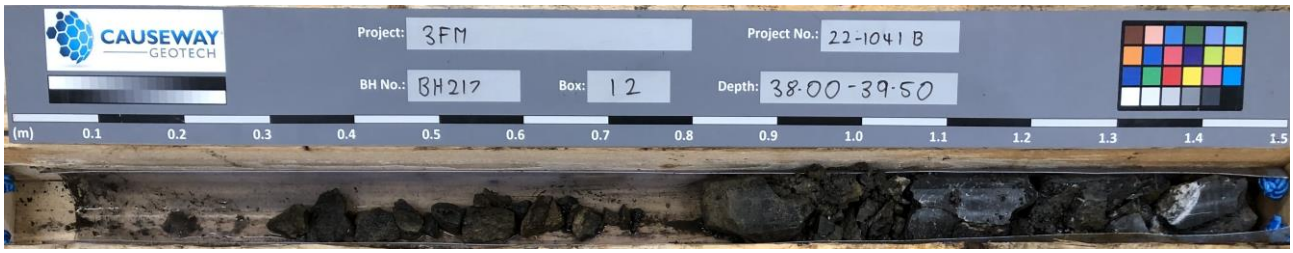
BH217 Box 9 (33.50-35.00m)



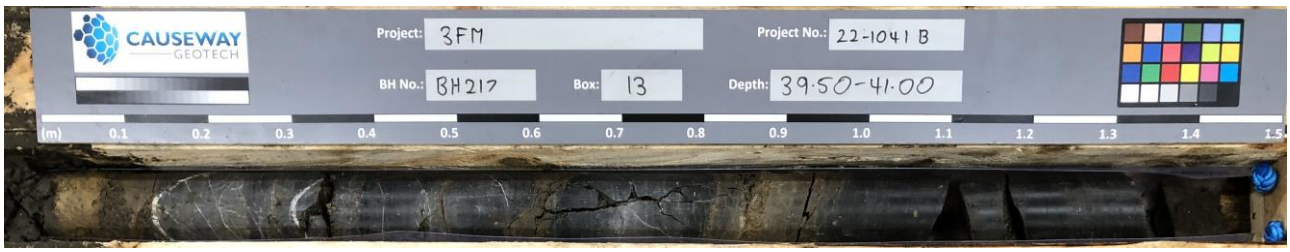
BH217 Box 10 (35.00-36.50m)



BH217 Box 11 (36.50-38.00m)



BH217 Box 12 (38.00-39.50m)



BH217 Box 13 (39.50-41.00m)

CAUSEWAY GEOTECH

APPENDIX D

SLIT TRENCH LOGS AND DRAWINGS

CAUSEWAY GEOTECH

Project No. 22-1041B	**Project Name:** 3FM Planning Design GI - Lot B 3rd Party Lands		**Trial Pit ID** ST203
Coordinates 719761.75 E 733579.51 N	**Client:** Dublin Port Company (DPC)		
Method: Slit Trenching	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3t Excavator	**Elevation** 3.60 mOD	**Date:** 05/12/2022	**Logger:** RS	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			3.50	0.10		BITMAC	
						MADE GROUND: Grey sandy very silty angular fine to coarse GRAVEL. Sand is fine to coarse.	
			3.15	0.45			
0.50 - 0.20	ES1					MADE GROUND: Brown sandy clayey subangular fine to coarse GRAVEL. Sand is fine to coarse.	
0.50 - 0.50	B2					*Terram at 0.45m*	
0.50		PID = 0.70ppm					
1.00 - 1.00	B4						
1.00 - 1.00	ES3		2.50	1.10			
1.00		PID = 1.10ppm				End of trial pit at 1.10m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 1.10
Width: 0.50
Length: 8.35

Remarks:
No groundwater encountered.

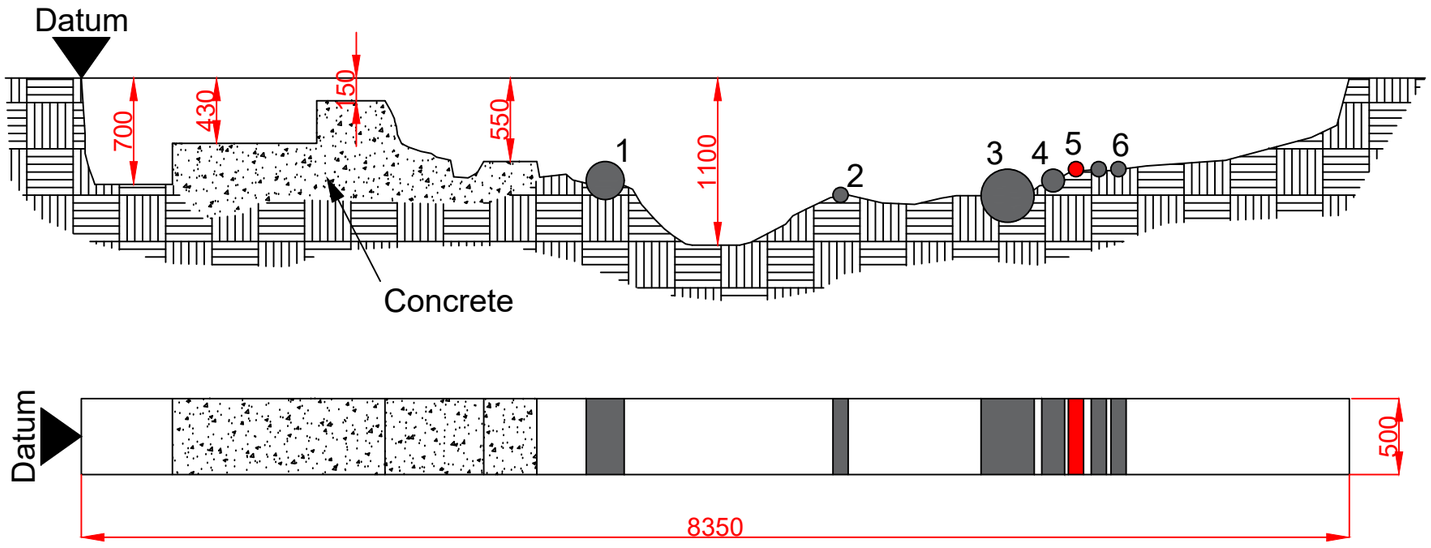
Stability:	Termination Reason	Last Updated
Unstable	Services exposed.	19/04/2023

AGS

JOB NUMBER: 22-1041B	JOB NAME: 3FM Planning Design GI - Lot B DPC Lands	LOCATION: ST203

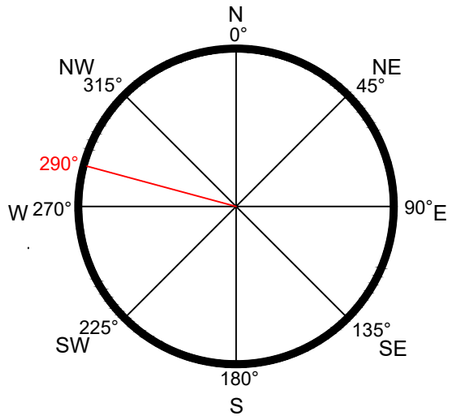
CLIENT: Dublin Port Company (DPC)	CLIENTS REPRESENTATIVE: RPS	CREW: RS	PLANT & EQUIPMENT 3 Tonne Excavator & Hand Tools

TRENCH: (SECTION & PLAN)



No:	Type of Service:	Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	Details/Comments
01	Unknown	250	0.55	3.45	250mm Asbestos Pipe
02	Unknown	100	0.72	5.00	100mm Grey Flexi
03	Unknown	175	0.60	6.10	175mm Grey PVC Pipe
04	Unknown	150	0.55	6.40	150mm Grey PVC Pipe
05	Unknown	100	0.55	6.55	100mm Red PVC Pipe
06	Unknown	100	0.55	6.70 - 6.83	2x100mm Grey PVC Pipe
07					
08					
09					
10					
11					
12					
13					
14					
15					

TRENCH - ORIENTATION



TRENCH ORIENTATED : 290° FROM NORTH

COORDINATES: DATUM

EASTING: 719761.75

NORTHING: 733579.51

ELEVATION: 3.60

TRENCH LENGTH (m) : 8.35

TRENCH DEPTH (m) : 1.10

TRENCH WIDTH (m) : 0.50

STABILITY: UNSTABLE

GROUNDWATER: DRY

SCALE: NTS@A3

DRAWN: BS

CHECKED: CH

DATE EXCAVATED: 05/12/2022

CAUSEWAY GEOTECH

CAUSEWAY GEOTECH

Project No. 22-1041B	**Project Name:** 3FM Planning Design GI - Lot B 3rd Party Lands		**Trial Pit ID** ST204
Coordinates 719763.10 E 733653.78 N	**Client:** Dublin Port Company (DPC)		
Method: Slit Trenching	**Client's Representative:** RPS		Sheet 1 of 1 Scale: 1:25
Plant: 3T Excavator	**Elevation** 3.74 mOD	**Date:** 05/12/2022	**Logger:** MMC	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			3.67	0.07		BITMAC	
			3.54	0.20		MADE GROUND: Grey slightly sandy angular fine to coarse GRAVEL. Sand is fine to coarse.	
						MADE GROUND: Firm light brown slightly sandy gravelly CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded of granite.	
0.50	B4						
0.50	ES1						
0.50		PID = 0.60ppm					
1.00	B5						
1.00	ES2						
1.00		PID = 0.00ppm					
1.50	B6		2.24	1.50		End of trial pit at 1.50m	
1.50	ES3						
1.50		PID = 0.40ppm					

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 1.50
Width: 10.50
Length: 7.10

Remarks:
No groundwater encountered.

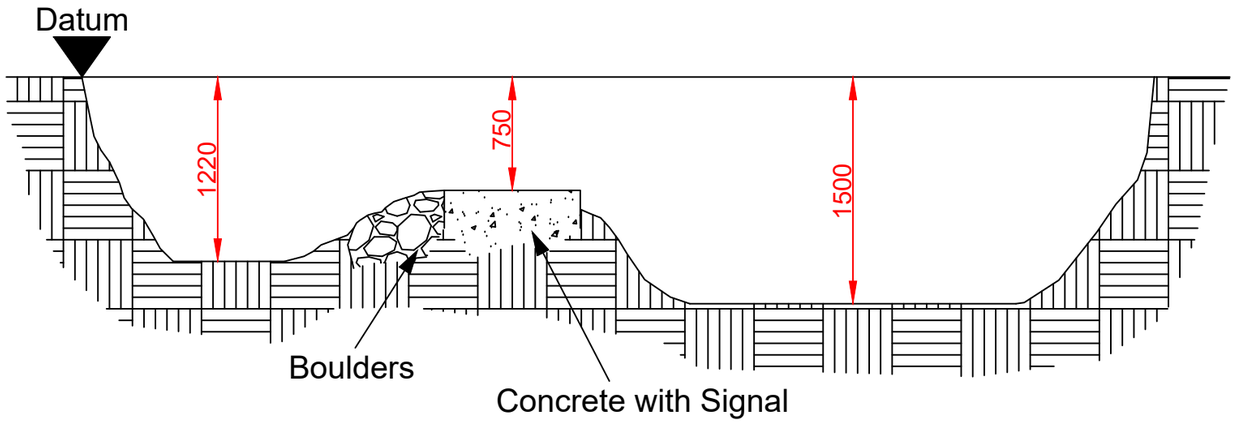
Stability:	Termination Reason	Last Updated
Stable	Services exposed.	19/04/2023

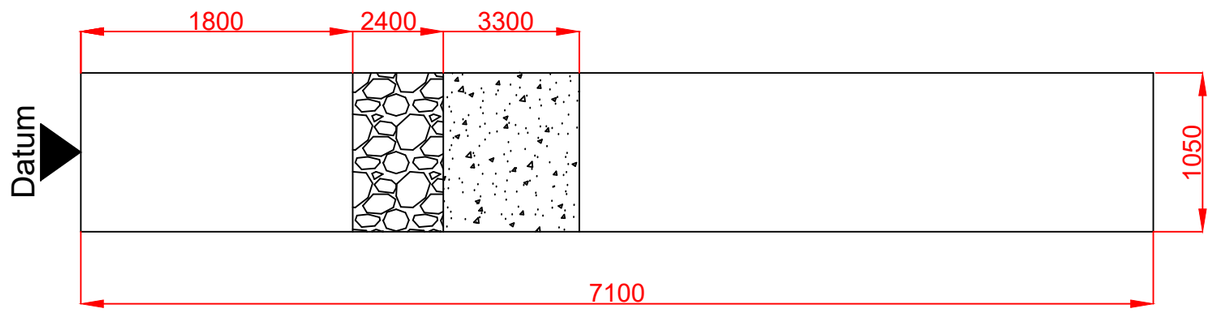
AGS

JOB NUMBER: 22-1041B	JOB NAME: 3FM Planning Design GI - Lot B DPC Lands	LOCATION: ST204

CLIENT: Dublin Port Company (DPC)	CLIENTS REPRESENTATIVE: RPS	CREW: RS	PLANT & EQUIPMENT 3 Tonne Excavator & Hand Tools

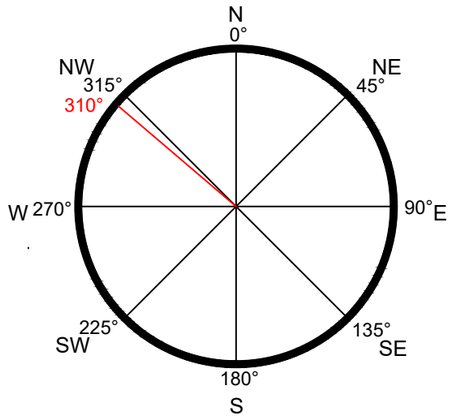
TRENCH: (SECTION & PLAN)





No:	Type of Service:	Diameter (in mm)	Depth to Top of Service (m)	Distance to Centre of Service (m)	Details/Comments
01					No Services Found
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					

TRENCH - ORIENTATION



TRENCH ORIENTATED : 310° FROM NORTH

COORDINATES: DATUM

EASTING: - 719763.095

NORTHING: - 733653.781

ELEVATION: - 3.741

TRENCH LENGTH (m) : 7.10

TRENCH DEPTH (m) : 1.50

TRENCH WIDTH (m) : 1.05

STABILITY: Stable

GROUNDWATER: Dry

SCALE: NTS@A3

DRAWN: BS

CHECKED: CH

DATE EXCAVATED: 06/12/2022

CAUSEWAY GEOTECH

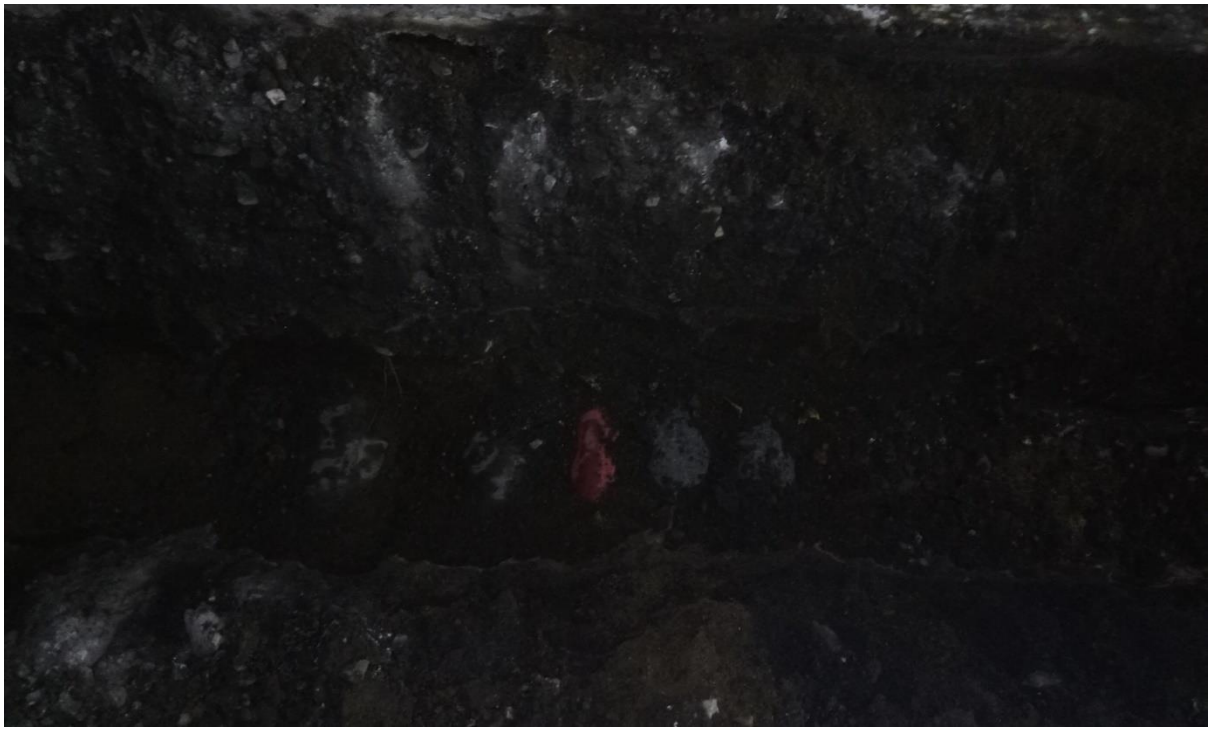
CAUSEWAY GEOTECH

APPENDIX E

SLIT TRENCH PHOTOGRAPHS

ST203

ST203



ST203

ST203

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CAUSEWAY GEOTECH

APPENDIX F

INDIRECT IN-SITU CBR TESTS

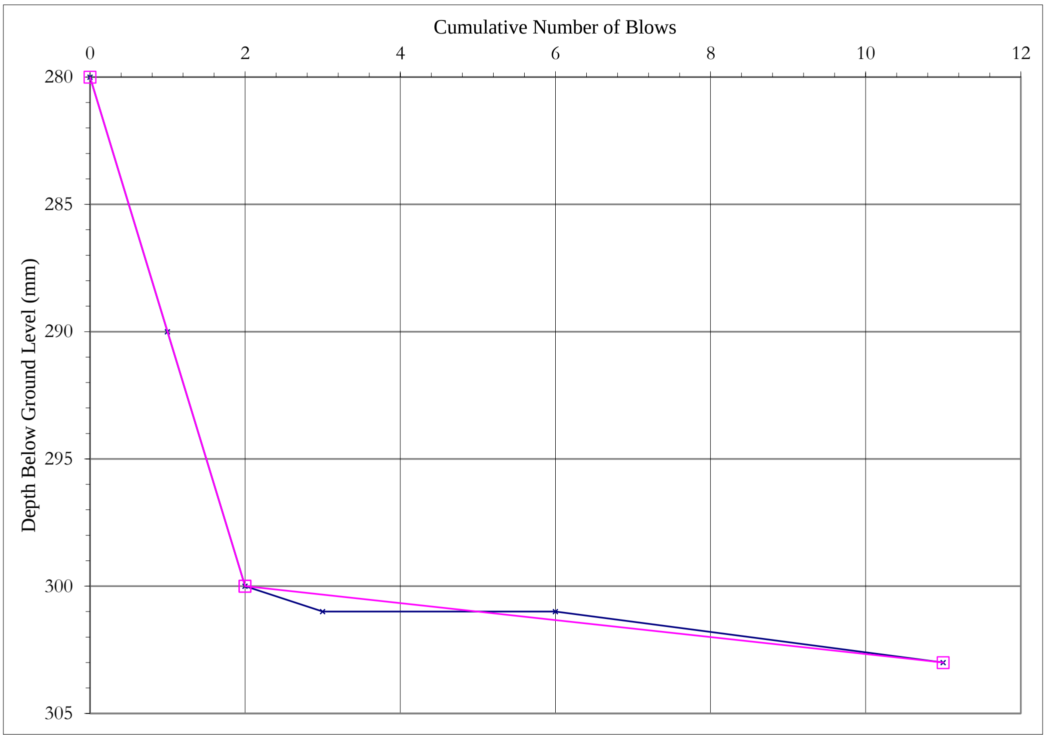
<u>**Dynamic Cone Penetrometer (DCP) test results and estimated CBR**</u>

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

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



top / base of layer (mm)	**mm/ blow**	**CBR (%)**
280 300	10	26
300 303	0.3	>100

CBR Range	Min: 26 Max: >100	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; 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	[signature]	April 2023

UKAS TESTING 10122

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

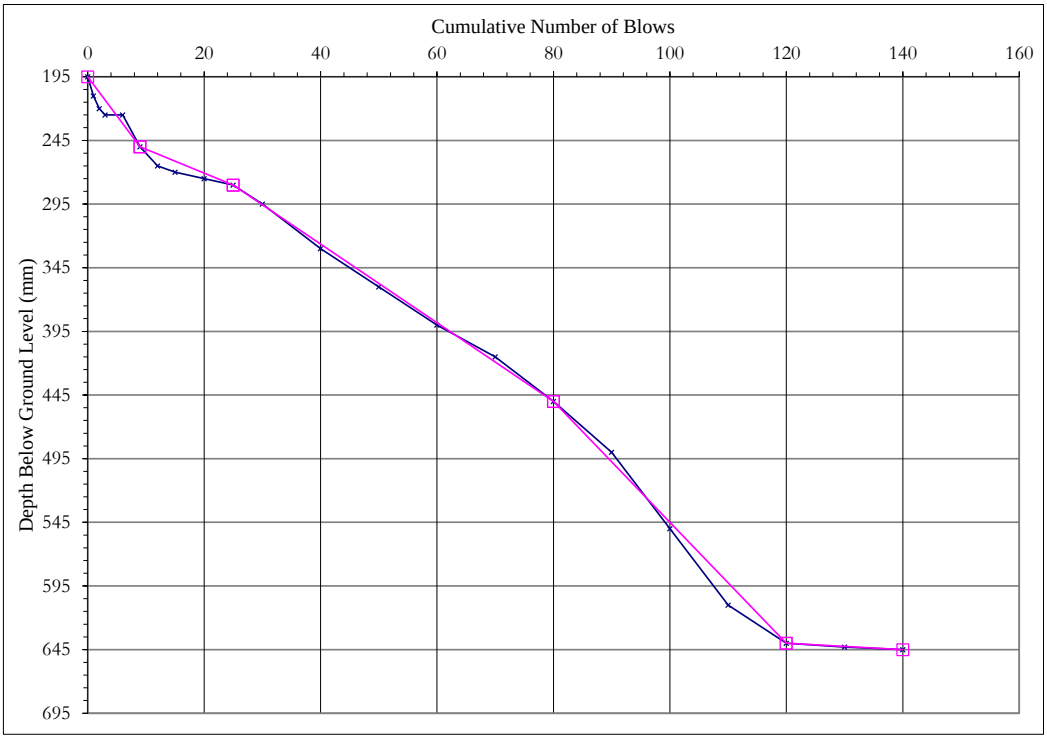
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC203
Depth bgl (m)	0.20

Date Tested	15/12/2022
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



top / base of layer (mm)	mm/ blow	CBR (%)
195	6.1	45
250		
250	1.9	>100
280		
280	3.1	92
450		
450	4.8	58
640		
640	0.3	>100
645		

CBR Range	Min: 45 Max: >100	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; 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		April 2023

UKAS TESTING 10122

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

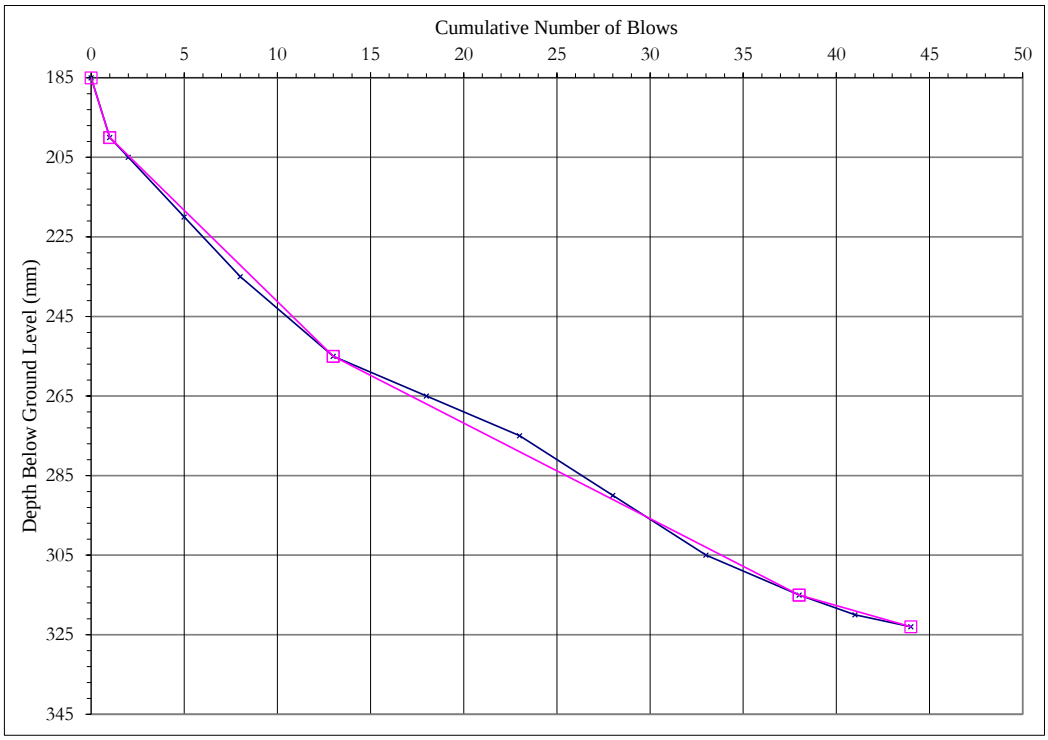
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC204
Depth bgl (m)	0.19

Date Tested	15/12/2022
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



top / base of layer (mm)	mm/ blow	CBR (%)
185	15	17
200		
200	4.6	60
255		
255	2.4	>100
315		
315	1.3	>100
323		

CBR Range	Min: 17 Max: >100	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; 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		April 2023

UKAS TESTING 10122

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

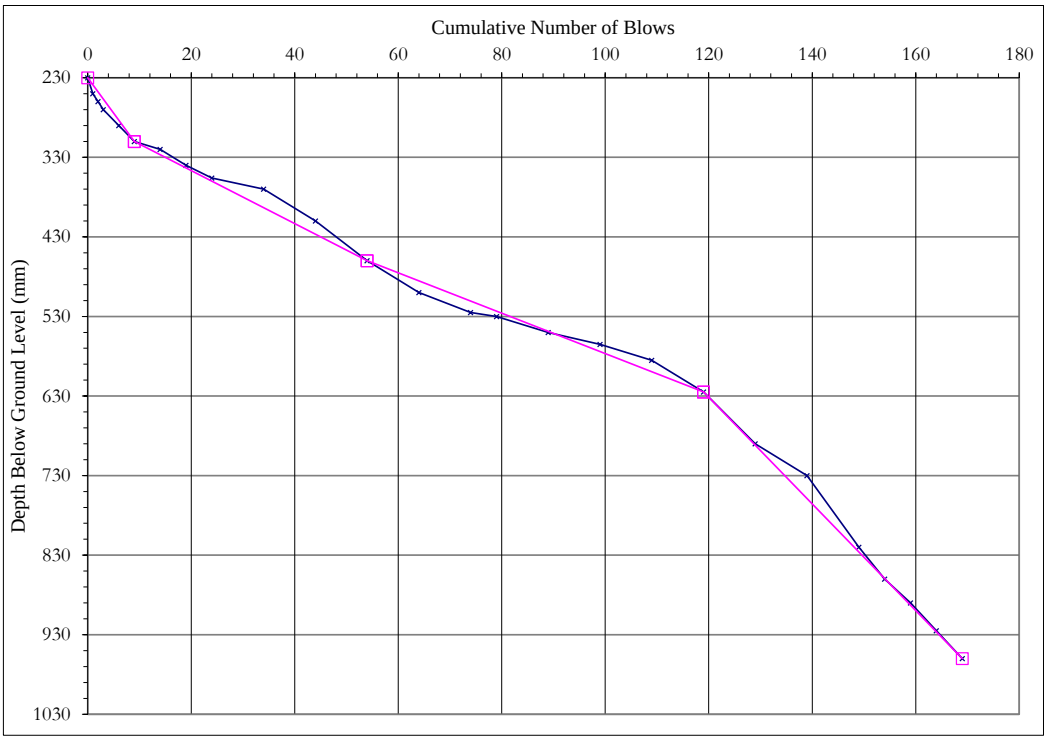
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC205
Depth bgl (m)	0.23

Date Tested	15/12/2022
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



top / base of layer (mm)	**mm/ blow**	**CBR (%)**
230	8.9	30
310		
310	3.3	85
460		
460	2.5	>100
625		
625	6.7	40
960		

CBR Range	Min: 30 Max: >100	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; 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		April 2023

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

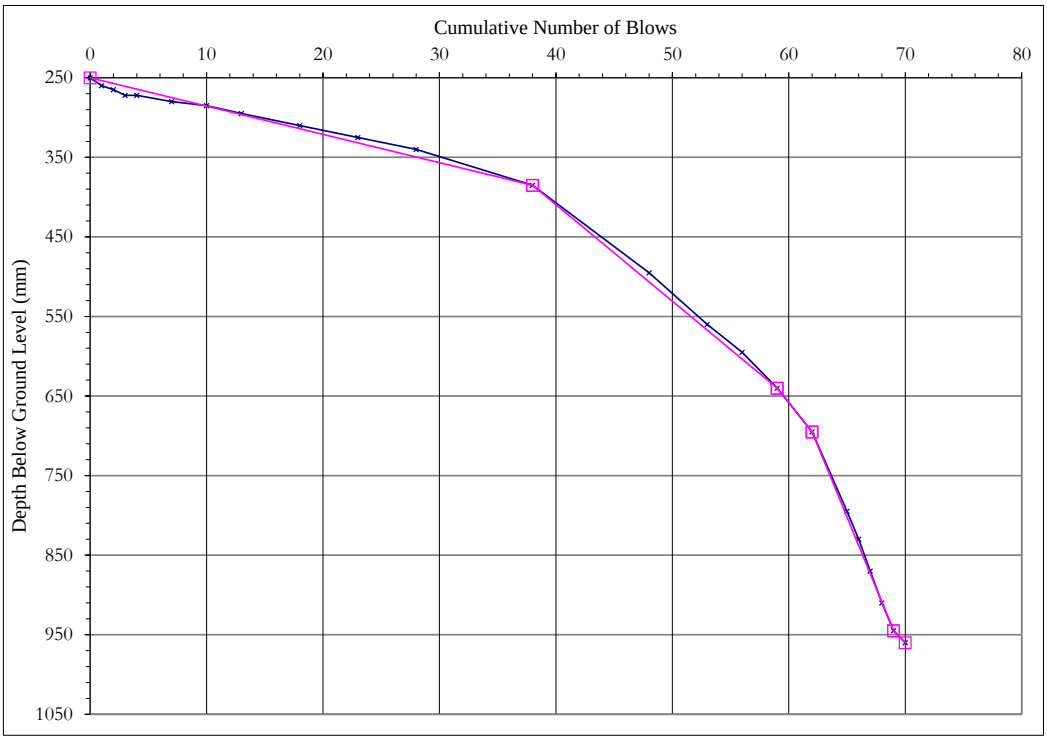
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC206
Depth bgl (m)	0.25

Date Tested	15/12/2022
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



top / base of layer (mm)	mm/ blow	CBR (%)
250	3.6	79
385		
385	12	22
640		
640	18	14
695		
695	36	6.9
945		
945	15	17
960		

CBR Range	Min: 6.9 Max: 79	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; 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		April 2023

UKAS TESTING 10122

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

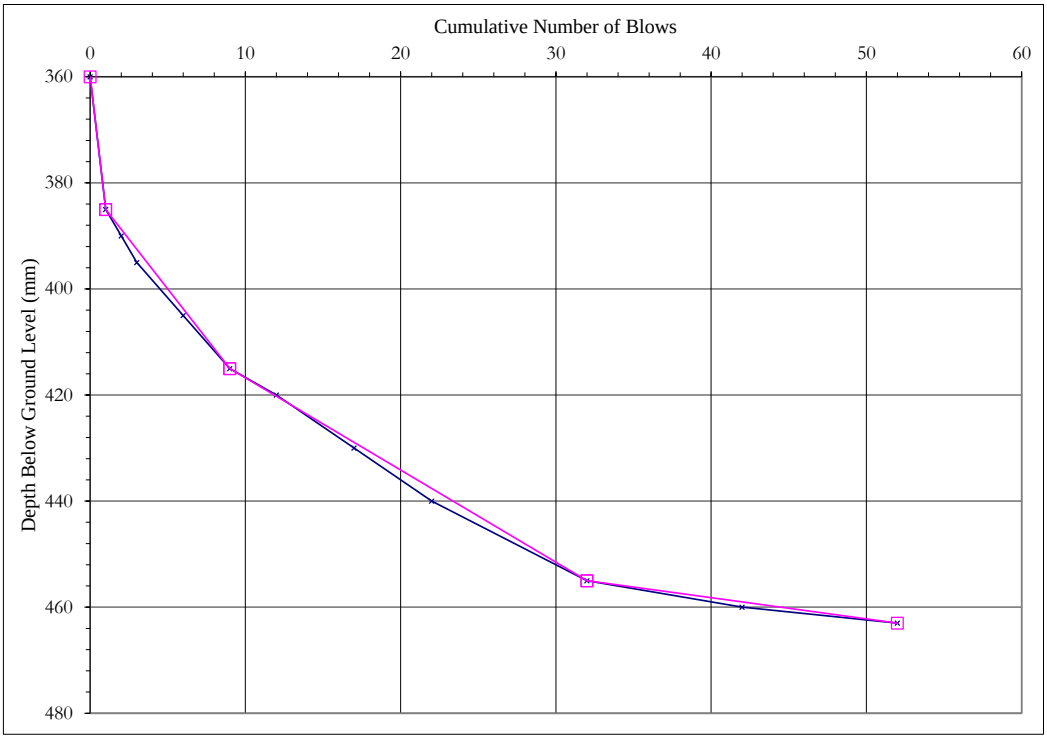
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC207
Depth bgl (m)	0.36

Date Tested	14/12/2022
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



top / base of layer (mm)	mm/ blow	CBR (%)
360	25	10
385		
385	3.8	75
415		
415	1.7	>100
455		
455	0.4	>100
463		

CBR Range	Min: 10 Max: >100	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; 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		April 2023

UKAS TESTING 10122

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

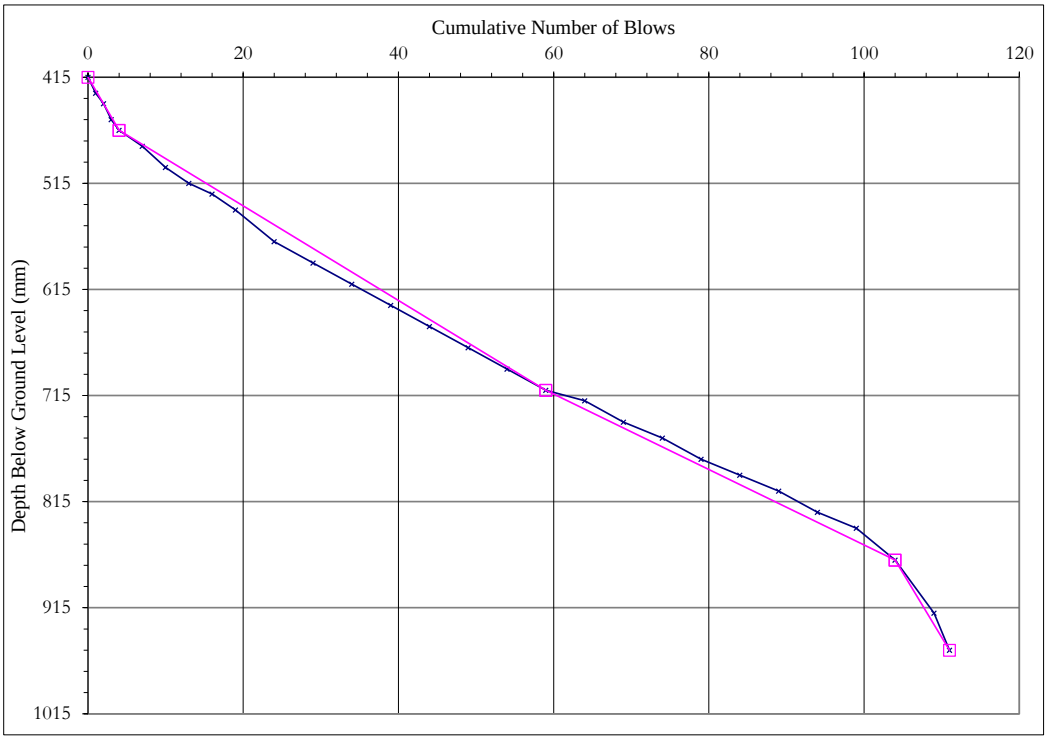
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC209
Depth bgl (m)	0.42

Date Tested	14/12/2022
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



top / base of layer (mm)	**mm/ blow**	**CBR (%)**
415	13	21
465		
465	4.5	62
710		
710	3.6	79
870		
870	12	22
955		

CBR Range	Min: 21 Max: 79	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; 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		January 2023

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

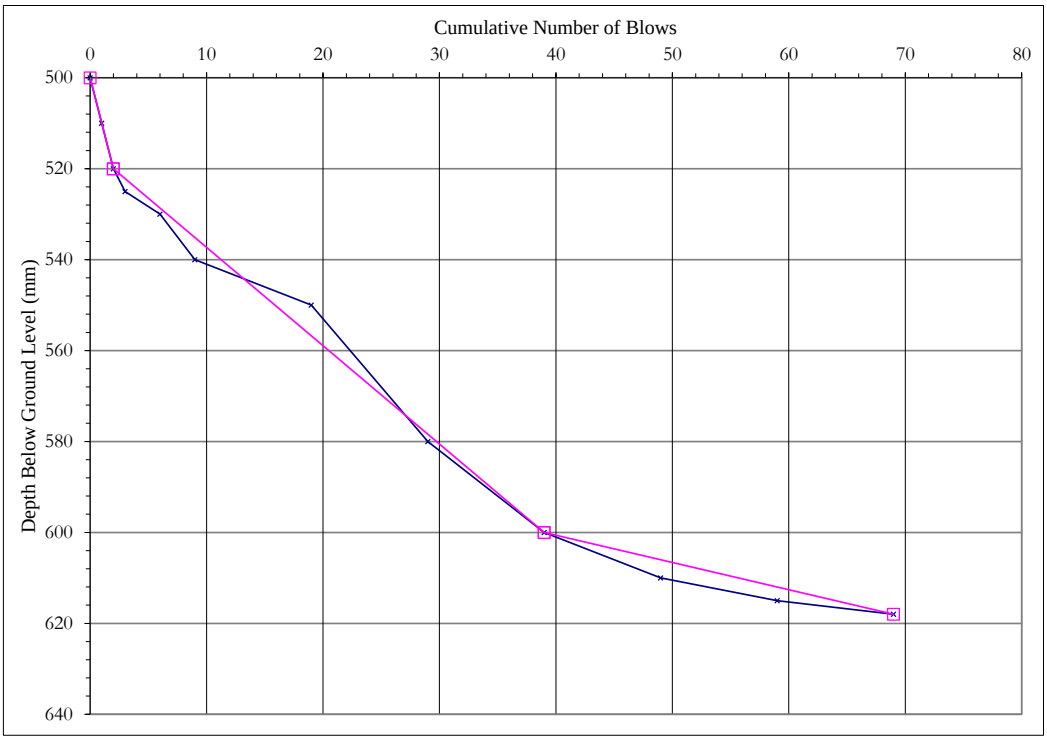
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC211
Depth bgl (m)	0.50

Date Tested	14/12/2022
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



top / base of layer (mm)	mm/ blow	CBR (%)
500	10	26
520		
520	2.2	>100
600		
600	0.6	>100
618		

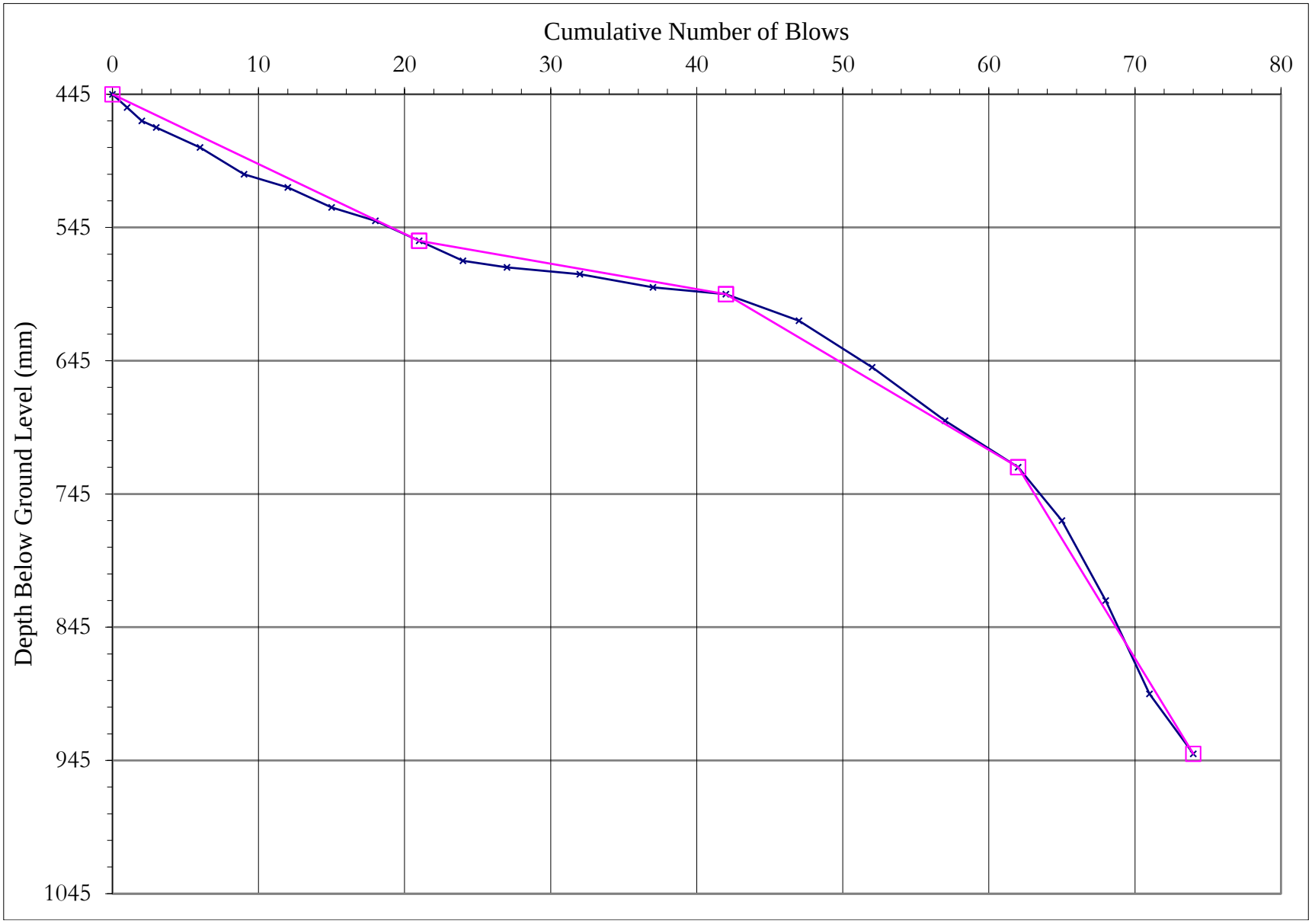
CBR Range	Min: 26 Max: >100	The selection of layers is based on visual interpretation of the data. The insitu DCP reading (mm/blow) and CBR values are valid at the time of testing; variation in moisture content or other factors may affect the insitu value.

Deviation(s) from standard procedure	None

Observations and comments	Terminated on refusal

Approved Name and Appointment		
Darren O'Mahony Director		April 2023

UKAS TESTING 10122


Cumulative Number of Blows
0
10
20
30
40
50
60
70
80
Depth Below Ground Level (mm)
445
545
645
745
845
945
1045

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

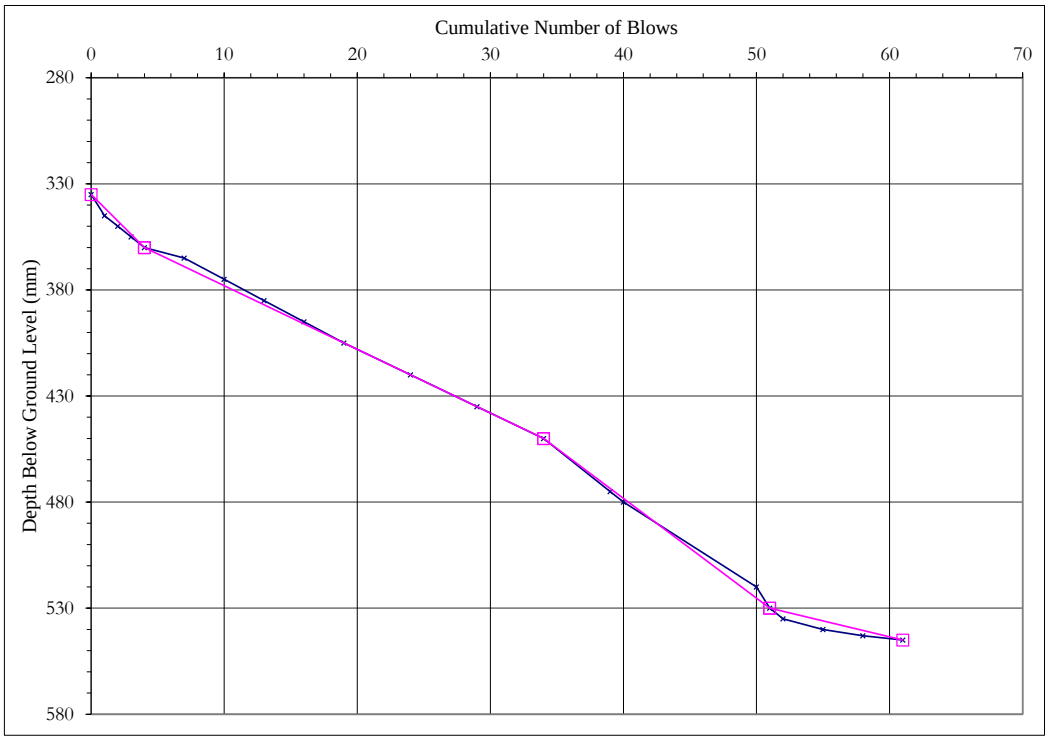
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC213
Depth bgl (m)	0.34

Date Tested	14/12/2022
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



top / base of layer (mm)	**mm/ blow**	**CBR (%)**
335	6.3	44
360		
360	3	95
450		
450	4.7	59
530		
530	1.5	>100
545		

CBR Range	Min: 44 Max: >100	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; 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		April 2023

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

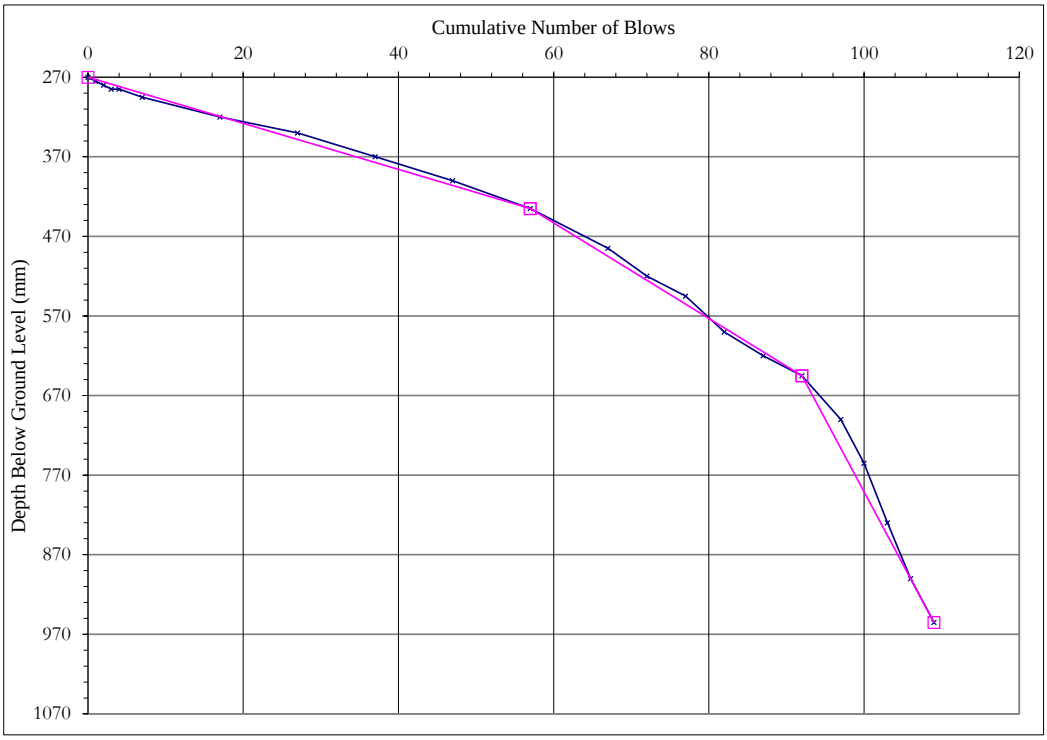
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC214
Depth bgl (m)	0.27

Date Tested	14/12/2022
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



top / base of layer (mm)	**mm/ blow**	**CBR (%)**
270	2.9	98
435		
435	6	45
645		
645	18	14
955		

CBR Range	Min: 14 Max: 98	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; 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		January 2023

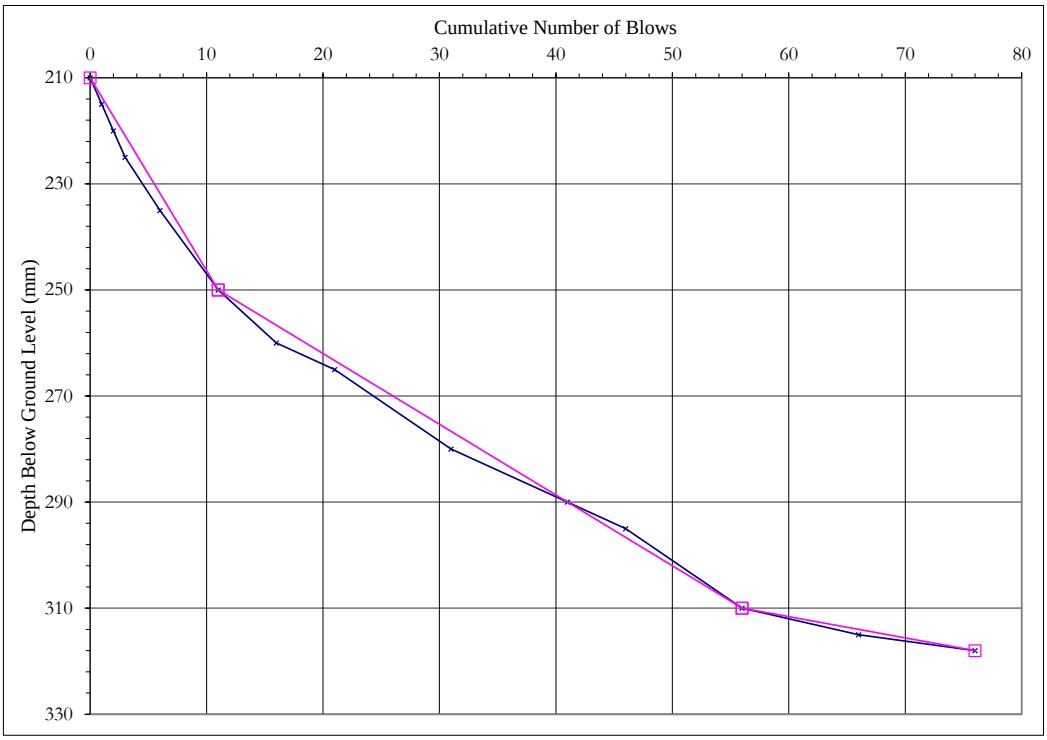
Dynamic Cone Penetrometer (DCP) test results and estimated CBR

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

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



top / base of layer (mm)	mm/ blow	CBR (%)
210	3.6	77
250		
250	1.3	>100
310		
310	0.4	>100
318		

CBR Range	Min: 77 Max: >100	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; 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		April 2023

UKAS TESTING 10122

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

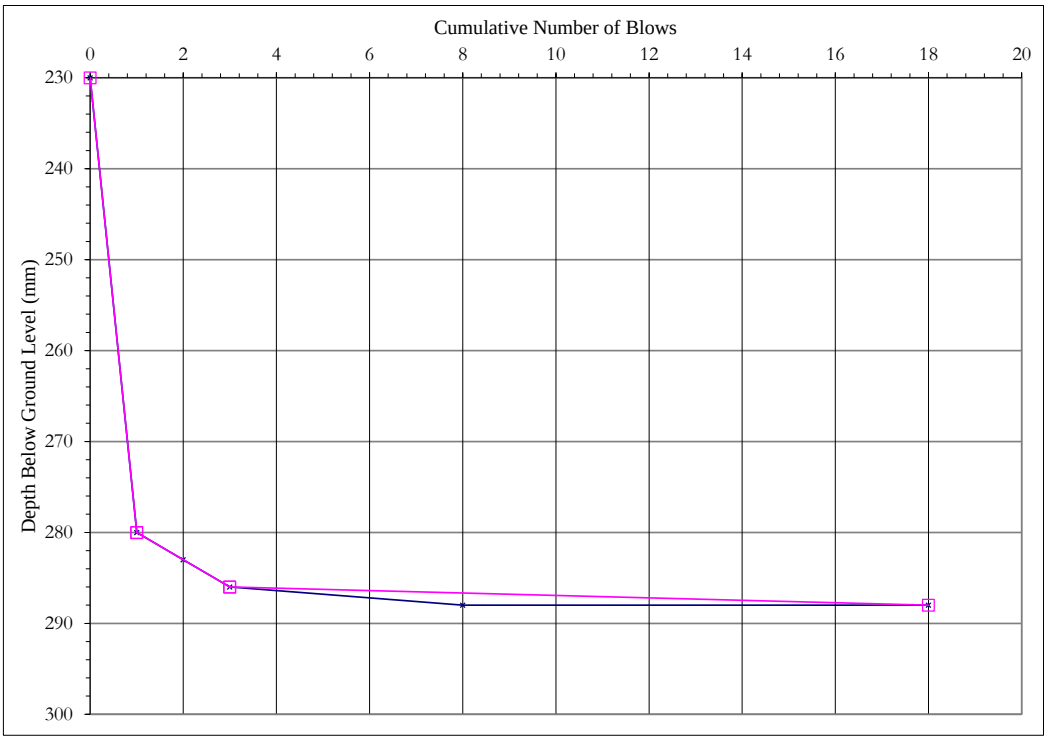
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC216
Depth bgl (m)	0.23

Date Tested	14/12/2022
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



top / base of layer (mm)	**mm/ blow**	**CBR (%)**
230	50	4.8
280		
280	3	95
286		
286	0.1	>100
288		

CBR Range	Min: 4.8 Max: >100	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; 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		April 2023

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

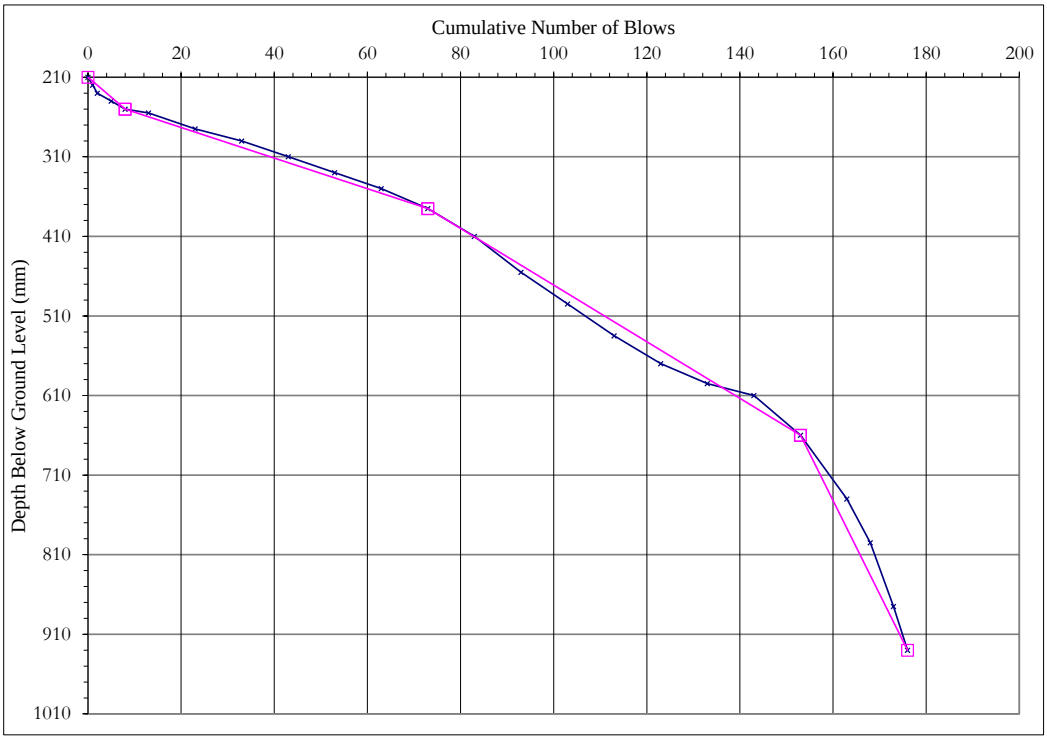
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC217
Depth bgl (m)	0.21

Date Tested	14/12/2022
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



top / base of layer (mm)	**mm/ blow**	**CBR (%)**
210	5	55
250		
250	1.9	>100
375		
375	3.6	79
660		
660	12	22
930		

CBR Range	Min: 22 Max: >100	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; 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		January 2023

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

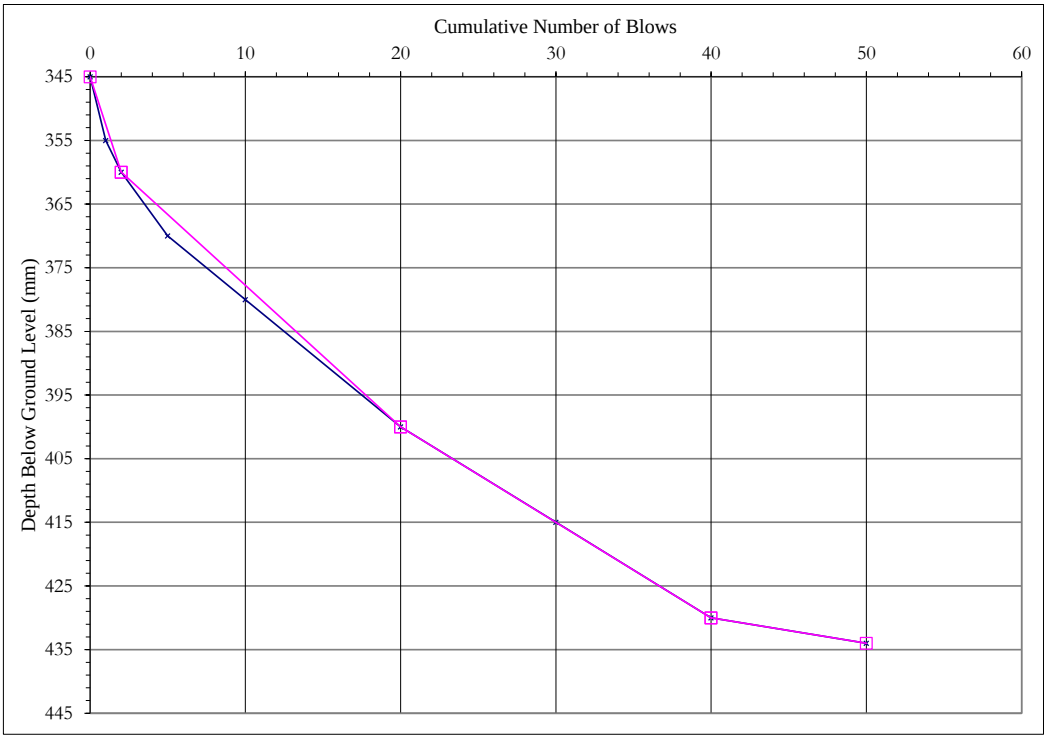
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC218
Depth bgl (m)	0.35

Date Tested	14/12/2022
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



top / base of layer (mm)	mm/ blow	CBR (%)
345	7.5	36
360		
360	2.2	>100
400		
400	1.5	>100
430		
430	0.4	>100
434		

CBR Range	Min: 36 Max: >100	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; 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		April 2023

UKAS TESTING 10122

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

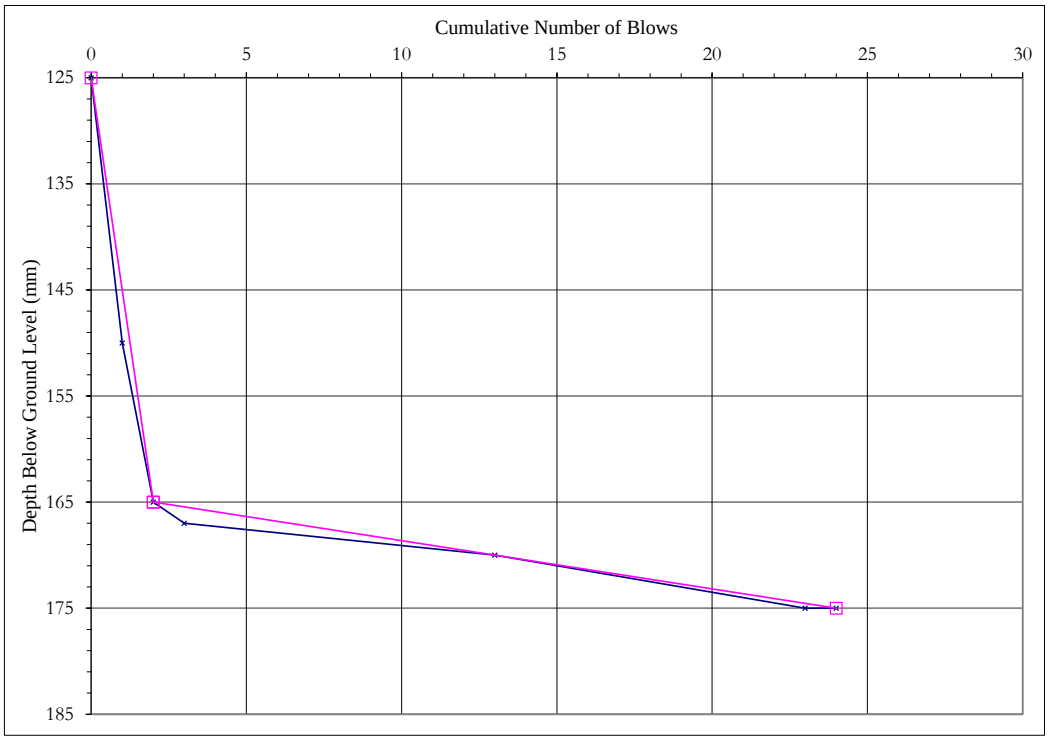
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC219
Depth bgl (m)	0.13

Date Tested	15/12/2022
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



top / base of layer (mm)	**mm/ blow**	**CBR (%)**
125	20	13
165		
165	0.5	>100
175		

CBR Range	Min: 13 Max: >100	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; 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		April 2023

UKAS TESTING 10122

Dynamic Cone Penetrometer (DCP) test results and estimated CBR

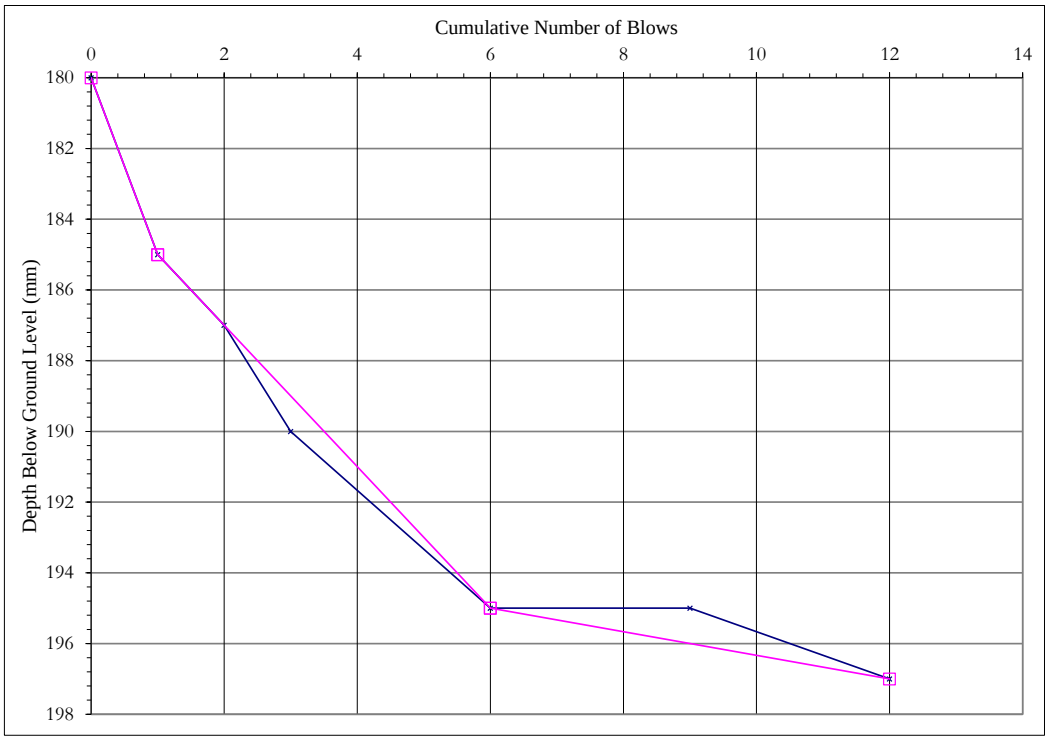
Project Number	22-1041B
Project Name	3FM Planning Design GI
Site Location	Dublin Port South

Test Number	3FM-RC220
Depth bgl (m)	0.18

Date Tested	15/12/2022
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



top / base of layer (mm)	mm/ blow	CBR (%)
180	5	55
185		
185	2	>100
195		
195	0.3	>100
197		

CBR Range	Min: 55 Max: >100	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; 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		April 2023

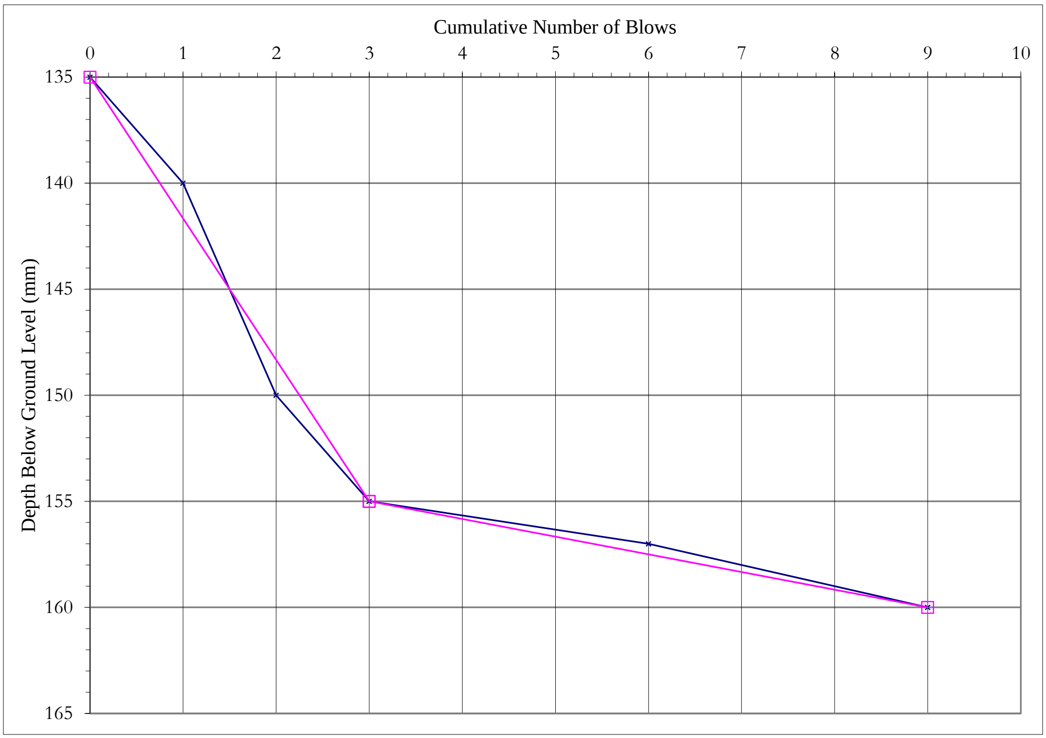
Dynamic Cone Penetrometer (DCP) test results and estimated CBR

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

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



top / base of layer (mm)	mm/ blow	CBR (%)
135 155	6.7	41
155 160	0.8	>100

CBR Range Min: 41 Max: >100	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; variation in moisture content or other factors may affect the insitu value.
Deviation(s) from standard procedure	None
Observations and comments	Terminated on refusal

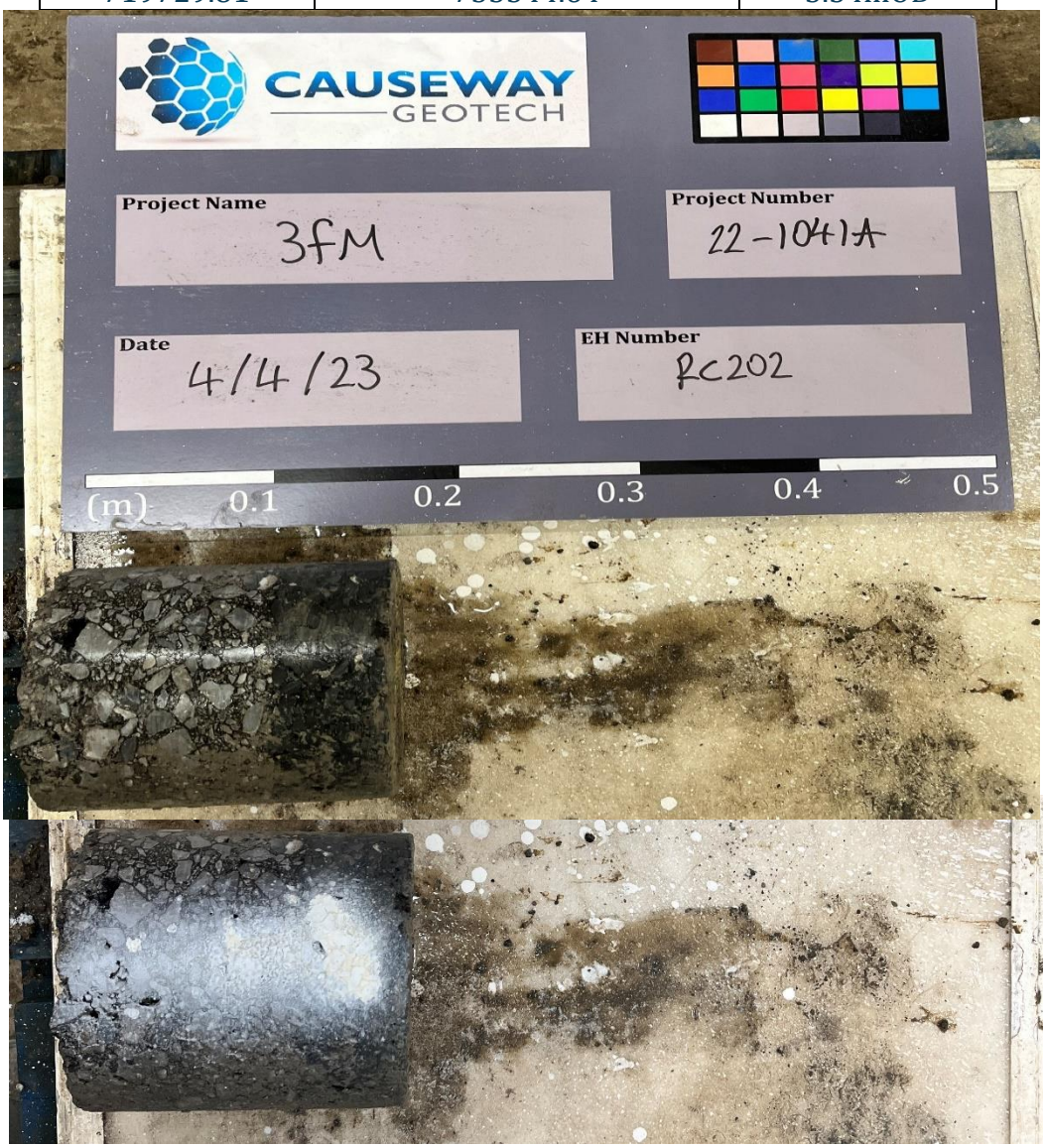
Approved Name and Appointment		
Darren O'Mahony Director	[signature]	April 2023

CAUSEWAY GEOTECH

APPENDIX G

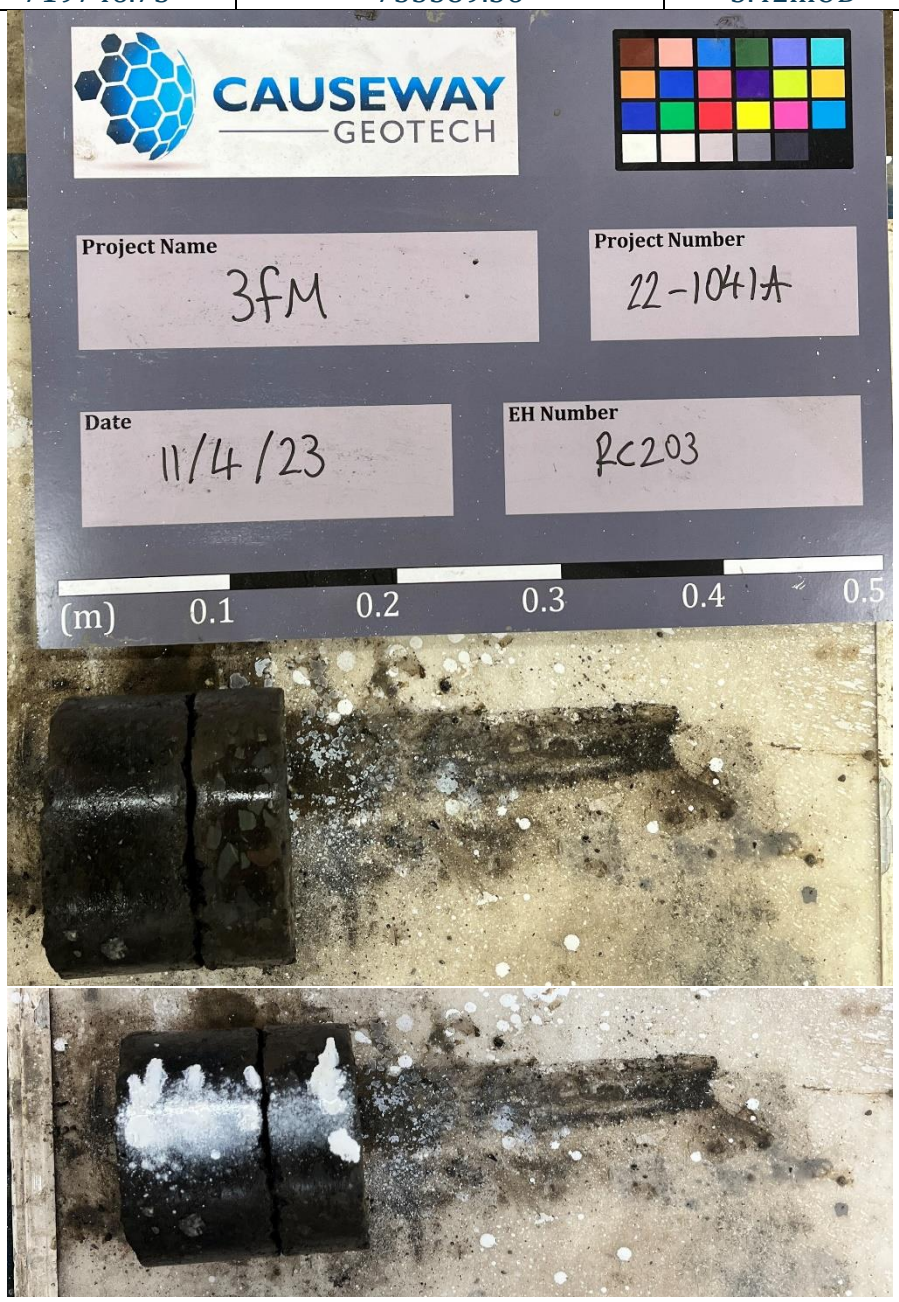
PAVEMENT CORE LOGS AND PHOTOGRAPHS

RC202		
Easting	**Northing**	**Elevation**
719729.81	733544.64	3.34mOD



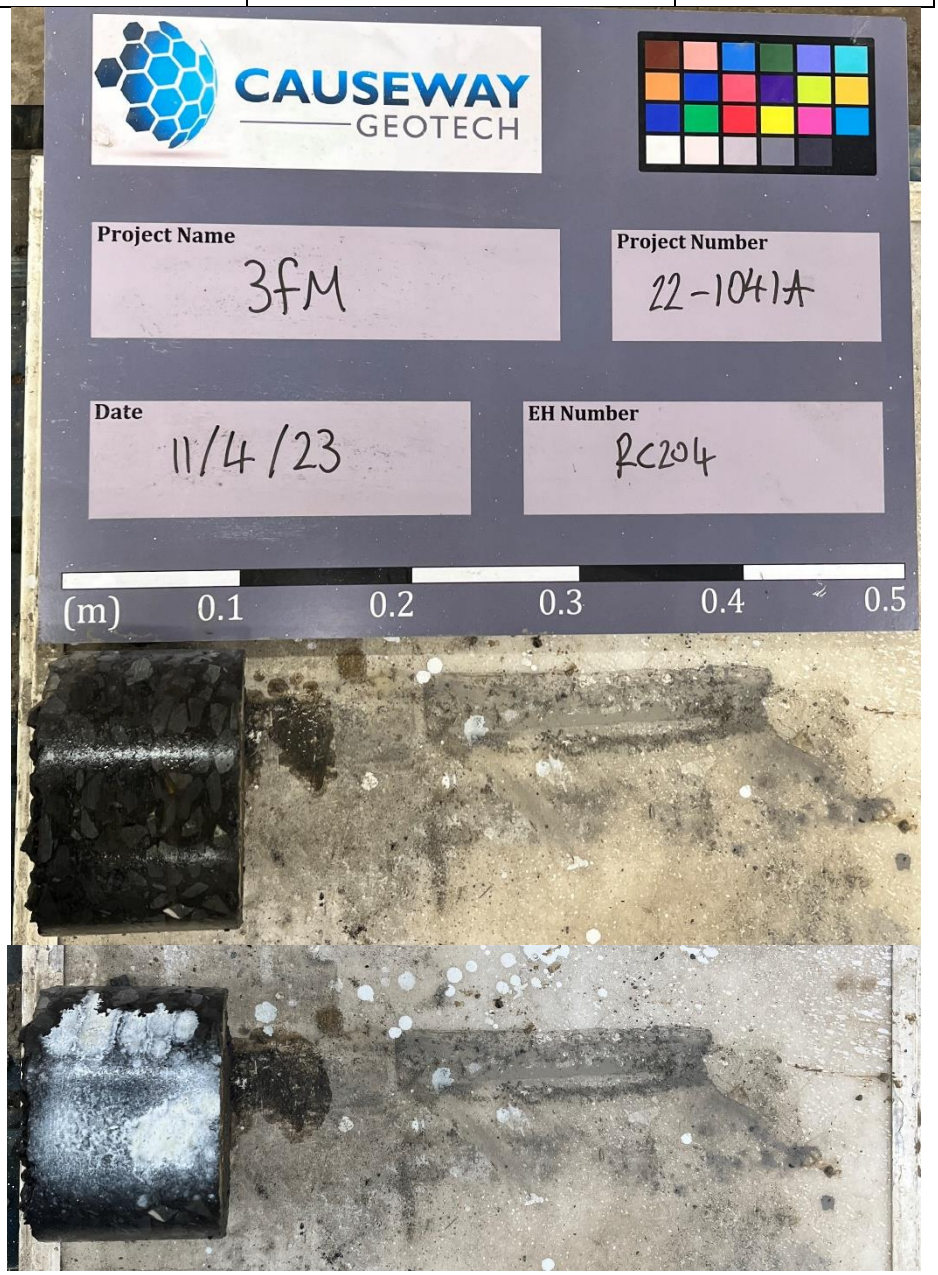
Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.1	100	Strong grey BITMAC. 70-80% aggregate of subangular to subrounded fine to medium gravel. No small voids.	Faint Yellow
2	0.1-0.16	60	Strong black BITMAC. 30-40% aggregate of angular to subangular fine gravel. 1-5% small voids.	Faint Yellow

RC203		
Easting	**Northing**	**Elevation**
719746.73	733589.36	3.42mOD



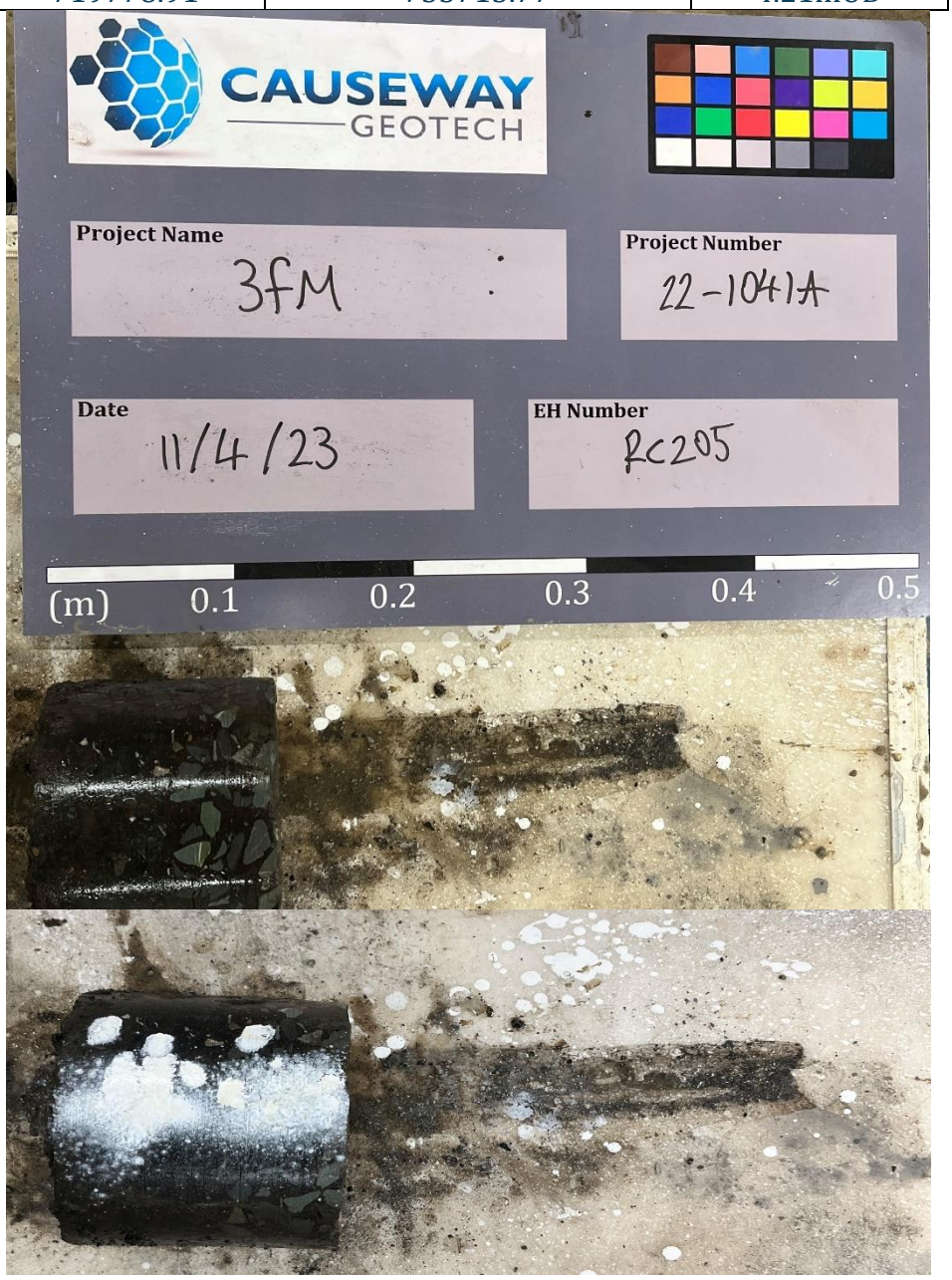
Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.083	83	Strong black BITMAC. 30-40% aggregate of subangular to subrounded fine to medium gravel. No small voids.	White
2	0.083-0.125	42	Strong dark grey BITMAC. 40-50% aggregate of subangular to subrounded fine to medium gravel. No small voids.	White

RC204		
Easting	**Northing**	**Elevation**
719765.61	733656.45	3.72mOD



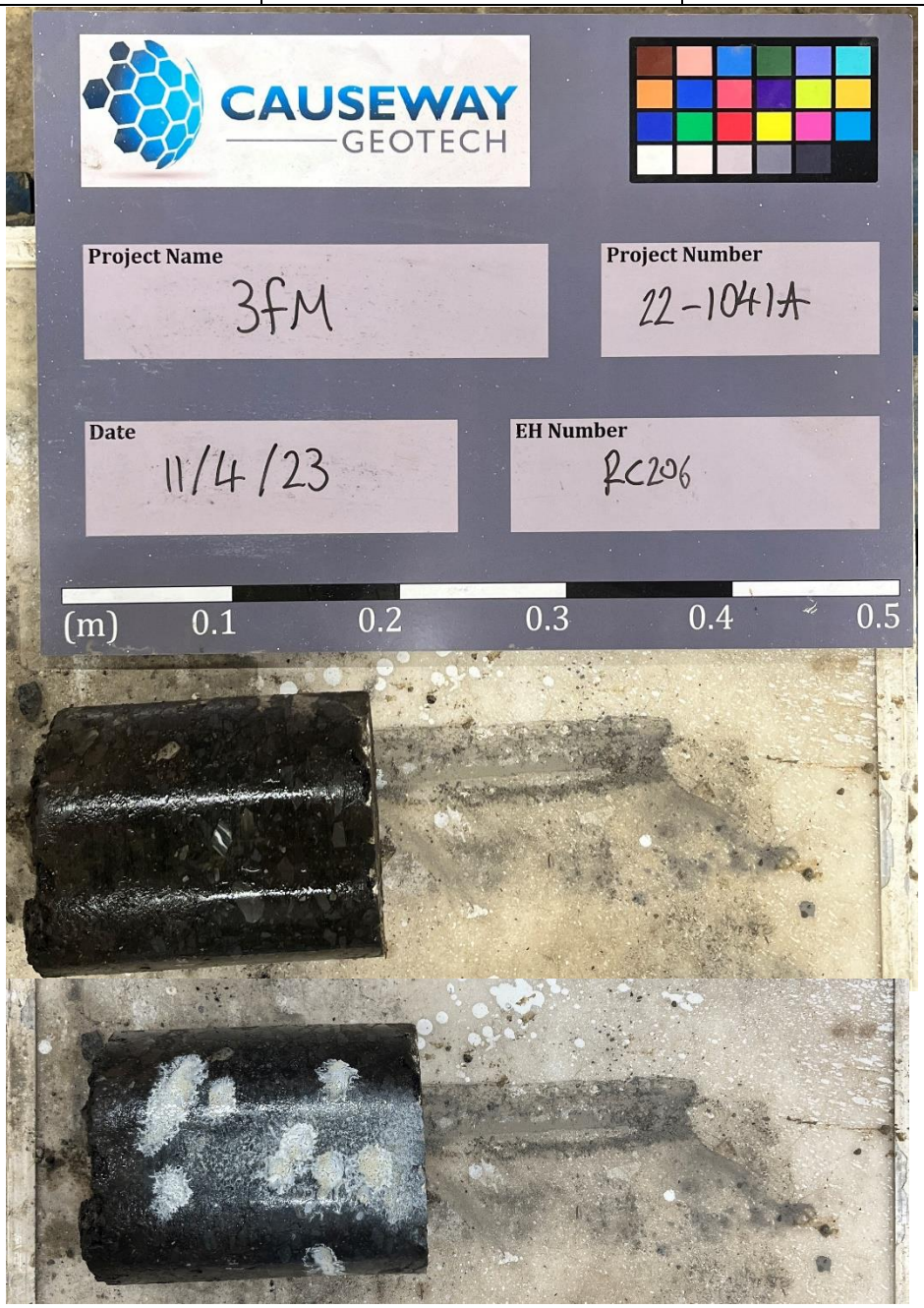
Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.105	105	Strong dark grey BITMAC. 60-70% aggregate of subangular to subrounded fine to medium gravel. No small voids.	Faint Yellow

RC205		
Easting	**Northing**	**Elevation**
719778.91	733713.77	4.21mOD



Layer	Depth	Thickness (mm)	Description	PAK Spray 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

RC206		
Easting	**Northing**	**Elevation**
719814.45	733753.69	4.74mOD



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

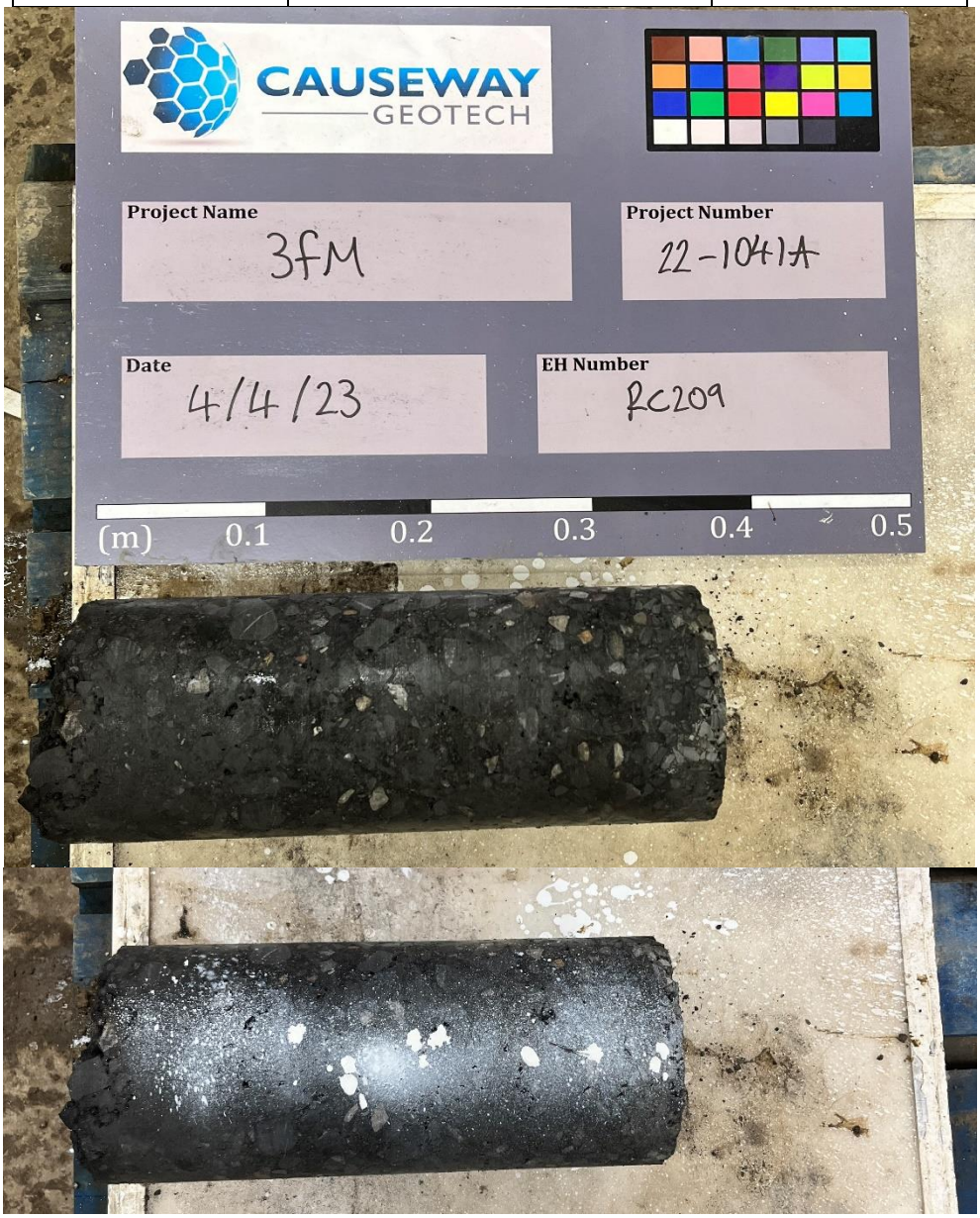
RC207		
Easting	**Northing**	**Elevation**
719759.12	733795.43	3.61mOD

Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.18	180	Strong dark grey BITMAC. 60-70% aggregate of subangular to subrounded fine to medium gravel. 5-10% small voids.	Faint Yellow
2	0.18-0.22	42	Strong dark grey BITMAC. 70-80% aggregate of angular to subangular fine to medium gravel. No small voids.	Faint Yellow
3	0.22-0.25	30	Strong grey BITMAC. 80-90% aggregate of subangular to subrounded fine gravel. No small voids	Faint Yellow
4	0.25-0.28	30	Strong dark grey BITMAC. 60-70% aggregate of subangular to subrounded fine to medium gravel. 5-10% small voids.	Faint Yellow

RC208		
Easting	**Northing**	**Elevation**
719822.32	733781.32	4.71mOD

Layer	Depth	Thickness (mm)	Description	PAK Spray 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

RC209		
Easting	**Northing**	**Elevation**
719905.54	733757.31	3.71mOD



Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.12	120	Strong dark grey BITMAC. 40-50% aggregate of subangular to subrounded fine to coarse gravel. 1-5% small voids	White
2	0.12-0.40	280	Strong black BITMAC. 50-60% aggregate of subangular to subrounded fine to medium gravel. No small voids	White

RC210		
Easting	**Northing**	**Elevation**
719938.80	733760.16	3.66mOD

Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.20	200	Strong dark grey BITMAC. 50-60% aggregate of angular to subangular fine to medium gravel. No small voids	Faint Yellow
2	0.2-0.24	40	Strong black BITMAC. 40-50% aggregate of angular to subangular fine gravel. No small voids	Faint Yellow

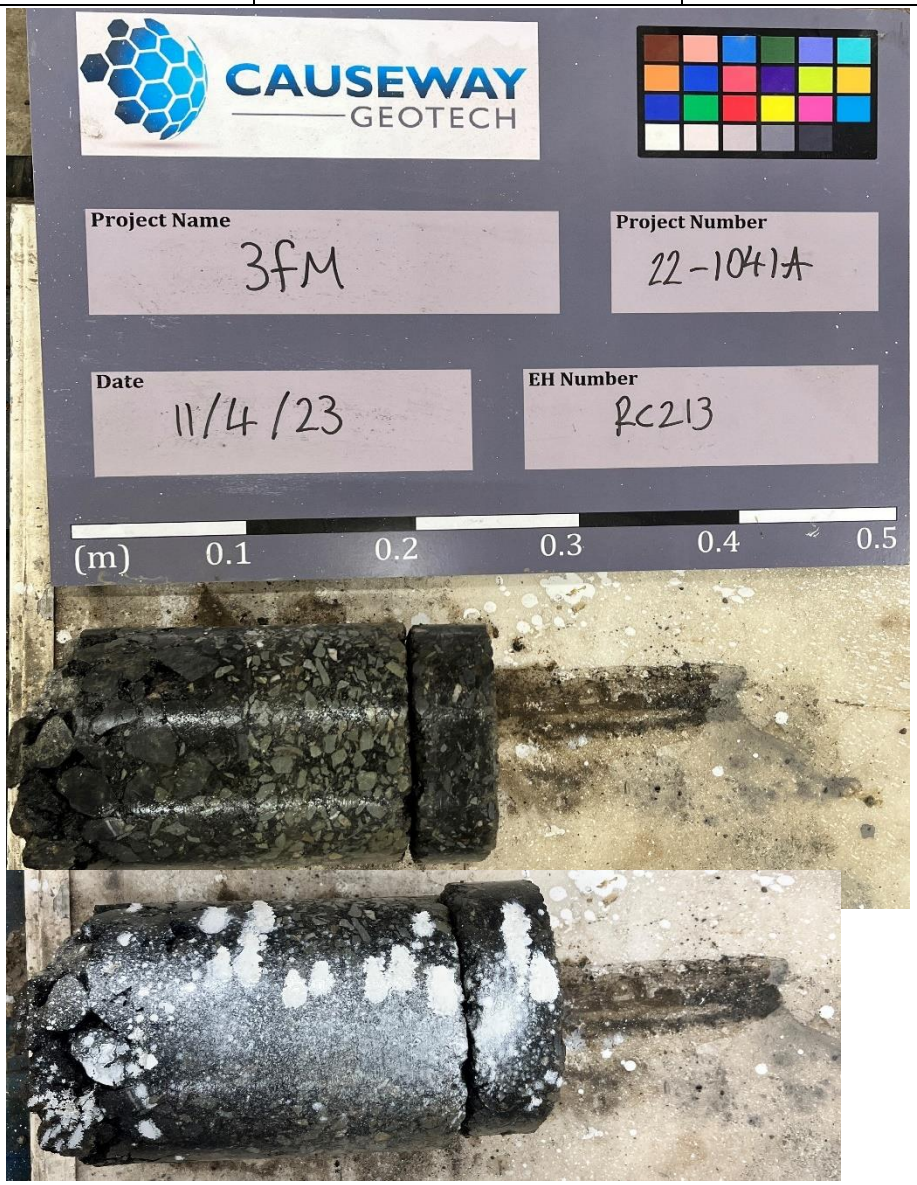
RC211		
Easting	**Northing**	**Elevation**
719996.63	733740.92	3.76mOD

Layer	Depth	Thickness (mm)	Description	PAK Spray 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

RC212		
Easting	**Northing**	**Elevation**
720070.85	733726.06	4.17mOD

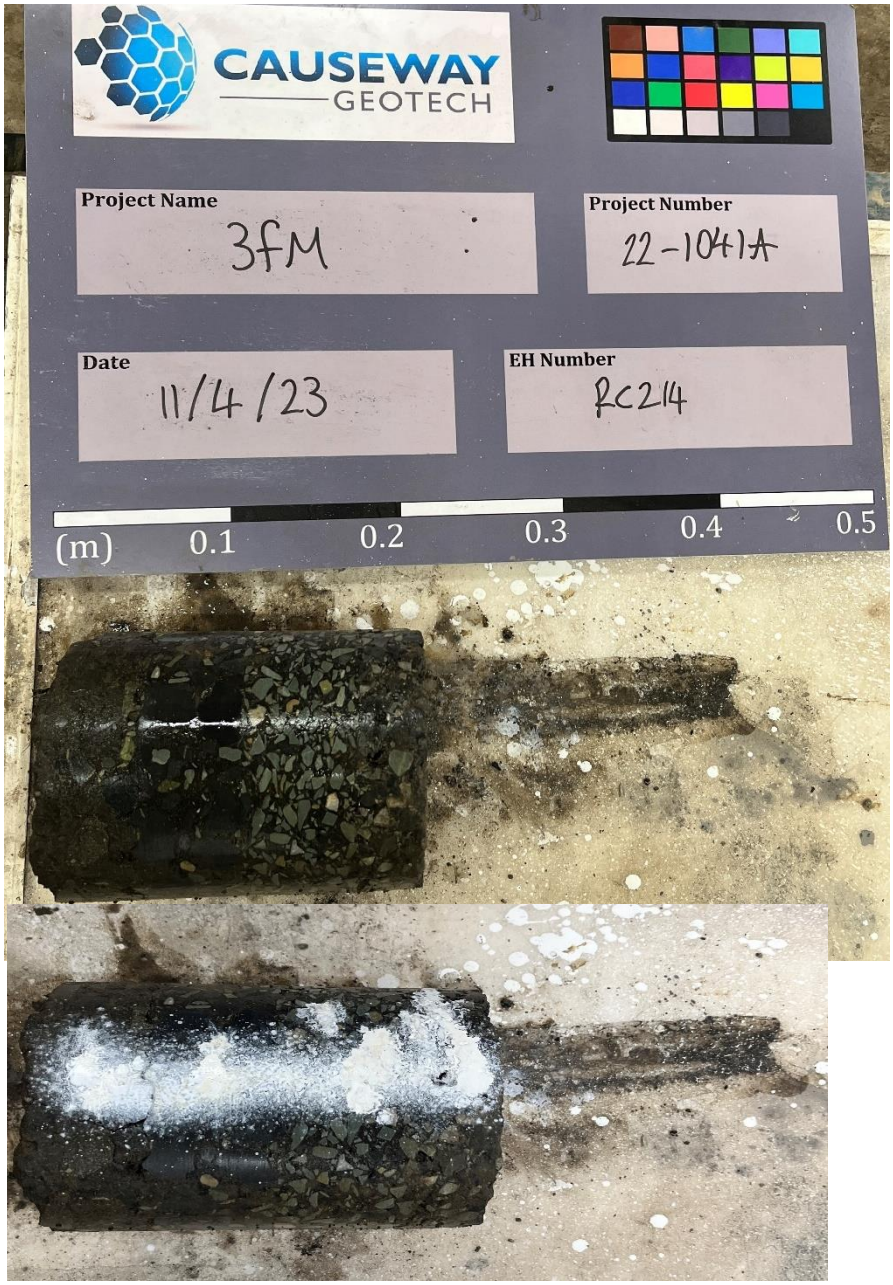
Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.095	95	Strong greyish brown CONCRETE. 60-70% aggregate of subangular to subrounded fine to coarse gravel. 5-10% small voids.	White
2	0.095-0.24	145	Strong light brown CONCRETE. 40-50% aggregate of subangular to subrounded fine gravel. 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

RC213		
Easting	**Northing**	**Elevation**
720252.55	733655.23	3.69mOD



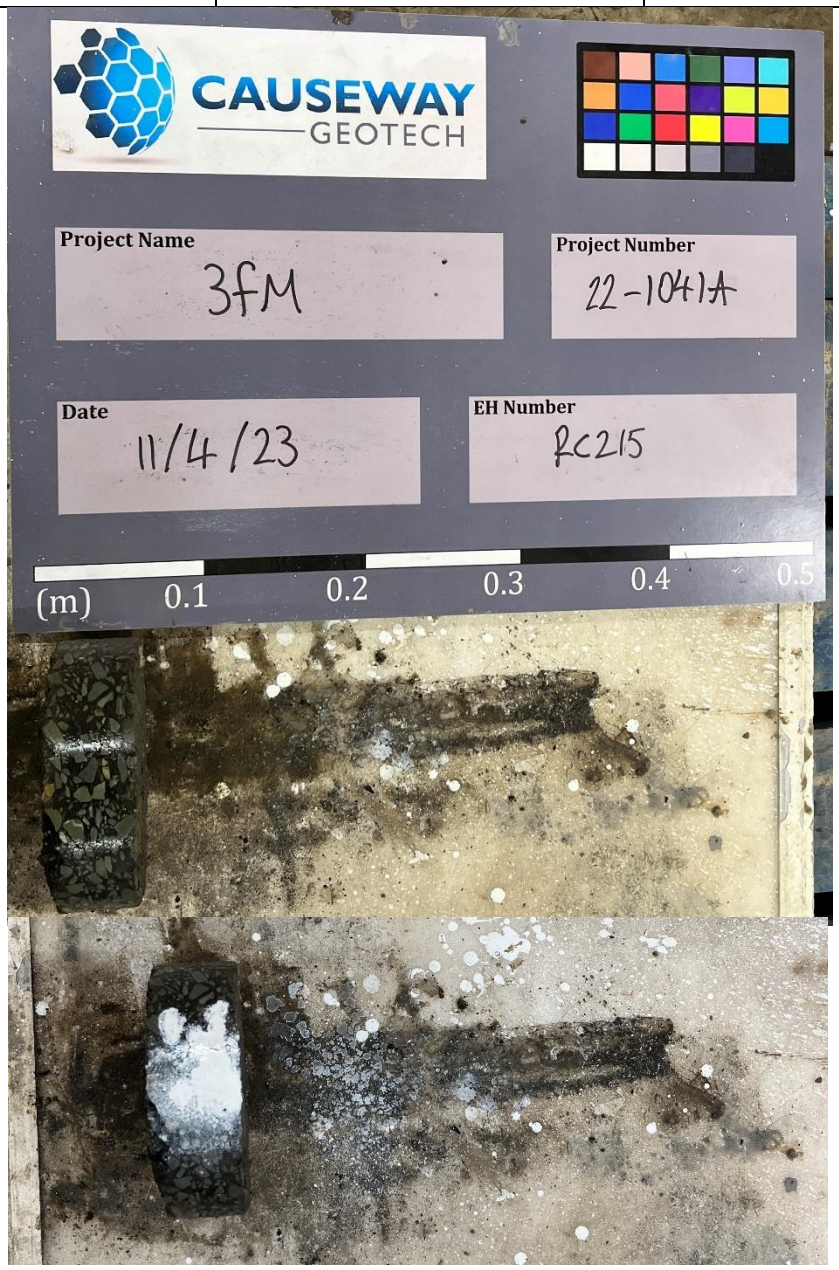
Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.12	120	Strong dark grey BITMAC. 60-70% aggregate of subrounded to rounded fine to coarse gravel. 10-15% small voids.	Faint Yellow
2	0.12-0.21	90	Strong greenish grey BITMAC. 75-85% aggregate of subangular to subrounded fine to medium 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

RC214		
Easting	**Northing**	**Elevation**
720282.25	733636.08	3.66mOD



Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.11	110	Strong dark grey BITMAC. 50-60% aggregate of subrounded to rounded fine to coarse gravel. No small voids.	Faint Yellow
2	0.11-0.21	100	Strong greenish grey BITMAC. 70-80% aggregate of subangular to subrounded fine to medium gravel. 5-10% small voids.	Faint Yellow

RC215		
Easting	**Northing**	**Elevation**
720336.54	733619.47	3.71mOD



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

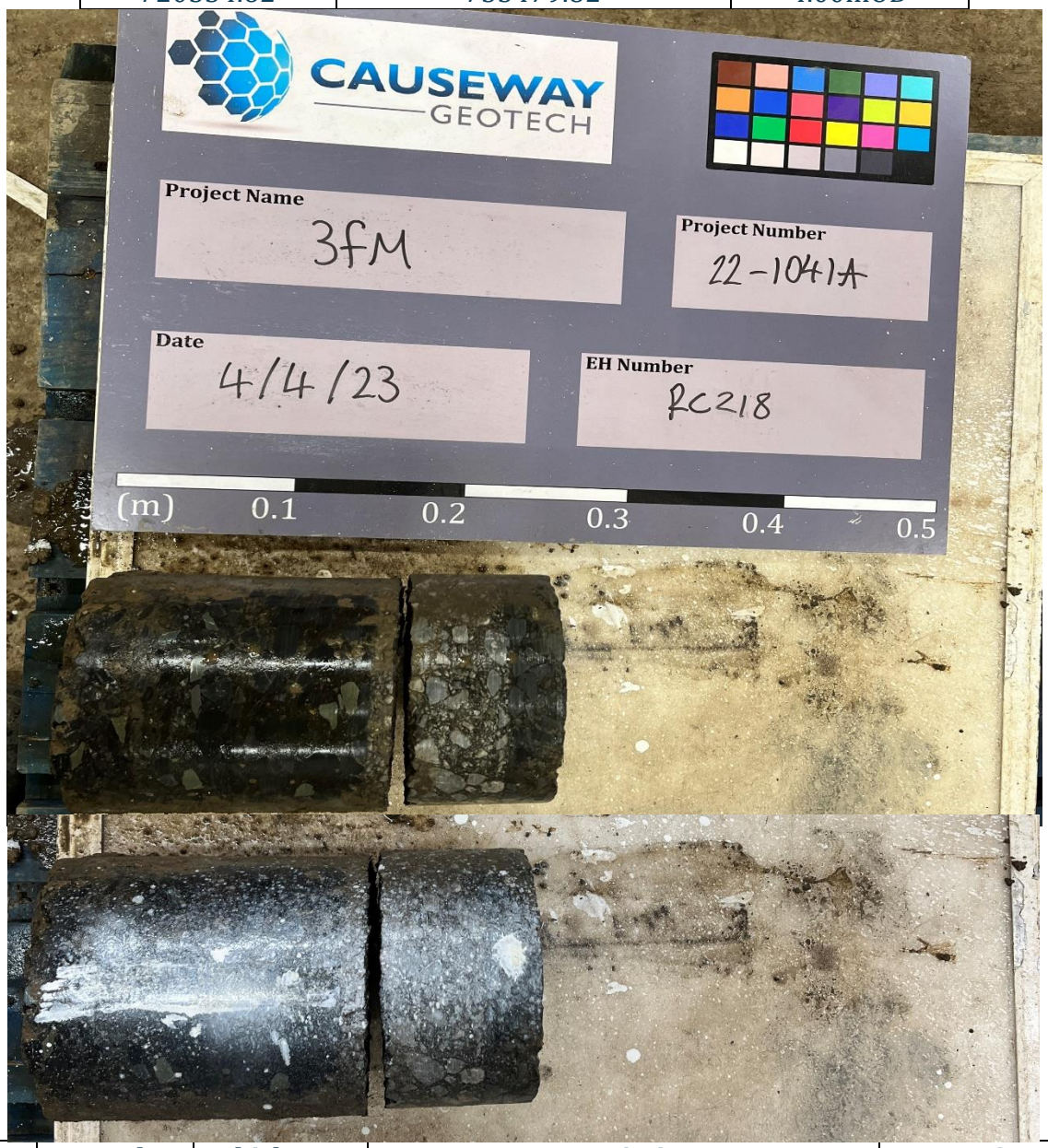
RC216		
Easting	**Northing**	**Elevation**
720372.52	733637.04	3.55mOD

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

RC217		
Easting	**Northing**	**Elevation**
720348.29	733579.95	3.79mOD

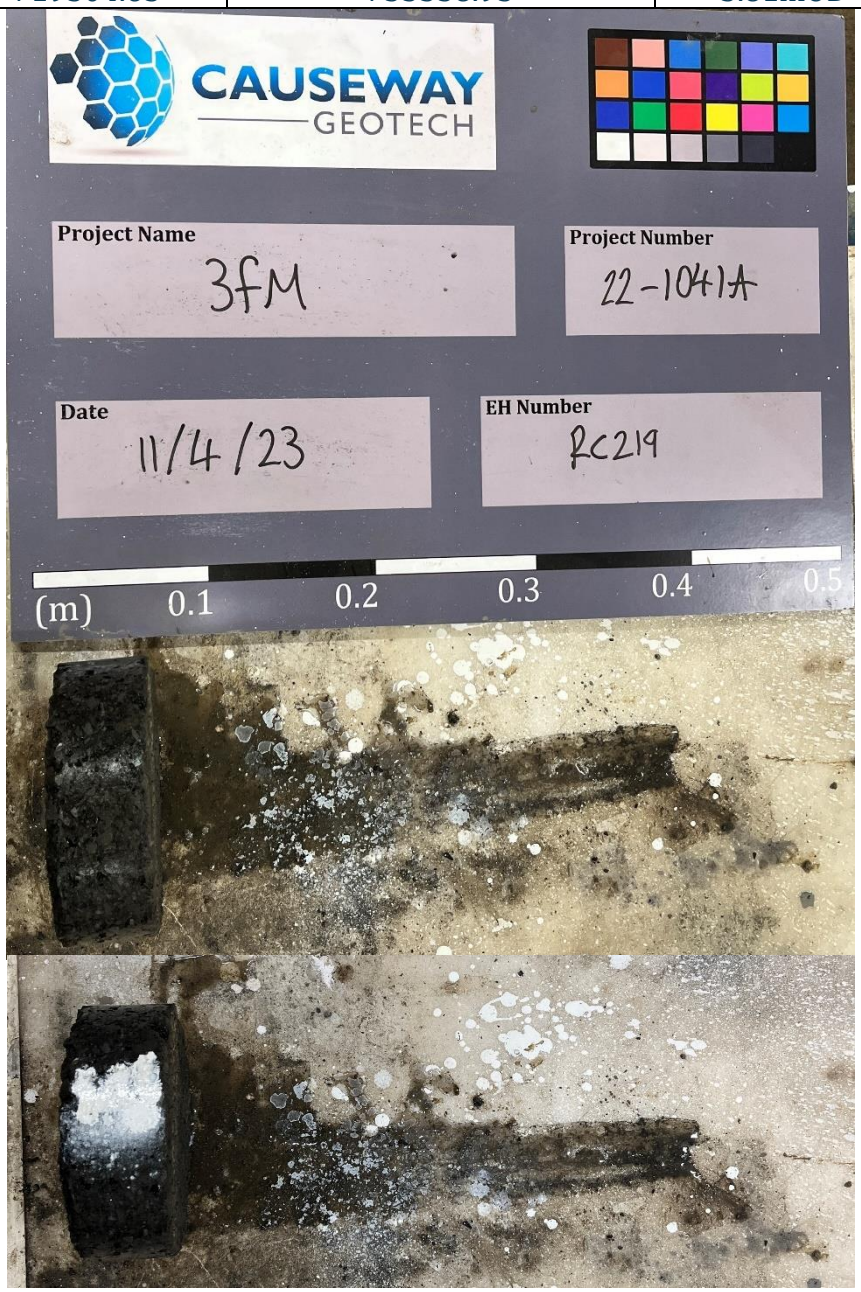
Layer	Depth	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.03	30	Stong black BITMAC. 40-50% aggregate of subangular to subrounded fine to medium gravel. No small voids	White
2	0.03-0.17	140	Strong dark grey BITMAC. 70-80% aggregate of angular to subangular fine gravel. No small voids	White

RC218		
Easting	**Northing**	**Elevation**
720334.62	733479.82	4.00mOD



Layer	Depth (mm)	Thickness (mm)	Description	PAK Spray Discoloration
1	0-0.174	174	Strong black BITMAC. 30-40% aggregate of angular to subangular fine to medium gravel. No small voids	White
2	0.174-0.22	46	Strong grey BITMAC. 70-80% aggregate of subangular to subrounded fine to medium gravel. No small voids	White
3	0.22-0.25	30	Strong dark grey BITMAC. 60-70% aggrgate of subangular to subrounded fine to medium gravel. No small voids.	White

RC219		
Easting	**Northing**	**Elevation**
719304.63	733338.93	3.81mOD



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

RC220		
Easting	**Northing**	**Elevation**
719202.08	733370.74	3.86mOD

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