Whitby Maritime Hub

Geo-Environmental Interpretative Report

FAIRHURST

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APPENDICES

1.0 INTRODUCTION

Fairhurst have been commissioned by Willmott Dixon Construction Ltd (WDC) on behalf of Scarborough Borough Council (SBC) to undertake a ground investigation for the proposed development of a Maritime Training Hub at Endeavour Wharf in Whitby.

The aims of the ground investigation were to obtain geotechnical and environmental information to assist with sub-structure design and confirm the on-site chemical conditions. The ground investigation was also designed to address the potential geotechnical and environmental constraints to the proposed development identified by the Geo-Environmental Desk Study (Ref. 01), prepared by Fairhurst.

This report presents the findings of the ground investigation undertaken on site, comments on the ground, groundwater and gassing conditions, and presents a contamination qualitative risk assessment and conceptual site model. Based on these findings, recommendations are made with regard to remedial works (from a geo-environmental and geotechnical perspective), mitigation measures, and preliminary engineering design considerations.

It is understood that this Geo-Environmental Interpretative Report is to be utilised in support of a planning application for the proposed development.

2.0 LIMITATIONS

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This Geo-Environmental Interpretative Report should be construed as being a Ground Investigation Report (GIR) as defined in BS EN 1997-1 (Ref. 02) and BS EN 1997-2 (Ref. 03). This report is not intended to be and should not be viewed or treated as a Geotechnical Design Report (GDR) as defined in BS EN 1997-1 and BS EN 1997-2. Any design recommendations which are provided are for guidance only and are intended to allow the relevant designer to assess the results and to permit design of the relevant elements of design.

3.0 SOURCES OF INFORMATION

The following information has been considered in the compilation of this report;

Fairhurst Geo-Environmental Desk Study (Ref. 01).

Solmek Limited, Ground Investigation Factual Report (Draft) (Appendix 2a and 2b).

4.0 DEVELOPMENT PROPOSALS

The new Whitby Maritime Hub development comprises a two storey steel structure, approximately 32m x 19m on plan, which will be used primarily for training, but also has several units that are available for private tenants to use for business.

In addition to the main building structure, an external plant and refuse bin store are also proposed along the western boundary.

The planning boundary comprises the entirety of the existing car park at Endeavour Wharf, however not all will be subject to development, and a large portion of the external surfacing and levels are to be retained. The existing harbour master stores and workshops within the south of the site are to be demolished as part of the works. Following demolition and limited resurfacing surrounding the proposed building, the car park lining will be repainted. The extent of the proposed resurfacing works within the development area is detailed within Enjoy Design's Drawing in Appendix 1.

The three main gated access points and the tourist information building located within the south eastern corner are to be retained as part of the development. The existing car park distribution building is to be relocated within the development area.

Soft landscaping is to be limited to 6 No. above ground stainless steel planters located to the south of the proposed building, which will form a barrier between the public car park and the plant and maintenance areas of the building.

5.0 SITE DESCRIPTION AND TOPOGRAPHY

The development site, which has an approximate National Grid Reference NZ 89952 10865, is situated at Endeavour Wharf in the centre of Whitby. The area is currently occupied by an existing car park, comprising hardstanding of concrete and tarmac.

The site is bound to the south west by a café along Langborne Road, which also provided vehicle access, with commercial developments beyond, to the south by a public car park and tourist information shop and to the east and north by the River Esk, including quay walls as part of the wharf.

The 0.90ha site is irregular in shape and is approximately 180m in length and 70m in width. Topographical levels gently slope from north (5.00mOD) to south (3.50mOD).

The site boundary and current conditions, are presented on Enjoy Design's drawing included within Appendix 1.

6.0 SUMMARY OF POTENTIAL CONTAMINATION SOURCES AND GEOTECHNICAL CONSTRAINTS

The following potential contamination sources and geotechnical constraints were identified by the Geo-Environmental Desk Study (Ref. 01).

6.1 On Site Potential Contamination Sources

Variable thicknesses, locally very deep, of heterogeneous made grade associated with the up-filling of the River Esk and subsequent construction and operation of Endeavour Wharf;

Construction, and subsequent demolition, of various buildings, warehouses and sheds;

Historic land uses including; a shipyard, railway sidings and a car park; and,

Gas and/or vapours, associated with made ground, infilled land, alluvial deposits and historic contamination.

6.2 Off Site Potential Contamination Sources

Potential migration onsite of contaminated groundwaters and leachates associated with offsite historic development including; railway land, engine sheds, goods sheds, electrical substations, infilled land, a garage and a bus station.

Migration and accumulation of soil gas and vapours associated with offsite made ground, infilled land and a former gas works.

6.3 Potential Geotechnical Constraints

A significant thickness of heterogeneous made ground, with poor engineering properties, low bearing capacity and high compressibility.

The presence of thick alluvial deposits, with low bearing capacity and high and variable compressibility, providing poor near surface conditions for foundations, roads and hardstanding.

A moderate risk of unexploded ordinance beneath the site.

The potential presence of soils and groundwater containing elevated pH, sulphates and chlorides with the potential for attack on buried concrete.

The presence of existing below ground structures associated with Endeavour Wharf, including; quay walls, tie rods, anchor piles and relieving slabs. Future maintenance or replacement of these features may be required and is to be considered during detailed design.

The known presence of extensive relic foundations, floor slabs and service runs, or the like, which could prove an obstruction to proposed foundations and services, and act as hard spots, requiring consideration in the structural designs, pre-auguring or removal.

Shallow, tidally influenced groundwaters, in the made ground and alluvial deposits.

The potential requirement to remove surplus hardstanding off site, should it not be possible to overlay it or re-incorporate crushed materials within the proposed development.

The requirement to remove asphalt/ tarmac hardstanding off site should it not be possible to overlay it in proposed hardstanding areas or the coal tar content determine it too high for reuse.

The requirement to remove surplus Made Ground and superficial deposits generated by the development off site, should it not be possible to re-incorporate them due to the requirement to tie in to existing levels at the boundary.

The presence of existing services potentially requiring diversion, decommissioning or protection should they be retained.

The potential presence of invasive species.

6.4 Recommendations

The following recommendations were provided within Fairhurst's Geo-Environmental Desk Study Report (Ref. 01):

Site investigation to confirm the geotechnical and chemical characteristics of the underlying made ground, superficial deposits, solid geology and groundwater regime.

A botanical survey to establish the location and extend of Japanese Knotweed onsite (and any other invasive species), and treatment/ removal of any identified species by a specialist.

Tracing and mapping of existing site services, including confirmation of the requirements for diversion, decommissioning or protection, and any easements or access for maintenance.

Structural survey of the existing quay walls associated with Endeavour Wharf to confirm their ongoing integrity.

Physical tracing of quay wall tie rods, anchor piles and relieving slabs to facilitate detailed design of the development layout, along with consideration of future maintenance requirements.

7.0 DESIGN OF GROUND INVESTIGATION

7.1 Investigation Objectives

In order to address recommendations presented in the Desk Study (Ref. 01), a ground investigation was designed by Fairhurst. The objectives of the ground investigation were to provide geotechnical and geo-environmental information for the proposed development for detailed design and planning purposes and to target the environmental and geotechnical issues listed in Section 6.0.

Specifically, there was a need to assess the current state of the site in relation to;

Environmental Considerations

Confirm the nature, putrescible content and chemical characteristics of the made ground, superficial deposits and groundwaters;

Confirm the potential for soil gas and vapour emissions associated with made ground, superficial deposits, infilled land and contamination, potentially underlying or migrating onto the site.

Geotechnical Considerations

Confirm the extent, thickness and material properties of hardstanding, made ground, superficial deposits and underlying bedrock geology present at the site;

Confirm the bearing characteristics of Made Ground and superficial deposits and bedrock, for foundation and hardstanding design, including in-situ Plate Load Bearing Tests;

Confirm the depth, thickness and composition of the relic concrete floor slab (and other relic structures, as encountered) left in place in the west of the site, along with the presence of any underlying contamination;

Determine the pH, sulphate and chloride content of the made ground, superficial deposits and groundwater for concrete design; and

Confirm the groundwater regime underlying the site.

7.2 Ground Investigation Design

The ground investigation was designed generally in accordance with BS5930:2015+A1:2020 Code of Practice for Site Investigations (Ref. 04), BS10175 Investigation of Potentially Contaminated Sites (Ref. 05) and Eurocode 7 (EN 1997-2) (Ref. 03).

7.3 Ground Investigation Works Undertaken

The ground investigation works were undertaken in two phases by Solmek Ltd, commencing on the 13th March and 16th October 2023 respectively. All site works were completed by the 26th October 2023. The works comprised the following;

Phase 1

4 No. window samples boreholes (WS101, WS102, WS104 and WS105) to a maximum depth of 6.45mbgl;

In-situ testing within the boreholes, including standard penetration tests;

Installation of gas and groundwater monitoring stand pipes; and

A programme of chemical and geotechnical sampling and laboratory analysis.

Phase 2

6 No. cable percussion boreholes (BH101-BH104, BH104A and BH105) to a maximum depth of 18.45mbgl;

4 No. rotary follow on holes (BH101-BH103 and BH105) to a maximum depth of 28.50mbgl;

5 No. plate load tests (PLT101-PLT105) undertaken at depths between 0.25mbgl and 0.70mbgl;

In-situ testing within the cable percussion boreholes, including standard penetration tests;

Installation of gas and groundwater monitoring stand pipes; and

A programme of chemical and geotechnical sampling and laboratory analysis.

Post Site Works

A programme of groundwater and ground gas monitoring comprising 6 No. post site works visits over a period of three months, of which four have been undertaken.

The exploratory hole locations are shown on Fairhurst Drawing No. 152982/9001 included in Appendix 1.

Supplementary site investigation to confirm the location of the anchor piles and tie rods associated with the quay walls along the north and eastern site boundaries was undertaken by a third party contractor concurrently with the Phase 1 works (Ref. 06). This trial pit investigation confirmed the exclusion zone for the quay wall and associated sensitive structures, in order for the building footprint to be finalised.

7.4 Ground Investigation Constraints

The following constraints were encountered during the ground investigation works:

The site comprises an existing car park and although this was closed during both phases of site investigation, cars were parked within the working areas and positions were relocated where required to protect private property.

A structure to the quay walls along the eastern and northern site boundaries includes anchor piles and tie rods which required protection during the site works. As such a 24m exclusion

zone from the quay wall was established and all exploratory hole positions were located outwith this zone.

WS103 was proposed adjacent to a pedestrian footpath and access road which it was later determined needed to remain in operation and accessible to the public. No alternative location could be agreed for WS103 to be completed within the site boundary resulting in it being abandoned.

The proposed building footprint was revised following completion of the Phase 2 works (boreholes), as such some positions (BH101) are now located at a greater distance from the proposed building footprint than was originally intended.

BH104 and BH104A were terminated due to obstructions within the made ground at shallow depth which prevented progress to the intended investigation depth. Although attempts were made to relocate this position, space was limited and it was decided that this position would not be redrilled at this time.

Existing utilities and services, were recorded to be extensively present. Exploratory positions were moved where required to avoid these.

7.5 Stratigraphic Descriptions

Descriptions of the strata encountered during the ground investigation within each exploratory hole are presented in Appendix 2a. Stratigraphic descriptions were specified to be to BS5930:2015 (Ref. 04) and BS EN ISO 14688:2018 (Ref. 07), as appropriate.

7.6 In-situ Testing

Standard penetration tests (SPTs) were carried out in the boreholes to provide an indication on the relative density of the granular soils encountered, and the undrained shear strength of the cohesive soils. SPT tests were specified to be undertaken in accordance with BS EN ISO 22476-3 2005 + A1 2011 (Ref. 08).

7.7 Chemical Laboratory Testing

Chemical analysis was undertaken on samples collected as part of the site investigation works to assess the chemical condition of the soils and groundwaters. The scheduled testing is summarised in Table 1.

Table 1: Summary of chemical laboratory testing

Laboratory Test	No. of Samples Tested		
	Made Ground	Natura Superficial Deposits	Total
Soils: General Suite: Heavy metals (antimony, arsenic, barium, beryllium, boron, cadmium, chromium (IV and total), copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, vanadium and zinc), inorganics (including; ammonia, cyanide (free, complex and total) and thiocyanate)	12	4	16
Soils: pH and Water Soluble Sulphate	14	11	25
Soils: Speciated TPH, Speciated PAH and Phenol	12	4	16

Laboratory Test	No. of Samples Tested		
	Made Ground	Natura Superficial Deposits	Total
Soils: BTEX and MTBE	5	-	5
Soils: PCBs	3	-	3
Asbestos Screen (Quantification)	11 (2)	1 (-)	12 (2)
Calorific Value	4	-	4
Waste Acceptance Criteria (WAC)	7	-	7
Leachates Suite: Heavy metals, inorganics, hydrocarbons (TPH / PAH / phenol)	10	1	11
Leachates: BTEX and MTBE	3	-	3
Leachates: PCBs	2	-	2
Waters General Suite: Heavy metals, inorganics, hydrocarbons ((TPH / PAH / phenol) and water hardness	-	-	5
Waters: BTEX, MTBE and PCBs	-	-	3

7.8 Geotechnical Laboratory Testing

Geotechnical testing was undertaken on samples collected as part of the site investigation works to determine the material properties of the soils and provide preliminary geotechnical design information. The scheduled testing is summarised in Tables 2 (soils) and 3 (rock).

Table 2: Summary of geotechnical laboratory testing (soils)

Laboratory Test	No. of Samples Tested			
	Made Ground	Alluvial Deposits	Glacial Deposits	Total
Moisture Content	5	10	1	16
Atterberg Limits	5	10	1	16
Particle Size Distribution - wet sieving and sedimentation by hydrometer	4	5	3	12
Undrained Triaxial Shear Strength	1	3	-	4
One Dimensional Consolidation	1	3	-	4
California Bearing Ratio (re-moulded)	2	-	-	2

Table 3: Summary of geotechnical laboratory testing (rock)

Laboratory Test	Samples Tested		
	Mudstone	Sandstone	Siltstone
pH and Water Soluble Sulphate	4	-	1
Natural Water Content	4	-	1
Uniaxial Compressive Strength	6	-	1
Point Load Strength Index (axial and diametral)	8	1	3

7.9 Monitoring Works Undertaken

Gas and groundwater monitoring standpipes were installed within eight of the exploratory boreholes during the ground investigation. Details of the monitoring response zones are summarised within Table 4.

Table 4: Summary of monitoring response zones

Borehole	Response Zone (mbgl)	Response Zone (mOD)	Strata
BH101	7.00 – 12.30	-3.56 to -8.86	Alluvial Silt
BH102	12.00 – 17.00	-8.29 to -13.29	Glacial Sand/ Gravel
BH103	7.90 – 12.40	-4.52 to -9.02	Alluvial Silt
BH105	7.10 – 8.70	-3.42 to -5.02	Alluvial Peat
WS101	1.20 – 3.70	2.30 to -0.20	Made Ground (granular)
WS102*	3.60 – 5.00	-0.23 to -1.63	Alluvial Sand
WS104	1.20 – 3.00	2.40 to 0.60	Made Ground (cohesive)
WS105	1.20 – 2.50	2.52 to 1.22	Made Ground (cohesive)

*Installation destroyed post site works

At the time of reporting, the standpipes have been monitored on four occasions post site works between 20th November and 8th January 2024. Gas monitoring has included the recording of methane, carbon dioxide, oxygen, carbon monoxide, hydrogen sulphide and volatile vapours together with gas flow rate and atmospheric pressure.

The results of the gas and groundwater monitoring undertaken to date are presented in Appendix 2a and 2b.

All findings in relation to the groundwater regime and gas profile at the site are preliminary and subject to confirmation upon completion of the outstanding monitoring works.

8.0 QUALITY ASSURANCE AND QUALITY CONTROL

8.1 General

The quality assurance and control requirements for the ground investigation were prepared by Fairhurst.

8.2 Responsibilities

Solmek Ltd. were responsible for overall implementation and monitoring of the quality assurance during sampling, field investigations and laboratory analysis.

8.3 Laboratory Testing

The geotechnical testing of soil samples was undertaken by a UKAS accredited laboratory and in accordance with BS1377:1990 (Ref. 09). The chemical testing was undertaken by an UKAS / MCERTS accredited laboratory.

9.0 GROUND CONDITIONS

The results of the ground investigation indicate the following general sequence of strata beneath the site;

Hardstanding, typically either asphalt or concrete.

Made ground, typically comprising granular and/ or localised cohesive deposits.

Alluvial deposits typically comprising soft silts and clays, interbedded with peat and loose sand and gravel.

Glacial deposits comprising stiff clays interbedded with dense gravel and cobbles.

Solid geology comprising interbedded mudstone, siltstone and sandstone.

Details of each of the stratum encountered are discussed in more detail in the following sections.

9.1 Hardstanding

Hardstanding comprising reinforced concrete associated with the existing car park was recorded within the eastern half of the site in all exploratory positions to a depth of up to 0.4mbgl and was underlain by sub-base to 0.60mbgl.

Asphalt was recorded locally within the western site extents (BH102, BH105, WS105, PLT01 and PLT04) from ground level to depths between 0.17mbgl and to 0.30mbgl (3.42mOD and 3.54mOD) Hardstanding within this area of the site is inferred to be associated with a former warehouse floor slab which was subsequently overlain by car parking. Locally deeper concrete was recorded underlying the asphalt from depths between 0.20mbgl and 0.30mbgl (3.42mOD to 3.48mOD) to depths between 0.68mbgl and 0.75mbgl (2.97mOD to 3.00mOD) within BH105 and WS105.

9.2 General Made Ground

Granular Made Ground

The hardstanding is underlain predominantly by granular made ground comprising slightly sandy gravel from depths between 0.22mbgl and 0.75mbgl (3.33mOD to 0.44mOD) to depths between 0.60mbgl and 3.70mbgl (3.00mOD to -0.32mOD). Sand is fine to coarse with ash. Gravel is fine to coarse, angular to sub-angular of brick, sandstone, chalk, limestone, mudstone and occasional ceramic, coal, glass and metal noted with a low cobble content of angular brick also noted. Locally within BH104 the granular made ground comprised cobbles and boulders of angular hard chalk.

Cohesive Made Ground

Cohesive made ground was locally recorded underlying the hardstanding (WS105, 0.75mbgl to 3.50mbgl), interbedded within the granular made ground (WS102, 1.50mbgl to 2.00mbgl) or underlying the granular made ground (BH101, BH105 and WS104) and proven to depths between 3.40mbgl and 4.30mbgl (0.28mOD to -0.86mOD).

The cohesive made ground was recorded to comprise: soft slightly sandy gravelly silt (BH101), soft slightly sandy slightly gravelly silty clay (BH105) or soft sandy slightly gravelly clay (WS102, WS104 and WS105), with a moderate cobble content, locally very cobbly.

Sand is fine to coarse with ash. Gravel is fine to coarse, angular to sub-angular of sandstone, limestone, mudstone, brick, glass, coal and metal. Cobbles and boulders are noted and are angular to sub-angular of sandstone, brick, concrete and occasionally chalk.

9.3 Alluvial Deposits

Natural alluvial deposits were recorded, underlying the made ground, to a maximum depth of 15.50mbgl. The alluvium was recorded to comprise soft silts and clays, very loose to medium dense sands and gravels and peat.

Alluvial Sand and Gravel

Alluvial sands and gravels were recorded in all exploratory positions (with the exception of BH101, BH103 and WS104) and described as very clayey sand or sandy gravel. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of sandstone and mudstone. Occasional cobbles were noted.

The alluvial sands and gravels were recorded from depths between 3.30mbgl and 4.90mbgl (0.41mOD and -1.22mOD) to depths between 4.25mbgl and 7.10mbgl (-0.53mOD and -3.42mOD). Locally deeper bands of alluvial sands and gravels were recorded in BH102 and BH105 at depths of 12.00mbgl to 12.50mbgl (-8.29mOD to -8.79mOD) and 12.00mbgl to 13.30mbgl (-8.32mOD to -9.62mOD) respectively,

The base of the sands and gravels was not proven within the window samples.

Alluvial Silt

Alluvial silt was locally recorded to underlie the made ground within BH101 and BH103, proven to depths between 12.30mbgl and 12.40mbgl (-8.86mOD and -9.02mOD). The silts are recorded as soft, sandy or clayey low strength silt of low to intermediate plasticity. Sand present is medium spaced, beds of grey fine to coarse sand. Locally within the deeper deposits, frequent plant matter was noted (BH103).

In addition, a band of soft silt was recorded within BH105, underlying the granular alluvium between 13.30mbgl and 15.50mbgl (-9.62mOD to -11.82mOD).

Peat

Peat deposits were locally recorded within BH102 and BH105 underlying the granular alluvial deposits. The peat was recorded to be organic rich with some intact plant matter noted. Peat was recorded from 7.10mbgl (-3.39 to -3.42mOD) to depths between 8.70mbgl and 8.90mbgl (-5.02mOD and -5.19mOD).

Alluvial Clay

Soft alluvial silty clay was locally recorded within BH102 and BH105 from 8.90mbgl to 12.00mbgl (-8.29mOD to -5.19mOD) and 8.70mbgl to 12.00mbgl (-5.02mOD to -8.32mOD) respectively, bands of peat were noted within the clay.

9.4 Glacial Deposits

Glacial deposits were recorded to underlie the alluvium in each of the deep boreholes (BH101-BH103 and BH105).

Gravels and Cobbles

Dense gravel was recorded within BH101, BH102 and BH105, underlying the alluvium, proven to depths between 17.00mbgl and 17.20mbgl (-13.29mOD to -13.76mOD). The gravel within BH101 was interbedded with clay.

The gravel was described to be of limestone and sandstone with cobbles and boulders noted.

Dense slightly sandy gravelly cobbles, of mudstone and sandstone, were recorded within BH103 between 12.40mbgl and 17.40mbgl (-9.02mOD to -14.02mOD).

Clay

Glacial clays were locally recorded within BH101 (interbedded with the gravel) and BH102 (underlying the gravel). The deposits were present from 14.20mbgl to 16.40mbgl (-8.86mOD to -12.96mOD) in BH101 and 17.00mbgl to 17.70mbgl (-13.29mOD to -13.99mOD) in BH102.

The glacial clay was described as stiff slightly sandy slightly gravelly clay, with cobbles and boulders noted within BH102.

9.5 Solid Geology

Solid geology comprising interbedded mudstone, siltstone and occasional sandstone was recorded within the deep boreholes, underlying the glacial deposits from depths between 17.20mbgl and 17.70mbgl (-13.52mOD and -20.62mOD), proven to a maximum recorded depth of 28.50mbgl (-24.79mOD and -25.12mAOD) (BH101 – BH103 and BH105) where the boreholes were terminated.

The bedrock was weathered / very soft, becoming soft with depth.

9.6 Visual / Olfactory Evidence of Contamination

The following visual or olfactory evidence of potential contamination was observed during the intrusive ground investigation:

BH101: Hydrocarbon sheen noted in the cohesive made ground at 3.10mbgl.

WS101: Slight sulphurous odour noted in the alluvial sand between 3.70mbgl and 4.00mbgl.

WS102: Slight sulphurous odour noted in the alluvial sand between 3.60mbgl and 4.00mbgl.

WS105: Slight sulphurous odour noted in the alluvial sand between 3.70mbgl and 4.00mbgl.

9.7 Relic Foundations and Obstructions

The site contains significant relic foundations throughout, including a reinforced concrete slab associated with a former warehouse within the western half of the site. As such, all exploratory hole positions were cored prior to commencement of the hand dug inspection pits.

BH104 and BH104A encountered obstructions at shallow depth and the position could not be accommodated. BH104A encountered a metallic obstruction which was reported as potentially associated within the anchor pile, however this position is located outwith the exclusion zone for the quay wall. It is recommended that further intrusive investigation in the form of trial pitting is undertaken prior to development in this area to confirm that the features noted in this area do not relate to the quay walls or wharf sub-structure.

10.0 GROUNDWATER CONDITIONS

The groundwater strikes recorded during the site works are summarised in Table 5:

Table 5: Summary of groundwater recorded during site works

Ref	Level (level after 20 mins)		Strata
	mbgl	mOD	
BH101	3.10 (2.95)	0.34 (0.49)	Alluvial Silt
	12.40 (6.10)	-8.96 (-2.66)	Glacial Sand/Gravel
BH102	2.60 (2.40)	1.11 (1.31)	Alluvial Silt
	12.40 (8.20)	-8.69 (-4.49)	Alluvial Peat
BH103	2.90 (2.40)	0.48 (0.98)	Made Ground (granular)
	12.10 (7.30)	-8.72 (-3.92)	Alluvial Sand
BH104	3.40 (no change)	0.05 (no change)	Made Ground (cohesive)
BH105	12.00 (7.90)	-8.32 (-4.22)	Made Ground (cohesive)
WS102	Damp at 3.00	0.37	Made Ground (granular)

At the time of reporting, the standpipes installed during the ground investigation have been monitored on four occasions between 20th November and 8th January 2024. A further 2 No. monitoring visits are scheduled to be undertaken.

The monitoring undertaken to date is summarised in Table 6.

Table 6: Summary of groundwater recorded during monitoring

Ref	Level		Response Zone
	mbgl	mOD	
BH101	1.28 – 3.07	0.37 - 2.16	Alluvial Silt
BH102	1.79 – 1.86	1.85 – 1.92	Glacial Sand/ Gravel
BH103	1.23 – 1.54	1.84 – 2.15	Alluvial Silt
BH105	0.99 - 2.10	1.58 – 2.69	Alluvial Peat

Ref	Level		Response Zone
	mbgl	mOD	
WS101	2.20 – 2.30	1.20 – 1.30	Made Ground (Granular)
WS102	-		-
WS104	1.28 – 2.60	1.00 – 2.32	Made Ground (cohesive)
WS105	2.00 – 2.05	1.67 – 1.72	Made Ground (cohesive)

*Installation removed/destroyed post site works

The groundwater monitoring results are presented in full in Appendix 2a and 2b.

Based on observations during the site works and groundwater monitoring undertaken to date, the following preliminary groundwater regime is anticipated;

Isolated perched groundwater within granular lenses in the made ground and granular alluvial / glacial deposits.

A groundwater table within the Made Ground and alluvial deposits, assessed as likely to be in hydraulic continuity and tidally influenced by the River Esk.

A main groundwater table at depth within the Cloughton Formation (sandstone, siltstone, mudstone), however this was not proven during the intrusive site investigation works.

All assertions as to the groundwater regime should be confirmed following completion of the monitoring programme.

Seasonal fluctuation of the shallow perched groundwater table cannot be discounted, with tidal fluctuations expected in the made ground / superficial groundwater body.

The Desk Study (Ref. 01) indicates the superficial deposits across the site classify as a Secondary A Aquifer. The underlying bedrock of the Cloughton Formation classifies as a Secondary A Aquifer of medium groundwater vulnerability.

11.0 SOIL GAS AND VAPOURS

The results of the ground investigation indicate the ground conditions to comprise of made ground to a maximum proven depth of 4.30mbgl, underlain by alluvium and peat deposits to a maximum proven depth of 15.50mbgl, where glacial deposits are present.

There was no visual or olfactory evidence of contamination or putrescible materials recorded during the site investigation works.

The site is considered to present a moderate risk in terms of a “gas generation potential of source” in accordance with CIRIA C665 (Ref. 10). On this basis, and in view of the low sensitivity of the development (commercial), 6 No. gas monitoring visits were scheduled to be undertaken over a minimum period of three months.

8 No. gas and groundwater monitoring standpipes were installed within the exploratory holes on site, with 4 No. response zones in the made ground (WS101, WS102, WS104 and WS105) and 4 No. in the natural superficial deposits (BH101, BH102, BH103, BH105). WS102 was destroyed after the site works as such no monitoring has taken place at this position.

At the time of reporting, the standpipes installed during the ground investigation have been monitored on four occasions between 20th November and 8th January 2024, post site works. A further 2 No. monitoring visits are scheduled to be undertaken.

The results of the gas and vapour monitoring are presented in Appendix 2a and 2b and summarised in Table 7:

Table 7: Summary of post site works gas monitoring

Carbon Dioxide, CO_2 (%v/v)	Methane, CH_4 (%v/v)	Oxygen, O_2 (%v/v)	Flow Rate (l/hr)	Volatile Vapours (ppm)	Hydrogen Sulphide, H_2S (ppm)	Carbon Monoxide, CO (ppm)	Atmospheric Pressure (mb)	Maximum Gas Screening Value (GSV)*	
								CO_2	CH_4
<0.1 to 4.90	<0.1 to 24.50	1.60 to 20.40	0.10**	0.00 – 1.00	0.00	0.00	999 to 1038	0.0049	0.0245

*Gas Screening Value, as defined by CIRA C665 (Ref. 10), based upon maximum carbon dioxide / methane concentration and positive flow rate.

**No flow rate was detected therefore detection limit of monitoring equipment has been used as worst case.

Based upon a maximum flow rate of 0.1l/hr, these readings give a Gas Screening Value of 0.0049 for carbon dioxide and 0.0245 for methane and the site is indicated as a Gas Characteristic Situation 1 (Very Low Risk) in accordance with CIRIA C665 (Ref. 10) and BS8485 (Ref. 11). However, as carbon dioxide concentrations approaching 5% were recorded, methane has been recorded over 1% (maximum 24.50%), and depleted oxygen is as low as 1.60%, it is considered that a preliminary classification of Gas Characteristic Situation 2 (Low Risk) is appropriate for the development.

The findings in relation to the gas conditions and the Gas Characteristic Situation at the site are preliminary and subject to confirmation upon completion of the remaining monitoring visits.

On the basis of the findings to date, gas protection measures are anticipated to be required and should be designed, installed and validated by a Specialist Gas Protection System Contractor with the proposed measures and validation procedures agreed with the Local Authority prior to installation. For the avoidance of doubt, Fairhurst do not offer these services.

A site specific Radon Report was procured as part of the Phase 1 Desk Study (Ref. 01) which confirmed that no radon protection measures are required within the proposed development. Requirements in this regard, however, should be confirmed with the Local Planning Authority / Regulator.

12.0 GEOTECHNICAL PROPERTIES

In-situ and laboratory geotechnical testing was undertaken as part of the ground investigation. The geotechnical soil properties for each of the stratum encountered are detailed in the following section.

12.1 Granular Made Ground

Particle Size Distribution

The results of 4 No. particle size distribution tests undertaken on the granular made ground indicate the material to comprise the following particle composition:

Table 8: Summary of Particle Size Distribution for Granular Made Ground

Particle Size		Percentage Composition			
		BH102 2.00mbgl	BH104 1.20mbgl	WS102 0.40mbgl	WS104 0.40mbgl
Boulders & Cobbles	>60mm	0%	0%	0%	0%
Gravel	60mm to 2mm	51%	33%	51%	74%
Sand	2mm to 0.06mm	34%	28%	30%	17%
Silts	0.06mm to 0.002mm	12%	29%	13%	9%
Clays	<0.002mm	3%	10%	6%	

Based upon the gradings undertaken, the granular made ground sampled has been assessed as a very sandy silty gravel (BH102, WS102 and WS104) or a very silty very sandy gravel (BH104), which generally correlates with the Engineer's field descriptions for the strata.

Standard Penetration Tests (SPTs)

The results of 16 No. SPTs undertaken in the granular made ground at depths between 1.20mbgl and 3.00mbgl determined field N values between 3 and 38 which relate to $N1_{60}$ values between 4 and 50 and indicate very loose to dense conditions.

3 No. tests undertaken within the granular made ground recorded SPT N values of 50, considered likely to be attributable to cobbles present within the material and are therefore discounted from further assessment.

Angle of Shearing Resistance

Based upon a design SPT value of 10 for the granular made ground, and correlation between SPT N values and effective angle of shearing resistance (φ´) (Ref. 13), an angle of shearing resistance value of 30° is considered appropriate for design purposes for the granular made ground.

CBRs

The results of 2 No. plate bearing tests (PLT101 and PLT105) undertaken within the area of proposed resurfacing at respective depths of 0.70mbgl and 0.25mbgl within the granular made ground, gave CBR values of 19% and 11%.

A further 3 No. tests, undertaken outwith the extents of the proposed resurfacing, between depths of 0.30mbgl and 0.60mbgl within the granular made ground, gave CBR values between 12% and 16%.

A further 2 No. laboratory CBR tests undertaken on remoulded samples taken at depths of 0.40mbgl (WS102, within the area of proposed resurfacing and WS104, outwith the area of proposed resurfacing) gave CBR values of 2.6% and 0.5% respectively.

As such a CBR value of 3% is considered appropriate for the granular made ground, subject to confirmatory testing during construction.

pH and Sulphate

The results of 6 No. water soluble sulphate and pH tests undertaken on the granular made ground gave water soluble sulphate contents between 77mg/l and 1,000mg/l with pH values between of 8.2 and 9.6.

Organic Matter

The results of a single organic matter content test undertaken on the granular made ground gave an organic matter content of 1.9%. Based on the limited testing the granular made ground would classify as being low organic in accordance with BS EN ISO 14688-2:2018 (Ref. 07).

12.2 Cohesive Made Ground

Natural Moisture Content

The results of 5 No. natural moisture content tests undertaken on the cohesive made ground gave moisture contents between 16% and 26%.

Atterberg Limits

The results of 5 No. Atterberg Limits tests undertaken on the cohesive made ground gave plastic limits between 19% and 27%, liquid limits between 25% and 38%, and plasticity indices between 6% and 12%.

On the basis of the limited results, the cohesive made ground would be classified as a clay of low to intermediate plasticity.

CBRs

In consideration of the plasticity indices recorded for the cohesive made ground and the guidance provided in Interim Advice Note 73/06 2009 (Ref. 14), a CBR value of 4% can be derived; however, on the basis of the inherent variability of the material, a CBR of 2% is considered to be appropriate for the cohesive made ground, subject to confirmatory testing during construction.

Undrained Shear Strength

The results of a single triaxial test undertaken within the cohesive made ground, at a depth of 3.00mbgl gave an undrained shear strength (c_u) value of 42kN/m^2 indicating medium strength and firm consistency.

The results of 10 No. SPTs undertaken in the cohesive made ground at depths between 1.20mbgl and 4.00mbgl determined field N values between 5 and 28 which correspond to corrected SPT N_{60} values between 5 and 26.

A single test undertaken within the cohesive made ground recorded an SPT N value of 50, considered likely to be attributable to cobbles present within the material and has therefore been discounted from further assessment.

Based upon empirical correlation between SPT N_{60} values, plasticity index and undrained shear strength (c_u) and using an F1 value of 5.0 (Ref. 13), undrained shear strengths (c_u) between 23kN/m^2 and 129kN/m^2 can be derived for the cohesive made ground. These results indicate low to high strengths and soft to stiff consistencies.

Based on consideration of the above, and the visual description of the material, an undrained shear strength of 40kN/m^2 is considered appropriate for use as a design value for the cohesive made ground beneath the proposed building;

Coefficient of Volume Compressibility

The results of a single oedometer consolidation test undertaken on the cohesive made ground at a depth of 3.00mbgl, gave a coefficient of volume compressibility (m_v) value of 0.13 m^2/MN.

Based upon empirical correlation between the SPT N_{60} values, plasticity index and the coefficient of volume compressibility (m_v), and using an F2 value of 0.52 (Ref. 13) based upon the plasticity indices recorded for this material, m_v values between 0.07m^2/MN and 0.42m^2/MN can be derived for the cohesive made ground.

Based upon consideration of the above results, an m_v value of 0.30m^2/MN is considered appropriate for use as a design value for the cohesive made ground beneath the proposed building.

pH and Sulphate

The results of 8 No. tests undertaken on the cohesive made ground gave water soluble sulphate contents between 32mg/l and 510mg/l and pH values between 8.5 and 11.1.

Organic Matter

The results of 4 tests undertaken on the cohesive made ground gave organic matter contents between 0.4% and 1.9%. Based on the results the cohesive made ground would classify as being low organic in accordance with BS EN ISO 14688-2:2018 (Ref. 07).

12.3 Alluvial Silt

Natural Moisture Content

The results of 7 No. tests undertaken on the alluvial silt gave moisture contents between 18% and 49%.

Atterberg Limits

The results of 7 No. Atterberg Limits tests undertaken on the alluvial silt gave plastic limits between 11% and 35%, liquid limits between 27% and 63% and plasticity indices between 5% and 31%.

On the basis of these results, the alluvial silt would be classified as silt of low to intermediate plasticity or clay of intermediate to high plasticity.

Undrained Shear Strength

The result of a single triaxial test undertaken within the alluvial silt, at a depth of 9.00mbgl gave an undrained shear strength (c_u) value of 9kN/m^2 indicating low strength and soft consistency.

The results of 17 No. Standard Penetration Tests undertaken in the alluvial silt at depths between 4.00mbgl and 15.00mbgl, determined field N values between 1 and 12, which correspond to corrected N_{60} values between 1 and 14.

Based upon the correlation between SPT N_{60} values, plasticity index and undrained shear strength (c_u), and using an F1 value of 4.2 (Ref. 13) based upon the plasticity indices recorded for this material, undrained shear strengths (c_u) ranging between 4kN/m^2 and 59kN/m^2 can be derived for the alluvial silt.

Based on consideration of the above, and the visual description of the material, an undrained shear strength of 10kN/m^2 is considered appropriate for use as a design value for the alluvial silt.

The undrained shear strengths are plotted against depth and elevation on Figures 1 and 2 respectively included within Appendix 5.

Coefficient of Volume Compressibility

The result of a single oedometer consolidation test undertaken at a depth of 9.00mbgl, gave a coefficient of volume compressibility (m_v) value 0.13 m^2/MN.

Based upon empirical correlation between plasticity index, the coefficient of compressibility and the SPT (N_{60}) value, and using an F2 value of 0.44 (Ref. 13), based upon the plasticity indices recorded for this material, m_v values ranging between 0.16m^2/MN and 2.18m^2/MN can be derived for the silt.

Based upon consideration of the above results, an m_v value of 1.00m^2/MN is considered appropriate for use as a design value for the alluvial silt.

The coefficients of compressibility are plotted against depth and elevation on Figures 3 and 4 respectively included within Appendix 5.

pH and Sulphate

The results of 5 No. tests undertaken on the alluvial silt gave water soluble sulphate contents between 360mg/l and 830mg/l and pH values between 7.2 and 8.6.

Organic Matter

The results of 4 No. tests undertaken on the alluvial silt gave organic matter contents between 3.2% and 7.4%. On the basis of the results these deposits would classify as being low to medium organic in accordance with BS EN ISO 14688-2:2018 (Ref. 07).

12.4 Alluvial Sands and Gravels

Particle Size Distribution

The results of 5 No. particle size distribution tests undertaken on the granular alluvial deposits indicate the material to comprise the following particle composition:

Table 9: Summary of Particle Size Distribution for Alluvial Sands and Gravels

Particle Size		Percentage Composition				
		BH102 5.00mbgl	BH103 2.00mbgl	BH105 2.00mbgl	BH105 6.00mbgl	WS102 3.60mbgl
Boulders & Cobbles	>60mm	0%	25%	0%	0%	0%
Gravel	60mm to 2mm	3%	34%	23%	2%	35%
Sand	2mm to 0.06mm	55%	23%	51%	80%	52%
Silts	0.06mm to 0.002mm	34%	14%	18%	17%	13%
Clays	<0.002mm	8%	5%	8%	0%	0%

Based upon the gradings undertaken, the granular alluvial deposits sampled have been assessed as a silty or very silty sand (BH102 and BH105, 6.00mbgl), or a very gravelly silty sand (BH103, BH105, 2.00mbgl and WS102, which generally correlates with the Engineer's field descriptions for the strata.

Standard Penetration Tests (SPTs)

The results of 14 No. SPTs undertaken in the alluvial sands and gravels at depths between 3.80mbgl and 6.00mbgl determined field N values between 1 and 35 which correlates to $N1_{60}$ values between 1 and 39 and indicate very loose to medium dense conditions.

The SPT N values are plotted against depth and elevation in Figures 5 and 6 respectively included within Appendix 5.

Angle of Shearing Resistance

Based upon a design SPT N value of 5 for the granular alluvium, and correlation between SPT N values and effective angle of shearing resistance (φ´) (Ref. 13), an angle of shearing resistance value of 26° is considered appropriate for design purposes for the alluvial sands and gravels.

pH and Sulphate

The results of 3 No. tests undertaken on the granular alluvial deposits gave water soluble sulphate contents between 210mg/l and 340mg/l and pH values between 8.2 and 8.6.

12.5 Peat

Natural Moisture Content

The results of a single test undertaken on the peat gave a moisture content of 43%.

Atterberg Limits

The results of a single Atterberg Limits test undertaken on the peat gave a plastic limit of 39%, liquid limit of 59% and plasticity index of 20%.

Undrained Shear Strength

The results of a single Standard Penetration Test undertaken in the peat deposits at a depth of 7.50mbgl, determined a field N of 7 which corresponds to a corrected N_{60} value of 8.

Based upon correlation between the SPT N_{60} value, plasticity index and undrained shear strength (c_u), and using an F1 value of 4.2 (Ref. 13) based upon the plasticity indices recorded for this material, an undrained shear strength (c_u) of 34kN/m^2 can be derived for the peat.

Based upon consideration of the above result, and inconsideration of the variability in the engineering properties of this material, an undrained shear strength of 5kN/m^2 is considered appropriate for use as the design value for the peat.

The designer shall take into consideration the potential for variable and lower values and undertake a sensitivity analysis as part of detailed design.

Coefficient of Volume Compressibility

Based upon empirical correlation between plasticity index, the coefficient of compressibility and the SPT (N_{60}) value, and using an F2 value of 0.44 (Ref. 13), based upon the plasticity index recorded for this material, an m_v value 0.28m^2/MN can be derived for the peat.

Based upon consideration of the above results and published data for peat (Ref. 13), an m_v value of 1.50m^2/MN is considered appropriate for use as the design value for the peat.

The designer shall take into consideration the potential for variable and higher values and undertake a sensitivity analysis as part of detailed design.

pH and Sulphate

The results of a single test undertaken on the peat deposits gave a water soluble sulphate content of 1,900mg/l and pH value of 5.7.

Organic Matter

The results of 2 No. tests undertaken on the peat deposits gave organic matter contents between 8.4% and 11%. Based on the limited results the peat would classify as being medium organic in accordance with BS EN ISO 14688-2:2018 (Ref. 07).

12.6 Alluvial Clay

Natural Moisture Content

The results of 2 No. tests undertaken on the alluvial clay gave moisture contents of 36% and 45%.

Atterberg Limits

The results of 2 No. Atterberg Limits tests undertaken on the alluvial clay gave plastic limits of 28% and 34%, liquid limits of 60% and 65% and plasticity indices of 26% and 37%.

On the basis of these results, the alluvial clays would be classified as a high plasticity clay or silt.

Undrained Shear Strength

The results of 2 No. triaxial tests undertaken within the alluvial clay, both at a depth of 9.00mbgl gave undrained shear strength (c_u) values of 17kN/m^2 indicating low strengths and soft consistencies.

The results of 2 No. Standard Penetration Tests undertaken in the alluvial clay, both at a depth of 10.50mbgl, determined field N values of 5 and 6 which correspond to corrected N_{60} values of 6 and 7.

Based upon the correlation between SPT N_{60} values, plasticity index and undrained shear strength (c_u), and using an F1 value of 4.2 (Ref. 13) based upon the plasticity indices recorded for this material, undrained shear strengths (c_u) ranging between 26kN/m^2 and 31kN/m^2 can be derived for the alluvial clay.

Based on consideration of the above, and the visual description of the material, an undrained shear strength of 20kN/m^2 is considered appropriate for use as a design value for the alluvial clay.

Coefficient of Volume Compressibility

The results of 2 No. oedometer consolidation tests both undertaken at a depth of 9.00mbgl, gave coefficient of volume compressibility (m_v) values of 0.09m^2/MN and 0.10 m^2/MN.

Based upon empirical correlation between plasticity index, the coefficient of compressibility and the SPT (N_{60}) value, and using an F2 value of 0.44 (Ref. 13), based upon the plasticity indices recorded for this material, m_v values of 0.31m^2/MN and 0.37m^2/MN can be derived for the alluvial clay.

Based upon consideration of the above results, an m_v value of 0.30m^2/MN is considered appropriate for use as design value for the alluvial clay.

12.7 Glacial Clays

Natural Moisture Content

The results of a single moisture content test undertaken on the glacial clays gave a moisture content of 16%.

Atterberg Limits

The results of a single Atterberg Limits test undertaken on the glacial clays gave plastic limit of 15%, liquid limit of 30% and plasticity index of 15%.

Undrained Shear Strength

The results of a single Standard Penetration Test undertaken in the Glacial clays at a depth of 15.00mbgl, determined a field SPT N value of 19 which corresponds to a corrected N_{60} value of 14.

Based upon correlation between the SPT N_{60} value, plasticity index and undrained shear strength (c_u), and using an F1 value of 5.0 (Ref. 13) based upon the plasticity indices for this material, an undrained shear strength (c_u) of 116kN/m^2 can be derived for the glacial clays. This results indicate high strength and stiff consistency.

Based on consideration of the above, the visual description of the material and the limited number of tests, a moderately conservative undrained shear strength of 100kN/m^2 is considered appropriate for use as design values for the Glacial clays.

Coefficient of Volume Compressibility

Based upon empirical correlation between plasticity index, the coefficient of compressibility and the SPT (N_{60}) value, and using an F2 value of 0.52 (Ref. 13), based upon the plasticity indices for this material, an m_v value of 0.08m^2/MN can be derived for the glacial clay.

Based upon consideration of the above result, and the limited data, an m_v value of 0.10m^2/MN is considered appropriate for use as the design value for the glacial clays.

pH and Sulphate

The results of 2 No. tests undertaken on the Glacial clays gave water soluble sulphate contents of 660mg/l and 820mg/l and pH values of 7.0 and 9.4.

Organic Matter

The result of a single organic matter content test undertaken on the glacial clay deposits gave an organic matter content of 4%. Based on this result the glacial clay would classify as being low organic in accordance with BS EN ISO 14688-2:2018 (Ref. 07).

12.8 Granular Glacial Deposits

Particle Size Distribution

The results of 3 No. particle size distribution tests undertaken on the granular glacial deposits indicates the material to comprise the following particle composition:

Table 10: Summary of Particle Size Distribution for Granular Glacial Deposits

Particle Size		Percentage Composition		
		BH101 16.50mbgl	**BH102 13.50mbgl**	**BH103 13.50mbgl**
Boulders & Cobbles	>60mm	0%	21%	0%
Gravel	60mm to 2mm	72%	54%	35%
Sand	2mm to 0.06mm	24%	22%	59%
Silts	0.06mm to 0.002mm	39%	3%	6
Clays	<0.002mm	0%	0%	0%

Based upon the gradings undertaken, the samples are assessed to comprise a slightly silty to very silty, gravelly to very gravelly sand or sandy to very sandy gravel, with a locally high cobble content (BH102), which generally correlates with the Engineer's field descriptions for the strata.

Standard Penetration Tests (SPTs)

The results of 9 No. SPTs undertaken in the granular glacial deposits at depths between 13.00mbgl and 16.50mbgl determined field N values between 17 and 50, which correlates to $N1_{60}$ values between 17 and 38 and indicates medium dense to dense conditions.

The SPT N values are plotted against depth and elevation in Figures 7 and 8 respectively included within Appendix 5.

Angle of Shearing Resistance

Based upon a design SPT N value of 24 for the granular glacial deposits and correlation between SPT N values and effective angle of shearing resistance (φ´) (Ref. 13), an angle of shearing resistance value of 34° is considered appropriate for design purposes for the granular glacial deposits.

pH and Sulphate

The results of a single test undertaken on the granular glacial deposits gave a water soluble sulphate content of 41mg/l and a pH value of 7.8.

12.9 Bedrock

Solid geology comprising interbedded mudstone, siltstone and occasional sandstone was recorded to a maximum depth of 28.50mbgl (-25.12mOD) where the boreholes were terminated.

Natural Moisture Content

The results of 5 No. moisture content tests undertaken on cored samples of the mudstone and sandstone gave moisture contents between 3.3% and 7.4%.

Standard Penetration Tests (SPTs)

The results of 8 No. SPTs undertaken at the rock head interface, all at depths of 18.00mbgl, determined field N values of 50+.

Angle of Shearing Resistance

Based upon consideration of both the weathered nature of the bedrock and available published data (Ref. 13), an angle of shearing resistance value of 27° is considered appropriate for design purposes for the bedrock.

Point Load

1 No. point load test scheduled on a sample of mudstone gave axial Is50 values between 0.01MPa and 1.57MPa.

5 No. point load tests scheduled on the siltstone gave axial Is50 values between 0.02MPa and 0.52MPa.

Unconfined Compressive Strength (UCS)

Based upon an empirical correlation between axial Point Load Tests and using K value conversion factors of 12.6 for a mudstone and 14.7 for a siltstone (Ref. 15), unconfined compressive strengths between 0.13MPa and 20.00MPa can be derived for the mudstone and between 0.29MPa and 7.60MPa can be derived for the siltstone, indicating weak to moderately strong conditions, which corroborates the description of the sandstone detailed on the drilling logs.

3 No. unconfined compressive strength tests undertaken on mudstone samples at depths between 19.95mbgl and 20.20mbgl gave UCS strengths between 0.04MPa and 0.20MPa indicating that the rock at this depth is destructured / completely weathered, exhibiting behaviour more akin to a soil.

On the basis of the UCS and Point Load test results and the visual descriptions of the bedrock, the following unconfined compressive strengths are considered appropriate for use as design values for the bedrock (mudstone, sandstone and siltstone) on site:

0.10MPa to a depth of 20.00mbgl;

0.25MPa to between 20.00mbgl and 23.00mbgl; and

1.00MPa below 23.00mbgl.

The unconfined compressive strengths are plotted against depth and elevation in Figures 9 and 10 respectively included within Appendix 5.

pH and Sulphate

The results of 4 No. water soluble sulphate and pH tests undertaken on the mudstone bedrock gave water soluble sulphate contents between <10mg/l and 270mg/l with pH values between 7.9 and 8.6.

The result of a single test undertaken on the siltstone gave a water soluble sulphate content of 29mg/l and 270mg/l with a pH value of 8.7.

13.0 CHEMICAL PROPERTIES

13.1 Soils – Visual / Olfactory Evidence of Contamination

No significant visual or olfactory evidence of contamination was recorded during the site investigation works.

13.2 Chemical Analysis and Assessment Criteria

The programme of chemical testing undertaken included the analysis of soil samples for specific determinants, which could potentially indicate contamination risks. A preliminary screen of the chemical test results has been undertaken, as presented in Appendix 3, in order to identify contamination hazards using site specific assessment criteria derived for a commercial development. The Assessment Criteria are presented in Appendix 4. Detailed assessment of the potential hazards presented by the elevated concentrations recorded, concerning specific receptors, is presented below.

13.3 Chemical Analysis of Made Ground

No significant difference in material chemistry was noted in the made ground attributable to specific contamination sources. As such, for the purpose of this assessment it has been assumed that the made ground comprises a single source.

Selected made ground samples, have been analysed for the range of determinands presented in Section 7.7. The results of the chemical testing have been compared to site specific assessment criteria for receptors including human health, (Tier 1 assessment criteria for commercial site end use), the built development and soft landscaping. The results of these tests are summarised below:

Human Health

The chemical analysis has recorded localised exceedances of the Tier 1 GAC with regard to human health as presented within Table 11.

Table 11: Soil Analysis Results (Human Health)

Contaminant	Range of Recorded Results (mg/kg)	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Asbestos	No Asbestos Detected (NAD) to 0.002%	No Asbestos Detected (NAD)	2/12	BH101 (3.10mbgl) and BH103 (0.70mbgl), Chrysotile fibres.

Built Development

The chemical analysis has recorded localised exceedances of the Tier 1 GAC with regard to built development as presented within Table 12.

Table 12: Soil Analysis Results (Built Development)

Contaminant	Range of Recorded Results (mg/kg)	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Sulphate Water Soluble (SO4)	510mg/l to 1,000mg/l	500mg/l	3/12	BH101 (3.10mbgl) BH102 (1.00mbgl) BH103 (0.70mbgl)

Landscaping

The chemical analysis has recorded localised exceedances with regard to landscaping as presented within Table 13.

Table 13: Soil Analysis Results (Landscaping)

Contaminant	Range of Recorded Results	Assessment Criteria*	No. of Failures / No. of Tests	Location of Failures
Water Soluble Boron	3.40mg/kg to 5.4mg/kg	3.0mg/kg	3/12	BH101 (0.80mbgl, 3.10mbgl and 3.80mbgl)
Copper	2,100mg/kg	200mg/kg	1/12	BH103 (0.70mbgl)
Molybdenum	7.4mg/kg	4.0mg/kg	1/12	BH101 (3.80mg/kg)

** Assessment criteria based on pH ≥7*

13.4 Chemical Analysis of Natural Superficial Deposits

Selected samples of the natural deposits were analysed for the range of determinands given in Section 7.7 and the results have been compared to site specific assessment criteria for receptors including human health, the built development and landscaping.

Human Health

No elevated concentrations of contaminants were recorded were recorded above the assessment criteria for human health.

Built Development

The chemical analysis has recorded localised exceedances of the Tier 1 GAC with regard to built development as presented within Table 14.

Table 14: Soil Analysis Results (Built Development)

Contaminant	Range of Recorded Results (mg/kg)	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Sulphate Water Soluble (SO4)	210mg/l to 1,900mg/l	500mg/l	6/12	BH101 (5.00mbgl) BH102 (7.50mbgl) BH102 (11.00mbgl) BH103 (7.50mbgl BH103 (10.50mbgl) BH105 (11.00mbgl)

Landscaping

The chemical analysis has recorded localised exceedances with regard to landscaping as presented within Table 15.

Table 15: Soil Analysis Results (Landscaping)

Contaminant	Range of Recorded Results	Assessment Criteria*	No. of Failures / No. of Tests	Location of Failures
Water Soluble Boron	3.7mg/kg to 4.7mg/kg	3.0mg/kg	3/12	BH105 (3.50mbgl) WS102 (3.80mbgl)

13.5 Leachate Analysis of Made Ground

Samples taken from the made ground were analysed for the range of leachable determinands given in Section 7.7 and the results have been compared to assessment criteria derived for groundwaters. On the basis of the nearest controlled surface water feature comprising the tidally influenced River Esk immediately adjacent to the east of the site, the results have also been assessed against surface water (marine) criteria.

The results of the assessment are summarised below:

Controlled Waters – Surface Waters (Marine)

The leachate analysis has recorded localised exceedances with regard to marine surface waters as presented within Table 16.

Table 16: Leachate Analysis Results (Surface Waters, Marine)

Contaminant	Range of Recorded Results	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Copper	7.00ug/l to 9.00ug/l	5.00ug/l	2/9	WS101 (0.80mbgl) WS102 (1.50mbgl)
Aliphatic TPH C12-16	100ug/l	20ug/l	1/10	WS102 (1.50mbgl)
Anthracene	0.14ug/l to 0.19ug/l	0.10ug/l	2/10	BH105 (2.20ug/l) WS101 (0.80mbgl)
Benzo(a)anthracene	0.09ug/l to 0.43ug/l	0.05ug/l	5/10	BH101 (3.10mbgl) BH103 (0.70mbgl) BH105 (2.20,bgl) WS101 (0.80mbgl) WS104 (0.60mbgl)
Benzo(a)pyrene	0.06ug/l to 0.50ug/l	0.05ug/l	6/10	BH101 (3.10mbgl) BH102 (1.00mbgl) BH103 (0.70mbgl) BH105 (2.20,bgl) WS101 (0.80mbgl) WS104 (0.60mbgl)
Benzo(b)fluoranthene	0.04ug/l to 0.58ug/l	0.03ug/l sum	8/10	BH101 (3.10mbgl) BH102 (1.00mbgl) BH103 (0.70mbgl) BH105 (2.20,bgl) WS101 (0.80mbgl) WS102 (1.50mbgl) WS104 (0.60mbgl) WS105 (1.20mbgl)
Benzo(k)fluoranthene	<0.01ug/l to 0.24ug/l			
Benzo(ghi)perylene	0.01ug/l to 0.42ug/l	0.002ug/l sum	9/10	BH101 (3.10mbgl) BH102 (1.00mbgl) BH103 (0.70mbgl) BH104 (0.80mbgl) BH105 (2.20mbgl) WS101 (0.80mbgl) WS102 (1.50mbgl) WS104 (0.60mbgl) WS105 (1.20mbgl)
Indeno(123-cd)pyrene	<0.01ug/l to 0.43ug/l			
Dibenzo(ah)anthracene	0.05ug/l to 0.08ug/l	0.10ug/l	2/10	BH105 (2.20mbgl) WS101 (0.80mbgl)
Fluoranthene	0.17ug/l to 0.79ug/l	0.10ug/l	5/10	BH101 (3.10mbgl) BH103 (0.70mbgl) BH105 (2.20mbgl) WS101 (0.80mbgl) WS104 (0.60mbgl)

Controlled Waters – Groundwaters

The leachate analysis has recorded localised exceedances with regard to groundwaters as presented within Table 17.

Table 17: Leachate Analysis Results (Groundwater)

Contaminant	Range of Recorded Results	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Benzo(a)pyrene	0.06ug/l to 0.50ug/l	0.01ug/l	8/10	BH101 (3.10mbgl) BH102 (1.00mbgl) BH103 (0.70mbgl) BH105 (2.20mbgl) WS101 (0.80mbgl) WS102 (1.50mbgl) WS104 (0.60mbgl) WS105 (1.20mbgl)

Contaminant	Range of Recorded Results	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Benzo(b)fluoranthene	0.04ug/l to 0.58ug/l	0.10ug/l sum	7/10	BH101 (3.10mbgl) BH102 (1.00mbgl) BH103 (0.70mbgl) BH105 (2.20,bgl) WS101 (0.80mbgl) WS104 (0.60mbgl) WS105 (1.20mbgl)
Benzo(k)fluoranthene	<0.01ug/l to 0.24ug/l			
Benzo(ghi)perylene	0.01ug/l to 0.42ug/l			
Indeno(123-cd)pyrene	<0.01ug/l to 0.43ug/l			

13.6 Leachate Analysis of Natural Superficial Deposits

Samples taken from the natural superficial deposits (due to the presence of a sulphurous odour at the interface between the made ground and the natural alluvium) were analysed for the range of leachable determinants given in Section 7.7 and the results have been compared to assessment criteria derived for groundwaters. On the basis of the nearest controlled surface water feature comprising the tidally influenced River Esk immediately adjacent to the east of the site, the results have also been assessed against surface water (marine) criteria.

The results of the assessment are summarised below:

Controlled Waters – Surface Waters (Marine)

The leachate analysis has recorded localised exceedances with regard to marine surface waters as presented within Table 18.

Table 18: Leachate Analysis Results (Surface Waters, Marine)

Contaminant	Range of Recorded Results	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Benzo(b)fluoranthene	0.20ug/l	0.03ug/l sum	1/1	WS102 (3.80mbgl)
Benzo(k)fluoranthene	0.07ug/l			
Benzo(ghi)perylene	0.12ug/l	0.002ug/l sum	1/1	WS102 (3.80mbgl)
Indeno(123-cd)pyrene	0.13ug/l			

Controlled Waters – Groundwaters

The leachate analysis has recorded localised exceedances with regard to groundwaters as presented within Table 19.

Table 19: Leachate Analysis Results (Groundwater)

Contaminant	Range of Recorded Results	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Benzo(a)pyrene	0.02ug/l	0.01ug/l	1/1	WS102 (3.80mbgl)

13.7 Groundwater Analysis

Samples taken from the ground water standpipes during the post sit works monitoring were analysed for the range of leachable determinants given in Section 7.7 and the results have been compared to assessment criteria derived for groundwaters. On the basis of the nearest controlled surface water feature comprising the tidally influenced River Esk immediately adjacent to the east of the site, the results have also been assessed against surface water (marine) criteria.

The results of the assessment are summarised below:

Controlled Waters – Surface Waters (Marine)

The groundwater analysis has recorded localised exceedances with regard to marine surface waters as presented within Table 20.

Table 20: Groundwater Analysis Results (Surface Waters, Marine)

Contaminant	Range of Recorded Results	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Copper	11.00ug/l	5.00ug/l	1/5	BH101
Zinc	55ug/l to 95ug/l	40ug/l	4/5	BH102 BH103 BH105 WS101
Benzo(a)anthracene	0.12ug/l	0.05ug/l	1/5	WS101
Benzo(a)pyrene	0.17ug/l	0.05ug/l	1/5	WS101
Benzo(b)fluoranthene	0.50ug/l	0.03ug/l sum	1/5	WS101
Benzo(k)fluoranthene	0.07ug/l			
Benzo(ghi)perylene	0.12ug/l	0.002ug/l sum	1/5	WS101
Indeno(123-cd)pyrene	0.13ug/l			
Fluoranthene	0.33ug/l	0.10ug/l	1/5	WS101

Controlled Waters – Groundwaters

The groundwater analysis has recorded localised exceedances with regard to groundwaters as presented within Table 21.

Table 21: Water Analysis Results (Groundwater)

Contaminant	Range of Recorded Results	Assessment Criteria	No. of Failures / No. of Tests	Location of Failures
Manganese	51ug/l to 4,500ug/l	50ug/l	4/5	BH102 BH103 BH105 WS101
pH	9.5	6.5-8.5	1/5	BH101
Benzo(a)pyrene	0.17ug/l	0.01ug/l	1/5	WS101
Benzo(b)fluoranthene	0.20ug/l	0.10ug/l sum	1/5	WS101
Benzo(k)fluoranthene	0.07ug/l			
Benzo(ghi)perylene	0.12ug/l			
Indeno(123-cd)pyrene	0.13ug/l			

13.8 Detection Limits

Human Health, the Built Development and Landscaping

The detection limits for all total soil tests were below assessment criteria for human health, built development and landscaping receptors.

Surface Water Assessment Criteria

Concentrations for chromium (VI) (<7ug/l), cyanide free (<20ug/l), benzo(ghi)perylene (<0.10ug/l) and indeno(123-cd)pyrene were recorded at levels below the testing laboratories limit of detection, however these detection limits are above the surface water assessment criteria.

Ground Water Assessment Criteria

The detection limits for water samples tests were below the assessment criteria for ground water receptors.

13.9 Waste Analysis

Five Waste Acceptance Criteria (WAC) tests were undertaken on samples taken from the boreholes and window samples (BH101, BH102, BH105, WS101 and WS104) within the made ground deposits. The results of the WAC screens are included in Appendix 2 and indicate that materials generated as part of the development may require disposal to a hazardous landfill, due to elevated total organic carbon, total dissolved solids and chlorides.

Waste disposal classification of onsite materials which may be generated as part of the works, and require offsite disposal, is outside the scope of this report and should be confirmed by the receiving landfill / treatment facility following excavation and confirmatory testing, as per the landfill or treatment facility's requirements.

14.0 ENVIRONMENTAL ASSESSMENT

14.1 Approach to Contamination Risk Assessment

The Environmental Protection Act 1990, Part II A Contaminated Land (Section 57 of the Environment Act 1995) and the Contaminated Land Regulations 2006 (and 2012 amendments) provide a basis on which to determine the risks and liabilities presented by a contaminated site. Contaminated Land is defined within Section 78A(2) of the Environmental Protection Act 1990, Part II A Contaminated Land (by commencement of Section 86 of The Water Act 2003 [Commencement Order No. 11] Order 2012) as:

"Any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that-

(a) Significant harm is being caused or there is significant possibility of such harm being caused; or

(b) Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused."

Section 57 of the Environment Act 1995 requires that any site identified as being "contaminated" by the Local Authority will be registered by them and remediation will be required to render the site fit for use.

The presence of contamination is not the sole factor for deciding whether a site is contaminated. Relevant parties should identify site-specific risks and provide objective, cost-effective methods to manage the contamination in a manner which satisfies the proposed end-use.

A risk-based approach, which takes both technical and non-technical aspects into consideration when making decisions on contamination resulting from past, present or future human activities, is advocated. The assessment of environmental risks generally relies on the identification of three principal elements forming a 'pollutant or contaminant linkage':

Source: the contaminant

Pathway: the route through which the contaminant can migrate, and

Receptor: all human, animal, plant, controlled water or property that may be adversely affected (harmed) by the contaminant

In the absence of one of these elements, on a given site, there is no risk. Where all three elements are present, risk assessment is required to determine the significance of the harm or pollution that is being or may be caused. As outlined above, the terms of the Contaminated Land regime specify that remediation need only be implemented where a site is causing, or there is a significant possibility that it will cause, significant harm, or that pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused.

Development of contaminated land is usually addressed through the application of planning and development legislation and guidance (i.e. NPPF). The suitable for use approach is seen as the most appropriate basis to deal with contaminated land, taking account of environmental, social and economic objectives. The assessment is made in the context of the proposed land use.

14.2 Conceptual Site Model

A conceptual site model is formed by presenting all identified and suspected sources, pathways and receptors. For this site, a conceptual site model has been developed based on the results of the site investigation and with consideration of a Commercial end use.

The significance of the presence of these elements is considered by carrying out a risk assessment of all potential pollutant or contaminant linkages, as presented in the following sections.

14.3 Source Characterisation

The following sources of contamination have been identified in relation to the site as determined by the ground investigation:

Made Ground

Localised presence of asbestos fibres (Human Health).

Locally elevated concentrations of water soluble sulphate (Built Development).

Locally elevated concentrations of heavy metals (Landscaping).

Localised elevated leachable concentrations of heavy metals, speciated TPH and speciated PAHs (Controlled Waters – Surface Waters)

Localised elevated leachable concentrations of speciated PAHs (Controlled Waters – Groundwater)

Natural Superficials

Locally elevated concentrations of heavy metals (Landscaping).

Localised elevated leachable concentrations of speciated PAHs (Controlled Waters – Surface Waters)

Localised elevated leachable concentrations of speciated PAHs (Controlled Waters – Groundwater)

Groundwaters

Localised elevated concentrations of heavy metals and speciated PAHs (Controlled Waters – Surface Waters)

Localised elevated concentrations of heavy metals, pH and speciated PAHs (Controlled Waters – Groundwater)

Soil Gas

Gas readings show there are depleted oxygen and elevated methane and carbon dioxide levels. The site has been preliminarily assessed as Gas Characteristic Situation 2.

14.4 Pathway Characterisation

The potential pathways by which receptors might be exposed to contaminants (sources) at the site can vary depending on the proposed land use.

For humans, the possible route of exposure to contaminants is:

Inhalation of dusts, fibres and accumulated ground gas and vapours;

Ingestion of soil and groundwater either by hand-to-mouth activity or by eating plants grown in contaminated soils/ waters; and

Dermal (skin) contact with contaminated soils and waters and transfer of contaminants through the skin to the body.

Buildings and service conduits can also be affected by contaminants in the following ways:

Ground gas and vapours accumulating in voids within or beneath structures;

By direct contact of building fabric with contaminated soils;

Service trenches acting as preferential migration pathways; and

Ingress of contaminants into conduits, contaminating drinking water supplies.

For the local water environment the following pathways may be present:

Leaching of contaminants from the soil to on-site groundwater;

Run-off from the site surface entering surface water courses near the site; and

Migration of contaminated on-site groundwater to off-site surface waters or groundwater.

For plants and soft landscaping the main pathway for exposure involves either direct contact with contaminated soils or groundwater or uptake of contaminants into the plant leading to adverse impact.

14.5 Receptor Characterisation

The receptors are the elements in the pollutant linkage that can potentially be harmed by the contaminants. These are as follows:

Part IIA Receptors

Human Health: Site end users and adjacent site users

Property: Buildings and services

The Water Environment: Groundwaters:

Secondary A Aquifer – Granular Glacial Deposits

Secondary A Aquifers – Cloughton Bedrock Formation

Surface Waters:

River Esk – adjacent east (Tidal)

Vegetation: Vegetation Growth

Non Part IIA Receptors

Human Health: Construction and maintenance workers.

14.6 Hazard Assessment

A screen of the chemical and gas monitoring data has been undertaken using Assessment Criteria developed for site specific receptors (Appendix 4) and the proposed end uses, to identify contamination hazards.

Where hazards have been identified these are summarised in Table 22:

Table 22 – Contaminants of Concern

Source	Human Health			Built Development (Buildings / Services)	Ecology	Pollution to Controlled Waters	
	End Users	Adjacent Users	Construction/ Maintenance Workers		Landscaping	Groundwaters	Surface Waters (Marine)
Made Ground	Asbestos 0.002% (<0.001%)	Asbestos 0.002% (<0.001%)	Asbestos 0.002% (<0.001%)	Water Soluble Sulphate 1,000mg/l (500mg/l)	Boron 5.4mg/kg (3mg/kg) Copper 2,100mg/kg (200mg/kg) Lead 370mg/kg (300mg/kg) Molybdenum 7.4mg/kg (4mg/kg)	Benzo(a)pyrene 0.50ug/l (0.01ug/l) Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene and Indeno(123-cdpyrene 0.85ug/l (0.10ug/l)	Copper 9ug/l (5ug/l) Aliphatic TPH C12-16 100ug/l (20ug/l) Anthracene 1.4ug/l (0.10ug/l) Benzo(a)anthracene 0.43ug/l (0.05ug/l) Benzo(a)pyrene 0.50ug/l (0.05ug/l) Benzo(b)fluoranthene and Benzo(k)fluoranthene 0.81ug/l (0.03ug/l total) Benzo(ghi)perylene and Indeno(123-cdpyrene 0.85ug/l (0.002ug/l total) Dibenzo(ah)anthracene 0.08ug/l (0.05ug/l) Fluoranthene 0.76ug/l (0.1ug/l)
Natural Superficial Deposits	-	-	-	Water Soluble Sulphate 1,900mg/l (500mg/l)	Boron 5.4mg/kg (3mg/kg)	Benzo(a)pyrene 0.02ug/l (0.01ug/l)	Benzo(b)fluoranthene and Benzo(k)fluoranthene 0.03ug/ l (0.03ug/l total) Benzo(ghi)perylene and Indeno(123-cdpyrene 0.02ug/l (0.002ug/l total)
Groundwaters	-	-	-	-	-	Manganese 4,500ug/l (50ug/l) pH 9.5 (6.5-8.5) Benzo(a)pyrene 0.17ug/l (0.01ug/l) Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene and Indeno(123-cdpyrene 0.52ug/l (0.10ug/l)	Copper 11ug/l (5ug/l) Zinc 95ug/l (40ug/l) Benzo(a)anthracene 0.12ug/l (0.05ug/l) Benzo(a)pyrene 0.17ug/l (0.05ug/l) Benzo(b)fluoranthene and Benzo(k)fluoranthene 0.27ug/l (0.03ug/l total) Benzo(ghi)perylene and Indeno(123-cdpyrene 0.25ug/l (0.002ug/l total) Fluoranthene 0.33ug/l (0.1ug/l)

Source	Human Health			Built Development (Buildings / Services)	Ecology	Pollution to Controlled Waters	
	End Users	Adjacent Users	Construction/ Maintenance Workers		Landscaping	Groundwaters	Surface Waters (Marine)
Soil Gas	Depleted Oxygen 1.6% Carbon Dioxide – 4.9% Methane 24.5%	Depleted Oxygen 1.6% Carbon Dioxide – 4.9% Methane 24.5%	Depleted Oxygen 1.6% Carbon Dioxide – 4.9% Methane 24.5%	-	-	-	-

Values shown are the maximum concentrations recorded as part of the site investigation works.

The values shown in brackets are based upon a recorded organic matter of 1.0% and relate to the Assessment Criteria Limit, detailed in Appendix 4.

14.7 Contaminant Linkages and Qualitative Risk Assessment

The significance of potential contaminant linkages at the site have been qualitatively assessed by considering the magnitude of the hazard and the possibility of the linkages occurring as shown in Table 23.

As part of future redevelopment and maintenance of the site it is assumed that the adoption of a permit to dig system and appropriate health and safety measures (i.e. RPE, PPE, monitoring, decontamination etc.) based upon a risk assessment of site conditions by future contractors would adequately mitigate the risk posed to construction and maintenance workers from the identified sources of contamination. As such, no contaminant linkage exists and construction / maintenance workers are not considered further in this risk assessment.

Table 23 – Qualitative Risk Assessment for Identified Sources of Contamination

Source	Contaminants of Concern	Potential Pathway (s)	Potential Receptor (s)	Assessment	Potential Severity	Potential Probability	Risk Class	Remediation / Mitigation
Contamination in on site made ground and superficial deposits	Soils – Heavy Metals, Sulphates and Asbestos Leachates – Heavy Metals, speciated TPHs and speciated PAHs Groundwater - Heavy Metals, pH, speciated TPHs and speciated PAHs	Ingestion, inhalation & dermal contact	Human Health End Users	Post construction the site is to comprise built development and hardstanding. It is understood that any soft landscaping is to be restricted to raised planters. On this basis, there is no pathway for end users to come into direct contact with contaminated soils (including asbestos). Imported soils used in the planters will need to be chemically suitable such that they do not present a risk to human health, as detailed in Section 15.	High	Low	Low	Yes
			Human Health Adjacent Users	There is the potential for onsite contaminants to migrate offsite and for adjacent site users to ingest or come into direct contact with them. However, significant sources of contamination were not identified by investigation and it is understood that the majority of the site is to be covered with hardstanding and building cover, which would reduce the infiltration of rainfall and therefore the off-site migration of mobile contamination. There is the temporary potential for the inhalation of wind-blown dust and asbestos fibres migrating offsite, which could be generated during earthworks and construction works. However, if appropriate suppression and monitoring is undertaken then no pathway or linkage would exist. Mitigation measures as detailed in Section 15 should be implemented.	Low	High	Moderate	Yes – During Construction
		Accumulation of gas / vapours and inhalation	Human Health End Users	There is the potential for elevated gas and vapours to migrate and accumulate within confined spaces in the built development, representing a risk of asphyxiation. There is also the potential for harm to site end users from migration, accumulation in confined spaces within the proposed development and explosion of gas / vapours. Mitigation measures as detailed in Section 15 should be implemented.	High	Low	Moderate	Yes
		Migration offsite, accumulation of gas / vapours and inhalation	Human Health Adjacent Users	There is the limited potential for the asphyxiation of adjacent users in confined spaces within adjacent properties from the migration, accumulation and inhalation of gas and vapours originating from onsite sources.	Low	High	Low	No
		Direct contact	Property; built fabric & services	There is the potential for chemical attack on below ground concrete and services (including tainting of water supply pipes) from direct contact with contaminants in the soils and groundwaters. Potentially high concentrations of chlorides and sulphates in saline groundwater and salt water spray also present a risk to concrete utilised as part of the proposed development. Mitigation measures as detailed in Section 15 should be implemented.	Moderate	Moderate	Moderate	Yes
		Accumulation of gas / vapours, preferential pathways and ingress		There is the potential for migration of potentially explosive gas/vapours and accumulation in confined spaces within the proposed development. Mitigation measures as detailed in Section 15 should be implemented.	Low	High	Moderate	Yes

Source	Contaminants of Concern	Potential Pathway (s)	Potential Receptor (s)	Assessment	Potential Severity	Potential Probability	Risk Class	Remediation / Mitigation
		Leaching, migration and runoff	Controlled Waters (Groundwater): Secondary A Aquifer – Superficial Deposits	Where superficial groundwater is present mobile contaminants from on-site sources (Made Ground) have the potential to leach into the superficial groundwater body, which may then migrate laterally to off-site receptors, causing potential pollution of the wider water environment. The construction of piled foundations and deep excavations could also introduce preferential pathways for contamination during construction. The ground conditions on site generally comprise granular and cohesive materials. Glacial Till is also locally present at depth. Where present, lower permeability layers of cohesive material will act as an aquitard restricting vertical and lateral migration of groundwater and potential contaminants present within the soils and groundwater. The proposed development will also comprise hard standing and built development throughout the site with formal surface water management, reducing the potential for infiltration of rain water. The superficial glacial deposits beneath the site are classified by the Environment Agency as being a Secondary A Aquifer and are likely to be impacted by saline intrusion due to hydraulic continuity with the River Esk. Marginally elevated leachable contaminants were identified in the site soils during the site investigation; however no definitive correlation can be made with the low elevations recorded in the shallow groundwaters, indicating that the waters are likely to have been at least in part impacted by offsite sources. On this basis of the above, it is considered that the proposed development presents a low risk to the Secondary A superficial aquifer.	Low	Low	Low	No
			Controlled Waters (Groundwater): Secondary A Aquifer - bedrock	Mobile contaminants from on-site sources (Made Ground) have the potential to leach into the bedrock aquifer which may then migrate laterally to offsite receptors, causing potential pollution of the wider water environment. The construction of piled foundations could also introduce preferential pathways for contamination during construction. Marginally elevated leachable contaminants were locally identified during the site investigation within the soils, with marginal elevations also recorded in the superficial groundwaters; however, where present, lower permeability layers of cohesive material will act as an aquitard restricting vertical migration of groundwater and contaminants present within the soils and groundwater. The proposed development will also comprise hard standing and build development with formal surface water management. The bedrock aquifer beneath the site is classified by the Environment Agency as being a Secondary A Aquifer, which comprises permeable and impermeable layers, is unlikely to form part of the local and wider water supply strategy and has the potential to be saline impacted. On the basis of the above, it is considered that the proposed development presents a low risk to the Secondary A bedrock aquifer.	Moderate	Low	Low	No

Source	Contaminants of Concern	Potential Pathway (s)	Potential Receptor (s)	Assessment	Potential Severity	Potential Probability	Risk Class	Remediation / Mitigation
			Controlled Waters (Surface Waters)	Surface water may be at risk from potentially mobile contaminants on site via migration of contaminated groundwater through permeable granular deposits and leaching of mobile contamination. Analysed groundwater samples have recorded localised concentrations of heavy metals, PAH's and TPH's which exceed the Tier 1 Assessment Criteria for the protection of surface water. However, significant sources of total contamination have not been identified (no exceedances of the Tier 1 assessment criteria for a commercial development) and leachable contaminants within the deposits were marginal and localised in nature. Although the assessment point for the River Esk is directly adjacent to the site, when considering the flow rate and extent of the River a high dilution factor is likely to be assigned to this surface water feature, as such reducing the associated risk to the surface water body. A significant proportion of the made ground and superficial deposits are also cohesive in nature, which is likely to be significantly restricting the migration of leachable contaminants and perched groundwater. Given that significant sources of contamination were not identified in the soils present on site and the marginal and localised nature of the leachate and groundwater exceedances recorded, the risk to the River Esk is considered low. The site is also to be covered with hardstanding and building cover, which further reduces the infiltration of rainfall and therefore the off-site migration of mobile or leachable contamination. There is a temporary pollution risk that the River Esk, located immediately east of the site may be impacted by contaminated surface water runoff during the construction phase. Due to the relatively flat topography of the site it is considered that this risk is low and can be mitigated through adoption of best practice surface water management techniques during construction. Post construction surface water run-off is to be controlled by a formal surface water drainage system. Should previously unrecorded hydrocarbon contamination be identified during investigation or construction works then additional assessments should be undertaken.	Moderate	Low	Low	Yes – During Construction
		Direct contact and uptake of contaminants	Landscaped Areas	It is understood that soft landscaping is to be restricted to raised planters with no planting within existing site soils. On this basis, there is no pathway for direct contact with or uptake of contaminated soils. Imported soils used in the planters will need to be chemically suitable such that they do not present a risk to soft landscaping, as detailed in Section 15.	Low	Low	Low	Yes
Gas & vapours	Carbon dioxide, methane and depleted oxygen	Accumulation in confined spaces and inhalation resulting in asphyxiation	Human Health End Users	Methane concentrations of up to 24.50% and depleted oxygen concentrations as low as 1.6% have been recorded as part of the preliminary gas monitoring programme. These concentrations are considered to present a risk to human health and the built development. Subject to completion of the post site works monitoring programme, gas protection measures	High	Low	Moderate	Yes

Source	Contaminants of Concern	Potential Pathway (s)	Potential Receptor (s)	Assessment	Potential Severity	Potential Probability	Risk Class	Remediation / Mitigation
		Accumulation in confined spaces and ignition	Built development	(CS2) are anticipated to be required. Potential sources of hydrocarbons were not recorded as visual/olfactory evidence and only marginally elevated volatile vapours of up to 1.00ppm were recorded during the post site works monitoring. As such, vapour protection measures are not considered to be required, subject to confirmation following completion of gas monitoring programme. The site is located within an area with less than 1% of homes at or above the Action Level. As such, radon gas protection measures are not a statutory requirement within new buildings on site. Requirements in this regard, however, should be confirmed with the Local Planning Authority / Regulator. Should previously unrecorded hydrocarbon contamination be identified during construction works then additional assessments should be undertaken.	High	Low	Moderate	Yes

15.0 RECOMMENDATIONS ON REMEDIAL/MITIGATION MEASURES

Based on review of the site investigation information and the potential contaminant linkages identified in the previous sections, the contamination sources identified on site would not preclude site development. The following preparatory works and mitigation measures should however be adopted.

15.1 Preparatory Works

As part of the preparatory works to facilitate redevelopment, the following surveys should be completed and measures adopted:

Further intrusive investigation in the form of trial pitting in the area of boreholes BH104 and BH104A, which encountered metallic obstructions, to confirm that the features do not relate to the quay walls or wharf sub-structure.

Following completion of the gas and groundwater monitoring programme, and agreement of the required gas protection measures with the Regulators, all installed boreholes should be decommissioned in accordance with current Environment Agency guidance to prevent them acting as a preferential pathway for migration of ground gas and contamination.

15.2 Mitigation Measures during Construction

15.2.1 General Measures

The following measures are required during the construction phase of development:

Implementation of health, safety, welfare and hygiene practices appropriate to the contamination risks identified by the site investigation and qualitative risk assessment, including asbestos risk.

Monitoring of sensitive structures including the existing quay wall, tie rods and anchor piles during construction activities.

Monitoring for soil gas and vapours in excavations, buried chambers and confined spaces during construction where man access is required.

Control of surface water runoff during all works until completion.

Implementation of dust and asbestos fibre control measures and monitoring, particularly during the earthworks. The specific measures required are to be informed by a construction phase risk assessment.

15.2.2 Measures Relating to Potential Asbestos Contamination

Made ground, has been identified to be impacted with asbestos fibres (chrysotile). Quantification analysis of the seven positive samples determined asbestos concentrations of up to 0.002%. There is a risk that further, unrecorded asbestos fibres and Asbestos Contaminated Materials (ACMs) may be identified in the soils during development.

The Principal Contractor, or their appointed sub-contractor/s shall undertake, or employ a specialist asbestos consultant/ contractor to undertake, a construction phase risk assessment and advise on the requirements for monitoring and mitigation measures during development of the site.

The Principal Contractor, or their appointed sub-contractor/s, shall prepare their own Risk Assessment and Method Statement (RAMS) for the proposed works following consultation with an Asbestos Specialist, and undertake all further testing and controls highlighted which are considered

necessary, to satisfy themselves of the potential risks and that the mitigation measures adopted fully address these risks and sever potential pathways to human health.

Should previously unidentified asbestos be identified in the soils during the works, the Engineer should be informed and the Principal Contractor, or their appointed sub-contractor/s, shall take further advice from a Specialist Asbestos consultant / contractor.

15.3 Material Management Plan

Should the reuse of site won made ground be proposed as part of the development, or the importation of engineered fill, working platforms or planting mediums from other development sites, a Materials Management Plan (MMP) may be required to facilitate these operations. The MMP should be prepared in accordance with 'The Definition of Waste: Development Industry Code of Practice (DoW CoP), published by Contaminated Land: Applications in Real Environments (CL:AIRE).

15.4 Mitigation Measures within the Built Development

It is recommended that the following mitigation measures are incorporated into the built development:

15.3.1 Clean Planting Medium

Post construction, the site is to comprise built development and hardstanding. It is understood that soft landscaping is to be restricted to raised planters. On this basis, there is no pathway for end users to come into direct contact with contaminated soils (including asbestos) underlying the site.

Imported soils used in the planters will need to be chemically suitable for use such that they do not present a risk to human health, with criteria agreed with the Regulators as part of the planning process and testing undertaken prior to import.

15.3.2 Gas Protection Measures

The gas monitoring undertaken to date has identified the gassing regime on site as a preliminary Gas Characteristic Situation 2 in accordance with CIRIA C665 (Ref. 10) and BS 8485 (Ref. 11), indicating that gas protection measures will be required within confined spaces in the proposed built development.

Protection measures shall be designed, installed and validated by a Specialist Gas Protection System Contractor with the proposed measures and validation procedures agreed with the Local Authority prior to installation. For the avoidance of doubt, Fairhurst do not offer these services.

Significant sources of hydrocarbons and volatile vapours were not recorded during the site investigation or during the post site works monitoring to date, however it is recommended that the specialist Contractor consider the requirement to incorporate vapour protection measures within the built development as part of their design. In addition, should hydrocarbon contamination be identified during the enabling works then this should be considered within any designs.

At the time of reporting the gas monitoring programme is incomplete. The assessment of the requirement for gas protection measures presented above is preliminary and subject to completion of two further monitoring visits (anticipated to be completed early 2024).

The BGS Site Specific Radon Report (included in Ref. 01) states that radon protective measures are not required for the development area. The requirement for omission of site specific radon protection measures should, however, be agreed with Environmental Health as part of the detailed design of the gas protection measures.

15.3.3 In Ground Concrete

Based on the site investigation, buried concrete should be designed to Design Sulphate Class DS-2, ACEC Class AC-2 in accordance with BRE Special Digest 1:2005, Concrete in Aggressive Ground (Ref. 16).

The risk to specific elements of the proposed development from high concentrations of chlorides and sulphates in saline groundwater and salt water spray should also be eliminated by designing the concrete mix to be resistant to the environmental conditions at the site – BS6349 Part 1 (2000) (Ref. 17). In addition, cover to the main reinforcement shall be 75mm minimum.

It is recommended that as part of the detailed design of the concrete mix, supplementary testing is undertaken on waters from the River Esk to confirm the chemical composition (including chloride content) and confirm the above classification.

15.3.4 Potable Water Supply

At the time of reporting, the proposed route of potable water is unknown. In view of the chemical conditions prevailing at the site special precautions are likely to be required in relation to potable water pipes. It is recommended that upon confirmation of their proposed route, the desk study and factual site investigation results are provided to the Local Water Authority for consideration, and their requirements confirmed concerning further testing along the line of supply pipelines or use of chemically resistant pipework, in accordance with guidance from the UK Water Industry Research (Ref. 18).

15.3.5 Unrecorded Contamination

The above assessment is based on the intrusive investigations results to date. The risk of unrecorded contamination, including but not limited to asbestos and hydrocarbons, being identified within areas of the site which have not previously been investigated cannot be fully discounted and is considered high. Such occurrences should immediately be notified to the Engineer for consideration.

16.0 PRELIMINARY ENGINEERING ASSESSMENT

16.1 Design Elements and Requirements

The development proposals are shown on Enjoy Design's drawing, included in Appendix 1.

The commentary provided within the following section represents a preliminary assessment and is subject to confirmation of the structural design requirements, which at this stage have been inferred as;

Maximum unfactored column loads of 2,500kN.

Maximum unfactored line loads of 50kN/m.

A permissible tolerance of 10mm for Total Settlement to the building

A permissible tolerance of 1 in 500 for Differential Settlement to the building.

A proposed finished floor level (FFL) of 3.89mOD for the building, and topographical levels between 3.497mOD and 3.890mOD for external areas, which remain close to existing.

16.2 Geotechnical Considerations

Based on current site conditions, the findings of the ground investigation and development proposals. the following geotechnical considerations have been identified.

Hardstanding including reinforced concrete is present throughout the majority of the site area which will require as a minimum removal in the area of the building and to facilitate service installation.

The presence of heterogeneous made ground across the site with variable thickness, strength and compressibility, and considered to be an unsuitable founding strata.

Alluvial deposits including peat with low and variable bearing capacity, compressibility and material properties and comprising interlayered granular and cohesive materials.

The presence of relic foundations, structures and floor slabs associated with historic development, along with structures and fill materials associated with historical reclamation of the area from the river. These features could present obstructions during construction works or present hard spots to the development.

The potential presence of ballast and large debris within the made ground and cobbles and boulders in the natural superficial deposits which could present hard spots and difficult ground conditions for piling or excavations for services.

Presence of sensitive infrastructure including quay walls, anchor piles and tie rods which are to be retained and will require protection during construction activities. Additional loading of this sensitive infrastructure should be avoided during construction and future operation without further detailed assessment.

The requirement to import suitable materials to form working platforms (i.e. a piling platform).

Generation of hardstanding and Made Ground materials requiring either reuse as part of the development under an approved Materials Management Plan, Environmental Exemption or Environmental Permit, or offsite disposal. Due to the proposed levels the latter is the more likely option.

The requirement to import suitable materials to act as a planting medium within raised planters (i.e. subsoil and topsoil).

The presence of localised potentially combustible materials including coal within the made ground requiring appropriate mitigation.

The presence of existing services requiring diversion, decommissioning or protection, should they be retained.

Shallow groundwater within the Made Ground and superficial deposits, inferred to be in hydraulic continuity with the river and tidally influenced. Due to the groundwater table being variable in height and shallow in places and at times, it is considered that groundwater conditions will present a constraint to the works programme and require control measures during excavations. This could include undertaking works at low tide and/ or dewatering.

Potential for aggressive ground and groundwaters including pH and sulphate within soils and chlorides and saltwater, with the potential for chemical attack on in-ground concrete, foundations and services.

A moderate risk of UXO, requiring the following mitigation measures:

- Preparation of a UXO Risk Management Plan.

- Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

16.3 Temporary Works

The following temporary works are anticipated as part of the proposed development:

Vibration and visual monitoring of the existing quay walls associated with Endeavour Wharf to confirm their ongoing integrity.

Excavation of made ground and superficial deposits should give minimal difficulty to traditional plant.

Removal of relic structures or large obstructions to facilitate the works, where encountered, will require use of a hydraulic breaker.

Shallow groundwater within the made ground and superficial deposits is inferred to be in hydraulic continuity with the river and tidally influenced. Discontinuous confined groundwaters are also expected behind/within structures. Significant groundwater flow is expected during site works and groundwater conditions could present a constraint to the works programme and require temporary works and control measures during excavations. This could include undertaking works at low tide and/ or dewatering by means of sumps, coffer dams and well point dewatering.

The shallow water bearing/tidally influenced very low density granular layers may be prone to necking after auger/flight extraction. Piles, if proposed, are anticipated to require installation with temporary casing to mitigate the impacts of the tidally influenced groundwater present beneath the site.

The made ground has been locally recorded to contain asbestos (0.002%). The presence of further materials at greater concentrations cannot be discounted. The generation of contaminated/ asbestos impacted arisings, control of asbestos fibre generation and generation of preferential contamination migration pathways should be considered by the Contractor during the proposed piling works.

Due to the identified material properties of the granular made ground and the preliminary groundwater conditions, adequate lateral trench support will be required for deeper excavations, to prevent trench wall collapse or over excavations, as well as to create a safe working environment.

Excavations on this site should also remain open for as short a period as possible, since some site materials may be susceptible to deterioration, if left open to the natural elements for any significant period of time.

Surface water runoff management should be implemented during construction in order to prevent the generation and migration of leachates during excavation works and prevent potential impact on the adjacent River Esk.

A working platform / distribution mattress will be required to facilitate the piling works / ground improvement for the building foundations.

16.4 Foundation Design Requirements

Based upon the high design loadings anticipated, and the nature of the underlying soils (comprising made ground to depth of up to 4.30mbgl, underlain by alluvial deposits to a maximum depth of 15.50mbgl), conventional shallow pad and strip, raft or ground improvement solutions are not anticipated to be viable options for the scheme. As such, it is recommended that a piled foundation

solution is adopted to ensure that total and differential settlements are restricted to less than the required limits.

Subject to detailed design by a Specialist Piling Contractor, it is anticipated that piles using a combination of skin friction and end bearing, will be required to be installed either into the glacial deposits (dense gravels and stiff clays) or the bedrock.

Due to the presence of thick made ground, and compressible alluvial deposits, negative skin friction loads will need to be accommodated for by the load bearing capacity of the pile.

In addition to the detrimental impacts of negative skin friction, the proposed pile design will also need to consider the presence of concrete obstructions / ballast at shallow depth, cobbles and boulders within the natural deposits, the impacts of tidally influenced groundwater at shallow depth and the presence of sensitive structures (quay walls, anchor piles and tie rods) within the vicinity of the proposed building footprint.

The impact of potentially high concentrations of chlorides and sulphates from saline / tidal groundwater and salt water spray from the River Esk shall also be considered.

In consideration of the above constraints, a cased Continuous Flight Auger (CFA) or rotary bored piling option may appropriate.

Consultation with Roger Bullivant Limited, a Specialist Piling Contractor, has been undertaken as part of the design development of the substructure solution. Roger Bullivant Limited have advised that 450mm diameter CFA piles could provide a capacity of up to 600kN per pile.

Alternatively, subject to detailed review by a Specialist Contractor and written confirmation that the site constraints (including: tidally influenced groundwater, sensitive structures and the presence of both shallow and deep obstructions), ground improvement in the form of Controlled Modulus Columns (CMCs) / Rigid Inclusions may be a more economical solution Preliminary consultation with Vibro Menard, a Specialist Ground Improvement Contactor, indicates a uniform bearing capacity of 200kN/m^2 could be achieved across the site.

For both piled and CMC solutions, an imported granular working platform / distribution mattress would be required to facilitate installation. The thickness of the granular working platform would be subject to detailed design following confirmation of the proposed rig loadings and size. The associated disposal of existing materials to accommodate the working platform should be included in the development costings.

16.5 Floor Slab

On the basis of the ground conditions identified on site comprising made ground to depths of up to 4.30mbgl, and the presence of natural alluvial deposits with poor engineering properties to a significant depth, a suspended floor slab is likely to be required within the proposed maritime building.

Alternatively, should ground improvement such as CMC's be utilised, there is potential for a ground bearing solution to be implemented alongside a distribution mattress where total and differential settlements can be reduced to within acceptable tolerances.

16.6 Pavement Design

On the basis that the proposed site levels (remaining relatively close to existing), the maximum loading of a bin lorry and an assumed preliminary construction thickness of 0.45m, formation levels

within areas of hardstanding and access roads are anticipated to lie within the granular made ground deposits.

In consideration of the guidance provided in Interim Advice Note 73/06 2009 (Ref. 14) and the nature of the made ground, the following preliminary CBR design values are likely to be applicable following adequate re-compaction of the subgrade:

3% CBR for the granular made ground; and

2% CBR for the cohesive made ground.

Materials with a CBR less than 2.5% are generally considered an unsuitable base upon which to form hardstanding.

It is recommended that confirmatory CBR testing of the subgrade is undertaken following proof rolling during construction. The formation level should be protected prior to and following testing (i.e. between excavation and placement of hardstanding). If the formation is left exposed and subject to moisture, then due to the materials encountered during the investigation there is a high chance that the deposits could quickly degrade resulting in a significantly lower CBR.

Soft spots and cohesive made ground deposits demonstrating a CBR lower than 2.5% cannot be discounted. These materials would need to be locally removed and replaced with competent material, such as SHW Class 6F5, to form a more robust construction makeup.

Subject to the groundwater conditions encountered, and the CBR results recorded during confirmatory testing, there may also be a requirement to undertake a level of stabilisation (lime / cement) at formation level, or introduce increased capping thicknesses / geogrids within the construction make-ups in the car park areas.

17.0 REFERENCES

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4. BS 5930:2015+A1:2020, Code of Practice for Site Investigations.
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6. Alto Tie Rod Investigation Pack, May 2023.
7. BS 14688-2:2018, Geotechnical investigation and testing – Identification and Classification of Soil, Part 2: Principles for a classification.
8. BS 22476-3 2005 + A1 2011, Geotechnical investigation and testing, Field testing - standard penetration test.
9. BS 1377:1990, Soils for Civil Engineering Purposes. Part 1: General requirements and sample preparation.
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12. BGS Radon potential - British Geological Survey (bgs.ac.uk).
13. Foundation Design and Construction, 7th Edition, MJ Tomlinson, 2001.
14. Interim Advice Note 73/06 Revision 1 (2009). Design Guidance for Road Pavement Foundations (Draft HD25).
15. Using the Point Load Test to Determine the Uniaxial Compressive Strength of Coal Measure Rock, John Rusnak and Christopher Mark, January 2000.
16. BRE Special Digest No. 1:2005 (3rd Edition), Concrete in Aggressive Ground.
17. BS6349 Part 1 (2000), Maritime Structures. General Criteria.
18. Water Sector Guidance in relation to the adoption of self-laid assets by Water Companies in England (UKWIR), June 2022.

Appendix 1

Drawings

Drawing Ref.	Revision	Originator	Title
P22-01573-MET-EXT-XX-TOP-M2-G-001	01	Met Geo Environmental	Topographical Survey
4052-01	A	Three Sixty Group	Ground Penetrating Radar Interpretation
WHIT-ENJ-Z0-00-DR-A-90002 S3	P05	Enjoy Design Ltd	Existing Site Plan
WHIT-ENJ-Z0-00-DR-A-90003	P13	Enjoy Design Ltd	Proposed Site Plan
WHIT-FHT_Z1_00_DR_G-09001	P02	Fairhurst	Exploratory Hole Location Plan

Notes

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N

Grid : OS National Grid.
Using the OS GPS Network and applying OSTN02 transformation and then removing the scale factor for true distances with a one-step transformation centred on S1.

Datum : OS Level Datum.
Using the OS GPS Network and applying OSGM02 National Geoid Model to obtain local area corrections.

Station Listing

Station	Easting	Northing	Level
L1	489887.403	510840.196	4.415
L2	489885.913	510867.603	3.970
L3	489940.375	510875.117	3.399
L4	489954.456	510820.161	3.536
L6	489955.919	510784.165	3.498
S1	489922.890	510825.264	4.161
S4	489910.551	510785.063	4.336

KEY

AIR VALVE	AV	JUNCTION BOX	JB
BENCH MARK	BM	KERB OUTLET	KO
BIN	BIN	LAMP POST	LP
BOLLARD	BOL	MANHOLE (CIRCULAR)	MH (C)
BORE HOLE	BH	MANHOLE (RECTANGULAR)	MH (R)
BRITISH TELECOM COVER	BT	MANHOLE (TRIANGULAR)	MH (T)
BUS STOP	BUS	MARKER POST	MKP
CABLE TV COVER	CATV	OILKY	OIL
CABLE TV SUPPLY	CTV	RODDING EYE	RE
COLUMN	COL	SIGN POST	SIGN
DROPPED KERB	DK	TELECOM COVER	TC
EARTHING POINT	EP	TELEGRAPH POLE	TP
ELECTRICITY COVER	ELEC	THRESHOLD LEVEL	TH
ELECTRICITY POLE	EP	TRAFFIC LIGHT	TL
FIRE HYDRANT	FH	TRIAL PIT	TRIAL PIT
GAS VALVE	GAS	WASH OUT	WO
GATE	GATE	WATER METER	WM
INSPECTION COVER (CIRCULAR)	IC	WATER STOP COCK	WSC
INSPECTION COVER (RECTANGULAR)	IC	WATER STOP VALVE	WV
COVER LEVEL	CL	CHAMBER BASE LEVEL	CH.L
INVERT LEVEL	IL	WATER SURFACE LEVEL	WL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE	UTM
GIRTH OF TREE TRUNK	G	DIAMETER OF TREE TRUNK	D
HEIGHT TO TOP OF TREE CANOPY	H	MULTI BOLE TREE	MB
LADDER GRAB RAIL	LGR		
MOORING POINT	MP		

Rev	Date	Drawn	Description	Check
-	--/--/----	--	--	--

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Client
WILLMOTT DIXON CONSTRUCTION LIMITED

Site
ENDEAVOUR WHARF
LANGBOURNE ROAD, WHITBY, YO21 1YW

Title
TOPOGRAPHICAL SURVEY

Surveyed	CAC, LD	Drawn	CAC
Check	DA	Date	07/02/2023
Scale 1:200	Job No P22-01573	Sheet Size A0	Rev 01

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P22-01573	MET	EXT	XX	TOP	M2	G	001

SCALE 1:200 @ A1

0 25m

N

Direction of North taken from topographical drawing *WHIT-MET- ZZ-XX-SU- G-00001_ MetGeo-Topographical Survey'* provided by the client.

Key

- Possible buried structural feature
- Possible secondary layer of reinforcement.
- 0.4 / 0.2 — Abrupt change in concrete slab level (depths in meters below ground level)
- Possible extent of former structure
- 0.2 — Approximate depth to rebar (Meters below ground level)
- 0.9-2.1 — Heterogeneous area anomaly - high amplitude. Possibly associated with disturbed ground - change in materials
- Extent of general heterogeneous response. Possible area of made ground or a previous ground surface
- 0.2 - 1.1 — Approximate depths of heterogeneous response (Meters below ground level)
- Area of signal attenuation. Possible change in buried materials / former excavation or high moisture content
- 0.9-2.1 — Sub-surface horizon. Possible previous ground surface, compacted layer or change in moisture content
- 0.2 — Approximate depth to sub-surface horizon (Meters below ground level)
- Linear anomaly. Possible structural feature or buried utility
- 0.2 — Approximate depth of GPR anomaly (Meters below ground level)
- Survey extents
- GPR extents

THREE SIXTY GROUP

UNIT 3, MANDALE PARK, WALLSEND, TYNE & WEAR, NE29 7FN

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Client Name: Willmott Dixon

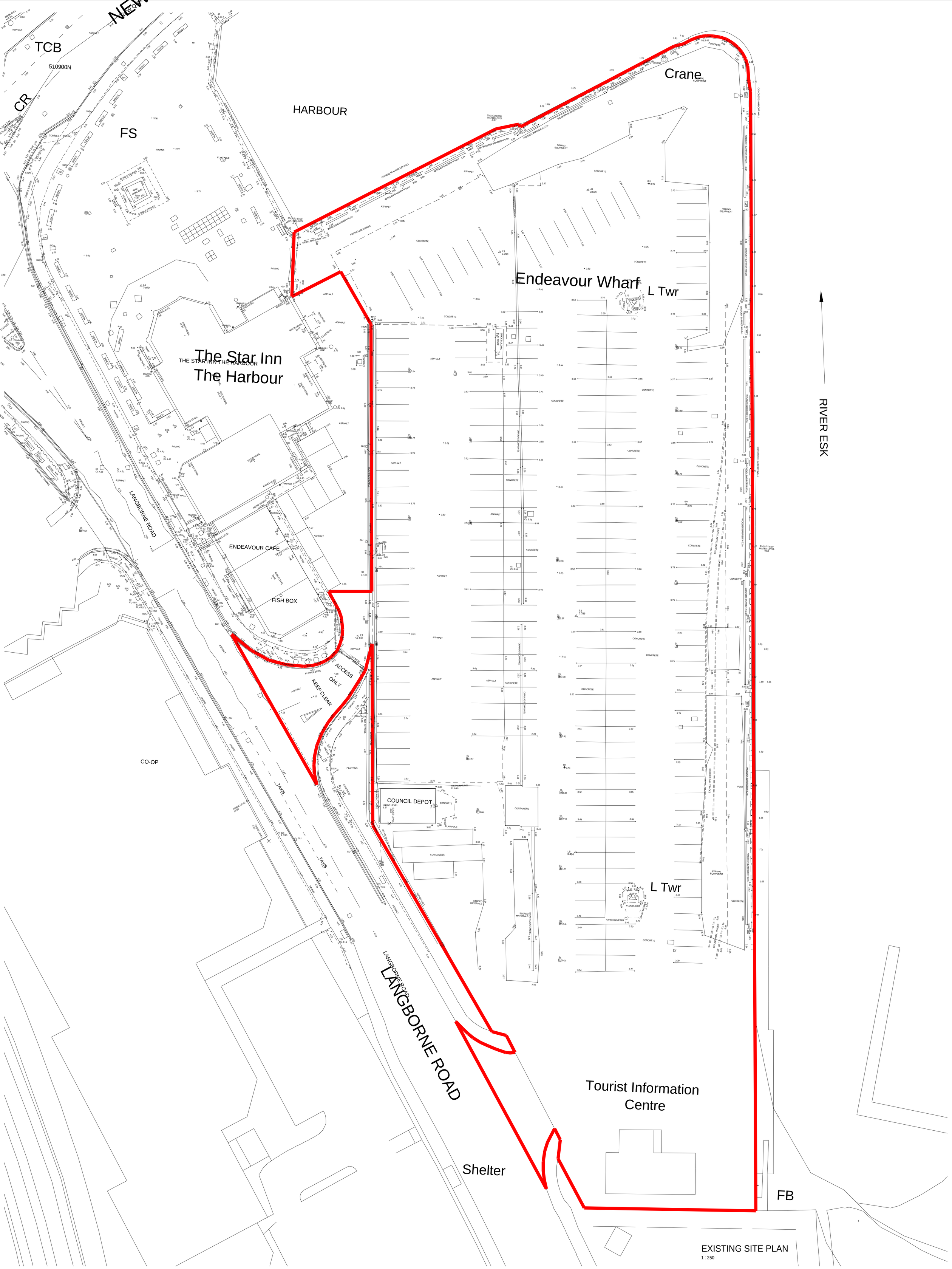
Job Title: Whitby Maritime Hub
Endeavour Wharf

Drawing Title: Ground Penetrating Radar Interpretation

Scale	Drawn
1:200 @ A1	NB
Date: 17/03/23	Approved: PH

Revision	Amendments		By	Checked

Project Number	Drawing No.	Revision	Status
4052	01	A	Final



1 : 200
0 2 4 6 8 10m

Contractor must verify all dimensions on site before commencing any work or shop drawings. If this drawing exceeds the quantities taken in any way the Architects are to be informed before the work is initiated. Only figured dimensions to be taken from this drawing. Do notscale off this drawing. Drawings based on Ordnance Survey and / or existing record drawings -design and drawing content subject to Site Survey, Structural Survey, Site Investigations, Planning and Statutory Requirements and Approvals. Authorised reproduction from Ordnance Survey Map with permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved. Enjoy Design Ltd.

Notes.

TOPOGRAPHICAL SURVEY BASED ON MET SURVEYS DRAWING P22-01573-MET-EXT-XX-TOP-M2-G-1-2D Topographical Survey

Rev.	Des.	By	Date	Ch.
P05	Site Boundary Update	MP	06.12.23	RG
P04	Site Boundary Update	MP	25.09.23	RG
P03	Building footprint amended. Red line boundary updated	RG	07.03.23	RG
P02	Red Line Boundary added	RG	22.02.23	RG
P01	First Issue	RG	16.02.23	RG

Suitability S3

Status:

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Client: WILLMOTT DIXON CONSTRUCTION
Job No: 22,101
Project: WHITBY MARITIME HUB
Title: EXISTING SITE PLAN
Date: 02/16/23
Scale: 1 : 250 @ A1
Drawn: RG
Check: RG
Drawing No: WHIT ENJ - Z0 - 00 -DR -A - 90002
Rev: P05

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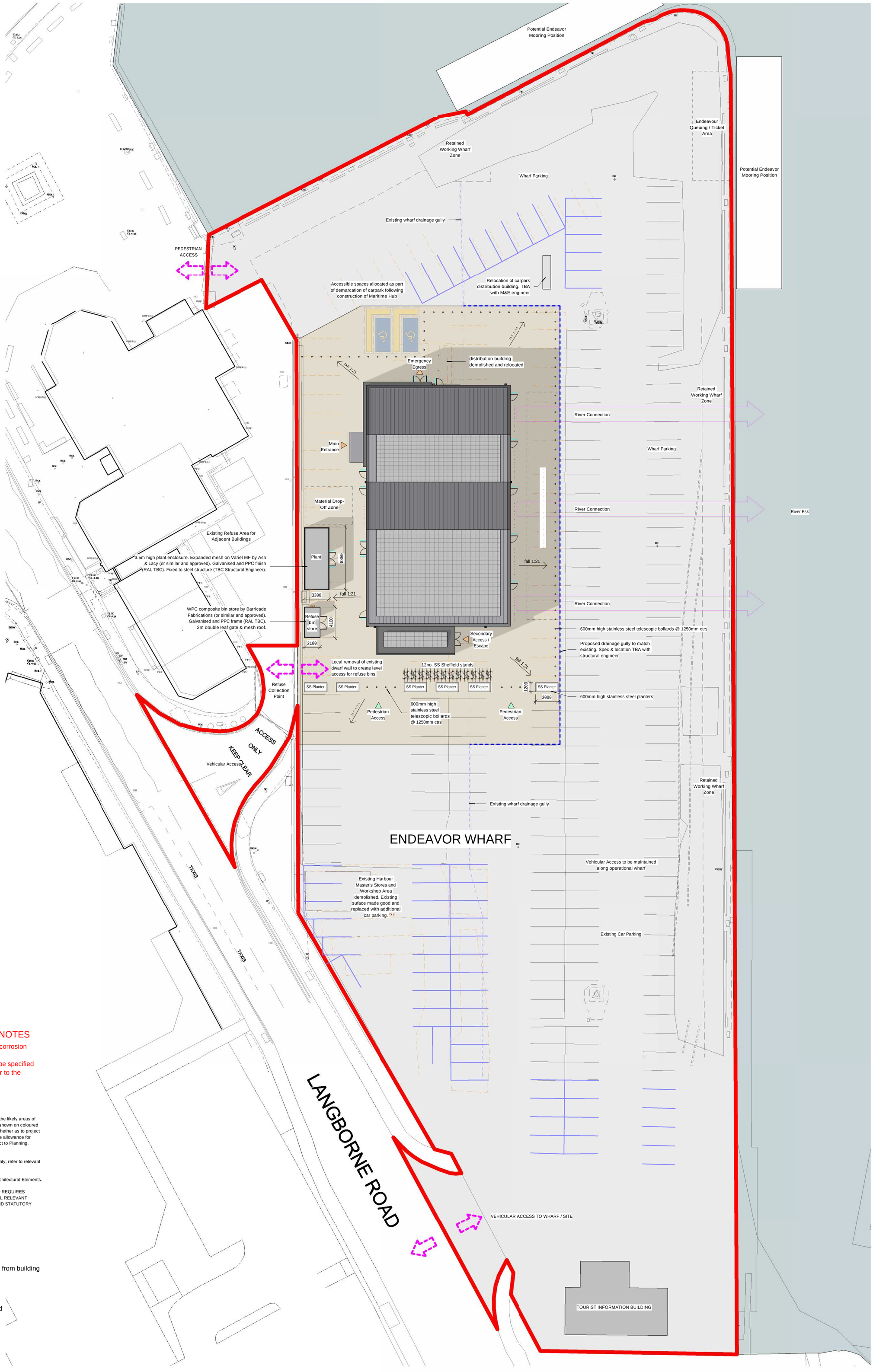
EXISTING SITE PLAN

1 : 250



CORROSION CLASSIFICATION NOTES

1. All materials & fixings are to comply with C4 corrosion classification based on ISO 12944-2.
2. All materials & fixings below level 01 should be specified to resist long term contact with sea water - refer to the Flood Risk Assessment for further details.

90 Series General Arrangement Notes

1. Any areas indicated on the plans are approximate. They relate to the likely areas of the building at the current state of the design and are calculated as shown on coloured plans. Any decision to be made on the basis of these predictions, whether as to project viability, pre-letting, lease agreements or the like, should include due allowance for design development and building tolerances. Floor areas are subject to Planning, Building Control and other statutory approvals.

2. Any structural, services or fit out detail shown is for coordination only, refer to relevant Consultants/Clients information for details.

3. Refer to Enjoy NBS for full outline performance specification of Architectural Elements.

4. THE CONTENT OF THIS DRAWING IS FOR DESIGN INTENT AND REQUIRES FURTHER DESIGN DEVELOPMENT AND COORDINATION WITH ALL RELEVANT CONSULTANTS, SUB-CONTRACTORS, SPECIALIST DESIGNERS AND STATUTORY AUTHORITIES.

Landscape Key

- New tarmacadam surface. Falling at 1:21 from building
- Existing surface & levels maintained
- Application Boundary
- Demo & existing parking spaces removed
- Proposed car parking spaces
- Proposed drainage gully
- SS Door Barriers

Proposed Site Plan

1 : 250

N

1 : 250

0 3 5 8 10 13m

Notes.

TOPOGRAPHICAL SURVEY BASED ON MET SURVEYS DRAWING P22-01573-MET-EXT-XX-TOP-M2-G-1-2D Topographical Survey

Rev.	Des.	By	Date	Ch.
P13	Site Boundary Update	MP	06.12.23	RG
P12	Red line updated + additional site info	MP	29.11.23	RG
P11	Added location of external Plant compound; Added location of cycle storage; Added further info regarding external works adjacent refuse store	MP	14.11.23	RG
P10	Ownership Boundary Included	MP	07.11.23	RG
P09	Updated in line with the latest building footprint	HSR	24.10.23	RG
P08	Ramped access update	MP	25.09.23	RG
P07	Re-design following recution in GIFA	RG	19.09.23	RG

Suitability: S2

Status:

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Client: WILLMOTT DIXON CONSTRUCTION

Job No: 22,101

Project: WHITBY MARITIME HUB

Title: PROPOSED SITE PLAN

Date: 02/16/23 | Scale: As indicated @ A1 | Drawn: SC | Check: RG

Drawing No: WHIT ENJ - Z0 - 00 -DR -A - 90003

Rev: P13

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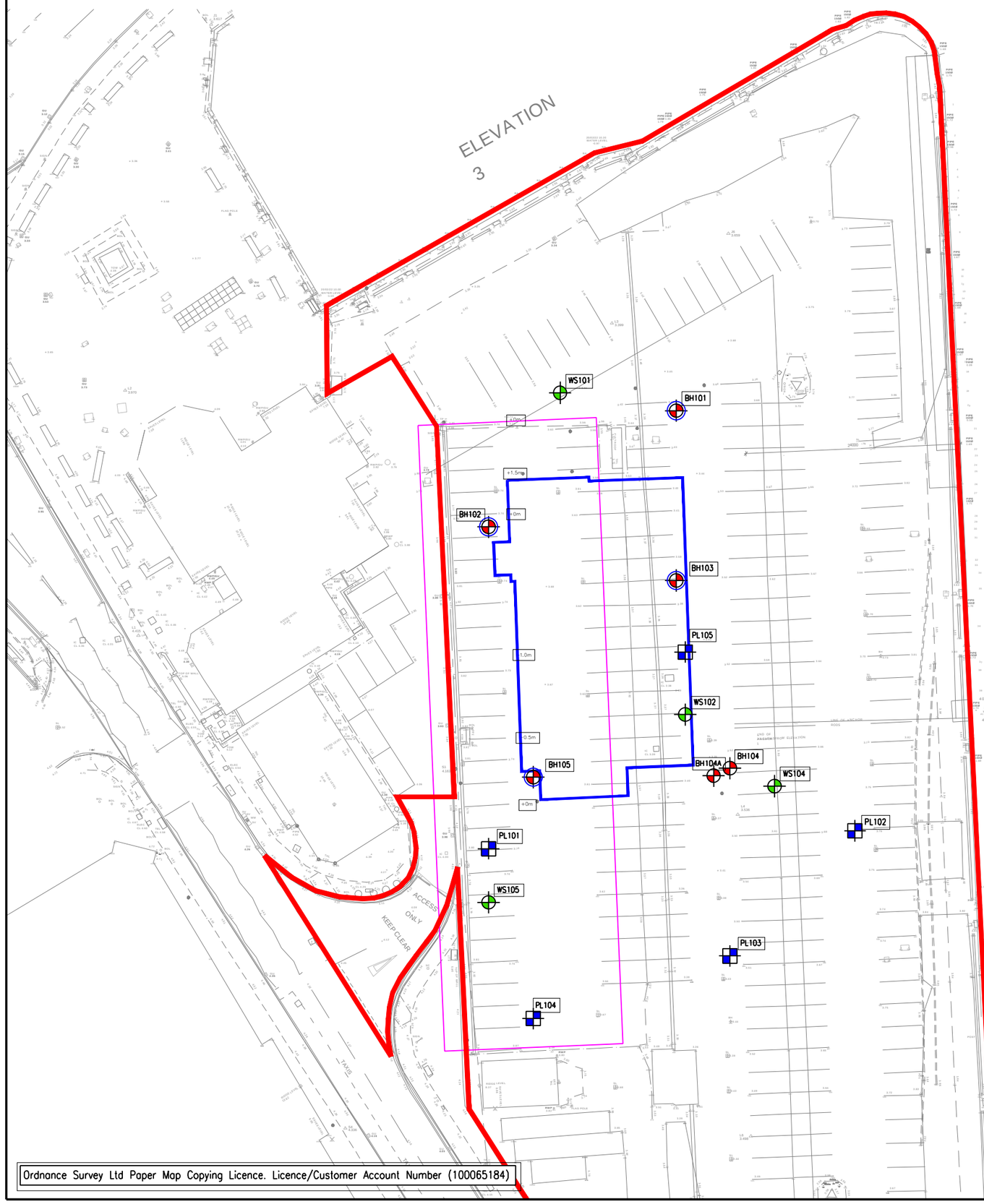

Ordnance Survey Ltd Paper Map Copying Licence. Licence/Customer Account Number (100065184)

Do not scale from this drawing.

Key:

- Preliminary Site Boundary
- Indicative Proposed Building Footprint
- Window Sample Borehole
- Cable Percussive Borehole
- Rotary Cored Follow On Drilling
- Plate Load Test
- Indicative Tie Rod Exclusion Zone (24m)
- Inferred Extents of Historic Building
- Extent of New Tarmacadam Surface

Rev.	Date	Description	Drwn.	Chkd.	Appd.
P02	19/12/23	UPDATED TO INCLUDE EXTERNAL DEVELOPMENT EXTENT	RD	CMC	DD
P01	11/12/23	UPDATED TO REFLECT BIM NAMING CONVENTION	CMC	DD	DD
D	11/12/23	AS BUILT ISSUE	OAU	CMC	DD
C	11/10/23	REVISED TO SHOW PROPOSED EXPLORATORY HOLE COORDINATES AND LARGER EXCLUSION ZONE	RD	CMC	JMM
B	27/03/23	REVISED TO SHOW AS BUILT EXPLORATORY HOLE LOCATIONS AND PHASE 2 PROPOSED LOCATION	RD	DD	DD
A	09/03/23	REVISED TO INCLUDE SITE BOUNDARY AND REVISED EXPLORATORY POSITIONS	RD	CMC	DD

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Client: WILLMOTT DIXON

Project Title: WHITBY MARITIME HUB

Drawing Title: EXPLORATORY HOLE LOCATION PLAN

Scale at A3:	Status:		
1:500	Tender		
Drawn:	Checked:	Approved:	
RD	CMC	DD	
Date:	Date:	Date:	
30/01/23	01/02/23	01/02/23	

Drawing No.: WHIT-FHT-Z1-00-DR-G-09001

Revision: P02

Appendix 2a

Ground Investigation Factual Report (Draft)



Factual Site Investigation

Whitby Maritime Hub

Willmott Dixon Construction Ltd

S230311

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info@solmek.com

FACTUAL SITE INVESTIGATION REPORT

WHITBY MARITIME HUB

TABLE OF CONTENTS

APPENDICES

Revision	Date	Prepared By	Signed
Draft	December 2023	L Cassidy *Principal Environmental Engineer*	
		Checked By	
		R Woods *Principal Geotechnical Engineer*	
		Approved By	
		R Woods *Principal Geotechnical Engineer*	

1 INTRODUCTION

1.1 Authorisation

The site investigation described in this report was carried out by Solmek to the instructions of Fairhurst, on behalf of Wilmott Dixon Construction, on land at Endeavour car park, Whitby. A site location plan is presented as Figure 1 in Appendix A.

1.2 Scope of Works

The site is expected to be developed with a new commercial building.

A geotechnical and environmental investigation including a ground gas assessment was requested. The type and position of exploratory positions and the scope and nature of testing were all determined by Fairhurst.

The fieldwork and testing was generally carried out according to the recommendations of BS5930:2015+A1:2020 “Code of Practice for Ground Investigations” and where applicable BS EN 1997-2:2007 with soil descriptions to BS EN 14688-1:2013 where applicable. The information provided in this report is based on the investigation fieldwork and is subject to the comments and approval of the various regulatory authorities.

There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report. Solmek reserve the right to alter conclusions and recommendations should further information be available or provided. Any schematic representation or opinion of the possible configuration of ground conditions between exploratory holes is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

2 SITE DESCRIPTION AND FIELDWORK

The site is located at 489952, 510865 and is approximately 0.3Ha. The site consists of hardstanding (variably concrete/tarmacadam) forming a parking area, serving the centre of Whitby. The car park is generally busy and access is via Langborne Road, to the west.

The site falls slightly towards the east.

The site is bounded to the north and west by roads/commercial developments, and the River Esk to the east.

2.1 Fieldwork

The fieldwork was undertaken in two phases, with Phase 1 commencing on 13th March 2023 and Phase 2 commencing on 16th October 2023. The extent of the investigation was:

- Ground penetrating radar (GPR) scan of the exploratory positions to check for underground utilities.
- 2no. cable percussive boreholes (BH104 & BH104A) to a maximum depth of 3.70mbgl.
  - The borehole locations and depths were specified by Fairhurst.
  - These boreholes were both terminated due to encountering shallow obstructions.
- 4no. cable percussive boreholes with rotary follow-on (BH101-BH103 & BH105) to a maximum depth of 28.50mbgl.
  - The borehole locations and depths were specified by Fairhurst.
- 4no. small percussive boreholes (WS101-WS102 & WS104-WS105) to a maximum depth of 6.45mbgl.
  - The borehole locations and depths were specified by Fairhurst.
  - WS103 was cancelled.
- Gas monitoring wells were installed within all boreholes (except BH104 & BH104A).
  - Gas response zones were designed by Fairhurst and are shown on the borehole logs and are summarised in Table 2.
- 5no. machine excavated trial pits (PLT01-PLT05) to a maximum depth of 0.70mbgl.
  - These locations were specified by Fairhurst for Plate Load Tests to be undertaken.
- Insitu testing in the exploratory boreholes as Standard Penetration Tests (SPTs).

Retrieval of samples for geotechnical and contamination testing.
Topographic survey of fieldwork positions.

The boreholes were backfilled with gas pipe installations, and the trial pits were backfilled with clean arisings.

Descriptions of the strata encountered in the exploratory positions together with details of sampling and groundwater are presented in Appendix B of this report. A plan showing the location of all positions can be found in Appendix A (Figure 2).

3 GROUND CONDITIONS

A brief summary of the ground conditions encountered is given below.

3.1 Made Ground

Made ground was variable across the site and was encountered to a minimum depth of 3.30mbgl (BH102) and a maximum depth of 4.30mbgl (BH101).

The made ground was not fully penetrated within BH104, BH104A, WS104, which terminated at depths between 1.70 and 3.70mbgl.

The made ground broadly consisted of a surface covering of concrete, which ranged in thickness from 0.22 to 0.40m.

Within BH102, BH105, PLT01, PLT04 and WS105, the concrete was overlain by macadam, ranging in thickness from 0.17-0.30m.

The underlying made ground was variable, with a granular subbase of dolomite (0.03-0.35m thick) generally present beneath the concrete.

The remainder of the made ground generally consisted of granular material of varying composition, with ash, brick, sandstone, limestone, chalk, ceramics, coal and metal present.

Locally, bands of cohesive made ground were encountered, as summarised below:

BH101 – 3.00-4.30m: Soft slightly sandy gravelly silt
BH104 – 3.20-3.60m: Soft slightly sandy slightly gravelly silt
BH105 – 2.60-3.40m: Soft slightly sandy slightly gravelly silty clay
WS102 – 0.60-1.50m: Soft sandy slightly gravelly clay
WS104 – 0.60-3.45m: Soft sandy slightly gravelly clay
WS105 – 0.75-3.50m: Soft sandy slightly gravelly clay

Within BH101 only, a hydrocarbon sheen was noted at 3.10mbgl.

3.2 Obstructions

The below buried obstructions (other than surface hardstanding) were encountered during the intrusive works:

BH101 – buried concrete from 0.45-0.70m
BH102 – SPT result of 50+ at 1.20mbgl
BH103 – SPT result of 50+ at 2.00mbgl
BH104 – SPT result of 50+ at 1.20mbgl, metal obstruction encountered at 3.70mbgl resulting in the borehole being terminated
BH104A – concrete obstruction encountered at 1.70mbgl, resulting in the borehole being terminated

3.3 Natural Deposits

Proven to underlie the made ground deposits across the site, natural deposits variably comprised interbedded bands of generally loose sands and soft silts/clays to depths of between 12.30 and 15.50mbgl,

at which point a band of dense to very dense sandy gravel (locally cobbles) was encountered and then proven to the base of the natural deposits.

Peat was encountered locally, within BH102 (7.10-8.90mbgl) and BH105 (7.10-8.70mbgl), whilst peat bands were noted within the clay between 8.90 and 12.00mbgl within BH102. Plant matter was present within BH101 (7.00-12.30mbgl) and BH103 (7.90-12.40mbgl).

3.4 Solid Geology

Rockhead was encountered between 17.20mbgl within BH101 and BH105 and18.00mbgl within BH103, generally comprising mudstone (sandstone within BH103).

The rock was cored to a maximum depth of 28.50mbgl and generally comprised mudstone with localised bands of siltstone and sandstone.

3.5 Groundwater

Groundwater strikes, where encountered, are presented on the exploratory logs (Appendix B) and are summarised below in Table 1:

TABLE 1: SUMMARY OF GROUNDWATER STRIKES

Exploratory Position	Depth Encountered (mbgl)	Depth after 20 minutes (mbgl)	Strata
BH101	3.10	2.95	MADE GROUND
	12.40	6.10	SANDY GRAVEL
BH102	2.60	2.40	MADE GROUND
	12.40	8.20	SANDY GRAVEL
BH103	2.90	2.40	MADE GROUND
	12.10	7.30	SANDY GRAVEL
BH104	3.40	-	MADE GROUND
BH105	12.00	7.90	SANDY GRAVEL

It should be noted the rapid rate of advancement of the exploratory holes may mask minor seepages and it should be borne in mind that water levels fluctuate with a number of influences including season, rainfall, dewatering and pumping activities. Therefore, water levels significantly higher than those found during this investigation may be encountered.

4 CONTAMINATION TESTING RESULTS

The proposed development of the site is to involve the construction of a commercial building. The chemical samples were generally retrieved in line with BS ISO 18400-105:2017 “Soil Quality. Sampling”. The chemical results are presented in Appendix C.

4.1 Contamination Testing

4.1.1 Soil Contamination Testing

To provide information upon the possibility of ground contamination, 15no samples of made ground and 4no samples of natural material were selected for contamination testing. The number and type of samples chosen were specified by Fairhurst, and are detailed below:

Schedule 1: 17th March

WS101 – 0.80-1.00m (Made ground – cohesive)
WS101 – 3.70-3.90m (Natural sand)
WS102 – 0.60-0.80m (Made ground – cohesive)
WS102 – 1.50-1.60m (Made ground – cohesive)
WS102 – 3.80-4.00m (Natural sand)
WS104 – 0.60-0.80m (Made ground – cohesive)
WS105 – 1.20-1.50m (Made ground – cohesive)
WS105 – 3.50-4.00m (Natural sand)

Schedule 2: 20th October

BH102 – 0.60m (Made ground – granular)
BH102 – 1.00m (Made ground – granular)
BH102 – 7.50m (Peat)
BH105 – 2.20m (Made ground – granular)
BH105 – 3.50m (Made ground – cohesive)

Schedule 3: 25th October

BH104 – 0.80m (Made ground – granular)
BH104 – 1.00m (Made ground – cohesive)

Schedule 4: 27th October

BH101 – 0.80m (Made ground – granular)
BH101 – 3.10m (Made ground – cohesive, hydrocarbon sheen)
BH101 – 3.80m (Made ground – cohesive)
BH103 – 0.70m (Made ground – granular)

The samples selected are considered to provide coverage of both the made ground and shallow natural strata from across the site that would be most likely to be exposed during future site works. The samples were tested for the following contaminant suites:

16no Metals, semi-metals, non-metals, inorganic determinants
16no Speciated Polyaromatic Hydrocarbons (PAHs)
16no Total Petroleum Hydrocarbon Criteria Working Group fractions (TPHCWG)
16no Total Petroleum Hydrocarbons (DRO/MRO Splits)
16no Phenol
14no Asbestos identification screenings
5no Methyl Tert-Butyl Ether (MTBE)
5no Benzene, Toluene, Ethylbenzene & Xylenes (BTEX)
5no Waste Acceptance Criteria (WAC)
4no Organic Matter
4no Calorific Value
3no Chlorine
3no Nitrate
3no Polychlorinated Biphenyls (PCBs)
2no Asbestos quantification tests

4.1.2 Leachate Contamination Testing

The following samples were also sent for leachate analysis, at the request of Fairhurst:

Schedule 1: 17th March

WS101 – 0.80-1.00m (Made ground – cohesive)

WS102 – 1.50-1.60m (Made ground – cohesive)
WS102 – 3.80-4.00m (Natural sand)
WS104 – 0.60-0.80m (Made ground – cohesive)
WS105 – 1.20-1.50m (Made ground – cohesive)

Schedule 2: 20th October

BH102 – 1.00m (Made ground – granular)
BH105 – 2.20m (Made ground – granular)

Schedule 3: 25th October

BH104 – 0.80m (Made ground – granular)

Schedule 4: 27th October

BH101 – 0.80m (Made ground – granular)
BH101 – 3.10m (Made ground – cohesive, hydrocarbon sheen)
BH103 – 0.70m (Made ground – granular)

The leachates were tested for the following contaminant suites:

11no Metals, semi-metals, non-metals, inorganic determinants
11no Speciated Polyaromatic Hydrocarbons (PAHs)
11no Total Petroleum Hydrocarbon Criteria Working Group fractions (TPHCWG)
11no Phenol
3no Methyl Tert-Butyl Ether (MTBE)
3no Benzene, Toluene, Ethylbenzene & Xylenes (BTEX)
2no Polychlorinated Biphenyls (PCBs)

4.1.3 Water Contamination Testing

During the gas monitoring fieldwork, samples of groundwater were retrieved where possible. Samples were retrieved once the wells were purged 3x the well volume and then allowed to recharge. The following samples were sent for water analysis, at the request of Fairhurst:

BH101 – 3.07m
BH102 – 1.86m
BH103 – 1.45m
BH105 – 2.10m
WS101 – 2.10m

The water samples were tested for the following contaminant suites:

5no Metals, semi-metals, non-metals, inorganic determinants
5no Water Hardness
5no Speciated Polyaromatic Hydrocarbons (PAHs)
5no Total Petroleum Hydrocarbon Criteria Working Group fractions (TPHCWG)
5no Phenol
3no Methyl Tert-Butyl Ether (MTBE)
3no Benzene, Toluene, Ethylbenzene & Xylenes (BTEX)
3no Polychlorinated Biphenyls (PCBs)

The water sampling results are outstanding and will be added to a future revision of this report.

4.2 Test Results

The contamination test results are presented in Appendix C.

5 GROUND GAS/WATER MONITORING

The proposed development includes the construction of a commercial building.

Ground gases such as carbon dioxide (CO_2), methane (CH_4), carbon monoxide (CO) and volatile organic compounds (VOCs) can be classed as a form of contamination where there is a potential risk to human health.

For this report, gas monitoring was via measuring emissions from eight standpipes (all boreholes except BH104 & BH104A) that were installed during the sitework. The gas monitoring will consist of six visits.

5.1 Monitoring Wells and Response Zones

During the site investigation works, gas monitoring wells were installed within fourteen boreholes, at the request of Fairhurst. The response zones were specified by Fairhurst and are briefly summarised below in Table 2.

TABLE 2: SUMMARY OF MONITORING WELL RESPONSE ZONES

Borehole	Pipework	Installation Depth (mbgl)	Response zone of slotted pipework (mbgl)	Response Zone Stratum
BH101	50mm HDPE pipe	12.30	7.00-12.30	Silt
BH102	50mm HDPE pipe	17.00	12.00-17.00	Sand/Gravel
BH103	50mm HDPE pipe	12.40	7.90-12.40	Silt
BH105	50mm HDPE pipe	8.70	7.10-8.70	Peat
WS101	50mm HDPE pipe	3.70	1.20-3.70	Made Ground
*WS102**	*50mm HDPE pipe*	*5.00*	*3.60-5.00*	*Sand*
WS104	50mm HDPE pipe	3.00	1.20-3.00	Made Ground
WS105	50mm HDPE pipe	2.50	1.20-2.50	Made Ground
**install removed/destroyed between installation and commencement of monitoring*				

5.2 Ground Gas Results

Two monitoring visits have been completed to date. The atmospheric pressure has an impact on the concentrations of gas released. Atmospheric pressure was between 999 and 1003 during the visits to date. The results of the visits undertaken to date are summarised below in Table 3 and are presented in full in Appendix E.

TABLE 3: SUMMARY OF GAS MONITORING RESULTS

Borehole	Flow Range (l/hr)	CH_4 Range (%v/v)	CO_2 Range (%v/v)	O_2 Range (%v/v)	PID Range (ppm)	CO Range (ppm)	H_2S Range (ppm)	GW Range (mbgl)
BH101	0.1	3.0 – 8.0	0.0 – 0.3	14.0 – 18.4	0.2 – 0.4	0	0	1.28 – 3.07
BH102	0.1	6.7 – 9.4	0.3 – 0.5	14.3 – 16.2	0.1 – 0.8	0	0	1.82 – 1.86
BH103	0.1	6.7 – 7.3	0.2	17.9 – 18.0	0.3 – 0.6	0	0	1.23 – 1.45
BH105	0.1	0	0.2	19.2 – 19.4	0	0	0	2.10
WS101	0.1	0	2.2 – 4.9	3.9 – 18.0	0	0	0	2.20 – 2.30
WS104	0.1	0	0.0	20.0 – 20.4	0	0	0	1.28 – 2.60
WS105	0.1	0	0.7 – 0.8	19.1 – 19.4	0	0	0	2.00 – 2.05

6 GEOTECHNICAL TESTING

Samples taken from the boreholes underwent a series of geotechnical tests to aid design and soil description. In addition, insitu Standard Penetration Tests (SPTs) were undertaken at regular intervals during drilling.

The geotechnical results are presented in Appendix D.

The scope of the testing undertaken was determined by Fairhurst.

6.1 In-Situ Testing

The in-situ testing results are shown on the logs (Appendix B). The Plate Load Test results are shown in Appendix D.
Generally, Standard Penetration Tests (SPTs) within the made ground yielded N values ranging from 6 to 35 within cohesive made ground (locally 50+), and between 3 and 38 within granular made ground (locally 50+).

SPTs within the localised shallow sand deposits ranged from 1 to 35, indicating very loose to dense deposits.

SPTs within the silt deposits ranged from 0 to 12, indicating very low to medium strength deposits.

SPTs within the localised peat deposits ranged from 7.

SPTs within the deeper granular deposits ranged from 17 to 50+, generally increasing with depth, indicating medium dense to very dense deposits.

SPTs within the clay deposits ranged from 6 to 19, indicating low to high strength deposits.

SPTs upon/within the rockhead ranged from 50+, generally increasing with depth.

6.2 Laboratory Testing

The scope of the laboratory testing to be undertaken was determined by Fairhurst. The below soils testing was scheduled:

16no K1.1 Moisture contents
16no K1.2 Atterberg limits
12no K1.9 Particle Size Distribution (PSD)
11no K1.12 Sedimentation by hydrometer
6no K2.1 Organic Matter Content (OMC)
9no K2.4 Sulphate
9no K2.12 pH
3no K3.9 CBR
1no K1.8 Particle Density
4no K4.1 One dimensional consolidation
4no K6.16 Undrained shear strength in triaxial

The below rock testing was scheduled:

6no K8.14 Uniaxial Compressive Strength (UCS)
8no K8.21 Point Load Test (PLT)
1no Point Load Test (Axial & Diametral)
3no Direct Shear
5no K2.4 Sulphate
5no K2.12 pH
5no Water Content

The geotechnical results are presented in Appendix D. Some geotechnical results are outstanding and will be added as an addendum to this report.

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APPENDIX A:
Figures & Drawings

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Figure Title

Site Location Plan

Project Number

S230311

Project Name

Whitby Maritime Hub, Whitby

Client

Willmott Dixon Construction

Date

October 2023

DRG Number

Figure 1

Scale

1:3500 @ A4 [DO NOT SCALE]

Legend Key

Project Bounds - Project Bounds

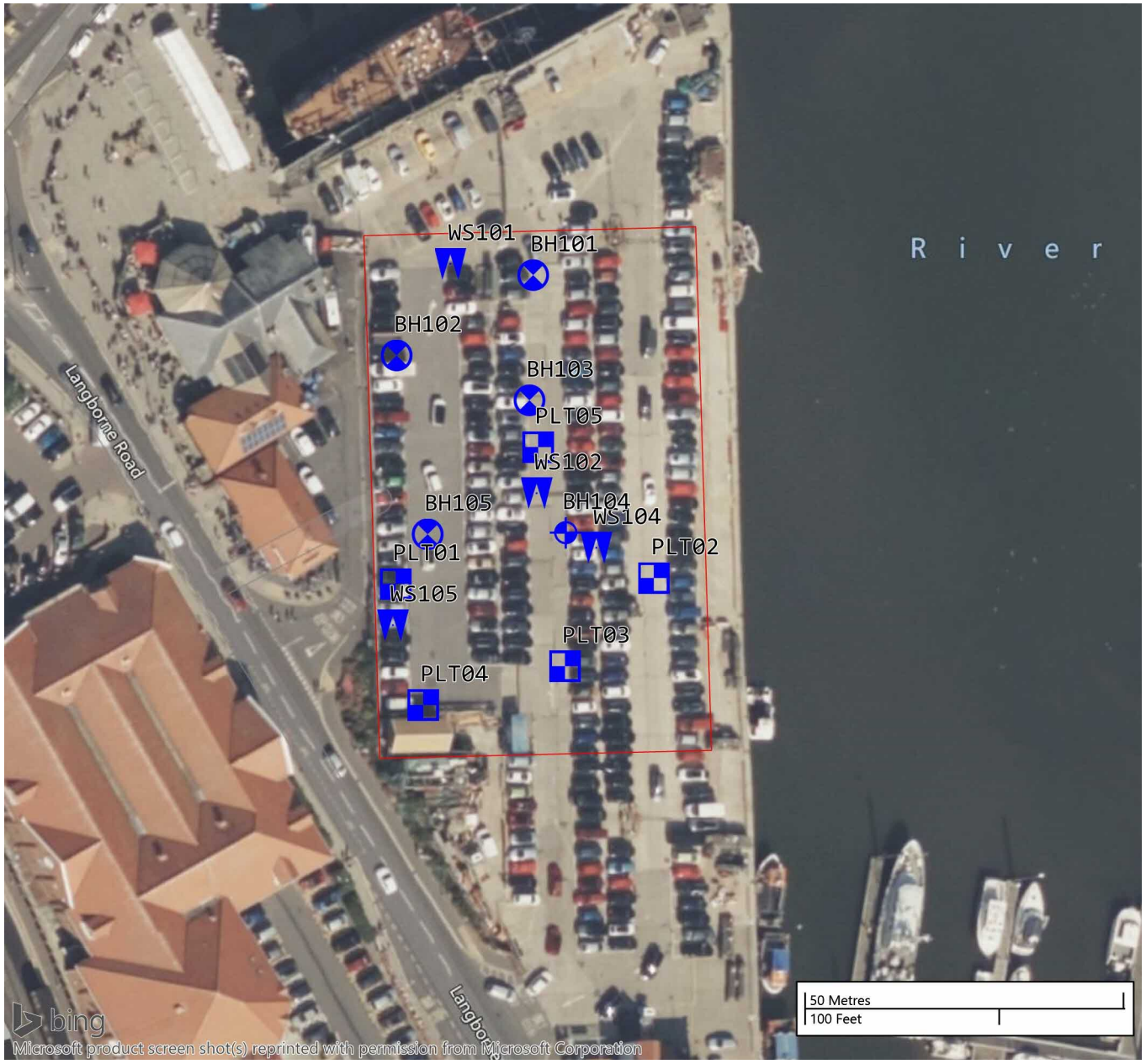

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Figure Title

Exploratory Hole Location Plan

Project Number

S230311

Project Name

Whitby Maritime Hub, Whitby

Client

Willmott Dixon Construction

Date

October 2023

DRG Number

Figure 2

Scale

1:1000 @ A4 [DO NOT SCALE]

Legend Key

- Locations By Type - BH
- Locations By Type - CP
- Locations By Type - CP+RC
- Locations By Type - TP
- Locations By Type - WS
- Project Bounds - Project Bounds

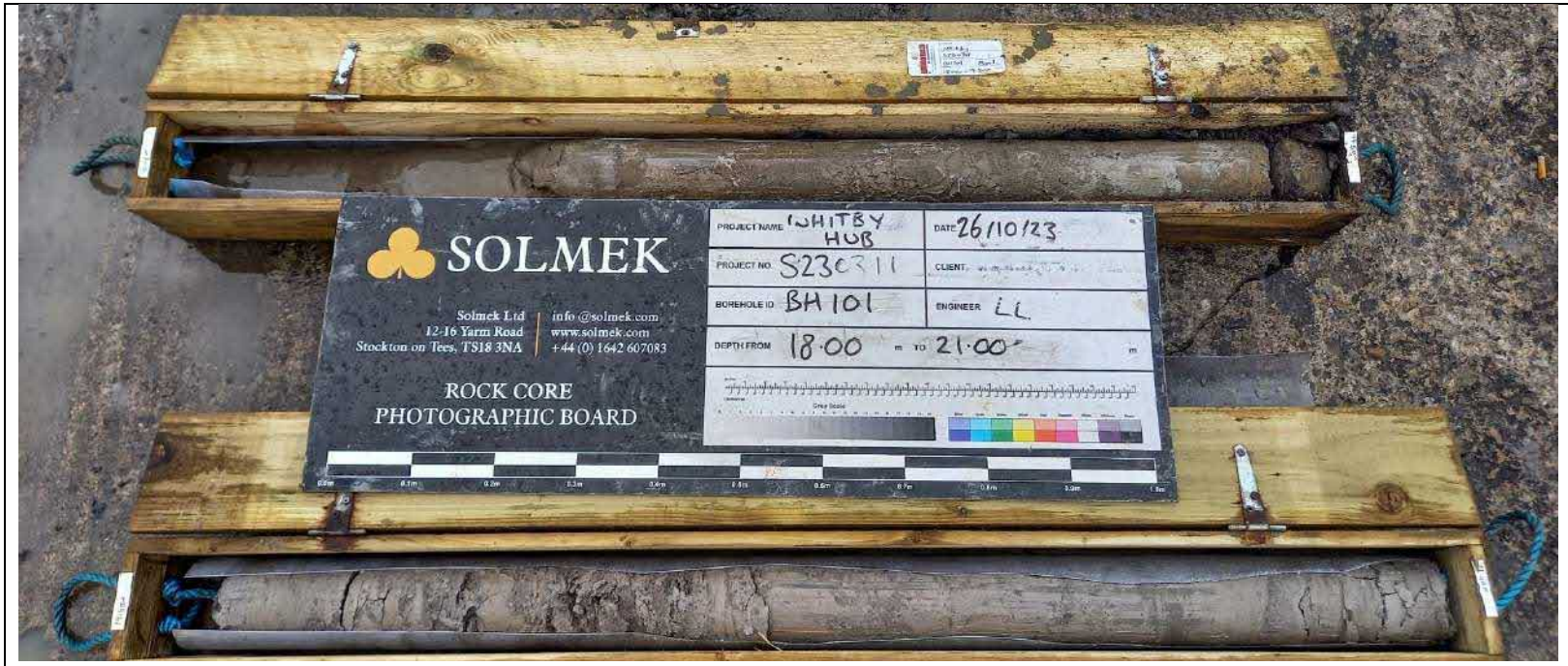

Figure 3: BH101 18.00-21.00m

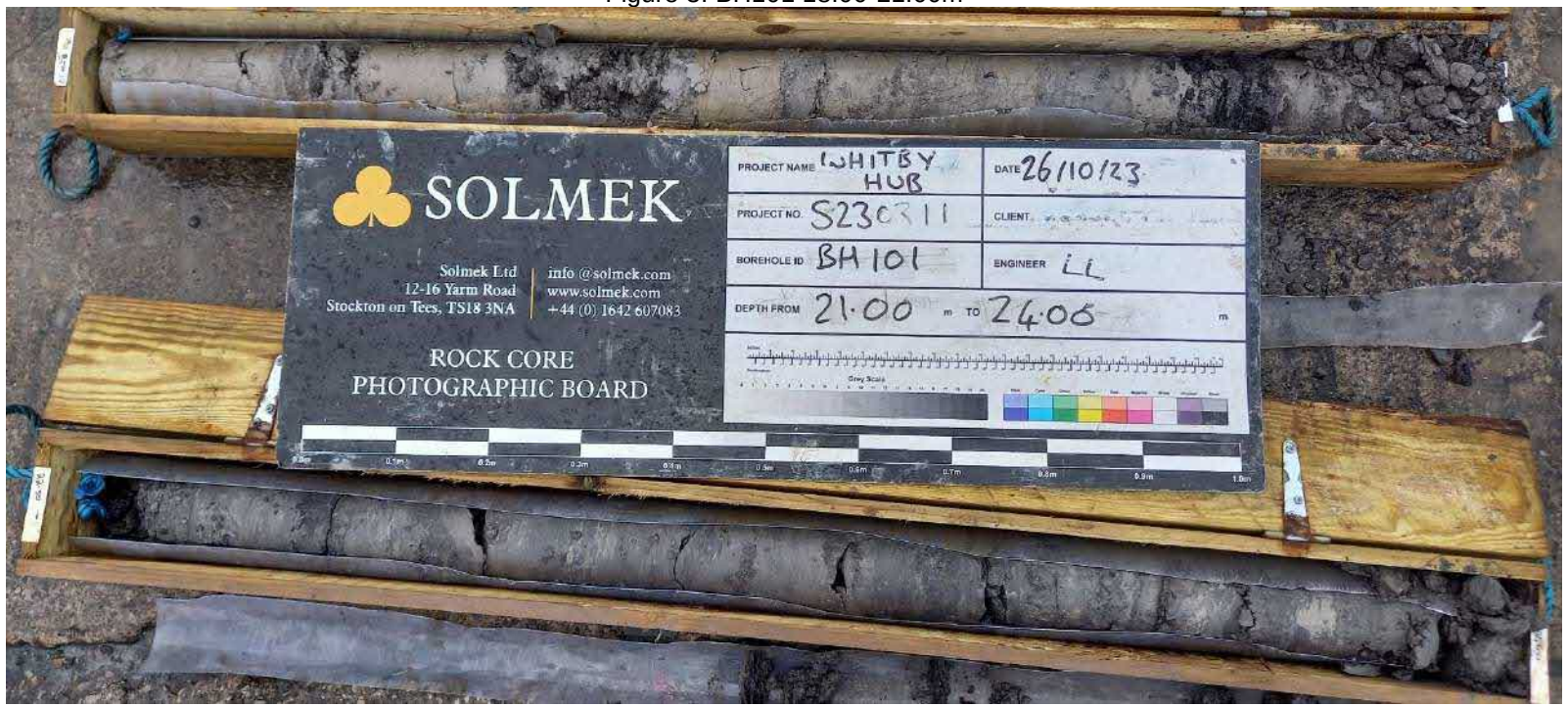

Figure 4: BH101 21.00-24.00m

Title
Rock Core Photographs
Project
Whitby Maritime Hub
Client
Wilmott Dixon Construction
Date
December 2023
Fig No.
Figures 3 & 4
Scale
N/A
Key

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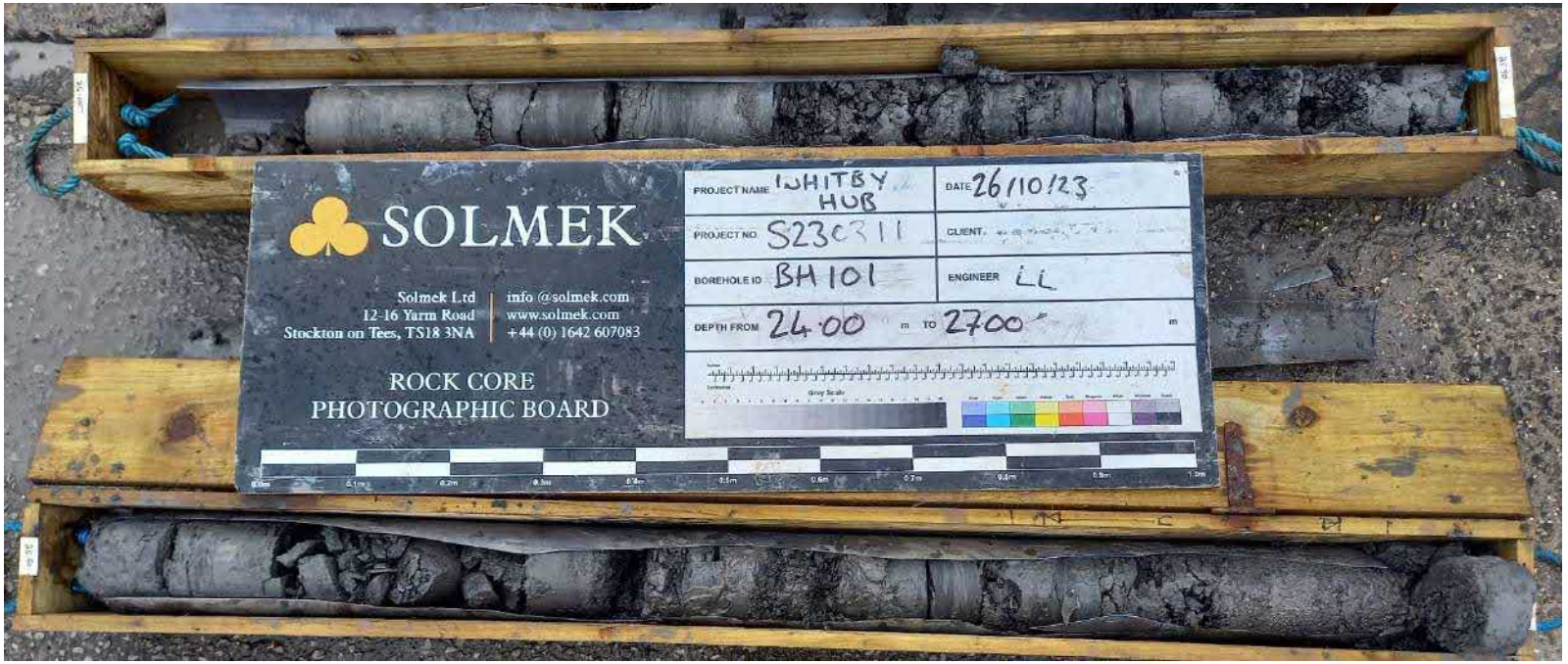

Figure 5: BH101 24.00-27.00m

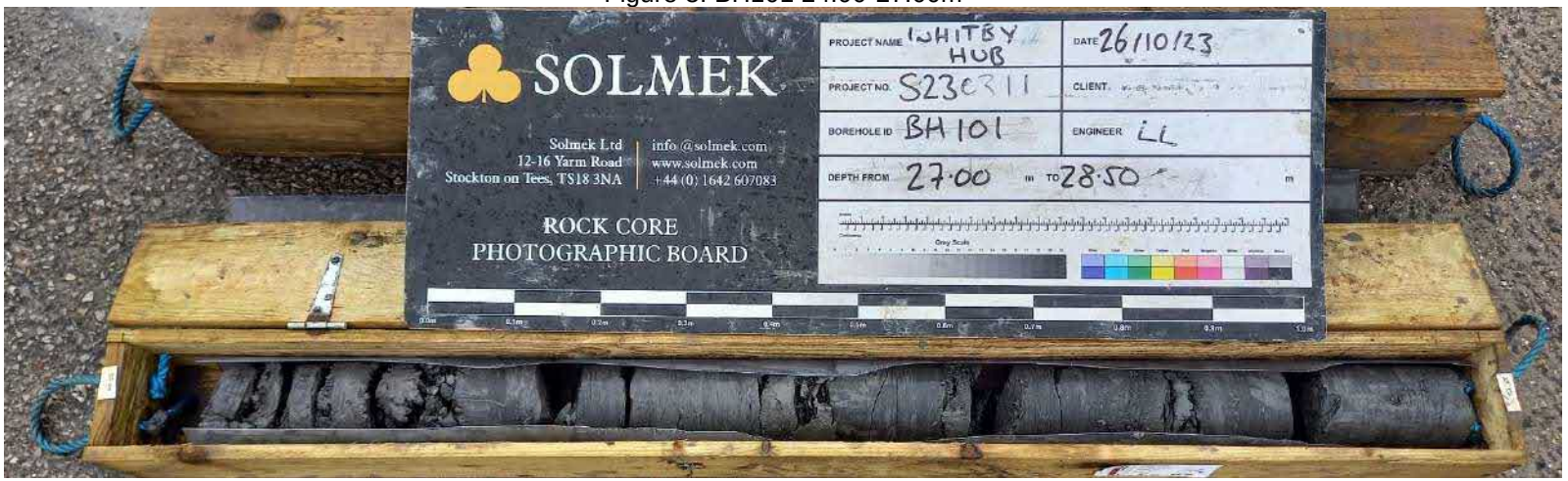

Figure 6: BH101 27.00-28.50m

Title
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Wilmott Dixon Construction
Date
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Figures 5 & 6
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Figure 7: BH102 18.00-21.00m

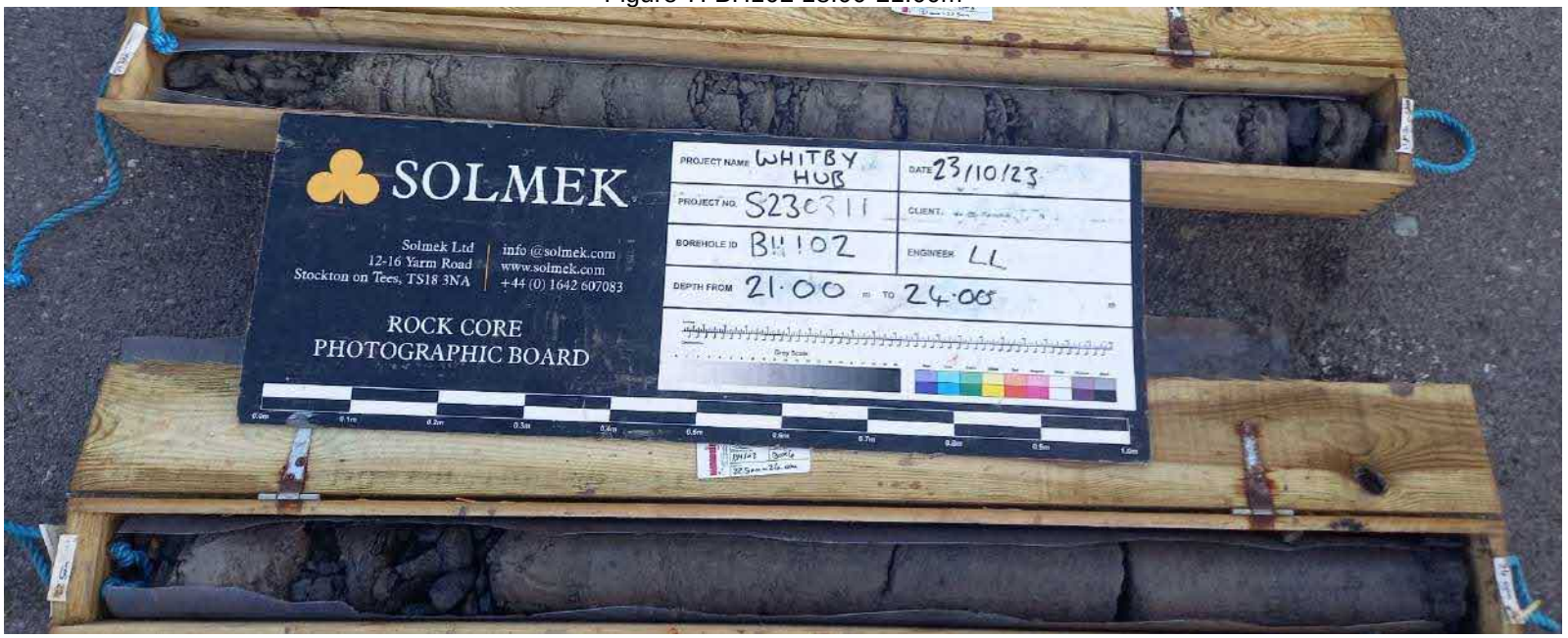

Figure 8: BH102 21.00-24.00m

Title
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Whitby Maritime Hub
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Date
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Fig No.
Figures 7 & 8
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Figure 9: BH102 24.00-27.00m

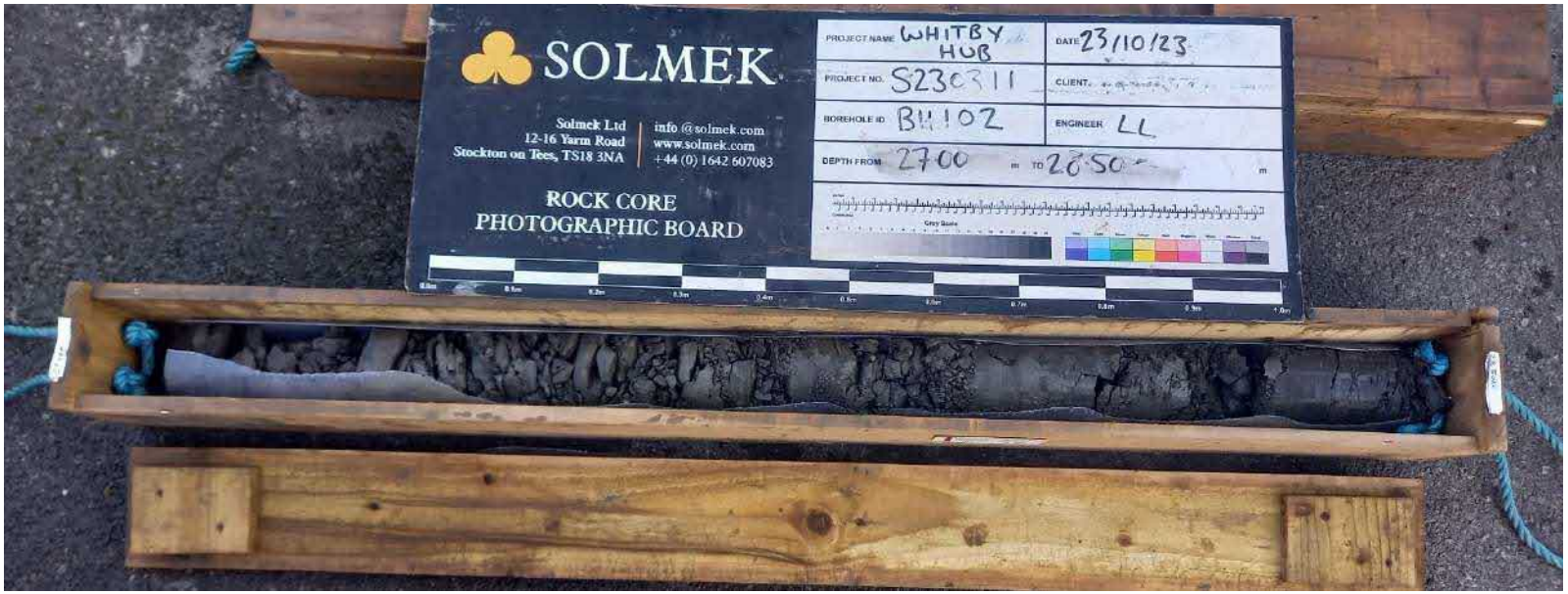

Figure 10: BH102 27.00-26.50m

Title
Rock Core Photographs
Project
Whitby Maritime Hub
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Wilmott Dixon Construction
Date
December 2023
Fig No.
Figures 9 & 10
Scale
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Key

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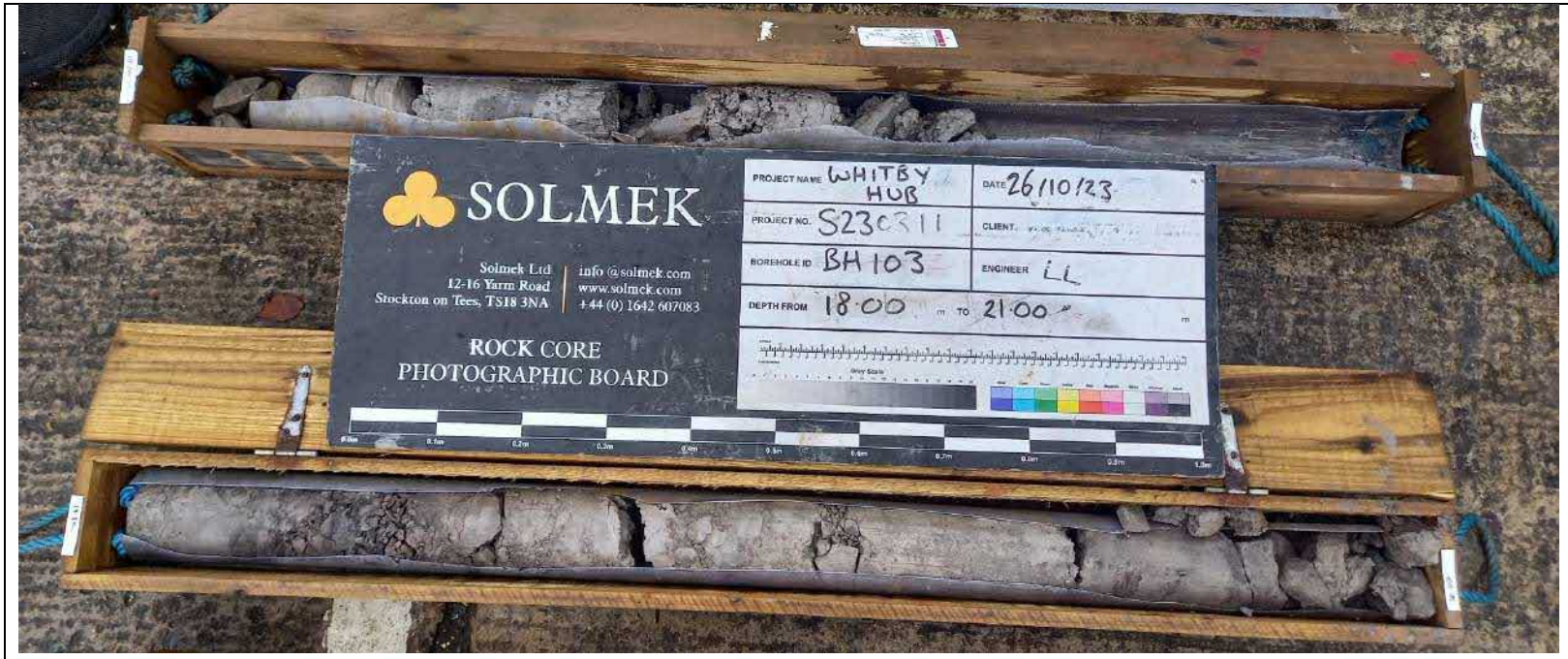

Figure 11: BH103 18.00-21.00m

Figure 12: BH103 21.00-24.00m

Title
Rock Core Photographs
Project
Whitby Maritime Hub
Client
Wilmott Dixon Construction
Date
December 2023
Fig No.
Figures 11 & 12
Scale
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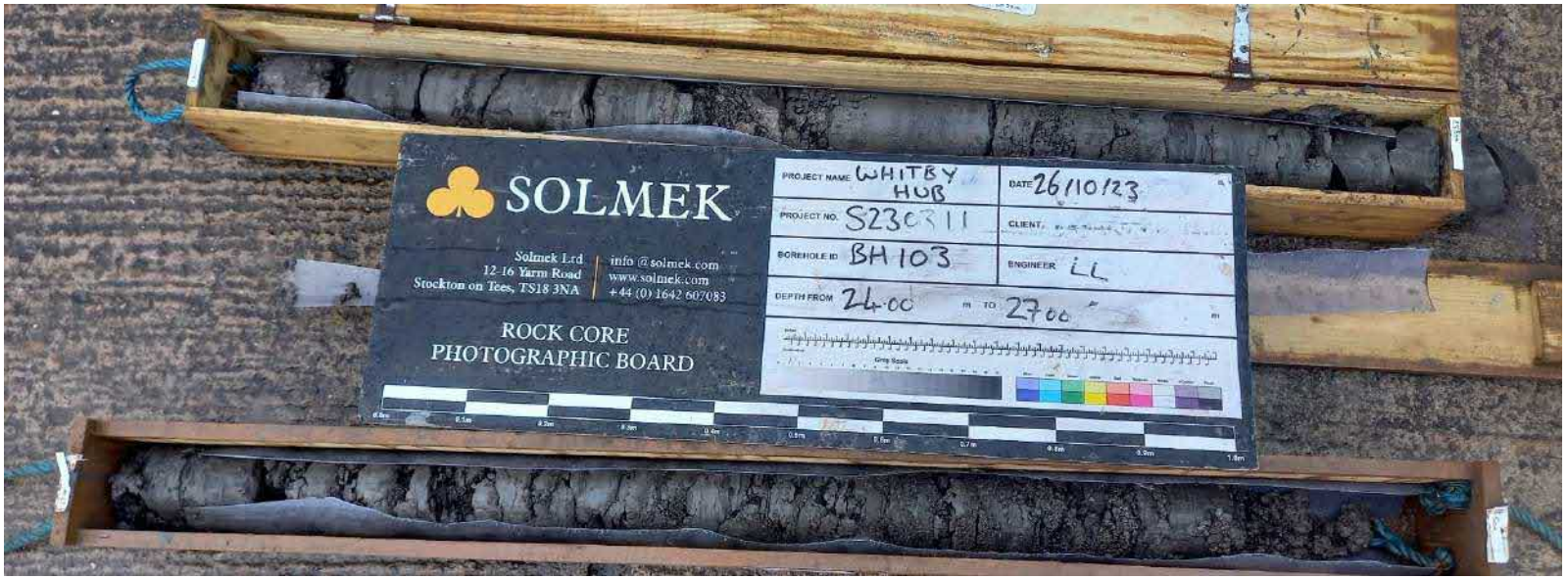

Figure 13: BH103 18.00-21.00m

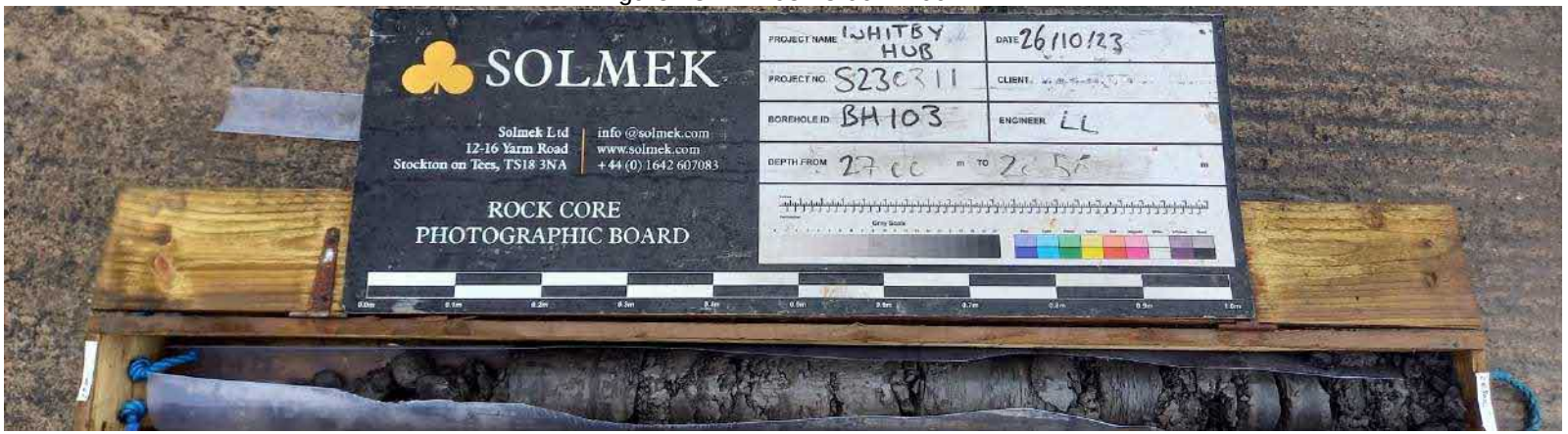

Figure 14: BH103 21.00-24.00m

Title
Rock Core Photographs
Project
Whitby Maritime Hub
Client
Wilmott Dixon Construction
Date
December 2023
Fig No.
Figures 13 & 14
Scale
N/A
Key

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Figure 15: BH105 18.00-21.00m

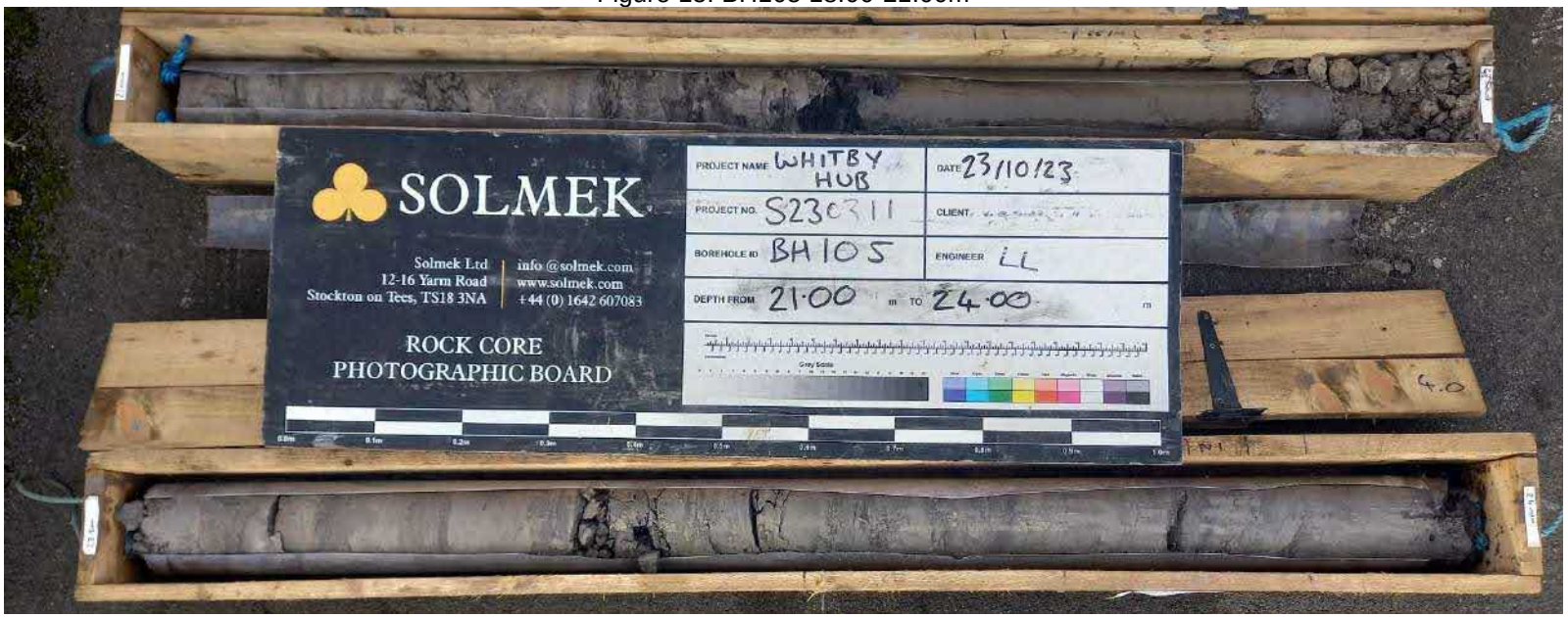

Figure 16: BH105 21.00-24.00m

Title
Rock Core Photographs
Project
Whitby Maritime Hub
Client
Wilmott Dixon Construction
Date
December 2023
Fig No.
Figures 15 & 16
Scale
N/A
Key

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Figure 17: BH105 18.00-21.00m

Figure 18: BH105 21.00-24.00m

Title
Rock Core Photographs
Project
Whitby Maritime Hub
Client
Wilmott Dixon Construction
Date
December 2023
Fig No.
Figures 17 & 18
Scale
N/A
Key

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APPENDIX B:
Borehole & Trial Pit Logs

	Backfill / Installation

Backfill / Installation

	Backfill / Installation

Backfill / Installation

	Backfill / Installation

Backfill / Installation

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	Backfill / Installation

	Backfill / Installation

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend
	Depth	Type	Results			
				0.25	3.48	
				0.65 0.70	3.08 3.03	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend
	Depth	Type	Results			
				0.24 0.30	3.46 3.40	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend
	Depth	Type	Results			
				0.22 0.30	3.22 3.14	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend
	Depth	Type	Results			
				0.17	3.56	
				0.55	3.18	
				0.60	3.14	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend
	Depth	Type	Results			
				0.22 0.25	3.16 3.13	

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APPENDIX C:
Contamination Laboratory Results

Certificate of Analysis

Certificate Number	23-06584	*Issued:*	29-Mar-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-06584
Client Reference	S230311
Order No	SOL7164LC
Contract Title	Whitby Maritime Hub, Whitby
Description	8 Soil samples, 9 Leachate samples.
Date Received	20-Mar-23
Date Started	20-Mar-23
Date Completed	29-Mar-23
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

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THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

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UKAS TESTING
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Summary of Chemical Analysis
Matrix Descriptions

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Sample ID	Depth	Lab No	Completed	Matrix Description
WS101	0.80-1.00	2142976	29/03/2023	Very gravelly, sandy CLAY (Possible made ground - brick)
WS101	3.70-3.90	2142977	29/03/2023	Black very gravelly, sandy CLAY
WS102	0.60-0.80	2142978	29/03/2023	Brown very gravelly, sandy CLAY (Possible made ground - brick) (Possible made ground - slate)
WS102	1.50-1.60	2142979	29/03/2023	Brown very gravelly, sandy CLAY (Possible made ground - brick)
WS102	3.80-4.00	2142980	29/03/2023	Dark brown slightly gravelly, sandy CLAY
WS104	0.60-0.80	2142981	29/03/2023	Brown gravelly, sandy CLAY (Possible made ground - brick)
WS105	1.20-1.50	2142982	29/03/2023	Brown gravelly, sandy CLAY (Possible made ground - brick)
WS105	3.50-4.00	2142983	29/03/2023	Brown slightly gravelly, sandy CLAY (Possible made ground - brick)

Summary of Chemical Analysis
Soil Samples

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2142976	2142977	2142979	2142980	2142981	2142982	2142983
			.Sample ID	WS101	WS101	WS102	WS102	WS104	WS105	WS105
			Depth	0.80-1.00	3.70-3.90	1.50-1.60	3.80-4.00	0.60-0.80	1.20-1.50	3.50-4.00
			Other ID							
			Sample Type	ES	ES	ES	ES	ES	ES	ES
			Sampling Date	15/03/2023	15/03/2023	14/03/2023	14/03/2023	14/03/2023	15/03/2023	15/03/2023
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units							
Metals										
Antimony	DETSC 2301*	1	mg/kg	5.3	< 1.0	1.2	< 1.0	1.6	1.8	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	14	7.8	4.0	12	9.1	15	8.9
Barium	DETSC 2301#	1.5	mg/kg	220	71	220	68	160	88	71
Beryllium	DETSC 2301#	0.2	mg/kg	1.7	0.2	0.9	0.4	1.0	0.7	0.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	1.1	1.6	2.7	4.7	2.4	1.1	1.9
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.1	< 0.1	< 0.1	0.2	0.1	< 0.1
Chromium III	DETSC 2301*	0.15	mg/kg	14	13	15	13	16	13	8.7
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	94	23	28	13	32	29	29
Iron	DETSC 2301	25	mg/kg	23000	19000	41000	26000	34000	36000	18000
Lead	DETSC 2301#	0.3	mg/kg	370	110	23	28	190	81	130
Manganese	DETSC 2301#	20	mg/kg	550	450	230	240	400	350	160
Mercury	DETSC 2325#	0.05	mg/kg	0.12	0.41	< 0.05	0.08	0.20	0.15	0.38
Molybdenum	DETSC 2301#	0.4	mg/kg	3.1	0.5	< 0.4	1.1	0.8	1.9	0.7
Nickel	DETSC 2301#	1	mg/kg	22	11	47	15	27	18	10
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	37	63	25	30	31	31	20
Zinc	DETSC 2301#	1	mg/kg	250	78	58	63	100	58	37
Inorganics										
pH	DETSC 2008#		pH	9.9	8.2	8.8	8.6	8.7	9.6	8.4
Calorific Value	DETSC 5008	1	MJ/kg					< 1.0		
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.5	0.2	< 0.1	< 0.1	0.6	0.5	< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cyanide, Complex	DETSC 2130*	0.2	mg/kg	0.4	< 0.2	< 0.2	< 0.2	0.5	0.5	< 0.2
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6	0.9	< 0.6	0.7	0.7	< 0.6	0.8
Organic matter	DETSC 2002#	0.1	%					1.9		
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	2.5	3.4	4.6	6.7	4.7	4.1	5.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	170	210	32	340	140	260	340
Sulphur as S, Total	DETSC 2320	0.01	%	0.11	0.18	0.02	0.39	0.07	0.10	0.95
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.16	0.14	0.04	0.20	0.10	0.14	0.25
Petroleum Hydrocarbons										
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >EC10-EC12: EH_2D_AL	DETSC 3521#	1.5	mg/kg	6.32	3.40	2.04	< 1.50	< 1.50	< 1.50	< 1.50
Aliphatic >EC12-EC16: EH_2D_AL	DETSC 3521#	1.2	mg/kg	27.45	3.94	2.07	< 1.20	1.51	1.60	< 1.20
Aliphatic >EC16-EC21: EH_2D_AL	DETSC 3521#	1.5	mg/kg	25.72	4.66	2.31	< 1.50	< 1.50	< 1.50	< 1.50
Aliphatic >EC21-EC35: EH_2D_AL	DETSC 3521#	3.4	mg/kg	335.1	13.28	6.50	4.89	< 3.40	6.72	< 3.40
Aliphatic >EC35-EC40: EH_2D_AL	DETSC 3521#	3.4	mg/kg	133.6	13.25	3.90	< 3.40	< 3.40	< 3.40	< 3.40
Aliphatic >EC40-EC44: EH_2D_AL	DETSC 3521*	3.4	mg/kg	34.29	12.68	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40
Aliphatic C5-C44: EH_2D+HS_1D_AL	DETSC 3521*	10	mg/kg	562.5	51.22	16.81	< 10.00	< 10.00	< 10.00	< 10.00

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2142976	2142977	2142979	2142980	2142981	2142982	2142983
			.Sample ID	WS101	WS101	WS102	WS102	WS104	WS105	WS105
			Depth	0.80-1.00	3.70-3.90	1.50-1.60	3.80-4.00	0.60-0.80	1.20-1.50	3.50-4.00
			Other ID							
			Sample Type	ES	ES	ES	ES	ES	ES	ES
			Sampling Date	15/03/2023	15/03/2023	14/03/2023	14/03/2023	14/03/2023	15/03/2023	15/03/2023
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units							
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >EC10-EC12: EH_2D_AR	DETSC 3521#	0.9	mg/kg	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Aromatic >EC12-EC16: EH_2D_AR	DETSC 3521#	0.5	mg/kg	1.97	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aromatic >EC16-EC21: EH_2D_AR	DETSC 3521#	0.6	mg/kg	20.63	1.14	1.09	0.99	3.17	1.14	8.05
Aromatic >EC21-EC35: EH_2D_AR	DETSC 3521#	1.4	mg/kg	19.13	3.54	4.44	< 1.40	3.98	< 1.40	4.48
Aromatic >EC35-EC40: EH_2D_AR	DETSC 3521*	1.4	mg/kg	2.28	3.73	6.16	< 1.40	< 1.40	< 1.40	< 1.40
Aromatic >EC40-EC44: EH_2D_AR	DETSC 3521*	1.4	mg/kg	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40
Aromatic C5-C44: EH_2D+HS_1D_AR	DETSC 3521*	10	mg/kg	44.02	< 10.00	11.69	< 10.00	< 10.00	< 10.00	12.53
TPH Ali/Aro C5-C44: EH_2D+HS_1D_Total	DETSC 3521*	10	mg/kg	606.5	51.22	28.51	< 10.00	< 10.00	< 10.00	12.53
C5-C10 Gasoline Range Organics (GRO): HS_1D_Total	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
EPH (C6-C10): HS_1D_Total	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
C10-C24 Diesel Range Organics (DRO): EH_1D_Total	DETSC 3311#	10	mg/kg	230	< 10	< 10	< 10	99	< 10	87
EPH (C10-C40): EH_1D_Total	DETSC 3311#	10	mg/kg	490	< 10	< 10	< 10	240	81	120
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01				< 0.01		
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01				< 0.01		
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01				< 0.01		
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01				< 0.01		
MTBE	DETSC 3321	0.01	mg/kg	< 0.01				< 0.01		
C24-C40 Lube Oil Range Organics (LORO): EH_1D_Total	DETSC 3311#	10	mg/kg	260	< 10	< 10	< 10	140	74	38
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	< 0.1	< 0.1	0.8	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.6	< 0.1	< 0.1	< 0.1	0.7	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	1.0	< 0.1	< 0.1	< 0.1	0.9	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	7.4	< 0.1	< 0.1	< 0.1	6.8	0.2	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	2.0	< 0.1	< 0.1	< 0.1	1.3	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	24	< 0.1	< 0.1	< 0.1	11	0.3	0.6
Pyrene	DETSC 3301	0.1	mg/kg	21	< 0.1	< 0.1	< 0.1	10	0.6	0.8
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	12	< 0.1	< 0.1	< 0.1	4.9	< 0.1	0.4
Chrysene	DETSC 3301	0.1	mg/kg	13	< 0.1	< 0.1	< 0.1	5.1	< 0.1	0.4
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	9.0	< 0.1	< 0.1	< 0.1	3.3	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	5.6	< 0.1	< 0.1	< 0.1	2.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	12	< 0.1	< 0.1	< 0.1	4.4	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	8.1	< 0.1	< 0.1	< 0.1	2.7	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	1.3	< 0.1	< 0.1	< 0.1	0.6	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	7.4	< 0.1	< 0.1	< 0.1	2.4	< 0.1	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	120	< 1.6	< 1.6	< 1.6	57	< 1.6	2.2

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

				Lab No	2142976	2142977	2142979	2142980	2142981	2142982	2142983
				.Sample ID	WS101	WS101	WS102	WS102	WS104	WS105	WS105
				Depth	0.80-1.00	3.70-3.90	1.50-1.60	3.80-4.00	0.60-0.80	1.20-1.50	3.50-4.00
				Other ID							
				Sample Type	ES	ES	ES	ES	ES	ES	ES
				Sampling Date	15/03/2023	15/03/2023	14/03/2023	14/03/2023	14/03/2023	15/03/2023	15/03/2023
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units								
PCBs											
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01				< 0.01		
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01				< 0.01		
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01				< 0.01		
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01				< 0.01		
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01				< 0.01		
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01				< 0.01		
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01				< 0.01		
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01				< 0.01		
Phenols											
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2142984	2142985	2142986	2142987	2142988
			.Sample ID	WS101	WS102	WS102	WS104	WS105
			Depth	0.80-1.00	1.50-1.60	3.80-4.00	0.60-0.80	1.20-1.50
			Other ID					
			Sample Type	ES	ES	ES	ES	ES
			Sampling Date	15/03/2023	14/03/2023	14/03/2023	14/03/2023	15/03/2023
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units					
Metals								
Antimony, Dissolved	DETSC 2306	0.17	ug/l	0.81	< 0.17	0.32	0.63	0.41
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	3.4	0.47	1.6	1.4	1.4
Barium, Dissolved	DETSC 2306	0.26	ug/l	5.5	2.0	10	7.6	5.4
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	< 12	74	130	28	< 12
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chromium III, Dissolved	DETSC 2306*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	9.0	7.0	3.1	1.8	3.8
Iron, Dissolved	DETSC 2306	5.5	ug/l	140	150	61	140	130
Lead, Dissolved	DETSC 2306	0.09	ug/l	2.1	0.40	0.12	2.2	1.2
Manganese, Dissolved	DETSC 2306	0.22	ug/l	1.3	1.5	2.3	1.9	1.3
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	0.01	< 0.01
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	1.2	< 1.1	7.2	1.7	< 1.1
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.38	0.35	< 0.25	0.25	0.31
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	7.1	1.4	1.9	1.4	1.3
Zinc, Dissolved	DETSC 2306	1.3	ug/l	1.9	< 1.3	< 1.3	< 1.3	< 1.3
Inorganics								
pH	DETSC 2008		pH	8.3	7.9	7.5	7.4	7.4
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	< 40	< 40	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20	< 20	< 20	< 20
Cyanide, Complex	DETSC 2130*	40	ug/l	< 40	< 40	< 40	< 40	< 40
Thiocyanate	DETSC 2130	20	ug/l	< 20	300	< 20	59	44
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.074	0.095	0.66	0.12	0.14
Sulphate as SO4	DETSC 2055	0.1	mg/l	6.4	6.1	6.5	10	12
Petroleum Hydrocarbons								
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	15	2.4	< 1.0	< 1.0
Aliphatic C10-C44: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	100	5.5	< 1.0	< 1.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	14	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	24	1.4	< 1.0	< 1.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	36	1.0	< 1.0	< 1.0
Aliphatic C35-C44: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	13	< 1.0	< 1.0	< 1.0
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

				Lab No	2142984	2142985	2142986	2142987	2142988
				.Sample ID	WS101	WS102	WS102	WS104	WS105
				Depth	0.80-1.00	1.50-1.60	3.80-4.00	0.60-0.80	1.20-1.50
				Other ID					
				Sample Type	ES	ES	ES	ES	ES
				Sampling Date	15/03/2023	14/03/2023	14/03/2023	14/03/2023	15/03/2023
				Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C35-C44: EH_CU_1D_AR	DETSC 3072*	1	ug/l		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C10-C44: EH_CU_1D_AR	DETSC 3072*	1	ug/l		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ali/Aro C10-C44: EH_CU_1D_Total	DETSC 3072*	1	ug/l		< 1.0	100	5.5	< 1.0	< 1.0
PAHs									
Naphthalene	DETSC 3304	0.05	ug/l		0.06	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l		0.05	< 0.01	0.03	0.02	0.03
Acenaphthene	DETSC 3304	0.01	ug/l		0.03	< 0.01	< 0.01	0.04	< 0.01
Fluorene	DETSC 3304	0.01	ug/l		0.03	< 0.01	< 0.01	0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l		0.21	0.03	< 0.01	0.04	0.01
Anthracene	DETSC 3304	0.01	ug/l		0.14	< 0.01	< 0.01	0.04	0.02
Fluoranthene	DETSC 3304	0.01	ug/l		0.76	0.04	0.02	0.23	0.04
Pyrene	DETSC 3304	0.01	ug/l		0.65	0.04	0.03	0.26	0.04
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l		0.43	0.02	0.02	0.13	0.03
Chrysene	DETSC 3304	0.01	ug/l		0.52	0.03	0.03	0.18	0.04
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l		0.58	0.04	0.02	0.30	0.07
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l		0.23	< 0.01	< 0.01	0.13	0.02
Benzo(a)pyrene	DETSC 3304	0.01	ug/l		0.50	0.02	0.02	0.28	0.05
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l		0.43	0.02	0.01	0.25	0.05
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l		0.08	< 0.01	< 0.01	0.03	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l		0.42	0.03	0.01	0.25	0.05
PAH Total	DETSC 3304	0.2	ug/l		5.1	0.29	< 0.20	2.2	0.46
Phenols									
Phenol - Monohydric	DETSC 2130	100	ug/l		< 100	< 100	< 100	< 100	< 100

Key: * -not accredited. n/s -not supplied.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby
Sample Id WS101 0.80-1.00

Sample Numbers 2142976 2142989 2142990
Date Analysed 29/03/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	10.0	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	490.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	120.0	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values Limit values for LS10 Leachate: Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	6	3.4	0.012	0.038	0.5	2	25
DETSC 2306 Barium as Ba	6.5	4.2	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.94	0.61	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	15	7.7	0.03	0.088	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	2.4	1.3	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.62	< 0.50	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	2.8	2.7	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	1.8	1	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.77	0.46	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	2.6	4	0.005	0.038	4	50	200
DETSC 2055 Chloride as Cl	12000	150	24	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	290	130	0.58	1.54	10	150	500
DETSC 2055 Sulphate as SO4	17000	3800	34	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	120000	46000	240	570.2	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	8200	9500	16.4	93.1	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.5	8.1
DETSC 2009 Conductivity uS/cm	171.0	65.2
* Temperature*	17.0	18.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.111

Stage 1

Volume of Leachant L2*	0.192
Volume of Eluate VE1*	0.165

Stage 2

Volume of Leachant L8*	0.887
Volume of Eluate VE2*	0.84

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby
Sample Id WS104 0.60-0.80

Sample Numbers 2142981 2142991 2142992
Date Analysed 29/03/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	2.0	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	240.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	57.0	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values Limit values for LS10 Leachate: Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	3.5	1.3	0.007	0.017	0.5	2	25
DETSC 2306 Barium as Ba	23	11	0.05	0.13	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	2.1	0.97	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	4.3	3.4	0.009	0.036	2	50	100
DETSC 2306 Mercury as Hg	0.022	0.015	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	4.1	1.8	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.63	< 0.50	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	3.7	2.1	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	2.5	1	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.96	0.48	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	2.6	2	0.005	0.021	4	50	200
DETSC 2055 Chloride as Cl	17000	2200	34	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	930	170	1.86	2.97	10	150	500
DETSC 2055 Sulphate as SO4	50000	7300	100	144.2	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	170000	55000	340	741.7	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	9100	7500	18.2	77.7	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	8.0	7.7
DETSC 2009 Conductivity uS/cm	241.0	78.1
* Temperature*	18.0	18.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.118

Stage 1

Volume of Leachant L2*	0.213
Volume of Eluate VE1*	0.196

Stage 2

Volume of Leachant L8*	0.94
Volume of Eluate VE2*	0.894

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

Summary of Asbestos Analysis
Soil Samples

Our Ref 23-06584
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2142976	WS101 0.80-1.00	SOIL	NAD	none	Pierce Booth
2142978	WS102 0.60-0.80	SOIL	NAD	none	Pierce Booth
2142981	WS104 0.60-0.80	SOIL	NAD	none	Pierce Booth
2142982	WS105 1.20-1.50	SOIL	NAD	none	Pierce Booth

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 23-06584
Client Ref S230311
Contract Whitby Maritime Hub, Whitby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2142976	WS101 0.80-1.00 SOIL	15/03/23	GJ 250ml x2, PT 1L	Ammonia (3 days)	
2142977	WS101 3.70-3.90 SOIL	15/03/23	GJ 250ml x2, PT 1L	Ammonia (3 days)	
2142978	WS102 0.60-0.80 SOIL	14/03/23	GJ 250ml x2, PT 1L		
2142979	WS102 1.50-1.60 SOIL	14/03/23	GJ 250ml x2, PT 1L	Ammonia (3 days)	
2142980	WS102 3.80-4.00 SOIL	14/03/23	GJ 250ml x2, PT 1L	Ammonia (3 days)	
2142981	WS104 0.60-0.80 SOIL	14/03/23	GJ 250ml x2, PT 1L	Ammonia (3 days)	
2142982	WS105 1.20-1.50 SOIL	15/03/23	GJ 250ml x2, PT 1L	Ammonia (3 days)	
2142983	WS105 3.50-4.00 SOIL	15/03/23	GJ 250ml x2, PT 1L	Ammonia (3 days)	
2142984	WS101 0.80-1.00 LEACHATE	15/03/23	GJ 250ml x2, PT 1L		
2142985	WS102 1.50-1.60 LEACHATE	14/03/23	GJ 250ml x2, PT 1L		
2142986	WS102 3.80-4.00 LEACHATE	14/03/23	GJ 250ml x2, PT 1L		
2142987	WS104 0.60-0.80 LEACHATE	14/03/23	GJ 250ml x2, PT 1L		
2142988	WS105 1.20-1.50 LEACHATE	15/03/23	GJ 250ml x2, PT 1L		
2142989	WS101 0.80-1.00 LEACHATE	15/03/23	GJ 250ml x2, PT 1L		
2142990	WS101 0.80-1.00 LEACHATE	15/03/23	GJ 250ml x2, PT 1L		
2142991	WS104 0.60-0.80 LEACHATE	14/03/23	GJ 250ml x2, PT 1L		
2142992	WS104 0.60-0.80 LEACHATE	14/03/23	GJ 250ml x2, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

End of Report

Certificate of Analysis

Certificate Number	23-24975	*Issued:*	02-Nov-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-24975
Client Reference	S230311
Order No	SOL--7796
Contract Title	WHITBY MARITIME HUB, WHITBY
Description	5 Soil samples, 4 Leachate samples.
Date Received	23-Oct-23
Date Started	23-Oct-23
Date Completed	02-Nov-23
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ilac-MRA

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

Sample ID	Depth	Lab No	Completed	Matrix Description
BH102	1	2251104	02/11/2023	Brown/ orange very gravelly CLAY (Made ground - brick)
BH102	7.5	2251105	02/11/2023	Dark slightly gravelly, sandy CLAY
BH105	2.2	2251106	02/11/2023	Dark brown slightly gravelly, sandy CLAY including odd rootlets (Possible made ground - brick)
BH105	3.5	2251107	02/11/2023	Dark brown slightly gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis
Soil Samples

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

Test	Method	LOD	Units	Lab No	2251104	2251105	2251106	2251107
				.Sample ID	BH102	BH102	BH105	BH105
				Depth	1.00	7.50	2.20	3.50
				Other ID				
				Sample Type	ES	ES	ES	ES
				Sampling Date	16/10/2023	16/10/2023	16/10/2023	16/10/2023
				Sampling Time	n/s	n/s	n/s	n/s
Metals								
Antimony	DETSC 2301*	1	mg/kg		1.4		1.3	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg		7.1		11	13
Barium	DETSC 2301#	1.5	mg/kg		59		130	57
Beryllium	DETSC 2301#	0.2	mg/kg		0.4		1.1	0.4
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg		2.3		2.0	3.7
Cadmium	DETSC 2301#	0.1	mg/kg		1.1		0.3	0.1
Chromium III	DETSC 2301*	0.15	mg/kg		11		15	14
Chromium, Hexavalent	DETSC 2204*	1	mg/kg		< 1.0		< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg		12		32	12
Iron	DETSC 2301	25	mg/kg		16000		30000	32000
Lead	DETSC 2301#	0.3	mg/kg		17		92	40
Manganese	DETSC 2301#	20	mg/kg		180		570	270
Mercury	DETSC 2325#	0.05	mg/kg		< 0.05		0.13	0.05
Molybdenum	DETSC 2301#	0.4	mg/kg		1.6		1.6	1.1
Nickel	DETSC 2301#	1	mg/kg		9.2		16	14
Selenium	DETSC 2301#	0.5	mg/kg		< 0.5		0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg		16		36	35
Zinc	DETSC 2301#	1	mg/kg		72		72	54
Inorganics								
pH	DETSC 2008#		pH		9.6		8.3	8.6
Calorific Value	DETSC 5008	1	MJ/kg		< 1.0			
Cyanide, Total	DETSC 2130#	0.1	mg/kg		< 0.1		0.2	< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg		< 0.1		< 0.1	< 0.1
Cyanide, Complex	DETSC 2130*	0.2	mg/kg		< 0.2		< 0.2	< 0.2
Thiocyanate	DETSC 2130#	0.6	mg/kg		< 0.6		0.9	0.8
Organic matter	DETSC 2002#	0.1	%			3.2		
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg		1.4		43	4.7
Nitrate as N	*	1	mg/kg		< 1.0		< 1.0	< 1.0
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l		1000		210	360
Sulphur as S, Total	DETSC 2320	0.01	%		0.27		0.13	0.39
Sulphate as SO4, Total	DETSC 2321#	0.01	%		0.69		0.13	0.13
Petroleum Hydrocarbons								
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg		< 1.5		< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg		< 1.2		< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg		< 1.5		< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg		< 3.4		< 3.4	< 3.4
Aliphatic C35-C40: EH_CU_1D_AL	DETSC 3072*	3.4	mg/kg		< 3.4		< 3.4	< 3.4
Aliphatic C5-C40: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg		< 10		< 10	< 10

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

			Lab No	2251104	2251105	2251106	2251107
			.Sample ID	BH102	BH102	BH105	BH105
			Depth	1.00	7.50	2.20	3.50
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	16/10/2023	16/10/2023	16/10/2023	16/10/2023
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4	< 1.4
Aromatic C35-C40: EH_CU_1D_AR	DETSC 3072*	1.4	mg/kg	< 1.4		< 1.4	< 1.4
Aromatic C5-C40: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10		< 10	< 10
TPH Ali/Aro C5-C40: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10		< 10	< 10
TPH (C6-C40): EH_CU+HS_1D_Total	DETSC 3311*	10	mg/kg	< 10		94	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01			
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01			
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01			
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01			
MTBE	DETSC 3321	0.01	mg/kg	< 0.01			
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1		0.2	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1		0.4	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1		0.3	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1		0.7	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.1		2.8	0.2
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1		0.8	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.5		4.4	0.2
Pyrene	DETSC 3301	0.1	mg/kg	0.3		3.7	0.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.2		2.2	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	0.3		2.5	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.2		1.7	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.2		1.2	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.3		2.5	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1		2.4	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1		0.5	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1		1.2	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	2.0		27	< 1.6
PCBs							
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01			

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

			Lab No	2251104	2251105	2251106	2251107
			.Sample ID	BH102	BH102	BH105	BH105
			Depth	1.00	7.50	2.20	3.50
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	16/10/2023	16/10/2023	16/10/2023	16/10/2023
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01			
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3		< 0.3	0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

			Lab No	2251108	2251109
			.Sample ID	BH102	BH102
			Depth	1.00	7.50
			Other ID		
			Sample Type	ES	ES
			Sampling Date	16/10/2023	16/10/2023
			Sampling Time	n/s	n/s
Test	Method	LOD	Units		
Preparation					
NRA Leachate Preparation	DETSC 1009*			Y	Y
Metals					
Antimony, Dissolved	DETSC 2306	0.17	ug/l	2.6	1.5
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.7	2.5
Barium, Dissolved	DETSC 2306	0.26	ug/l	30	12
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	71	93
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03
Chromium III, Dissolved	DETSC 2306*	1	ug/l	21	14
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.7	0.5
Iron, Dissolved	DETSC 2306	5.5	ug/l	< 5.5	7.3
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.29	0.31
Manganese, Dissolved	DETSC 2306	0.22	ug/l	0.95	1.3
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	3.4	4.7
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.46	< 0.25
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	4.3	2.9
Zinc, Dissolved	DETSC 2306	1.3	ug/l	< 1.3	< 1.3
Inorganics					
pH	DETSC 2008		pH	8.1	8.3
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20
Cyanide, Complex	DETSC 2130*	40	ug/l	< 40	< 40
Thiocyanate	DETSC 2130	20	ug/l	< 20	25
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	< 0.015	< 0.015
Sulphate as SO4	DETSC 2055	0.1	mg/l	130	20

Key: * -not accredited. n/s -not supplied.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY
Sample Id BH102 1.00
Sample Numbers 2251104 2251110
Date Analysed 31/10/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	2.1	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	2.0	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values Limit values for LS10 Leachate: Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	1.3	0.013	0.5	2	25
DETSC 2306 Barium as Ba	47	0.47	20	100	300
DETSC 2306 Cadmium as Cd	0.054	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	2.4	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	1.6	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	0.021	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	10	0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.62	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.53	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.36	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	1.8	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	< 1.3	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	25000	250	800	15,000	25,000
DETSC 2055* Fluoride as F	250	2.5	10	150	500
DETSC 2055 Sulphate as SO4	240000	2400	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	450000	4500	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	8.6
DETSC 2009 Conductivity uS/cm	639.0
* Temperature*	18.0

Mass of Sample Kg*	0.100
Mass of dry Sample Kg*	0.092

Stage 1

Volume of Leachant L2*	0.913
Volume of Eluate VE1*	0.85

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY
Sample Id BH105 2.20
Sample Numbers 2251106 2251111
Date Analysed 31/10/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	3.5	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	94.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	27.0	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values Limit values for LS10 Leachate: Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	1.2	0.012	0.5	2	25
DETSC 2306 Barium as Ba	15	0.15	20	100	300
DETSC 2306 Cadmium as Cd	0.11	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.3	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.1	0.021	2	50	100
DETSC 2306 Mercury as Hg	0.021	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	4.7	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	1.3	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	4.4	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.44	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	1.5	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	20	0.2	4	50	200
DETSC 2055 Chloride as Cl	8500	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	12000	120	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	76000	760	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	2200	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.8
DETSC 2009 Conductivity uS/cm	109.0
* Temperature*	18.0

Mass of Sample Kg*	0.100
Mass of dry Sample Kg*	0.092

Stage 1

Volume of Leachant L2*	0.913
Volume of Eluate VE1*	0.85

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

Summary of Asbestos Analysis
Soil Samples

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2251103	BH102 0.60	SOIL	NAD	none	Ben Rose
2251104	BH102 1.00	SOIL	NAD	none	Ben Rose
2251106	BH105 2.20	SOIL	NAD	none	Ben Rose
2251107	BH105 3.50	SOIL	NAD	none	Ben Rose

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 23-24975
Client Ref S230311
Contract WHITBY MARITIME HUB, WHITBY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2251103	BH102 0.60 SOIL	16/10/23	GJ 250ml, PT 1L x2		
2251104	BH102 1.00 SOIL	16/10/23	GJ 250ml, PT 1L x2		
2251105	BH102 7.50 SOIL	16/10/23	PT 500ml		
2251106	BH105 2.20 SOIL	16/10/23	GJ 250ml, PT 1L x2		
2251107	BH105 3.50 SOIL	16/10/23	GJ 250ml, PT 1L x2		
2251108	BH102 1.00 LEACHATE	16/10/23	GJ 250ml, PT 1L x2		
2251109	BH102 7.50 LEACHATE	16/10/23	PT 500ml		
2251110	BH102 1.00 LEACHATE	16/10/23	GJ 250ml, PT 1L x2		
2251111	BH105 2.20 LEACHATE	16/10/23	PT 500ml		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

End of Report

Certificate of Analysis

Certificate Number 23-24975-1 *Issued:* 11-Dec-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 23-24975-1

Client Reference S230311

Order No SOL--7796

Contract Title WHITBY MARITIME HUB, WHITBY

Description 5 Soil samples, 4 Leachate prepared by DETS samples.

Date Received 23-Oct-23

Date Started 23-Oct-23

Date Completed 11-Dec-23

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 23-24975, amendments made**
Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ilac-MRA

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 23-24975-1
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

Sample ID	Depth	Lab No	Completed	Matrix Description
BH102	1	2251104	02/11/2023	Brown/ orange very gravelly CLAY (Made ground - brick)
BH102	7.5	2251105	02/11/2023	Dark slightly gravelly, sandy CLAY
BH105	2.2	2251106	02/11/2023	Dark brown slightly gravelly, sandy CLAY including odd rootlets (Possible made ground - brick)
BH105	3.5	2251107	02/11/2023	Dark brown slightly gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis
Soil Samples

Our Ref 23-24975-1
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

				Lab No	2251104	2251105	2251106	2251107
				.Sample ID	BH102	BH102	BH105	BH105
				Depth	1.00	7.50	2.20	3.50
				Other ID				
				Sample Type	ES	ES	ES	ES
				Sampling Date	16/10/2023	16/10/2023	16/10/2023	16/10/2023
				Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units					
Metals								
Antimony	DETSC 2301*	1	mg/kg	1.4		1.3	< 1.0	
Arsenic	DETSC 2301#	0.2	mg/kg	7.1		11	13	
Barium	DETSC 2301#	1.5	mg/kg	59		130	57	
Beryllium	DETSC 2301#	0.2	mg/kg	0.4		1.1	0.4	
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	2.3		2.0	3.7	
Cadmium	DETSC 2301#	0.1	mg/kg	1.1		0.3	0.1	
Chromium III	DETSC 2301*	0.15	mg/kg	11		15	14	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0		< 1.0	< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	12		32	12	
Iron	DETSC 2301	25	mg/kg	16000		30000	32000	
Lead	DETSC 2301#	0.3	mg/kg	17		92	40	
Manganese	DETSC 2301#	20	mg/kg	180		570	270	
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05		0.13	0.05	
Molybdenum	DETSC 2301#	0.4	mg/kg	1.6		1.6	1.1	
Nickel	DETSC 2301#	1	mg/kg	9.2		16	14	
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5		0.5	< 0.5	
Vanadium	DETSC 2301#	0.8	mg/kg	16		36	35	
Zinc	DETSC 2301#	1	mg/kg	72		72	54	
Inorganics								
pH	DETSC 2008#		pH	9.6		8.3	8.6	
Calorific Value	DETSC 5008	1	MJ/kg	< 1.0				
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1		0.2	< 0.1	
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1		< 0.1	< 0.1	
Cyanide, Complex	DETSC 2130*	0.2	mg/kg	< 0.2		< 0.2	< 0.2	
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6		0.9	0.8	
Organic matter	DETSC 2002#	0.1	%		3.2			
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	1.4		43	4.7	
Nitrate as N	*	1	mg/kg	< 1.0		< 1.0	< 1.0	
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	1000		210	360	
Sulphur as S, Total	DETSC 2320	0.01	%	0.27		0.13	0.39	
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.69		0.13	0.13	
Petroleum Hydrocarbons								
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5	
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2	< 1.2	
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5	
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4	< 3.4	
Aliphatic C35-C40: EH_CU_1D_AL	DETSC 3072*	3.4	mg/kg	< 3.4		< 3.4	< 3.4	
Aliphatic C5-C40: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10		< 10	< 10	

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-24975-1
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

			Lab No	2251104	2251105	2251106	2251107
			.Sample ID	BH102	BH102	BH105	BH105
			Depth	1.00	7.50	2.20	3.50
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	16/10/2023	16/10/2023	16/10/2023	16/10/2023
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4	< 1.4
Aromatic C35-C40: EH_CU_1D_AR	DETSC 3072*	1.4	mg/kg	< 1.4		< 1.4	< 1.4
Aromatic C5-C40: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10		< 10	< 10
TPH Ali/Aro C5-C40: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10		< 10	< 10
TPH (C6-C40): EH+HS_1D_Total	DETSC 3311*	10	mg/kg	< 10		94	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01			
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01			
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01			
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01			
MTBE	DETSC 3321	0.01	mg/kg	< 0.01			
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1		0.2	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1		0.4	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1		0.3	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1		0.7	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.1		2.8	0.2
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1		0.8	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.5		4.4	0.2
Pyrene	DETSC 3301	0.1	mg/kg	0.3		3.7	0.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.2		2.2	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	0.3		2.5	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.2		1.7	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.2		1.2	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.3		2.5	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1		2.4	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1		0.5	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1		1.2	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	2.0		27	< 1.6
PCBs							
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01			

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-24975-1
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

			Lab No	2251104	2251105	2251106	2251107
			.Sample ID	BH102	BH102	BH105	BH105
			Depth	1.00	7.50	2.20	3.50
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	16/10/2023	16/10/2023	16/10/2023	16/10/2023
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01			
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3		< 0.3	0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-24975-1
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

Test	Method	LOD	Units	Lab No 2251108	2251109	2251111
				.Sample ID BH102	BH102	BH105
				Depth 1.00	7.50	2.20
				Other ID		
				Sample Type ES	ES	ES
				Sampling Date 16/10/2023	16/10/2023	16/10/2023
				Sampling Time n/s	n/s	n/s
Metals						
Antimony, Dissolved	DETSC 2306	0.17	ug/l	2.6	1.5	0.44
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.7	2.5	1.2
Barium, Dissolved	DETSC 2306	0.26	ug/l	30	12	15
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	71	93	33
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	0.11
Chromium III, Dissolved	DETSC 2306*	1	ug/l	21	14	1.3
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.7	0.5	2.1
Iron, Dissolved	DETSC 2306	5.5	ug/l	< 5.5	7.3	24
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.29	0.31	4.5
Manganese, Dissolved	DETSC 2306	0.22	ug/l	0.95	1.3	9.8
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	0.02
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	3.4	4.7	4.7
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5	< 0.5	1.3
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.46	< 0.25	1.5
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	4.3	2.9	1.9
Zinc, Dissolved	DETSC 2306	1.3	ug/l	< 1.3	< 1.3	20
Inorganics						
pH	DETSC 2008		pH	8.1	8.3	
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20	
Cyanide, Complex	DETSC 2130*	40	ug/l	< 40	< 40	
Thiocyanate	DETSC 2130	20	ug/l	< 20	25	
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	< 0.015	< 0.015	
Sulphate as SO4	DETSC 2055	0.1	mg/l	130	20	

Key: * -not accredited. n/s -not supplied.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY
Sample Id BH102 1.00
Sample Numbers 2251104 2251110
Date Analysed 31/10/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	2.1	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	2.0	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	1.3	0.013	0.5	2	25
DETSC 2306 Barium as Ba	47	0.47	20	100	300
DETSC 2306 Cadmium as Cd	0.054	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	2.4	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	1.6	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	0.021	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	10	0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.62	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.53	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.36	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	1.8	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	< 1.3	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	25000	250	800	15,000	25,000
DETSC 2055* Fluoride as F	250	2.5	10	150	500
DETSC 2055 Sulphate as SO4	240000	2400	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	450000	4500	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	8.6
DETSC 2009 Conductivity uS/cm	639.0
* Temperature*	18.0

Mass of Sample Kg*	0.100
Mass of dry Sample Kg*	0.092

Stage 1

Volume of Leachant L2*	0.913
Volume of Eluate VE1*	0.85

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-24975
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY
Sample Id BH105 2.20
Sample Numbers 2251106 2251111
Date Analysed 31/10/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	3.5	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	94.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	27.0	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	1.2	0.012	0.5	2	25
DETSC 2306 Barium as Ba	15	0.15	20	100	300
DETSC 2306 Cadmium as Cd	0.11	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.3	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.1	0.021	2	50	100
DETSC 2306 Mercury as Hg	0.021	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	4.7	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	1.3	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	4.4	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.44	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	1.5	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	20	0.2	4	50	200
DETSC 2055 Chloride as Cl	8500	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	12000	120	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	76000	760	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	2200	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.8
DETSC 2009 Conductivity uS/cm	109.0
* Temperature*	18.0

Mass of Sample Kg*	0.100
Mass of dry Sample Kg*	0.092

Stage 1

Volume of Leachant L2*	0.913
Volume of Eluate VE1*	0.85

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

Summary of Asbestos Analysis
Soil Samples

Our Ref 23-24975-1
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2251103	BH102 0.60	SOIL	NAD	none	Ben Rose
2251104	BH102 1.00	SOIL	NAD	none	Ben Rose
2251106	BH105 2.20	SOIL	NAD	none	Ben Rose
2251107	BH105 3.50	SOIL	NAD	none	Ben Rose

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 23-24975-1
Client Ref S230311
Contract WHITBY MARITIME HUB, WHITBY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2251103	BH102 0.60 SOIL	16/10/23	GJ 250ml, PT 1L x2		
2251104	BH102 1.00 SOIL	16/10/23	GJ 250ml, PT 1L x2	Ammonia (3 days)	BTEX / C5-C10
2251105	BH102 7.50 SOIL	16/10/23	PT 500ml		
2251106	BH105 2.20 SOIL	16/10/23	GJ 250ml, PT 1L x2	Ammonia (3 days)	BTEX / C5-C10
2251107	BH105 3.50 SOIL	16/10/23	GJ 250ml, PT 1L x2	Ammonia (3 days)	BTEX / C5-C10
2251108	BH102 1.00 LEACHATE	16/10/23	GJ 250ml, PT 1L x2		
2251109	BH102 7.50 LEACHATE	16/10/23	PT 500ml		
2251110	BH102 1.00 LEACHATE	16/10/23	GJ 250ml, PT 1L x2		
2251111	BH105 2.20 LEACHATE	16/10/23	PT 500ml		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

End of Report

Certificate of Analysis

Certificate Number	23-27300	*Issued:*	01-Dec-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-27300
Client Reference	S230311
Order No	SOL--7796
Contract Title	WHITBY MARITIME HUB, WHITBY
Description	1 Soil sample, 2 Leachate prepared by DETS samples.
Date Received	23-Oct-23
Date Started	20-Nov-23
Date Completed	01-Dec-23
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

ilac-MRA

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 23-27300
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

Lab No	2264873
.Sample ID	BH105
Depth	2.20
Other ID	
Sample Type	ES
Sampling Date	16/10/2023
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
Calorific Value	DETSC 5008	1	MJ/kg	< 1.0

Key: n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-27300
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

			Lab No	2264874	2264875
			.Sample ID	BH102	BH105
			Depth	1.00	2.20
			Other ID		
			Sample Type	ES	ES
			Sampling Date	16/10/2023	16/10/2023
			Sampling Time	n/s	n/s
Test	Method	LOD	Units		
Preparation					
NRA Leachate Preparation	DETSC 1009*			Y	Y
Petroleum Hydrocarbons					
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C35-C40: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C40: EH_CU+HS_1D_AL	DETSC 3072*	10	ug/l	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C35-C40: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C40: EH_CU+HS_1D_AR	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro C5-C40: EH_CU+HS_1D_Total	DETSC 3072*	10	ug/l	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0
MTBE	DETSC 3322	1	ug/l	< 1.0	< 1.0
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	0.09
Acenaphthene	DETSC 3304	0.01	ug/l	0.02	0.27
Fluorene	DETSC 3304	0.01	ug/l	0.02	0.17
Phenanthrene	DETSC 3304	0.01	ug/l	0.12	0.46
Anthracene	DETSC 3304	0.01	ug/l	0.04	0.19
Fluoranthene	DETSC 3304	0.01	ug/l	0.11	0.79
Pyrene	DETSC 3304	0.01	ug/l	0.13	0.62
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	0.06	0.34
Chrysene	DETSC 3304	0.01	ug/l	0.06	0.37
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.07	0.49
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	0.03	0.24
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	0.06	0.39
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	0.04	0.31

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-27300
Client Ref S230311
Contract Title WHITBY MARITIME HUB, WHITBY

			Lab No	2264874	2264875
			.Sample ID	BH102	BH105
			Depth	1.00	2.20
			Other ID		
			Sample Type	ES	ES
			Sampling Date	16/10/2023	16/10/2023
			Sampling Time	n/s	n/s
Test	Method	LOD	Units		
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	0.05
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.05	0.26
PAH Total	DETSC 3304	0.2	ug/l	0.79	5.0
PCBs					
PCB 28 + PCB 31	DETSC 3402	0.3	ug/l	< 0.3	< 0.3
PCB 52	DETSC 3402	0.2	ug/l	< 0.2	< 0.2
PCB 101	DETSC 3402	0.3	ug/l	< 0.3	< 0.3
PCB 118 + PCB 123	DETSC 3402	0.6	ug/l	< 0.6	< 0.6
PCB 138	DETSC 3402	0.2	ug/l	< 0.2	< 0.2
PCB 153	DETSC 3402	0.2	ug/l	< 0.2	< 0.2
PCB 180	DETSC 3402	0.2	ug/l	< 0.2	< 0.2
PCB 7 Total	DETSC 3402	1	ug/l	< 1.0	< 1.0
Phenols					
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100

Key: * -not accredited. n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 23-27300
Client Ref S230311
Contract WHITBY MARITIME HUB, WHITBY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2264873	BH105 2.20 SOIL	16/10/23	GJ 250ml, PT 1L x2		
2264874	BH102 1.00 LEACHATE	16/10/23	GJ 250ml, PT 1L x2		
2264875	BH105 2.20 LEACHATE	16/10/23	GJ 250ml, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL
Aliphatic C6-C8	HS_1D_AL
Aliphatic C8-C10	HS_1D_AL
Aliphatic C10-C12	EH_CU_1D_AL
Aliphatic C12-C16	EH_CU_1D_AL
Aliphatic C16-C21	EH_CU_1D_AL
Aliphatic C21-C35	EH_CU_1D_AL
Aliphatic C35-C40	EH_CU_1D_AL
Aliphatic C5-C40	EH_CU+HS_1D_AL
Aromatic C5-C7	HS_1D_AR
Aromatic C7-C8	HS_1D_AR
Aromatic C8-C10	HS_1D_AR
Aromatic C10-C12	EH_CU_1D_AR
Aromatic C12-C16	EH_CU_1D_AR
Aromatic C16-C21	EH_CU_1D_AR
Aromatic C21-C35	EH_CU_1D_AR
Aromatic C35-C40	EH_CU_1D_AR
Aromatic C5-C40	EH_CU+HS_1D_AR
TPH Ali/Aro C5-C40	EH_CU+HS_1D_Total

End of Report

Certificate of Analysis

Certificate Number	23-27302	*Issued:*	28-Nov-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-27302
Client Reference	S230311
Order No	SOL-7810
Contract Title	Whitby Maritime Hub, Whitby
Description	2 Soil samples.
Date Received	26-Oct-23
Date Started	20-Nov-23
Date Completed	28-Nov-23
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Soil Samples

Our Ref 23-27302
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2264877	2264878
			.Sample ID	BH104	BH104
			Depth	0.80	1.00
			Other ID		
			Sample Type	ES	ES
			Sampling Date	19/10/2023	19/10/2023
			Sampling Time	n/s	n/s
Test	Method	LOD	Units		
Metals					
Antimony	DETSC 2301*	1	mg/kg	1.5	1.6
Arsenic	DETSC 2301#	0.2	mg/kg	3.8	3.6
Barium	DETSC 2301#	1.5	mg/kg	51	45
Beryllium	DETSC 2301#	0.2	mg/kg	< 0.2	< 0.2
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.8	0.6
Cadmium	DETSC 2301#	0.1	mg/kg	0.1	< 0.1
Chromium III	DETSC 2301*	0.15	mg/kg	4.5	4.0
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	13	12
Iron	DETSC 2301	25	mg/kg	7800	7500
Lead	DETSC 2301#	0.3	mg/kg	54	42
Manganese	DETSC 2301#	20	mg/kg	280	290
Mercury	DETSC 2325#	0.05	mg/kg	0.08	0.07
Molybdenum	DETSC 2301#	0.4	mg/kg	0.5	0.5
Nickel	DETSC 2301#	1	mg/kg	8.9	7.6
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	8.8	7.4
Zinc	DETSC 2301#	1	mg/kg	43	38
Inorganics					
pH	DETSC 2008#		pH	8.4	8.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Cyanide, Complex	DETSC 2130*	0.2	mg/kg	< 0.2	< 0.2
Thiocyanate	DETSC 2130#	0.6	mg/kg	4.5	4.3
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	2.0	2.4
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	200	170
Sulphur as S, Total	DETSC 2320	0.01	%	0.04	0.04
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.09	0.08
Petroleum Hydrocarbons					
TPH (C6-C40): EH+HS_1D_Total	DETSC 3311*	10	mg/kg	< 10	< 10

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 23-27302
Client Ref S230311
Contract Whitby Maritime Hub, Whitby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2264877	BH104 0.80 SOIL	19/10/23	GJ 250ml, PT 1L x2		
2264878	BH104 1.00 SOIL	19/10/23	GJ 250ml, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
TPH (C6-C40)	EH+HS_1D_Total

End of Report

Certificate of Analysis

Certificate Number	23-27292	*Issued:*	23-Nov-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-27292
Client Reference	S230311
Order No	SOL-7819
Contract Title	Whitby Maritime Hub, Whitby
Description	2 Soil samples.
Date Received	01-Nov-23
Date Started	20-Nov-23
Date Completed	23-Nov-23
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

2139

Summary of Asbestos Analysis
Samples

Our Ref 23-27292
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Lab No	Sample ID	Sample Location	Material Type	Result	Comment*	Analyst

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 23-27292
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

		Lab No	2264823	2264824
		.Sample ID	BH101	BH103
		Depth	3.10	0.70
		Other ID		
		Sample Type	ES	ES
		Sampling Date	23/10/2023	23/10/2023
		Sampling Time		
Test	Method	Units		
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**< 0.001**	**0.002**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na	0.002
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	<0.001	na
Quantification by PCOM (c)	DETSC 1102	Mass %	na	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na	na
Breakdown of Gravimetric Analysis (a)				
Mass of Sample		g	957.67	771.29
ACMs present*		type		Cement
Mass of ACM in sample		g		0.12
% ACM by mass		%		0.02
% asbestos in ACM		%		15
% asbestos in sample		%		0.002
Breakdown of Detailed Gravimetric Analysis (b)				
% Amphibole bundles in sample		Mass %	na	na
% Chrysotile bundles in sample		Mass %	<0.001	na
Breakdown of PCOM Analysis (c)				
% Amphibole fibres in sample		Mass %	na	na
% Chrysotile fibres in sample		Mass %	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)				
Amphibole fibres		Fibres/g	na	na
Chrysotile fibres		Fibres/g	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
# denotes deviating sample

Information in Support of the Analytical Results

Our Ref 23-27292
Client Ref S230311
Contract Whitby Maritime Hub, Whitby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2264823	BH101 3.10 SOIL	23/10/23	GJ 250ml, PT 1L x2		
2264824	BH103 0.70 SOIL	23/10/23	GJ 250ml, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number 23-27301 *Issued:* 22-Nov-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 23-27301

Client Reference S230311

Order No SOL-7819

Contract Title Whitby Maritime Hub, Whitby

Description One Soil sample.

Date Received 01-Nov-23

Date Started 20-Nov-23

Date Completed 22-Nov-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]
Kirk Bridgewood
General Manager

ilac-MRA UKAS TESTING 2139

Summary of Chemical Analysis
Soil Samples

Our Ref 23-27301
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Lab No	2264876
.Sample ID	BH101
Depth	3.10
Other ID	
Sample Type	ES
Sampling Date	23/10/2023
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
Calorific Value	DETSC 5008	1	MJ/kg	< 1.0

Key: n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 23-27301
Client Ref S230311
Contract Whitby Maritime Hub, Whitby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2264876	BH101 3.10 SOIL	23/10/23	GJ 250ml, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number	23-25774	*Issued:*	14-Nov-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-25774
Client Reference	S230311
Order No	SOL-7819
Contract Title	Whitby Maritime Hub, Whitby
Description	4 Soil samples, 5 Leachate samples.
Date Received	01-Nov-23
Date Started	01-Nov-23
Date Completed	14-Nov-23
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]
Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Soil Samples

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2256396	2256397	2256398	2256399
			.Sample ID	BH101	BH101	BH101	BH103
			Depth	0.80	3.10	3.80	0.70
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	23/10/2023	23/10/2023	23/10/2023	23/10/2023
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
Metals							
Antimony	DETSC 2301*	1	mg/kg	1.2	1.1	1.3	2.4
Arsenic	DETSC 2301#	0.2	mg/kg	10	7.3	7.8	8.5
Barium	DETSC 2301#	1.5	mg/kg	110	150	130	160
Beryllium	DETSC 2301#	0.2	mg/kg	0.5	1.5	1.1	0.6
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	4.4	5.4	3.4	1.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.1	0.2	0.1	0.1
Chromium III	DETSC 2301*	0.15	mg/kg	11	13	17	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	33	32	120	2100
Iron	DETSC 2301	25	mg/kg	25000	16000	19000	20000
Lead	DETSC 2301#	0.3	mg/kg	110	120	150	230
Manganese	DETSC 2301#	20	mg/kg	360	580	520	410
Mercury	DETSC 2325#	0.05	mg/kg	0.38	0.16	0.63	0.10
Molybdenum	DETSC 2301#	0.4	mg/kg	1.1	1.1	7.4	1.1
Nickel	DETSC 2301#	1	mg/kg	21	15	16	18
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.1	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	27	30	27	23
Zinc	DETSC 2301#	1	mg/kg	81	100	100	100
Inorganics							
pH	DETSC 2008#		pH	9.2	9.4	8.9	9.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.3	< 0.1	< 0.1	0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Cyanide, Complex	DETSC 2130*	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Thiocyanate	DETSC 2130#	0.6	mg/kg	3.8	1.0	< 0.6	2.1
Organic matter	DETSC 2002#	0.1	%	1.8	1.4		
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	1.6	1.5	1.4	1.5
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	77	510	53	820
Sulphur as S, Total	DETSC 2320	0.01	%	0.05	0.29	0.32	0.13
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.08	0.17	0.19	0.27

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2256396	2256397	2256398	2256399
			.Sample ID	BH101	BH101	BH101	BH103
			Depth	0.80	3.10	3.80	0.70
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	23/10/2023	23/10/2023	23/10/2023	23/10/2023
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
Petroleum Hydrocarbons							
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	4.2	< 0.9	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	1.9	< 0.5	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	0.8	< 0.6	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
EPH (C10-C40): EH_1D_Total	DETSC 3311#	10	mg/kg	15	69	60	130
Benzene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	
Ethylbenzene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	
Toluene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	
Xylene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	
MTBE	DETSC 3321	0.01	mg/kg		< 0.01	< 0.01	

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2256396	2256397	2256398	2256399
			.Sample ID	BH101	BH101	BH101	BH103
			Depth	0.80	3.10	3.80	0.70
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	23/10/2023	23/10/2023	23/10/2023	23/10/2023
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.5
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	1.6
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.1	0.4
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	0.2	0.3	2.7
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	1.2	1.8	9.6
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	0.7	0.4	2.7
Fluoranthene	DETSC 3301	0.1	mg/kg	0.1	3.9	3.4	7.4
Pyrene	DETSC 3301	0.1	mg/kg	0.1	3.3	2.8	6.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	1.6	1.1	2.8
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	1.4	1.1	2.9
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	1.0	0.8	1.4
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.6	0.5	1.0
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	1.4	1.2	2.2
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	0.9	0.8	1.2
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	0.2	0.3
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	0.8	0.6	0.9
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	17	15	44
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.7	0.7	< 0.3

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2256400	2256401	2256402
			.Sample ID	BH101	BH101	BH103
			Depth	0.80	3.10	0.70
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	23/10/2023	23/10/2023	23/10/2023
			Sampling Time	n/s	n/s	n/s
Test	Method	LOD	Units			
Preparation						
BS EN 12457 10:1	DETSC 1009*					
NRA Leachate Preparation	DETSC 1009*			Y	Y	Y
Metals						
Antimony, Dissolved	DETSC 2306	0.17	ug/l	1.6	1.5	1.7
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	9.9	1.8	0.70
Barium, Dissolved	DETSC 2306	0.26	ug/l	3.0	18	37
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	41	90	32
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	< 0.03
Chromium III, Dissolved	DETSC 2306*	1	ug/l	5.6	< 1.0	4.3
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.8	< 0.4	1.8
Iron, Dissolved	DETSC 2306	5.5	ug/l	100	< 5.5	< 5.5
Lead, Dissolved	DETSC 2306	0.09	ug/l	1.5	0.10	1.0
Manganese, Dissolved	DETSC 2306	0.22	ug/l	1.7	14	4.0
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.01	< 0.01	< 0.01
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	3.0	6.2	2.1
Nickel, Dissolved	DETSC 2306	0.5	ug/l	0.6	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.83	0.53	0.61
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	2.9	2.9	0.8
Zinc, Dissolved	DETSC 2306	1.3	ug/l	< 1.3	< 1.3	4.0
Inorganics						
pH	DETSC 2008		pH	8.2	7.8	7.4
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20	< 20
Cyanide, Complex	DETSC 2130*	40	ug/l	< 40	< 40	< 40
Thiocyanate	DETSC 2130	20	ug/l	95	< 20	< 20
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.019	< 0.015	< 0.015
Sulphate as SO4	DETSC 2055	0.1	mg/l	8.0	45	140

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2256400	2256401	2256402
			.Sample ID	BH101	BH101	BH103
			Depth	0.80	3.10	0.70
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	23/10/2023	23/10/2023	23/10/2023
			Sampling Time	n/s	n/s	n/s
Test	Method	LOD	Units			
Petroleum Hydrocarbons						
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	ug/l	< 10	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	ug/l	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	ug/l	< 10	< 10	< 10
Benzene	DETSC 3322	1	ug/l		< 1.0	
Toluene	DETSC 3322	1	ug/l		< 1.0	
Ethylbenzene	DETSC 3322	1	ug/l		< 1.0	
Xylene	DETSC 3322	1	ug/l		< 1.0	
MTBE	DETSC 3322	1	ug/l		< 1.0	
PAHs						
Naphthalene	DETSC 3304	0.05	ug/l	0.07	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	0.01	0.03
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	0.07	0.02
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	0.04	0.03
Phenanthrene	DETSC 3304	0.01	ug/l	0.01	0.10	0.07
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	0.04	0.03
Fluoranthene	DETSC 3304	0.01	ug/l	0.01	0.22	0.17
Pyrene	DETSC 3304	0.01	ug/l	0.01	0.19	0.16
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	< 0.01	0.09	0.09
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	0.10	0.10
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	0.12	0.14
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	0.05	0.05
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.10	0.13
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.07	0.09
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	0.02	0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	0.07	0.08
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	1.3	1.2

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2256400	2256401	2256402
			.Sample ID	BH101	BH101	BH103
			Depth	0.80	3.10	0.70
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	23/10/2023	23/10/2023	23/10/2023
			Sampling Time	n/s	n/s	n/s
Test	Method	LOD	Units			
Phenols						
Phenol - Monohydric	DETSC 2130	100	ug/l	140	< 100	< 100

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby
Sample Id BH101 3.10
Sample Numbers 2256397 2256403
Date Analysed 10/11/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	2.7	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	69.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	17.0	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	1.1	0.011	0.5	2	25
DETSC 2306 Barium as Ba	16	0.16	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.34	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	< 0.40	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	4.3	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.25	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	1	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.27	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	2.2	0.022	4	50	200
DETSC 2055 Chloride as Cl	190000	1900	800	15,000	25,000
DETSC 2055* Fluoride as F	150	1.5	10	150	500
DETSC 2055 Sulphate as SO4	31000	310	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	710000	7100	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.5
DETSC 2009 Conductivity uS/cm	1020.0
* Temperature*	17.0

Mass of Sample Kg*	0.120
Mass of dry Sample Kg*	0.099

Stage 1

Volume of Leachant L2*	0.966
Volume of Eluate VE1*	0.91

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby
Sample Id BH103 0.70

Sample Numbers 2256399 2256404
Date Analysed 10/11/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	1.4	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	130.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	44.0	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	0.62	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	33	0.33	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.4	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	1.7	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	1.6	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	1.3	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	2.5	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.64	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	4.7	0.047	4	50	200
DETSC 2055 Chloride as Cl	72000	720	800	15,000	25,000
DETSC 2055* Fluoride as F	290	2.9	10	150	500
DETSC 2055 Sulphate as SO4	140000	1400	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	760000	7600	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.1
DETSC 2009 Conductivity uS/cm	1090.0
* Temperature*	17.0

Mass of Sample Kg*	0.120
Mass of dry Sample Kg*	0.099

Stage 1

Volume of Leachant L2*	0.974
Volume of Eluate VE1*	0.92

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

Summary of Asbestos Analysis
Soil Samples

Our Ref 23-25774
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2256396	BH101 0.80	SOIL	NAD	none	Ben Rose
2256397	BH101 3.10	SOIL	Chrysotile	Chrysotile present as fibre bundles	Ben Rose
2256399	BH103 0.70	SOIL	Chrysotile	Chrysotile present in microscopic cement fragments	Ben Rose

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 23-25774
Client Ref S230311
Contract Whitby Maritime Hub, Whitby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2256396	BH101 0.80 SOIL	23/10/23	GJ 250ml, PT 1L x2	Ammonia (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	BTEX / C5-C10
2256397	BH101 3.10 SOIL	23/10/23	GJ 250ml, PT 1L x2	Ammonia (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	BTEX / C5-C10
2256398	BH101 3.80 SOIL	23/10/23	GJ 250ml, PT 1L x2	Ammonia (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	BTEX / C5-C10
2256399	BH103 0.70 SOIL	23/10/23	GJ 250ml, PT 1L x2	Ammonia (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	BTEX / C5-C10
2256400	BH101 0.80 LEACHATE	23/10/23	GJ 250ml, PT 1L x2		
2256401	BH101 3.10 LEACHATE	23/10/23	GJ 250ml, PT 1L x2		
2256402	BH103 0.70 LEACHATE	23/10/23	GJ 250ml, PT 1L x2		
2256403	BH101 3.10 LEACHATE	23/10/23	GJ 250ml, PT 1L x2		
2256404	BH103 0.70 LEACHATE	23/10/23	GJ 250ml, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL
Aliphatic C6-C8	HS_1D_AL
Aliphatic C8-C10	HS_1D_AL
Aliphatic C10-C12	EH_CU_1D_AL
Aliphatic C12-C16	EH_CU_1D_AL
Aliphatic C16-C21	EH_CU_1D_AL
Aliphatic C21-C35	EH_CU_1D_AL
Aliphatic C5-C35	EH_CU+HS_1D_AL
Aromatic C5-C7	HS_1D_AR
Aromatic C7-C8	HS_1D_AR
Aromatic C8-C10	HS_1D_AR
Aromatic C10-C12	EH_CU_1D_AR
Aromatic C12-C16	EH_CU_1D_AR
Aromatic C16-C21	EH_CU_1D_AR
Aromatic C21-C35	EH_CU_1D_AR
Aromatic C5-C35	EH_CU+HS_1D_AR
TPH Ali/Aro Total C5-C35	EH_CU+HS_1D_Total
EPH (C10-C40)	EH_1D_Total
TPH (C10-C40)	EH_1D_Total

End of Report

Certificate of Analysis

Certificate Number	23-25310	*Issued:*	09-Nov-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-25310
Client Reference	S230311
Order No	SOL-7810
Contract Title	Whitby Maritime Hub, Whitby
Description	2 Soil samples, 2 Leachate samples.
Date Received	26-Oct-23
Date Started	26-Oct-23
Date Completed	09-Nov-23
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ilac-MRA

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 23-25310
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Sample ID	Depth	Lab No	Completed	Matrix Description
BH104	0.8	2253351	09/11/2023	Light brown very gravelly, sandy CLAY
BH104	1	2253352	09/11/2023	Light brown very gravelly, sandy CLAY

Summary of Chemical Analysis
Soil Samples

Our Ref 23-25310
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2253351	2253352
			.Sample ID	BH104	BH104
			Depth	0.80	1.00
			Other ID		
			Sample Type	ES	ES
			Sampling Date	19/10/2023	19/10/2023
			Sampling Time	n/s	n/s
Test	Method	LOD	Units		
Petroleum Hydrocarbons					
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	0.40	0.43
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	0.99	0.07
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.2	0.2
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.5

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-25310
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Lab No	2253353
.Sample ID	BH104
Depth	0.80
Other ID	
Sample Type	ES
Sampling Date	19/10/2023
Sampling Time	n/s

Test	Method	LOD	Units	
Preparation				
BS EN 12457 10:1	DETSC 1009*			Y
BS EN 12457 10:1	DETSC 1009*			
Metals				
Antimony, Dissolved	DETSC 2306	0.17	ug/l	2.8
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.3
Barium, Dissolved	DETSC 2306	0.26	ug/l	24
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	27
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.12
Chromium III, Dissolved	DETSC 2306*	1	ug/l	4.0
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.3
Iron, Dissolved	DETSC 2306	5.5	ug/l	74
Lead, Dissolved	DETSC 2306	0.09	ug/l	6.0
Manganese, Dissolved	DETSC 2306	0.22	ug/l	14
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.03
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	6.0
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.7
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.9
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	2.6
Zinc, Dissolved	DETSC 2306	1.3	ug/l	36
Inorganics				
pH	DETSC 2008		pH	6.6
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20
Cyanide, Complex	DETSC 2130*	40	ug/l	< 40
Thiocyanate	DETSC 2130	20	ug/l	< 20
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.070
Sulphate as SO4	DETSC 2055	0.1	mg/l	28
Petroleum Hydrocarbons				
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 23-25310
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Lab No	2253353
.Sample ID	BH104
Depth	0.80
Other ID	
Sample Type	ES
Sampling Date	19/10/2023
Sampling Time	n/s

Test	Method	LOD	Units	
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	ug/l	< 10
PAHs				
Naphthalene	DETSC 3304	0.05	ug/l	0.07
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.02
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.02
Pyrene	DETSC 3304	0.01	ug/l	0.02
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20
Phenols				
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100

Key: * -not accredited. n/s -not supplied.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 23-25310
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby
Sample Id BH104 0.80
Sample Numbers 2253351 2253354
Date Analysed 06/11/2023

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	9.0	3	5	6
DETSC2003# Loss On Ignition	%		n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# EPH (C10 - C40): EH_1D_Total	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values Limit values for LS10 Leachate: Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	0.32	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	15	0.15	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	< 0.25	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2	0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.18	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	2.7	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.44	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	5.9	0.059	4	50	200
DETSC 2055 Chloride as Cl	25000	250	800	15,000	25,000
DETSC 2055* Fluoride as F	180	1.8	10	150	500
DETSC 2055 Sulphate as SO4	30000	300	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	170000	1700	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.2
DETSC 2009 Conductivity uS/cm	239.0
* Temperature*	18.0

Mass of Sample Kg*	0.110
Mass of dry Sample Kg*	0.095

Stage 1

Volume of Leachant L2*	0.936
Volume of Eluate VE1*	0.88

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

V.2.06 * DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

Summary of Asbestos Analysis
Soil Samples

Our Ref 23-25310
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2253351	BH104 0.80	SOIL	NAD	none	Ben Rose
2253352	BH104 1.00	SOIL	NAD	none	Ben Rose

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 23-25310
Client Ref S230311
Contract Whitby Maritime Hub, Whitby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2253351	BH104 0.80 SOIL	19/10/23	GJ 250ml, PT 1L x2		BTEX / C5-C10
2253352	BH104 1.00 SOIL	19/10/23	GJ 250ml, PT 1L x2		BTEX / C5-C10
2253353	BH104 0.80 LEACHATE	19/10/23	GJ 250ml, PT 1L x2		
2253354	BH104 0.80 LEACHATE	19/10/23	GJ 250ml, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

End of Report

Certificate of Analysis

Certificate Number 23-27958 *Issued:* 11-Dec-23

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 23-27958

Client Reference S230311

Order No SOL-7906

Contract Title Whitby Maritime Hub, Whitby

Description 5 Water samples.

Date Received 28-Nov-23

Date Started 28-Nov-23

Date Completed 11-Dec-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]
Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Water Samples

Our Ref 23-27958
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2268784	2268785	2268786	2268787	2268788
			.Sample ID	BH101	BH102	BH103	BH105	WS101
			Depth	2.07	1.86	1.86	2.00	2.30
			Other ID					
			Sample Type	WATER	WATER	WATER	WATER	WATER
			Sampling Date	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units					
Metals								
Antimony, Dissolved	DETSC 2306	0.17	ug/l	1.1	0.19	< 0.17	0.68	0.89
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	2.8	1.7	1.3	2.0	2.4
Barium, Dissolved	DETSC 2306	0.26	ug/l	140	610	480	350	290
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	62	140	110	130	880
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.13	0.03	< 0.03	< 0.03	0.04
Chromium III, Dissolved	DETSC 2306*	1	ug/l	12	2.3	7.9	5.5	< 1.0
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	11	1.6	1.2	1.7	0.9
Iron, Dissolved	DETSC 2306	5.5	ug/l	84	27	24	32	110
Lead, Dissolved	DETSC 2306	0.09	ug/l	1.6	0.55	1.1	0.46	0.18
Manganese, Dissolved	DETSC 2306	0.22	ug/l	9.6	520	210	51	4500
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.03	0.01	< 0.01	< 0.01	< 0.01
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	21	14	5.6	15	10
Nickel, Dissolved	DETSC 2306	0.5	ug/l	2.1	0.7	0.6	1.8	5.3
Selenium, Dissolved	DETSC 2306	0.25	ug/l	2.1	0.63	0.33	0.45	0.35
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	5.8	< 0.6	< 0.6	< 0.6	0.6
Zinc, Dissolved	DETSC 2306	1.3	ug/l	20	55	76	95	84
Inorganics								
pH	DETSC 2008		pH	9.5	8.0	7.7	7.8	7.3
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	< 40	< 40	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20	< 20	< 20	< 20
Cyanide, Complex	DETSC 2130*	40	ug/l	< 40	< 40	< 40	< 40	< 40
Thiocyanate	DETSC 2130	20	ug/l	< 20	< 20	< 20	< 20	< 20
Total Hardness as CaCO3	DETSC 2303	0.1	mg/l	74.5	144	121	138	1310
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.26	0.45	0.43	1.3	1.8
Sulphate as SO4	DETSC 2055	0.1	mg/l	76	11	5.1	110	610
Petroleum Hydrocarbons								
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 23-27958
Client Ref S230311
Contract Title Whitby Maritime Hub, Whitby

			Lab No	2268784	2268785	2268786	2268787	2268788
			.Sample ID	BH101	BH102	BH103	BH105	WS101
			Depth	2.07	1.86	1.86	2.00	2.30
			Other ID					
			Sample Type	WATER	WATER	WATER	WATER	WATER
			Sampling Date	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units					
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0			< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0			< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0			< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0			< 1.0
MTBE	DETSC 3322	1	ug/l	< 1.0	< 1.0			< 1.0
PAHs								
Naphthalene	DETSC 3304	0.05	ug/l	0.07	0.08	< 0.05	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Acenaphthene	DETSC 3304	0.01	ug/l	0.01	0.01	< 0.01	0.01	0.02
Fluorene	DETSC 3304	0.01	ug/l	0.01	0.01	< 0.01	< 0.01	0.02
Phenanthrene	DETSC 3304	0.01	ug/l	0.03	0.02	0.01	< 0.01	0.10
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.07
Fluoranthene	DETSC 3304	0.01	ug/l	0.02	< 0.01	< 0.01	< 0.01	0.33
Pyrene	DETSC 3304	0.01	ug/l	0.02	< 0.01	< 0.01	< 0.01	0.29
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.12
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.14
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.20
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.07
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.17
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.13
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.03
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	0.12
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20	< 0.20	< 0.20	1.8
PCBs								
PCB 28 + PCB 31	DETSC 3402	0.3	ug/l	< 0.3	< 0.3			< 0.3
PCB 52	DETSC 3402	0.2	ug/l	< 0.2	< 0.2			< 0.2
PCB 101	DETSC 3402	0.3	ug/l	< 0.3	< 0.3			< 0.3
PCB 118 + PCB 123	DETSC 3402	0.6	ug/l	< 0.6	< 0.6			< 0.6
PCB 138	DETSC 3402	0.2	ug/l	< 0.2	< 0.2			< 0.2
PCB 153	DETSC 3402	0.2	ug/l	< 0.2	< 0.2			< 0.2
PCB 180	DETSC 3402	0.2	ug/l	< 0.2	< 0.2			< 0.2
PCB 7 Total	DETSC 3402	1	ug/l	< 1.0	< 1.0			< 1.0
Phenols								
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100	< 100	< 100	< 100

Key: * -not accredited. n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 23-27958
Client Ref S230311
Contract Whitby Maritime Hub, Whitby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2268784	BH101 2.07 WATER	27/11/23	GB to 500ml x4, GV		
2268785	BH102 1.86 WATER	27/11/23	GB to 500ml x4, GV		
2268786	BH103 1.86 WATER	27/11/23	GB to 500ml x4, GV		
2268787	BH105 2.00 WATER	27/11/23	GB to 500ml x4, GV		
2268788	WS101 2.30 WATER	27/11/23	GB to 500ml x2, GV		

Key: G-Glass B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL
Aliphatic C6-C8	HS_1D_AL
Aliphatic C8-C10	HS_1D_AL
Aliphatic C10-C12	EH_CU_1D_AL
Aliphatic C12-C16	EH_CU_1D_AL
Aliphatic C16-C21	EH_CU_1D_AL
Aliphatic C21-C35	EH_CU_1D_AL
Aliphatic C5-C35	EH_CU+HS_1D_AL
Aromatic C5-C7	HS_1D_AR
Aromatic C7-C8	HS_1D_AR
Aromatic C8-C10	HS_1D_AR
Aromatic C10-C12	EH_CU_1D_AR
Aromatic C12-C16	EH_CU_1D_AR
Aromatic C16-C21	EH_CU_1D_AR
Aromatic C21-C35	EH_CU_1D_AR
Aromatic C5-C35	EH_CU+HS_1D_AR
TPH Ali/Aro Total C5-C35	EH_CU+HS_1D_Total

End of Report

APPENDIX D:
Geotechnical Laboratory Results

Laboratory Report Front Sheet

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Client details:

Reference:	S230311
Name:	Solmek
Address:	12 Yarm Road, Stockton-on-tees, TS18 3NA
Telephone:	01642 607083
Email:	lcassidy@solmek.com
FAO:	Leo Cassidy

Samples received:

Date commenced: 31/03/2023

Date reported: 19/04/2023

Observations and interpretations are outside of the UKAS Accreditiation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Samples will be held at the laboratory for a period of 4 weeks after the report date. After the above reporting date the samples will be disposed of. Should further testing be required then the office should be informed before the above date.

Signature:	Approved Signitories:
[redacted]	☐ D.Anderson (Managing Director) ☑ J. Brischuk (Laboratory Manager) ☐ T. Finnimore (Quality/Technical Manager)

Summary of Classification Tests

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING

10258

Site name	Job number
Whitby	S230311

Hole	Depth Top m	Depth Base m	Type	*w* %	Oven temp. oc	wa %	Pa %	Pr %	wL %	wP %	IP %	IL	Plasticity class	Preparation method
WS101	2.40		D	24	105	65	37	63	38-s	26	12	3.250	MI	Tested after >425µm removed by hand
WS102	1.20		B	16	105	30	54	46	37-s	27	10	0.300	MI	Tested after washing to remove >425µm
WS104	1.80		B	26	105	84	31	69	34-s	25	9	6.556	ML	Tested after >425µm removed by hand
WS105	3.30		B	23	105	256	9	91	35-s	25	10	23.100	MI	Tested after washing to remove >425µm

All tests found in G2M Testing UKAS Schedule of Accreditation are tested to standard unless otherwise indicated

Key	Description		Category	BS Test Code
w	Moisture content			BS 1377:1990 Part 2 Clause 3.2
wa	Equivalent moisture content passing 425µm sieve			BS 1377:1990 Part 2 Clause 3.2
wL	Liquid limit	Single point	-s	BS 1377:1990 Part 2 Clause 4.4
		Four point	-f	BS 1377:1990 Part 2 Clause 4.3
wP	Plastic limit			BS 1377:1990 Part 2 Clause 5.2
Pa	Percentage passing 425um sieve			
Pr	Percentage retained 425um sieve			
IP	Plasticity index			BS 1377:1990 Part 2 Clause 5.4
IL	Liquidity index			BS 1377:1990 Part 2 Clause 5.4
	Suffix indicating test is "Not UKAS Accredited"		*	

Approved by	JBrischuk
Approval date	14/04/2023 16:08
Date report generated	
Report Number	

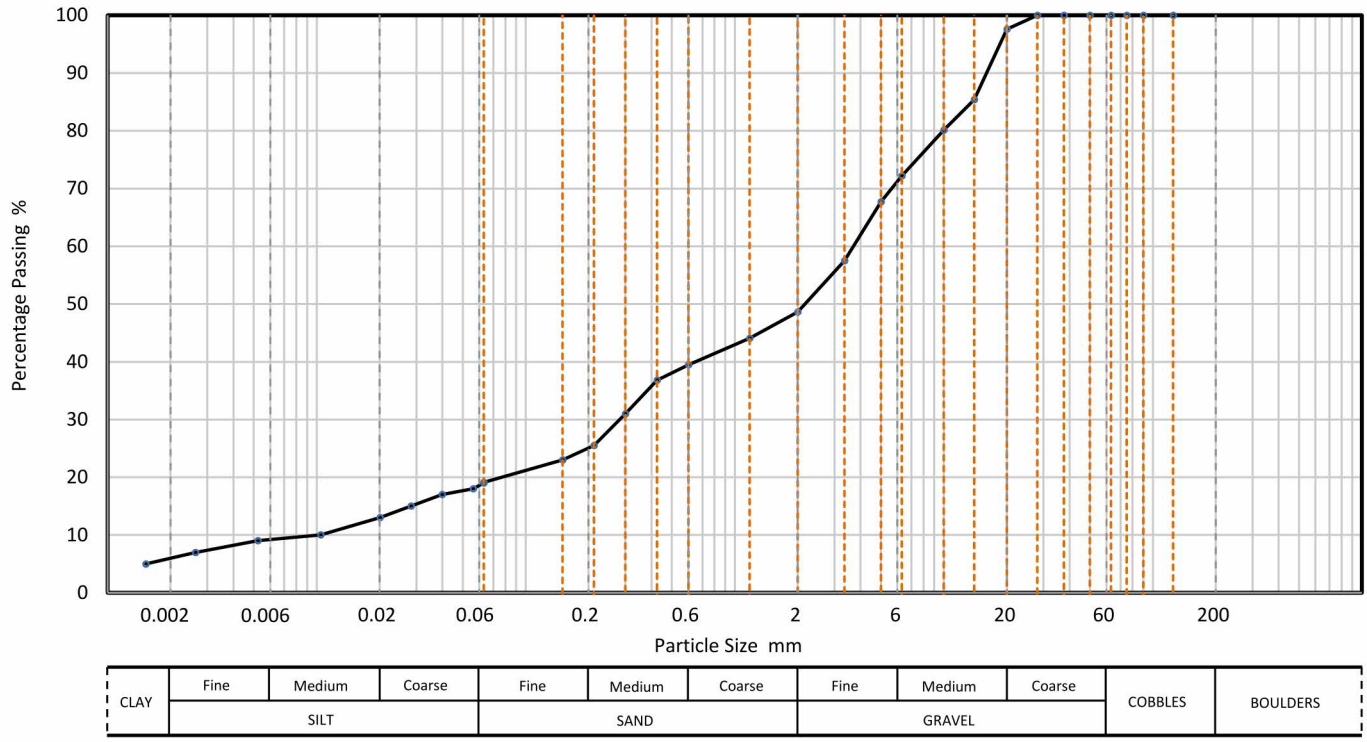
PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Site name	Job number
Whitby	S230311

Hole	WS102	Lab sample ID	G2MT2023033123
Depth (Top) m	0.40	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base) m		Soil Description	Clayey, Silty, Sandy GRAVEL
Sample type	B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	19
90	100	0.0561	18
75	100	0.0398	17
63	100	0.0283	15
50	100	0.0201	13
37.5	100	0.0104	10
28	100	0.0052	9
20	98	0.0026	7
14	85	0.0015	5
10	80		
6.3	72		
5	68		
3.35	58		
2	49		
1.18	44		
0.6	40	Particle density (assumed)	
0.425	37	2.65 Mg/m3	
0.3	31		
0.212	26		
0.15	23		
0.063	19		

Dry Mass of sample, g	814

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	51.4
Sand	29.5
Silt	13.0
Clay	6.1

Grading Analysis		
D100	mm	
D60	mm	3.7
D30	mm	0.282
D10	mm	0.00877
Uniformity Coefficient		420
Curvature Coefficient		2.5

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	11/04/2023 10:39

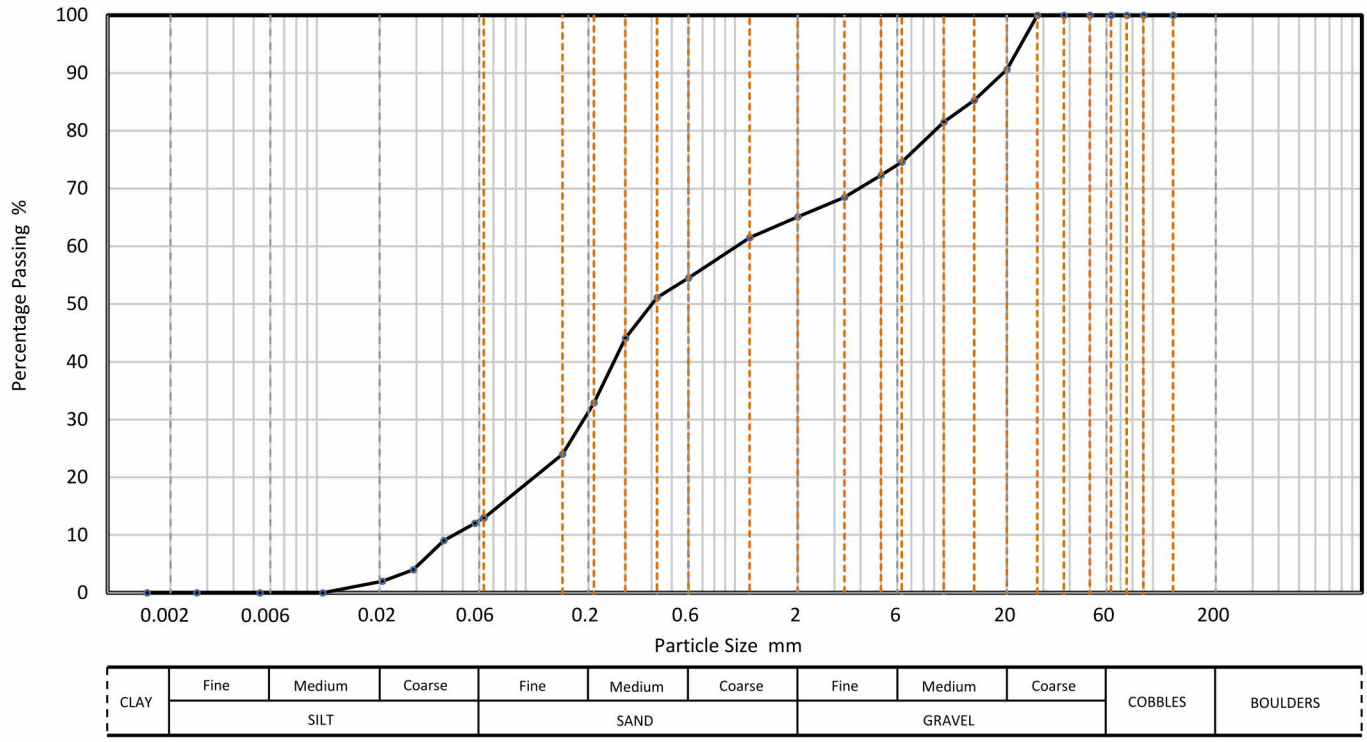
PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Site name	Job number
Whitby	S230311

Hole	WS102	Lab sample ID	G2MT2023033124
Depth (Top) m	3.60	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base) m		Soil Description	Silty, Very Gravelly SAND
Sample type	B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	13
90	100	0.0570	12
75	100	0.0406	9
63	100	0.0290	4
50	100	0.0206	2
37.5	100	0.0107	0
28	100	0.0053	0
20	91	0.0027	0
14	85	0.0015	0
10	82		
6.3	75		
5	72		
3.35	69		
2	65		
1.18	62		
0.6	55	Particle density	(assumed)
0.425	51	2.65	Mg/m3
0.3	44		
0.212	33		
0.15	24		
0.063	13		

Dry Mass of sample, g	1281

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	34.9
Sand	52.3
Silt	12.8
Clay	0.0

Grading Analysis		
D100	mm	
D60	mm	1.02
D30	mm	0.189
D10	mm	0.0452
Uniformity Coefficient		22
Curvature Coefficient		0.78

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	14/04/2023 15:26

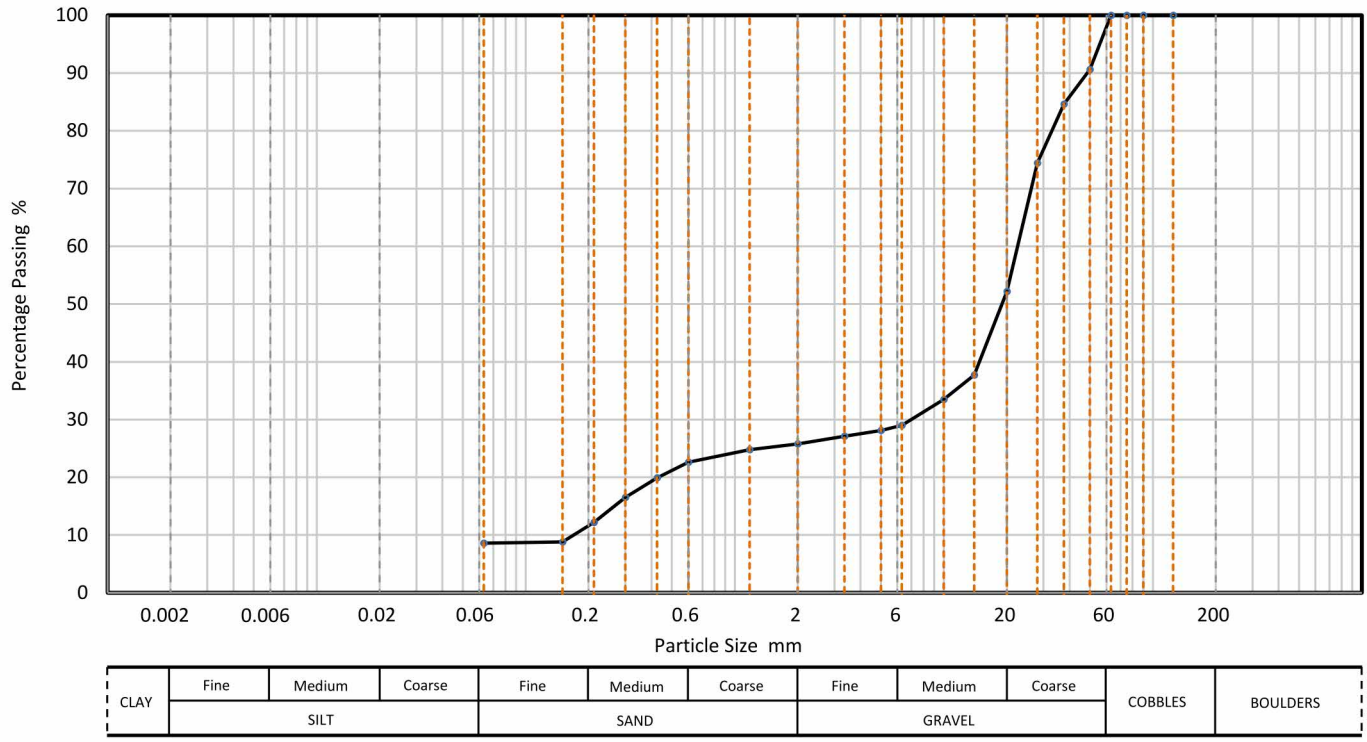
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
[redacted]

UKAS TESTING
10258

Hole		WS104	Lab sample ID	G2MT2023033125
Depth (Top)	m	0.40	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base)	m		Soil Description	Silty Sandy GRAVEL
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	91		
37.5	85		
28	74		
20	52		
14	38		
10	34		
6.3	29		
5	28		
3.35	27		
2	26		
1.18	25		
0.6	23		
0.425	20		
0.3	17		
0.212	12		
0.15	9		
0.063	9		

Dry Mass of sample, g: 4228

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	74.2
Sand	17.2
Fines <0.063mm	9.0

Grading Analysis		
D100	mm	
D60	mm	22.5
D30	mm	6.98
D10	mm	0.169
Uniformity Coefficient		130
Curvature Coefficient		13

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

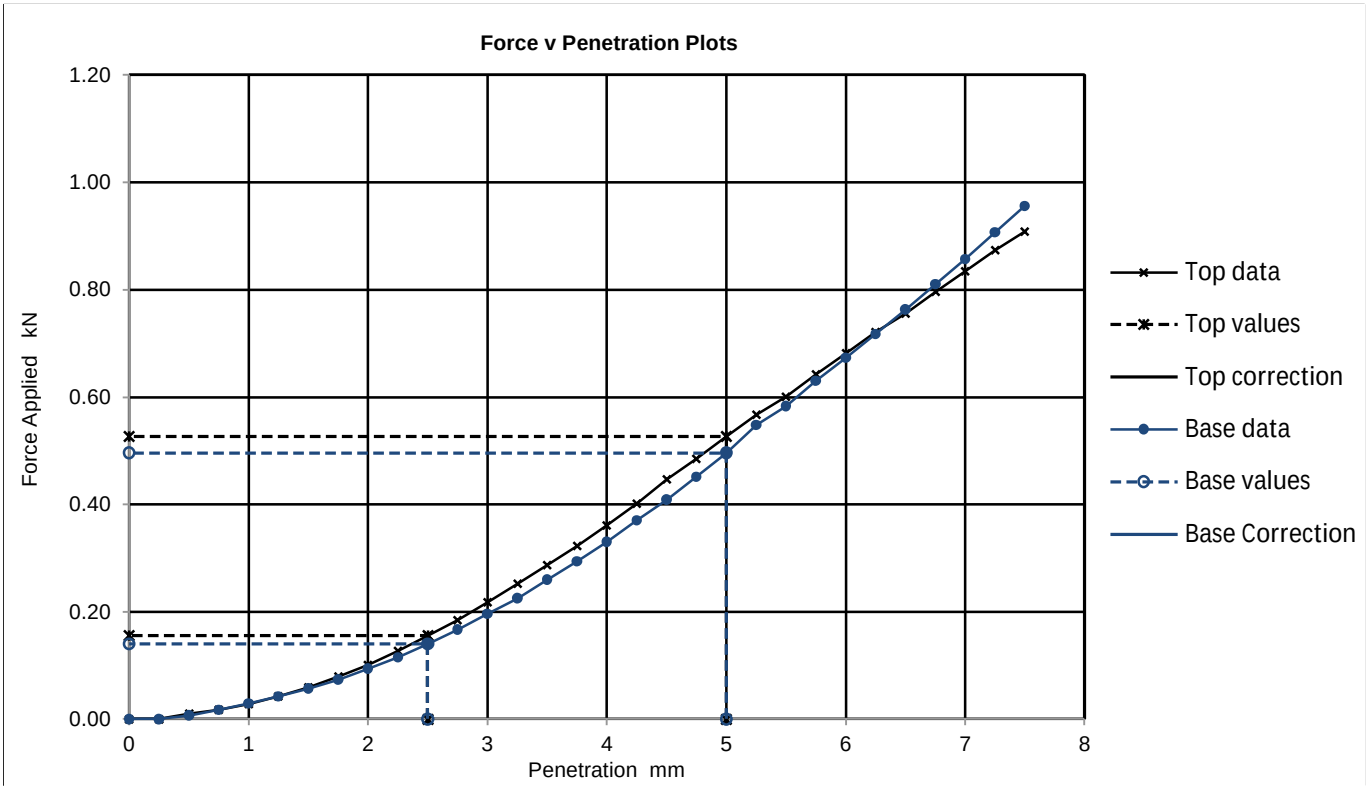
Approved by	D Anderson
Approval date	14/04/2023 15:26

California Bearing Ratio (CBR)

					Job Ref	S230311
					Borehole/Pit No.	WS102
Site Name	Whitby				Sample No.	
Soil Description					Depth m	0.40
Specimen Reference	WS102	Specimen Depth	0.40	m	Sample Type	B
Specimen Description					KeyLAB ID	G2MT2023033123
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			31	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density		2.07	Mg/m3	Surcharge applied	2	kg
	Dry density		1.75	Mg/m3		1	kPa
	Moisture content		18.6	%			



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP		1.2	2.6	2.6	2.6	18.9
BASE		1.1	2.5	2.5		19.0

General remarks	Test specific remarks	Approved
		JBrischuk

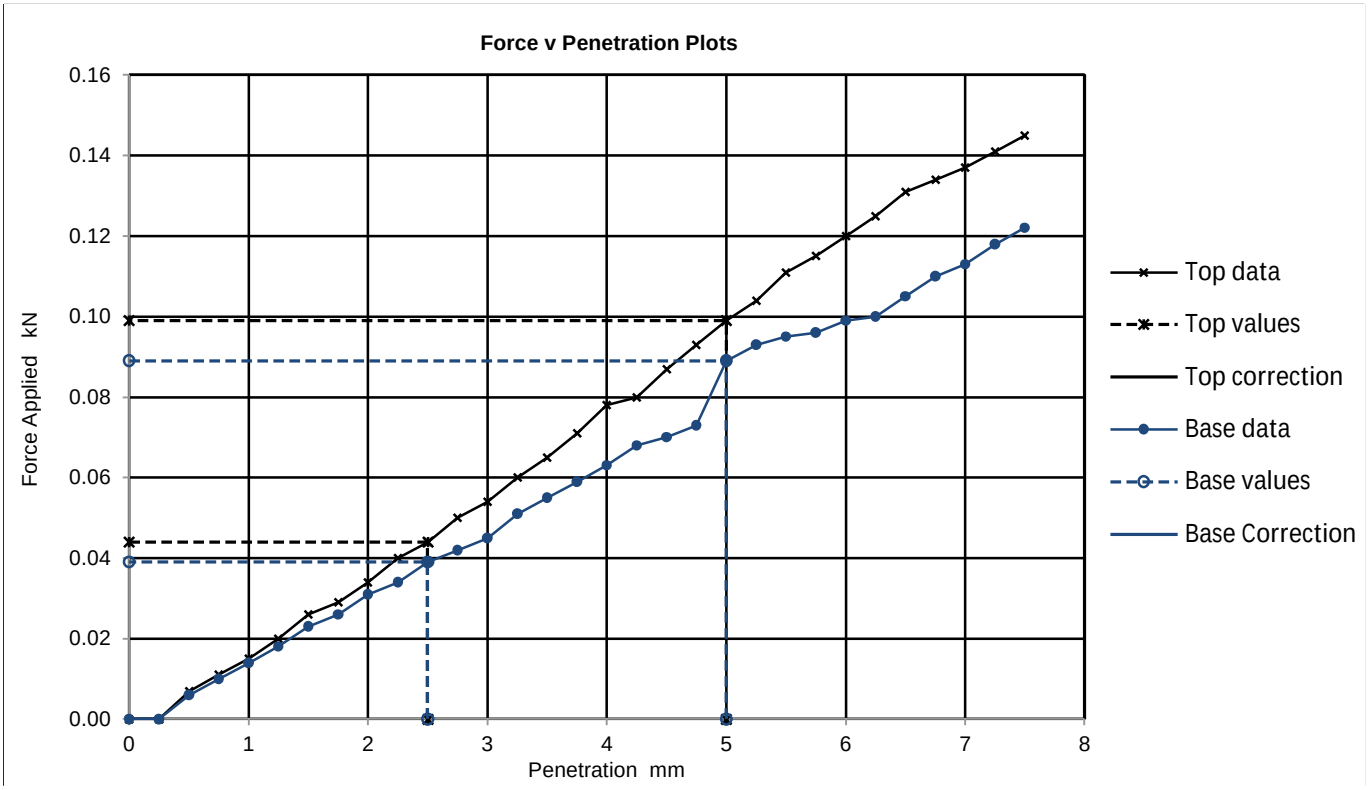
Fig No.	1
Sheet No	1

Lab Sheet Reference :

	California Bearing Ratio (CBR)				Job Ref	S230311
					Borehole/Pit No.	WS104
Site Name	Whitby				Sample No.	
Soil Description					Depth m	0.40
Specimen Reference	WS104	Specimen Depth	0.40	m	Sample Type	B
Specimen Description					KeyLAB ID	G2MT2023033125
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			21	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density		1.91	Mg/m3	Surcharge applied	2	kg
	Dry density		1.51	Mg/m3		1	kPa
	Moisture content		26.8	%			



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP		0.3	0.5	0.5	0.5	26.6
BASE		0.3	0.5	0.5		26.0

General remarks	Test specific remarks	Approved
		JBrischuk

Fig No.	1
Sheet No	2

Lab Sheet Reference :

Certificate of Analysis

Certificate Number 23-07997 *Issued:* 12-Apr-23

Client G2M Testing Ltd
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 23-07997

Client Reference S230311

Order No LAB1840

Contract Title WHITBY

Description 3 Soil samples.

Date Received 04-Apr-23

Date Started 04-Apr-23

Date Completed 12-Apr-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]
Kirk Bridgewood
General Manager

ilac-MRA UKAS TESTING 2139

Summary of Chemical Analysis
Soil Samples

Our Ref 23-07997
Client Ref S230311
Contract Title WHITBY

Test	Method	LOD	Units	Lab No 2151135	2151136	2151137
			.Sample ID	WS104	WS105	WS101
			Depth	3.30	3.30	4.00
			Other ID			
			Sample Type	SOIL	SOIL	SOIL
			Sampling Date	31/03/2023	31/03/2023	31/03/2023
			Sampling Time	n/s	n/s	n/s
Inorganics						
pH	DETSC 2008#		pH	11.1	8.5	
Organic matter	DETSC 2002#	0.1	%	0.7	0.4	0.4
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	140	170	

Information in Support of the Analytical Results

Our Ref 23-07997
Client Ref S230311
Contract WHITBY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2151135	WS104 3.30 SOIL	31/03/23	PT 1L		
2151136	WS105 3.30 SOIL	31/03/23	PT 1L		
2151137	WS101 4.00 SOIL	31/03/23	PT 1L		

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Laboratory Report Front Sheet

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Client details:

Reference:	S230311_2
Name:	Solmek
Address:	12 Yarm Road, Stockton-on-tees, TS18 3NA
Telephone:	01642 607083
Email:	lcassidy@solmek.com
FAO:	Leo Cassidy

Samples received:

Date commenced: 09/11/2023

Date reported: 22/11/2023

Observations and interpretations are outside of the UKAS Accreditiation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Samples will be held at the laboratory for a period of 4 weeks after the report date. After the above reporting date the samples will be disposed of. Should further testing be required then the office should be informed before the above date.

Signature:	Approved Signitories:
[redacted]	☐ D.Anderson (Managing Director) ☑ J. Brischuk (Laboratory Manager) ☐

Summary of Classification Tests

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
[redacted]

UKAS TESTING
10258

Site name	Job number
Whitby	S230311

Hole	Depth Top m	Depth Base m	Type	w %	Oven temp. oc	wa %	Pa %	Pr %	wL %	wP %	IP %	IL	Plasticity class	Preparation method
BH101	3.00		D	25	50	33	75	25	25-s	19	6	2.333	ML	Tested after >425µm removed by hand
BH101	5.00		D	27	50	27	99	1	27-s	11	16	1.000	CL	Tested after >425µm removed by hand
BH101	7.50		D	40	105	40	100	0	48-s	35	13	0.385	MI	Tested in natural condition
BH101	15.00		D	16	105	22	74	26	30-s	15	15	0.467	CL	Tested after >425µm removed by hand
BH101	19.50		C	14	105									
BH101	24.50		C	12	105									
BH102	7.50		D	43	105	43	100	0	59-s	39	20	0.200	MH	Tested in natural condition
BH102	10.50		D	45	50	45	100	0	65-s	28	37	0.459	CH	Tested in natural condition
BH102	21.35		C	13	105									
BH103	4.00		D	20	50	20	100	0	24-s	19	5	0.200	ML	Tested in natural condition
BH103	6.00		D	29	105	29	100	0	29-s	23	6	1.000	ML	Tested in natural condition
BH103	10.50		D	49	105	49	100	0	63-s	32	31	0.548	MH	Tested in natural condition
BH103	21.90		C	9.2	105									
BH103	23.70		C	11	105									
BH105	4.00		D	18	105	18	100	0	28-s	21	7	-0.429	CL	Tested in natural condition
BH105	10.50		D	36	105	36	100	0	60-s	34	26	0.077	MH	Tested in natural condition
BH105	13.50		D	22	105	22	100	0	28-s	19	9	0.333	CL	Tested in natural condition

All tests found in G2M Testing UKAS Schedule of Accreditation are tested to standard unless otherwise indicated

Key	Description		Category	BS Test Code
w	Moisture content			BS 1377:1990 Part 2 Clause 3.2
wa	Equivalent moisture content passing 425µm sieve			BS 1377:1990 Part 2 Clause 3.2
wL	Liquid limit	Single point	-s	BS 1377:1990 Part 2 Clause 4.4
		Four point	-f	BS 1377:1990 Part 2 Clause 4.3
wP	Plastic limit			BS 1377:1990 Part 2 Clause 5.2
Pa	Percentage passing 425um sieve			
Pr	Percentage retained 425um sieve			
IP	Plasticity index			BS 1377:1990 Part 2 Clause 5.4
IL	Liquidity index			BS 1377:1990 Part 2 Clause 5.4
	Suffix indicating test is "Not UKAS Accredited"		*	

Approved by	D Anderson
Approval date	16/11/2023 09:34
Date report generated	
Report Number	

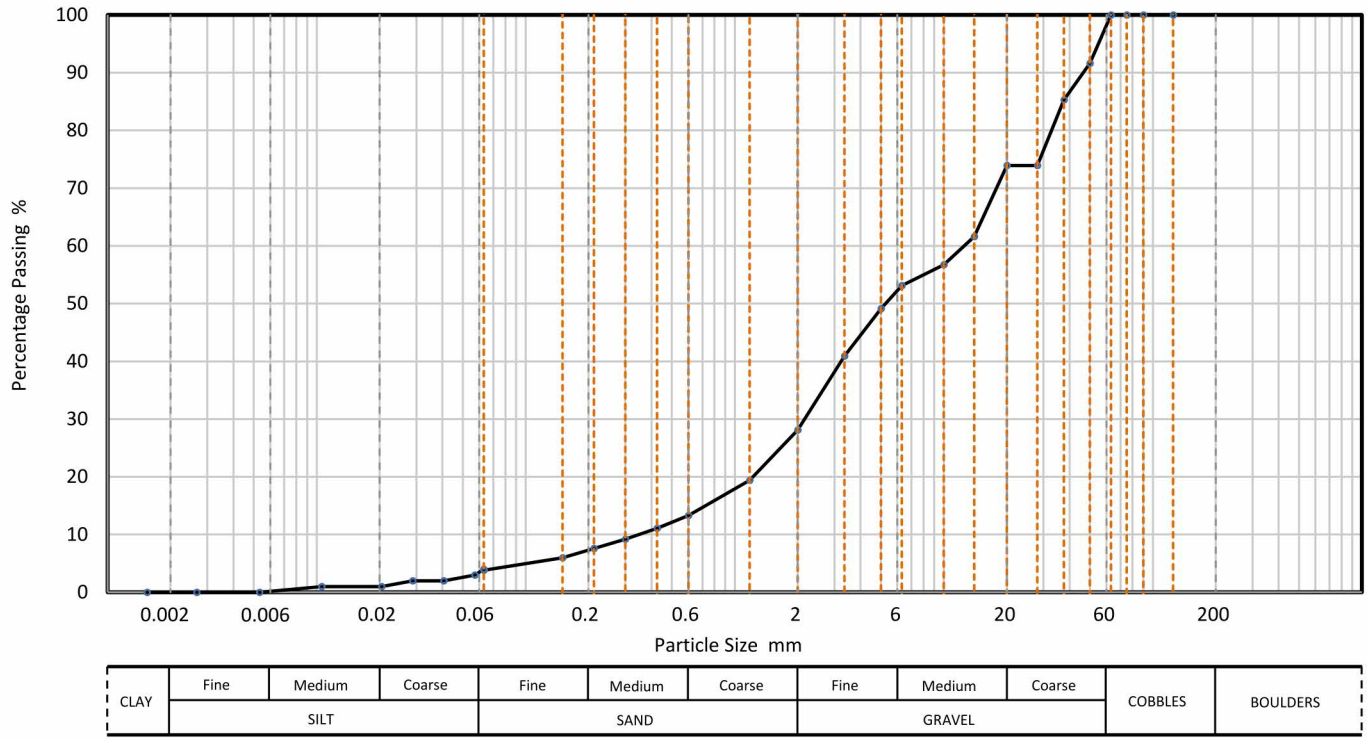
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Hole		BH101	Lab sample ID	G2MT2023110911
Depth (Top)	m	16.50	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Slightly Silty, very Sandy, GRAVEL
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	4
90	100	0.0570	3
75	100	0.0405	2
63	100	0.0288	2
50	92	0.0204	1
37.5	85	0.0106	1
28	74	0.0053	0
20	74	0.0027	0
14	62	0.0015	0
10	57		
6.3	53		
5	49		
3.35	41		
2	28		
1.18	19		
0.6	13	Particle density	(assumed)
0.425	11	2.65	Mg/m3
0.3	9		
0.212	8		
0.15	6		
0.063	4		

Dry Mass of sample, g	6896

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	71.9
Sand	24.2
Silt	3.9
Clay	0.0

Grading Analysis		
D100	mm	
D60	mm	12.5
D30	mm	2.16
D10	mm	0.346
Uniformity Coefficient		36
Curvature Coefficient		1.1

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	20/11/2023 08:33

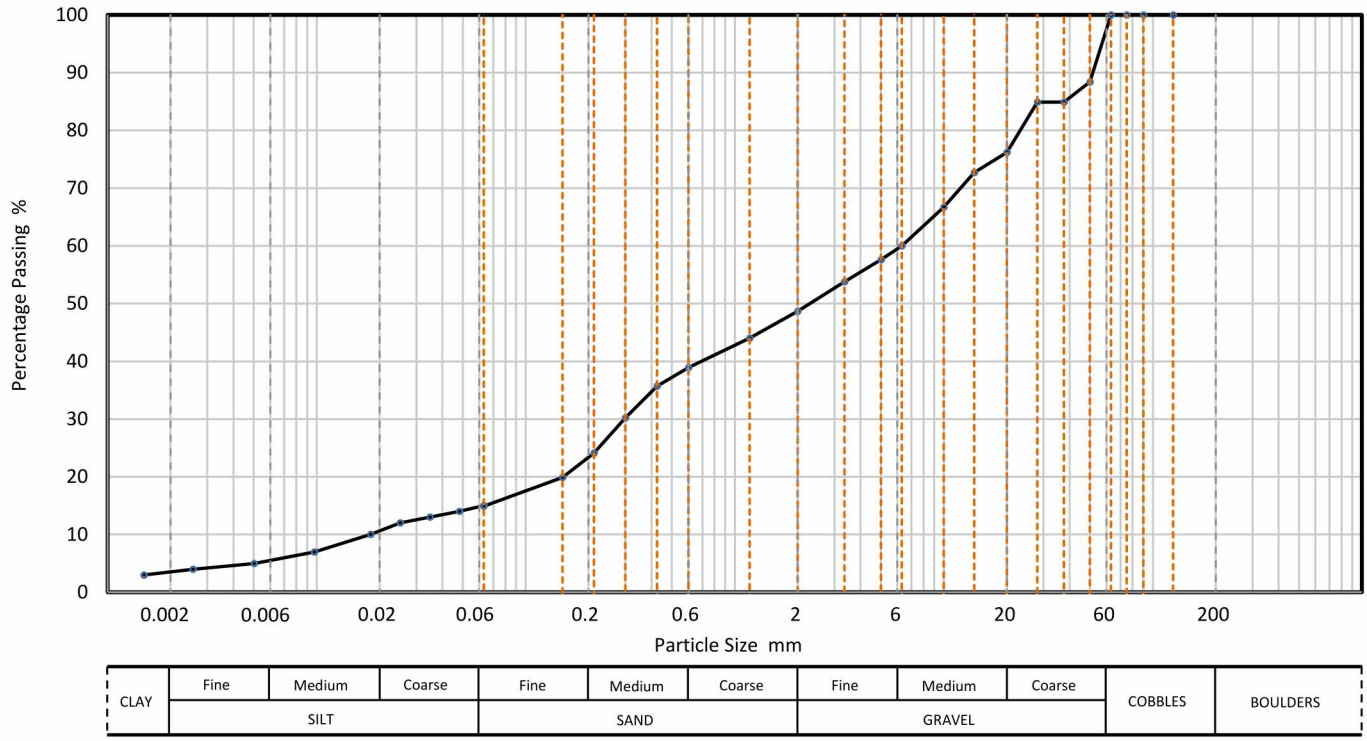
PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Site name	Job number
Whitby	S230311

Hole		BH102	Lab sample ID	G2MT2023110912
Depth (Top)	m	2.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Slightly Clayey, Silty, very Sandy, GRAVEL
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	15
90	100	0.0481	14
75	100	0.0348	13
63	100	0.0251	12
50	88	0.0181	10
37.5	85	0.0097	7
28	85	0.0050	5
20	76	0.0026	4
14	73	0.0015	3
10	67		
6.3	60		
5	58		
3.35	54		
2	49		
1.18	44		
0.6	39	Particle density	(assumed)
0.425	36	2.65	Mg/m3
0.3	30		
0.212	24		
0.15	20		
0.063	15		

Dry Mass of sample, g	4702

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	51.3
Sand	33.7
Silt	11.7
Clay	3.3

Grading Analysis		
D100	mm	
D60	mm	6.3
D30	mm	0.296
D10	mm	0.0174
Uniformity Coefficient		360
Curvature Coefficient		0.8

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	20/11/2023 08:36

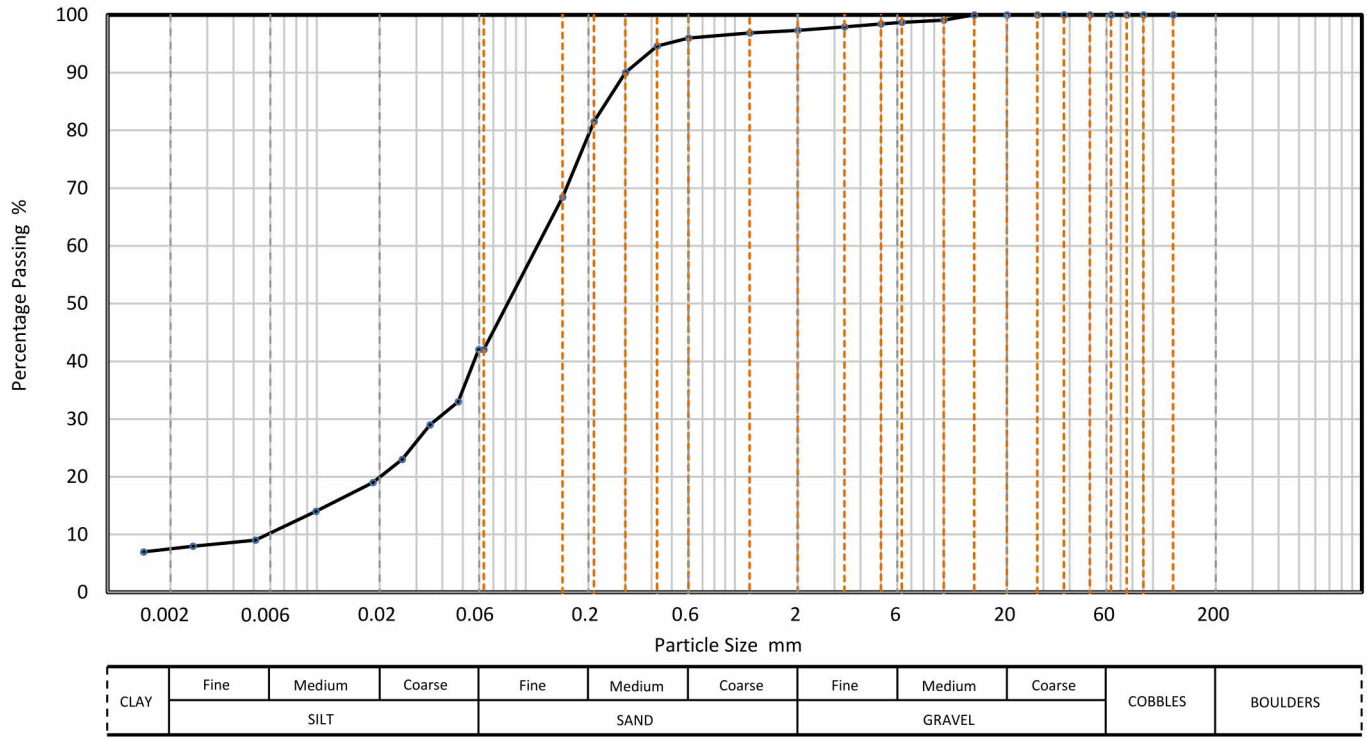
PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Site name	Job number
Whitby	S230311

Hole	BH102	Lab sample ID	G2MT2023110913
Depth (Top) m	5.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base) m		Soil Description	Slightly Gravelly, slightly Clayey, very Silty, SAND
Sample type	B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0595	42
90	100	0.0475	33
75	100	0.0348	29
63	100	0.0256	23
50	100	0.0186	19
37.5	100	0.0099	14
28	100	0.0051	9
20	100	0.0026	8
14	100	0.0015	7
10	99		
6.3	99		
5	98		
3.35	98		
2	97		
1.18	97		
0.6	96	Particle density	(assumed)
0.425	95	2.65	Mg/m3
0.3	90		
0.212	82		
0.15	68		
0.063	42		

Dry Mass of sample, g	490

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	2.7
Sand	55.4
Silt	34.4
Clay	7.5

Grading Analysis		
D100	mm	
D60	mm	0.114
D30	mm	0.0379
D10	mm	0.00593
Uniformity Coefficient		19
Curvature Coefficient		2.1

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	17/11/2023 08:07

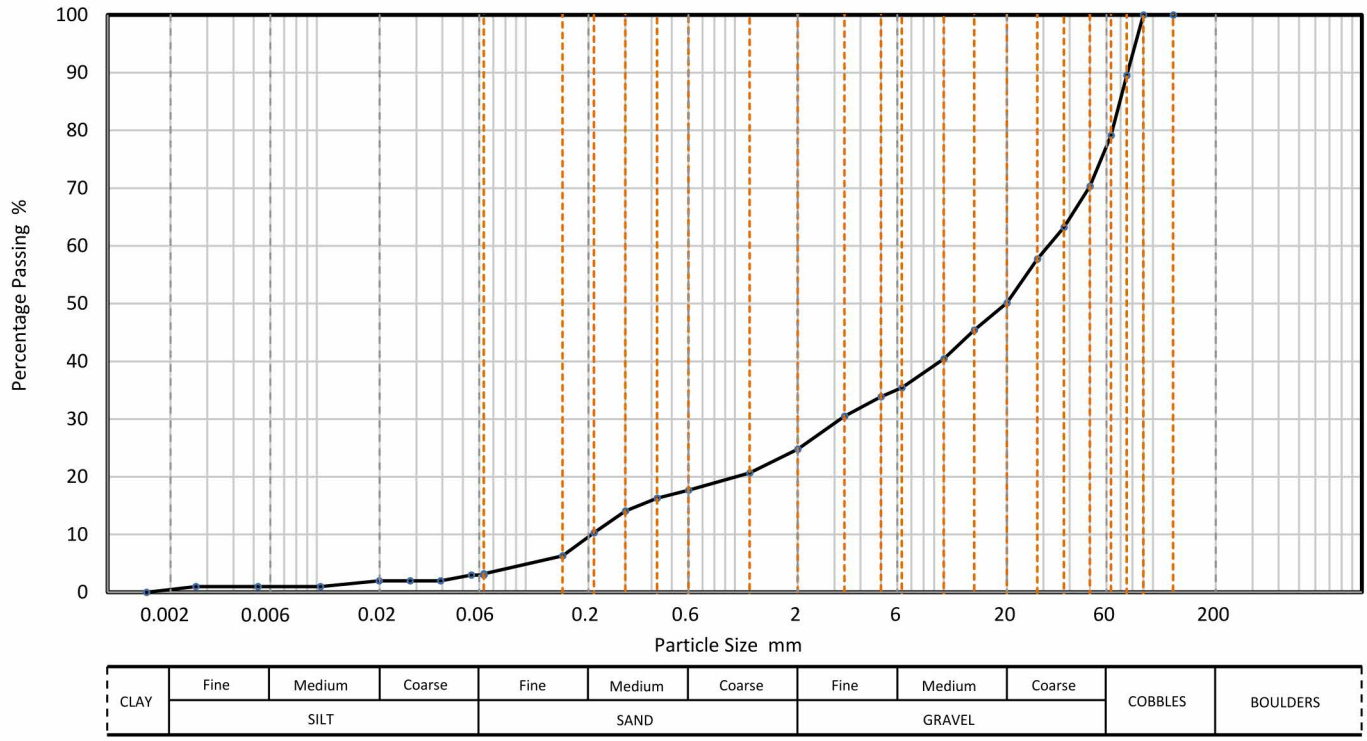
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Hole		BH102	Lab sample ID	G2MT2023110917
Depth (Top)	m	13.50	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Very slightly Clayey, slightly Silty, very Cobbly, very Sandy, GRAVEL
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	3
90	100	0.0550	3
75	90	0.0391	2
63	79	0.0279	2
50	70	0.0199	2
37.5	63	0.0104	1
28	58	0.0052	1
20	50	0.0026	1
14	45	0.0015	0
10	40		
6.3	35		
5	34		
3.35	31		
2	25		
1.18	21		
0.6	18	Particle density	(assumed)
0.425	16	2.65	Mg/m3
0.3	14		
0.212	10		
0.15	6		
0.063	3		

Dry Mass of sample, g: 14653

Sample Proportions	% dry mass
Very coarse	20.9
Gravel	54.4
Sand	21.6
Silt	2.7
Clay	0.4

Grading Analysis		
D100	mm	
D60	mm	31.6
D30	mm	3.2
D10	mm	0.207
Uniformity Coefficient		150
Curvature Coefficient		1.6

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	20/11/2023 08:41

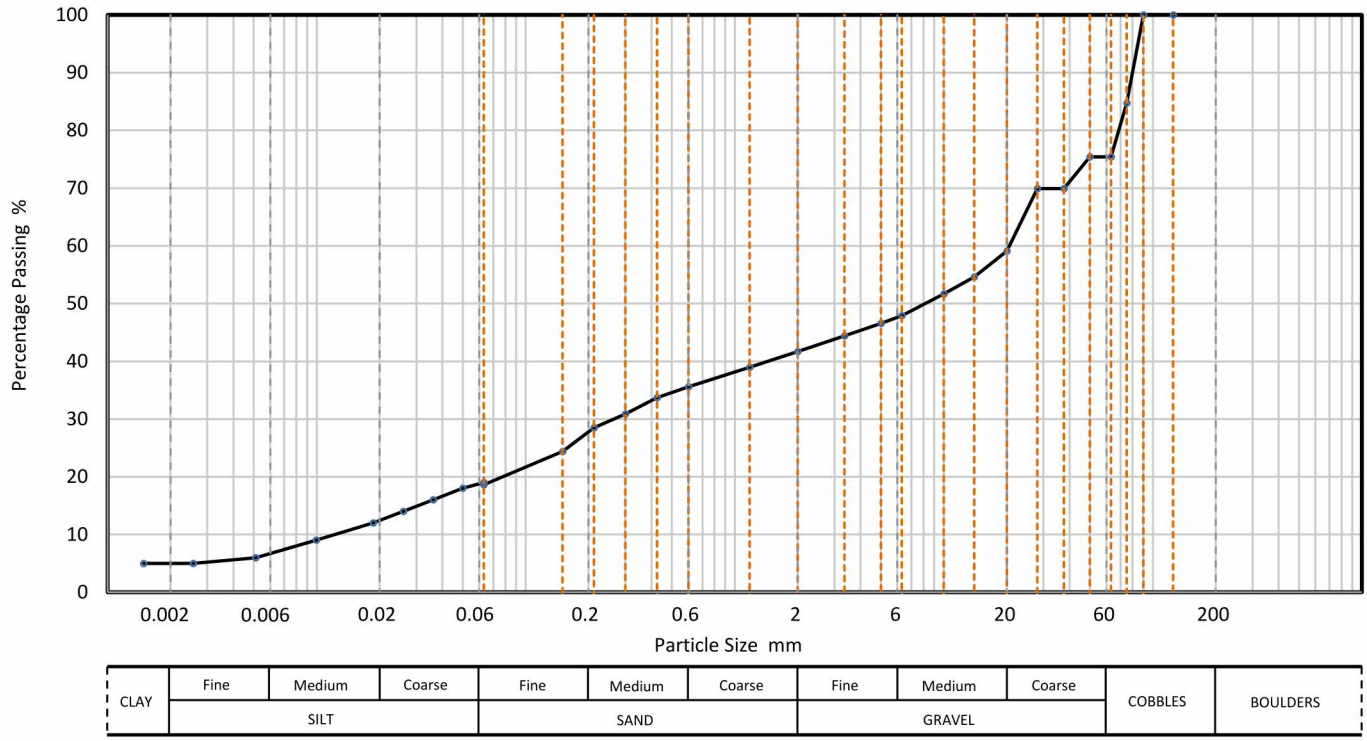
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Hole		BH103	Lab sample ID	G2MT2023110918
Depth (Top)	m	2.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Slightly Clayey, Silty, very Sandy, very Cobbly, GRAVEL
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	19
90	100	0.0499	18
75	85	0.0360	16
63	75	0.0260	14
50	75	0.0187	12
37.5	70	0.0099	9
28	70	0.0051	6
20	59	0.0026	5
14	55	0.0015	5
10	52		
6.3	48		
5	47		
3.35	44		
2	42		
1.18	39		
0.6	36	Particle density	(assumed)
0.425	34	2.65	Mg/m3
0.3	31		
0.212	29		
0.15	24		
0.063	19		

Dry Mass of sample, g: 3923

Sample Proportions	% dry mass
Very coarse	24.6
Gravel	33.7
Sand	23.1
Silt	13.7
Clay	4.9

Grading Analysis		
D100	mm	
D60	mm	20.6
D30	mm	0.263
D10	mm	0.0124
Uniformity Coefficient		1700
Curvature Coefficient		0.27

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	20/11/2023 08:45

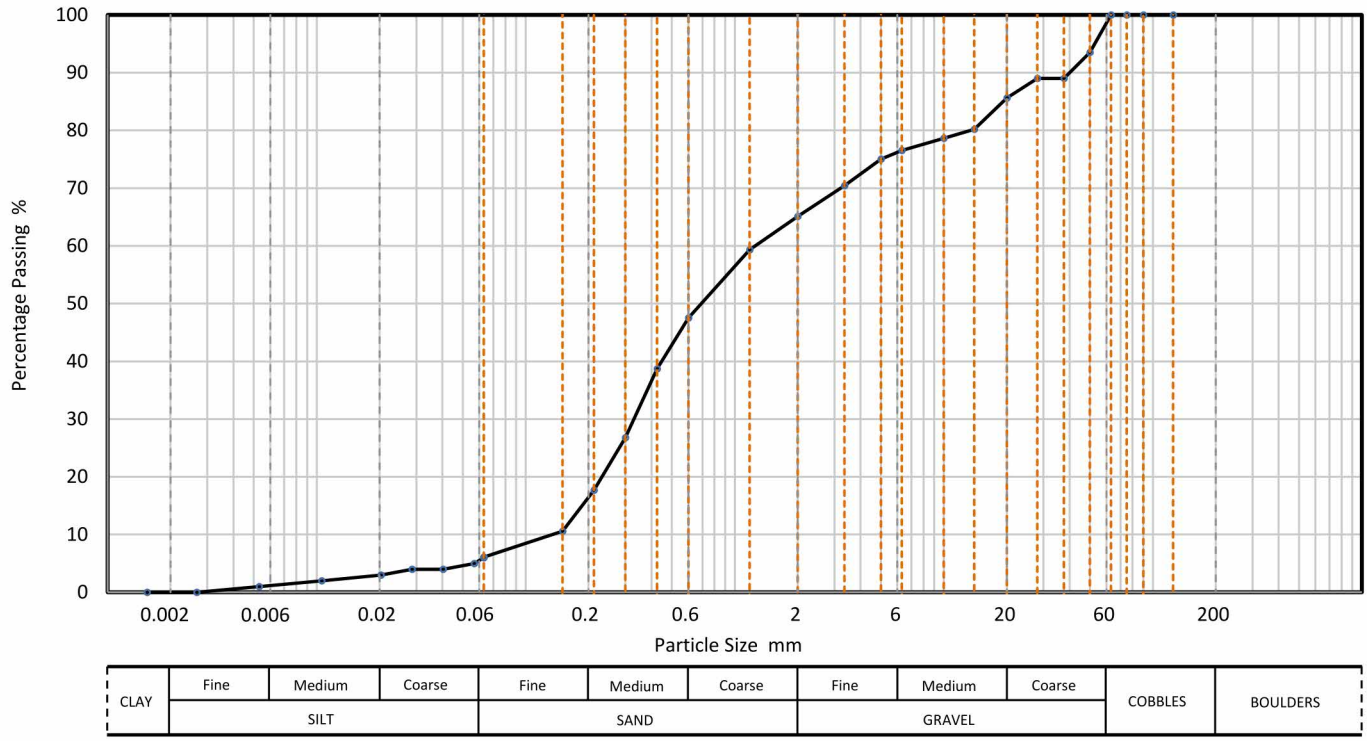
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
[redacted]

UKAS TESTING
10258

Hole		BH103	Lab sample ID	G2MT2023110923
Depth (Top)	m	13.50	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Slightly Silty, very Gravelly, SAND
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	6
90	100	0.0565	5
75	100	0.0402	4
63	100	0.0286	4
50	94	0.0203	3
37.5	89	0.0105	2
28	89	0.0053	1
20	86	0.0027	0
14	80	0.0015	0
10	79		
6.3	77		
5	75		
3.35	70		
2	65		
1.18	59		
0.6	48	Particle density	(assumed)
0.425	39	2.65	Mg/m3
0.3	27		
0.212	18		
0.15	11		
0.063	6		

Dry Mass of sample, g	3679

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	34.9
Sand	58.9
Silt	6.2
Clay	0.0

Grading Analysis		
D100	mm	
D60	mm	1.26
D30	mm	0.329
D10	mm	0.133
Uniformity Coefficient		9.5
Curvature Coefficient		0.65

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	20/11/2023 08:49

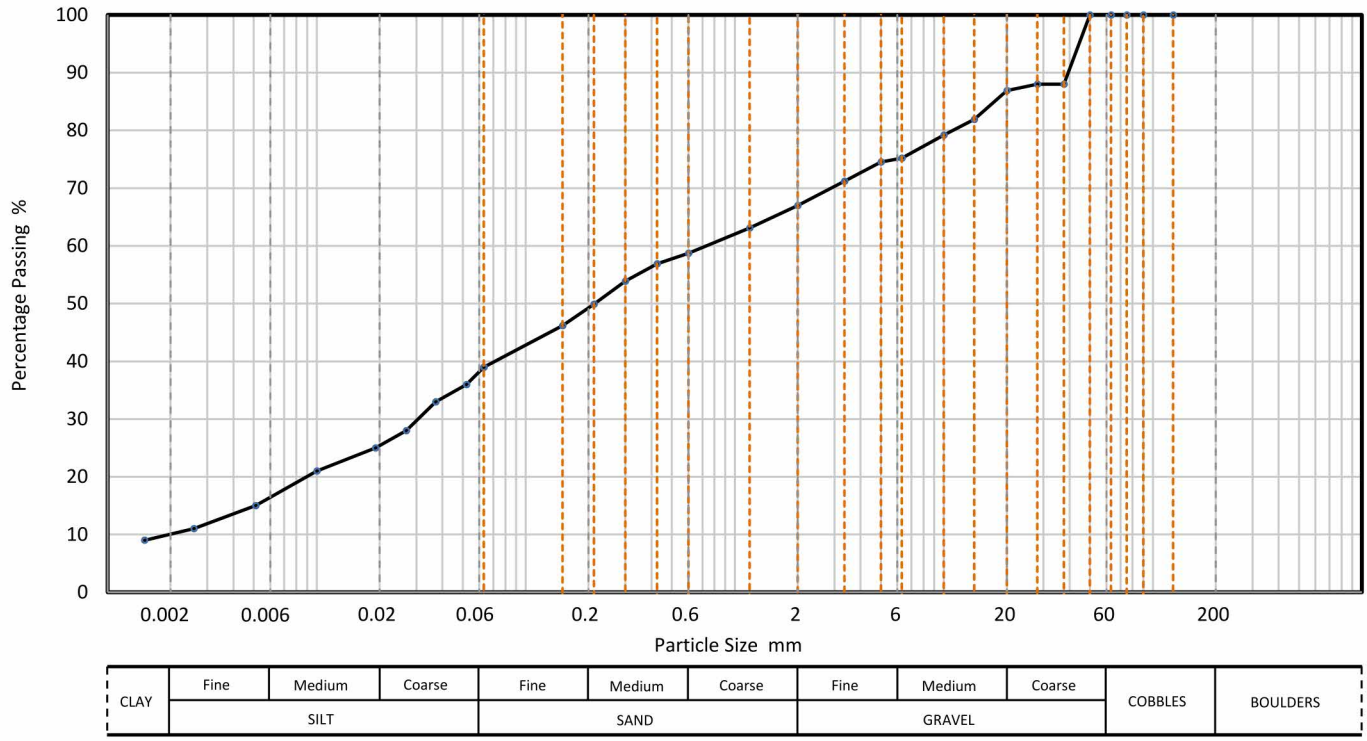
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
[redacted]

UKAS TESTING
10258

Hole		BH104	Lab sample ID	G2MT2023110924
Depth (Top)	m	1.20	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Clayey, very Sandy, very Silty, GRAVEL
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	39
90	100	0.0520	36
75	100	0.0371	33
63	100	0.0268	28
50	100	0.0191	25
37.5	88	0.0100	21
28	88	0.0051	15
20	87	0.0026	11
14	82	0.0015	9
10	79		
6.3	75		
5	75		
3.35	71		
2	67		
1.18	63		
0.6	59	Particle density	(assumed)
0.425	57	2.65	Mg/m3
0.3	54		
0.212	50		
0.15	46		
0.063	39		

Dry Mass of sample, g	2567

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	33.0
Sand	27.9
Silt	29.1
Clay	10.0

Grading Analysis		
D100	mm	
D60	mm	0.728
D30	mm	0.0307
D10	mm	0.002
Uniformity Coefficient		360
Curvature Coefficient		0.65

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	22/11/2023 08:14

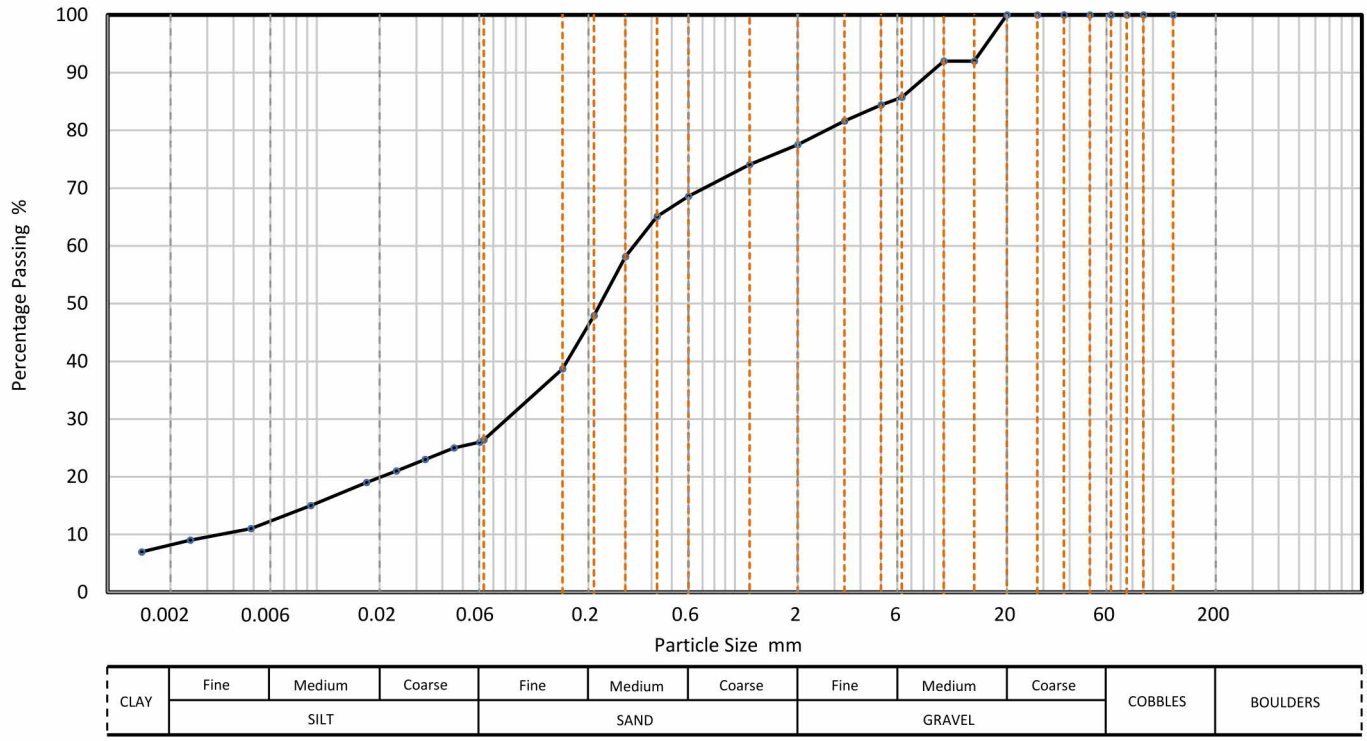
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
[redacted]

UKAS TESTING
10258

Hole		BH105	Lab sample ID	G2MT2023110925
Depth (Top)	m	2.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Slightly Clayey, Silty, very Gravelly, SAND
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0601	26
90	100	0.0454	25
75	100	0.0330	23
63	100	0.0240	21
50	100	0.0173	19
37.5	100	0.0094	15
28	100	0.0048	11
20	100	0.0025	9
14	92	0.0015	7
10	92		
6.3	86		
5	84		
3.35	82		
2	78		
1.18	74		
0.6	69	Particle density	(assumed)
0.425	65	2.65	Mg/m3
0.3	58		
0.212	48		
0.15	39		
0.063	26		

Dry Mass of sample, g	220

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	22.5
Sand	51.2
Silt	18.2
Clay	8.1

Grading Analysis		
D100	mm	
D60	mm	0.33
D30	mm	0.0813
D10	mm	0.00348
Uniformity Coefficient		95
Curvature Coefficient		5.7

Remarks

Preparation and testing in accordance with test method unless noted below

Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	17/11/2023 08:34

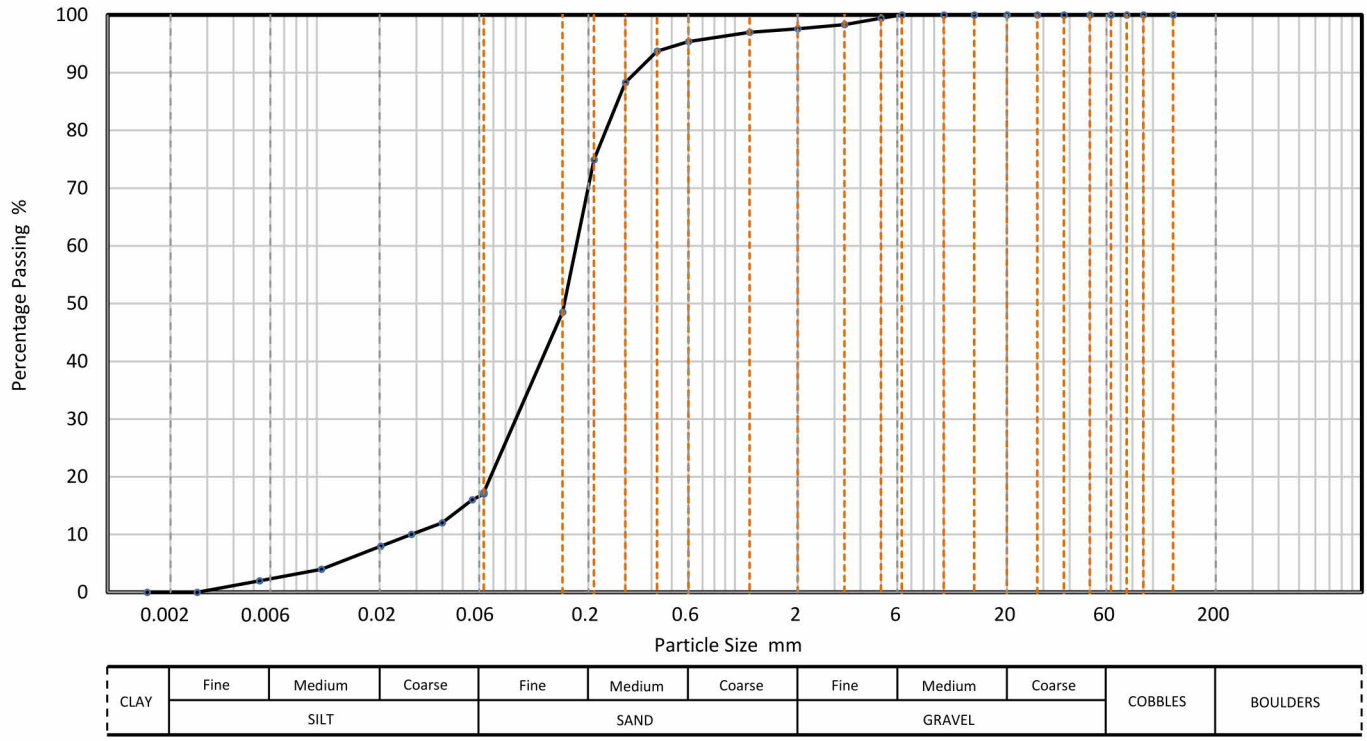
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Whitby	S230311

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
[redacted]

UKAS TESTING
10258

Hole		BH105	Lab sample ID	G2MT2023110928
Depth (Top)	m	6.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Slightly Gravelly, Silty, SAND
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	17
90	100	0.0555	16
75	100	0.0398	12
63	100	0.0284	10
50	100	0.0202	8
37.5	100	0.0105	4
28	100	0.0053	2
20	100	0.0027	0
14	100	0.0015	0
10	100		
6.3	100		
5	99		
3.35	98		
2	98		
1.18	97		
0.6	95	Particle density	(assumed)
0.425	94	2.65	Mg/m3
0.3	88		
0.212	75		
0.15	49		
0.063	17		

Dry Mass of sample, g	128

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	2.4
Sand	80.2
Silt	17.4
Clay	0.0

Grading Analysis		
D100	mm	
D60	mm	0.174
D30	mm	0.0896
D10	mm	0.0304
Uniformity Coefficient		5.7
Curvature Coefficient		1.5

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	D Anderson
Approval date	17/11/2023 08:41

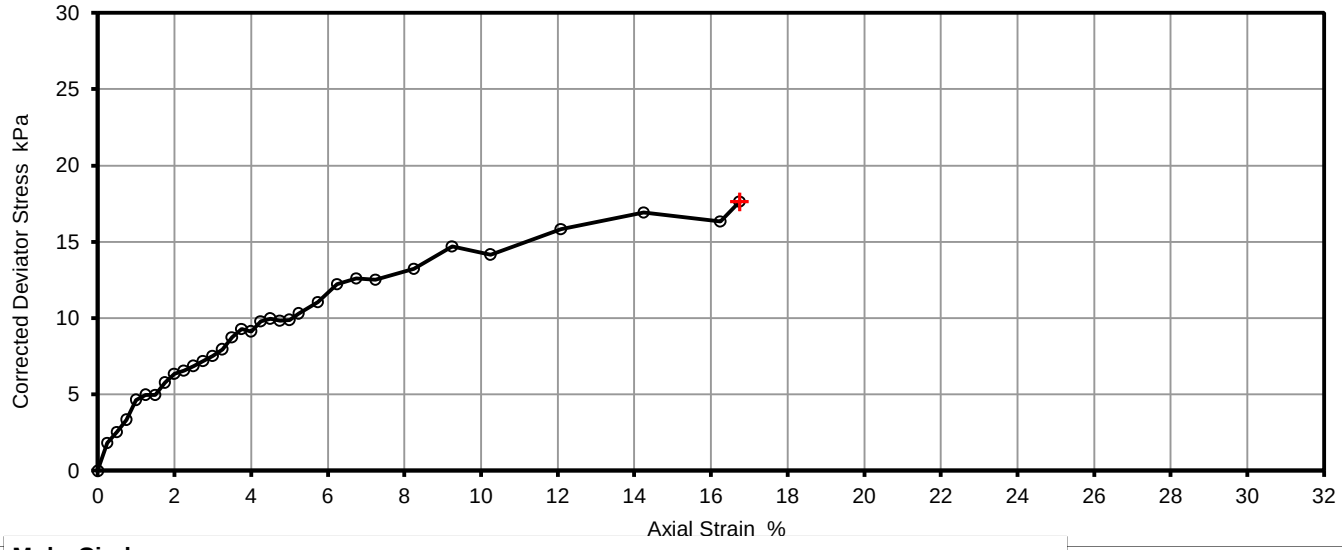
UKAS TESTING 10258	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	S230311
				Borehole/Pit No.	BH101
Site Name	Whitby			Sample No.	
Soil Description				Depth	9.00
Specimen Reference	BH101	Specimen Depth	9.00 m	Sample Type	U
Specimen Description	Extremely Low Strength CLAY			KeyLAB ID	G2MT202311098
Test Method				Date of test	10/11/2023

Test Number	1	
Length	200.0	mm
Diameter	102.0	mm
Bulk Density	1.84	Mg/m3
Moisture Content	42.7	%
Dry Density	1.29	Mg/m3
Rate of Strain	1.0	%/min
Cell Pressure	180	kPa
At failure: Axial Strain	16.7	%
At failure: Deviator Stress, (σ1 - σ3)f	18	kPa
At failure: Undrained Shear Strength, cu	9	kPa ½(σ1 - σ3)f
At failure: Mode of Failure	Plastic	

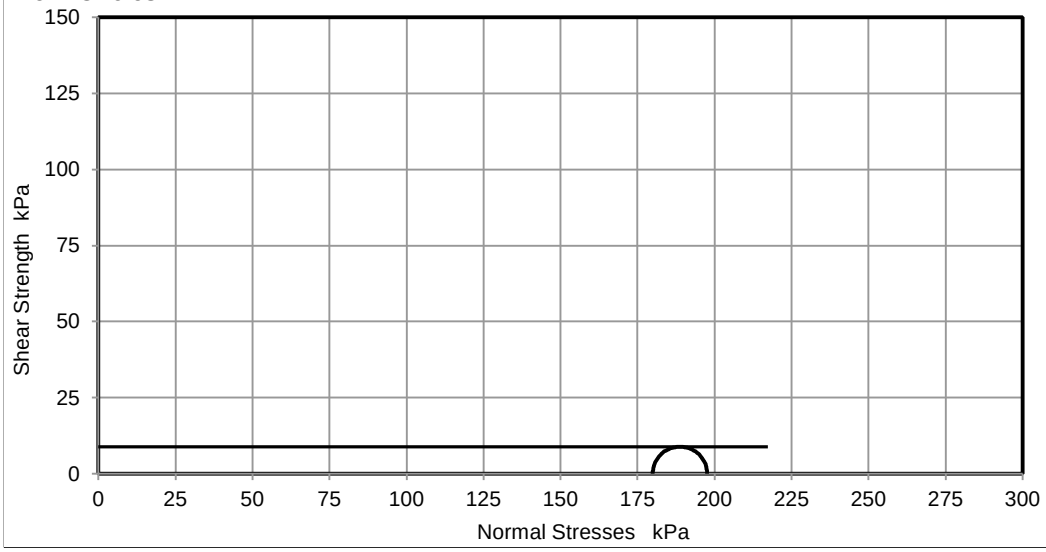
Tracable Equipment Record

Test Frame	TRI 004
Load Ring	LOAD CELL 003
Pressure Gauge	PRE 006
Digital Caliper	CAL 006
Balance	BAL 011

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 Part 8- 1990. This is provided for information only.

No of membranes used
1
Total thickness (mm)
0.25
Membrane Correction
Membrane Type

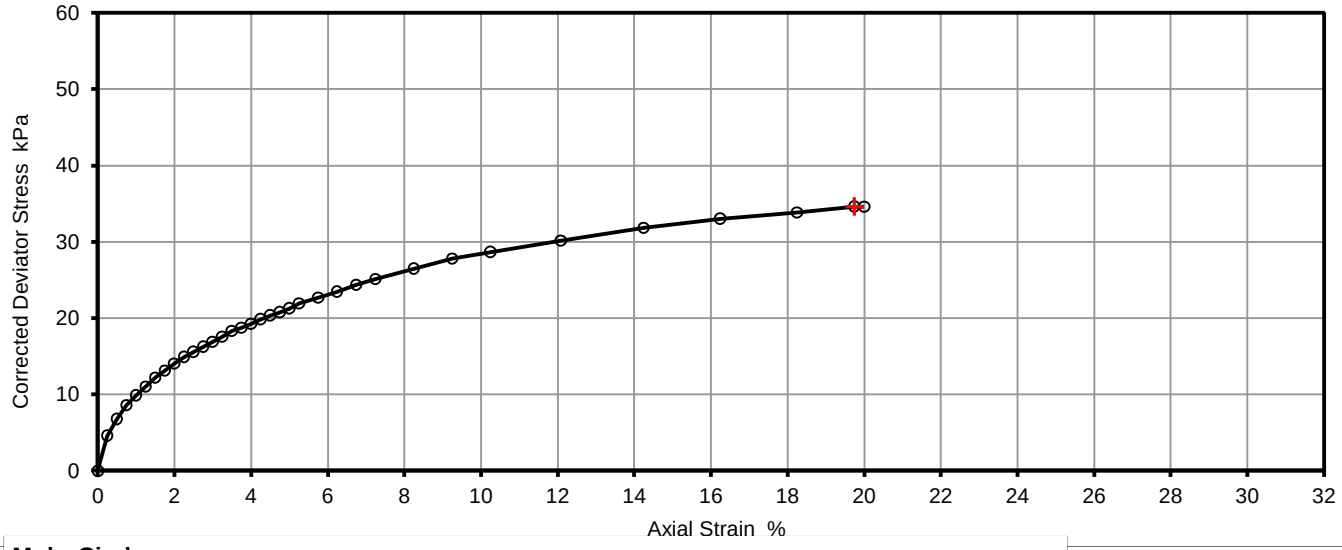
UKAS TESTING 10258	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	S230311
				Borehole/Pit No.	BH102
Site Name	Whitby			Sample No.	
Soil Description				Depth	9.00
Specimen Reference	BH102	Specimen Depth	9.00 m	Sample Type	U
Specimen Description	Very Low Strength CLAY			KeyLAB ID	G2MT2023110915
Test Method				Date of test	10/11/2023

Test Number	1	
Length	202.0	mm
Diameter	102.0	mm
Bulk Density	1.81	Mg/m3
Moisture Content	46.5	%
Dry Density	1.23	Mg/m3
Rate of Strain	1.0	%/min
Cell Pressure	180	kPa
At failure: Axial Strain	19.7	%
At failure: Deviator Stress, (σ1 - σ3)f	35	kPa
At failure: Undrained Shear Strength, cu	17	kPa ½(σ1 - σ3)f
At failure: Mode of Failure	Plastic	

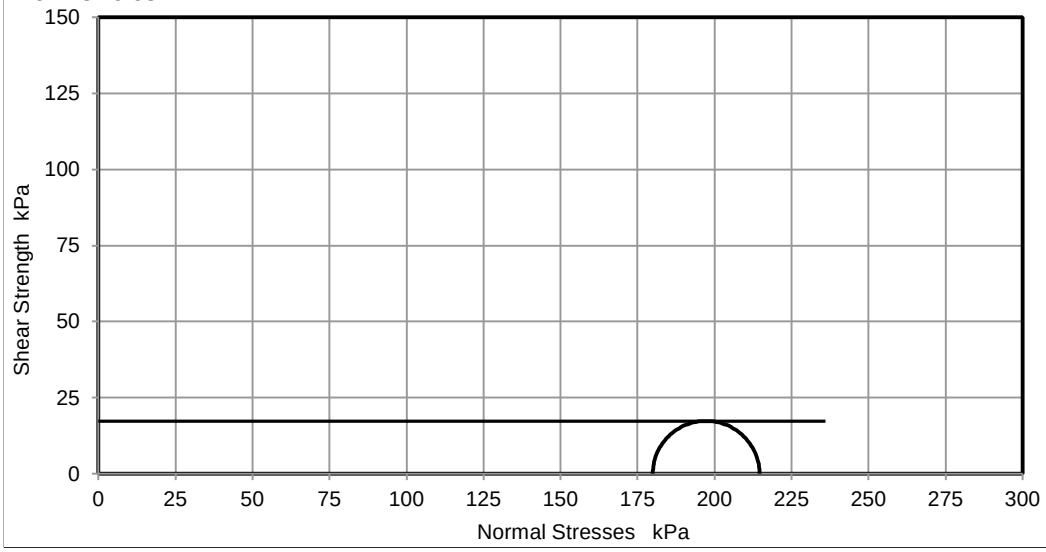
Tracable Equipment Record

Test Frame	TRI 004
Load Ring	LOAD CELL 003
Pressure Gauge	PRE 006
Digital Caliper	CAL 006
Balance	BAL 011

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 Part 8- 1990. This is provided for information only.

No of membranes used
1
Total thickness (mm)
0.25
Membrane Correction
Membrane Type

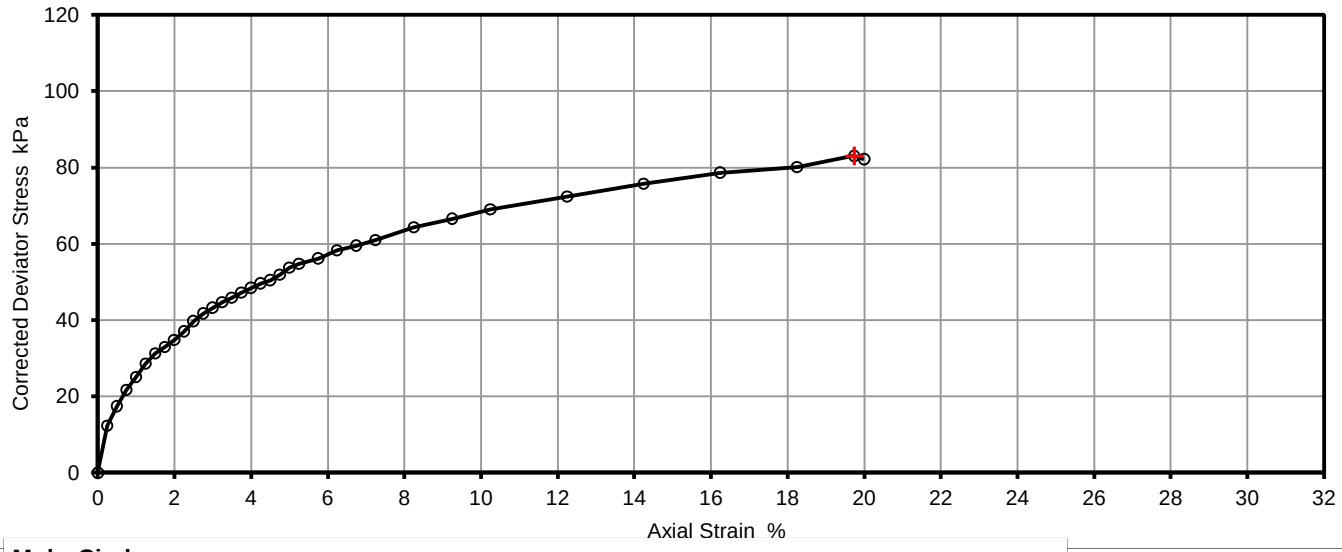
UKAS TESTING 10258	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	S230311
				Borehole/Pit No.	BH105
Site Name	Whitby			Sample No.	
Soil Description				Depth	3.00
Specimen Reference	Bh105	Specimen Depth	3.00 m	Sample Type	U
Specimen Description	Medium Strength CLAY			KeyLAB ID	G2MT2023110926
Test Method				Date of test	10/11/22023

Test Number	1	
Length	202.0	mm
Diameter	102.0	mm
Bulk Density	2.05	Mg/m3
Moisture Content	23.9	%
Dry Density	1.65	Mg/m3
Rate of Strain	1.0	%/min
Cell Pressure	60	kPa
At failure: Axial Strain	19.7	%
At failure: Deviator Stress, (σ1 - σ3)f	83	kPa
At failure: Undrained Shear Strength, cu	42	kPa ½(σ1 - σ3)f
At failure: Mode of Failure	Plastic	

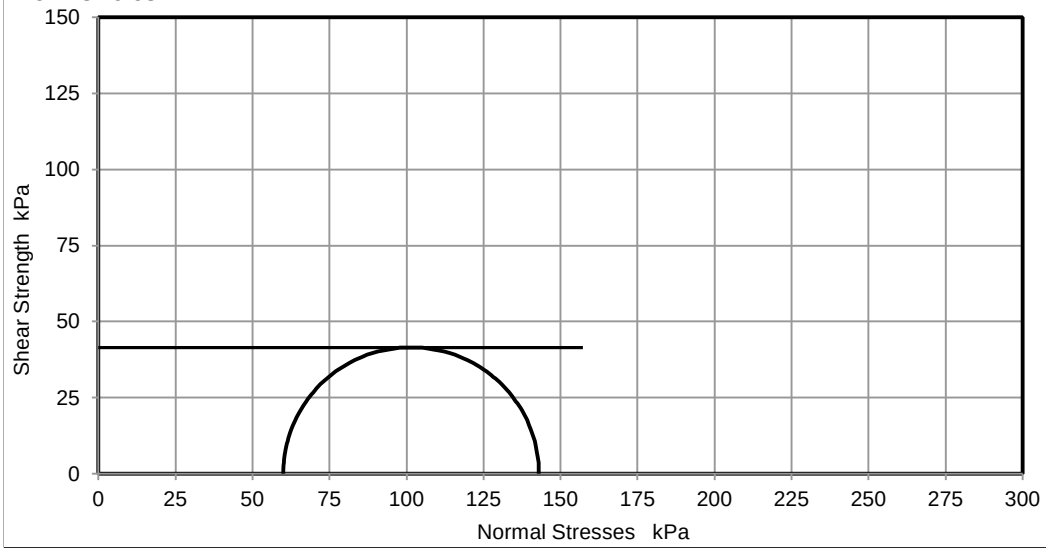
Tracable Equipment Record

Test Frame	TRI 004
Load Ring	LOAD CELL 003
Pressure Gauge	PRE 006
Digital Caliper	CAL 006
Balance	BAL 011

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 Part 8- 1990. This is provided for information only.

No of membranes used
1
Total thickness (mm)
0.25
Membrane Correction
Membrane Type

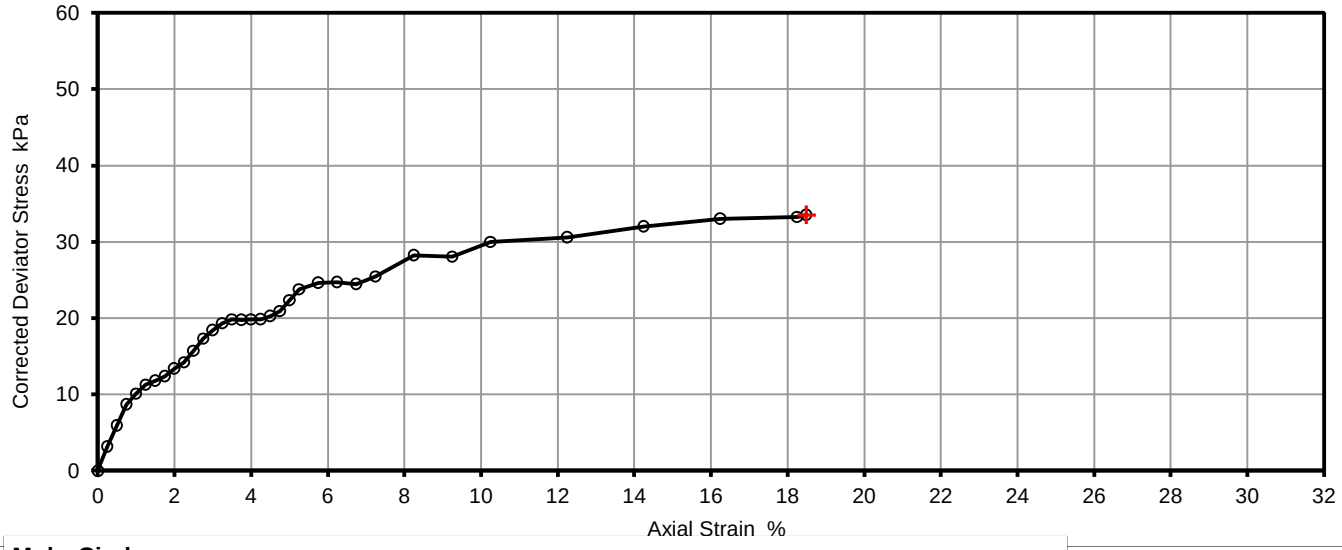
UKAS TESTING 10258	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	S230311
				Borehole/Pit No.	BH105
Site Name	Whitby			Sample No.	
Soil Description				Depth	9.00
Specimen Reference	BH105	Specimen Depth	9.00 m	Sample Type	U
Specimen Description	Very Low Strength CLAY			KeyLAB ID	G2MT2023110930
Test Method				Date of test	10/11/2023

Test Number	1	
Length	202.0	mm
Diameter	102.0	mm
Bulk Density	1.74	Mg/m3
Moisture Content	46.3	%
Dry Density	1.19	Mg/m3
Rate of Strain	1.0	%/min
Cell Pressure	180	kPa
At failure: Axial Strain	18.5	%
At failure: Deviator Stress, (σ1 - σ3)f	34	kPa
At failure: Undrained Shear Strength, cu	17	kPa ½(σ1 - σ3)f
At failure: Mode of Failure	Plastic	

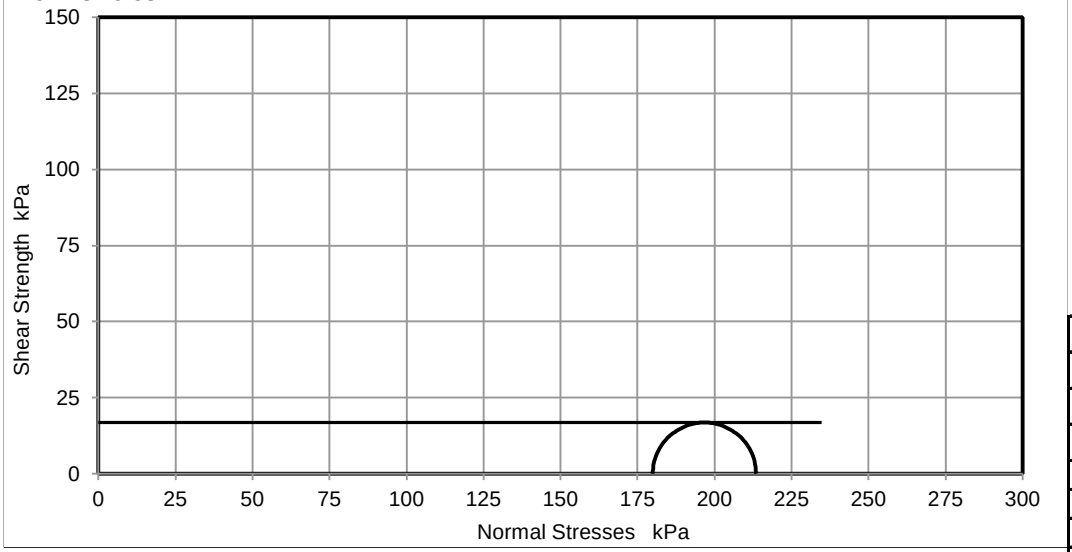
Tracable Equipment Record

Test Frame	TRI 004
Load Ring	LOAD CELL 003
Pressure Gauge	PRE 006
Digital Caliper	CAL 006
Balance	BAL 011

Deviator Stress v Axial Strain



Mohr Circles

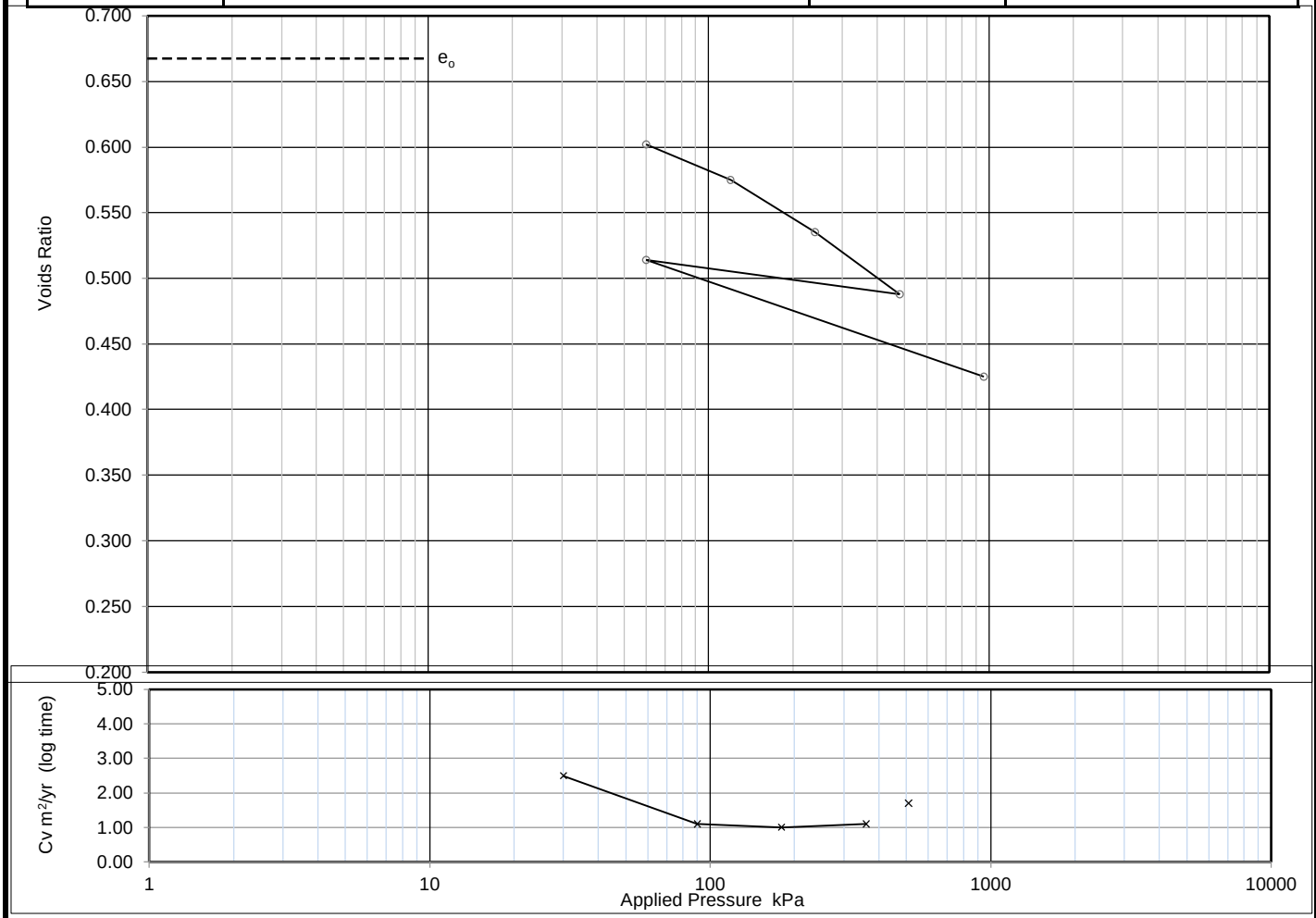


Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377 Part 8- 1990. This is provided for information only.

No of membranes used
1
Total thickness (mm)
0.25
Membrane Correction
Membrane Type

UKAS TESTING 10258	**ONE DIMENSIONAL CONSOLIDATION TEST BS EN ISO 17892 -5, clause 3**			Job Ref	S230311
				Borehole/Pit No.	BH105
Site Name	Whitby			Sample No.	
Soil Description				Depth	3
Specimen Reference	BH105	Specimen Depth	3 m	Sample Type	U
Specimen Description				KeyLAB ID	G2MT2023110926
Test Method	BS EN ISI 17892 :Part 5			Date started	13/11/2023



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0.0	0.667	-	-	-	-
60	0.602	0.65	2.5	8.9	0.0018
120	0.575	0.29	1.1	5.6	0.002
240	0.535	0.21	1	3.9	0.0024
480	0.488	0.13	1.1	4.3	0.0027
60	0.514	0.041			
960	0.425	0.066	1.7	6.3	0.0029

Preparation

Index tests Liquid limit % Plastic limit %

Particle density assumed 2.65 Mg/m3

Specimen details	Initial	Final	
Diameter	74.76	-	mm
Height	20.23	17.28	mm
Moisture Content	25.4	19.6	%
Bulk density	1.99		Mg/m3
Dry density	1.59		Mg/m3
Voids Ratio	0.667		
Saturation	101		%
Average temperature for test	21.0		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	Tested	Checked	Approved	Printed : 22/11/2023 10:33	Fig. No 1

Particle Density by Gas Jar Tests - Summary of Results

Project No.	Project Name
S230311	Whitby

Hole No.	Sample				Soil Description at test horizon	Particle Density Mg/m^3	Remarks
	Ref	Top	Base	Type			
BH104		1.20		B	Soft, Brown, Gravelly, Slightly Sandy, Slightly Silty, CLAY	2.69	

Notes	Date Printed	Table
Tests performed in accordance with BS 1377 unless annotated otherwise Gas Jar tests to BS1377: Part 2 : 1990, clause 8.2	22/11/2023	sheet

Summary of Rock Point Load Tests

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 033318
info@g2mtesting.co.uk

Site name	Job number
Whitby	S230311

Hole	Sample			Specimen		Rock type and test condition	Test Type		Failure validity	Dimensions			Is	Is(50)	Remarks
	Depth m	Ref	Type	Depth m	Ref		Type	Dir.		W mm	D mm	D' mm	MPa	MPa	
BH101	18.60		C	18.60	BH101	As received	A	P	Valid	100	120		0.00	0.01	CLAY
BH101	22.95		C	22.95	Bh101	Mudstone	A	P	Valid	100	120		0.01	0.01	
BH101	25.65		C	25.65	BH101	Mudstone	A	P	Valid	100	40		0.20	0.23	
BH101	27.22		C	27.22	BH101	Mudstone	A	P	Valid	100	80		0.13	0.18	
BH102	19.90		C	19.90	BH102	Mudstone	A	P	Valid	40	100		0.91	1.07	
BH102	20.10		C	20.10	BH102	Mudstone	A	P	Valid	100	60		0.01	0.02	
BH102	24.40		C	24.40	BH102	Sandstone	A	P	Valid	100	50		0.38	0.47	
BH102	26.30		C	26.30	BH102	Mudstone	A	P	Valid	100	50		0.75	0.93	
BH103	18.30		C	18.30	BH103	Mudstone	A	P	Valid	105	60		0.02	0.02	
BH103	20.10		C	20.10	BH103	Mudstone	A	P	Valid	100	60		0.28	0.35	
BH103	21.10		C	21.10	BH103	Mudstone	A	P	Valid	100	60		0.08	0.10	
BH103	22.20		C	22.20	BH103	Mudstone	A	P	Valid	100	60		0.01	0.02	
BH103	22.90		C	22.90	BH103	Mudstone	A	P	Valid	100	60		0.40	0.52	
BH103	24.77		C	24.77	BH103	As received	A	P	Valid	100	60		0.03	0.03	
BH103	26.35		C	26.35	BH103	As received	A	P	Valid	100	60		1.22	1.57	

Test not currently within the scope of G2M Testing UKAS accrediation schedule

Column	Key	Description
Test Type	A	Axial
	B	Block
	D	Diametral
	I	Irregular lump
Test Direction	L	Parallel to planes of weakness
	P	Perpendicular to planes of weakness
	U	Unknown
Dimensions	W	Width
	D	Platen seperation at start of test
	D'	Platen seperation at sample failure
	Is	Point Load Index
	Is(50)	Corrected Point Load Index to equivalent 50 mm diameter

Approved by	
Approval date	11/12/2023 13:16
Date report generated	
Report Number	

Total Stress Triaxial Compression

Unconfined Compression

Summary Report

Sample Details

sketch showing specimen location in original sample

Depth	20.20-20.55 m		
Description	Undisturbid		
Type	Mudstone		
Initial Sample Length	L_0	(mm)	216.0
Initial Sample Diameter	D_0	(mm)	103.8
Initial Sample Weight	W_0	(gr)	4285.0
Bulk Density	ρ_0	(Mg/m3)	2.34
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Strain Rate	ε	(%/min)	1.816
MembraneThickness	m_b	(mm)	0.00
Displacement Input	L_{IP}	(mm)	CH 2
Load Input	N_{IP}	(N)	CH 1
Initial Moisture	$\omega_i\%$	(%)	7.63
Initial Dry Density	ρ_{d0}	(Mg/m3)	2.18
Initial Voids Ratio	e_0	.	0.22
Initial Degree of Saturation	S_o	(%)	93

Final Conditions

Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	201.72
Strain At Max Stress	$\varepsilon_f\%$	(%)	3.14
Final Moisture	$\omega_f\%$	(%)	7.63
Final Dry Density	ρ_{df}	(Mg/m3)	2.18
Final Voids Ratio	e_f	.	0.22
Final Degree of Saturation	S_f	(%)	93.3

Notes

Failure Sketch

(surface inclination)

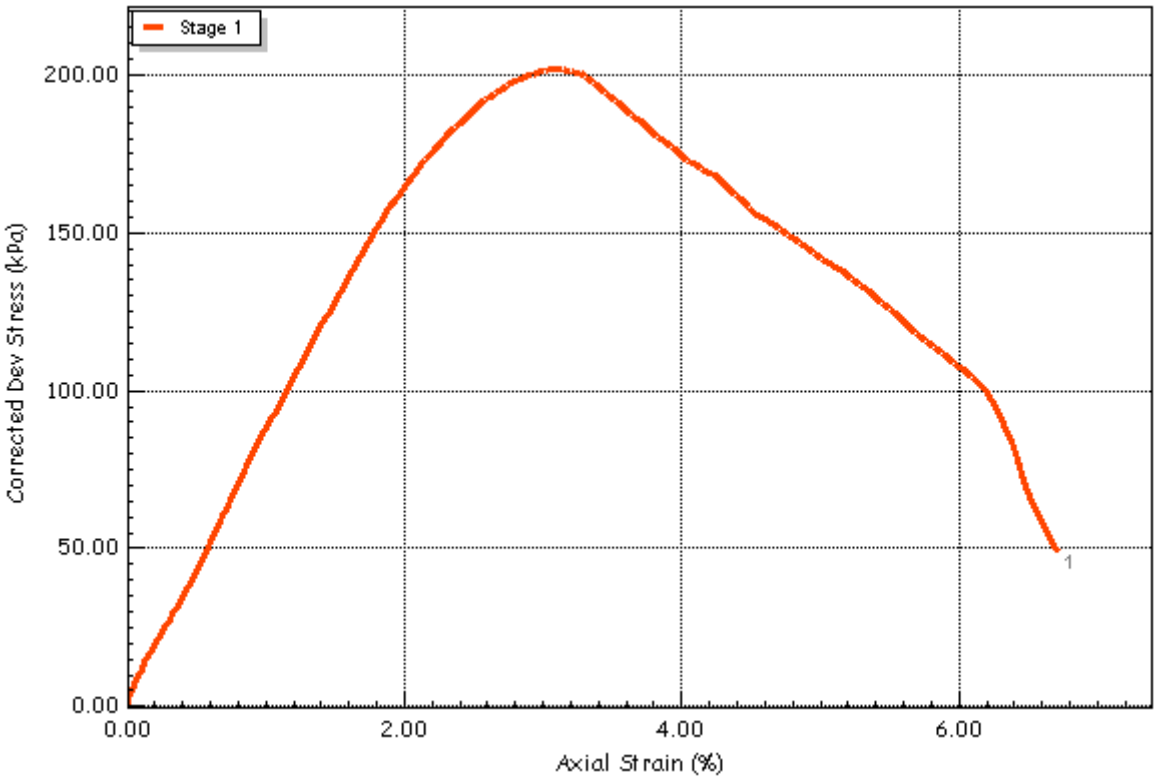
Test Method	BS1377: Part 7 1990 : Clause 7			Test Name	UCS 071223 SOLMEK BH101 20.20
Database: DESKTOP-IBEJL9B\SQLEXPRESS2019 \				Test Date	07/12/2023
Site Reference				Borehole	BH101
Jobfile	S230311			Sample	BH101 20.20-20.55m
Client	SOLMEK			Depth	20.20-20.55 m
Operator	Ali	Checked	Graham	Approved	Aiston

G2M TESTING

Total Stress Triaxial Compression

Unconfined Compression

Test Results Plots



Test Method	BS1377: Part 7 1990 : Clause 7		Test Name	UCS 071223 SOLMEK BH101 20.20	
Database: DESKTOP-IBEJL9B\SQLEXPRESS2019 \			Test Date	07/12/2023	
Site Reference			Borehole	BH101	
Jobfile	S230311		Sample	BH101 20.20-20.55m	
Client	SOLMEK		Depth	20.20-20.55 m	
Operator	Ali	Checked	Graham	Approved	Aiston

Total Stress Triaxial Compression

Unconfined Compression

Summary Report

Sample Details

sketch showing specimen location in original sample

Depth			
Description			UNDISTURBID
Type			MUDSTONE
Initial Sample Length	L_0	(mm)	204.0
Initial Sample Diameter	D_0	(mm)	102.3
Initial Sample Weight	W_0	(gr)	3489.5
Bulk Density	ρ_0	(Mg/m3)	2.08
Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Strain Rate	ε	(%/min)	1.943
MembraneThickness	m_b	(mm)	0.00
Displacement Input	L_{IP}	(mm)	CH 2
Load Input	N_{IP}	(N)	CH 1
Initial Moisture	$\omega_i\%$	(%)	11
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.88
Initial Voids Ratio	e_0	.	0.41
Initial Degree of Saturation	S_o	(%)	69

Final Conditions

Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	58.09
Strain At Max Stress	$\varepsilon_f\%$	(%)	5.95
Final Moisture	$\omega_f\%$	(%)	11
Final Dry Density	ρ_{df}	(Mg/m3)	1.88
Final Voids Ratio	e_f	.	0.41
Final Degree of Saturation	S_f	(%)	68.7

Notes

Failure Sketch

(surface inclination)

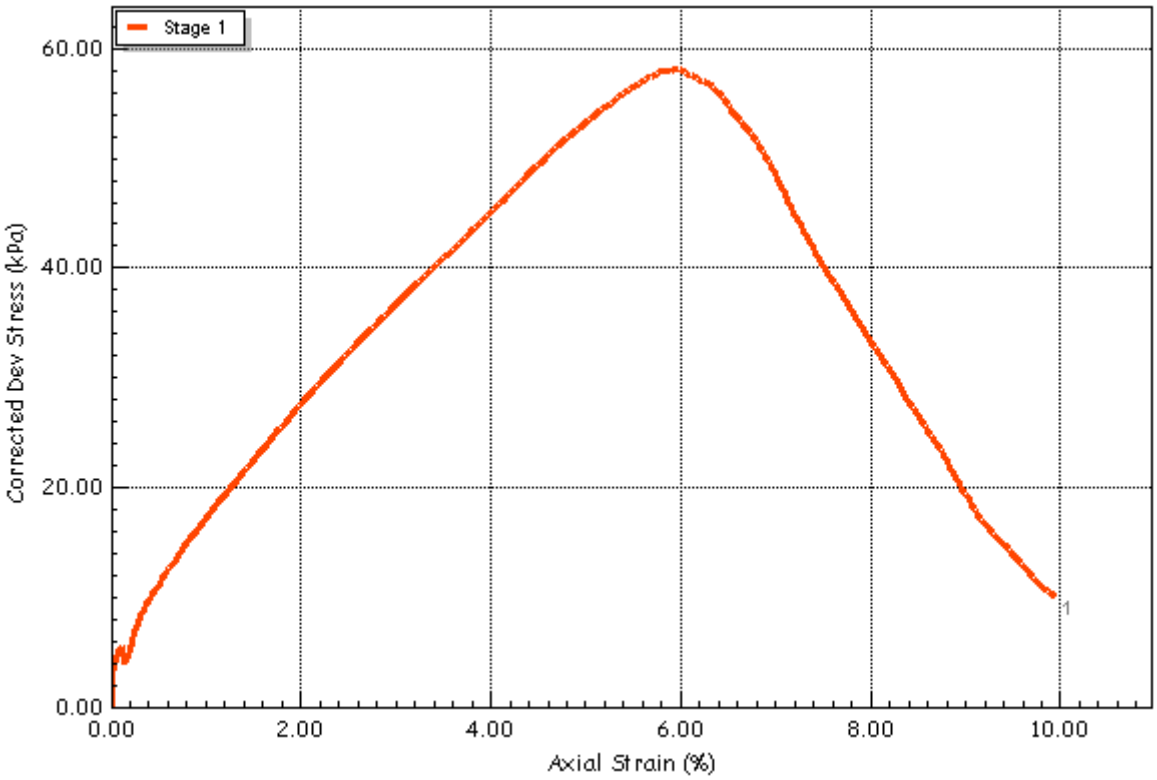
Test Method	BS1377: Part 7 1990 : Clause 7			Test Name	UCS 071223 BH102
Database: DESKTOP-IBEJL9B\SQLEXPRESS2019 \				Test Date	07/12/2023
Site Reference				Borehole	BH102
Jobfile	S230311			Sample	BH102 23-05-23 40
Client	SOLMEK			Depth	
Operator	Ali	Checked	Graham	Approved	Aiston

G2M TESTING

Total Stress Triaxial Compression

Unconfined Compression

Test Results Plots



Test Method	BS1377: Part 7 1990 : Clause 7		Test Name	UCS 071223 BH102	
Database: DESKTOP-IBEJL9B\SQLEXPRESS2019 \			Test Date	07/12/2023	
Site Reference			Borehole	BH102	
Jobfile	S230311		Sample	BH102 23-05-23 40	
Client	SOLMEK		Depth		
Operator	Ali	Checked	Graham	Approved	Aiston

Total Stress Triaxial Compression

Unconfined Compression

Summary Report

Sample Details				
 *sketch showing specimen location in original sample*	Depth	19.95-20.25		
	Description	UNDISTURBID		
	Type	Mudstone		
	Initial Sample Length	L_0	(mm)	209.0
	Initial Sample Diameter	D_0	(mm)	103.5
	Initial Sample Weight	W_0	(gr)	3886.2
	Bulk Density	ρ_0	(Mg/m3)	2.21
	Particle Density	ρ_s	(Mg/m3)	2.65

Initial Conditions

Strain Rate	ε	(%/min)	1.886
MembraneThickness	m_b	(mm)	0.00
Displacement Input	L_{IP}	(mm)	CH 2
Load Input	N_{IP}	(N)	CH 1
Initial Moisture	$\omega_i\%$	(%)	10
Initial Dry Density	ρ_{d0}	(Mg/m3)	2.01
Initial Voids Ratio	e_0	.	0.32
Initial Degree of Saturation	S_o	(%)	84

Final Conditions

Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	44.95
Strain At Max Stress	$\varepsilon_f\%$	(%)	3.15
Final Moisture	$\omega_f\%$	(%)	10
Final Dry Density	ρ_{df}	(Mg/m3)	2.01
Final Voids Ratio	e_f	.	0.32
Final Degree of Saturation	S_f	(%)	83.8

Notes

Failure Sketch

(surface inclination)

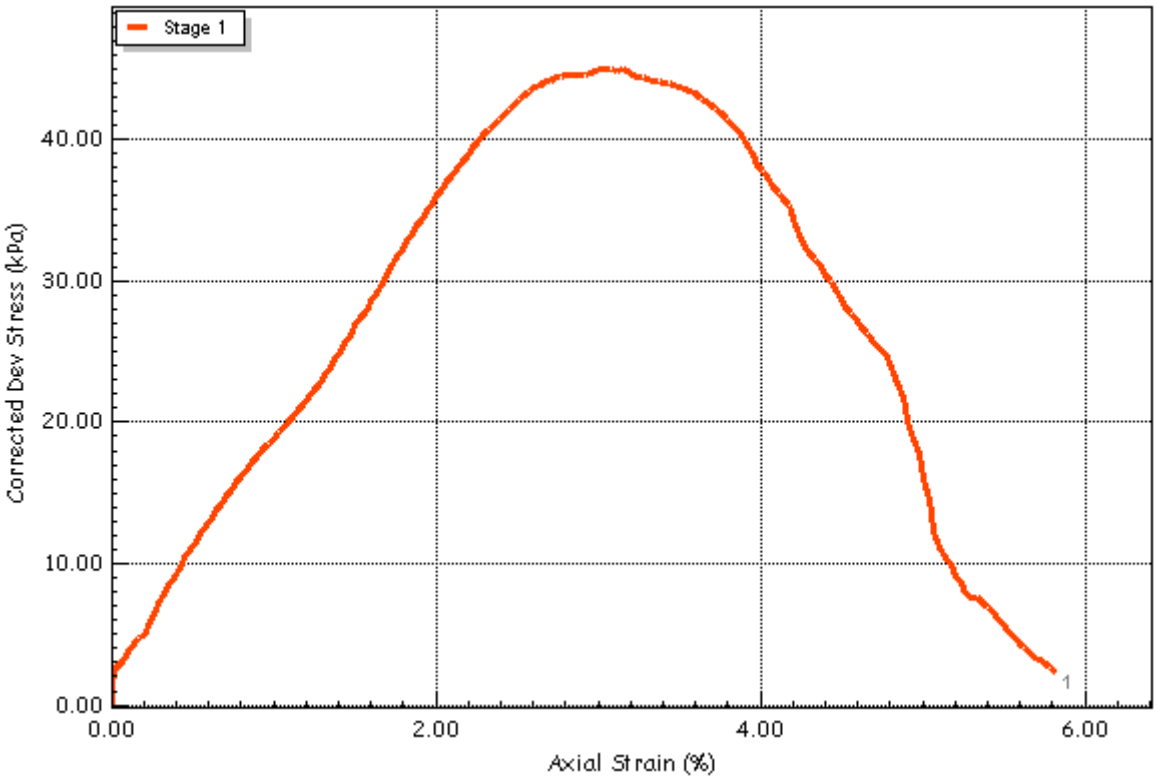
Test Method	BS1377: Part 7 1990 : Clause 7			Test Name	UCS 071223 SOLMEK BH105
Database: DESKTOP-IBEJL9B\SQLEXPRESS2019 \				Test Date	07/12/2023
Site Reference				Borehole	BH105
Jobfile	S230311			Sample	BH105 19.95-20.25 m
Client	SOLMEK			Depth	19.95-20.25
Operator	Ali	Checked	Graham	Approved	Aiston

G2M TESTING

Total Stress Triaxial Compression

Unconfined Compression

Test Results Plots



Test Method	BS1377: Part 7 1990 : Clause 7		Test Name	UCS 071223 SOLMEK BH105	
Database: DESKTOP-IBEJL9B\SQLEXPRESS2019 \			Test Date	07/12/2023	
Site Reference			Borehole	BH105	
Jobfile	S230311		Sample	BH105 19.95-20.25 m	
Client	SOLMEK		Depth	19.95-20.25	
Operator	Ali	Checked	Graham	Approved	Aiston

LABORATORY REPORT

Contract Number: PSL23/9618

Report Date: 04 December 2023

Client's Reference: S230311

Client Name: G2M Testing
Unit 5e
Edwardson Road
Meadowfield
Durham
DH7 8RL

For the attention of: James Eglintine

Contract Title: Whitby

Date Received: 15/11/2023
Date Commenced: 15/11/2023
Date Completed: 4/12/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

L Knight
(Assistant Laboratory Manager)

R Berriman
(Associate Director)

S Royle
(Laboratory Manager)

[redacted]

A Watkins
(Managing Director)

S Eyre
(Senior Technical Coordinator)

T Watkins
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098
Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH101		U	9.00	9.45	Brown slightly sandy very silty CLAY.
BH102		U	9.00	9.45	Brown slightly sandy very silty CLAY.
BH105		U	9.00	9.45	Brown slightly sandy very silty CLAY.

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Whitby

Contract No:

PSL23/9618

Client Ref:

S230311

ONE DIMENSIONAL CONSOLIDATION TEST

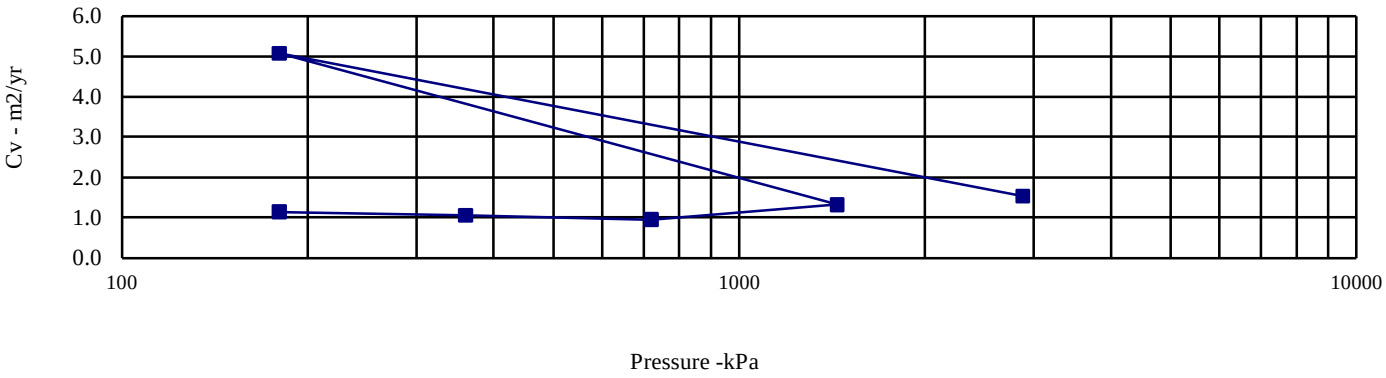
BS 1377: Part 5: 1990: Clause 3

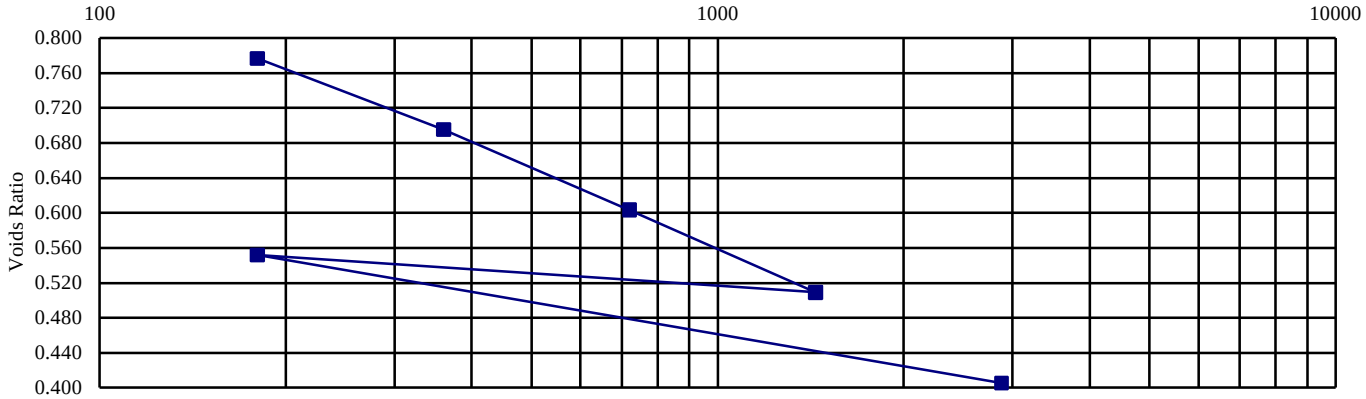
Hole Number: **BH101** **Top Depth (m):** **9.00**

Sample Number: **Base Depth (m) :** **9.45**

Sample Type: **U**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	41						
Bulk Density (Mg/m3):	1.81	0	180	0.774	1.142	Method used to	
Dry Density (Mg/m3):	1.28	180	360	0.254	1.056	determine CV:	T90
Voids Ratio:	1.064	360	720	0.151	0.953	Nominal temperature	
Degree of saturation:	102.1	720	1440	0.082	1.323	during test ' C:	20
Height (mm):	20.014	1440	180	0.022	5.071	Remarks:	
Diameter (mm)	75.028	180	2880	0.035	1.532	See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043 / PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY	**Whitby**	**Contract No:** **PSL23/9618** **Client Ref:** **S230311**

ONE DIMENSIONAL CONSOLIDATION TEST

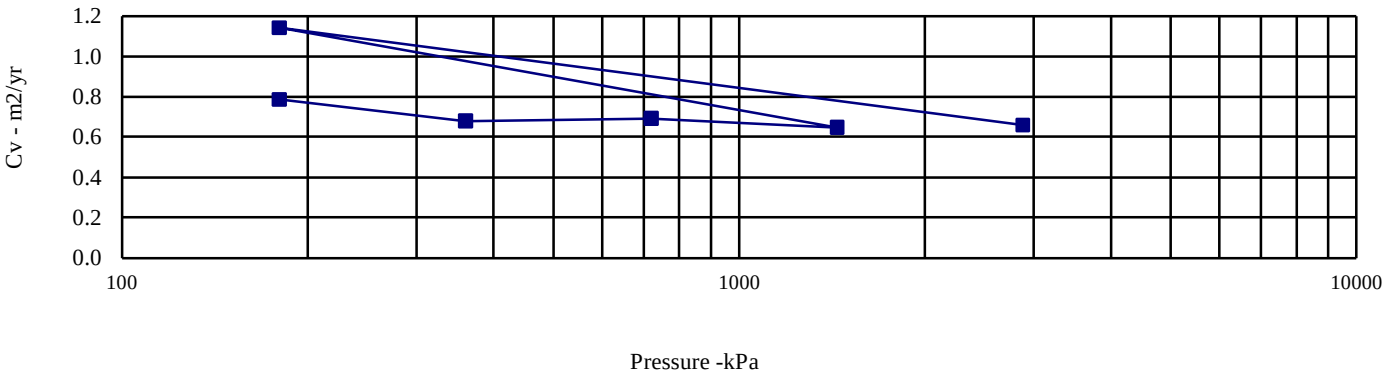
BS 1377: Part 5: 1990: Clause 3

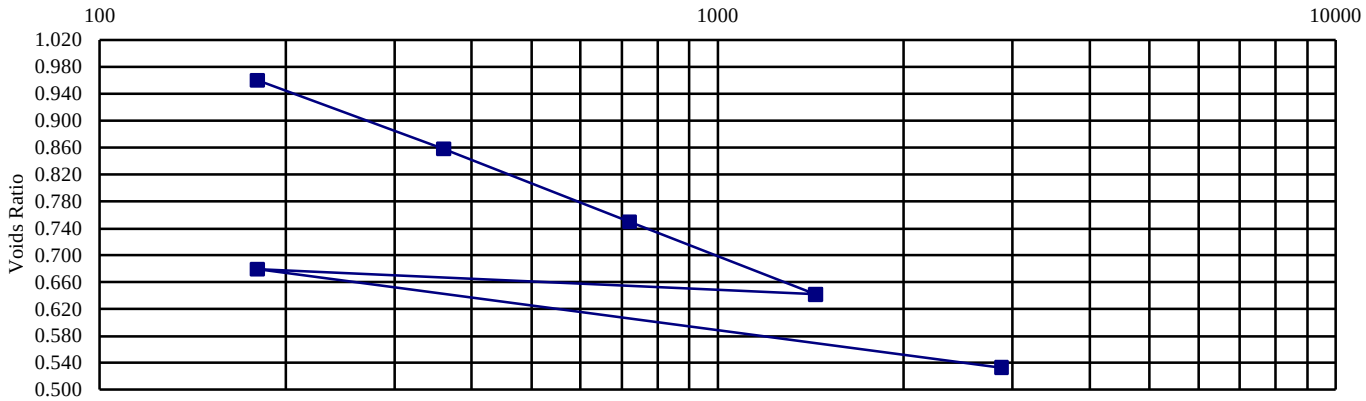
Hole Number: **BH102** **Top Depth (m):** **9.00**

Sample Number: **Base Depth (m) :** **9.45**

Sample Type: **U**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	46						
Bulk Density (Mg/m3):	1.69	0	180	0.804	0.786	Method used to	
Dry Density (Mg/m3):	1.16	180	360	0.290	0.680	determine CV:	T90
Voids Ratio:	1.292	360	720	0.162	0.692	Nominal temperature	
Degree of saturation:	95.1	720	1440	0.086	0.648	during test ' C:	20
Height (mm):	20.016	1440	180	0.018	1.142	Remarks:	
Diameter (mm)	75.008	180	2880	0.032	0.660	See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043 / PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY	**Whitby**	**Contract No:** PSL23/9618 / **Client Ref:** S230311

ONE DIMENSIONAL CONSOLIDATION TEST

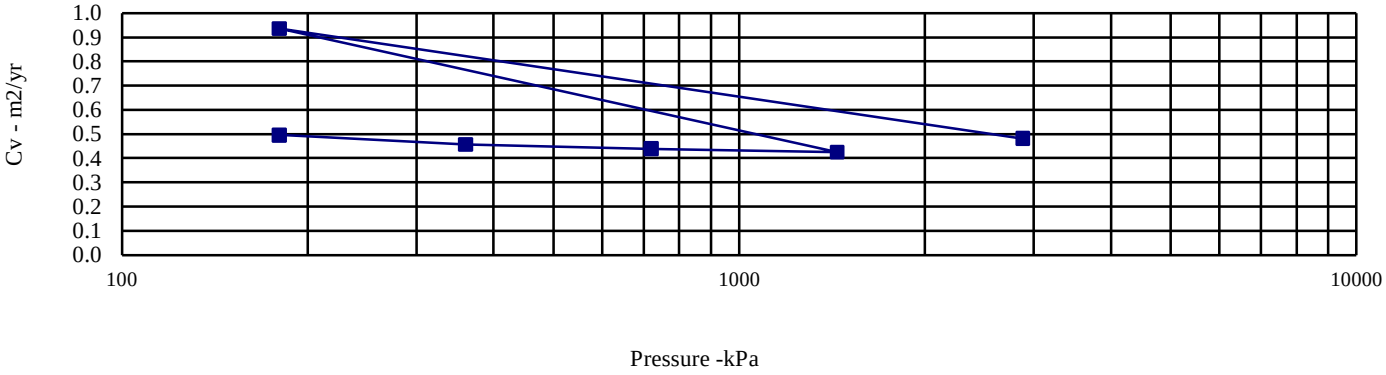
BS 1377: Part 5: 1990: Clause 3

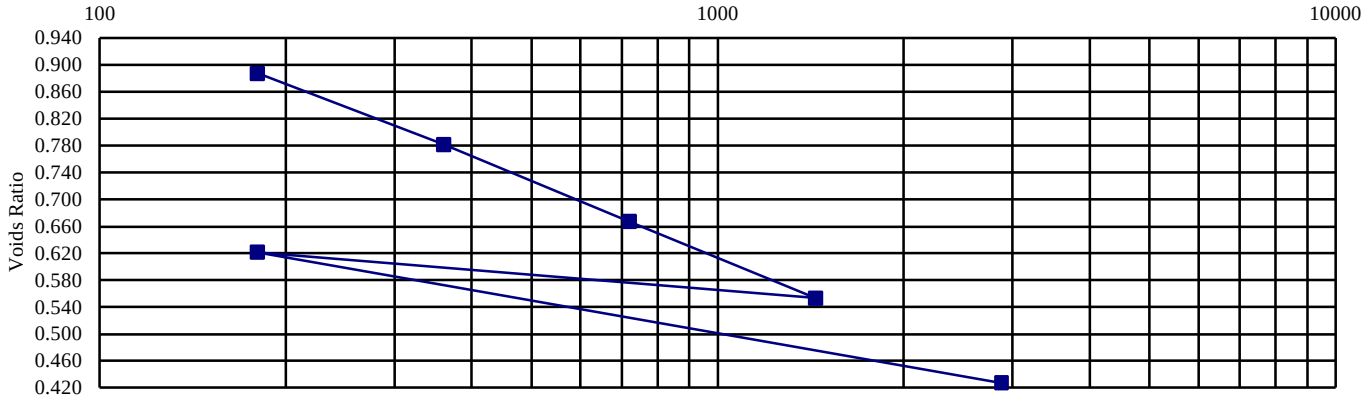
Hole Number: **BH105** **Top Depth (m):** **9.00**

Sample Number: **Base Depth (m) :** **9.45**

Sample Type: **U**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	44						
Bulk Density (Mg/m3):	1.73	0	180	0.794	0.495	Method used to	
Dry Density (Mg/m3):	1.20	180	360	0.310	0.456	determine CV:	T90
Voids Ratio:	1.202	360	720	0.179	0.439	Nominal temperature	
Degree of saturation:	97.0	720	1440	0.095	0.425	during test ' C:	20
Height (mm):	20.018	1440	180	0.035	0.937	Remarks:	
Diameter (mm)	75.025	180	2880	0.044	0.481	See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043 / PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY	**Whitby**	**Contract No:** **PSL23/9618** **Client Ref:** **S230311**

Certificate of Analysis

Certificate Number	23-26611	*Issued:*	16-Nov-23

Client G2M Testing Ltd
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-26611
Client Reference	S230311
Order No	LAB2042
Contract Title	WHITBY
Description	7 Soil samples.
Date Received	13-Nov-23
Date Started	13-Nov-23
Date Completed	16-Nov-23
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Soil Samples

Our Ref 23-26611
Client Ref S230311
Contract Title WHITBY

Test	Method	LOD	Units	Lab No	2261184	2261185	2261186	2261187	2261188	2261189
				.Sample ID	BH101	BH101	BH102	BH102	BH103	BH103
				Depth	5.00	13.50	7.50	10.50	7.50	10.50
				Other ID						
				Sample Type	D	D	D	D	D	D
				Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Inorganics										
pH	DETSC 2008#		pH		7.8	7.8	5.7	7.0	7.2	7.2
Organic matter	DETSC 2002#	0.1	%		3.4		8.4		7.0	7.4
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l		830	41	1900	820	780	560

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-26611
Client Ref S230311
Contract Title WHITBY

Lab No	2261190
.Sample ID	BH105
Depth	7.10
Other ID	
Sample Type	D
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
pH	DETSC 2008#		pH	
Organic matter	DETSC 2002#	0.1	%	11
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	

Information in Support of the Analytical Results

Our Ref 23-26611
Client Ref S230311
Contract WHITBY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2261184	BH101 5.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
2261185	BH101 13.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
2261186	BH102 7.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
2261187	BH102 10.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
2261188	BH103 7.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
2261189	BH103 10.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
2261190	BH105 7.10 SOIL		PT 1L	Sample date not supplied, Organic Matter (Manual) (28 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number	23-27587	*Issued:*	28-Nov-23

Client G2M Testing Ltd
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	23-27587
Client Reference	S230311
Order No	LAB2042
Contract Title	WHITBY
Description	One Soil sample.
Date Received	23-Nov-23
Date Started	23-Nov-23
Date Completed	28-Nov-23
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Soil Samples

Our Ref 23-27587
Client Ref S230311
Contract Title WHITBY

Lab No	2266640
.Sample ID	BH105
Depth	10.50
Other ID	
Sample Type	D
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
pH	DETSC 2008#		pH	9.4
Organic matter	DETSC 2002#	0.1	%	4.0
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	660

Information in Support of the Analytical Results

Our Ref 23-27587
Client Ref S230311
Contract WHITBY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2266640	BH105 10.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

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Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number 23-28817 *Issued:* 12-Dec-23

Client G2M Testing Ltd
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 23-28817

Client Reference S230311

Order No LAB2077

Contract Title WHITBY ROCK SCHEDULE

Description 5 Soil samples.

Date Received 07-Dec-23

Date Started 07-Dec-23

Date Completed 12-Dec-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]
Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Soil Samples

Our Ref 23-28817
Client Ref S230311
Contract Title WHITBY ROCK SCHEDULE

			Lab No	2273501	2273502	2273503	2273504	2273505
			.Sample ID	BH101	BH101	BH102	BH103	BH105
			Depth	19.50	24.50	21.35	21.90	23.70
			Other ID					
			Sample Type	D	D	D	D	D
			Sampling Date	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units					
Inorganics								
pH	DETSC 2008#		pH	8.5	7.9	8.2	8.7	8.6
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	< 10	270	24	29	34

Information in Support of the Analytical Results

Our Ref 23-28817
Client Ref S230311
Contract WHITBY ROCK SCHEDULE

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2273501	BH101 19.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
2273502	BH101 24.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
2273503	BH102 21.35 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
2273504	BH103 21.90 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
2273505	BH105 23.70 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

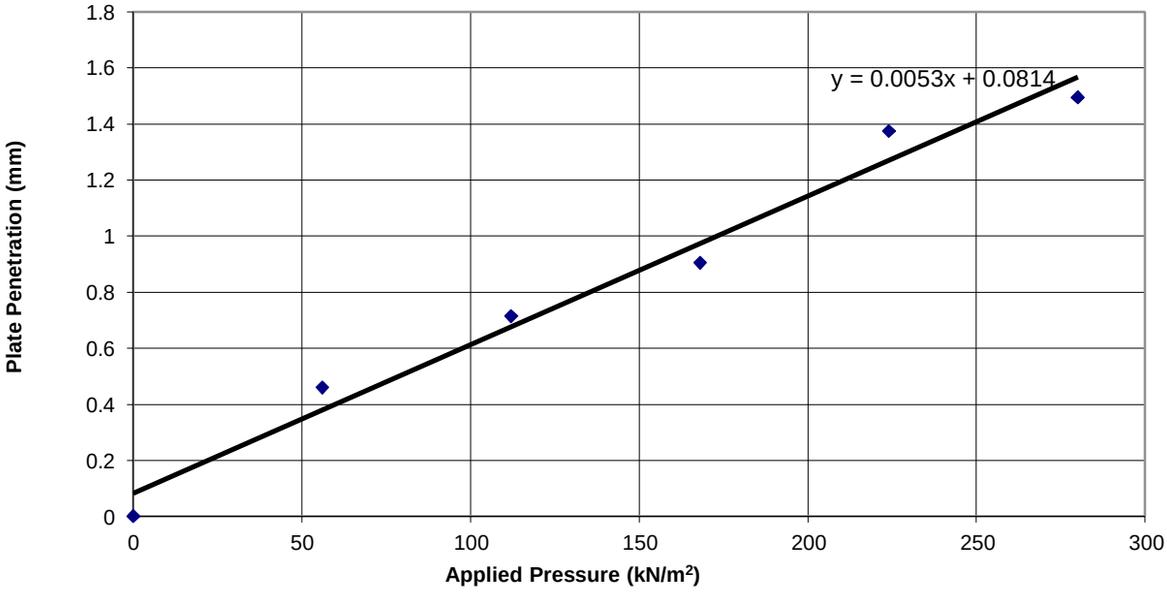
From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			**Date:**	24/10/2023
Project Number:	S230311		**Test No:**	PLT01
Project Name:	Whitby Maritime Hub		**Test Level:**	0.7
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			**Weather:**	Cold/overcast
Plate Diameter:	0.305 m		**Load Applied:**	280 kPa
Kentledge Type:	Tractor		**Remarks:**	Made Ground (Dolomite)



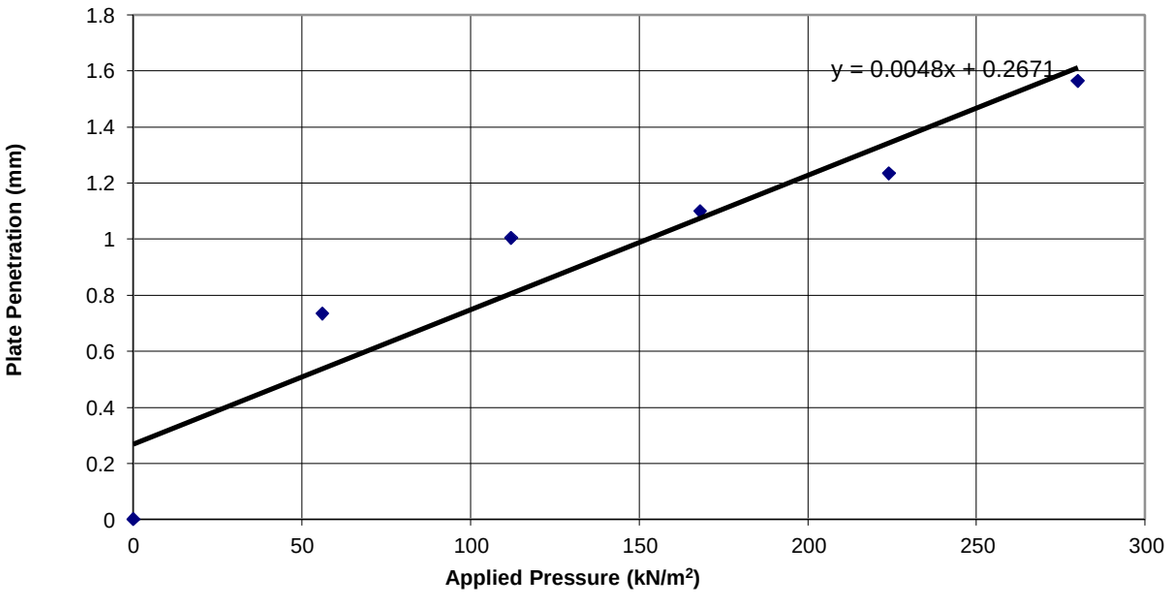
	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.46
Stage 2	112	0.72
Stage 3	168	0.91
Stage 4	224	1.38
Stage 5	280	1.50

Conversion Factor	0.45	Produced by:	E. Lupton
Stress Applied @ 1.25mm	220.02 kN/m^2		
Total Plate Deflection	1.50 mm	Checked by:	L. Cassidy
Plate Diameter	305 mm		
k305	176015		
k762	78810		
CBR	19 %		

SOLMEK

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			**Date:**	24/10/2023
Project Number:	S230311		**Test No:**	PLT02
Project Name:	Whitby Maritime Hub		**Test Level:**	0.3
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			**Weather:**	Cold/overcast
Plate Diameter:	0.305 m		**Load Applied:**	280 kPa
Kentledge Type:	Tractor		**Remarks:**	Made Ground (Dolomite)



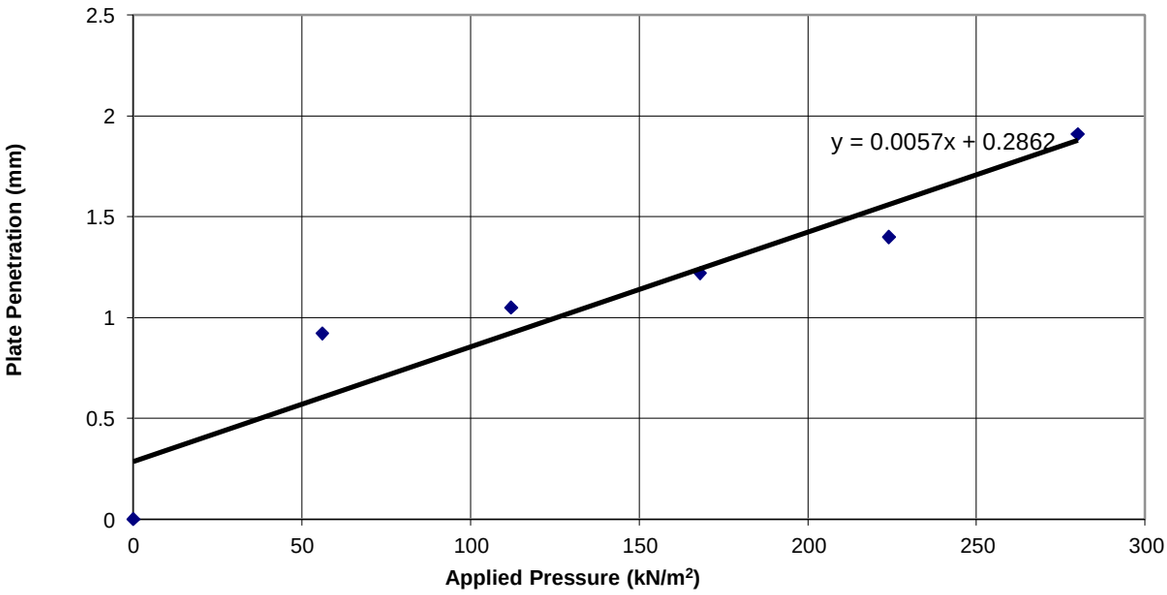
	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.74
Stage 2	112	1.01
Stage 3	168	1.10
Stage 4	224	1.24
Stage 5	280	1.57

Conversion Factor	0.45	Produced by:	E. Lupton
Stress Applied @ 1.25mm	204.50 kN/m^2		
Total Plate Deflection	1.57 mm	Checked by:	L. Cassidy
Plate Diameter	305 mm		
k305	163601		
k762	73251		
CBR	16 %		

SOLMEK

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			**Date:**	24/10/2023
Project Number:	S230311		**Test No:**	PLT03
Project Name:	Whitby Maritime Hub		**Test Level:**	0.3
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			**Weather:**	Cold/overcast
Plate Diameter:	0.305 m		**Load Applied:**	280 kPa
Kentledge Type:	Tractor		**Remarks:**	Made Ground (Dolomite)



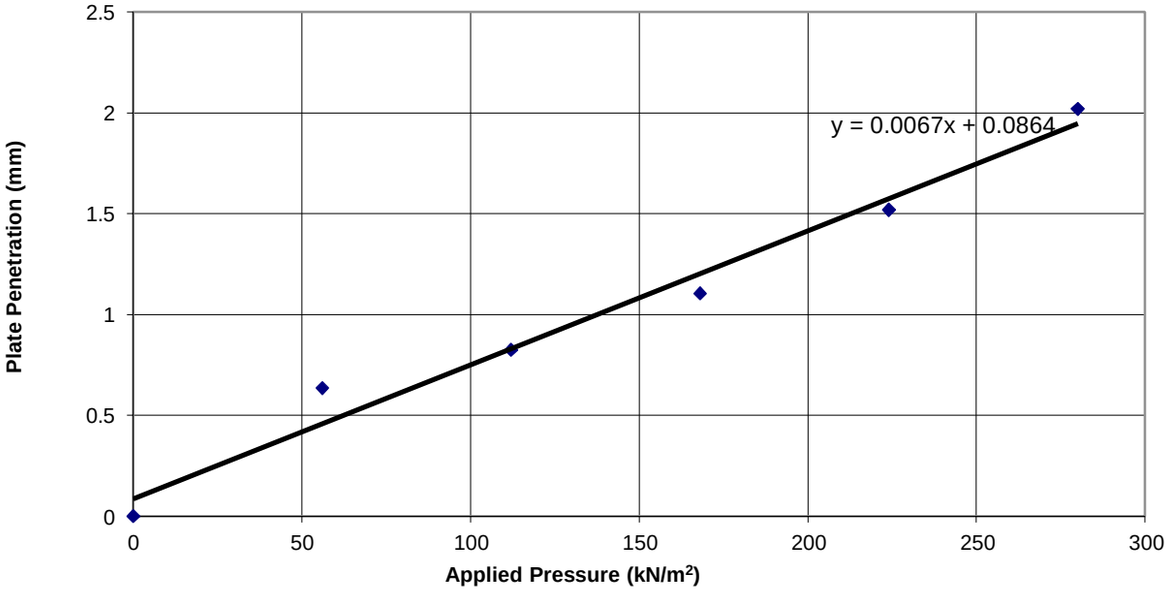
	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.92
Stage 2	112	1.05
Stage 3	168	1.22
Stage 4	224	1.40
Stage 5	280	1.91

Conversion Factor	0.45	Produced by:	E. Lupton
Stress Applied @ 1.25mm	169.27 kN/m^2		
Total Plate Deflection	1.91 mm	Checked by:	L. Cassidy
Plate Diameter	305 mm		
k305	135417		
k762	60632		
CBR	12 %		

SOLMEK

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			**Date:**	24/10/2023
Project Number:	S230311		**Test No:**	PLT04
Project Name:	Whitby Maritime Hub		**Test Level:**	0.6
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			**Weather:**	Cold/overcast
Plate Diameter:	0.305 m		**Load Applied:**	280 kPa
Kentledge Type:	Tractor		**Remarks:**	Made Ground (Dolomite)



	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.64
Stage 2	112	0.83
Stage 3	168	1.11
Stage 4	224	1.52
Stage 5	280	2.02

Conversion Factor	0.45	Produced by:	E. Lupton
Stress Applied @ 1.25mm	174.96 kN/m^2		
Total Plate Deflection	2.02 mm	Checked by:	L. Cassidy
Plate Diameter	305 mm		
k305	139968		
k762	62670		
CBR	13 %		

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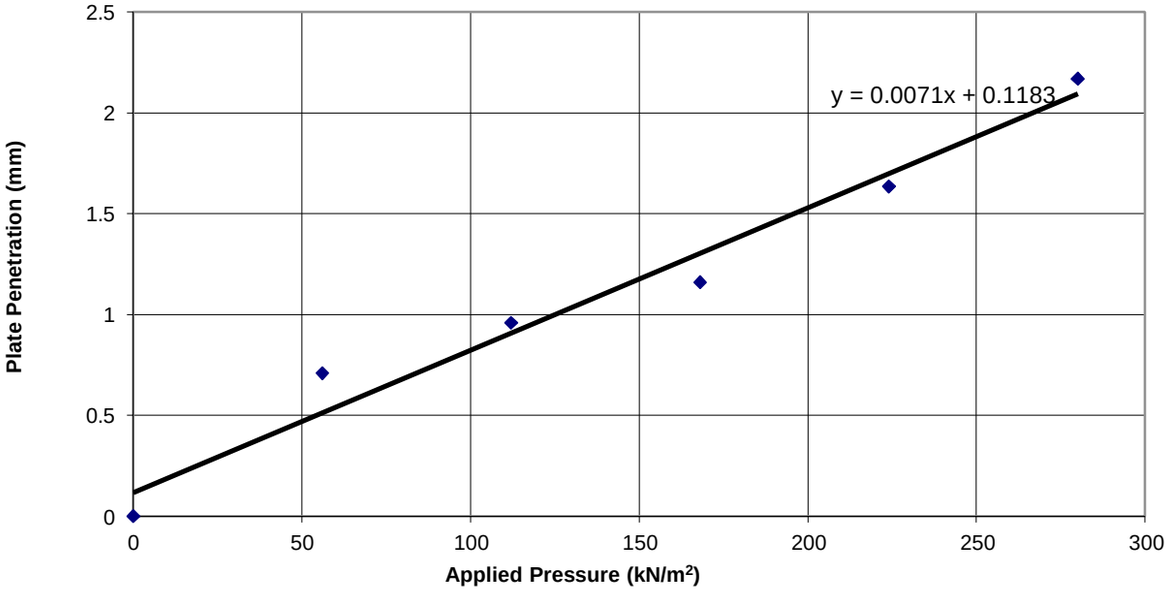
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			**Date:**	24/10/2023
Project Number:	S230311		**Test No:**	PLT05
Project Name:	Whitby Maritime Hub		**Test Level:**	0.25
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			**Weather:**	Cold/overcast
Plate Diameter:	0.305 m		**Load Applied:**	280 kPa
Kentledge Type:	Tractor		**Remarks:**	Made Ground (Dolomite)



	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.71
Stage 2	112	0.96
Stage 3	168	1.16
Stage 4	224	1.64
Stage 5	280	2.17

Conversion Factor	0.45	Produced by:	E. Lupton
Stress Applied @ 1.25mm	160.44 kN/m^2		
Total Plate Deflection	2.17 mm	Checked by:	L. Cassidy
Plate Diameter	305 mm		
k305	128351		
k762	57469		
CBR	11 %		

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APPENDIX E:
Gas Monitoring Results

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GAS MONITORING RESULTS

Project number	S230311
Project name	Whitby Maritime Hub, Whitby
Client	Fairhurst
Visit no	1
Date	20/11/2023
Equipment	GFM 435 Gas Analyser
Operator	LO

Weather Conditions	Cloudy
Ground Conditions	Wet
Ambient Atmospheric Pressure	1003
Regional Pressure Trend	Falling

Position	Flow	Pressure	CH4		CO2		O2 (% v/v)	PID (ppm)	CO (ppm)	H2S (ppm)	Groundwater Level (mbgl)	Depth to Base (mbgl)	Notes
			(% v/v)	GSV (l/hr)	(% v/v)	GSV (l/hr)							
BH101	0.1	1003	8.0	0.0080	0.3	0.0003	14.0	0.2	0.0	0.0	1.28	12.30	
BH102	0.1	1003	6.7	0.0067	0.3	0.0003	16.2	0.1	0.0	0.0	1.82	17.00	
BH103	0.1	1003	6.7	0.0067	0.2	0.0002	17.9	0.3	0.0	0.0	1.23	12.40	
BH105	0.1	1003	0.0	0.0000	0.2	0.0002	19.4	0.0	0.0	0.0	2.10	8.70	
WS101	0.1	1003	0.0	0.0000	2.2	0.0022	18.0	0.0	0.0	0.0	2.20	3.70	
WS104	0.1	1003	0.0	0.0000	0.0	0.0000	20.4	0.0	0.0	0.0	1.28	5.00	
WS105	0.1	1003	0.0	0.0000	0.8	0.0008	19.1	0.0	0.0	0.0	2.05	3.00	

KEY

CH_4 = Methane, **CO_2** = Carbon Dioxide, **O_2** = Oxygen, **CO** = Carbon Monoxide, **H_2S** = Hydrogen Sulphide, **GSV** = Gas Screening Value (If no flow is recorded a value of 0.1 is assumed), ND = Not Detected, * = not measured, N/A = Not applicable, % = % by volume, mbgl = m below ground level, ppm = parts per million.

GAS MONITORING RESULTS

Project number	S230311
Project name	Whitby Maritime Hub, Whitby
Client	Fairhurst
Visit no	2
Date	27/11/2023
Equipment	GFM 435 Gas Analyser
Operator	LO

Weather Conditions	Cloudy
Ground Conditions	Wet
Ambient Atmospheric Pressure	999
Regional Pressure Trend	Falling

Position	Flow	Pressure	CH4		CO2		O2 (% v/v)	PID (ppm)	CO (ppm)	H2S (ppm)	Groundwater Level (mbgl)	Depth to Base (mbgl)	Notes
			(% v/v)	GSV (l/hr)	(% v/v)	GSV (l/hr)							
BH101	0.1	999	3.0	0.0030	0.0	0.0000	18.4	0.4	0.0	0.0	3.07	12.30	Water sample retrieved
BH102	0.1	999	9.4	0.0094	0.5	0.0005	14.3	0.8	0.0	0.0	1.86	17.00	Water sample retrieved
BH103	0.1	999	7.3	0.0073	0.2	0.0002	18.0	0.6	0.0	0.0	1.45	12.40	Water sample retrieved
BH105	0.1	999	0.0	0.0000	0.2	0.0002	19.2	0.0	0.0	0.0	2.10	8.70	Water sample retrieved (partia
WS101	0.1	999	0.0	0.0000	4.9	0.0049	3.9	0.0	0.0	0.0	2.30	3.70	Water sample retrieved (partia
WS104	0.1	999	0.0	0.0000	0.0	0.0000	20.0	0.0	0.0	0.0	2.60	5.00	Insufficient water
WS105	0.1	999	0.0	0.0000	0.7	0.0007	19.4	0.0	0.0	0.0	2.00	3.00	Insufficient water

KEY

CH_4 = Methane, **CO_2** = Carbon Dioxide, **O_2** = Oxygen, **CO** = Carbon Monoxide, **H_2S** = Hydrogen Sulphide, **GSV** = Gas Screening Value (If no flow is recorded a value of 0.1 is assumed), ND = Not Detected, * = not measured, N/A = Not applicable, % = % by volume, mbgl = m below ground level, ppm = parts per million.

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GAS MONITORING RESULTS

Project number	S230311
Project name	Whitby Maritime Hub, Whitby
Client	Fairhurst
Visit no	3
Date	15/12/2023
Equipment	GFM 435 Gas Analyser
Operator	LO

Weather Conditions	Sunny
Ground Conditions	Damp
Ambient Atmospheric Pressure	1031
Regional Pressure Trend	Steady

Position	Flow	Pressure	CH4		CO2		O2 (% v/v)	PID (ppm)	CO (ppm)	H2S (ppm)	Groundwater Level (mbgl)	Depth to Base (mbgl)	Notes
			(% v/v)	GSV (l/hr)	(% v/v)	GSV (l/hr)							
BH101	0.1	1031	1.2	0.0012	0.0	0.0000	19.2	0.2	0.0	0.0	1.90	12.30	
BH102	0.1	1031	2.6	0.0026	0.5	0.0005	18.0	0.3	0.0	0.0	1.79	17.00	
BH103	0.1	1031	4.8	0.0048	0.2	0.0002	18.6	0.3	0.0	0.0	1.54	12.40	
BH105	0.1	1031	0.0	0.0000	0.3	0.0003	18.5	0.0	0.0	0.0	0.99	8.70	
WS101	0.1	1031	0.0	0.0000	3.0	0.0030	11.9	0.0	0.0	0.0	2.22	3.70	
WS104	0.1	1031	0.0	0.0000	0.0	0.0000	20.1	0.0	0.0	0.0	2.00	5.00	
WS105	0.1	1031	0.0	0.0000	0.7	0.0007	19.1	0.0	0.0	0.0	2.02	3.00	

KEY

CH_4 = Methane, **CO_2** = Carbon Dioxide, **O_2** = Oxygen, **CO** = Carbon Monoxide, **H_2S** = Hydrogen Sulphide, **GSV** = Gas Screening Value (If no flow is recorded a value of 0.1 is assumed), ND = Not Detected, * = not measured, N/A = Not applicable, % = % by volume, mbgl = m below ground level, ppm = parts per million.

APPENDIX F:
Notes on Limitations & Contamination Guidance

SOLMEK NOTES ON CONTAMINATION GUIDANCE (REF: VERSION 1/2023)

UK BACKGROUND

Environmental Protection Act 1990: Part 2A Revised Statutory Guidance (April 2012)

This revised document explains how the Local Authority should decide if land, based on a legal interpretation, is contaminated. The document replaces the previous guidance given in Annex 3 of DEFRA Circular 01/2006, issued in accordance with section 78YA of the 1990 Environmental Protection Act.

The main objectives of the Part 2A regime are to *"identify and remove unacceptable risks to human health and the environment" and* to *"seek to ensure that contaminated land is made suitable for its current use".*

Part 2A uses a risk based approach to defining contaminated land whereby the "risk" is interpreted as *"the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land"* and by *"the scale and seriousness of such harm or pollution if it did occur".*

For a relevant risk to exist a contaminant, pathway and receptor linkage must be present before the land can be considered to be contaminated. The document explains that *"for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters."*

A conceptual model is used to develop and communicate the risks associated with a particular site.

To determine if land is contaminated the local authority use various categories from 1 to 4. Categories 1 and 2 include *"land which is capable of being determined as contaminated land on grounds of significant possibility of significant harm to human health."*

Categories 3 and 4 *"encompass land which is not capable of being determined on such grounds".*

PRELIMINARY CONCEPTUAL MODEL

Preliminary Conceptual Models are undertaken in accordance with CIRIA C552. The Preliminary Conceptual Model assesses the consequence and the likelihood of a risk being realised to provide a risk classification, using the tables detailed below.

CONSEQUENCE OF RISK BEING REALISED (Based on C552 CIRIA, 2001)

Classification	Definition	Example
Severe	Short-term (acute) risk to human health, the environment, an element of the development or other aspect with is likely to result in *significant harm*, damage or both.	High concentrations of cyanide on the surface of an informal recreational area. Major spills of contaminants from site into controlled water. High concentrations of explosive gas in the subsurface environment that have a clear unobstructed pathway into buildings.
Moderate	Chronic damage to human health, a plausible chance that an event will occur, although the timeline is not immediate to be in the short-term.	Appreciable concentration of contamination that over the longer-term will cause significant harm i.e. high lead concentration in topsoil. Shallow mine workings that are potentially unstable but may remain in a satisfactory or stable conditions for a number of years.
Mild	Low level pollution of non-sensitive water, a feasible hazardous scenario although the timeline of such occurring can probably be considered in 10's of years.	The effect of high sulphate concentrations on structural concrete. Pollution of non-classified groundwater.
Minor	Harm, although not necessarily significant to human health, or with respect to other aspects of the development, which are considered implausible in terms of occurrence, or will have little consequential impact.	The presence of contaminants at such low concentrations that protective equipment is required during site works. Any damage to structures is minimal and will not be structural in characteristics.

PROBABILITY OF RISK BEING REALISED (C552 CIRIA, 2001)

Classification	Definition
High Likelihood	There is a viable pollutant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence that the receptor has been harmed or polluted.
Likely	There is a viable pollutant linkage and all elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a viable pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a viable pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

RISK CLASSIFICATION MATRIX (C552 CIRIA, 2001)

Risk = Probability x Consequence		Consequence			
		Severe	Moderate	Mild	Minor
Probability	High likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

HUMAN RECEPTORS

Human exposure to contaminants present in soils can occur via several pathways. Direct exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatised compounds, and inadvertent soil ingestion (or deliberate soil ingestion in the case of some children). Other indirect pathways include human ingestion of plants grown in contaminated soil or contaminated ground or surface water. Contaminants associated with wind blown dust can affect humans on surrounding sites.

VEGETATION

Plants can be affected by soil contamination in a number of ways resulting in growth inhibition, nutrient deficiencies and yellowing of leaves. Contaminants are taken up by plants through the roots and through foliage. Contaminants identified as being highly phytotoxic include boron, cadmium, copper, lead, nickel, and zinc.

To establish if the levels of contaminants present on a site may pose a risk to vegetation the results of the contamination testing are compared to a series of threshold values published in 'Code of Good Agricultural Practice for the Protection of Soil'.

GROUNDWATER AND SURFACE WATER RECEPTORS

The principal pathway by which soil contamination may reach the water environment is through a slow seepage or leaching to groundwater or surface water. The potential for contaminants to migrate along such pathways is dependent on the chemical and physical characteristics of the contaminants and the local hydrogeology. Surface watercourses may also accumulate contamination as contaminated sediments are deposited within the water body.

Where the site investigated overlies major/principal aquifers (and in some cases minor/secondary aquifers depending on certain conditions), groundwater Source Protection Zones and areas in close proximity to groundwater abstractions, contamination test results have been compared with the Water Supply (Water Quality) Regulations 1989 and The Water Supply (Water Quality) Regulations 2000.

Should a surface water receptor, such as a fresh water environment (river, canal, stream, lake etc), or marine environment be considered sensitive in relation to a site, then test results are compared with DEFRA & SEPA Environmental Quality Standards (2004). Many of the Environmental Quality Standards are hardness ($CaCO_3$) depended. Where no hardness values are available, Solmek assume conservative values (of between 0 and 50mg/l).

In the absence of vulnerable ground and surface water environments, Solmek may compare any test results with the Environment Agency Leachate Quality Threshold Values.

DETAILED QUANTITATIVE RISK ASSESSMENT (DQRA)

In line with Environment Agency's guidance document Environment Agency *Land Contamination Risk Management*, which replaced the now-withdrawn *Contaminated Land Report 11 – Model Procedures for the Management of Land Contamination (2004)*, a DQRA for groundwater/human health may be required following a Phase 2 investigation and before the preparation of a Phase 3 Remediation Strategy. For human health DQRA, a site specific assessment criteria is undertaken using CLEA Software Version 1.06. For groundwater DQRA, the Environment Agency Remedial Targets Worksheet Version 3.1 is used.

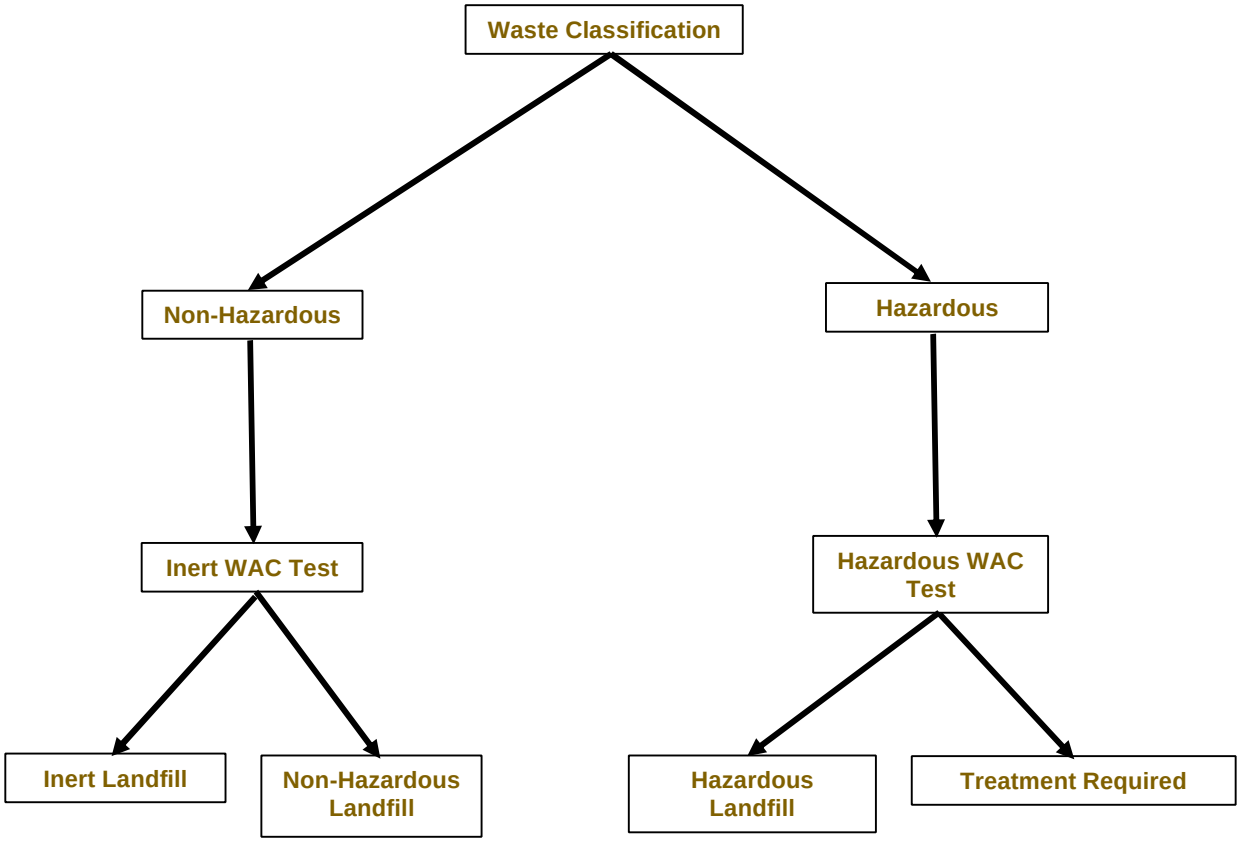
WASTE CLASSIFICATION AND WASTE ACCEPTANCE CRITERIA

During the site strip and construction activities, material may be required to be removed from site. Any such material would require classification, in line with Environment Agency Technical Guidance *Waste Classification: Guidance on the classification and assessment of waste (2015)*. This would classify the material as either Non-Hazardous or Hazardous Waste.

Once the material has been classified, determining the suitable landfill for disposal is governed by landfill directive Waste Acceptance Criteria (WAC) testing, with landfills categorized as Inert Waste, Stable Non-Reactive Hazardous Waste and Hazardous Waste. The WAC testing relates to materials that are to be exported from a site/development to landfill, and do not directly relate to human health specifically. The testing results are generally presented as certificates which can be used by site owners/contractors etc, which should be presented to the accepting waste facility or waste contractor.

If waste classification and/or WAC testing are not undertaken, material taken off site may be subject to WAC testing by the appropriate waste disposal company. The decision on whether or not to accept waste, or whether further testing is required, is at the discretion of the waste disposal company.

The below flow chart provides further information on the waste classification process.



CONSTRUCTION MATERIALS

Materials at risk from possible soil contaminants include inorganic matrices such as cement and concrete and also organic material such as plastics and rubbers. Acid ground conditions and high levels of sulphates can accelerate the corrosion of building materials. Where pH and soluble sulphate analysis has been undertaken, Solmek compare the test results with the guidelines presented within BRE Special Digest 1, 2005 (3rd Edition) 'Concrete in Aggressive Ground'. Plastics and rubbers are generally used for piping and service ducts and are potentially attacked by a range of chemicals, most of which are organic, particularly petroleum based substances. Drinking water supplies can be tainted by substances that can penetrate piping and water companies enforce stringent threshold values.

The levels of potential contaminants should be compared to thresholds supplied in the UK Water Industry Research (UKWIR) publication "Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites" (January 2011). A Brownfield Site is defined in the document as "Land or premises that have not previously been used or developed that may be vacant or derelict". It should be noted that Brownfield sites may not be contaminated. The guidance does not apply to Greenfield Sites however water companies may have their own assessment criteria which should be checked by the developer. The table below outlines the pipe material selection threshold concentrations.

	Pipe Material (Threshold concentrations in mg/kg)					
Parameter group	**PE**	**PVC**	**Barrier pipe (PE-AL-PE)**	**Wrapped Steel**	**Wrapped Ductile Iron**	**Copper**
Extended VOC suite by purge and trap or head space and GC-MS with TIC	0.5	0.125	Pass	Pass	Pass	Pass
+ BTEX + MTBE	0.1	0.03	Pass	Pass	Pass	Pass
SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C5-C10)	2	1.4	Pass	Pass	Pass	Pass
+ Phenols	2	0.4	Pass	Pass	Pass	Pass
+ Cresols and chlorinated phenols	2	0.04	Pass	Pass	Pass	Pass
Mineral oil C11-C20	10	Pass	Pass	Pass	Pass	Pass
Mineral oil C21-C40	500	Pass	Pass	Pass	Pass	Pass
Corrosive (Conductivity, Redox and pH)	Pass	Pass	Pass	Corrosive if pH <7 and conductivity >400µS/cm	Corrosive if pH <5, Eh not neutral and conductivity >400µS/cm	Corrosive if pH <5 or >8 and Eh positive
Specific suite identified as relevant following site investigation						
Ethers	0.5	1	Pass	Pass	Pass	Pass
Nitrobenzene	0.5	0.4	Pass	Pass	Pass	Pass
Ketones	0.5	0.02	Pass	Pass	Pass	Pass
Aldehydes	0.5	0.02	Pass	Pass	Pass	Pass
Amines	Fail	Pass	Pass	Pass	Pass	Pass

REQUIREMENTS OF PARTIES WITHIN THE DEVELOPMENT PROCESS

Interested parties involved in the development process may use the data in different ways and there may be varying views and interpretation of the factual data. Local Authority staff may have a view on contamination and human health and the wider environment. The Environment Agency are concerned principally with the protection of Controlled waters. Building insurers, funders and purchasers may be primarily concerned with issues of potential commercial blight. Purchasers are also not always fully informed, and perceptions on issues associated with risk can affect the decision to purchase. Developers and construction organisations will focus on financial aspects of dealing with the contamination in the context of the development and construction programme.

RISKS & LIABILITIES FROM CONTAMINATION

In simple terms, risks associated with contamination may be considered in terms of 1) statutory risks and 2) development related risks. If contamination is severe or forms a potential hazard based on its potential to affect groundwater, surface water or human health, a statutory risk may be present, and as such, if the risk is not reduced, criminal proceedings may be instigated by a government body or local authority.

If the contamination is less severe or not considered to be mobile, it may be considered a commercial liability which could, in theory remain untreated, but which may at a later date affect the value of the property, or, with changing legislation, become a statutory risk. Commercial liabilities could give rise to civil proceedings by third parties if there are grounds for action.

♣Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2023)

These conditions accompany our tender and supercede any previous conditions issued. Solmek will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of Solmek. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from Solmek. A charge may be levied against such approval, the same to be made at the discretion of Solmek.

Solmek cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. Solmek are not responsible for the action negligent of otherwise of subcontractors or third parties.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that mobile contamination, ground gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Solmek cannot be held liable for any unrecorded or unforeseen obstructions between exploratory boreholes and trial pits. This includes instances where previous structures on the site (buried man made structures) or the presence of boulder clay (cobbles and/or boulder obstructions) have been anticipated. All types of piling operations should make allowance for obstructions within the construction budget to accommodate this. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2011 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, Solmek cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by Solmek in the course of investigation is the property of Solmek, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. Solmek reserve the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. The presence or otherwise of Japanese Knotweed or other invasive plants can be difficult to identify especially during winter months. If Japanese Knotweed or other invasive species are suspect, it should be confirmed by an ecologist. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning Solmek you understand and accept that you/your agent have a contractual relationship with Solmek & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Solmek are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete, and Solmek has not allowed for this. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming Solmek agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We reserve the right to pursue full payment of the invoice prior to release of any information including reports. We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 8% to the base rate for unreasonably late payments. Solmek are exempt from the CIS Scheme. Solmek offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. Solmek are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by Solmek. Solmek give notice that consequential loss as a direct or indirect result of Solmek's activities or omission of the same are excluded.

Appendix 2b

Supplementary Gas and Groundwater Monitoring

SOLMEK

GAS MONITORING RESULTS

Project number	S230311
Project name	Whitby Maritime Hub, Whitby
Client	Fairhurst
Visit no	4
Date	08/01/2024
Equipment	GFM 435 Gas Analyser
Operator	LO

Weather Conditions	Cloudy
Ground Conditions	Wet
Ambient Atmospheric Pressure	1038
Regional Pressure Trend	Rising

Position	Flow	Pressure	CH4		CO2		O2 (% v/v)	PID (ppm)	CO (ppm)	H2S (ppm)	Groundwater Level (mbgl)	Depth to Base (mbgl)	Notes
			(% v/v)	GSV (l/hr)	(% v/v)	GSV (l/hr)							
BH101	0.1	1038	1.6	0.0016	0.0	0.0000	17.6	0.1	0.0	0.0	2.00	12.30	
BH102	0.1	1038	24.5	0.0245	0.5	0.0005	9.9	1.0	0.0	0.0	0.01	17.00	
BH103	0.1	1038	7.2	0.0072	0.4	0.0004	17.6	0.6	0.0	0.0	1.30	12.40	
BH105	0.1	1038	0.0	0.0000	0.2	0.0002	18.6	0.0	0.0	0.0	0.98	8.70	
WS101	0.1	1038	0.0	0.0000	3.1	0.0031	11.0	0.0	0.0	0.0	1.60	3.70	
WS104	0.1	1038	0.0	0.0000	0.0	0.0000	20.5	0.0	0.0	0.0	N/A	5.00	
WS105	0.1	1038	0.0	0.0000	0.7	0.0007	19.7	0.0	0.0	0.0	2.09	3.00	

KEY

CH_4 = Methane, **CO_2** = Carbon Dioxide, **O_2** = Oxygen, **CO** = Carbon Monoxide, **H_2S** = Hydrogen Sulphide, **GSV** = Gas Screening Value (If no flow is recorded a value of 0.1 is assumed), ND = Not Detected, * = not measured, N/A = Not applicable, % = % by volume, mbgl = m below ground level, ppm = parts per million.

Appendix 3

Contamination Summary

Determinand		Tests	Min Value	Max Value	Mean Value	US95 Value	Human Health (Commercial)	Landscaping (MAFF 1998)	Buildings & Utilities (WRAS)	Human Health Source	Human Health Model	Other Source	WS101	WS102	WS102	WS104	WS105	BH101	BH101	BH102	BH102	BH104	BH104	BH101	BH105	BH103	WS102	WS105	WS101	BH102	BH105
													15-Mar	14-Mar	14-Mar	14-Mar	15-Mar	23/10/2023	23/10/2023	23/10/2023	16/10/2023	19/10/2023	19/10/2023	23/10/2023	16/10/2023	16/10/2023	14/03/2023	15/03/2023	15/03/2023	16/10/2023	16/10/2023
													ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
													MG - CLAY	MG - CLAY	MG - CLAY	MG - CLAY	MG - CLAY	MG - SILT	MG - SILT	MG - GRAVEL	MG - GRAVEL	MG - GRAVEL	MG - CHALK	MG - GRAVEL	MG - GRAVEL	MG - GRAVEL	SAND	SAND	SAND	SILT	SILT
								SOM	(pH ≥7)				0.80	0.60	1.50	0.60	1.20	3.10	3.80	0.60	1.00	0.80	1.00	0.80	2.20	0.70	3.80	3.50	3.70	7.50	3.50
								1.0%					2142976	2142978	2142979	2142981	2142982	2264823	2256398	2251103	2251104	2253351	2253352	2256396	2251106	2264824	2142980	2142983	2142977	2251105	2251107
Metals																															
Antimony	mg/kg	16	1.10	5.30	1.81	5.90	7,500	-	-	CL:AIRE	CLEA v1.06	-	5.3		1.2	1.6	1.8	1.1	1.3		1.4	1.50	1.60	1.2	1.3	2.4	< 1.0	< 1.0	< 1.0		< 1.0
Arsenic	mg/kg	16	3.60	15.00	8.93	16.53	640	50	-	LQM/CIEH S4ULs	CLEA v1.071	MAF (1998)	14		4	9.1	15	7.3	7.8		7.1	3.80	3.60	10	11	8.5	12	8.9	7.8		13
Barium	mg/kg	16	45.00	220.00	111.88	245.29	22,000	-	-	CL:AIRE	CLEA v1.06	-	220		220	160	88	150	130		59	51.00	45.00	110	130	160	68	71	71		57
Beryllium	mg/kg	16	0.20	1.70	0.77	1.92	12	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	1.7		0.9	1	0.7	1.5	1.1		0.4	<0.2	<0.2	0.5	1.1	0.6	0.4	0.3	0.2		0.4
Boron (water soluble)	mg/kg	16	0.60	5.40	2.46	6.04	240,000	3.0	-	LQM/CIEH S4ULs	CLEA v1.071	MAF (1998)	1.1		2.7	2.4	1.1	5.4	3.4		2.3	0.80	0.60	4.4	2	1.3	4.7	1.9	1.6		3.7
Cadmium	mg/kg	16	0.10	1.10	0.26	1.26	190	3.0	-	LQM/CIEH S4ULs	CLEA v1.071	MAF (1998)	0.6		< 0.1	0.2	0.1	0.2	0.1		1.1	0.10	<0.1	0.1	0.3	0.1	< 0.1	< 0.1	0.1		0.1
Chromium (III)	mg/kg	16	4.00	17.00	12.20	18.62	8,600	400	-	LQM/CIEH S4ULs	CLEA v1.071	MAF (1998)	14		15	16	13	13	17		11	4.50	4.00	11	15	13	13	8.7	13		14
Chromium (VI) - hexavalent	mg/kg	16	-	-	-	-	33	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0
Copper	mg/kg	16	12.00	2,100.00	163.38	2,326.71	68,000	200	-	LQM/CIEH S4ULs	CLEA v1.071	MAF (1998)	94		28	32	29	32	120		12	13.00	12.00	33	32	2100	13	29	23		12
Iron	mg/kg	16	7,500.00	41,000.00	23,143.75	45,221.72	-	-	-	-	-	-	23000		41000	34000	36000	16000	19000		16000	7,800.00	7,500.00	25000	30000	20000	26000	18000	19000		32000
Lead	mg/kg	16	17.00	370.00	111.69	410.36	2,330	300	-	CL:AIRE C4SL	CLEA	MAF (1998)	370		23	190	81	120	150		17	54.00	42.00	110	92	230	28	130	110		40
Manganese	mg/kg	16	160.00	580.00	365.00	640.85	-	-	-	-	-	-	550		230	400	350	580	520		180	280.00	290.00	360	570	410	240	160	450		270
Mercury (Elemental)	mg/kg	16	0.05	0.63	0.21	0.71	58	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	0.12		<0.4	0.2	0.15	0.16	0.63		< 0.05	0.08	0.07	0.38	0.13	0.1	0.08	0.38	0.41		0.05
Molybdenum	mg/kg	16	0.50	7.40	1.61	8.19	17,000	4.0	-	CL:AIRE	CLEA v1.06	MAF (1998)	3.1		< 0.4	0.8	1.9	1.1	7.4		1.6	0.50	0.50	1.1	1.6	1.1	1.1	0.7	0.5		1.1
Nickel	mg/kg	16	7.60	47.00	17.23	51.17	980	110	-	LQM/CIEH S4ULs	CLEA v1.071	MAF (1998)	22		47	27	18	15	16		9.2	8.90	7.60	21	16	18	15	10	11		14
Selenium	mg/kg	16	0.50	1.10	0.80	2.99	12,000	3.0	-	LQM/CIEH S4ULs	CLEA v1.071	MAF (1998)	< 0.5		< 0.5	< 0.5	< 0.5	1.1	< 0.5		< 0.5	<0.5	<0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5
Vanadium	mg/kg	16	7.40	63.00	27.95	68.64	9,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	37		25	31	31	30	27		16	8.80	7.40	27	36	23	30	20	63		35
Zinc	mg/kg	16	37.00	250.00	81.50	271.92	730,000	300	-	LQM/CIEH S4ULs	CLEA v1.071	MAF (1998)	250		58	100	58	100	100		72	43.00	38.00	81	72	100	63	37	78		54
Inorganics																															
Ammonia	mg/kg	16	1.40	43.00	5.69	47.42	-	-	-	-	-	-	2.5		4.6	4.7	4.1	1.5	1.4		1.4	2.00	2.40	1.6	43	1.5	6.7	5.5	3.4		4.7
Cyanide Complex	mg/kg	16	0.40	0.50	0.47	0.60	-	-	-	-	-	-	0.4		< 0.2	0.5	0.5	< 0.2	< 0.2		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2		< 0.2
Cyanide Free	mg/kg	16	0.10	0.10	0.10	0.10	34	-	-	ATKINS ATRISK SSV	CLEA v1.04	-	< 0.1		0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1
Cyanide Total	mg/kg	16	0.10	0.60	0.34	0.74	-	-	-	-	-	-	0.5		< 0.1	0.6	0.5	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	0.3	0.2	0.1	< 0.1	< 0.1	0.2		< 0.1
pH	-	16	8.20	9.90	8.87	10.14	-	>5.0	>5.0	-	-	MAF (1998)	9.9		8.8	8.7	9.6	9.4	8.9		9.6	8.40	8.20	9.2	8.3	9.1	8.6	8.4	8.2		8.6
Sulphate Total (SO4)	%	16	0.04	0.69	0.18	0.76	-	-	2,400	-	-	BRE (2005)	0.16		0.04	0.1	0.14	0.17	0.19		0.69	0.09	0.08	0.08	0.13	0.27	0.2	0.25	0.14		0.13
Sulphate Water Soluble (SO4)	mg/l	16	32.00	1,000.00	305.75	1,117.62	-	-	500	-	-	BRE (2005)	170		32	140	260	510	53		1000	200.00	170.00	77	210	820	340	340	210		360
Thiocyanate	mg/kg	16	0.70	4.50	1.86	5.35	-	-	-	-	-	-	< 0.6		< 0.6	0.7	< 0.6	1	< 0.6		< 0.6	4.50	4.30	3.8	0.9	2.1	0.7	0.8	0.9		0.8
Total Sulphur as S	mg/l	16	0.02	0.95	0.22	1.05	-	-	5,000	-	-	BRE (2005)	0.11		0.02	0.07	0.1	0.29	0.32		0.27	0.04	0.04	0.05	0.13	0.13	0.39	0.95	0.18		0.39
Misc																															
Organic matter	%	4	1.40	3.20	2.08	4.12	-	-	-	-	-	-				1.9		1.4						1.8						3.2	
Calorific Value	MJ/kg	4	-	-	-	-	-	-	2.0	-	-	ICRCL Note 61/84				< 1.0		<1.0			< 1.0				<1						
Asbestos (See Separate Sheet)	-	13	-	-	-	-	NAD	-	-	ICRCL	Note 64/85	-	NAD	NAD		NAD	NAD	Chrysotile		NAD	NAD	NAD	NAD	NAD	Chrysotile					NAD
Asbestos (See Separate Sheet)	%	2	-	-	-	-	0.001	-	-	ICRCL	Note 64/85	-						<0.001								0.002					
BTEX																															
Benzene	mg/kg	5	-	-	-	-	27	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01					< 0.01	< 0.01		< 0.01						< 0.01				
Toluene	mg/kg	5	-	-	-	-	56,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01					< 0.01	< 0.01		< 0.01						< 0.01				
Ethylbenzene	mg/kg	5	-	-	-	-	5,700	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01					< 0.01	< 0.01		< 0.01						< 0.01				
xylene	mg/kg	5	-	-	-	-	6,600	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01					< 0.01	< 0.01		< 0.01						< 0.01				
TPHs																															
Aliphatic EC >5-6 (benzene)	mg/kg	16	0.40	0.43	0.42	0.52	3,200	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	0.4	0.43	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01
Aliphatic EC >6-8 (toluene)	mg/kg	16	-	-	-	-	7,800	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01
Aliphatic EC >8-10	mg/kg	16	0.07	0.99	0.53	3.89	2,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	0.99	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01
Aliphatic EC >10-12	mg/kg	16	2.04	6.32	3.92	10.01	9,700	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	6.32		2.04	< 1.50	< 1.50	< 1.5	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.50	< 1.50	3.4		< 1.5
Aliphatic EC >12-16	mg/kg	16	1.51	27.45	7.31	38.22	59,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	27.45		2.07	1.51	1.6	< 1.2	< 1.2		< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.20	< 1.20	3.94		< 1.2
Aliphatic EC >16-21	mg/kg	16	2.31	25.72	10.90	47.45	1,600,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	25.72		2.31	< 1.50	< 1.50	< 1.5	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.50	< 1.50	4.66		< 1.5
Aliphatic EC >21-35	mg/kg	16	4.89	335.10	73.30	474.67		-	-	LQM/CIEH S4ULs	CLEA v1.071	-	335.1		6.5	< 3.40	6.72	< 3.4	< 3.4		< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	4.89	< 3.40	13.28		< 3.4
Aliphatic EC >35-40	mg/kg	10	3.90	133.60	50.25	255.55	1,600,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	133.6		3.9	< 3.40	< 3.40				< 3.4				< 3.4		< 3.40	< 3.40	13.25		< 3.4
Aliphatic EC >40-44	mg/kg	7	0.00	0.00	0.00	0.00		-					34.29		< 3.40	< 3.40	< 3.40										< 3.40	< 3.40	12.68		
Aliphatic EC >5-44	mg/kg	7	16.81	562.50	210.18	1,077.71	-	-	-	-	-	-	562.5		16.81	< 10.00	< 10.00										< 10.00	< 10.00	51.22		
Aromatic EC >5-7	mg/kg	16	-	-	-	-	26,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01
Aromatic EC >7-8	mg/kg	16	-	-	-	-	56,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01
Aromatic EC >8-10	mg/kg	16	-	-	-	-	3,500	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01
Aromatic EC >10-12	mg/kg	16	4.20	4.20	4.20	-	16,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.90		< 0.90	< 0.90	< 0.90	< 0.9	< 0.9		< 0.9	< 0.9	< 0.9	4.2	< 0.9	< 0.9	< 0.90	< 0.90	< 0.90		< 0.9
Aromatic EC >12-16	mg/kg	16	1.90	1.97	1.94	2.19	36,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	1.97		< 0.50	< 0.50	< 0.50	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	1.9	< 0.5	< 0.5	< 0.50	< 0.50	< 0.50		< 0.5
Aromatic EC >16-21	mg/kg	16	0.80	20.63	4.63	25.26	28,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	20.63		1.09	3.17	1.14	< 0.6	< 0.6		< 0.6	< 0.6	< 0.6	0.8	< 0.6	< 0.6	0.99	8.05	1.14		< 0.6
Aromatic EC >21-35	mg/kg	16	3.54	19.13	7.11	25.54	28,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	19.13		4.44	3.98	< 1.40	< 1.4	< 1.4		< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.40	4.48	3.54		< 1.4
Aromatic EC >35-40	mg/kg	10	2.28	6.16	4.06	9.47	28,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	2.28		6.16	< 1.40	< 1.40				< 1.4				< 1.4		< 1.40	< 1.40	3.73		< 1.4
Aromatic EC >40-44	mg/kg	7	-	-	-	-		-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 1.40		< 1.40	< 1.40	< 1.40										< 1.40	< 1.40	< 1.40		
Aromatic EC >5-44	mg/kg	7	11.69	44.02	22.75	75.09	-	-	-	-	-	-	44.02		11.69	< 10.00	< 10.00										< 10.00	12.53	< 10.00		
Aliphatic + Aromatic EC >44-70	mg/kg	16	12.53	606.50	174.69	945.70	28,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	606.5		28.51	< 10.00	< 10.00	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10.00	12.53	51.22		< 10
C5-C10 Gasoline Range Organics (GRO): HS_1D_T	mg/kg	9	0.00	0.00	0.00	0.00	-	-	-				< 0.1		< 0.1	< 0.1	< 0.1								-		< 0.1	< 0.1	< 0.1		-
EPH (C6-C10): HS_1D_Total	mg/kg	10	0.00	0.00	0.00	0.00	-	-	-				< 0.1		< 0.1	< 0.1	< 0.1				< 10				94		< 0.1	< 0.1	< 0.1		< 10
C10-C24 Diesel Range Organics (DRO): EH_1D_To	mg/kg	7	0.00	0.00	0.00	0.00	-	-	-				230		< 10	99	< 10										< 10	87	< 10		
EPH (C10-C40): EH_1D_Total	mg/kg	7	0.00	0.00	0.00	0.00	-	-	-				490		< 10	240	81										< 10	120	< 10		
PAHs																															
Acenaphthene	mg/kg	16	0.10	0.70	0.42	0.93	84,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	0.6		< 0.1	0.7	< 0.1	< 0.1	0.1		< 0.1	< 0.1	< 0.1	< 0.1	0.3	0.4	< 0.1	< 0.1	< 0.1		< 0.1
Acenaphthylene	mg/kg	16	0.20	1.60	0.60	2.39	83,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	0.2	0.2	< 0.1	0.4	1.6	< 0.1	< 0.1	< 0.1		< 0.1
Anthracene	mg/kg	16	0.40	2.70	1.32	3.42	520,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	2		< 0.1	1.3	< 0.1	0.7	0.4		< 0.1	< 0.1	< 0.1	< 0.1	0.8	2.7	< 0.1	< 0.1	< 0.1		< 0.1
Benzo(a)anthracene	mg/kg	16	0.20	12.00	3.15	14.60	170	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	12		< 0.1	4.9	< 0.1	1.6	1.1		0.2	< 0.1	< 0.1	< 0.1	2.2	2.8	< 0.1	0.4	< 0.1		< 0.1
Benzo(a)pyrene	mg/kg	16	0.30	12.00	3.43	14.93	35	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	12		< 0.1	4.4	< 0.1	1.4	1.2		0.3	< 0.1	< 0.1	< 0.1	2.5	2.2	< 0.1	< 0.1	< 0.1		< 0.1
Benzo(b)fluoranthene	mg/kg	16	0.20	9.00	2.49	11.23	44	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	9		< 0.1	3.3	< 0.1	1	0.8		0.2	< 0.1	< 0.1	< 0.1	1.7	1.4	< 0.1	< 0.1	< 0.1		< 0.1
Benzo(k)fluoranthene	mg/kg	16	0.20	5.60	1.60	6.97	1,200	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	5.6		< 0.1	2.1	< 0.1	0.6	0.5		0.2	< 0.1	< 0.1	< 0.1	1.2	1	< 0.1	< 0.1	< 0.1		< 0.1
Benzo(g,h,i)perylene	mg/kg	16	0.60	7.40	2.22	9.55	3,900	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	7.4		< 0.1	2.4	< 0.1	0.8	0.6		< 0.1	< 0.1	< 0.1	< 0.1	1.2	0.9	< 0.1	< 0.1	< 0.1		< 0.1
Chrysene	mg/kg	16	0.30	13.00	3.34	15.82	350	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	13		< 0.1	5.1	< 0.1	1.4	1.1		0.3	< 0.1	< 0.1	< 0.1	2.5	2.9	< 0.1	0.4	< 0.1		< 0.1
Dibenz(a,h)anthracene	mg/kg	16	0.20	1.30	0.53	1.63	3.5	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	1.3		< 0.1	0.6	< 0.1	0.3	0.2		< 0.1	< 0.1	< 0.1	< 0.1	0.5	0.3	< 0.1	< 0.1	< 0.1		< 0.1
Fluoranthene	mg/kg	16	0.10	24.00	5.07	27.92	23,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	24		< 0.1	11	0.3	3.9	3.4		0.5	< 0.1	< 0.1	0.1	4.4	7.4	< 0.1	0.6	< 0.1		0.2
Fluorene	mg/kg	16	0.20	2.70	0.97	3.45	63,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	1		< 0.1	0.9	< 0.1	0.2	0.3		< 0.1	< 0.1	< 0.1	< 0.1	0.7	2.7	< 0.1	< 0.1	< 0.1		< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	16	0.80	8.10	2.68	10.38	500	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	8.1		< 0.1	2.7	< 0.1	0.9	0.8		< 0.1	< 0.1	< 0.1	< 0.1	2.4	1.2	< 0.1	< 0.1	< 0.1		< 0.1
Naphthalene	mg/kg	16	0.20	0.80	0.43	1.14	190	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	0.2		< 0.1	0.8	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.5	< 0.1	< 0.1	< 0.1		< 0.1
Phenanthrene	mg/kg	16	0.10	9.60	3.02	11.67	22,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	7.4		< 0.1	6.8	0.2	1.2	1.8		0.1	0.1	< 0.1	< 0.1	2.8	9.6	< 0.1	< 0.1	< 0.1		0.2
Pyrene	mg/kg	16	0.10	21.00	4.45	24.43	54,000	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	21		< 0.1	10	0.6	3.3	2.8		0.3	< 0.1	< 0.1	0.1	3.7	6.1	< 0.1	0.8	< 0.1		0.2
PAH (total)	mg/kg	16	2.00	120.00	35.53	146.24	-	-	-	-	-	-	120		< 1.6	57	< 1.6	17	15		2	< 1.6	< 1.6	< 1.6	27	44	< 1.6	2.2	< 1.6		< 1.6
Dioxins, Furans and Dioxin-like PCBs																															
PCDDs, PCDFs and dioxin-like PCB's (Sum)	mg/kg	3	-	-	-	-	0.24	-	-	EA SGV	CLEA v1.05	-	< 0.01			< 0.01					< 0.01										
Phenols																															
Phenol	mg/kg	16	0.30	0.70	0.50	0.89	440	-	-	LQM/CIEH S4ULs	CLEA v1.071	-	0.3		< 0.3	< 0.3	< 0.3	0.7	0.7		< 0.3	< 0.3	0.5	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3		0.3
Other (Unchlorinated)																															
Methyl tert-butyl ether (MTBE)	mg/kg	5	-	-	-	-	7,900	-	-	CL:AIRE	CLEA v1.06	-	< 0.01			< 0.01		< 0.01	< 0.01		< 0.01										

Determinand		Tests	Min Value	Max Value	Mean Value	US95 Value	Acceptance Criteria		BH101	BH101	BH102	BH103	BH104	BH105	WS101	WS102	WS104	WS105	BH102	WS102	BH101	BH102	BH103	BH105	WS101
									23/10/2023	23/10/2023	16/10/2023	23/10/2023	19/10/2023	16/10/2023	15/03/2023	14/03/2023	14/03/2023	15/03/2023	16/10/2023	14/03/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023
									ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	Water	Water	Water	Water	Water
							Surface Waters (Marine)	Source	MG - Gravel	MG - SAND	MG - Gravel	MG - Gravel	MG - COBBLES	MG - GRAVEL	MG - CLAY	MG - CLAY	MG - CLAY	MG - CLAY	PEAT	SAND	-	-	-	-	-
									0.80	3.10	1.00	0.70	0.80	2.20	0.80	1.50	0.60	1.20	7.50	3.80	2.07	1.86	1.86	2.00	2.30
									2256396	2256397	2251104	2264824	2253351	2251106	2142976	2142979	2142981	2142982	2251105	2142980	2268784	2268785	2268786	2268787	2268788
Metals																									
Antimony	ug/l	16	0.32	1.50	0.73	1.95	-	-	1.6	1.5	2.6	1.7	2.8		0.81	< 0.17	0.63	0.41	1.5	0.32	1.10	0.19	< 0.17	0.68	0.89
Arsenic	ug/l	16	0.47	3.40	1.80	4.24	25	Annex G EQS	9.9	1.8	1.7	0.7	1.3		3.40	0.47	1.40	1.40	2.5	1.60	2.80	1.70	1.3	2	2.4
Barium	ug/l	16	2.00	12.00	7.08	14.95	-	-	3	18	30	37	24		5.50	2.00	7.60	5.40	12	10.00	140.00	610.00	480	350	290
Beryllium	ug/l	16	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.10	< 0.1	< 0.1	< 0.1	< 0.1
Boron (water soluble)	ug/l	16	28.00	130.00	81.25	179.93	7,000	Annex G EQS	41	90	71	32	27		< 12	74.00	28.00	< 12	93	130.00	62.00	140.00	110	130	880
Cadmium	ug/l	16	-	-	-	-	0.20	EU standard	< 0.03	< 0.03	< 0.03	< 0.03	0.12		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.13	0.03	< 0.03	< 0.03	0.04
Chromium (III)	ug/l	16	14.00	14.00	14.00	-	-	-	5.6	< 1.0	21	4.3	4		< 1.0	< 1.0	< 1.0	< 1.0	14	< 1.0	12.00	2.30	7.9	5.5	< 1.0
Chromium (VI) - hexavalent	ug/l	16	-	-	-	-	0.60	Proposed UKTAG	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0		< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
Copper	ug/l	16	0.50	9.00	4.20	11.65	5.0	Annex G EQS	1.8	< 0.4	1.7	1.8	2.3		9.00	7.00	1.80	3.80	0.5	3.10	11.00	1.60	1.2	1.7	0.9
Iron	ug/l	16	7.30	150.00	104.72	197.37	1,000	Annex G EQS	100	< 5.5	< 5.5	< 5.5	74		140.00	150.00	140.00	130.00	7.3	61.00	84.00	27.00	24	32	110
Lead	ug/l	16	0.12	2.20	1.06	2.96	7.2	EU standard	1.5	0.1	0.29	1	6		2.10	0.40	2.20	1.20	0.31	0.12	1.60	0.55	1.1	0.46	0.18
Manganese	ug/l	16	1.30	2.30	1.60	2.64	-	-	1.7	14	0.95	4	14		1.30	1.50	1.90	1.30	1.3	2.30	9.60	520.00	210	51	4500
Mercury (Elemental)	ug/l	16	0.01	0.01	0.01	-	0.05	EU standard	0.01	< 0.01	< 0.01	< 0.01	0.03		< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.03	0.01	< 0.01	< 0.01	< 0.01
Molybdenum	ug/l	16	1.20	7.20	3.70	10.49	-	-	3	6.2	3.4	2.1	6		1.20	< 1.1	1.70	< 1.1	4.7	7.20	21.00	14.00	5.6	15	10
Nickel	ug/l	16	-	-	-	-	20	EU standard	0.6	< 0.5	< 0.5	< 0.5	1.7		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.10	0.70	0.6	1.8	5.3
Selenium	ug/l	16	0.25	0.38	0.32	0.45	-	-	0.83	0.53	0.46	0.61	1.9		0.38	0.35	0.25	0.31	< 0.25	< 0.25	2.10	0.63	0.33	0.45	0.35
Vanadium	ug/l	16	1.30	7.10	2.67	8.95	100	Annex G EQS	2.9	2.9	4.3	0.8	2.6		7.10	1.40	1.40	1.30	2.9	1.90	5.80	<0.06	<0.06	<0.06	0.6
Zinc	ug/l	16	1.90	1.90	1.90	-	40	Annex G EQS	< 1.3	< 1.3	< 1.3	4	36		1.90	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3	20.00	55.00	76	95	84
Inorganics																									
Ammonia	ug/l	16	0.07	0.66	0.22	0.90	21	Proposed UKTAG	0.019	< 0.015	< 0.015	< 0.015	0.07		0.07	0.10	0.12	0.14	< 0.015	0.66	0.21	0.45	0.43	1.3	1.8
Cyanide Complex	ug/l	16	-	-	-	-	-	-	< 40	< 40	< 40	< 40	< 40		< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
Cyanide Free	ug/l	15	-	-	-	-	1.0	Annex G EQS	< 20	< 20	< 20	< 20	< 20			< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Cyanide Total	ug/l	16	-	-	-	-	-	-	< 40	< 40	< 40	< 40	< 40		< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
pH	-	16	7.40	8.30	7.80	8.65	-	-	8.2	7.8	8.1	7.4	6.6		8.30	7.90	7.40	7.40	8.3	7.50	9.50	8.00	7.7	7.8	7.3
Sulphate Total (SO4)	ug/l	16	6.10	20.00	10.17	24.42	-	-	8	45	130	140	28		6.40	6.10	10.00	12.00	20	6.50	76.00	11.00	5.1	110	610
Thiocyanate	ug/l	16	25.00	300.00	107.00	452.26	-	-	95	< 20	< 20	< 20	< 20		< 20	300.00	59.00	44.00	25	< 20	< 20	< 20	< 20	< 20	< 20
TPHs																									
Aliphatic EC >5-6 (benzene)	ug/l	16	-	-	-	-	20	Ethylbenzene EQS used as surrogate	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic EC >6-8 (toluene)	ug/l	16	-	-	-	-	20	Ethylbenzene EQS used as surrogate	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic EC >8-10	ug/l	16	-	-	-	-	20	Ethylbenzene EQS used as surrogate	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic EC >10-12	ug/l	16	2.40	15.00	8.70	54.78	20	Ethylbenzene EQS used as surrogate	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	15.00	< 1.0	< 1.0		2.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic EC >12-16	ug/l	16	5.50	100.00	52.75	398.34	20	Ethylbenzene EQS used as surrogate	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	100.00	< 1.0	< 1.0		5.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic EC >16-21	ug/l	16	14.00	14.00	14.00	-	NV	TPHCWG	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	14.00	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic EC >21-35	ug/l	16	1.40	24.00	12.70	95.35	NV	TPHCWG	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	24.00	< 1.0	< 1.0		1.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic EC >35-44	ug/l	5	1.00	36.00	18.50	146.50	NV	TPHCWG							< 1.0	36.00	< 1.0	< 1.0		1.00					
Aliphatic EC >5-44	ug/l	5	13.00	13.00	13.00	-	-	-							< 1.0	13.00	< 1.0	< 1.0		< 1.0					
Aromatic EC >5-7	ug/l	16	-	-	-	-	8.0	Benzene EQS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic EC >7-8	ug/l	16	-	-	-	-	40	Toluene EQS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic EC >8-10	ug/l	16	-	-	-	-	20	Ethylbenzene EQS as a surrogate	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic EC >10-12	ug/l	16	-	-	-	-	20	Ethylbenzene EQS as a surrogate	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EC >12-16	ug/l	16	-	-	-	-	20	Ethylbenzene EQS as a surrogate	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EC >16-21	ug/l	16	-	-	-	-	20	Ethylbenzene EQS as a surrogate	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EC >21-35	ug/l	16	-	-	-	-	20	Ethylbenzene EQS as a surrogate	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EC >35-44	ug/l	5	-	-	-	-	20	Ethylbenzene EQS as a surrogate							< 1.0	< 1.0	< 1.0	< 1.0		< 1.0					
Aromatic EC >5-44	ug/l	5	-	-	-	-	-	-							< 1.0	< 1.0	< 1.0	< 1.0		< 1.0					
Aliphatic + Aromatic EC >44-70	ug/l	16	5.50	100.00	52.75	398.34	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 1.0	100.00	< 1.0	< 1.0		5.50	< 10	< 10	< 10	< 10	< 10
PAHs																									
Acenaphthene	ug/l	16	0.03	0.04	0.04	0.07	NV	-	< 0.01	0.07	0.02	0.02	0.01	0.27	0.03	< 0.01	0.04	< 0.01		< 0.01	0.01	0.01	< 0.01	0.01	0.02
Acenaphthylene	ug/l	16	0.02	0.05	0.03	0.06	NV	-	< 0.01	0.01	< 0.01	0.03	< 0.01	0.09	0.05	< 0.01	0.02	0.03		0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Anthracene	ug/l	16	0.02	0.14	0.07	0.25	0.10	EU standard	< 0.01	0.04	0.04	0.03	< 0.01	0.19	0.14	< 0.01	0.04	0.02		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.07
Benzo(a)anthracene	ug/l	16	0.02	0.43	0.13	0.60	0.05	Benzo(a)pyrene threshold	< 0.01	0.09	0.06	0.09	< 0.01	0.34	0.43	0.02	0.13	0.03		0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.12
Benzo(a)pyrene	ug/l	16	0.02	0.50	0.17	0.70	0.05	EU standard	< 0.01	0.1	0.06	0.13	< 0.01	0.39	0.50	0.02	0.28	0.05		0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.17
Benzo(b)fluoranthene	ug/l	16	0.02	0.58	0.20	0.81	0.03 sum	EU standard	< 0.01	0.12	0.07	0.14	< 0.01	0.49	0.58	0.04	0.30	0.07		0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.20
Benzo(k)fluoranthene	ug/l	16	0.02	0.23	0.13	0.41		EU standard	< 0.01	0.05	0.03	0.05	< 0.01	0.24	0.23	< 0.01	0.13	0.02		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.07
Benzo(ghi)perylene	ug/l	16	0.01	0.42	0.15	0.59	0.002 sum	EU standard	< 0.01	0.07	0.05	0.08	0.01	0.26	0.42	0.03	0.25	0.05		0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12
Indeno(123-cd)pyrene	ug/l	16	0.01	0.43	0.15	0.61		EU standard	< 0.01	0.07	0.04	0.09	< 0.01	0.31	0.43	0.02	0.25	0.05		0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.13
Chrysene	ug/l	16	0.03	0.52	0.16	0.72	NV	-	< 0.01	0.1	0.06	0.1	< 0.01	0.37	0.52	0.03	0.18	0.04		0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.14
Dibenzo(ah)anthracene	ug/l	16	0.03	0.08	0.06	0.24	0.05	Benzo(a)pyrene threshold	< 0.01	0.02	<0.01	0.01	< 0.01	0.05	0.08	< 0.01	0.03	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03
Fluoranthene	ug/l	16	0.02	0.76	0.22	1.06	0.10	EU standard	0.01	0.22	0.11	0.17	0.02	0.79	0.76	0.04	0.23	0.04		0.02	0.02	< 0.01	< 0.01	< 0.01	0.33
Fluorene	ug/l	16	0.01	0.03	0.02	0.09	NV	-	< 0.01	0.04	0.02	0.03	< 0.01	0.17	0.03	< 0.01	0.01	< 0.01		< 0.01	0.01	0.01	< 0.01	< 0.01	0.02
Naphthalene	ug/l	16	0.06	0.06	0.06	-	1.20	EU standard	0.07	< 0.05	< 0.05	< 0.05	0.07	<0.05	0.06	< 0.05	< 0.05	< 0.05		< 0.05	0.07	0.08	< 0.05	< 0.05	< 0.05
Phenanthrene	ug/l	16	0.01	0.21	0.07	0.32	NV	-	0.01	0.1	0.12	0.07	0.02	0.46	0.21	0.03	0.04	0.01		< 0.01	0.03	0.02	0.01	< 0.01	0.1
Pyrene	ug/l	16	0.03	0.65	0.20	0.91	-	-	0.01	0.19	0.13	0.16	0.02	0.62	0.65	0.04	0.26	0.04		0.03	0.02	< 0.01	< 0.01	< 0.01	0.29
PAH (total)	ug/l	16	0.29	5.10	2.01	7.73	-	-	< 0.20	1.3	0.79	1.2	< 0.20	5	5.10	0.29	2.20	0.46		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1.8
BTEX																									
Benzene	ug/l	6	-	-	-	-	8	Annex G EQS		< 1.0	< 1.0			< 1.0							< 1.0	< 1.0			< 1.0
Toluene	ug/l	6	-	-	-	-	74	Proposed UKTAG		< 1.0	< 1.0			< 1.0							< 1.0	< 1.0			< 1.0
Ethylbenzene	ug/l	6	-	-	-	-	20	Annex G EQS		< 1.0	< 1.0			< 1.0							< 1.0	< 1.0			< 1.0
Phenols																									
Phenol	ug/l	16	-	-	-	-	7.7	Proposed UKTAG	140	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100		< 100	< 100	< 100	< 100	< 100	< 100
Other (Unchlorinated)																									
Methyl tert-butyl ether (MTBE)	ug/l	5	-	-	-	-	-	-			< 1.0			< 1.0							< 1.0	< 1.0			< 1.0

Determinand		Tests	Min Value	Max Value	Mean Value	US95 Value	Acceptance Criteria		BH101	BH101	BH102	BH103	BH104	BH105	WS101	WS102	WS104	WS105	BH102	WS102	BH101	BH102	BH103	BH105	WS101
									23/10/2023	23/10/2023	16/10/2023	23/10/2023	19/10/2023	16/10/2023	15/03/2023	14/03/2023	14/03/2023	15/03/2023	16/10/2023	14/03/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023
							Ground Waters	Source	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	Water	Water	Water	Water	Water
									MG - Gravel	MG - SAND	MG - Gravel	MG - Gravel	MG - COBBLE	MG - GRAVEL	MG - CLAY	MG - CLAY	MG - CLAY	MG - CLAY	PEAT	SAND	-	-	-	-	-
									0.80	3.10	1.00	0.70	0.80	2.20	0.80	1.50	0.60	1.20	7.50	3.80	2.07	1.86	1.86	2.00	2.30
									2256396	2256397	2251104	2264824	2253351	2251106	2142976	2142979	2142981	2142982	2251105	2142980	2268784	2268785	2268786	2268787	2268788
Metals																									
Antimony	ug/l	16	0.19	1.50	0.73	1.75	5.0	EU DWS	1.6	1.5	2.6	1.7	2.8		0.81	< 0.17	0.63	0.41	1.5	0.32	1.10	0.19	< 0.17	0.68	0.89
Arsenic	ug/l	16	0.47	3.40	1.91	3.85	10	EU DWS	9.9	1.8	1.7	0.7	1.3		3.40	0.47	1.40	1.40	2.5	1.60	2.80	1.70	1.3	2	2.4
Barium	ug/l	16	2.00	610.00	173.86	731.74	700	WHO DW	3	18	30	37	24		5.50	2.00	7.60	5.40	12	10.00	140.00	610.00	480	350	290
Beryllium	ug/l	16	0.10	0.10	0.10		4.0	US EPA	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.10	< 0.1	< 0.1	< 0.1	< 0.1
Boron (water soluble)	ug/l	16	28.00	880.00	183.00	1,043.63	1,000	EU DWS	41	90	71	32	27		< 12	74.00	28.00	< 12	93	130.00	62.00	140.00	110	130	880
Cadmium	ug/l	16	0.03	0.13	0.07	0.22	5.0	EU DWS	< 0.03	< 0.03	< 0.03	< 0.03	0.12		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.13	0.03	< 0.03	< 0.03	0.04
Chromium (III)	ug/l	16	2.30	14.00	8.34	18.53	50	EU DWS	5.6	< 1.0	21	4.3	4		< 1.0	< 1.0	< 1.0	< 1.0	14	< 1.0	12.00	2.30	7.9	5.5	< 1.0
Chromium (VI) - hexavalent	ug/l	16	-	-	-	-	-	-	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0		< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
Copper	ug/l	16	0.50	11.00	3.78	12.96	2,000	EU DWS	1.8	< 0.4	1.7	1.8	2.3		9.00	7.00	1.80	3.80	0.5	3.10	11.00	1.60	1.2	1.7	0.9
Iron	ug/l	16	7.30	150.00	82.30	179.60	200	EU DWS	100	< 5.5	< 5.5	< 5.5	74		140.00	150.00	140.00	130.00	7.3	61.00	84.00	27.00	24	32	110
Lead	ug/l	16	0.12	2.20	0.93	2.62	10	EU DWS	1.5	0.1	0.29	1	6		2.10	0.40	2.20	1.20	0.31	0.12	1.60	0.55	1.1	0.46	0.18
Manganese	ug/l	16	1.30	4,500.00	481.84	5,233.26	50	UK DWS	1.7	14	0.95	4	14		1.30	1.50	1.90	1.30	1.3	2.30	9.60	520.00	210	51	4500
Mercury (Elemental)	ug/l	16	0.01	0.03	0.02	0.05	1.0	EU DWS	0.01	< 0.01	< 0.01	< 0.01	0.03		< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.03	0.01	< 0.01	< 0.01	< 0.01
Molybdenum	ug/l	16	1.20	21.00	8.93	25.12	-	-	3	6.2	3.4	2.1	6		1.20	< 1.1	1.70	< 1.1	4.7	7.20	21.00	14.00	5.6	15	10
Nickel	ug/l	16	0.60	5.30	2.10	7.12	20	EU DWS	0.6	< 0.5	< 0.5	< 0.5	1.7		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.10	0.70	0.6	1.8	5.3
Selenium	ug/l	16	0.25	2.10	0.57	2.46	10	EU DWS	0.83	0.53	0.46	0.61	1.9		0.38	0.35	0.25	0.31	< 0.25	< 0.25	2.10	0.63	0.33	0.45	0.35
Vanadium	ug/l	16	0.60	7.10	2.80	8.69	-	-	2.9	2.9	4.3	0.8	2.6		7.10	1.40	1.40	1.30	2.9	1.90	5.80	<0.06	<0.06	<0.06	0.6
Zinc	ug/l	16	1.90	95.00	55.32	125.62	3,000	WHO taste threshold	< 1.3	< 1.3	< 1.3	4	36		1.90	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3	20.00	55.00	76	95	84
Inorganics											-						-	-							
Ammonia	ug/l	16	0.07	1.80	0.53	2.14	500	UK DWS	0.019	< 0.015	< 0.015	< 0.015	0.07		0.07	0.10	0.12	0.14	< 0.015	0.66	0.21	0.45	0.43	1.3	1.8
Cyanide Complex	ug/l	16	-	-	-	-	-	-	< 40	< 40	< 40	< 40	< 40		< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
Cyanide Free	ug/l	16	-	-	-	-	50	EU DWS	< 20	< 20	< 20	< 20	< 20		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Cyanide Total	ug/l	16	-	-	-	-	-	-	< 40	< 40	< 40	< 40	< 40		< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
pH	-	16	7.30	9.50	7.92	9.84	6.5 - 8.5	US EPA (SDWR)	8.2	7.8	8.1	7.4	6.6		8.30	7.90	7.40	7.40	8.3	7.50	9.50	8.00	7.7	7.8	7.3
Sulphate Total (SO4)	ug/l	16	5.10	610.00	79.37	707.97	-	-	8	45	130	140	28		6.40	6.10	10.00	12.00	20	6.50	76.00	11.00	5.1	110	610
Thiocyanate	ug/l	16	25.00	300.00	107.00	452.26	-	-	95	< 20	< 20	< 20	< 20		< 20	300.00	59.00	44.00	25	< 20	< 20	< 20	< 20	< 20	< 20
TPHs																	-	-							
Aliphatic EC >5-6 (benzene)	ug/l	16	-	-	-	-	300	WHO DWS for C8-C16	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic EC >6-8 (toluene)	ug/l	16	-	-	-	-	300	WHO DWS for C8-C16	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic EC >8-10	ug/l	16	-	-	-	-	300	WHO DWS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic EC >10-12	ug/l	16	2.40	15.00	8.70	54.78	300	WHO DWS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	15.00	< 1.0	< 1.0		2.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic EC >12-16	ug/l	16	5.50	100.00	52.75	398.34	300	WHO DWS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	100.00	< 1.0	< 1.0		5.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic EC >16-21	ug/l	16	14.00	14.00	14.00	-	NV	TPHCWG	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	14.00	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic EC >21-35	ug/l	16	1.40	24.00	12.70	95.35	NV	TPHCWG	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	24.00	< 1.0	< 1.0		1.40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic EC >35-44	ug/l	5	1.00	36.00	18.50	146.50	NV	TPHCWG							< 1.0	36.00	< 1.0	< 1.0		1.00					
Aliphatic EC >5-44	ug/l	5	13.00	13.00	13.00	-	-	-							< 1.0	13.00	< 1.0	< 1.0		< 1.0					
Aromatic EC >5-7	ug/l	16	-	-	-	-	1.0	UK DWS for benzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic EC >7-8	ug/l	16	-	-	-	-	700	WHO DWS for toluene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic EC >8-10	ug/l	16	-	-	-	-	300	WHO DWS for ethyl benze	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic EC >10-12	ug/l	16	-	-	-	-	100	WHO DWS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EC >12-16	ug/l	16	-	-	-	-	100	WHO DWS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EC >16-21	ug/l	16	-	-	-	-	90	WHO DWS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EC >21-35	ug/l	16	-	-	-	-	90	WHO DWS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EC >35-44	ug/l	5	-	-	-	-	90	WHO DWS							< 1.0	< 1.0	< 1.0	< 1.0		< 1.0					
Aromatic EC >5-44	ug/l	5	-	-	-	-	-	-							< 1.0	< 1.0	< 1.0	< 1.0		< 1.0					
Aliphatic + Aromatic EC >44-70	ug/l	16	5.50	100.00	52.75	398.34	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 1.0	100.00	< 1.0	< 1.0		5.50	< 10	< 10	< 10	< 10	< 10
PAHs																	-	-							
Acenaphthene	ug/l	16	0.01	0.04	0.02	0.05	-	-	< 0.01	0.07	0.02	0.02	0.01	0.27	0.03	< 0.01	0.04	< 0.01		< 0.01	0.01	0.01	< 0.01	0.01	0.02
Acenaphthylene	ug/l	16	0.02	0.05	0.03	0.06	-	-	< 0.01	0.01	< 0.01	0.03	< 0.01	0.09	0.05	< 0.01	0.02	0.03		0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Anthracene	ug/l	16	0.02	0.14	0.07	0.20	-	-	< 0.01	0.04	0.04	0.03	< 0.01	0.19	0.14	< 0.01	0.04	0.02		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.07
Benzo(a)anthracene	ug/l	16	0.02	0.43	0.13	0.56	-	-	< 0.01	0.09	0.06	0.09	< 0.01	0.34	0.43	0.02	0.13	0.03		0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.12
Benzo(a)pyrene	ug/l	16	0.02	0.50	0.17	0.66	0.01	EU DWS	< 0.01	0.1	0.06	0.13	< 0.01	0.39	0.50	0.02	0.28	0.05		0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.17
Benzo(b)fluoranthene	ug/l	16	0.02	0.58	0.20	0.76	0.10 sum	EU DWS	< 0.01	0.12	0.07	0.14	< 0.01	0.49	0.58	0.04	0.30	0.07		0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.20
Benzo(k)fluoranthene	ug/l	16	0.02	0.23	0.11	0.34		EU DWS	< 0.01	0.05	0.03	0.05	< 0.01	0.24	0.23	< 0.01	0.13	0.02		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.07
Benzo(ghi)perylene	ug/l	16	0.01	0.42	0.15	0.55		EU DWS	< 0.01	0.07	0.05	0.08	0.01	0.26	0.42	0.03	0.25	0.05		0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12
Indeno(123-cd)pyrene	ug/l	16	0.01	0.43	0.15	0.57		EU DWS	< 0.01	0.07	0.04	0.09	< 0.01	0.31	0.43	0.02	0.25	0.05		0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.13
Chrysene	ug/l	16	0.03	0.52	0.16	0.68	-	-	< 0.01	0.1	0.06	0.1	< 0.01	0.37	0.52	0.03	0.18	0.04		0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.14
Dibenzo(ah)anthracene	ug/l	16	0.03	0.08	0.05	0.13	-	-	< 0.01	0.02	<0.01	0.01	< 0.01	0.05	0.08	< 0.01	0.03	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03
Fluoranthene	ug/l	16	0.02	0.76	0.21	0.96	-	-	0.01	0.22	0.11	0.17	0.02	0.79	0.76	0.04	0.23	0.04		0.02	0.02	< 0.01	< 0.01	< 0.01	0.33
Fluorene	ug/l	16	0.01	0.03	0.02	0.04	-	-	< 0.01	0.04	0.02	0.03	< 0.01	0.17	0.03	< 0.01	0.01	< 0.01		< 0.01	0.01	0.01	< 0.01	< 0.01	0.02
Naphthalene	ug/l	16	0.06	0.08	0.07	0.10	-		0.07	< 0.05	< 0.05	< 0.05	0.07	<0.05	0.06	< 0.05	< 0.05	< 0.05		< 0.05	0.07	0.08	< 0.05	< 0.05	< 0.05
Phenanthrene	ug/l	16	0.01	0.21	0.06	0.26	-	-	0.01	0.1	0.12	0.07	0.02	0.46	0.21	0.03	0.04	0.01		< 0.01	0.03	0.02	0.01	< 0.01	0.1
Pyrene	ug/l	16	0.02	0.65	0.19	0.82	-	-	0.01	0.19	0.13	0.16	0.02	0.62	0.65	0.04	0.26	0.04		0.03	0.02	< 0.01	< 0.01	< 0.01	0.29
PAH (total)	ug/l	15	0.29	5.10	1.97	6.95	-	-	< 0.20	1.3		1.2	< 0.20	5	5.10	0.29	2.20	0.46		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1.8
BTEX																	-	-							
Benzene	ug/l	6	-	-	-	-	1.0	UK DWS		< 1.0	< 1.0			< 1.0							< 1.0	< 1.0			< 1.0
Toluene	ug/l	6	-	-	-	-	700.0	WHO DW		< 1.0	< 1.0			< 1.0							< 1.0	< 1.0			< 1.0
Ethylbenzene	ug/l	6	-	-	-	-	300	WHO DW		< 1.0	< 1.0			< 1.0							< 1.0	< 1.0			< 1.0
Phenols																	-	-							
Phenol	ug/l	16	-	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100		< 100	< 100	< 100	< 100	< 100	< 100
Other (Unchlorinated)																									
Methyl tert-butyl ether (MTBE)	ug/l	5	-	-	-	-	15	EA report MTBE			< 100			< 1.0							< 1.0	< 1.0			< 1.0

Appendix 4

Assessment Criteria

SOIL ASSESSMENT CRITERIA FOR HUMAN HEALTH RISK ASSESSMENT

Parameter	Residential: With Home Grown Produce 1-6% SOM (mg kg^{-1})	Residential: Without Home Grown Produce 1-6% SOM (mg kg^{-1})	Commercial 1-6% SOM (mg kg^{-1})	Allotment 1-6% SOM (mg kg^{-1})	Public Open Space near Residential land (POSresi) 1-6% SOM (mg kg^{-1})	Public Park Land (POSpark) 1-6% SOM (mg kg^{-1})	Source	Model
Metals/Metalloids (a)								
Antimony	Not Derived	550	7,500	Not Derived	-	-	CL:AIRE	CLEA v1.06
Arsenic (inorganic)	37	40	640	43	79	170	LQM/CIEH S4ULs	CLEA v1.071
Barium	Not Derived	1,300	22,000	Not Derived	-	-	CL:AIRE	CLEA v1.06
Beryllium	1.7	1.7	12	35	2.2	63	LQM/CIEH S4ULs	CLEA v1.071
Boron	290	11,000	240,000	45	21,000	46,000	LQM/CIEH S4ULs	CLEA v1.071
Cadmium (d)	11	85	190	1.9	120	560	LQM/CIEH S4ULs	CLEA v1.071
Chromium (III)	910	910	8,600	18,000	1,500	33,000	LQM/CIEH S4ULs	CLEA v1.071
Chromium (VI) (e)	6	6	33	1.8	7.7	220	LQM/CIEH S4ULs	CLEA v1.071
Copper	2,400	7,100	68,000	520	12,000	44,000	LQM/CIEH S4ULs	CLEA v1.071
Lead (f)	200	310	2,330	80	630	1,300	CL:AIRE C4SL	CLEA
Mercury (Elemental)	1.2	1.2	58	21	16	30	LQM/CIEH S4ULs	CLEA v1.071
Mercury (Inorganic)	40	56	1,100	19	120	240	LQM/CIEH S4ULs	CLEA v1.071
Mercury (Methyl)	11	15	320	6	40	68	LQM/CIEH S4ULs	CLEA v1.071
Molybdenum	Not Derived	670	17,000	Not Derived	-	-	CL:AIRE	CLEA v1.06
Nickel	130	180	980	53	230	800	LQM/CIEH S4ULs	CLEA v1.071
Selenium	250	430	12,000	88	1,100	1,800	LQM/CIEH S4ULs	CLEA v1.071
Vanadium	410	1,200	9,000	91	2,000	5,000	LQM/CIEH S4ULs	CLEA v1.071
Zinc	3,700	40,000	730,000	620	81,000	170,000	LQM/CIEH S4ULs	CLEA v1.071
Other Inorganics								
Asbestos	Non Detection	Non Detection	Non Detection	Non Detection	Non Detection	Non Detection		
Free Cyanide	34	34	34	34	34	34	ATKINS ATRISK SSV	CLEA v1.04
pH	<5	<5	<5	<5	<5	<5	-	
Total Sulphate	2400	2400	2400	2400	2400	2400	BRE (2005)	
Water-Soluble Sulphate	0.5g/l	0.5g/l	0.5g/l	0.5g/l	0.5g/l	0.5g/l	BRE (2005)	

Parameter	Residential: With Home Grown Produce (mg kg^{-1})			Residential: Without Home Grown Produce (mg kg^{-1})			Commercial (mg kg^{-1})			Allotment (mg kg^{-1})			Public Open Space near Residential land (POSresi) (mg kg^{-1})			Public Park Land (POSpark) (mg kg^{-1})			Source	Model
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM		
Organics																				
Biphenyl	66	160	360	220	500	980	18,000	33,000	48,000	14	35	83	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Organometals																				
Tributyl tin oxide	0.25	0.59	1.3	1.4	3.1	5.7	130	180	200	0.042	0.1	0.24	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
PAHs																				
Acenaphthene	210	510	1,100	3,000	4,700	6,000	84,000	97,000	100,000	34	85	200	15,000	15,000	15,000	29,000	30,000	30,000	LQM/CIEH S4ULs	CLEA v1.071
Acenaphthylene	170	420	920	2,900	4,600	6,000	83,000	97,000	100,000	28	69	160	15,000	15,000	15,000	29,000	30,000	30,000	LQM/CIEH S4ULs	CLEA v1.071
Anthracene	2,400	5,400	11,000	31,000	35,000	37,000	520,000	540,000	540,000	380	950	2,200	74,000	74,000	74,000	150,000	150,000	150,000	LQM/CIEH S4ULs	CLEA v1.071
Benzo(a)anthracene	7.2	11	13	11	14	15	170	170	180	2.9	6.5	13	29	29	29	49	56	62	LQM/CIEH S4ULs	CLEA v1.071
Benzo(a)pyrene	2.2	2.7	3.0	3.2	3.2	3.2	35	35	36	0.97	2	3.5	5.7	5.7	5.7	11	12	13	LQM/CIEH S4ULs	CLEA v1.071
Benzo(b)fluoranthene	2.6	3.3	3.7	3.9	4.0	4.0	44	44	45	0.99	2.1	3.9	7.1	7.2	7.2	13	15	16	LQM/CIEH S4ULs	CLEA v1.071
Benzo(g,h,i)perylene	320	340	350	360	360	360	3,900	4,000	4,000	290	470	640	640	640	640	1,400	1,500	1,600	LQM/CIEH S4ULs	CLEA v1.071
Benzo(k)fluoranthene	77	93	100	110	110	110	1,200	1,200	1,200	37	75	130	190	190	190	370	410	440	LQM/CIEH S4ULs	CLEA v1.071
Chrysene	15	22	27	30	31	32	350	350	350	4.1	9.4	19	57	57	57	93	110	120	LQM/CIEH S4ULs	CLEA v1.071
Dibenz(a,h)anthracene	0.24	0.28	0.30	0.31	0.32	0.32	3.5	3.6	3.6	0.14	0.27	0.43	0.57	0.57	0.58	1.1	1.3	1.4	LQM/CIEH S4ULs	CLEA v1.071
Fluoranthene	280	560	890	1,500	1,600	1,600	23,000	23,000	23,000	52	130	290	3,100	3,100	3,100	6,300	6,300	6,400	LQM/CIEH S4ULs	CLEA v1.071
Fluorene	170	400	860	2,800	3,800	4,500	63,000	68,000	71,000	27	67	160	9,900	9,900	9,900	20,000	20,000	20,000	LQM/CIEH S4ULs	CLEA v1.071
Indeno(1,2,3-cd)pyrene	27	36	41	45	46	46	500	510	510	9.5	21	39	82	82	82	150	170	180	LQM/CIEH S4ULs	CLEA v1.071
Naphthalene	2.3	5.6	13	2.3	5.6	13	190	460	1,100	4.1	10	24	4,900	4,900	4,900	1,200	1,900	3,000	LQM/CIEH S4ULs	CLEA v1.071
Phenanthrene	95	220	440	1,300	1,500	1,500	22,000	22,000	23,000	15	38	90	3,100	3,100	3,100	6,200	6,200	6,300	LQM/CIEH S4ULs	CLEA v1.071
Pyrene	620	1,200	2,000	3,700	3,800	3,800	54,000	54,000	54,000	110	270	620	7,400	7,400	7,400	15,000	15,000	15,000	LQM/CIEH S4ULs	CLEA v1.071
Coal Tar (Bap as surrogate marker)	0.79	0.98	1.1	1.2	1.2	1.2	15	15	15	0.32	0.67	1.2	2.2	2.2	2.2	4.4	4.7	4.8	LQM/CIEH S4ULs	CLEA v1.071
TPHs																				
Aliphatic EC 5-6 (benzene)	24	40	80	24	40	80	2,400	4,000	8,000	752	1,730	3,900	570,000	590,000	600,000	95,000	130,000	180,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >6-8 (toluene)	52	110	250	52	110	250	5,200	11,000	25,000	2,304	5,580	13,000	600,000	610,000	620,000	150,000	220,000	320,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >8-10	13	30	70	13	30	70	1,300	3,000	7,000	321	770	1,700	13,000	13,000	13,000	14,000	18,000	21,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >10-12	60	150	360	60	150	360	6,000	15,000	32,000	2,153	4,300	7,150	13,000	13,000	13,000	21,000	23,000	24,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >12-16	500	1,200	2,600	500	1,200	2,600	42,000	72,000	90,000	10,800	12,400	13,200	13,000	13,000	13,000	25,000	25,000	26,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >16-35	41,000	69,000	94,000	41,000	69,000	94,000	140,000	160,000	180,000	240,000	260,000	260,000	250,000	250,000	250,000	450,000	480,000	490,000	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic EC >35-44	41,000	69,000	94,000	41,000	69,000	94,000	140,000	160,000	180,000	240,000	260,000	260,000	250,000	250,000	250,000	450,000	480,000	490,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >5-7	50	110	240	155	300	630	15,000	28,000	55,000	12	25	57	56,000	56,000	56,000	76,000	84,000	92,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >7-8	100	240	550	370	800	1,800	33,000	68,000	130,000	21	50	117	56,000	56,000	56,000	87,000	95,000	100,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >8-10	20	50	110	20	53	125	2,000	5,000	120,000	8.6	21	50	5,000	5,000	5,000	7,200	8,500	9,300	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >10-12	63	150	340	120	280	650	11,000	22,000	31,000	12.5	31	74	5,000	5,000	5,000	9,200	9,700	10,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >12-16	140	320	660	1,100	1,900	2,300	35,000	37,000	38,000	23	57	134	5,100	5,100	5,000	10,000	10,000	10,000	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >16-21	260	540	930	1,800	1,900	1,900	28,000	28,000	28,000	47	112	260	3,800	3,800	3,800	7,600	7,700	7,800	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >21-35	1,100	1,400	1,700	1,900	1,900	1,900	28,000	28,000	28,000	370	820	1,500	3,800	3,800	3,800	7,800	7,800	7,900	LQM/CIEH S4ULs	CLEA v1.071
Aromatic EC >35-44	1,100	1,400	1,700	1,900	1,900	1,900	28,000	28,000	28,000	370	820	1,500	3,800	3,800	3,800	7,800	7,800	7,900	LQM/CIEH S4ULs	CLEA v1.071
Aliphatic + Aromatic EC >44-70	1,600	1,800	1,900	1,900	1,900	1,900	28,000	28,000	28,000	1,200	2,100	3,000	3,800	3,800	3,800	7,800	7,800	7,900	LQM/CIEH S4ULs	CLEA v1.071
BTEX																				
Benzene	0.087	0.17	0.37	0.38	0.7	1.4	27	47	90	0.017	0.034	0.075	72	72	73	90	100	110	LQM/CIEH S4ULs	CLEA v1.071
Toluene	130	290	660	880	1,900	3,900	56,000	110,000	180,000	22	51	120	56,000	56,000	56,000	87,000	95,000	100,000	LQM/CIEH S4ULs	CLEA v1.071
Ethylbenzene	47	110	260	83	190	440	5,700	13,000	27,000	16	39	91	24,000	24,000	25,000	17,000	22,000	27,000	LQM/CIEH S4ULs	CLEA v1.071
o-xylene	60	140	330	88	210	480	6,600	15,000	33,000	28	67	160	41,000	42,000	43,000	17,000	24,000	33,000	LQM/CIEH S4ULs	CLEA v1.071
m-xylene	59	140	320	82	190	450	6,200	14,000	31,000	31	74	170	41,000	42,000	43,000	17,000	24,000	32,000	LQM/CIEH S4ULs	CLEA v1.071
p-xylene	56	140	310	79	180	310	5,900	14,000	30,000	29	69	160	41,000	42,000	43,000	17,000	23,000	31,000	LQM/CIEH S4ULs	CLEA v1.071
Chloroalkanes & Alkenes																				
1,1-Dichloroethane	2.4	3.9	7.4	2.5	4.1	7.7	280	450	850	9.2	17	35	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
1,2 Dichloroethane	0.0071	0.011	0.019	0.0092	0.013	0.023	0.67	0.97	1.7	0.0046	0.0083	0.016	29	29	29	21	24	28	LQM/CIEH S4ULs	CLEA v1.071
1,1-Dichloroethene	0.23	0.4	0.82	0.23	0.41	0.82	26	46	92	2.8	5.6	12	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
1,1,1 Trichloroethane	8.8	18	39	9	18	40	660	1,300	3,000	48	110	240	140,000	140,000	140,000	57,000	76,000	100,000	LQM/CIEH S4ULs	CLEA v1.071
1,1,2 Trichloroethane	0.6	1.2	2.7	0.88	1.8	3.9	94	190	400	0.28	0.61	1.4	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
1,1,2,2 Tetrachloroethane	1.6	3.4	7.5	3.9	8	17	270	550	1,100	0.41	0.89	2	1,400	1,400	1,400	1,800	2,100	2,300	LQM/CIEH S4ULs	CLEA v1.071
1,1,1,2 Tetrachloroethane	1.2	2.8	6.4	1.5	3.5	8.2	110	250	560	0.79	1.9	4.4	1,400	1,400	1,400	1,500	1,800	2,100	LQM/CIEH S4ULs	CLEA v1.071
Tetrachloroethane	0.18	0.39	0.9	0.18	0.4	0.92	19	42	95	0.65	1.5	3.6	1,400	1,400	1,400	810	1,100	1,500	LQM/CIEH S4ULs	CLEA v1.071
Tetrachloromethane (Carbon tetrachloride)	0.026	0.056	0.13	0.026	0.056	0.13	2.9	6.3	14.0	0.45	1	2.4	890	920	950	190	270	400	LQM/CIEH S4ULs	CLEA v1.071
Trichloroethane	0.016	0.034	0.075	0.017	0.036	0.08	1.2	2.6	5.7	0.041	0.091	0.21	120	120	120	70	91	120	LQM/CIEH S4ULs	CLEA v1.071
Trichloromethane (chloroform)	0.91	1.7	3.4	1.2	2.1	4.2	99	170	350	0.42	0.83	1.7	2,500	2,500	2,500	2,600	2,800	3,100	LQM/CIEH S4ULs	CLEA v1.071
Chloroethane (vinyl chloride)	0.00064	0.00087	0.0014	0.00077	0.0010	0.0015	0.059	0.077	0.12	0.00055	0.0010	0.0018	3.5	3.5	3.5	4.8	5	5.4	LQM/CIEH S4ULs	CLEA v1.071
Explosives																				
2,4,6 Trinitrotoluene (TNT)	1.6	3.7	8.1	65	66	66	1,000	1,000	1,000	0.24	0.58	1.4	130	130	130	260	270	270	LQM/CIEH S4ULs	CLEA v1.071
RDX	120	250	540	13,000	13,000	13,000	210,000	210,000	210,000	17	38	85	26,000	26,000	27,000	49,000	51,000	53,000	LQM/CIEH S4ULs	CLEA v1.071
HMX	5.7	13	26	6,700	6,700	6,700	110,000	110,000	110,000	1	2	4	13,000	13,000	13,000	23,000	23,000	24,000	LQM/CIEH S4ULs	CLEA v1.071
Pesticides																				
Aldrin	5.7	6.6	7.1	7.3	7.4	7.5	170	170	170	3.2	6.1	9.6	18	18	18	30	31	31	LQM/CIEH S4ULs	CLEA v1.071
Dieldrin	0.97	2	3.5	7	7.3	7.4	170	170	170	0.17	0.41	0.96	18	18	18	30	30	31	LQM/CIEH S4ULs	CLEA v1.071
Atrazine	3.3	7.6	17.4	610	620	620	9,300	9,400	9,400	0.5	1.2	2.7	1,200	1,200	1,200	2,300	2,400	2,400	LQM/CIEH S4ULs	CLEA v1.071
Dichlorvos	0.032	0.066	0.14	6.4	6.5	6.6	140	140	140	0.0049	0.01	0.022	16	16	16	26	26	27	LQM/CIEH S4ULs	CLEA v1.071
Alpha-Endosulfan	7.4	18	41	160	280	410	5,600	7,400	8,400	1.2	2.9	6.8	1,200	1,200	1,200	2,400	2,400	2,500	LQM/CIEH S4ULs	CLEA v1.071
Beta-Endosulfan	7	17	39	190	320	440	6,300	7,800	8,700	1.1	2.7	6.4	1,200	1,200	1,200	2,400	2,400	2,500	LQM/CIEH S4ULs	CLEA v1.071
Alpha-Hexachlorocyclohexane	0.23	0.55	1.2	6.9	9.2	11	170	180	180	0.035	0.087	0.21	24	24	24	47	48	48	LQM/CIEH S4ULs	CLEA v1.071
Beta-Hexachlorocyclohexane	0.085	0.2	0.46	3.7	3.8	3.8	65	65	65	0.013	0.032	0.077	8.1	8.1	8.1	15	15	16	LQM/CIEH S4ULs	CLEA v1.071
Gamma-Hexachlorocyclohexane	0.06	0.14	0.33	2.9	3.3	3.5	67	69	70	0.0092	0.023	0.054	8.2	8.2	8.2	14	15	15	LQM/CIEH S4ULs	CLEA v1.071
Chlorobenzenes																				
Chlorobenzene	0.46	1	2.4	0.46	1	2.4	56	130	290	5.9	14	32	11,000	13,000	14,000	1,300	2,000	2,900	LQM/CIEH S4ULs	CLEA v1.071
1,2 Dichlorobenzene	23	55	130	24	57	130	2,000	4,800	11,000	94	230	540	90,000	95,000	98,000	24,000	36,000	51,000	LQM/CIEH S4ULs	CLEA v1.071
1,3 Dichlorobenzene	0.4	1	2.3	0.44	1.1	2.5	30	73	170	0.25	0.6	1.5	300	300	300	390	440	470	LQM/CIEH S4ULs	CLEA v1.071
1,4 Dichlorobenzene	61	150	350	61	150	350	4,400	10,000	25,000	15	37	88	17,000	17,000	17,000	36,000	36,000	36,000	LQM/CIEH S4ULs	CLEA v1.071
1,2,3 Trichlorobenzene	1.5	3.6	8.6	1.5	3.7	8.8	102	250	590	4.7	12	28	1,800	1,800	1,800	770	1,100	1,600	LQM/CIEH S4ULs	CLEA v1.071
1,2,4 Trichlorobenzene	2.6	6.4	15	2.6	6.4	15	220	530	1,300	55	140	320	15,000	17,000	19,000	1,700	2,600	4,000	LQM/CIEH S4ULs	CLEA v1.071
1,3,5 Trichlorobenzene	0.33	0.81	1.9	0.33	0.81	1.9	23	55	130	4.7	12	28	1,700	1,700	1,800	380	580	860	LQM/CIEH S4ULs	CLEA v1.071
1,2,3,4 Tetrachlorobenzene	15	36	78	24	56	120	1,700	3,080	4,400	4.4	11	26	830	830	830	1,500	1,600	1,600	LQM/CIEH S4ULs	CLEA v1.071
1,2,3,5 Tetrachlorobenzene	0.66	1.6	3.7	0.75	1.9	4.3	49	120	240	0.38	0.9	2.2	78	79	79	110	120	130	LQM/CIEH S4ULs	CLEA v1.071
1,2,4,5 Tetrachlorobenzene	0.33	0.77	1.6	0.73	1.7	3.5	42	72	96	0.06	0.16	0.37	13	13	13	25	26	26	LQM/CIEH S4ULs	CLEA v1.071
Pentachlorobenzene	5.8	12	22	19	30	38	640	770	830	1.2	3.1	7	100	100	100	190	190	190	LQM/CIEH S4ULs	CLEA v1.071
Hexachlorobenzene	1.8	3.3	4.9	4.1	5.7	6.7	110	120	120	0.47	1.1	2.5	16	16	16	30	30	30	LQM/CIEH S4ULs	CLEA v1.071
Phenols																				
Phenol	120	200	380	440	690	1,200	440	690	1,300	23	42	83	440	690	1,300	440	690	1,300	LQM/CIEH S4ULs	CLEA v1.071
Chlorophenol (4 congeners)	0.87	2	4.5	94	150	210	3,500	4,000	4,300	0.13	0.3	0.7	620	620	620	1,100	1,100	1,100	LQM/CIEH S4ULs	CLEA v1.071
Pentachlorophenol	0.22	0.52	1.2	27	29	31	400	400	400	0.03	0.08	0.19	60	60	60	110	120	120	LQM/CIEH S4ULs	CLEA v1.071
Other (Unchlorinated)																				
Methyl tert-butyl ether (MTBE)	49	84	160	73	120	220	7,900	13,000	24,000	23	44	90	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Carbon disulphide	0.14	0.29	0.62	0.14	0.29	0.62	11	22	47	4.8	10	23	11,000	11,000	12,000	1,300	1,900	2,700	LQM/CIEH S4ULs	CLEA v1.071
Hexachlorobutadiene	0.29	0.7	1.6	0.32	0.78	1.8	31	66	120	0.25	0.61	1.4	25	25	25	48	50	51	LQM/CIEH S4ULs	CLEA v1.071
Styrene	8.1	19	43	35	78	170	3,300	6,500	11,000	12	3.7	8.7	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Dioxins, Furans and Dioxin-like PCBs																				
PCDDs, PCDFs and dioxin-like PCB's (Sum)	0.008	0.008	0.008	0.008	0.008	0.008	0.24	0.24	0.24	0.008	0.008	0.008	-	-	-	-	-	-	EA SGV	CLEA v1.05
VOC																				
1,2-Dichloropropane	0.024	0.042	0.084	0.024	0.042	0.085	3	6	12	0.62	1.2	2.6	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Bromoform	2.8	5.9	13	5.2	11	23	760	1,500	3,100	0.95	2.1	4.6	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
1,2,4-Trimethylbenzene	0.35	0.85	2	0.41	0.99	2.3	42	99	220	0.38	0.93	2.2	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Chloromethane	0.0083	0.0098	0.013	0.0085	0.0099	0.013	1	1	2	0.066	0.13	0.23	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Dichloromethane	0.58	0.98	1.7	2.1	2.8	4.5	270	360	560	0.1	0.19	0.34	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Bromodichloromethane	0.016	0.03	0.061	0.019	0.034	0.07	2	4	8	0.016	0.032	0.068	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Trans 1,2 Dichloroethene	0.19	0.34	0.7	0.19	0.35	0.71	22	40	81	0.93	1.9	4	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Cis 1,2 Dichloroethene	0.11	0.19	0.37	0.12	0.2	0.39	14	24	47	0.26	0.5	1	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Isopropylbenzene	11	27	64	12	28	67	1,400	3,300	7,700	32	79	190	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
SVOCs																				
2,4-Dimethylphenol	19	43	97	210	410	730	16,000	24,000	30,000	3.1	7.2	17	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
2,4-Dinitrotoluene	1.5	3.2	7.2	170	170	170	3,700	3,700	3,800	0.22	0.49	1.1	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
2,6-Dinitrotoluene	0.78	1.7	3.9	78	84	87	1,900	1,900	1,900	0.12	0.27	0.61	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
2-Chloronaphthalene	3.7	9.2	22	3.8	9.3	22	390	960	2,200	40	98	230	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Diethyl Phthalate	120	260	570	1800	3500	6300	150,000	220,000	290,000	19	41	94	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Bis (2-ethylhexyl) phthalate	280	610	1100	2700	2800	2800	85,000	86,000	86,000	47	120	280	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Propylbenzene	34	82	190	40	97	230	4,100	9,700	21,000	34	83	200	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Bromobenzene	0.87	2	4.7	0.91	2.1	4.9	97	220	520	3.2	7.6	18	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Hexachloroethane	0.2	0.48	1.1	0.22	0.54	1.3	22	53	120	0.27	0.67	1.6	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Chloroethane	8.3	11	18	8.4	11	18	960	1,300	2,100	110	200	380	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Total Cresols (2-, 3- and 4-methylphenol)	80	180	400	3700	5400	6900	160,000	180,000	180,000	12	27	63	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Butyl benzyl phthalate	1400	3300	7200	42000	44000	44000	940,000	940,000	950,000	220	550	1300	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Di-n-butyl phthalate	13	31	67	450	450	450	15,000	15,000	15,000	2	5	12	-	-	-	-	-	-	CL:AIRE	CLEA v1.06
Di-n-octyl phthalate	2300	2800	3100	3400	3400	3400	89,000	89,000	89,000	940	2100	3900	-	-	-	-	-	-	CL:AIRE	CLEA v1.06

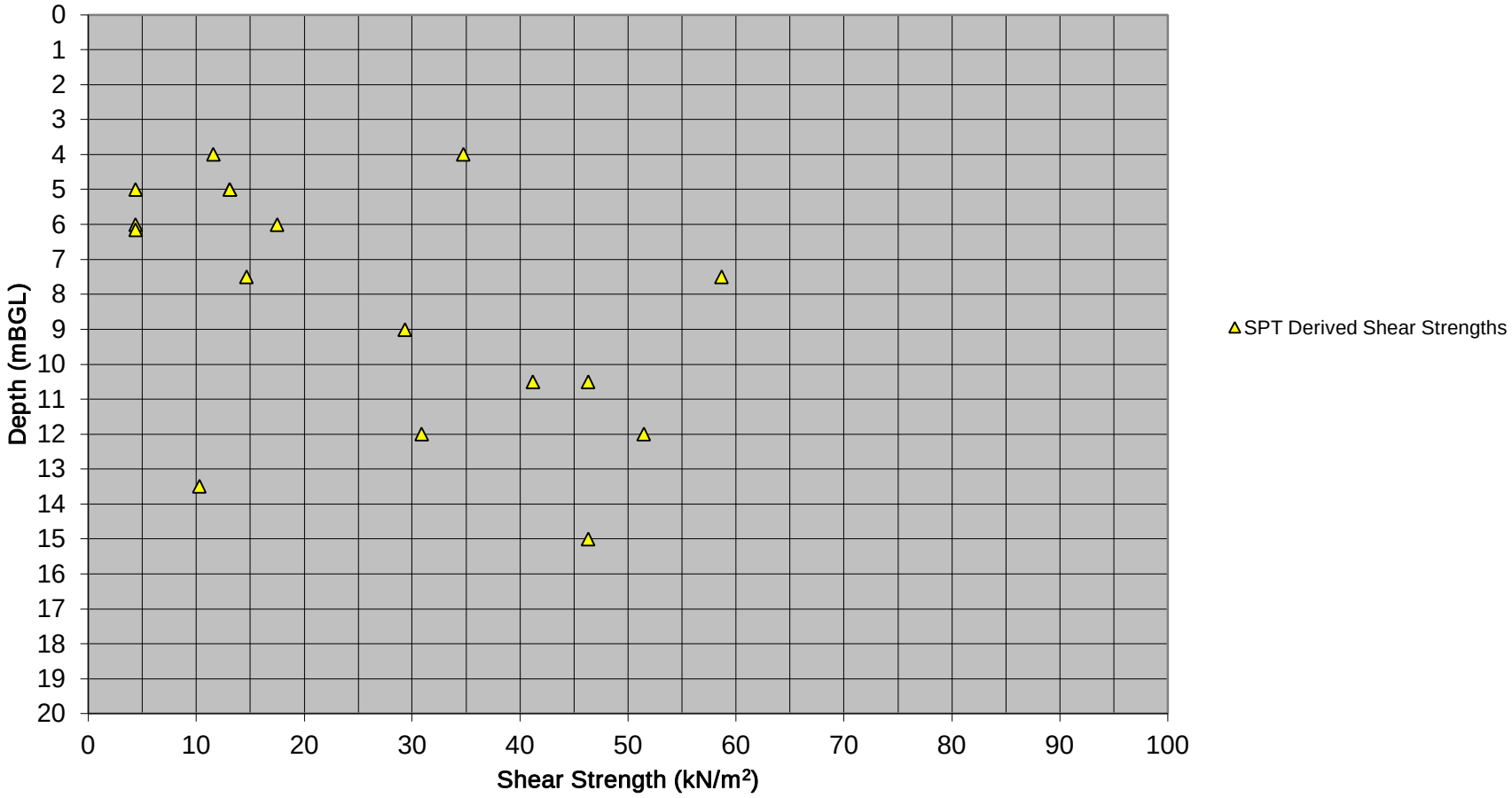
Assessment Criteria Substance	Waters					
	Surface Waters (mg/l) Fresh Water	Source	Surface Waters (mg/l) Marine	Source	Groundwater (mg/l)	Source
METALS						
Aluminium					0.2	UK DWS
Antimony					0.005	EU DWS
Arsenic	0.05	Annex G EQS	0.025	Annex G EQS	0.01	EU DWS
Barium					0.7	WHO DW
Beryllium					0.004	US EPA
Boron	2	Annex G EQS	7	Annex G EQS	1	EU DWS
Cadmium	0.00008 - 0.00025(a)	EU standard	0.0002	EU standard	0.005	EU DWS
Chromium (III)	0.0047	proposed UKTAG	N/A		0.05 (total Cr)	EU DWS
Chromium (VI)	0.0034	proposed UKTAG	0.0006	proposed UKTAG		
Copper	0.001 - 0.028(a)	Annex G EQS	0.005	Annex G EQS	2	EU DWS
Iron	1	Annex G EQS	1	Annex G EQS	0.2	EU DWS
Lead	0.0072	EU standard	0.0072	EU standard	0.01	EU DWS
Manganese					0.05	UK DWS
Mercury (methyl)	0.00005	EU standard	0.00005	EU standard	0.001	EU DWS
Molybdenum						
Nickel	0.02	EU standard	0.02	EU standard	0.02	EU DWS
Selenium					0.01	EU DWS
Silver	0.00005	Annex G EQS	0.00005	Annex G EQS	0.01	UK DWS
Tin	0.025	Annex G EQS	0.01	Annex G EQS		
Vanadium	0.02	Annex G EQS	0.1	Annex G EQS		
Zinc	0.008 - 0.125(a)	Annex G EQS	0.04	Annex G EQS	3	WHO taste threshold
INORGANICS						
Free cyanide	0.001 (free)	Annex G EQS	0.001 (free)	Annex G EQS	0.05(total)	EU DWS
Ammonia	0.2 - 0.6 (alkalinity dependant)	proposed UKTAG	0.021	proposed UKTAG	0.5	UK DWS
Bromate					0.01	UK DWS
Sulphate					250	UK DWS
Nitrates					50	EU DWS
Chlorine	0.002	proposed UKTAG	0.001 (short term)	proposed UKTAG	5	WHO
pH	6.0 - 9.0	Annex G EQS			6.5 - 8.5	US EPA (SDWR)
ORGANICS						
ORGANOMETALS						
Triphenyltin	0.00002	Annex G EQS	0.000008	Annex G EQS		
Tributyl tin (oxide)	0.0000002	EU standard	0.0000002	EU standard		
Hydrocarbons						
BTEX						
Benzene	0.01	Annex G EQS	0.008	Annex G EQS	0.001	UK DWS
Ethylbenzene	0.02	Annex G EQS	0.02	Annex G EQS	0.3	WHO DW
Toluene	0.074	proposed UKTAG	0.074	proposed UKTAG	0.7	WHO DW
P-xylene	0.03 (all isomers)	Annex G EQS	0.03 (all isomers)	Annex G EQS	0.5	WHO DW
TPH						
Aliphatic 5-6	0.02	Ethylbenzene EQS used as surrogate	0.02	Ethylbenzene EQS used as surrogate	0.3	
Aliphatic 6-8	0.02		0.02		0.3	WHO DWS for C8-C16
Aliphatic 8-10	0.02		0.02		0.3	
Aliphatic 10-12	0.02		0.02		0.3	
Aliphatic 12-16	0.02		0.02		0.3	WHO DWS
Aliphatic 16-35	NV insoluble	TPHCWG	NV insoluble	TPHCWG	NV insoluble	TPHCWG
Aliphatic 35-44	NV insoluble	TPHCWG	NV insoluble	TPHCWG	NV insoluble	TPHCWG
Aromatic 5-7 (waters 6-7)	0.01	benzene EQS	0.008	benzene EQS	0.001	UK DWS for benzene
Aromatic 7-8 (waters7-8)	0.05	toluene EQS	0.04	toluene EQS	0.7	WHO DWS for toluene
Aromatic 8-10	0.02	ethlybenzene EQS as a surrogate	0.02	ethlybenzene EQS as a surrogate	0.3	WHO DWS for ethyl benzene
Aromatic 10-12	0.02		0.02		0.1	WHO DWS
Aromatic 12-16	0.02		0.02		0.1	WHO DWS
Aromatic 16-21	0.02		0.02		0.09	WHO DWS
Aromatic 21-35	0.02		0.02		0.09	WHO DWS
Aromatic 35-44	0.02		0.02		0.09	WHO DWS
PAH (US EPA-16)						
Acenaphthene	NV		NV			
Acenaphthylene	NV		NV			
Anthracene	0.0001	EU standard	0.0001	EU standard		
Benzo(a)anthracene	0.00005	B(a)P threshold	0.00005	B(a)P threshold		
Benzo(a)pyrene	0.00005	EU standard	0.00005	EU standard	0.00001	EU DWS
Benzo(b)fluoranthene	0.00003(sum)	EU standard	0.00003(sum)	EU standard	0.0001 (sum)	EU DWS
Benzo(k)fluoranthene						
Benzo(ghi)perylene	0.000002(sum)	EU standard	0.000002 (sum)	EU standard		
Indeno(123-cd)pyrene						
Chrysene	NV		NV			
Dibenzo(ah)anthracene	0.00005	B(a)P threshold	0.00005	B(a)P threshold		
Fluoranthene	0.0001	EU standard	0.0001	EU standard		
Fluorene	NV		NV			
Naphthalene	0.0024	EU standard	0.0012	EU standard		
Phenanthrene	NV		NV			
Pyrene						
OTHER (unchlorinated)						
Phenol	0.0077	proposed UK TAG	0.0077	proposed UK TAG		
MTBE	0.015	EA report MTBE			0.015	EA report MTBE
Carbon disulphide						
Styrene	0.05	Annex G EQS	0.05	Annex G EQS	0.02	WHO DW

Appendix 5

Geotechnical Figures

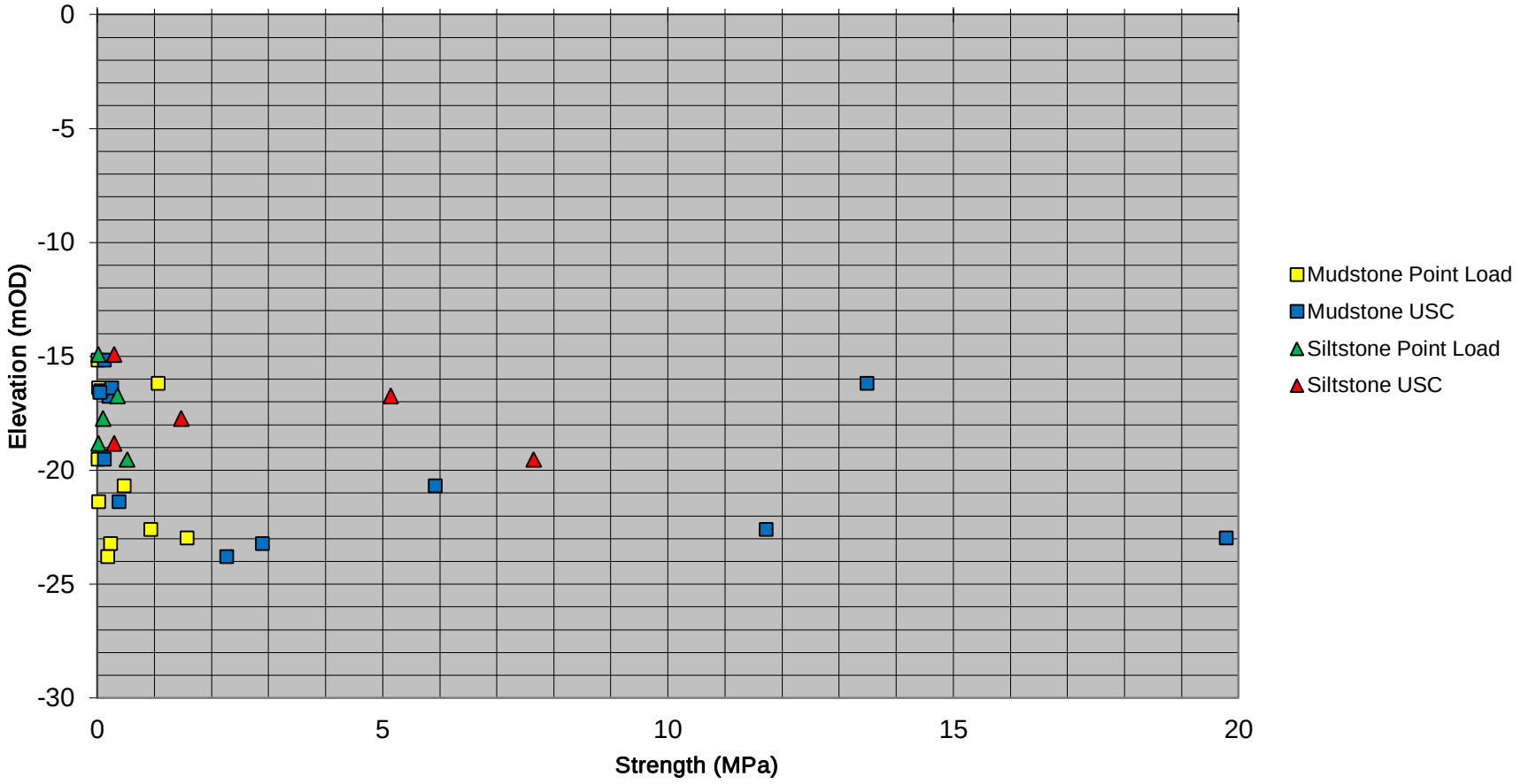
FAIRHURST

Fig 1 -Undrained Shear Strength vs Depth (Alluvial Silt)
Whitby Maritime Hub



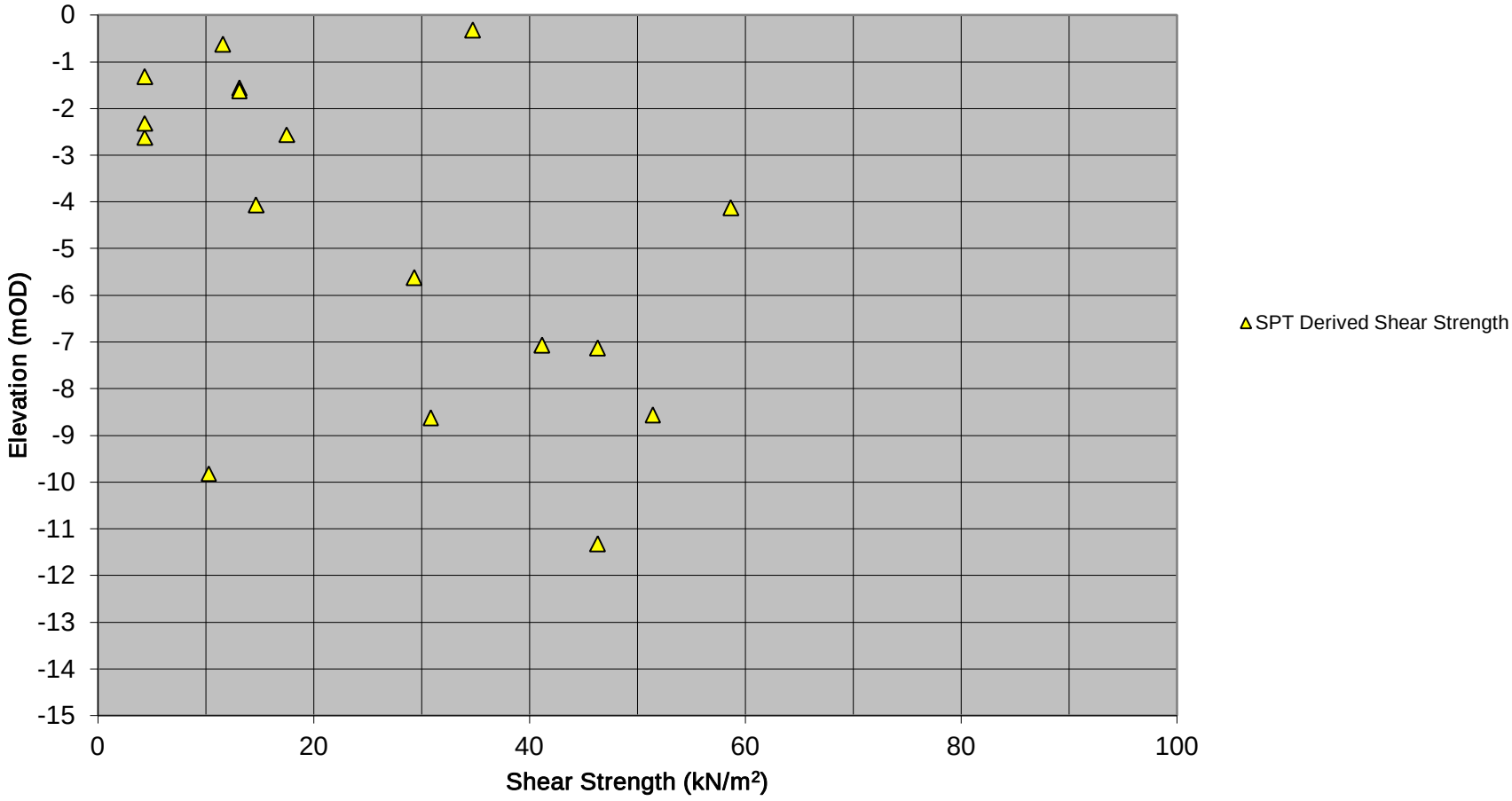
FAIRHURST

Fig 10 -Strength vs Elevation (Mudstone and Siltstone)
Whitby Maritime Training Hub



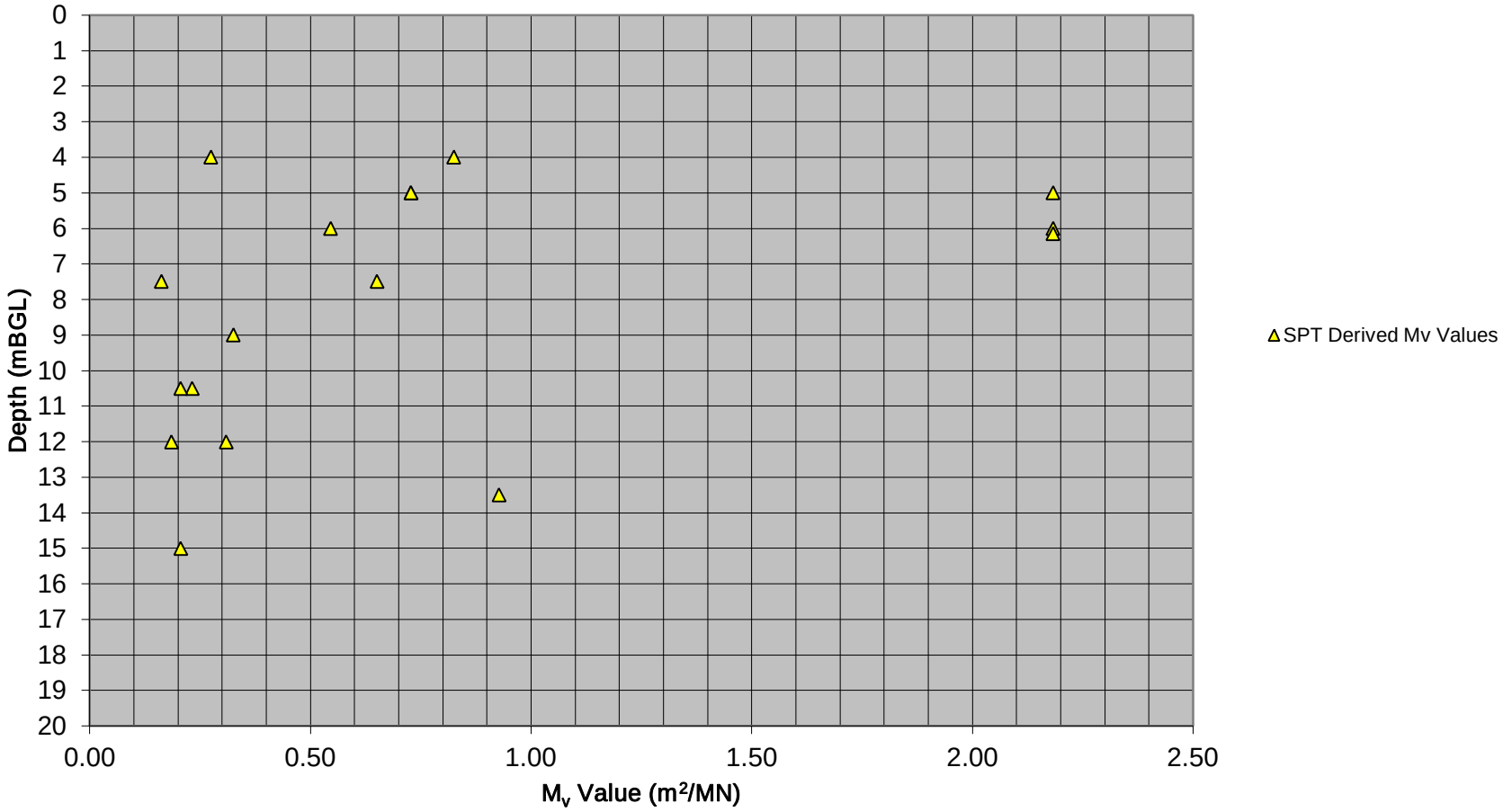
FAIRHURST

Fig 2 -Undrained Shear Strength vs Elevation (Alluvial Silt) Whitby Maritime Hub



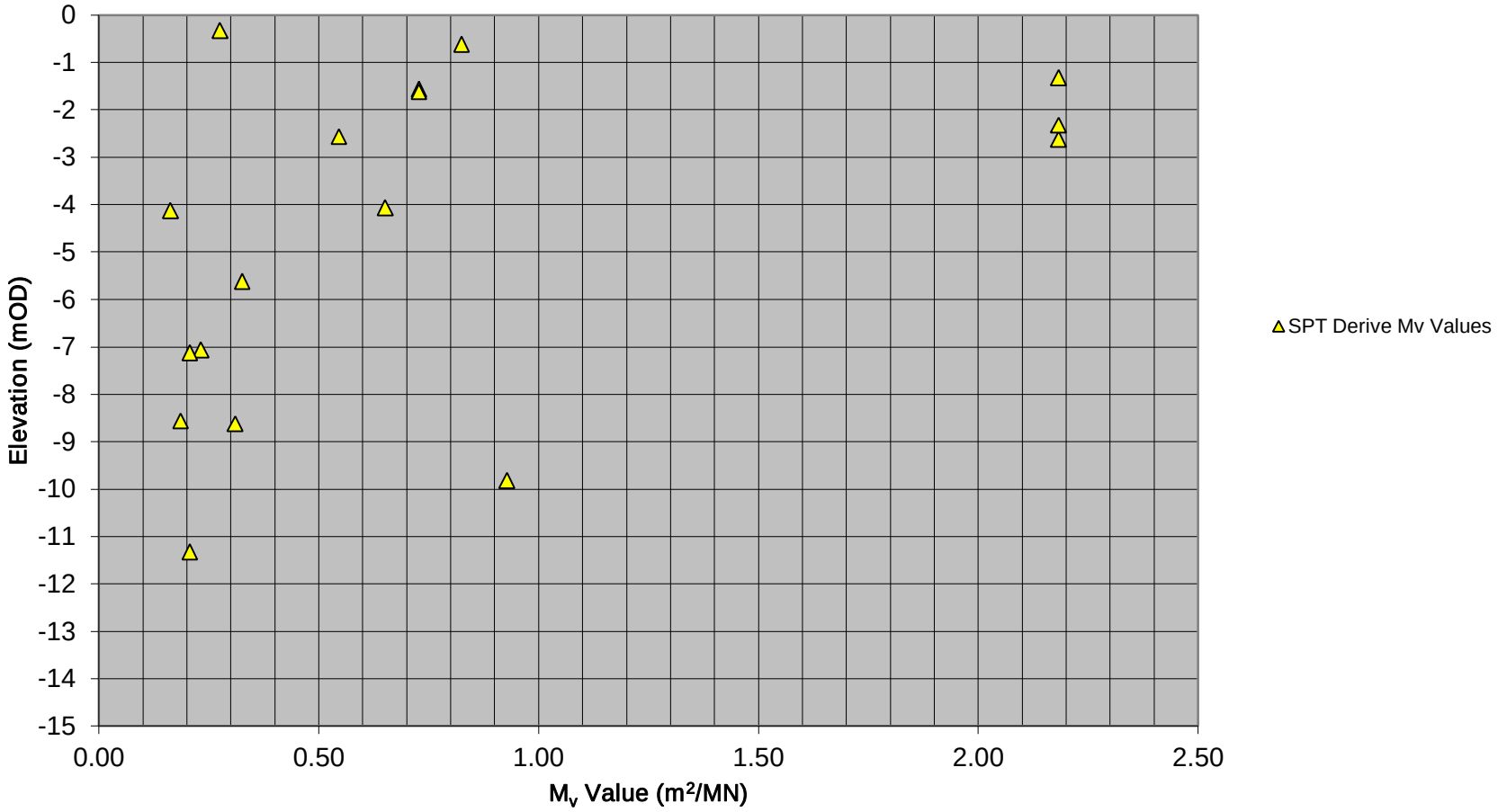
FAIRHURST

Fig 3 -Mv Values vs Depth (Alluvial Silt)
Whitby Maritime Hub



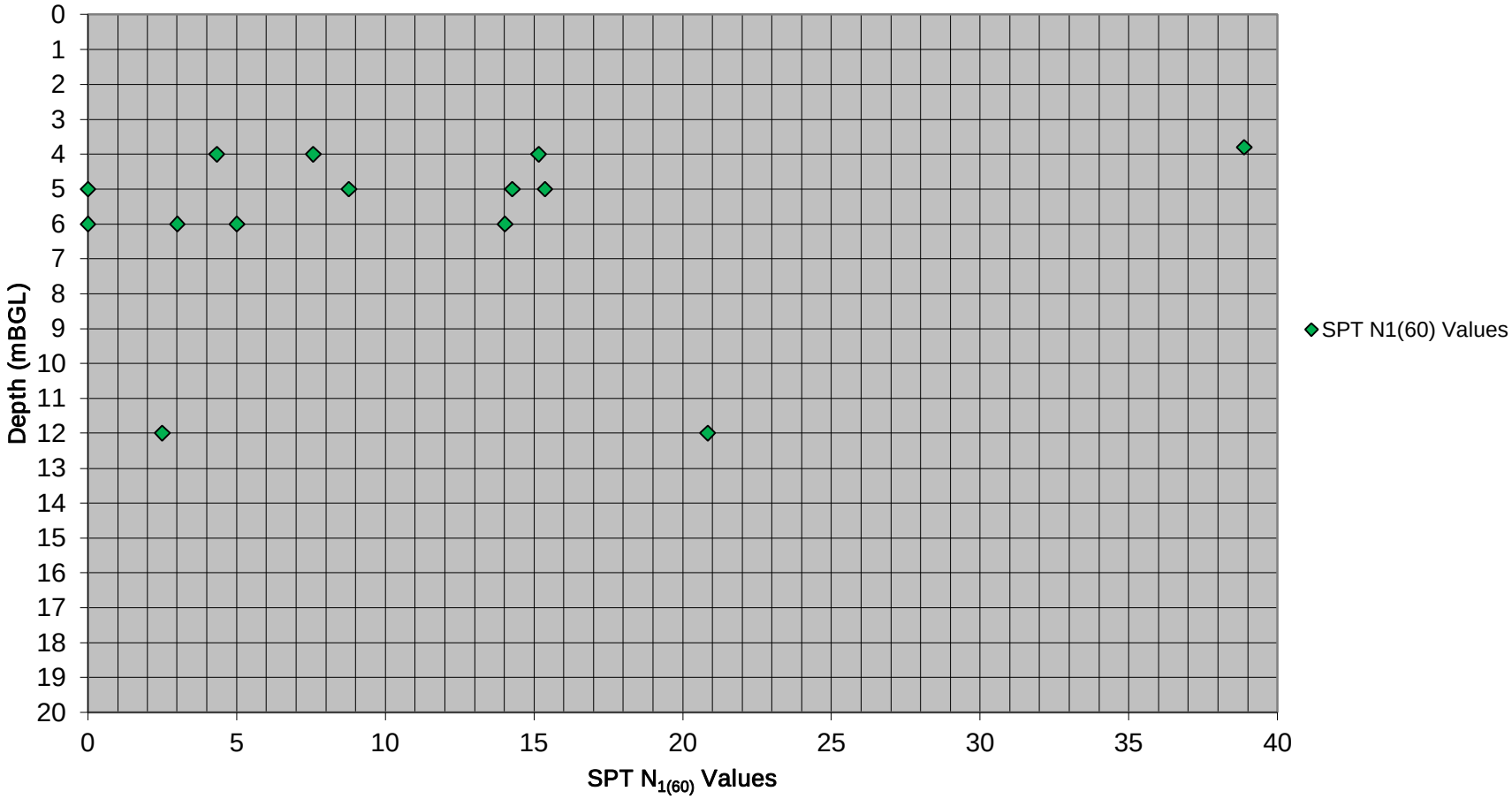
FAIRHURST

Fig 4 -Mv Values vs Elevation (Alluvial Silt)
Whitby Maritime Hub



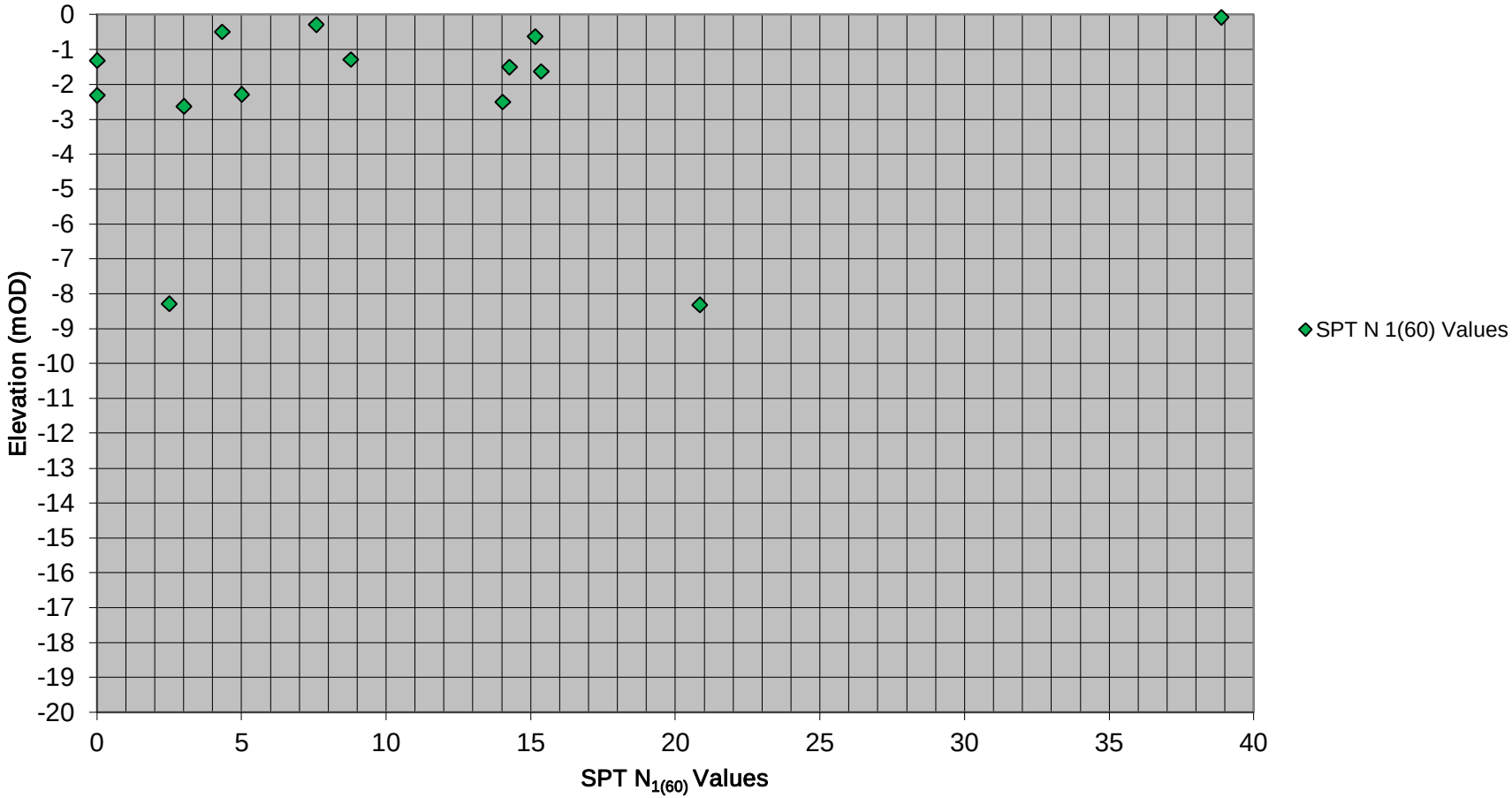
FAIRHURST

Fig 5 -SPT N Values vs Depth (Alluvial Sand and Gravel)
Whitby Maritime Hub



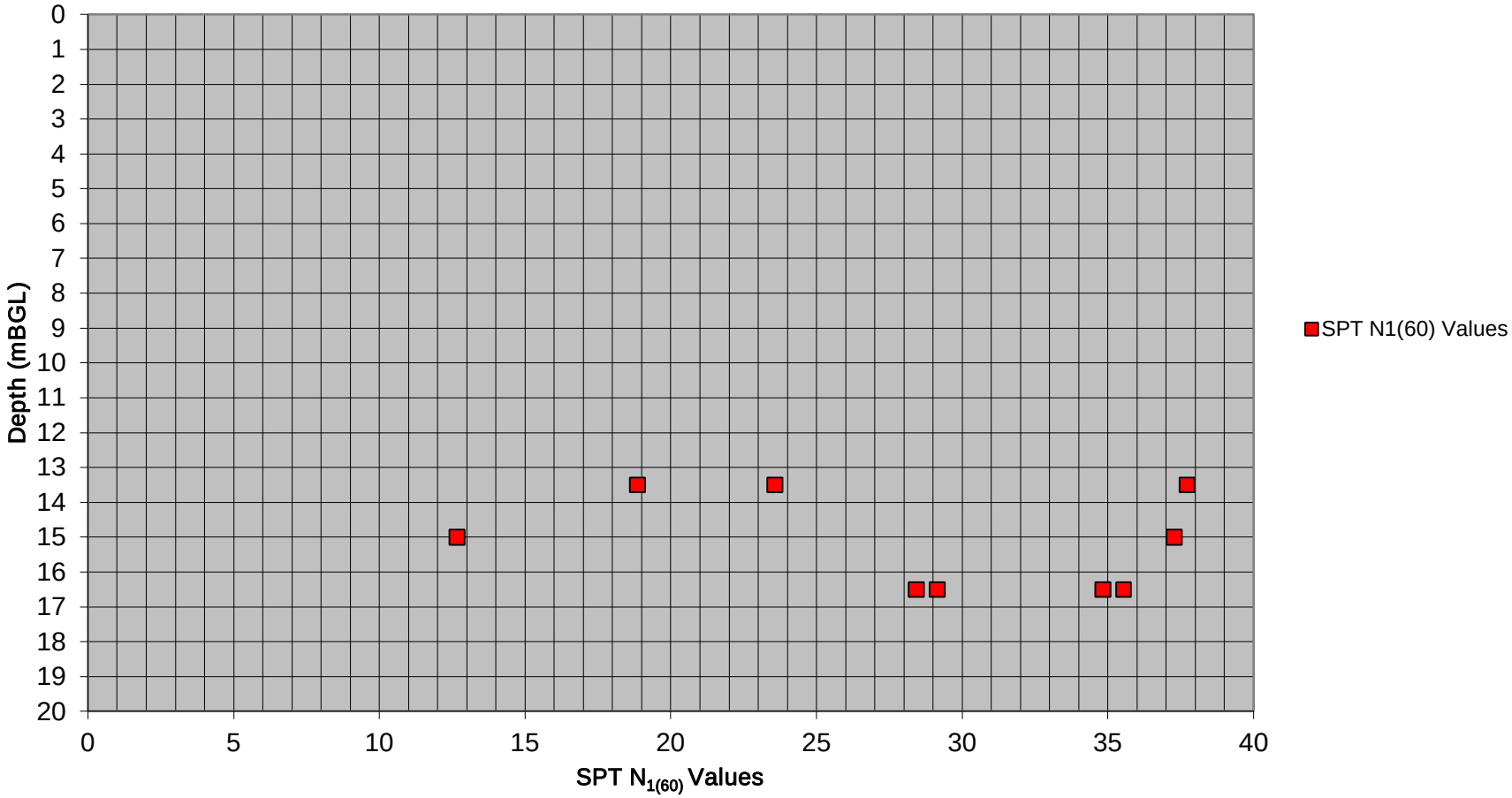
FAIRHURST

Fig 6 -SPT N Values vs Elevation (Alluvial Sand and Gravel)
Whitby Maritime Hub



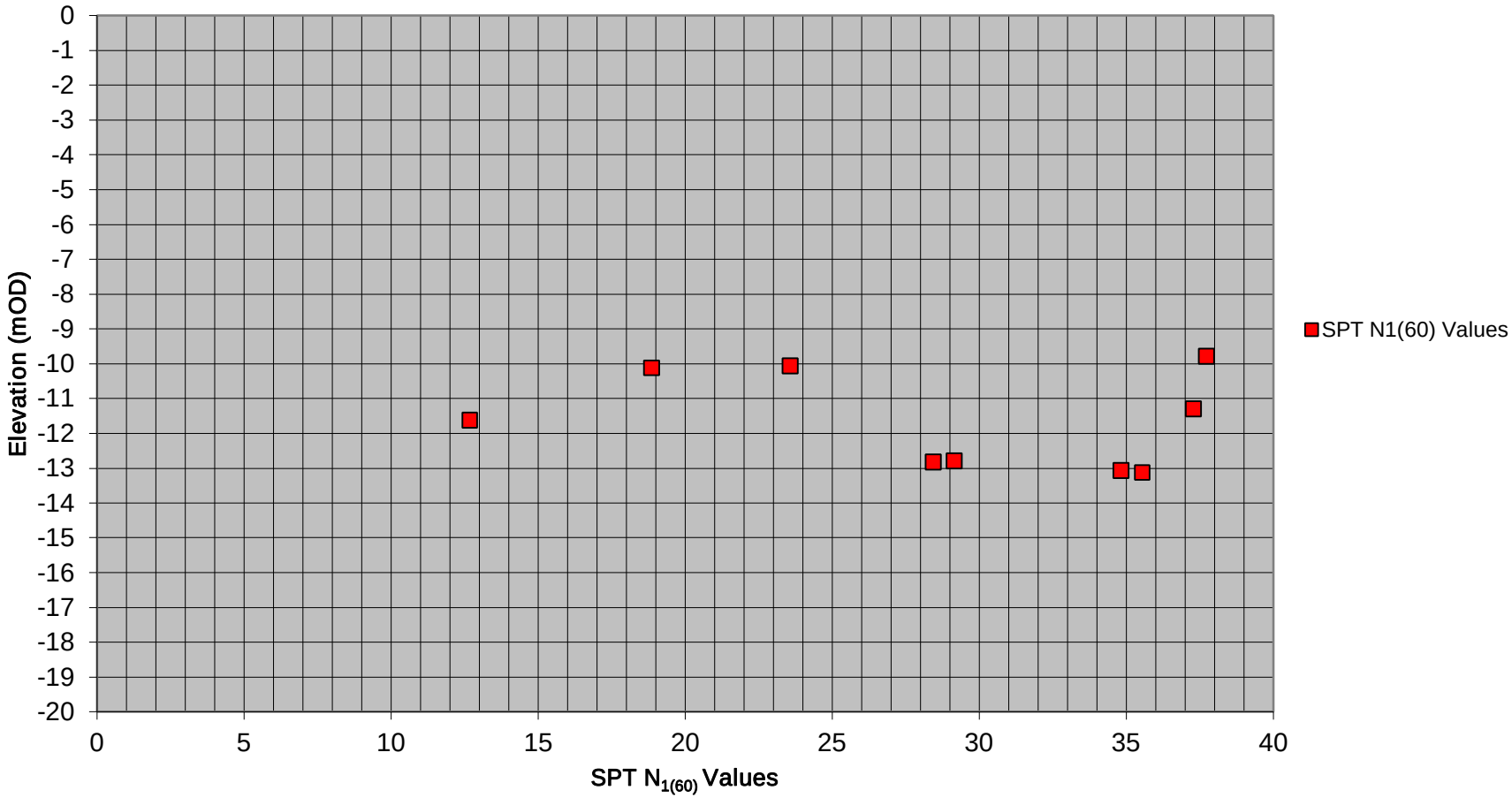
FAIRHURST

Fig 7 -SPT N Values vs Depth (Granular Glacial Deposits)
Whitby Maritime Hub



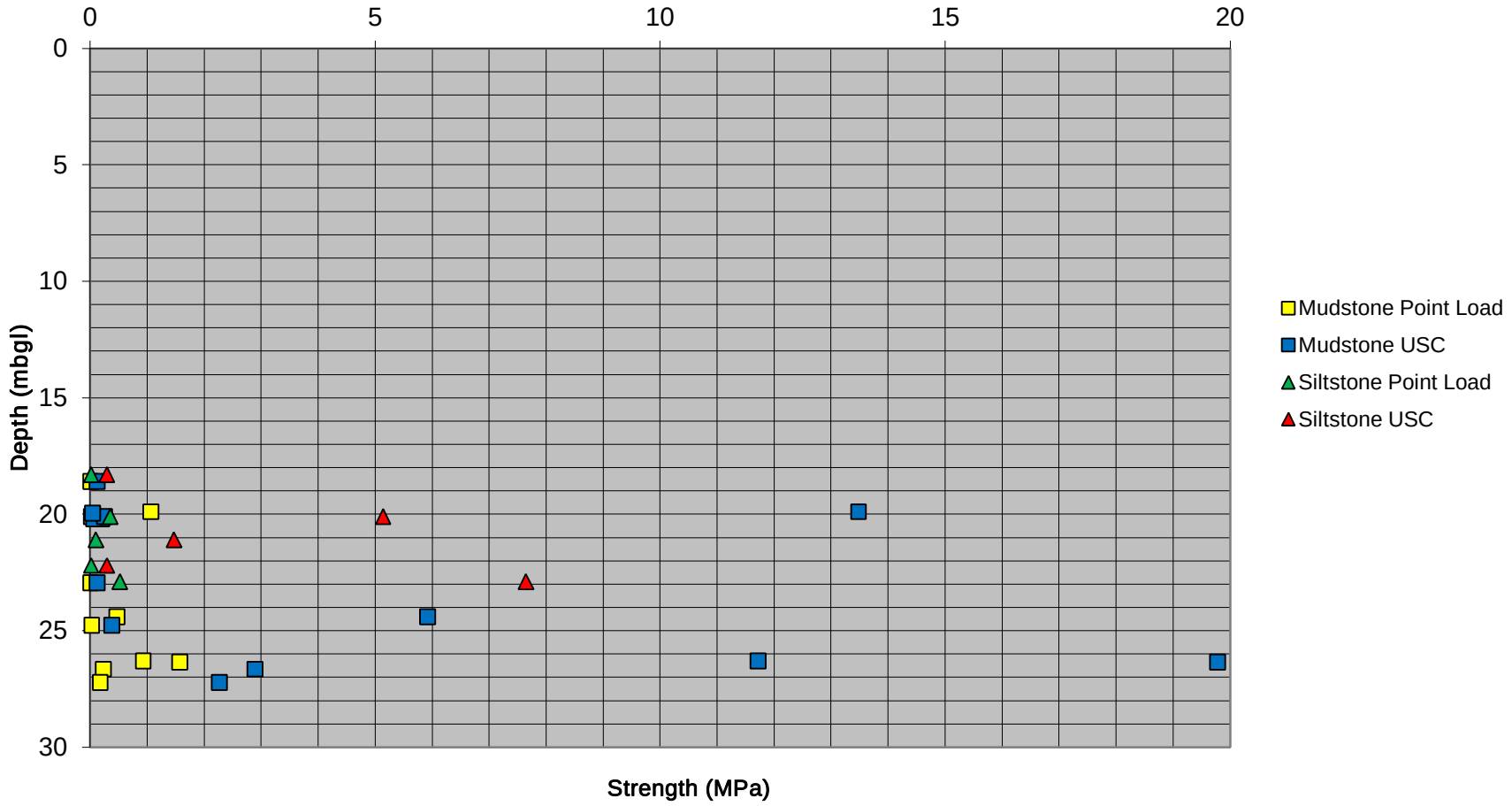
FAIRHURST

Fig 8 -SPT N Values vs Elevation (Granular Glacial Deposits)
Whitby Maritime Hub



FAIRHURST

Fig 9 -Strength vs Depth (Mudstone and Siltstone)
Whitby Maritime Training Hub



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