

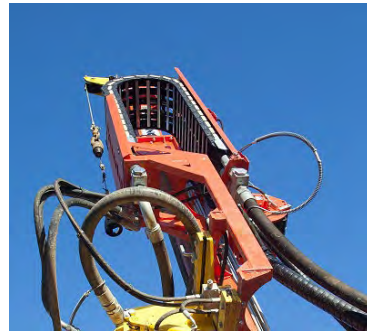


REPORT NO: D30056

**GEOENVIRONMENTAL APPRAISAL FOR LAND AT
TATHAM STREET, SUNDERLAND**

PREPARED FOR:

SUNDERLAND BANGLADESHI INTERNATIONAL CENTRE



● FOUNDATION HOUSE ● ST. JOHN'S ROAD ● MEADOWFIELD ● DURHAM ● DH7 8TZ

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Contract No.	D30056
Contract Name	Tatham Street, Sunderland

REPORT REVISIONS

Revision No.	Issue Date	Details
D30056_01_00	20.09.2023	Phase 2 Geoenvironmental Appraisal
D30056_01_01	15.01.2024	Updated proposed development

VERIFICATION

Revision No.	Issue Date		Written By	Checked By	Verified By
D30056_01_01	15.01.2024	Initials	KD	KJ	KJ
		Signature	<i>KD</i>	<i>Karin Jones</i>	<i>Karin Jones</i>

TATHAM STREET, SUNDERLAND – EXECUTIVE SUMMARY
SUMMARY OF GEOENVIRONMENTAL ISSUES

Issue	Remarks
Grid Reference	440191, 556594.
Proposed Development	This site is presently a single-storey building occupied by the Bangladesh International Centre and used as a community centre. It is proposed to renovate the building for continued use as a community centre, with a small extension planned to the existing building, to be located to the northwest, northeast and southwest.
Former Uses	Car park and railway,
Present Uses	None.
Made Ground	Made ground extended to varying depths between 0.8m and in excess of 1.1m bgl.
Natural Ground	The natural ground consisted of firm clays underlain by medium dense sand.
Contamination	No significant contamination identified during this investigation.
Hazardous Gas	Gas monitoring ongoing.
Mining & Quarrying	No evidence of shallow mineworkings.
Foundation Solution	Strip/pad foundations.
Groundwater & Excavations	No major groundwater flows encountered.
Highways	A CBR of at least 3% should be achievable within natural firm clay.

The executive summary is intended as a synopsis only. Further detail and limitations of the assessment is provided within the main body of the Report.

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D30056_01_00	Site Location Plan
D30056_02_00	Exploratory Hole Location Plan
D30056_03_00	Foundation Pit – TP1
D30056_04_00	Foundation Pit – TP2
D30056_05_00	Foundation Pit – TP3
D30056_06_00	Conceptual Site Model

APPENDIX B - Exploratory Hole Records

APPENDIX C - Chemical Testing Results

APPENDIX D - Geotechnical Testing Results and Concrete Core

APPENDIX E - Dunelm Conditions of Offer, Notes on Limitations & Basis for Contract

1 INTRODUCTION

1.1 SCOPE OF INVESTIGATION

Dunelm Geotechnical and Environmental Limited (Dunelm) were instructed by via Ged McCormack Architects by Sunderland Bangladesh International Centre to undertake a Preliminary Investigation (Phase 1 Desk Study) of land at the Bangladesh International Centre on Tatham Street in Sunderland.

This site is presently a single-storey building occupied by the Bangladesh International Centre and used as a community centre. It is proposed to renovate the building for continued use as a community centre, with a small extension planned to the existing building, to be located to the northwest, northeast and southwest.

Dunelm have previously produced a Phase 1 Preliminary Investigation report for the site, as referenced below:

- *Preliminary Investigation of land at Sunderland Bangladeshi International Centre, prepared by Dunelm on behalf of Sunderland Bangladeshi International Centre. Ref D10648_01_00, dated February 2022.*

Reference should be made to this report for details of the site's history and environmental setting.

The objectives of this exploratory phase of investigation were as follows:

- To determine the ground conditions beneath the site.
- To assess risks from ground contamination.
- To provide recommendations for foundations.

This report may be regarded as providing a Generic Quantitative Risk Assessment (Phase 2) in accordance with the Environment Agency's guidance document Land Contamination Risk Management.

Conditions of offer and notes on limitations relevant to all Dunelm geoenvironmental investigations are described in Appendix E and should be read in conjunction with this report.

2 SITE RECONNAISSANCE

2.1 GENERAL

The site is located at Ordnance Survey Grid Reference 440191, 556594. The site is situated on the western side of Tatham Street in Hendon, Sunderland, and is approximately 0.1h in area.

2.2 SITE DESCRIPTION

The site is relatively flat-lying and has a gentle slope from the southwest boundary towards the building.

The boundaries of the site consist of a car park to the north, a wall and a road to the south (Salisbury Street), and walls on the east and west boundaries. Tatham Street forms the eastern boundary of the site, and Tatham Street Back the western boundary.

Residential buildings are situated to the west beyond Tatham Street Back, and to the east of the site beyond Tatham Street. To the south of the site, beyond Salisbury Street, are commercial premises including a skip hire and waste management company.

The site can be accessed from the north. Several immature trees and bushes are present within the car parking area.

The site appears to be a single-storey steel framed building with a curved roof, occupied by the Bangladesh International Centre and used as a community centre.

There is street lighting in and around the boundaries of the site.

It is possible that basements / cellars are present beneath the existing community centre building.

3 SITE WORKS AND LABORATORY TESTING

3.1 CONCEPTUAL SITE MODEL

A preliminary conceptual site model, including an assessment of potential pollutant linkages, has been determined based on the desk study information presented in report ref D10648_01_00.

The desk study has shown that the site has been occupied previously and it is possible that contamination is present associated with the site's previous use as a car park and its proximity to a historical railway feature.

Based on the above references, the following potential contaminants have been identified associated with the former:

- Asbestos.
- Heavy metals.
- Polycyclic Aromatic Hydrocarbons (PAHs).
- Total Petroleum Hydrocarbons (TPHs) if leakages or spillages are present from the site's previous use as a car park.

It should be noted that the above potential contaminants are considered to be commonly associated with the specified industrial land use; no evidence exists to indicate that such contaminants are present in the ground at the site. However, an intrusive investigation should take into account the possibility that the above potential contaminants may be encountered. Risk assessment should be undertaken for contamination identified during intrusive investigation.

The main receptors include future site building occupiers and the underlying Principal Aquifer.

3.2 SUMMARY OF INVESTIGATION

The exploratory holes listed below were advanced on the 28th July 2023. Records for each of the exploratory holes noted are included in Appendix B to this report and the locations are shown on Drawing No. D30056_02_00 presented in Appendix A.

- Trial pits: TP1 to 3 to maximum 1.05m bgl
- Mini percussion boreholes: WS1 and WS1A to maximum 3.95m bgl
- Concrete core CC1

The exploratory holes were specified by Ged McCormack Architects.

A combined gas and groundwater monitoring well was installed in the borehole WS1A, with the response zone of each well screened into natural strata.

3.3 CHEMICAL TESTING

Appropriate samples were delivered to a UKAS and MCERTS accredited laboratory with a schedule of testing drawn up by Dunelm. The laboratory test results are presented in Appendix C to this report and discussed in Section 5. Selected samples were tested for the following suite of determinands:

- *pH, metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc), Soil Organic Matter (SOM), water-soluble sulphate, Polycyclic Aromatic Hydrocarbons (PAHs: US EPA 16 suite), Total Petroleum Hydrocarbons (TPH CWG suite), BTEX compounds and asbestos.*

3.4 GEOTECHNICAL TESTING

Samples of natural soil were delivered to a UKAS accredited geotechnical laboratory with a schedule of testing drawn up by Dunelm. The geotechnical laboratory test results are presented in Appendix D to this

report. Material properties assessed using the results are considered further in the following Section.

4 GROUND CONDITIONS AND MATERIAL PROPERTIES

4.1 GENERAL

Strata encountered were generally similar beneath all parts of the site. Ground conditions are described in the following sections.

4.2 TOPSOIL

Topsoil was not encountered.

4.3 MADE GROUND

Made ground was encountered across the site to depths between 0.8m and in excess of 1.05m bgl.

The made ground generally consisted of hardstand comprising a combination of macadam and concrete underlain by a combination of gravelly sand and reworked clays with sandstone, limestone, brick, siltstone and rare concrete and metal fragments.

4.4 HARDSTANDING

A surface layer of macadam was present in TP2, WS01 WS01A with a recorded thickness of 0.1m. Concrete was recorded un TP1 and TP3 with a thickness of 0.05m.

A concrete core was obtained as shown on the exploratory hole location plan in Appendix A. The concrete core details and photograph are included within Appendix D. The core was recorded as 300mm diameter and 205mm thick including a polystyrene base. The maximum aggregate size was recorded as 20mm. A damp proof membrane was also noted to be present.

4.5 BURIED OBSTRUCTIONS

WS01 recorded the presence of unrecorded services at 0.7m bgl and the exploratory hole was terminated.

The trial pits recorded existing foundation details but no other obstructions were recorded.

It may be possible that further obstruction lie undetected elsewhere on the site.

4.6 NATURAL SOILS

The natural soils at the site were only recorded within WS01A and comprised firm slightly sandy slightly gravelly clay to 2.9m bgl underlain by medium dense clayey sand to the base of the hole at 3.95m bgl.

SPT testing within the clay recorded an 'N' value of 8; with a hand vane test recording a shear strength of 60kPa both confirming the firm nature of the clay.

Moisture content testing within the clay recorded results of 22% and 23% with plasticity indices of 14 and 19 indicating intermediate plasticity clay with low volume change potential.

SPT 'N' values of 17 and 24 were recorded within the clayey sand confirming the medium dense nature of the deposits.

4.7 ROCK HEAD

Rockhead was not recorded within this investigation.

4.8 GROUNDWATER

A groundwater seepage was encountered at a depth of 1.2m bgl in WS01A during site works. Further groundwater monitoring is currently being carried out and will be issued as an addendum.

4.9 HYDROCARBON CONTAMINATION

No visual or olfactory evidence of hydrocarbon contamination was noted during the investigation.

4.10 CONCRETE IN AGGRESSIVE GROUND

To enable buried concrete to be designed to resist sulfate attack, samples of made ground and natural strata from depths corresponding to the anticipated foundation depth have been tested for water-soluble sulfate and pH.

The maximum water-soluble sulfate concentration is 950mg/l and the lowest recorded pH value is 8.3.

Based on the above results, Design Sulfate Class DS-2 and ACEC Classification AC-2 would be appropriate for buried concrete at the site.

4.11 FOUNDATION PITS

Foundation pits were excavated to determine the existing foundations of the wall in the car park area and against the existing building. Logs and drawings of these pits can be found in Appendix B and as Drawings D30056_03,04 and 05 in Appendix A respectively.

TP1 recorded a foundation from 0.25m bgl with a projection of 0.4m and extending to a depth of 0.45m bgl a thickness of 0.2m.

TP2 recorded a foundation from 0.35m bgl with a projection of 0.1m and extending to a depth of 1.1m bgl a thickness of 0.75m.

TP3 recorded a foundation from 0.25m bgl with no projection extending to a depth of 0.95m bgl a thickness of 0.70m.

5 CHEMICAL TESTING RESULTS

5.1 SELECTION OF CHEMICAL TESTING

This section represents the 'risk assessment' process required in accordance with the Environment Agency's guidance document Land Contamination Risk Management.

Contaminants identified in association with the former site uses have been discussed in Section 3.1.

Appropriate chemical testing has been undertaken taking into account potential contaminants identified and evidence of contamination recorded during the ground investigation.

Laboratory test certificates are presented in Appendix C to this report. The test results are presented in the following sections.

5.2 GENERIC ASSESSMENT CRITERIA FOR INORGANIC CONTAMINATION

Generic Assessment Criteria (GAC) appropriate to current UK practice for the assessment of inorganic contamination are shown in the table below. These criteria are dependent on the nature of the proposed development. In addition, some contaminants depend on other soil parameters as shown.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH

<i>All values in mg/kg</i>	Residential with homegrown produce (based on 6% SOM)	Residential without homegrown produce (based on 6% SOM)	Commercial (based on 6% SOM)	Allotments (based on 6% SOM)	Public Open space (resi) (based on 6% SOM)
Arsenic	37	40	640	43	79
Cadmium	11	85	190	1.9	120
Chromium (Total)	910	910	8,600	18,000	1,500
Chromium (VI)	6	6	33	1.8	7.7

All values in mg/kg	Residential with homegrown produce (based on 6% SOM)	Residential without homegrown produce (based on 6% SOM)	Commercial (based on 6% SOM)	Allotments (based on 6% SOM)	Public Open space (resi) (based on 6% SOM)
Copper	2,400	7,100	68,000	520	12,000
Lead	200*	310*	2,300*	80*	630
Mercury	40	56	1,100	19	120
Nickel	130	180	980	53	230
Selenium	250	430	12,000	88	1,100
Zinc	3,700	40,000	730,000	620	81,000

Soil Screening Values from The LQM/CIEH S4ULs for Human Health Risk Assessment (2015). *taken from DEFRA C4SL database.

5.3 MADE GROUND AND NATURAL SOILS (INORGANIC CONTAMINANTS)

A summary of the results of inorganic testing on made ground samples is shown in the table below.

INORGANIC TEST RESULTS – MADE GROUND

Contaminant	Units	No. of made ground samples tested	No. of samples exceeding GAC	Generic Assessment Criteria	Maximum concentration above GAC
pH	-	4	0	<5	-
Arsenic	mg/kg	4	0	640	-
Cadmium	mg/kg	4	0	190	-
Chromium (Total)	mg/kg	4	0	8,600	-
Chromium VI	mg/kg	4	0	33	-
Copper	mg/kg	4	0	68,000	-
Lead*	mg/kg	4	0	2,300*	-
Mercury	mg/kg	4	0	1,100	-
Nickel	mg/kg	4	0	980	-
Selenium	mg/kg	4	0	12,000	-
Zinc	mg/kg	4	0	730,000	-
Asbestos	-	4	0	Present	-

Soil Screening Values from The LQM/CIEH S4ULs for human Health Risk Assessment (2015) for a residential with homegrown produce end use. *Taken from DEFRA C4SL database.

All samples tested fall below the relevant guideline values.

5.4 ASBESTOS TESTING

Asbestos was not detected in the samples where tested.

5.5 ORGANIC CONTAMINATION

The selection of hydrocarbon (organic) testing was based on the conceptual model and the assessment of potential contamination sources presented in earlier sections of this report.

Analysis for organic determinands has been carried out in general accordance with the EA Report: *The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils* (2005). Consequently, samples of made ground were tested for the following:

- Polycyclic Aromatic Hydrocarbon compounds (US EPA 16 suite)
- 13 petroleum hydrocarbon fractions based on the methodology of the United States Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG suite).
- Benzene, toluene, ethylbenzene and xylenes (BTEX compounds).
- Methyl tertiary butyl ether (MTBE).

Appropriate samples were tested for Soil Organic Matter (SOM) and the results ranged between 1.0% and

1.7%.

An assessment of selected PAH compounds is shown in the following table together with Generic Assessment Criteria (GAC) from the LQM guidance.

SUMMARY OF RESULTS FOR POLYCYCLIC AROMATIC HYDROCARBONS

Contaminant	Generic Assessment Criteria (mg/kg)					No. of samples tested	No. of samples with value greater than GAC	Maximum Concentration above GAC (mg/kg)
	Residential with home grown produce	Residential without home grown produce	Allotments	Comm / industrial	Public Open Space (resi)			
Naphthalene	2.3	2.3	4.1	190	4,900	4	0	-
Acenaphthylene	170	2,900	28	83,000	15,000	4	0	-
Acenaphthene	210	3,000	34	84,000	15,000	4	0	-
Fluorene	170	2,800	27	63,000	9,900	4	0	-
Phenanthrene	95	1,300	15	22,000	3,100	4	0	-
Anthracene	2400	31,000	380	520,000	74,000	4	0	-
Fluoranthene	280	1,500	52	23,000	3,100	4	0	-
Pyrene	620	3,700	110	54,000	7,400	4	0	-
Benzo(a)anthracene	7.2	11	2.9	170	29	4	0	-
Chrysene	15	30	4.1	350	57	4	0	-
Benzo(b)fluoranthene	2.6	3.9	0.99	44	7.1	4	0	-
Benzo(k)fluoranthene	77	110	37	1,200	190	4	0	-
Benzo(a)pyrene	2.2	3.2	0.97	35	5.7	4	0	-
Indeno(1,2,3,-cd)pyrene	27	45	9.5	500	82	4	0	-
Dibenz(a,h)anthracene	0.24	0.31	0.14	3.5	0.57	4	0	-
Benzo(g,h,i)perylene	320	360	290	3,900	640	4	0	-

Soil Screening Values from the LQM/CIEH S4ULs for Human Health Risk Assessment (2015) for 1% SOM soil, for a commercial with homegrown produce end use.

All samples tested fall below the relevant guideline values.

Results for the 13 petroleum hydrocarbon fractions are presented in the table below together with appropriate generic assessment criteria.

SUMMARY OF RESULTS FOR PETROLEUM HYDROCARBON FRACTIONS

EC bands	Aromatic fractions							Aliphatic fractions					
	5-7	7-8	8-10	10-12	12-16	16-21	21-35	5-6	6-8	8-10	10-12	12-16	16-35
GAC (comm) mg/kg	26,000	56,000	3,500	16,000	36,000	28,000	28,000	3,200	7,800	2,000	9,700	59,000	1,600,000
Sample location & depth (m bgl)	Recorded concentrations (mg/kg) - exceedances in bold												
WS1-0.15	<0.01	<0.01	<0.01	<0.9	<0.5	4.7	610	<0.01	<0.01	<0.01	3.9	7.7	614.7
WS1-0.5	<0.01	<0.01	<0.01	2.8	2.8	6.7	110	<0.01	<0.01	<0.01	5.0	7.9	116.7
WS1A-1.0	<0.01	<0.01	<0.01	<0.9	<0.5	<0.6	<1.4	<0.01	<0.01	<0.01	<1.5	<1.2	<2
WS1A-1.5	<0.01	<0.01	<0.01	<0.9	<0.5	<0.6	<1.4	<0.01	<0.01	<0.01	<1.5	<1.2	<2

Soil Screening Values from the LQM/CIEH S4ULs for Human Health Risk Assessment (2015) for a 1% SOM soil, for a commercial with homegrown produce end use.

The above assessment of the 13 petroleum hydrocarbon fractions indicates that no significant TPH concentrations have been recorded during this investigation.

A summary of the results of the BTEX testing is shown in the table below.

SUMMARY OF BTEX RESULTS

Sample Location & depth (m)	Material	Contaminant Concentrations (SGV shown below in brackets) mg/kg			
		Benzene	Toluene	Ethyl Benzene	Xylenes ¹
		(27)	(869)	(518)	(478)
WS1-0.15	Made ground	<0.01	<0.01	<0.01	<0.01
WS1 -0.5	Made ground	<0.01	<0.01	<0.01	<0.01
WS1A-1.0	Made ground	<0.01	<0.01	<0.01	<0.01
WS1A-1.5	Natural soils	<0.01	<0.01	<0.01	<0.01

Soil Screening Values from The LQM/CIEH S4ULs for Human Health Risk Assessment (2015) for a 1% SOM soil, for a commercial with homegrown produce end use.

¹ Lowest value used of SGVs for *o*-xylene, *m*-xylene and *p*-xylene.

The results show that no significant BTEX concentrations have been recorded during this investigation, with all results below the laboratory's limit of detection of 0.01mg/kg.

All the samples tested for MTBE recorded values below the laboratory's limit of detection of 0.01mg/kg.

6 ASSESSMENT OF CONTAMINATION RISKS

6.1 SUMMARY OF CONTAMINATION SOURCES

MADE GROUND

The majority of the site is underlain by a layer of made ground extending to depths between 0.8m and in excess of 1.21m bgl.

Testing has indicated that this made ground does not contain elevated concentrations of inorganic contaminants.

HYDROCARBON CONTAMINATION

No significant hydrocarbon contamination was encountered during this investigation.

6.2 HAZARD ASSESSMENT

No sources of contamination have been encountered during this investigation and consequently no unacceptable risks have been identified.

If during redevelopment works on site any fibrous, noxious, brightly coloured, drummed, liquid, etc waste is encountered, works should cease in these areas and further advice should be sought from a suitably qualified consultant.

7 HAZARDOUS GAS

7.1 HAZARD IDENTIFICATION

Desk study information has indicated that the site could be affected by potential sources of gas including:

- Former Hendon brick field indicated to have been located within c.8m to the southwest of the site.
- Historical saw pit located c.144m southwest of the site.

Given the above, a gas monitoring well was installed in the borehole during the fieldwork with the response screened into natural ground. Details of the monitoring installations are shown on the exploratory hole

records in Appendix B to this report.

Once the monitoring period is complete, the complete set of monitoring results will be provided together with a gas risk assessment report with recommendations for gas protection measures for new structures. It is essential that the monitoring wells are protected from damage during re-development works such as site clearance or demolition.

8 FOUNDATIONS AND GEOTECHNICAL ISSUES

8.1 INTRODUCTION

It is proposed to renovate the building for continued use as a community centre, with a small extension planned to the existing building, to be located to the northwest, northeast and southwest.

Ground conditions encountered during this investigation comprised made ground extending to varying depths between 0.8m and in excess of 1.1m bgl. The underlying natural ground consisted of firm clays underlain by medium dense sand.

8.2 MINING

No evidence has been found to indicate that the site is underlain by coal workings at shallow depth.

No evidence has been found to indicate that the site has been affected by quarrying.

8.3 FOUNDATIONS

Due to the heterogeneous nature of the made ground, unacceptable total and differential settlements may occur if foundations are placed on made ground. Therefore, foundations should be taken through made ground onto underlying natural ground of adequate bearing capacity considered to be the firm clay.

It is considered that strip or pad foundations should be suitable for the proposed structures.

Sub-surface concrete should be Design Sulphate Class DS-2, with the site allocated an ACEC Classification of AC-2.

Based on the visual description and laboratory testing, a safe bearing capacity of 90kN/m² has been determined for foundations upto 1.0m wide founding on the natural firm clay at depths of at least 0.75m bgl. At this width of foundation and bearing pressure settlements should be less than 25mm.

Based on plasticity index results, cohesive soils at the site should be regarded as being of low volume change potential. Foundations should therefore be placed at a minimum depth of 0.75m below original or finished ground level, whichever is the lower, however, deepened where necessary to found on natural ground of adequate bearing capacity.

Foundations should be taken below a line drawn up at 45° from the base of existing or proposed services or foundations.

It should be recognised that clay rich soils can deteriorate fairly rapidly on exposure, particularly in periods of wet weather and frost. It would be prudent to protect all exposed soils in foundation excavations with a concrete blinding layer, particularly if they are likely to remain open for extended period of time.

Prior to placing foundation concrete, obvious soft or loose spots should be removed and replaced with suitably recompacted hardcore or lean mix concrete. In addition, all excavations should be inspected to ensure that they fully penetrate areas of disturbed ground.

If the founding stratum is found to be variable, and particularly if it is found to consist both of clay and sand, the foundations should be reinforced to limit differential settlement.

Further advice should be sought from Dunelm if unexpected ground conditions are encountered during redevelopment.

8.4 FLOOR SLABS

In accordance with current guidance, suspended floor slabs should be adopted where made ground exceeds 0.6m in thickness.

Alternatively, in order to utilise ground bearing slabs, made ground could be removed from beneath the footprint of the buildings and a blanket of compacted granular fill placed in accordance with an engineering specification subject to regulatory approval and validation.

8.5 BURIED OBSTRUCTIONS

WS01 recorded the presence of unrecorded services at 0.7m bgl and the exploratory hole was terminated.

The trial pits recorded existing foundation details but no other obstructions were recorded.

It may be possible that further obstruction lie undetected elsewhere on the site.

8.6 EXCAVATIONS

Observations made during the fieldwork indicate that shallow groundwater flows may be anticipated in shallow excavations. However, 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.

Excavation sides should be designed, constructed and supported in accordance with the recommendations given in CIRIA Report No. 97.

It is recommended that an adequate drainage system for surface water be installed by a competent contractor in order to prevent surface water ponding or collecting during and post construction, which may in turn lead to deterioration of the founding stratum.

Based on the nature of the ground conditions encountered, excavations should be within the capacity of normal earthworks plant although breaking out of relict foundations and other obstructions should be anticipated.

8.7 ROAD PAVEMENT DESIGN


A CBR value of 3% should be assumed for highway construction within natural firm clays. This is based on visual inspection and the results of plasticity index testing.

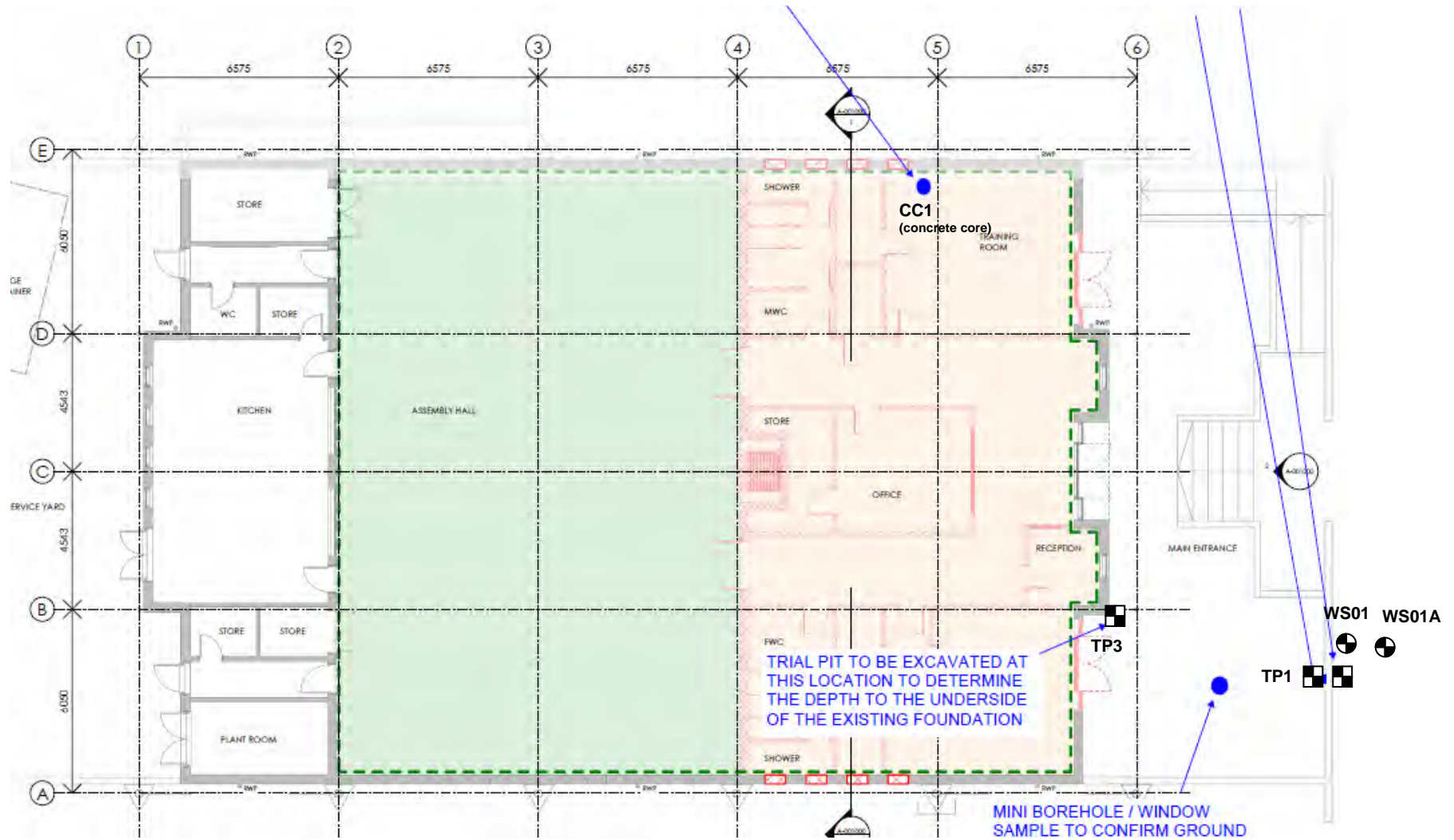
Where the granular made ground is re-engineered it is considered that a CBR value of 5% should be achievable, however, this should be verified by insitu CBR testing on site and confirmed with the adopting authority.


Appendix A
Drawings

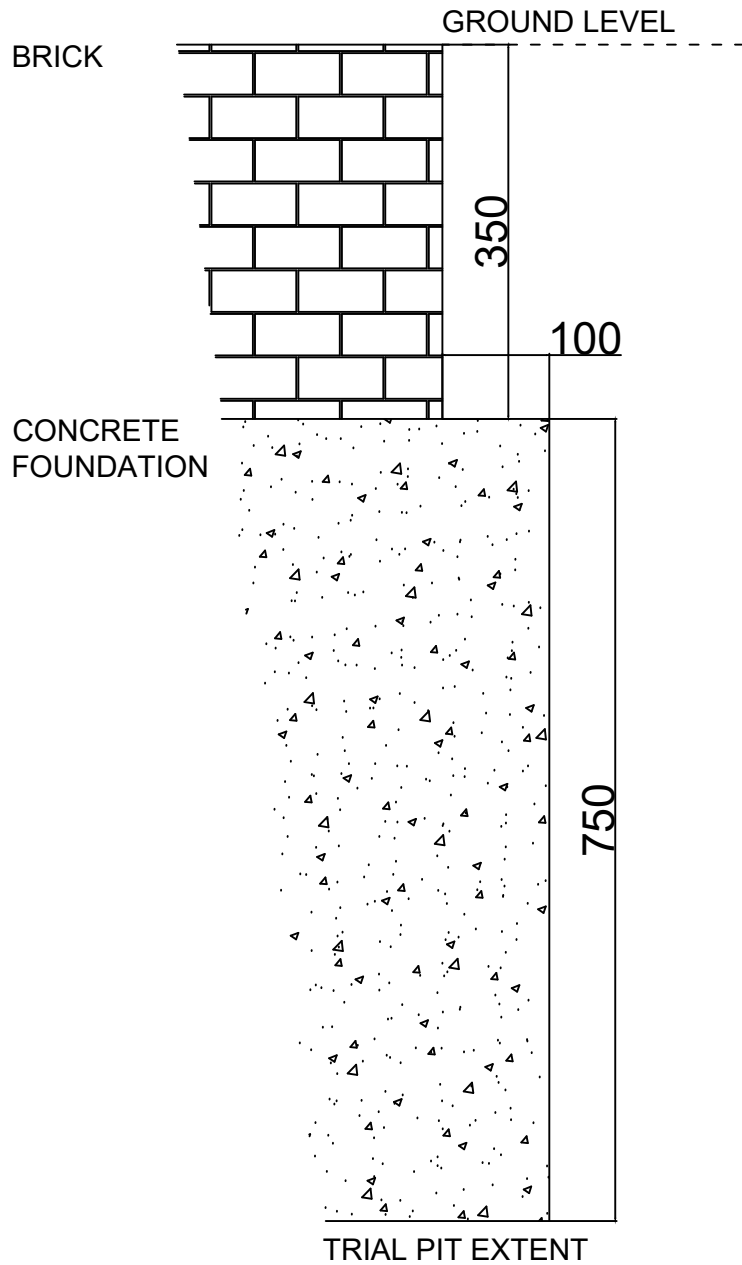




	Contract: Tatham Street, Sunderland		Contract No: D30056	
	Client: Sunderland Bangladesh International Centre			
TEL: 0191 3783 151		Drawing Title: Site Location Plan		
Drawing No: DUN_D30056_01_00	Date: September 2023	Scale: NTS	Status: Final	Drawn by: RG



	Contract: Tatham Street, Sunderland	Contract No.: D30056	
TEL: 0191 378 3151	Drawing Title: Exploratory Hole Location Plan		Client: Sunderland Bangladesh International Centre
Drawing & Revision No: DUN_D30056_02_00	Date: September 2023	Scale: NTS	Drawn by: KD



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NOT TO SCALE: Contractor to check all dimensions on site before commencement of any works. No dimensions to be scaled from this drawing.
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1. All measurements in mm

CLIENT:
 Sunderland Bangladesh International Centre Ltd.

PROJECT TITLE:
 Sunderland Bangladesh International Centre

DRAWING TITLE:
 TP01 TRIAL PIT DRAWING

DRAWING NUMBER:
 D30056/03

DATE:
 August 2023



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1. All measurements in mm

CLIENT:
Sunderland Bangladesh International Centre Ltd.

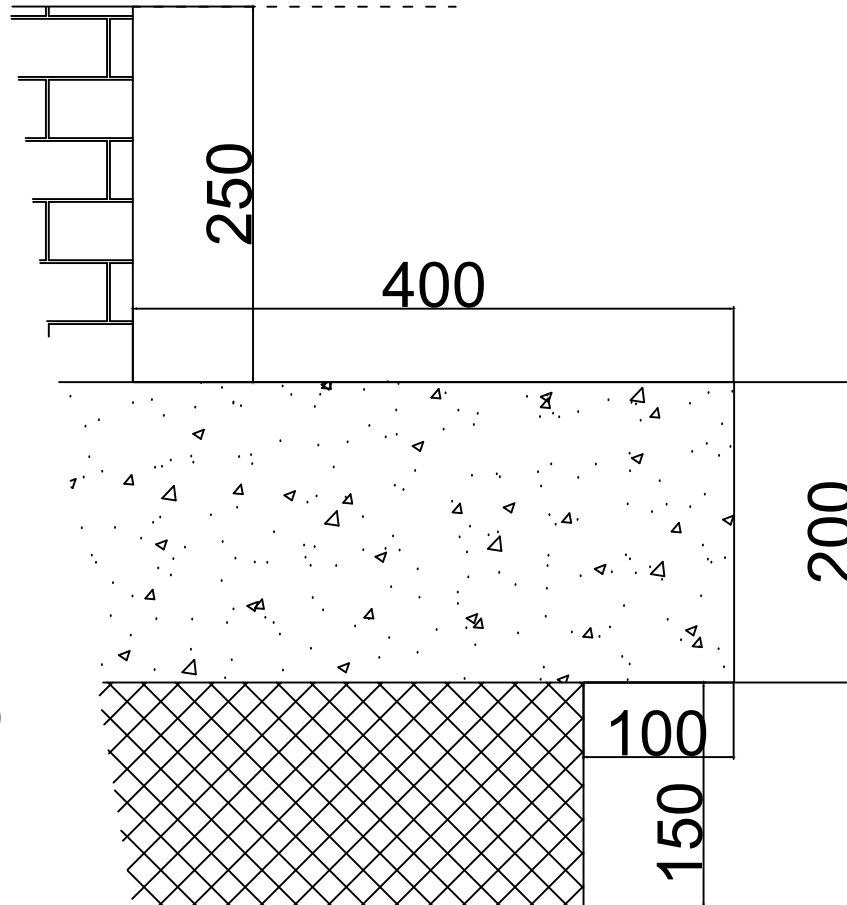
PROJECT TITLE:
Sunderland Bangladesh International Centre

DRAWING TITLE:
TP02 TRIAL PIT DRAWING

DRAWING NUMBER: D30056/04	DATE: August 2023
------------------------------	----------------------

BRICK

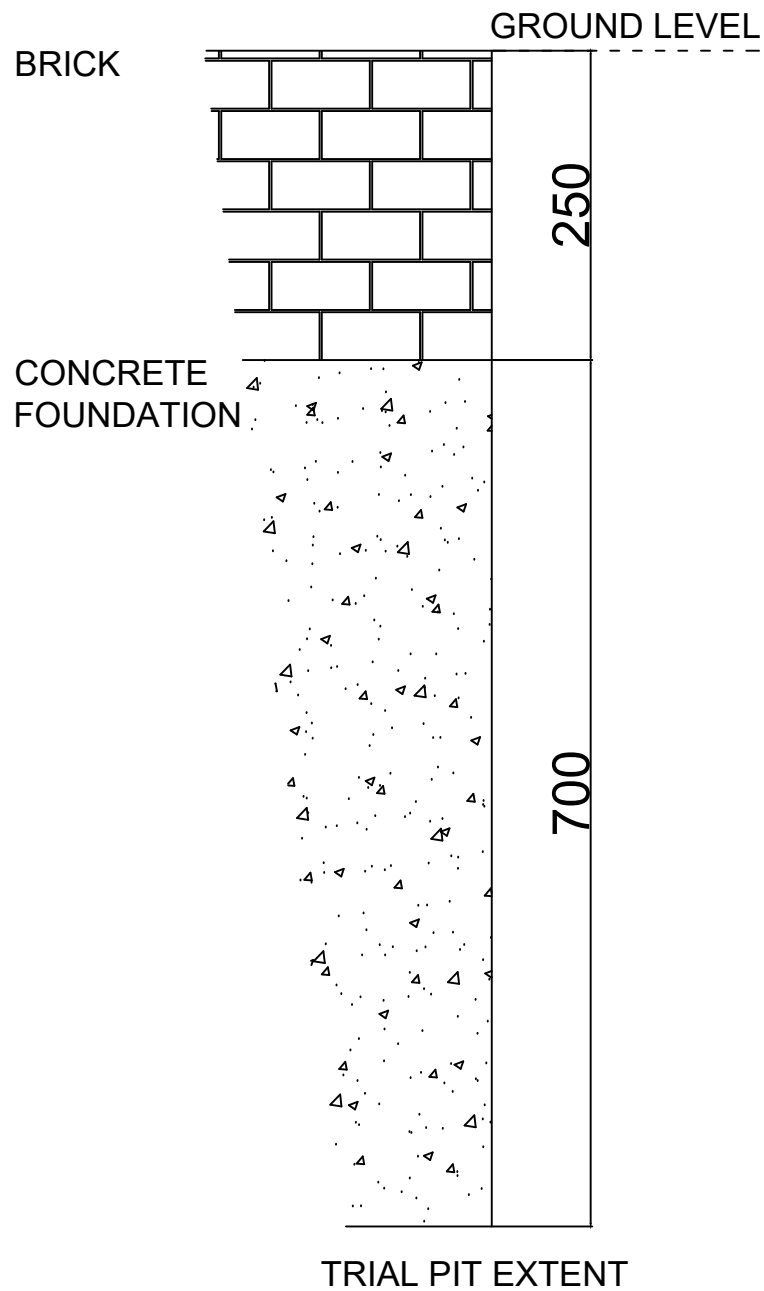
GROUND LEVEL



CONCRETE FOUNDATION

MADEGROUND

TRIAL PIT EXTENT



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NOT TO SCALE: Contractor to check all dimensions on site before commencement of any works. No dimensions to be scaled from this drawing.
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1. All measurements in mm

CLIENT:
 Sunderland Bangladesh International Centre Ltd.

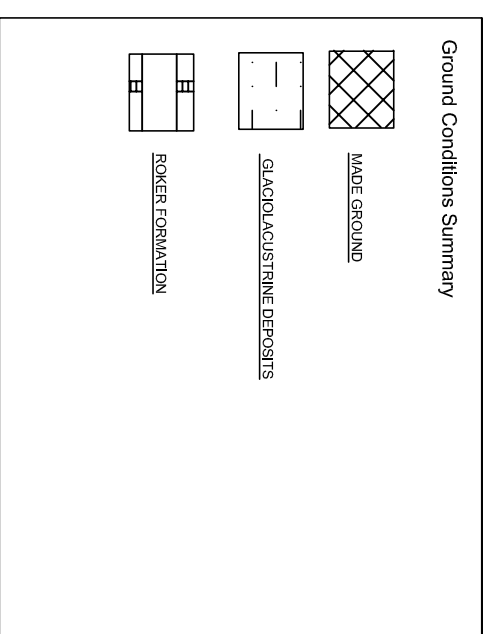
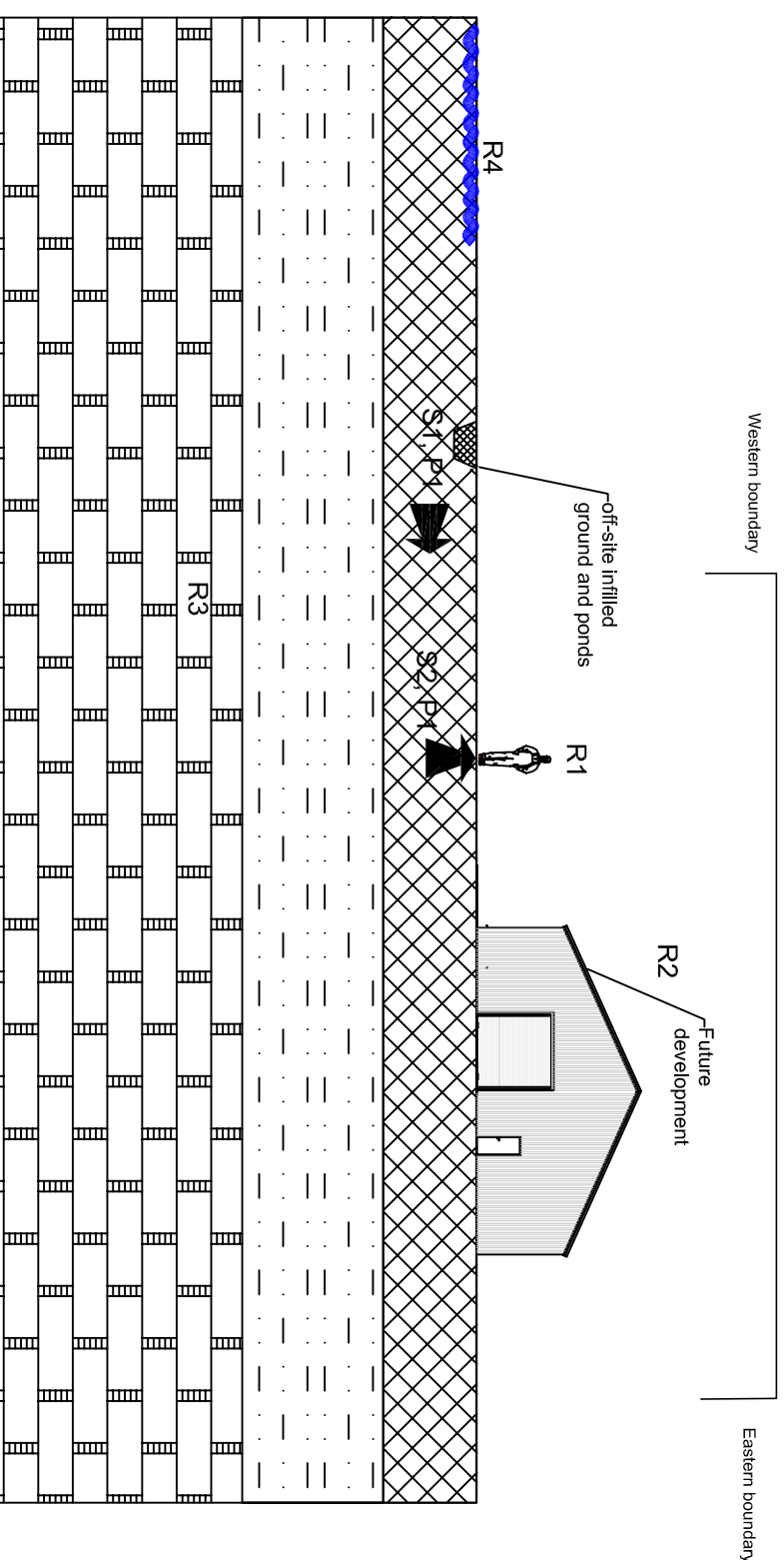
PROJECT TITLE:
 Sunderland Bangladesh International Centre

DRAWING TITLE:
 TP03 TRIAL PIT DRAWING

DRAWING NUMBER:
 D30056/05

DATE:
 August 2023

Cross Section Through the Site (Approximately West to East)



Pollutant Linkages

SOURCE	PATHWAY	RECEPTOR
<ol style="list-style-type: none"> Potential ground gas from off site sources Potential ground gas from made ground on site 	<ol style="list-style-type: none"> Potential migration and inhalation of gas through underlying soil 	<ol style="list-style-type: none"> Human Health (Future occupants, workers) Future development Principal Aquifer Wear Lower Estuary

CLIENT:

Sunderland Bangladesh International Centre

PROJECT TITLE:

Sunderland Bangladesh International Centre

DRAWING TITLE:

Preliminary Conceptual Site Model

DATE:

September 2023

DRAWING NUMBER:

D30056_06_00

REVISION NUMBER:

0

Appendix B
Exploratory Hole Records



INFORMATION GENERALLY RELATING TO ALL EXPLORATORY HOLE RECORDS

GENERAL

Borehole/Trial Pit No

The exploratory hole identity number used throughout the report.

Site

The ground investigation project name.

Client

Client's name responsible for funding the ground investigation project.

Ground Level and Location

The precise ground level in meters above Ordnance Datum at the exploratory hole location from which the reduced level for each stratigraphic boundary is calculated. The exploratory hole position is given as either national grid-coordinates or local grid as specified.

ABBREVIATIONS

Samples

B	Bulk disturbed sample generally representative of the soil type for cohesive and fine granular soils.
BRE	Sample taken for electrochemical testing
C	Core soil samples
CEF	CEFAS Sample
D	Small disturbed tub sample normally taken at intermediate depth between other sampling or testing operations. The sample is stored in an airtight container.
ES	Sample of potentially contaminated materials.
P	Piston Sample
PF	An attempted but failed piston sample
U	100mm diameter undisturbed thick-walled sample (OS-TK/W)
UT	100mm diameter undisturbed thin walled sample (OS-T/W)
UF/UTF	An attempted but failed 100mm undisturbed sample.
W	Water sample.
EW	Water sample for contamination testing

In-situ Testing

CBR	California Bearing Ratio mould sample or test.
SPT	Standard Penetration Test (SPT) using the split barrel sampler (S) or solid cone (C). The corresponding 'N' value is given in the test result column.
SWPen	Self-Weight Penetration
PID	On Site Volatile Headspace Testing by Photo Ionisation Detector
pp	Pocket Penetrometer, report unit: kPa
HVP/HVR	Hand Shear Vane test

Rock Quality and Core Recovery


















TCR	Total core recovery - The length of the recovered core expressed as a percentage of the length of core run.
SCR	Solid Core Recovery - The sum length of all core pieces (measured along the centre of the core), expressed as a percentage of the length of core run.
RQD	Rock Quality Designation- The sum length of all core pieces that are 100mm or longer (measured along the centre of the core), expressed as a percentage of the length of core run.
FI	Fracture Index- The number of fractures per 1000mm length of solid core.
NI	Non-intact- The material recovered in a non-intact state.
NR	No recovery from the core run.
AZCL	Assessed Zone of Core Loss.
NA	Not Applicable

Cobble Content

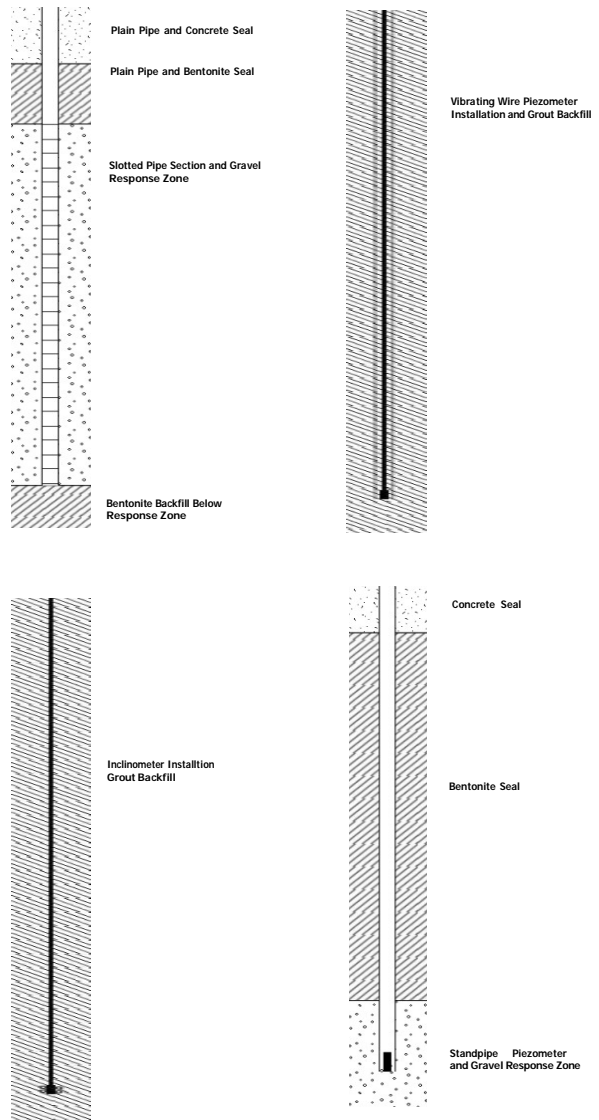
Low <10%, medium 10 – 20%, high >20%

Exploratory Hole Log Legend

BOREHOLE LEGEND:

TOPSOIL	
MADE GROUND	
SILT	
CLAY	
SAND	
GRAVEL	
PEAT	
MUDSTONE	
SILTSTONE	
SANDSTONE	
LIMESTONE	
COAL	
CHALK	
BENTONITE	
GROUT	
ARISINGS	
COBBLES and BOULDERS	

Monitoring Installation Legend:



NB Where strata consists of material of more than one soil or rock type the legends are appropriately combined.



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 web: www.dunelm.co.uk



TRIAL PIT RECORD

TP No.
TP01 Face D

Contract No.: D30056

Site: Tatham Street, Sunderland

Scale 1:25

Client: Sunderland Bangladesh International Centre

Logged By: RJ

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: KJ

Dates: 28/07/2023

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
			1	<p>MADE GROUND: Light grey concrete slab.</p> <p>MADE GROUND: Light grey concrete.</p> <p>MADE GROUND: Light yellowish brown sandy gravel. Gravel is angular to subangular fine to coarse of limestone.</p> <p>MADE GROUND: Light greyish brown slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse of sandstone, limestone and siltstone. Frequent brick and concrete fragments noted. Occasional rootlets and roots up to 10mm in diameter.</p> <p>MADE GROUND: Light grey gravelly sand. Gravel is angular to subrounded fine to coarse of sandstone, limestone brick and siltstone. Rare concrete and metal fragments noted.</p>	0.05 0.05 0.05 0.10 0.10 0.20 0.20 0.40 0.65 1.05	0.05 0.05 0.05 0.10 0.10 0.20 0.20 0.40 0.65 1.05		
			2	End of Trial Pit at 1.05 m				
			3					
			4					
			5					

Remarks 1. No groundwater encountered. 2. Foundation pit terminated due to instability in faces B, C and D.	Ground Water (m)		Excavation Details		Orientation
	Depth	Strike	Remarks	Dimensions: 0.40m x 0.40m	
				Stability: Faces B, C and D unstable from 0.4m to 1.05m	
				Weather: Dry	
			Remarks: Machine Excavated Trial Pit		



TRIAL PIT RECORD

TP No. TP02 Face B

Contract No.: D30056

Site: Tatham Street, Sunderland

Scale 1:25

Client: Sunderland Bangladesh International Centre

Logged By: RJ

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: KJ

Dates: 28/07/2023

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Backfill
Type	Depth From-To (m)	In situ Testing						
				MADE GROUND: Black macadam.	(0.10)			
				MADE GROUND: Light yellowish brown sandy gravel. Gravel is angular to subangular fine to coarse of limestone.	0.10 (0.10)			
				MADE GROUND: Light grey sandy gravel. Gravel is angular to subrounded fine to coarse of sandstone, limestone brick and siltstone. Rare concrete and metal fragments noted. Occasional rootlets noted.	0.20 (0.40)			
				End of Trial Pit at 0.60 m	0.60			
			1					
			2					
			3					
			4					
			5					

Remarks 1. No groundwater encountered. 2. Foundation pit terminated at 0.6m due to proving depth of foundation.	Ground Water (m)		Excavation Details		Orientation	
	Depth Strike	Remarks	Dimensions: 0.40m x 0.80m			
			Stability: Stable.			
			Weather: Dry			
			Remarks: Machine Excavated Trial Pit			



TRIAL PIT RECORD

TP No.
TP03 Face B

Contract No.: D30056

Site: Tatham Street, Sunderland

Scale 1:25

Client: Sunderland Bangladesh International Centre

Logged By: RJ

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: KJ

Dates: 28/07/2023

SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Backfill
Type	Depth From-To (m)	Insitu Testing						
				MADE GROUND: Light grey concrete slab. MADE GROUND: Reddish brown sand. MADE GROUND: Light greyish brown slightly sandy gravelly clay. Gravel is angular to subrounded fine to coarse of sandstone, limestone and siltstone. Frequent brick, metal and concrete fragments noted. Occasional rootlets and roots up to 20mm in diameter noted.	(0.05) 0.05 (0.10) 0.15 (0.60) 0.75			
				End of Trial Pit at 0.75 m				

Remarks 1. No groundwater encountered. 2. Foundation pit terminated at 0.75m due to proving depth of foundation.	Ground Water (m)		Excavation Details		Orientation	
	Depth	Strike	Remarks	Dimensions: 0.40m x 0.40m	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> D A C B </div> 0° </div>	
				Stability: Stable.		
				Weather: Dry		
			Remarks: Machine Excavated Trial Pit			



BOREHOLE RECORD

Borehole WS01

Contract No: D30056

Site: Tatham Street, Sunderland

GL (m AOD) - Scale 1:50
Easting: - Northing: -

Client: Sunderland Bangladesh International Centre

Driller: SA

Logged By:

Sheet 1 of 1

Method: Windowless Sampling

Checked By: KJ

Dates: 28/07/2023

SAMPLE DETAILS

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	In situ Testing						
B	0.05		1	MADE GROUND: Black macadam.	(0.10)			
D	0.15			MADE GROUND: Light yellowish brown sandy gravel. Gravel is angular to subangular fine to coarse of limestone.	0.10			
ES	0.15				(0.10)			
B	0.20 - 0.50			MADE GROUND: Light grey sandy gravel. Gravel is angular to subrounded fine to coarse of sandstone, limestone brick and siltstone. Rare concrete and metal fragments noted.	0.20			
D	0.50				(0.50)			
ES	0.50				0.70			
				End of Borehole at 0.70 m				
			2					
			3					
			4					
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	
												1. Inspection pit terminated at 0.70m due to presence of unknown service.
Log last updated 19/09/2023												



BOREHOLE RECORD

Borehole WS01A

Contract No: D30056

Site: Tatham Street, Sunderland

GL (m AOD) -
Easting: -
Northing: -

Scale 1:50

Client: Sunderland Bangladesh International Centre

Driller: SA

Logged By:

Sheet 1 of 1

Method: Windowless Sampling

Checked By: KJ

Dates: 28/07/2023

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	In situ Testing						
B	0.80 - 1.20			MADE GROUND: Black macadam. MADE GROUND: Light yellowish brown sandy gravel. Gravel is angular to subangular fine to coarse of limestone. MADE GROUND: Light grey sandy gravel. Gravel is angular to subrounded fine to coarse of sandstone, limestone brick and siltstone. Rare concrete and metal fragments noted. Firm light reddish brown to light grey sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone, limestone, mudstone and coal.	(0.10) 0.10 (0.10) 0.20 (0.60) 0.80			
D ES	1.00 1.00	HVP=60 kPa	1.20					
D SPT (S)	1.20 1.20 - 1.65	SWPen=300mm N=1 (/,1,0)						
D ES	1.50 1.50							
D SPT (S)	2.00 2.00 - 2.45	N=8 (1,1/1,2,2,3)	2.00		(2.10)			
D SPT (S)	3.00 3.00 - 3.45	N=24 (14,9/7,7,5,5)	3.00	Medium dense light greyish brown clayey SAND.	2.90			
D SPT (S)	3.50 3.50 - 3.95	N=17 (9,4/5,4,3,5)	3.50		(1.05)			
			4.00	End of Borehole at 3.95 m	3.95			
			5.00					
			6.00					
			7.00					
			8.00					
			9.00					
			10.00					

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water Level (m)	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	
1.20		1.20	20							87 77 67	2.00 3.00 3.95	
Log last updated 19/09/2023												

Appendix C
Chemical Testing Results





Certificate of Analysis

Certificate Number 23-18403

Issued: 17-Aug-23

Client Dunelm Geotechnical & Environmental Ltd
Foundation House
St. John's Road
Meadowfield
Durham
DH7 8TZ

Our Reference 23-18403

Client Reference D30056

Order No PO1021

Contract Title Sunderland Bangladeshi

Description 5 Soil samples.

Date Received 02-Aug-23

Date Started 02-Aug-23

Date Completed 17-Aug-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

A handwritten signature in black ink, appearing to read 'Kirk Bridgewood'.

Kirk Bridgewood
General Manager



2139

Summary of Chemical Analysis

Matrix Descriptions

Our Ref 23-18403

Client Ref D30056

Contract Title Sunderland Bangladeshi

Sample ID	Depth	Lab No	Completed	Matrix Description
WS01	0.05	2212418	17/08/2023	U/S (sample matrix outside MCERTS scope of accreditation)
WS01	0.15	2212419	17/08/2023	Brown very gravelly, sandy CLAY
WS01	0.5	2212420	17/08/2023	Brown sandy CLAY
WS01A	1	2212421	17/08/2023	Brown sandy CLAY
WS01A	1.5	2212422	17/08/2023	Brown sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 23-18403

Client Ref D30056

Contract Title Sunderland Bangladesehi

Lab No	2212418	2212419	2212420	2212421	2212422
Sample ID	WS01	WS01	WS01	WS01A	WS01A
Depth	0.05	0.15	0.50	1.00	1.50
Other ID					
Sample Type	B	ES	ES	ES	ES
Sampling Date	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Metals								
Arsenic	DETSC 2301#	0.2	mg/kg		2.4	8.0	6.4	5.8
Cadmium	DETSC 2301#	0.1	mg/kg		0.1	0.2	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg		4.4	12	20	22
Chromium, Hexavalent	DETSC 2204*	1	mg/kg		< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg		6.3	13	15	20
Lead	DETSC 2301#	0.3	mg/kg		20	260	35	39
Mercury	DETSC 2325#	0.05	mg/kg		< 0.05	0.15	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg		5.2	9.7	15	23
Selenium	DETSC 2301#	0.5	mg/kg		< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg		28	98	57	49
Inorganics								
pH	DETSC 2008#		pH		9.4	9.0	8.3	8.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg		< 0.1	0.3	0.3	0.1
Organic matter	DETSC 2002#	0.1	%		1.6	1.4	1.7	1.0
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l		21	950	40	130
Sulphur as S, Total	DETSC 2320	0.01	%		0.03	0.13	0.02	0.02
Sulphate as SO4, Total	DETSC 2321#	0.01	%		0.07	0.31	0.05	0.06
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg		3.9	5.0	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg		7.7	7.9	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg		14	11	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg		380	51	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg		410	74	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg		< 0.9	2.8	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg		< 0.5	2.8	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg		4.7	6.7	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg		610	110	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg		620	120	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg		1000	200	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01
PAHs								
Naphthalene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03	< 0.03

Summary of Chemical Analysis

Soil Samples

Our Ref 23-18403

Client Ref D30056

Contract Title Sunderland Bangladesehi

Lab No	2212418	2212419	2212420	2212421	2212422
Sample ID	WS01	WS01	WS01	WS01A	WS01A
Depth	0.05	0.15	0.50	1.00	1.50
Other ID					
Sample Type	B	ES	ES	ES	ES
Sampling Date	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Acenaphthylene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg		< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg		0.04	0.11	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg		< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg		0.04	0.11	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg		0.04	0.09	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg		< 0.03	0.04	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg		0.04	0.08	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg		0.06	0.07	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg		0.05	0.04	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg		0.04	0.05	< 0.03	< 0.03
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1				
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1				
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1				
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1				
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1				
Anthracene	DETSC 3301	0.1	mg/kg	0.1				
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1				
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1				
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1				
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1				
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1				
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1				
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1				
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1				
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1				
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1				
Coronene	DETSC 3301*	0.1	mg/kg	< 0.1				
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg		0.31	0.59	< 0.10	< 0.10
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6				
Phenols								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg		< 0.3	< 0.3	< 0.3	< 0.3

Summary of Asbestos Analysis Soil Samples

Our Ref 23-18403

Client Ref D30056

Contract Title Sunderland Bangladeshi

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2212419	WS01 0.15	SOIL	NAD	none	Steven Lambert
2212420	WS01 0.50	SOIL	NAD	none	Steven Lambert
2212421	WS01A 1.00	SOIL	NAD	none	Steven Lambert
2212422	WS01A 1.50	SOIL	NAD	none	Steven Lambert

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 23-18403
 Client Ref D30056
 Contract Sunderland Bangladesehi

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
2212418	WS01 0.05 SOIL	28/07/23	PG		Naphthalene, PAH FID
2212419	WS01 0.15 SOIL	28/07/23	GJ 250ml, GJ 60ml, PT 1L		
2212420	WS01 0.50 SOIL	28/07/23	GJ 250ml, GJ 60ml, PT 1L		
2212421	WS01A 1.00 SOIL	28/07/23	GJ 250ml, GJ 60ml, PT 1L		
2212422	WS01A 1.50 SOIL	28/07/23	GJ 250ml, GJ 60ml, PT 1L		

Key: P-Plastic G-Bag G-Glass 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

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

Appendix D
Geotechnical Testing Results



Laboratory Report Front Sheet

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 033318
info@g2mtesting.co.uk



Site name	Job number
Sunderland Bangladeshi	D30056

Client details:

Reference: D30056
Name: Dunelm
Address: Foundation House,
St John's Road,
Meadowfield,
County Durham,
DH7 8TZ

Telephone: 0191 3783151
Email: RJones@dunelm.co.uk

FAO: Rhys Jones


Samples received:

Date commenced: 04/08/2023
Date reported: 15/08/2023

Observations and interpretations are outside of 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 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 Signatories:
	<input checked="" type="checkbox"/> D.Anderson (Managing Director) <input type="checkbox"/> J. Brischuk (Laboratory Manager) <input type="checkbox"/>

G2M Testing Ltd

Unit 5E Edwardson Road, Meadowfield, Durham DH7 8RL Tel 01913499210 www.g2mtesting.co.uk Company Registration Number 04330408

Concrete Core Log- Sunderland Bangladesh International Centre

LAB008, Version 1 - Nov 2019

Core Reference: D300056 - Core 1

Core dimensions	Length (mm)	205 including 25mm polystyrene base
	Diameter (mm)	300
Aggregate	Maximum Size (mm)	20-Section 1
	Petrological Description	Gravel
	Particle Shape	Sub Angular- Angular
	Distribution	Even
Compaction and Cracks	Mean Excess Voids (%)	0%
	Small Voids (0.5-3mm)	0%
	Medium Voids (3-6mm)	0%
	Large Voids (>6mm)	0%
	Honeycombing	None
	Cracks	None
Reinforcement	Number of Bars	None
	Diameter of bars (mm)	N/A
Other details	Top	Smooth
	Bottom	Smooth - Damproof Membrane Present

Core Logged By: JK Date Logged 28.07.2023

Checked By: MA Date Checked 18.09.2023



Appendix E

Dunelm Conditions of Offer, Notes on Limitations & Basis for Contract



Dunelm Conditions of Offer, Notes on Limitations & Basis for Contract

These conditions accompany our tender and supercede any previous conditions issued. The firm 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 the firm. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from the firm. A charge may be levied against such approval, the same to be made at the discretion of the firm.

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, soil gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. 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.

The firm 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. The firm are not responsible for the action negligent or otherwise of subcontractors or third parties.

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 5.2.7 of BS 10175:2011+A2:2017 in order to confirm the conceptual assumptions, and in accordance with BS5930:2015+A1:2020. 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, the firm 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 the firm in the course of investigation is the property of the firm, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. The firm reserves 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, we will invoice on an interim basis (on completion of fieldwork, on completion of report and on completion of gas monitoring (if applicable)) 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 and additional costs maybe required if ground conditions dictate. We have not allowed for acquiring buried utility/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 the firm, you understand and accept that you/your agent have a contractual relationship with the firm & 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. Dunelm 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. Dunelm have not allowed for subsequent reinstatement as a result of settlement. Should artesian water be encountered the cost of dealing with this would be charged at dayworks plus supervision with any temporary works/materials at cost plus 20%. Should access to the site be restricted for reasons beyond our control such as soft or boggy ground then there may be the requirement for hiring in plant such as a tractor or tracked dumper, the cost of this would be charged at cost plus 20%. Should the site fall into a BDA Red Classification and further protection measures be required, this would be charged at cost plus 20%. The rates we have supplied for geotechnical laboratory testing are for sample recovered from BDA Green and Yellow classified sites. If the site is deemed to be Red we can supply uplifted testing rates on request. No price has been provided or requested for a return visit to remove pipework and covers. 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 the firm agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.the, firm 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. We will also apply the right to claim any associated legal costs incurred with recovery of late payments. The firm is exempt from the CIS Scheme. The firm offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. The company 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 the firm, and we give notice that consequential loss as a direct or indirect result of the firms activities or omission of the same are excluded.

Where the works require a Coal Authority Permit (hereafter referred to as 'the Permit'), we will apply for the Permit in the name of the employer, who, upon accepting the quotation, is deemed to have accepted the Terms and Conditions in respect of the Permit.