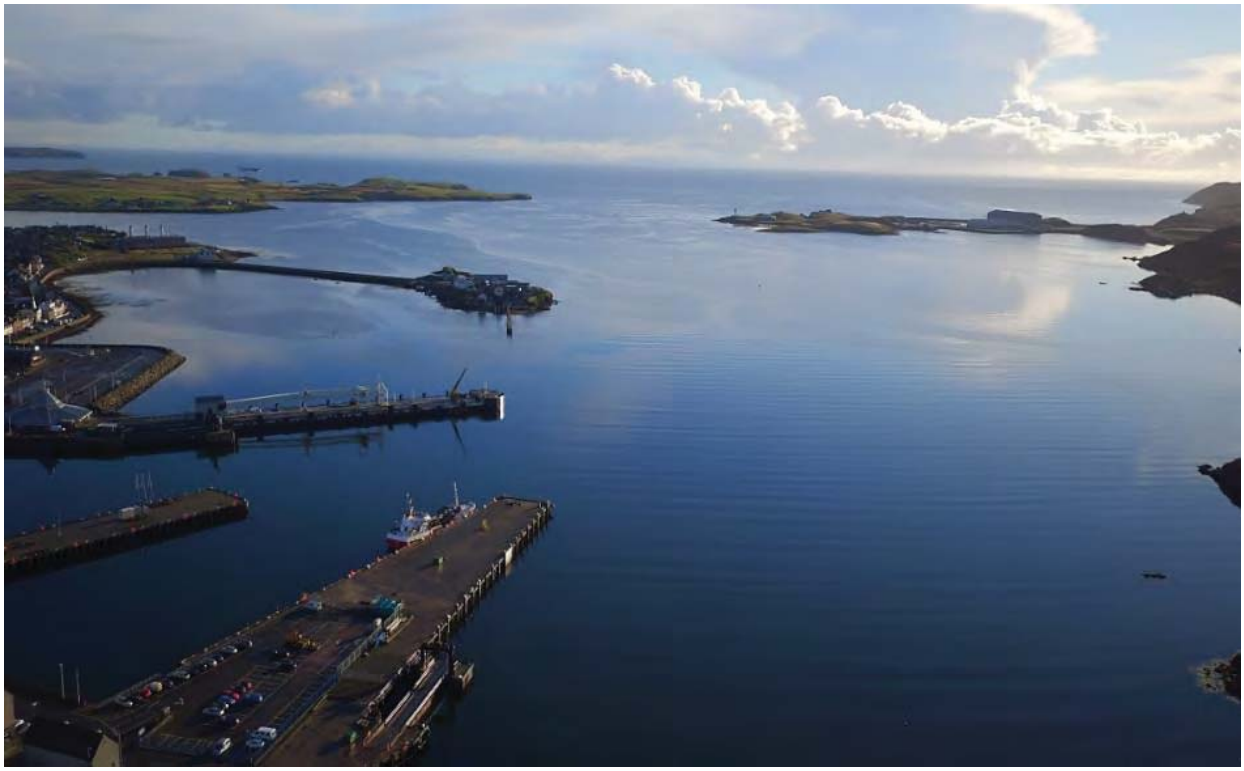
Ref	Start Month	Finish Month	Construction Stage	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Times	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
			support structure)	Excavator	1	68	BS5228 C3. Ref. 23	0.5		75	495	0
				100t crane (lifting)	1	67	BS 5228 C.3 Ref. 28	1		70	462	0
				Cement truck (delivery)	1 per day	80	BS5228 C.4 Ref. 20	0.5		1	4	0
				Cement truck (pour)	1 per day	67	BS5228 C.4 Ref. 24	0.5		25	165	0
11	10	11	Drainage and sewage pump	Excavator (20t) - groundworks	1	71	BS 5228 C.2 Ref. 21	0.5	0700-1800 (660 mins)	70	462	0
				HGV (pipe delivery)	1 per day	80	BS5228 C6 Ref. 21	0.5		1	4	0
12	12	13	Pontoons	100t crane (lifting)	1	67	BS 5228 C.3 Ref. 28	1	0700-2000 (780 mins)	50	390	0
				Multicat workboat with HIAB	1	84	CNP 048	1		75	585	0
				HGV delivery	1 per day	80	BS5228 C6 Ref. 21	0.5		1	4	0
13	12	13	Surfacing	vibrating rollers (20t for compaction)	2	80	BS5228 C.5 Ref. 21	0.5	0700-1900 (720 mins)	90	648	0
				Excavator (30t spreading)	1	76	BS5228 D3 Ref. 61	0.5		75	540	0
				Articulated dump truck; tipping	3	80	BS5228 C1 Ref. 11	1		5	36	0
				Articulated dump truck	3	85	BS5228 C6 Ref. 17	1		15	108	0
				Articulated dump truck delivery	6 per day	85	BS5228 C6 Ref. 17	1		3	24	0
				Articulated dump truck delivery; tipping fill	6 per day	80	BS5228 C1 Ref. 11	1		1	6	0
14	14	14	Services to Pontoons	Cement truck (delivery)	1 per day	80	BS5228 C.4 Ref. 20	0.5	0700-1900 (720 mins)	1	4	0
				Cement truck (pour)	1 per day	67	BS5228 C.4 Ref. 24	0.5		25	165	0
				35t crane (lifting)	1	70	BS5228 C3 Ref. 29	1		20	144	0
15	13	14	Installation of replacement small boatsheds (2 No.)	Cement truck (delivery)	1 per day	80	BS5228 C.4 Ref 20	0.5		1	4	1
				Cement truck (pour)	1 per day	67	BS5228 C.4 Ref 24	0.5		25	165	25
				35t crane (lifting)	1	70	BS5228 C3 Ref. 29	1		20	144	20

Ref	Start Month	Finish Month	Construction Stage	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Times	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
16	14	24	Construction of new boat workshop	Excavator (30t)	1	75	BS5228 C2 Ref. 16	0.5	0700-1900 (720 mins)	75	540	0
				100t crane (lifting)	1	67	BS 5228 C.3 Ref. 28	1		30	216	0
				Excavator (piling)	1	68	BS 5228 C.3 Ref 23	0.5		40	288	0
				Large capacity impact hammer	1	90	BS 5228 D.4 Ref 64b	1		30	216	0
				Cement truck (delivery)	1 per day	80	BS5228 C.4 Ref. 20	0.5		1	4	0
				Cement truck (pour)	1 per day	67	BS5228 C.4 Ref. 24	0.5		25	165	0
				HGV delivery	1 per day	80	BS5228 C6 Ref. 21	0.5		1	4	0
Proposed Fish Processing Factory; Goat Island												
17	2	13	Construction of fish processing factory	Excavator (30t)	1	75	BS5228 C2 Ref. 16	0.5	0700-1900 (720 mins)	75	540	0
				100t crane (lifting)	1	67	BS 5228 C.3 Ref. 28	1		30	216	0
				Excavator (piling)	1	68	BS 5228 C.3 Ref 23	0.5		40	288	0
				Large capacity impact hammer	1	90	BS 5228 D.4 Ref 64b	1		30	216	0
				Cement truck (delivery)	1 per day	80	BS5228 C.4 Ref. 20	0.5		1	4	0
				Cement truck (pour)	1 per day	67	BS5228 C.4 Ref. 24	0.5		25	165	0
				HGV delivery	1 per day	80	BS5228 C6 Ref. 21	0.5		1	4	0

Newton Marina

Technical Appendix 8.1



September 2018

Stornoway Newton Basin – Ground Investigation

INTERPRETATIVE REPORT

Client:	Stornoway Port Authority
Client's Representative:	Wallace Stone Consulting Civil Engineers
Report No.:	17-0769b Interpretative
Date:	27 April 2018
Status:	*Final for Issue*

Causeway Geotech Ltd
8 Drumahiskey Road, Ballymoney
Co. Antrim, N. Ireland, BT53 7QL

+44 (0)28 2766 6640
info@causewaygeotech.com
www.causewaygeotech.com

Registered in Northern Ireland. Company Number: NI610766
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CONTENTS

APPENDICES

Document Control Sheet

Report No.:		17-0769b			
Project Title:		Stornoway Newton Basin – Ground Investigation INTERPRETATIVE REPORT			
Client:		Stornoway Port Authority			
Client's Representative:		Wallace Stone Consulting Civil Engineers			
Revision:	A01	**Status:**	Final for issue	**Issue Date:**	27 April 2018
Prepared by:		**Reviewed by:**		**Approved by:**	
[Redacted] BSc (Hons)		[Redacted] BSc(Hons) MSc FGS		[Redacted] BSc MSc MIEI	

The works were conducted in accordance with:

UK Specification for Ground Investigation 2nd Edition, published by ICE Publishing (2012)

British Standards Institute (2015) BS 5930:2015, Code of practice for site investigations.

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377-2:1990, BS EN ISO 17892-1:2014, and BS EN ISO 17892-2:2014

METHODS OF DESCRIBING SOILS AND ROCKS

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

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler)
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler)
P	Nominal 100mm diameter undisturbed piston sample
B	Bulk disturbed sample
LB	Large bulk disturbed sample
D	Small disturbed sample
C	Core sub-sample (displayed in the Field Records column on the logs)
L	Liner sample from dynamic sampled borehole
W	Water sample
ES / EW	Soil sample for environmental testing / Water sample for environmental testing
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained)
SPT (c)	Standard penetration test using 60 degree solid cone
x,x/x,x,x,x	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length. The length achieved is stated (mm) for any test increment less than 75mm
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm)
N=X/Z	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given test length 'Z' (mm)
V VR	Shear vane test (borehole) Hand vane test (trial pit) Shear strength stated in kPa V: undisturbed vane shear strength VR: remoulded vane shear strength
dd/mm/yy: 1.0 dd/mm/yy: dry	Date & water level at the borehole depth at the end of shift and the start of the following shift
Abbreviations relating to rock core – reference Clause 44.4.4 of BS 5930: 2015	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.

Stornoway Newton Basin

1 AUTHORITY

On the instructions of Wallace Stone Consulting Civil Engineers, ("the Client's Representative"), acting on the behalf of Stornoway Port Authority ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical information for input to the design and construction of a proposed new Newton Basin Marina structure and associated soft sediment dredging programme.

This report details the work carried out both on site and in the geotechnical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results. A discussion on the recommendations for construction is also provided.

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

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

2 SCOPE

The extent of the investigation, as instructed by the Client's Representative, included marine boreholes, soil sampling, in-situ and laboratory testing, and the preparation of a report on the findings including recommendations for construction.

3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted around the existing Newton basin area to the east of Stornoway Harbour.

The boreholes were put down at given locations within the Newton Basin and western approach.

4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between 15th February 2018 and 2nd March 2018, comprised:

- Eight marine light cable percussion boreholes
- Six marine boreholes with rotary follow-on
- Soil and rock core sampling
- In-situ testing of soils
- Sediment samples for Marine Scotland Dredge Analysis

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

4.2 Marine Plant

The OCM80 jack-up barge was deployed for the duration of the site works. OCM80 is a Combi-float C5 modular jack-up barge in a ten-pontoon configuration joined and secured with a simple pinning system. The jack-up barge sits on four 28m spudded legs with associated hydraulic rams and can be operated in both spudded (floating) or jack-up modes.

The barge was contracted and operated through Ocean Crest Marine for the duration of the site works. Boreholes were sunk through an integral moonpool through one of the pontoons which make up the main deck of the jack-up barge.

Ocean Crest Marine also provided the marine support vessels OCM Supporter and OCM Fortess to assist with crew transfers and barge movements respectively.

4.3 Boreholes

4.3.1 Light cable percussion boreholes

Eight No boreholes (BH33-BH40) were put down to completion in minimum 200mm diameter using one Dando 3000 light cable percussion boring rig. All boreholes were terminated either at their scheduled completion depths, or else on encountering virtual refusal on obstructions, including large boulders and weathered bedrock

Disturbed (bulk and small bag) samples were taken within the encountered strata. Undisturbed (UT100 and U100) samples were taken where appropriate and as directed within cohesive soils. Environmental samples were taken at standard intervals, as directed by the Client's Representative.

Standard penetration tests were carried out in accordance with EC7 at standard depth intervals using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix H.

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

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

Appendix B presents the borehole logs.

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

Six boreholes (BH33-BH35, BH37-BH39) were put down by a combination of light cable percussion boring and rotary follow-on drilling techniques with core recovery in bedrock. Where the cable percussion borehole had not been advanced onto bedrock, rotary coring methods were employed to advance the borehole to completion/bedrock.

Standard penetration tests were carried out in accordance with EC7 at standard depth intervals throughout the overburden using the split spoon sampler ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix H.

The core was extracted in up to 1.5m lengths using a SK6L GeoborS core barrel, which produced core of nominal 103mm diameter, and was placed in single channel wooden core boxes.

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

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

4.4 Surveying

The as-built exploratory hole positions were surveyed throughout the project by the Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R8S GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (UK National Grid) and ground elevation (mCD) at each location are recorded on the individual exploratory hole logs. The exploratory hole plan presented in Appendix A shows these as-built positions.

5 LABORATORY WORK

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

5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests and particle size distribution analysis.
- **shear strength** (total stress): unconsolidated undrained triaxial tests
- **direct shear:** shear box tests
- **soil chemistry:** pH, and water-soluble sulphate

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

The test results are presented in Appendix D.

5.2 Geotechnical laboratory testing of rock

Laboratory testing of rock sub-samples comprised:

- point load index

Test	Test carried out in accordance with
Point load index	ISRM Suggested Methods (1985) Suggested method for determining point-load strength. Int. J. Rock Mech. Min. Sci. Geomech. Abstr. 22, pp. 53–60

The test results are presented in Appendix D.

5.3 Marine Scotland Analysis – Pre-Disposal Dredge Sampling

In addition to geotechnical testing conducted on soils, environmental samples were selected at standard intervals for chemical testing relating to disposal at sea parameters.

Sampling was carried out in accordance with Marine Scotland's "Guidance for The Sampling and Analysis of Sediment and Dredge material to be Submitted in Support of Applications for Sea Disposal of Dredged Material" 2011.

All 7 sample locations extended to between -5.00mCD and -8.00m CD with sample intervals as required by the above document. Two samples were recovered at each location and depth for separate testing of (a) Metals and particle size and (b) Organic carbon and organic chemicals.

Testing was conducted to determine chemical concentrations to allow assessment of disposal of dredged material at sea.

The dredge analysis test results are included in Appendix E; a summary table showing the Marine Scotland Pre-disposal Sampling Guidance Action Levels has also been included before the RPS lab results.

5.4 Environmental laboratory testing of soils

In addition, environmental testing, was conducted on selected environmental soil samples by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out for a range of determinants, including:

- Metals
- Tributyl Tin (TBT)
- Total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- PCB (7 congeners)

Waste acceptance criteria (WAC) testing was carried out on four samples.

Results of the environmental laboratory testing are presented in Appendix F.

6 GROUND CONDITIONS

6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise marine-derived sands and gravels overlying glacial till. These deposits are underlain by locally sourced conglomerates of the Early Triassic Stornoway Formation.

6.2 Ground types encountered during investigation of the site

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

- **Marine sands and gravel deposits:** Typically loose to medium dense sands and gravels with low to medium cobble content; occasionally with localised pockets of firm sandy gravelly silts/clays throughout. Where encountered at depth tend to be dense to very dense.
- **Glacial Till:** Sandy gravelly silty clay, frequently with low to medium cobble content, typically firm to stiff in upper horizons, becoming stiff to very stiff with increasing depth.
- **Bedrock (conglomerate):** The rockhead was encountered at varying depths ranging from 0.40mbgl (-1.71mCD) in BH33 to a maximum depth of 14.80mbgl (-14.06mCD) in borehole BH39. There were no obvious signs of rockhead in either BH36 or in BH40; terminated at 11.00mbgl (-10.04mCD) and 3.20mbgl (-4.45mCD) respectively.

Representative geological long sections showing the rockhead profile in the area of the proposed new Marina Facility are provided in Appendix G.

6.3 Groundwater

Groundwater was not noted during drilling at any of the borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any groundwater strikes encountered and the possibility of encountering groundwater during excavation works should not be ruled out. Seasonal variation in groundwater levels should also be factored into design considerations.

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

7 DISCUSSION

7.1 Proposed construction

It is proposed to construct a new Marina Facility within the existing Newton Basin to the east of the main Stornoway Harbour area.

The works for the Newton basin Marina Facility will include:

- New retaining wall structure (pre-cast cantilever retaining wall with spread footings)
- Boat hoist structure (axially loaded cantilever piles)
- Pontoon arrangement (cantilever piled moorings)
- Associated dredging programme

Limited information has been provided at this stage and any designs based on the recommendations or conclusions within this report should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory holes. Causeway Geotech were commissioned to provide a geotechnical report, and it is outwith our remit to advise on structure design.

7.2 Recommendations for construction

7.2.1 Proposed New Marina Structures

7.2.1.1 Piled Foundations – Retaining Wall, Boat Hoist Structure, and Pontoons

The ground conditions along the lines of the proposed new Newton Marina structures are highly variable; marine beach deposits, with some occurrences of glacial till material, and a highly irregular rockhead level. This will render the implementation of any shallow design solution problematic. Based on the proposals it follows that a piled solution may be used to transfer the loadings to depth.

The ultimate effective angle of shearing resistance, Φ', as determined by the small shear box tests in the geotechnical laboratory on representative samples of soils encountered, was found to be in the order of 33-35 degrees. The effective cohesion, c', unless obtained through shear box testing, should be taken as zero given the prevalence of coarse grained soils interbedded with cohesive strata throughout.

Potential founding strata are as follows; this will be confirmed by the specialist piling contractor:

- BH36: Dense to very dense sandy Gravel; encountered at 9.80mbgl (-8.85mCD). No bedrock was encountered in BH36; completion depth was 11.00mbgl (-10.04mCD).

- BH37: Stiff to very stiff sandy gravelly Clay; encountered at 3.90mbgl (-2.80mCD). Extremely weak to weak Conglomerate encountered at 5.40mbgl (-4.30mCD).

- BH38: Very stiff sandy gravelly Clay; encountered at 5.10mbgl (-4.42mCD). Extremely weak to weak Conglomerate encountered at 5.50mbgl (-4.82mCD).

- BH39: Dense silty Sand; encountered at 10.30mbgl (-9.56mCD). Weak Conglomerate (weak to medium strong clast of gneiss) encountered at 14.80mbgl (-14.06mCD).

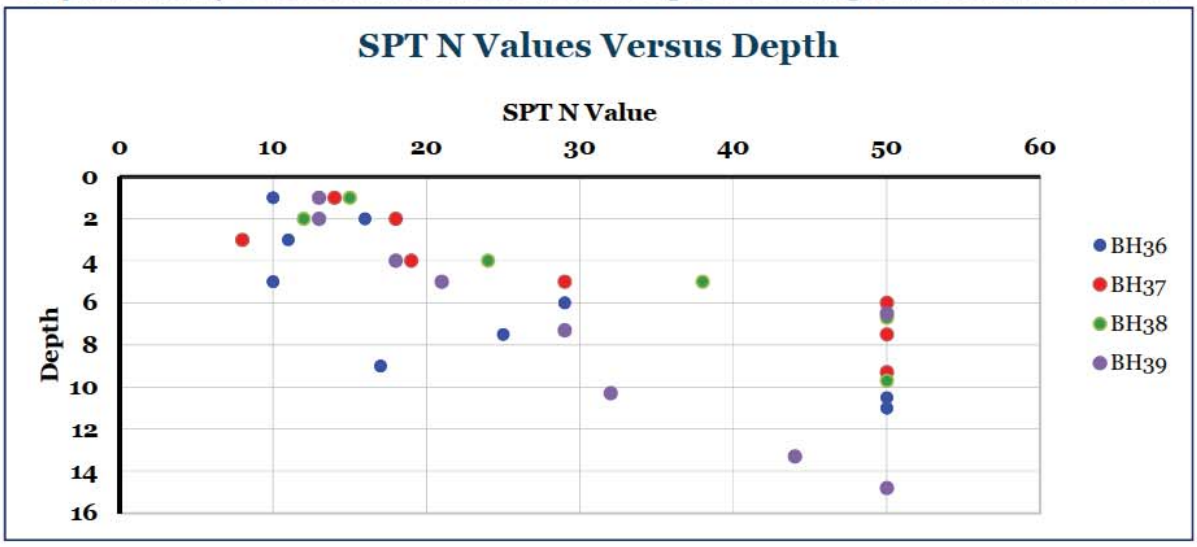
Table 1: Ground parameters for bearing piles derived from in-situ testing and laboratory results

Location	Depth (mbgl)	Strata Description	Pile base bearing capacity	Bulk Density (Mg/m³)	Angle of Shearing Resistance Φ (Degrees)	Effective Cohesion C' (kPa)
BH36	2.00	Medium dense sandy Gravel	100 kPa	-	30.00	-
	4.00	Firm sandy gravelly Clay	43 kPa	1.68	-	-
	7.00	Medium dense sandy Gravel (REMOULDED)	250 kPa	2.03, 2.04, 2.04	33.00	20.00
	9.00	Medium dense sandy Gravel	170 kPa	-	32.00	-
	11.00	Very dense sandy Gravel	>300 kPa	-	42.00	-
	No rockhead encountered during drilling works at this location					
BH37	1.00	Medium dense sandy Gravel	140 kPa	-	31.00	-
	2.00	Medium dense sandy Gravel	180 kPa	-	32.00	-
	3.00	Loose sandy Gravel	80 kPa	-	29.00	-
	4.00	Stiff sandy gravelly Clay	190 kPa	-	-	-
	6.00	Weak CONGLOMERATE	18 MPa	-	-	-
BH38	1.00	Medium dense sandy Gravel	150 MPa	-	32.00	-
	3.10	Very soft sandy gravelly Clay	12 MPa	1.80	-	-
	5.00	Very stiff sandy gravelly Clay	380 kPa	-	-	-
	6.60	Extremely weak CONGLOMERATE	0.6 MPa	-	-	-
	8.10	Medium strong CONGLOMERATE (constituent clast, not matrix)	32 MPa	-	-	-
	9.70	Weak CONGLOMERATE	20 MPa	-	-	-
BH39	1.00	Medium dense sandy Gravel	130 kPa	-	31.00	-
	3.00	Soft silty Clay	36 kPa	1.81	-	-
	5.00	Medium dense sandy Gravel	210 kPa	-	33.00	-
	8.00	Medium dense silty Sand (REMOULDED)	290 kPa	1.86, 1.87, 1.87	35.00	8.00

Location	Depth (mbgl)	Strata Description	Pile base bearing capacity	Bulk Density (Mg/m³)	Angle of Shearing Resistance Φ (Degrees)	Effective Cohesion C' (kPa)
	12.00	Medium dense silty Sand (REMOULDED)	320 kPa	1.90, 1.91, 1.90	35.00	4.00
	15.80	Extremely weak CONGLOMERATE	0.6 MPa	-	-	-
	16.30	Weak CONGLOMERATE	14 MPa	-	-	-
	17.70	Very strong CONGLOMERATE (constituent clast, not matrix)	148 MPa	-	-	-
	18.00	Weak CONGLOMERATE	16 MPa	-	-	-
	18.50	Strong CONGLOMERATE (constituent clast, not matrix)	66 MPa	-	-	-

An indication of standard penetration test results against depth has been carried out and is summarised in the graph provided below.

Graph 1: Summary of SPT *N* Values across the areas investigated – Retaining Wall, Boat Hoist, & Pontoons



The specialist piling contractor may propose either driven piles into medium dense granular/very stiff cohesive soils or drilled piles into the underlying conglomerate bedrock.

In all instances above, it is recommended that the advice of specialist contractors is sought out at an early stage to ensure the correct methods and pile specifications are selected with regard to the site-specific ground conditions.

Pile driving conditions will vary across the site through local variations in ground conditions, further accentuated by the presence of cobbles and/or boulders. The ultimate load capacity of the piles should be determined by the execution of in-situ dynamic load tests.

7.2.2 Proposed Dredge Operation

7.2.2.1 Seabed Material

The proposed dredge area encompasses over half the site area. There are 8 exploratory hole locations within the dredge area; 7 of these were selected for Marine Scotland Analysis to inform the requirements for the disposal of the dredge material.

The table below lists the depth to sea bed at each of the 8 borehole locations within the proposed dredge zone, estimated thickness of the soft marine sediments, and the depth to more competent strata (all depths given in mCD).

Table 2: Summary of marine sediment material encountered at each dredge borehole location

Location	Depth to Loose / med. dense Sediment (mCD)	Thickness of sediment (m)	Sediment Description	Depth to dense/very dense material (mCD)	Strata Description
BH33	-1.31	0.40	Sandy Gravel	-1.71	Weak Conglomerate
BH34	0.91	3.10	Loose to medium dense sandy Gravel	-2.39	Extremely weak to very weak Conglomerate
BH35	1.04	4.00	Medium dense sandy Gravel, medium dense Cobbles, and stiff Clay	-2.96	Extremely weak to weak Conglomerate
BH36	0.96	9.80	Medium dense sandy Gravel / gravelly Sand, firm Clay	-8.85	Dense to very dense sandy Gravel
BH37	1.10	5.40	Loose to medium dense silty sandy Gravel, stiff to very stiff Clay	-4.30	Extremely weak to weak Conglomerate
BH38	0.68	5.50	Medium dense sandy Gravel, very stiff Clay	-4.82	Extremely weak to weak Conglomerate
BH39	0.75	10.30	Medium dense sandy Gravel, Medium dense gravelly Sand, soft to firm Clay, firm to stiff Clay	-9.56	Dense silty Sand
BH40	-1.25	2.40	Medium dense sandy Gravel	-3.65	Very dense silty sandy Gravel

The proposed depth of the dredge for the Newton Basin Marina Facility will be -3.00mCD as advised in the scope of works. The majority of the dredge area has a blanket covering of either medium dense granular or firm to stiff cohesive marine sediments ranging from 0.40 to 10.30m in thickness; average around 4.00m thick. These overlie dense granular material or extremely weak to weak conglomerate bedrock; recovered as sandy gravels and gravelly sands which would be easily excavatable by any proposed dredging operation.

Shallow rockhead was found in a number of the borehole locations within the proposed dredging area above -3.00mCD; BH33 (-1.71mCD), BH34 (-2.39mCD), and BH35 (-2.96mCD). Where encountered the rockhead was extremely weak to weak and would be classed as hard digging to easy ripping on the rippability index.

The shallowest occurrence of rockhead is in BH33 where a weak Conglomerate is encountered at -1.71mCD. This location was intended to mark the entrance to the new Marina Facility. However, on encountering the rockhead at shallow depths, BH40 was put down to assess the possibility of moving the entrance channel to the south. Subsequently, the rockhead was not encountered in BH40 which terminated in very dense gravels at -4.45mCD. It is therefore advised the entrance to the Marina Facility is moved to the south to ensure the dredge operation encounters the minimum volume of rockhead.

7.2.3 Leachate and Waste Acceptance Criteria Analysis

7.2.3.1 Material re-use

It is proposed to re-use all of the acceptable dredged material to backfill behind the proposed retaining wall.

Forty-eight selected soil samples were analysed for a range of potential contaminants including:

- Metals
- Tributyl Tin (TBT)
- Total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- PCB (7 congeners)

In the initial examination of the potential risk of site contamination, the laboratory results have been compared to the following available assessment criteria relevant to the proposed land use:

- SEPA Statutory EQS values for Marine Sediments published in 2004. These relate to arsenic (dissolved), cadmium (dissolved), chromium (dissolved), copper (dissolved), mercury (dissolved), nickel (dissolved), lead (dissolved), and zinc (dissolved).

The results from the samples do not identify significantly elevated concentrations for the compounds analysed over the majority of the site area. A few instances of elevated levels of chromium (Cr) and Nickel (Ni) were observed in BH34 at 1.00m (-0.09mCD) and 2.50m (-1.59mCD) and in BH35 at 1.00m (0.04mCD). Elevated levels of Copper (Cu) were also noted in BH40 at 1.00m (-2.25mCD).

It should be noted that the above assessment is based on the results of the soil samples against available criteria. No assessment has been made where criteria is not available. Any potential contamination identified during site development by visual or olfactory means should be investigated, including further laboratory testing, and appropriate health & safety, waste disposal and remediation measures adopted.

From the four samples tested for WAC analysis material from the site may potentially be classified as inert/non-hazardous. It is noted however that the recorded concentrations of chloride and total dissolved solids in two of the four samples falls just above the threshold for inert/non-hazardous and would classify this material as stable non-reactive hazardous waste. Any material excavated for off-site disposal would require further Waste Classification analysis and WAC testing and would have to be classified under the SEPA Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3.

7.2.4 Soil strength parameters

When estimating the shear strength of cohesive soils (silt/clay), reference is made to the results of Standard Penetration Tests (SPT's) carried out within the boreholes. The undrained shear strength of cohesive soils can be estimated using the correlation developed by Stroud & Butler:

$$C_u = f_1 \times N$$

where f_1 is typically in the range 4 to 6. A median f_1 value of 5 is adopted for this report.

For granular soils (sand/gravel), a graphical relationship between SPT "N" value and angle of shearing resistance, φ, has been developed by Peck, Hanson and Thorburn. This is published in *Foundation Design and Construction* (Tomlinson, 2001) and is referenced in this report when deriving angles of shearing resistance for the granular soils.

7.2.5 Soil aggressivity

An assessment of the Aggressive Chemical Environment for Concrete (ACEC) was undertaken through reference to the Building Research Establishment (BRE) Special Digest 1 (2005).

As noted by BRE Special Digest 1, sulphates in the soil and groundwater are the chemical agents most likely to attack concrete. The extent to which sulphates affect concrete is linked to their concentrations, the type of ground, the presence of groundwater, the type of concrete and the form of construction in which concrete is used.

BRE Special Digest 1 identifies four different categories of site which require specific procedures for investigation for aggressive ground conditions:

- Sites not subjected to previous development and not perceived as containing pyrite;
- Sites not subjected to previous development and perceived as containing pyrite;
- Brownfield sites not perceived as containing pyrite;

- Brownfield sites perceived as containing pyrite.

For the purposes of this report the site was classified as not having been subject to previous development and not perceived as containing pyrite.

The results of chemical tests (pH and water-soluble sulphate contents) on soil samples indicate Design Sulphate Class DS-3 and ACEC Class AC-3 – reference Table C1 of BRE Special Digest 1 (Building Research Establishment, 2005).

The Special Digest will require measures to protect underground concrete elements; reference should be made to the *Building Research Establishment (2005) BRE Special Digest 1, Concrete in aggressive ground* documentation by the nominated Geotechnical Design Engineer.

8 REFERENCES

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

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

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

Construction Industry Research and Information Association (CIRIA). 1993. Research Project 369. The Standard Penetration Test (SPT): Methods and Use. CIRIA. London.

BS EN ISO 14688-1: 2002: Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

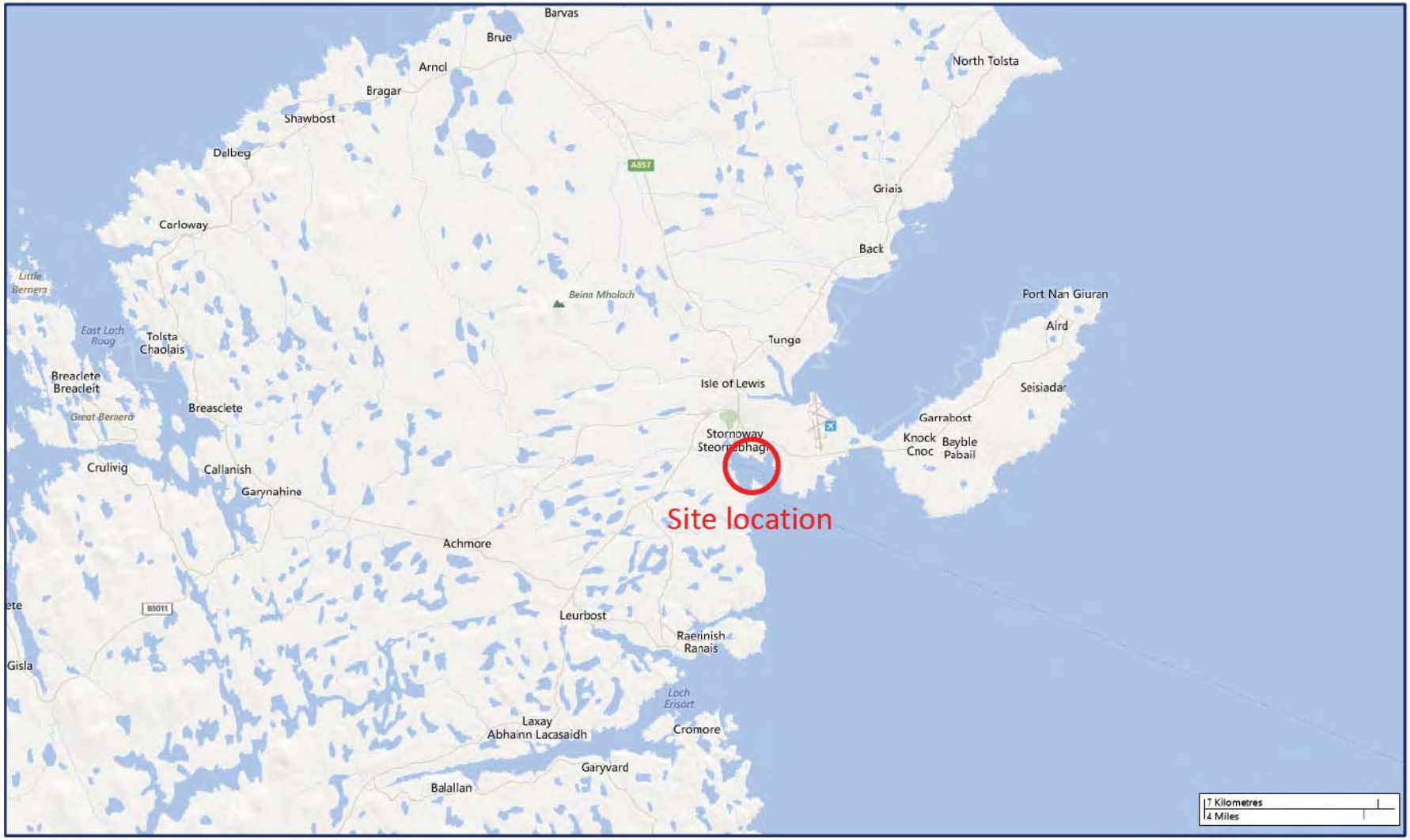
Building Research Establishment (2005) BRE Special Digest 1, Concrete in aggressive ground.

Guidance for The Sampling and Analysis of Sediment and Dredge material to be Submitted in Support of Applications for Sea Disposal of Dredged Material (2011)

CAUSEWAY GEOTECH

APPENDIX A

Site and exploratory hole location plans


Barvas
Brue
Arnol
Bragar
Shawbost
Dalbeg
Carloway
Little Bernera
East Loch Roag
Tolsta Chaolais
Breaclete Breacleit
Great Bernera
Breasclete
Crulivig
Callanish
Garynahine
Achmore
Leurbost
Raerinish Ranais
Loch Erisort
Laxay Abhainn Lacasaidh
Cromore
Garyvard
Balallan
Gisla
B8011
A857
Beinn Mholach
North Tolsta
Griais
Back
Port Nan Giuran
Aird
Tunga
Isle of Lewis
Seisiadar
Garrabost
Knock Cnoc
Bayble Pabail
Stornoway Steornabhagh
Site location
7 Kilometres
4 Miles


Newton Street
Inaclete Road
Bells Road
Inaclete Road
Newton Street
Barraid na MaraSeay
Lewis
Lewis
BH33
BH34
BH35
BH36
BH37
BH38
BH39
BH40
Battery Point
100 Metres
300 Feet

CAUSEWAY GEOTECH

APPENDIX B

Borehole logs

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH33
	Coordinates: 142535.25 E 932393.30 N	Client: Stornoway Port Authority	Sheet 1 of 1
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: -1.31 mCD	Dates: 01/03/2018	Driller: [Red Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	0.40
Rotary Coring	Comacchio 405	0.40	3.60

Depth (m)	Sample / Tests		Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0 00 - 0.40	B3						(0.40)		Dark grey slightly sandy subrounded fine to coarse GRAVEL with shells. Sand is fine to coarse.		
0.40	ES1 ES2 SPT (C)		0.40		ES1 ES2 50 (25 for 15mm/50 for 25mm)	-1.71	0.40		Weak reddish brown and grey poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix. Clasts are up to 160mm. Partially weathered: reddish brown discolouration penetrating sand matrix, reduced strength. Discontinuities: 1. 0 to 30 degree bedding fractures, closely spaced (80/100/160) stepped, rough, reddish brown staining along bedding fracture with sand matrix infill.		
0.40 - 0.44	62	7	0	NA			(3.20)				
2.10	66	35	16	11					*3.20m to 3.60m: Cement quality increasing and clast size decreasing.*		
3.60						-4 91	3.60		End of Borehole at 3.60m		
	TCR	SCR	RQD	FI							

Remarks
Deck to Bed = 7.90m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					0.20	0.40	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			0.40	200

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH34
	Coordinates: 142633.01 E 932394.98 N	Client: Stornoway Port Authority	Sheet 1 of 2
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.91 mCD	Dates: 28/02/2018	Driller [
			Logger [

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	3.30
Rotary Coring	Comacchio 405	3.30	6.30

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0 00 - 1.00	B1							Loose grey slightly silty very sandy subrounded fine to coarse GRAVEL with shells. Sand is fine to coarse.		
0 50	ES13 ES7									0.5
1 00	D5 ES14 ES8					(2.00)				1.0
1 00 - 2.00	B2									
1 00 - 1.45	SPT (S) N=8			N=8 (1,2/2,2,2,2)						
1 50	ES15 ES9									1.5
2 00	D6 ES10 ES16				-1 09	2.00		Medium dense reddish brown slightly clayey sandy subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		2.0
2 00 - 2.45	SPT (S) N=11			N=11 (2,2/3,3,2,3)						
2 50	ES11 ES17					(1.10)				2.5
2.60 - 3.10	B3									
3 00	ES12 ES18									3.0
3.10 - 3.30	B4				-2.19	3.10 (0.20)		Reddish grey sandy gravelly subangular to subrounded COBBLES predominantly of gneiss. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
3 30 - 3.37	SPT (S)			50 (25 for 30mm/50 for 40mm)	-2 39	3.30		Extremely weak to very weak dark red and brown poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix - recovered as very dense dark red and brown slightly sandy subrounded to subangular fine to coarse GRAVEL predominately of gneiss. Sand is fine to coarse.		
3 30 - 3.37	77	0	0	50 (25 for 30mm/50 for 40mm)		(3.00)				3.5 4.0 4.5
4 80 - 4.90 4 80				50 (25 for 40mm/50 for 60mm)						5.0
	TCR	SCR	RQD	FI						

Remarks
Deck to Bed = 5.40m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					3.10	3.30	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			3.30	200

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH34
	Coordinates: 142633.01 E 932394.98 N	Client: Stornoway Port Authority	Sheet 2 of 2
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.91 mCD	Dates: 28/02/2018	Driller: [Red Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	3.30
Rotary Coring	Comacchio 405	3.30	6.30

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	20	0	0						Extremely weak to very weak dark red and brown poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix - recovered as very dense dark red and brown slightly sandy subrounded to subangular fine to coarse GRAVEL predominately of gneiss. Sand is fine to coarse.		
6 30 - 6.39 6 30					50 (25 for 30mm/50 for 60mm)	-5 39	6.30		End of Borehole at 6 30m		

5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

TCR	SCR	RQD	FI

Remarks
Deck to Bed = 5.40m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					3.10	3.30	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH35
	Coordinates: 142674.13 E 932361.04 N	Client: Stornoway Port Authority	Sheet 1 of 2
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 1.04 mCD	Dates: 27/02/2018 - 28/02/2018	[Red
			Logger [

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	4.10
Rotary Coring	Comacchio 405	4.10	6.70

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0 00 - 1.00	B16							Medium dense reddish brown slightly sandy subrounded fine to coarse GRAVEL with low cobble content and shells. Sand is medium to coarse. Cobbles are subrounded to rounded.		
0 50	ES1 ES2									0.5
1 00	D21 ES3 ES4					(2.00)				1.0
1 00 - 2.00	B17									
1 00 - 1.45	SPT (S) N=15	1.00		N=15 (2,2/3,3,4,5)						
1 50	ES5 ES6									1.5
2 00	D22 ES7 ES8				-0 96	2.00		Medium dense grey silty sandy gravelly subangular to subrounded COBBLES with shell fragments. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		2.0
2 00 - 2.50	B18					(0.50)				
2 00 - 2.45	SPT (S) N=19	2.00		N=19 (3,5/6,5,4,4)						
2 50	ES10 ES9				-1.46	2.50		Stiff brown slightly sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		2.5
2 50 - 3.20	B19					(0.70)				
3 00	D23 ES11 ES12									3.0
3 00 - 3.45	SPT (S) N=23	3.00		N=23 (3,4/5,5,6,7)	-2.16	3.20		Medium dense brown and grey slightly silty very sandy subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular.		
3 20 - 4.00	B20									
3 50	ES13 ES14					(0.80)				3.5
4 00	D24 ES15 ES25				-2 96	4.00		Extremely weak to weak dark red and brown poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix - recovered as very dense dark red and brown slightly sandy subrounded to subangular fine to coarse GRAVEL predominately of gneiss. Sand is fine to coarse.		4.0
4 00 - 4.14	SPT (S)	4.00		50 (25 for 75mm/50 for 65mm)						
	81 0 0									4.5
										5.0
	TCR SCR	RQD	FI							

Remarks
Deck to Bed = 4.50m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					4.00	4.10	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			4.10	200

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH35
	Coordinates: 142674.13 E 932361.04 N	Client: Stornoway Port Authority	Sheet 2 of 2
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 1.04 mCD	Dates: 27/02/2018 - 28/02/2018	Driller [
			Logger [

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	4.10
Rotary Coring	Comacchio 405	4.10	6.70

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
5 20	23	0	0	NI			(2.70)		Extremely weak to weak dark red and brown poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix - recovered as very dense dark red and brown slightly sandy subrounded to subangular fine to coarse GRAVEL predominately of gneiss. Sand is fine to coarse.		
6.70 - 7.10 6.70					N=50 (8,11/50 for 250mm)	-5.66	6.70		End of Borehole at 6.70m		

5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

Remarks
Deck to Bed = 4.50m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					4.00	4.10	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH36
	Coordinates: 142701.06 E 932320.76 N	Client: Stornoway Port Authority	Sheet 1 of 3
Method: Cable Percussion; Plant Used: Dando 3000; Top: 0.00; Base: 11.00		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.96 mCD	Dates: 24/02/2018 - 26/02/2018	[Red [acted R]

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0 00 - 1.00	B21							Medium dense reddish brown and grey slightly silty very sandy subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded to rounded.		
0 50	ES1 ES2									0.5
1 00	D24 ES3 ES4									1.0
1 00 - 2.00	B22									
1 00 - 1.45	SPT (S) N=10	1.00		N=10 (1,2/2,3,2,3)						
1 50	ES5 ES6									1.5
						(3.60)				
2 00	D25 ES7 ES8									2.0
2 00 - 3.00	B23									
2 00 - 2.45	SPT (S) N=16	2.00		N=16 (2,3/3,4,4,5)						
2 50	ES10 ES9									2.5
3 00	D26 ES11 ES12									3.0
3 00 - 3.50	B27									
3 00 - 3.45	SPT (S) N=11	3.00		N=11 (2,2/3,4,2,2)						
3 50	ES13 ES14									3.5
					-2.64	3.60				
3.60 - 4.00	B28							Firm grey slightly sandy slightly gravelly slightly silty organic CLAY . Sand is fine to coarse. Gravel is subrounded fine to medium.		
4 00	D29 ES15 ES16									4.0
4 00 - 4.45	UT35	4.00		Ublow=21 100%						
4 00 - 5.00	B32									
						(2.00)				
4 50	ES17 ES18									4.5
5 00	D30 ES19 ES20									5.0

Remarks
Deck to Bed = 4.70m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH36
	Coordinates: 142701.06 E 932320.76 N	Client: Stornoway Port Authority	Sheet 2 of 3
Method: Cable Percussion; Plant Used: Dando 3000; Top: 0.00; Base: 11.00		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.96 mCD	Dates: 24/02/2018 - 26/02/2018	Driller: [
			Logger: [R

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
5 00 - 5.45	SPT (S) N=10	5.00		N=10 (2,2/2,2,3,3)				Firm grey slightly sandy slightly gravelly slightly silty organic CLAY . Sand is fine to coarse. Gravel is subrounded fine to medium.		
5.60 - 6.00	B33				-4.64	5.60		Medium dense dark grey and black slightly silty very gravelly fine to coarse SAND. Gravel is subangular fine to coarse.		
6 00 6 00 - 6.50 6 00 - 6.45	D31 B34 SPT (S) N=29	6.00		N=29 (3,4/6,6,8,9)		(0.90)				
6 50 - 7.00	B36				-5 54	6.50 (0.50)		Reddish brown and grey slightly silty very sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
7 00 - 8.00	B39				-6 04	7.00		Medium dense reddish brown and grey silty very sandy subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
7 50 7 50 - 7.95	D37 SPT (S) N=25	7.50		N=25 (4,4/5,7,7,6)						
8 00 - 9.00	B40					(2.80)				
9 00 9 00 - 9.80 9 00 - 9.45	D38 B41 SPT (S) N=17	9.00		N=17 (2,3/4,4,4,5)						
9 80 - 11 00	B42				-8 85	9.80		Dense to very dense brown silty clayey very sandy subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		

Remarks
Deck to Bed = 4.70m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH36
	Coordinates: 142701.06 E 932320.76 N	Client: Stornoway Port Authority	Sheet 3 of 3
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.96 mCD	Dates: 24/02/2018 - 26/02/2018	Driller: [
			Logger: [R

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	11.00

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.50 - 10.85	SPT (S)	10.50		50 (3,5/50 for 200mm)		(1.20)		Dense to very dense brown silty clayey very sandy subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
11.00	D43				-10.04	11.00		End of Borehole at 11.00m		
11.00 - 11.31	SPT (S)	11.00		50 (3,7/50 for 160mm)						

10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0

Remarks
Deck to Bed = 4.70m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			11.00	200

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH37
	Coordinates: 142658.67 E 932272.01 N	Client: Stornoway Port Authority	Sheet 1 of 2
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 1.10 mCD	Dates: 23/02/2018	Driller: [Red Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	6.00
Rotary Coring	Comacchio 405	6.00	9.30

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0 00 - 1.00	B13							Medium dense reddish brown slightly silty sandy subrounded fine to coarse GRAVEL with shells. Sand is fine to coarse.		
0 50	ES1 ES2									0.5
1 00	D16 ES3 ES4									1.0
1 00 - 2.00	B14									
1 00 - 1.45	SPT (S) N=14	5.50		N=14 (3,3/4,3,4,3)		(2.70)				
1 50	ES5 ES6									1.5
2 00	D17 ES7 ES8									2.0
2 00 - 2.50	B15									
2 00 - 2.45	SPT (S) N=18	6.50		N=18 (2,3/3,5,5,5)						
2 50	ES10 ES9									2.5
2.70 - 3.00	B18				-1.60	2.70		Medium dense silty very sandy subrounded fine to coarse GRAVEL shells. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
						(0.30)				
3 00	ES11 ES12				-1 90	3.00		Loose black slightly silty sandy subangular to subrounded fine to coarse GRAVEL with low to medium cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		3.0
3 00 - 3.50	B19									
3 00 - 3.45	SPT (C) N=8	7.50		N=8 (1,2/2,2,2,2)						
						(0.90)				
3 50	ES26 ES27									3.5
					-2 80	3.90		Stiff reddish brown slightly silty slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
4 00	D21 ES28 ES29									4.0
4 00 - 5.00	B20									
4 00 - 4.45	SPT (C) N=19	8.50		N=19 (3,4/4,4,5,6)						
						(1.50)				4.5
5 00	D22									5.0
5 00 - 5.40	B24									
5 00 - 5.45	SPT (S) N=29	9.50		N=29 (3,5/6,7,7,9)						

Remarks

Deck to Bed = 4.50m

Terminated on possible bedrock - rotary follow on

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					5.70	6.00	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH37
	Coordinates: 142658.67 E 932272.01 N	Client: Stornoway Port Authority	Sheet 2 of 2
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 1.10 mCD	Dates: 23/02/2018	Driller: [Red Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	6.00
Rotary Coring	Comacchio 405	6.00	9.30

Depth (m)	Sample / Tests		Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
5.40 - 6.00	B25					-4 30	5.40		Stiff reddish brown slightly silty slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
							(0.60)		Reddish brown silty clayey very gravelly fine to coarse SAND. Gravel is subrounded fine to coarse (weathered CONGLOMERATE).		
6 00 6 00 6 00 - 6.10 6 00 - 6.10	D23 SPT (S)		10.5 0		D23 50 (25 for 35mm/50 for 65mm) 50 (25 for 35mm/50 for 65mm)	-4 90	6.00		Extremely weak to weak heavily weathered dark red and brown poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix - recovered as very dense reddish brown slightly sandy subangular fine to coarse GRAVEL of gneiss with low cobble content. Sand is fine to coarse. Cobbles are subangular up to 100mm of gneiss.		
	18	0	0								
7 50 - 7.64 7 50					50 (25 for 62mm/50 for 75mm)		(3.30)		*Assumed zone of core loss - possibly core left down the hole by the core barrel, or highly weathered, rock core flushed away by the drilling medium.*		
	0	0	0								
9 30 - 9.42 9 30					50 (25 for 40mm/50 for 80mm)	-8 20	9.30		End of Borehole at 9 30m		
	TCR	SCR	RQD	FI							

Remarks
Deck to Bed = 4.50m

Terminated on possible bedrock - rotary follow on

Core Barrel

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				5.70	6.00	01 00

Flush Type

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
		6.00	200

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH38
	Coordinates: 142725.12 E 932270.19 N	Client: Stornoway Port Authority	Sheet 1 of 3
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.68 mCD	Dates: 15/02/2018	Driller [
			Logger [

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	5.70
Rotary Coring	Comacchio 405	5.70	11.20

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0 00 - 1.00	B7							Medium dense reddish brown sandy subangular to subrounded fine to coarse GRAVEL with shells and shell fragments. Sand is medium to coarse.		
0 50	ES20 ES21									0.5
1 00	D15 ES1 ES2					(2.00)				1.0
1 00 - 2.00	B8									
1 00 - 1.45	SPT (S) N=15	1.00		N=15 (2,3/3,3,4,5)						
1 50	ES22 ES23									1.5
2 00	D16 ES3 ES4				-1 32	2.00		Medium dense reddish brown and grey slightly silty sandy subangular to subrounded fine to coarse GRAVEL with shells and shell fragments. Sand is fine to coarse.		2.0
2 00 - 3.00	B9									
2 00 - 2.45	SPT (S) N=12	2.00		N=12 (1,1/2,3,3,4)						
2 50	ES24 ES25					(1.10)				2.5
3 00	ES5 ES6				-2.42	3.10				3.0
3.10 - 3.40	B10							Very soft to soft grey slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
3.10 - 3.55	U19			Ublow=21 100%		(0.35)				
3 50	ES26 ES27				-2.77	3.45		Grey silty very sandy subangular fine to coarse GRAVEL. Sand is fine to coarse.		3.5
3 50 - 4.00	B11					(0.55)				
4 00	D17				-3 32	4.00		Medium dense black and reddish brown slightly clayey silty very sandy subangular fine to coarse GRAVEL with shell fragments. Sand is fine to coarse.		4.0
4 00 - 5.00	B12									
4 00 - 4.45	SPT (S) N=24	4.00		N=24 (2,3/4,5,7,8)						
						(1.10)				4.5
5 00	D18									5.0
5 00 - 5.45	SPT (S) N=38	5.00		N=38 (4,5/7,9,9,13)	-4.42	5.10				
5.10 - 5.50	B13									

Remarks
Deck to Bed = 7.00m

Terminated by Engineer 5.5m into bedrock

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					5.50	5.70	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH38
	Coordinates: 142725.12 E 932270.19 N	Client: Stornoway Port Authority	Sheet 2 of 3
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.68 mCD	Dates: 15/02/2018	Driller: [Red Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	5.70
Rotary Coring	Comacchio 405	5.70	11.20

Depth (m)	Sample / Tests		Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
							(0.40)		Very stiff brown slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
5 50 - 5.70	B14					-4 82	5.50		Extremely weak to weak heavily weathered dark red and brown poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix - recovered as very dense reddish brown slightly silty sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse predominately of gneiss. Cobbles are up to 140mm of gneiss.		
	99	0	0								
6.70 - 6.72 6.70					50 (25 for 10mm/50 for 5mm)						
	66	0	0				(4.20)				
8 20									*Zone of assumed core loss - highly weathered, rock core flushed away by the drilling medium.*		
	0	0	0								
9.70 - 9.70 9.70					50 (25 for 5mm/50 for 0mm)	-9 02	9.70		Weak heavily weathered dark red and brown poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix - recovered as very dense reddish brown silty sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is angular to subangular coarse predominately of gneiss. Cobbles are up to 100mm of gneiss.		
	TCR	SCR	RQD	FI							

Remarks
Deck to Bed = 7.00m

Terminated by Engineer 5.5m into bedrock

Core Barrel

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				5.50	5.70	01 00

Flush Type

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
		5.70	200

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH38
	Coordinates: 142725.12 E 932270.19 N	Client: Stornoway Port Authority	Sheet 3 of 3
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.68 mCD	Dates: 15/02/2018	Driller: [Red
			Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	5.70
Rotary Coring	Comacchio 405	5.70	11.20

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	46	0	0				(1.50)		Weak heavily weathered dark red and brown poorly sorted and poorly cemented clast-supported CONGLOMERATE with fine to coarse sand matrix - recovered as very dense reddish brown silty sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is angular to subangular coarse predominately of gneiss. Cobbles are up to 100mm of gneiss.		
11.20						-10.52	11.20		End of Borehole at 11.20m		
	TCR	SCR	RQD	FI							

Depth scale: 10.5, 11.0, 11.5, 12.0, 12.5, 13.0, 13.5, 14.0, 14.5, 15.0

Remarks
Deck to Bed = 7.00m

Terminated by Engineer 5 5m into bedrock

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					5.50	5.70	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH39
	Coordinates: 142748.00 E 932227.11 N	Client: Stornoway Port Authority	Sheet 1 of 4
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.75 mCD	Dates: 20/02/2018 - 22/02/2018	Driller: [Red Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	6.70
Rotary Coring	Comacchio 405	6.70	19.30

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0 00 - 1.00	B1							Medium dense grey and red slightly sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse.		
0 50	ES16 ES17									0.5
1 00	ES18 ES19									1.0
1 00 - 2.00	B2									
1 00 - 1.45	SPT (C) N=13	1.00		N=13 (1,2/3,3,3,4)		(2.40)				
1 50	ES20 ES21									1.5
2 00	ES22 ES23									2.0
2 00 - 2.45	SPT (C) N=13	2.00		N=13 (2,2/2,4,4,3)						
2.40 - 3.00	B3				-1.66	2.40		Medium dense grey silty clayey very sandy subangular to subrounded fine to coarse GRAVEL with occasional bands of soft to firm silt with shells. Sandy is fine to coarse.		
2 50	ES24 ES25					(0.60)				2.5
3 00	ES26 ES27				-2 26	3.00		Soft to firm grey silty CLAY with shells.		3.0
3 00 - 3.45	UT12	3.00		Ublow=24 100%						
3 00 - 3.50	B4					(0.70)				
3 50	D5 ES28 ES29									3.5
3.70 - 4.50	B6				-2 96	3.70		Firm to stiff brown sandy gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
4 00	D7									4.0
4 00 - 4.45	SPT (S) N=18	4.00		N=18 (3,3/4,4,5,5)		(0.80)				
4 50 - 5.50	B8				-3.76	4.50		Medium dense brown slightly clayey silty sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse.		4.5
						(1.10)				
5 00	D9									5.0
5 00 - 5.45	SPT (S) N=21	5.00		N=21 (2,3/3,5,7,6)						

Remarks
Deck to Bed = 5.00m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					6.50	6.70	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH39
	Coordinates: 142748.00 E 932227.11 N	Client: Stornoway Port Authority	Sheet 2 of 4
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.75 mCD	Dates: 20/02/2018 - 22/02/2018	Driller [
			Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	6.70
Rotary Coring	Comacchio 405	6.70	19.30

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Medium dense brown slightly clayey silty sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse.		
5.60 - 6.00	B10				-4 86	5.60		Brown slightly silty sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
						(0.80)				
6.40 - 6.70	B11				-5.66	6.40		BOULDERS		
6 50 - 6.57	SPT (C)	6.50		50 (25 for 25mm/50 for 45mm)		(0.30)				
					-5 96	6.70		Medium dense to dense reddish brown slightly clayey very silty fine to medium SAND.		
	0 0 0									
7 30 - 7.75				N=29 (4,4/5,7,6,11)						
7 30										
8 00 - 9.00	0 0 0			B13						
						(3.60)				
8 80										
	0 0 0									
10.00 - 11.00				B14						
~~10.30 - 10.75~~				~~N=32 (7,7/7,8,8,9)~~	~~-9 56~~	~~10.30~~				
10.30	TCR	SCR	RQD	FI						

Backfill depth scale: 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0

Remarks

Deck to Bed = 5.00m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					6.50	6.70	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			6.70	200

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH39
	Coordinates: 142748.00 E 932227.11 N	Client: Stornoway Port Authority	Sheet 3 of 4
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.75 mCD	Dates: 20/02/2018 - 22/02/2018	Driller: [Red Logger: [Red

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	6.70
Rotary Coring	Comacchio 405	6.70	19.30

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	0	0	0						Dense brown and grey slightly clayey very silty fine to coarse SAND.		
11.80											
12.00 - 13.00	0	0	0		B15		(4.50)				
13.30 - 13.75 13.30	0	0	0		N=44 (8,9/10,11,11,12)						
14.80 - 14.82 14.80					50 (25 for 15mm/50 for 0mm)	-14.06	14.80 (0.50)		Weak to medium strong grey and pink boulder of GNEISS. Partially weathered: faint greyish green staining on joint surfaces. Discontinuities: 1. 0 to 30 degree joints, probably closely spaced, planar, rough, faint greenish grey staining on joint surface.		
						-14.56	15.30		Extremely weak reddish brown poorly sorted poorly cemented		
	TCR	SCR	RQD	FI							

Backfill depth scale: 10.5, 11.0, 11.5, 12.0, 12.5, 13.0, 13.5, 14.0, 14.5, 15.0

Remarks
Deck to Bed = 5.00m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					6.50	6.70	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH39
	Coordinates: 142748.00 E 932227.11 N	Client: Stornoway Port Authority	Sheet 4 of 4
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: 0.75 mCD	Dates: 20/02/2018 - 22/02/2018	Driller: [Red
			Logger [

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	6.70
Rotary Coring	Comacchio 405	6.70	19.30

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	53	40	0	NI			(1.00)		Extremely weak reddish brown poorly sorted poorly cemented clast-supported CONGLOMERATE. Clasts are predominately of gneiss. Highly weathered.		
16.30						-15.56	16.30				
	100	98	93						Weak medium bedded reddish brown poorly sorted poorly cemented clast-supported CONGLOMERATE. Clasts are predominately of gneiss. Fine to coarse sands and cobbles up to 150mm. Partially weathered: reddish brown discolouration penetrating sand matrix. Discontinuities: 1. 0 to 30 degree bedding fractures closely spaced (80/180/370) stepped, rough, reddish brown discolouration on fracture surfaces penetrating up to 20mm through sand matrix.		
17.80							(3.00)				
	100	92	64								
19.30						-18.56	19.30		End of Borehole at 19.30m		
	TCR	SCR	RQD	FI							

Remarks
Deck to Bed = 5.00m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					6.50	6.70	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH	Project No.: 17-0769	Project Name: Stornoway Deep Water Berth G.I.	Borehole No.: BH40
	Coordinates: 142566.10 E 932367.59 N	Client: Stornoway Port Authority	Sheet 1 of 1
		Client's Representative: Wallace Stone Consulting Civil Engineers	Scale: 1:25
	Ground Level: -1.25 mCD	Dates: 02/03/2018	Driller [
			Logger [

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	3.20

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mCD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0 00 - 1.00	B4							Medium dense reddish brown silty sandy subangular to subrounded fine to coarse GRAVEL with shells and low cobble content and occasional bands of reddish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Cobbles are subangular to subrounded.		
0 50	ES1									
1 00	D8									
	ES2									
1 00 - 2.00	B5									
1 00 - 1.45	SPT (S) N=10			N=10 (2,2/2,3,3,2)		(2.40)				
1 50	ES3									
2 00	D9									
2 00 - 2.45	SPT (S) N=19			N=19 (2,3/4,4,5,6)						
2.40 - 3.00	B6				-3.65	2.40		Very dense red and grey slightly silty sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
						(0.80)				
3 00 - 3.20	B7									
3 00 - 3.16	SPT (C)			50 (25 for 75mm/50 for 90mm)	-4.45	3.20		End of Borehole at 3 20m		

Remarks
Deck to Bed = 7.50m

Terminated at scheduled depth

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					3.00	3.20	01 00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			3.20	200

CAUSEWAY GEOTECH

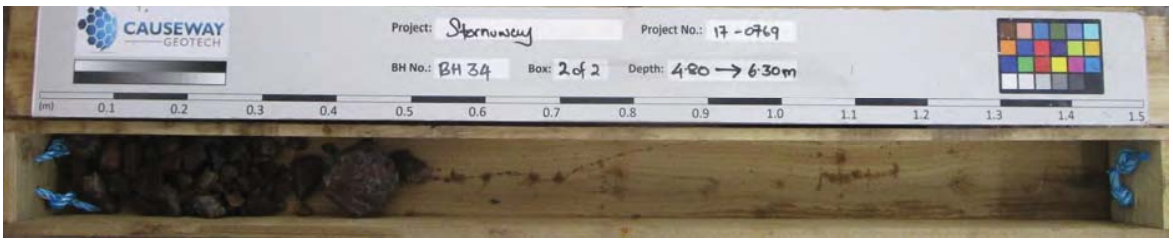
APPENDIX C

Core photographs

BH33 0.40m to 2.10m

BH33 2.10m to 3.60m

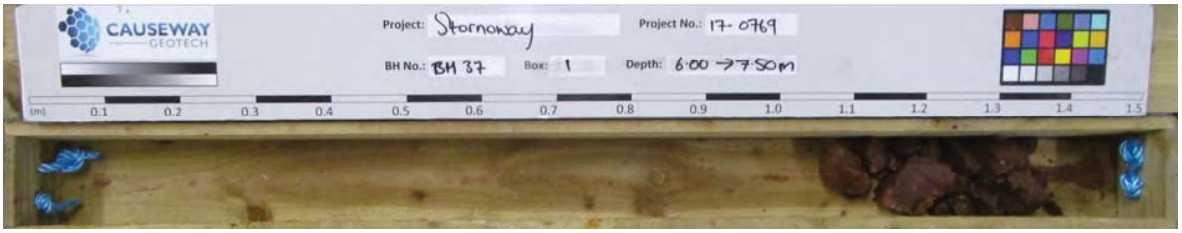
BH34 3.30m to 4.80m



BH34 4.80m to 6.30m

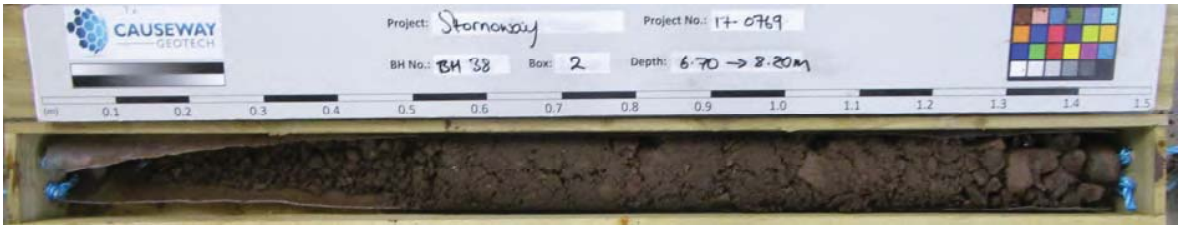
BH35 4.10m to 5.20m

BH35 5.20m to 6.70m



BH37 6.00m to 7.50m

BH38 5.70m to 6.70m



BH38 6.70m to 8.20m

BH38 9.70m to 11.20m

BH39 14.80m to 16.30m

BH39 16.30m to 17.80m

BH39 17.80m to 19.30m

CAUSEWAY GEOTECH

APPENDIX D

Geotechnical laboratory test results

LABORATORY REPORT

4043

Contract Number: PSL18/1312

Report Date: 09 April 2018

Client's Reference: 17-0769

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

For the attention of: [Redacted]

Contract Title: Stornoway Deep Water Berth G.I.

Date Received: 21/3/2018
Date Commenced: 21/3/2018
Date Completed: 9/4/2018

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:

[Redacted]

	[Redacted]	[Redacted]
(Director)	(Director)	(Quality Manager)
[Redacted]	[Redacted]	[Redacted]
(Senior Technician)	(Senior Technician)	(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
[Redacted]

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH33	3	B	0.00	0.40	Reddish brown slightly sandy GRAVEL.
BH34	2	B	1.00	2.00	Brown very sandy slightly silty GRAVEL.
BH35	16	B	0.00	1.00	Brown slightly sandy GRAVEL with cobbles.
BH35	18	B	2.00	2.50	Brown sandy clayey GRAVEL of cobbles.
BH35	19	B	2.50	3.20	Brown sandy GRAVEL with cobbles.
BH35	23	D	3.00		Brown gravelly very sandy CLAY.
BH35	20	B	3.20	4.00	Brown very sandy slightly silty GRAVEL with cobbles.
BH36	22	B	1.00	2.00	Reddish brown very sandy slightly silty GRAVEL.
BH36	35	UT	4.00	4.45	Firm dark grey organic CLAY.
BH36	32	B	4.00	5.00	Dark grey gravelly very sandy very silty organic CLAY.
BH36	34	B	6.00	6.50	Brown slightly silty SAND & GRAVEL.
BH36	36	B	6.50	7.00	Brown silty SAND & GRAVEL.
BH36	39	B	7.00	8.00	Brown silty SAND & GRAVEL.
BH36	41	B	9.00	9.80	Brown very sandy slightly silty GRAVEL.
BH36	42	B	9.80	11.00	Brown very sandy very clayey GRAVEL.
BH36	43	D	11.00		Brown gravelly SAND.
BH37	13	B	0.00	1.00	Reddish brown sandy slightly silty GRAVEL.
BH37	18	B	2.70	3.00	Brown very sandy silty GRAVEL.
BH37	19	B	3.00	3.50	Brown slightly sandy slightly silty GRAVEL with cobbles.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Stornoway Deep Water Berth G.I.	Contract No: PSL18/1312
			Client Ref: 17-0769

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH37	20	B	4.00	5.00	Brown very sandy clayey GRAVEL.
BH37	21	D	4.00		Brown gravelly sandy CLAY.
BH37	25	B	5.40	6.00	Reddish brown clayey very silty SAND & GRAVEL.
BH38	8	B	1.00	2.00	Reddish brown sandy GRAVEL.
BH38	19	U	3.10	3.55	Very soft dark grey slightly sandy organic CLAY.
BH38	11	B	3.50	4.00	Grey slightly silty SAND & GRAVEL.
BH38	12	B	4.00	5.00	Brown very sandy slightly clayey silty GRAVEL.
BH38	13	B	5.10	5.50	Brown very gravelly very sandy CLAY.
BH39	2	B	1.00	2.00	Reddish brown slightly sandy GRAVEL with cobbles.
BH39	3	B	2.40	3.00	Brown very sandy very clayey GRAVEL.
BH39	12	UT	3.00	3.45	Soft dark grey slightly gravelly slightly sandy organic CLAY.
BH39	8	B	4.50	5.50	Brown sandy slightly clayey silty GRAVEL with cobbles.
BH39	10	B	5.60	6.00	Brown sandy slightly silty GRAVEL.
BH39	13	B	8.00	9.00	Brown very silty SAND.
BH39	15	B	12.00	13.00	Brown very Silty SAND.
BH40	4	B	0.00	1.00	Brown sandy clayey GRAVEL.
BH40	6	B	2.40	3.00	Reddish brown sandy slightly silty GRAVEL.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Stornoway Deep Water Berth G.I.	Contract No: PSL18/1312 Client Ref: 17-0769

SUMMARY OF SOIL CLASSIFICATION TESTS

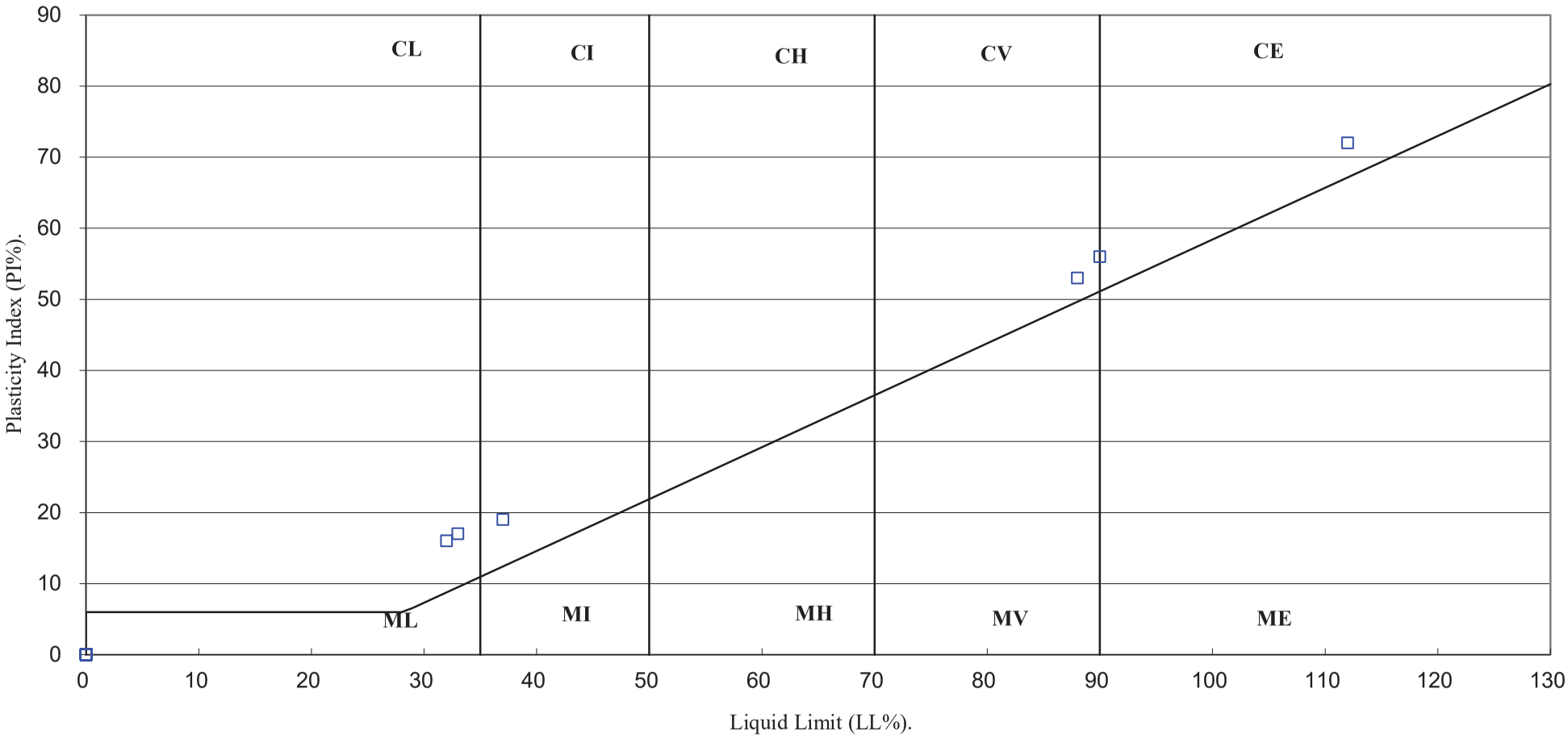
(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH35	23	D	3.00		14			32	16	16	77	Low plasticity CL.
BH36	35	UT	4.00	4.45	55			112	40	72	80	Extremely high plasticity CE.
BH36	43	D	11.00		7.5				NP			
BH37	21	D	4.00		16			37	18	19	82	Intermediate plasticity CI.
BH38	19	U	3.10	3.55	43			90	34	56	98	Very high plasticity CV.
BH38	13	B	5.10	5.50	15			33	16	17	53	Low plasticity CL.
BH39	12	UT	3.00	3.45	44			88	35	53	97	Very high plasticity CV.
BH39	8	B	4.50	5.50	4.2				NP			

SYMBOLS : NP : Non Plastic * : Liquid Limit and Plastic Limit Wet Sieved.

UKAS TESTING 4043 PSL Professional Soils Laboratory	Stornoway Deep Water Berth G.I.	Contract No: PSL18/1312 Client Ref: 17-0769

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



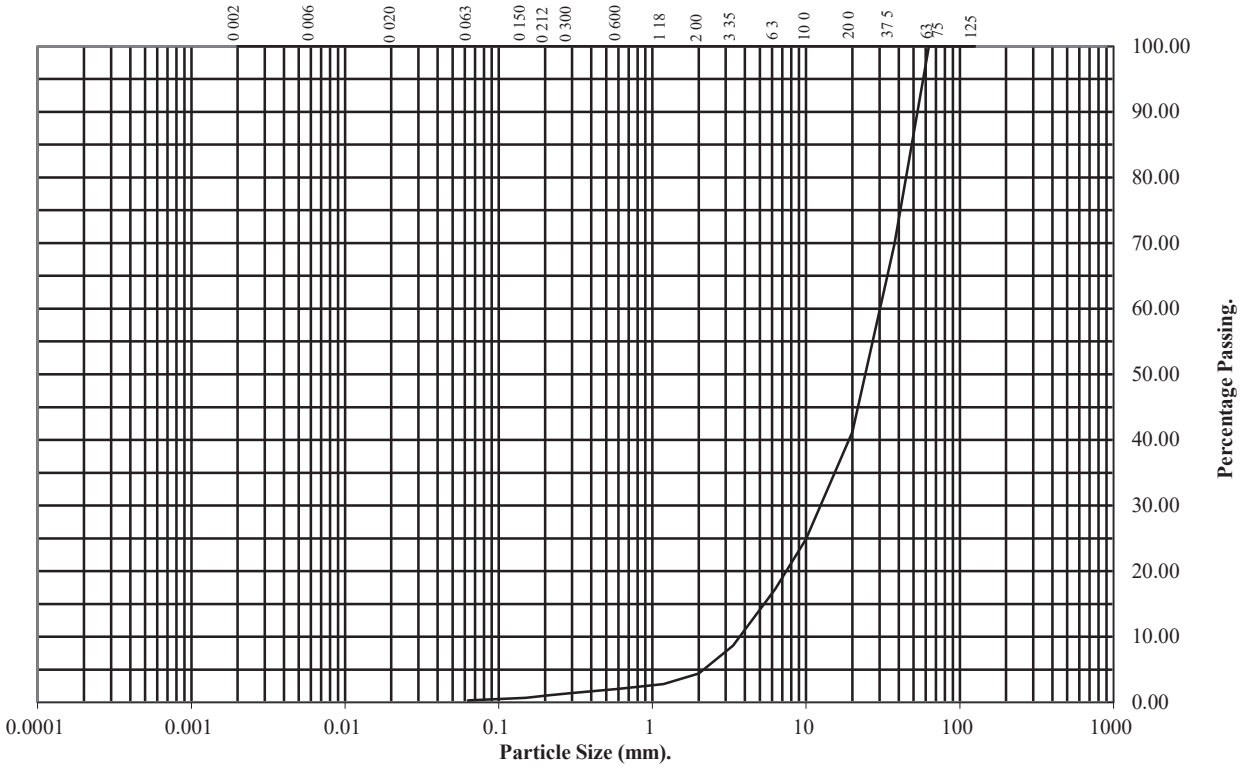
UKAS TESTING 4043	PSL Professional Soils Laboratory	Stornoway Deep Water Berth G.I.	Contract No: PSL18/1312
			Client Ref: 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH33**	**Top Depth (m):**	**0.00**
Sample Number:	**3**	**Base Depth(m):**	**0.40**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	70
20	41
10	25
6.3	17
3.35	9
2	4
1.18	3
0.6	2
0.3	1
0.212	1
0.15	1
0.063	0

Soil Fraction	Total Percentage
Cobbles	0
Gravel	96
Sand	4
Silt/Clay	0

Remarks:
See Summary of Soil Descriptions

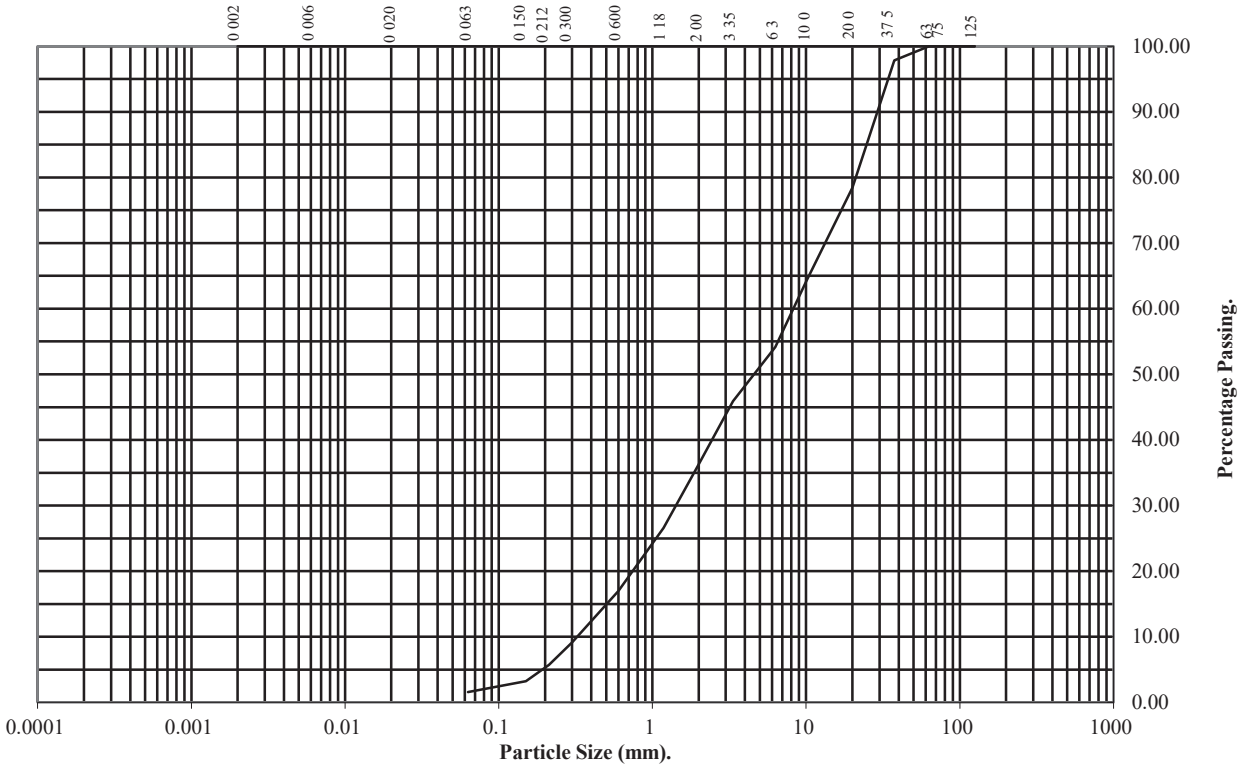
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH34**	**Top Depth (m):**	**1.00**
Sample Number:	**2**	**Base Depth(m):**	**2.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	98
20	78
10	64
6.3	54
3.35	46
2	36
1.18	27
0.6	17
0.3	9
0.212	6
0.15	3
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	64
Sand	34
Silt/Clay	2

Remarks:
See Summary of Soil Descriptions

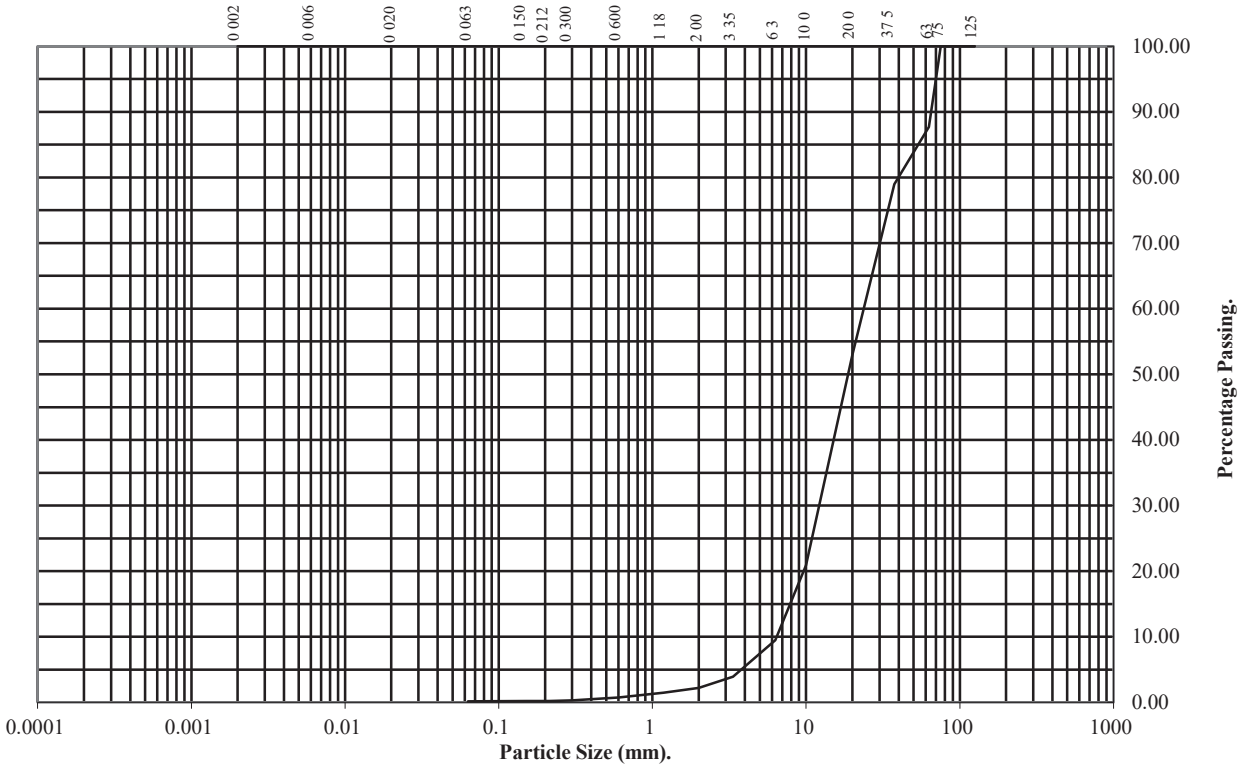
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH35**	**Top Depth (m):**	**0.00**
Sample Number:	**16**	**Base Depth(m):**	**1.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	88
37.5	79
20	53
10	21
6.3	9
3.35	4
2	2
1.18	1
0.6	1
0.3	0
0.212	0
0.15	0
0.063	0

Soil Fraction	Total Percentage
Cobbles	12
Gravel	86
Sand	2
Silt/Clay	0

Remarks:
See Summary of Soil Descriptions

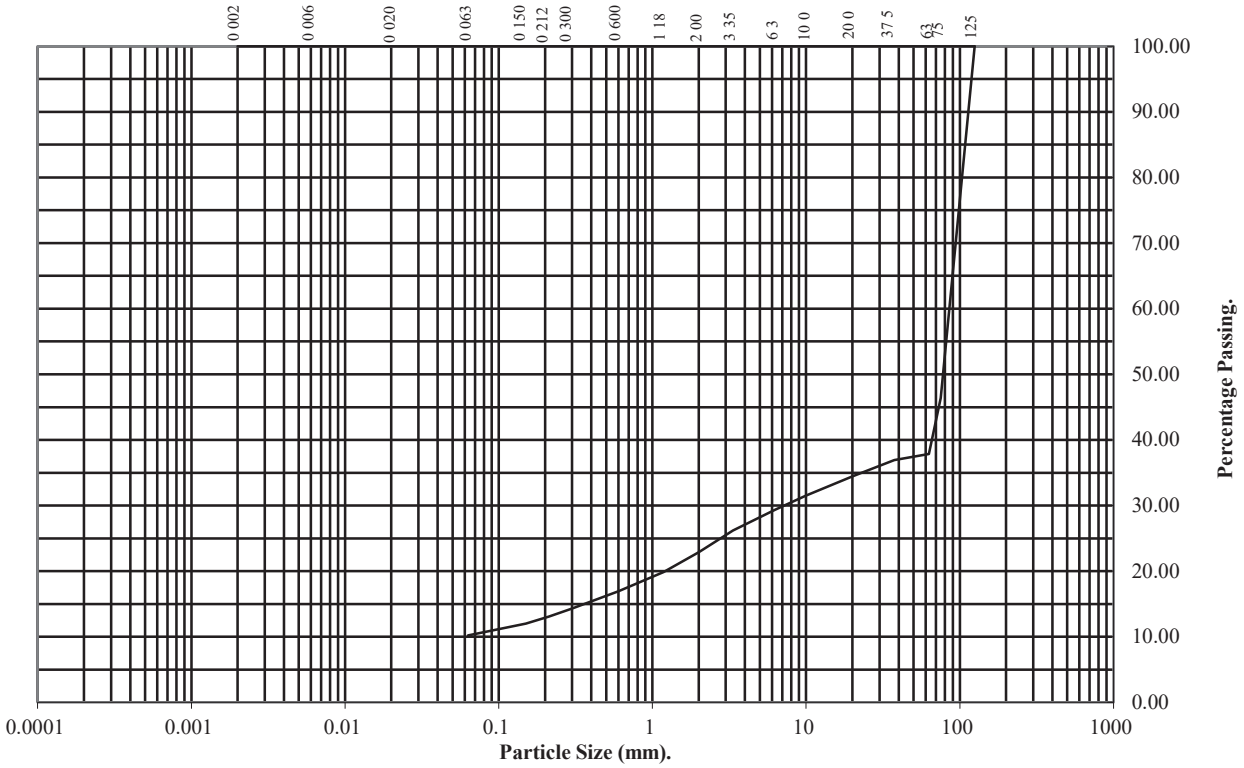
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH35**	**Top Depth (m):**	**2.00**
Sample Number:	**18**	**Base Depth(m):**	**2.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	46
63	38
37.5	37
20	34
10	32
6.3	29
3.35	26
2	23
1.18	20
0.6	17
0.3	14
0.212	13
0.15	12
0.063	10

Soil Fraction	Total Percentage
Cobbles	62
Gravel	15
Sand	13
Silt/Clay	10

Remarks:
See Summary of Soil Descriptions

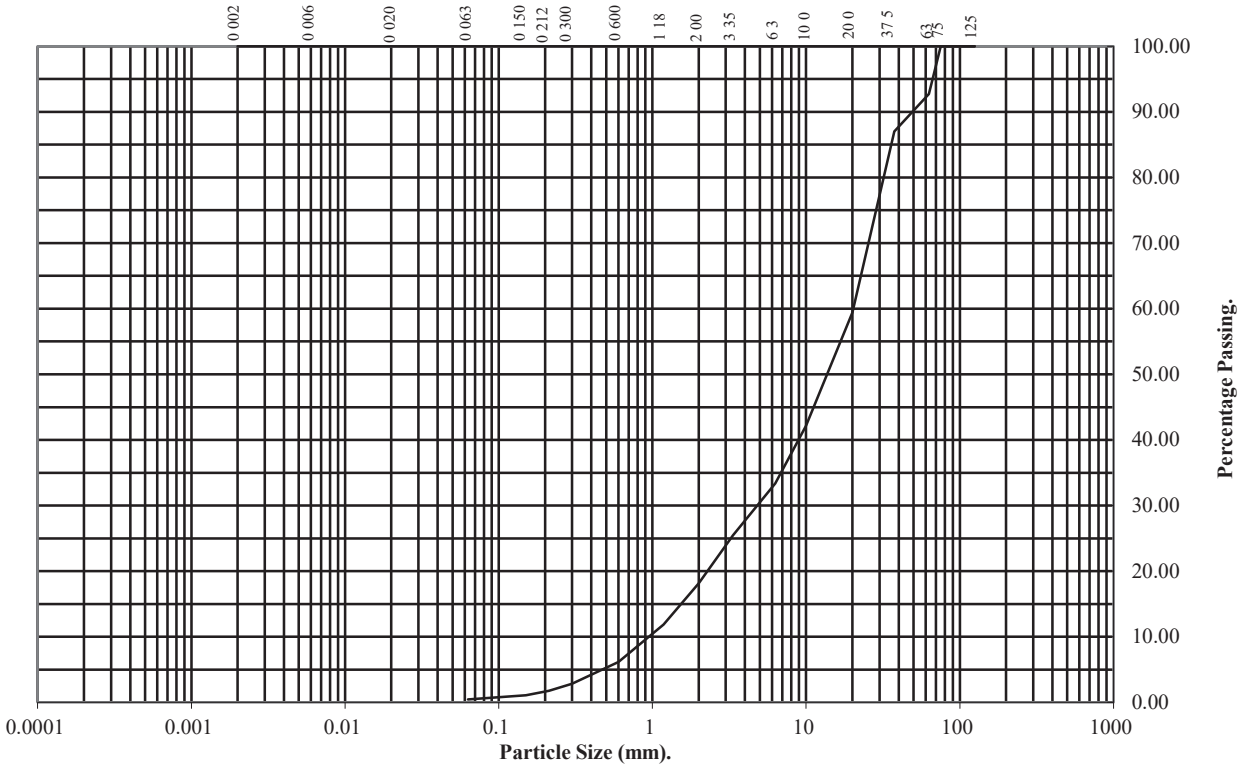
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH35**	**Top Depth (m):**	**2.50**
Sample Number:	**19**	**Base Depth(m):**	**3.20**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	93
37.5	87
20	59
10	42
6.3	33
3.35	25
2	18
1.18	12
0.6	6
0.3	3
0.212	2
0.15	1
0.063	0

Soil Fraction	Total Percentage
Cobbles	7
Gravel	75
Sand	18
Silt/Clay	0

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

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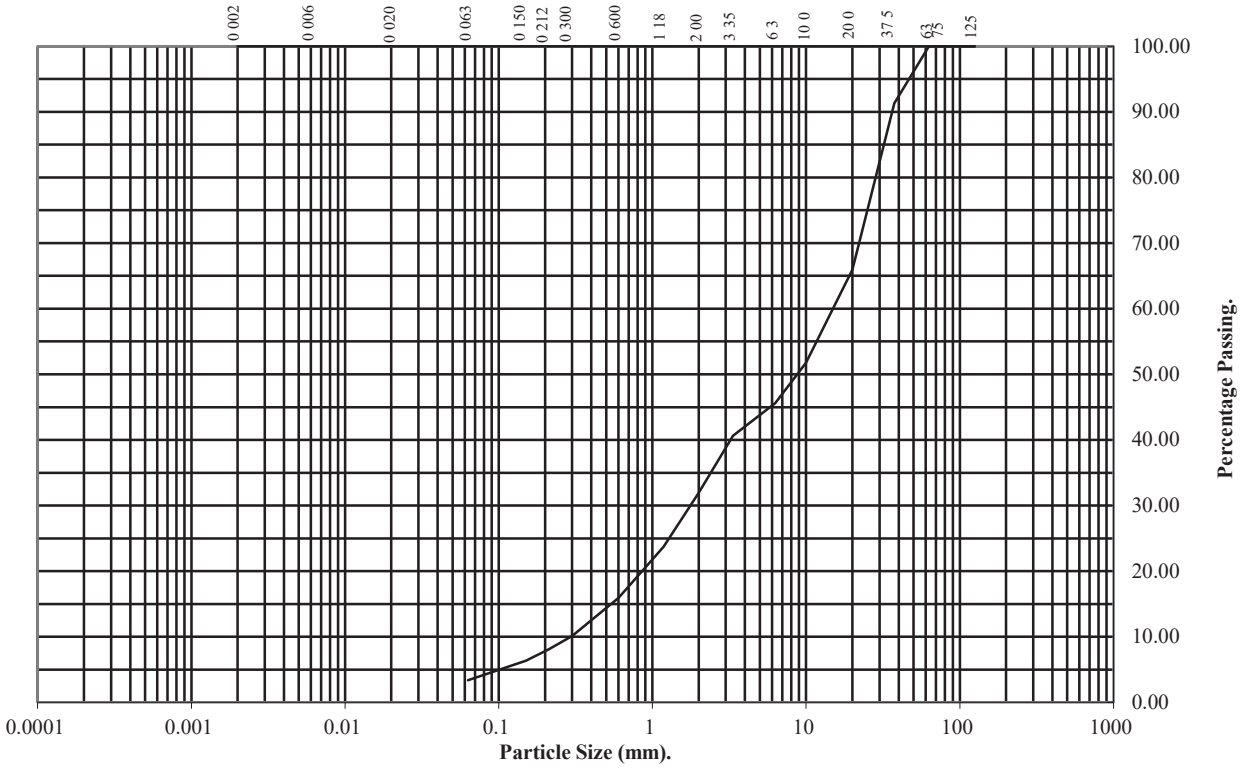
Client Ref:
17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH35**	**Top Depth (m):**	**3.20**
Sample Number:	**20**	**Base Depth(m):**	**4.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	91
20	66
10	52
6.3	46
3.35	41
2	32
1.18	24
0.6	16
0.3	10
0.212	8
0.15	6
0.063	3

Soil Fraction	Total Percentage
Cobbles	0
Gravel	68
Sand	29
Silt/Clay	3

Remarks:
See Summary of Soil Descriptions

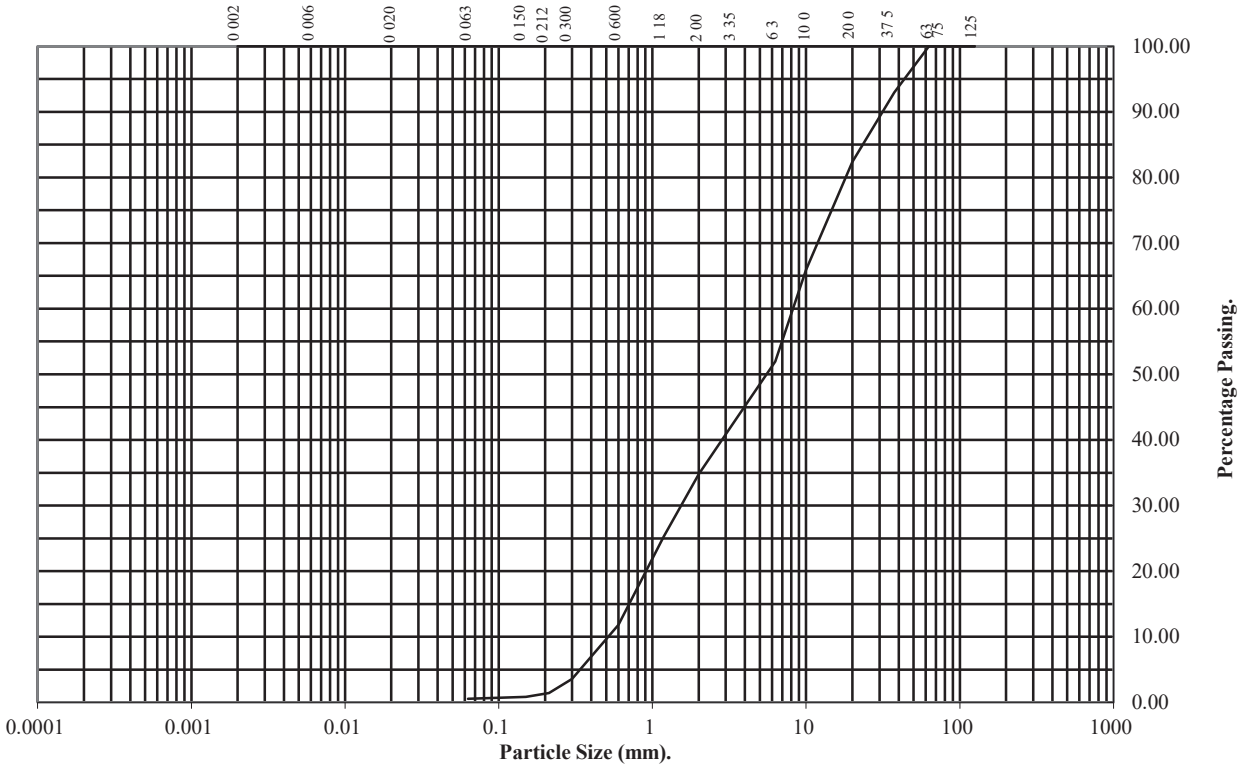
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH36**	**Top Depth (m):**	**1.00**
Sample Number:	**22**	**Base Depth(m):**	**2.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	82
10	66
6.3	52
3.35	43
2	35
1.18	25
0.6	12
0.3	4
0.212	1
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	65
Sand	34
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

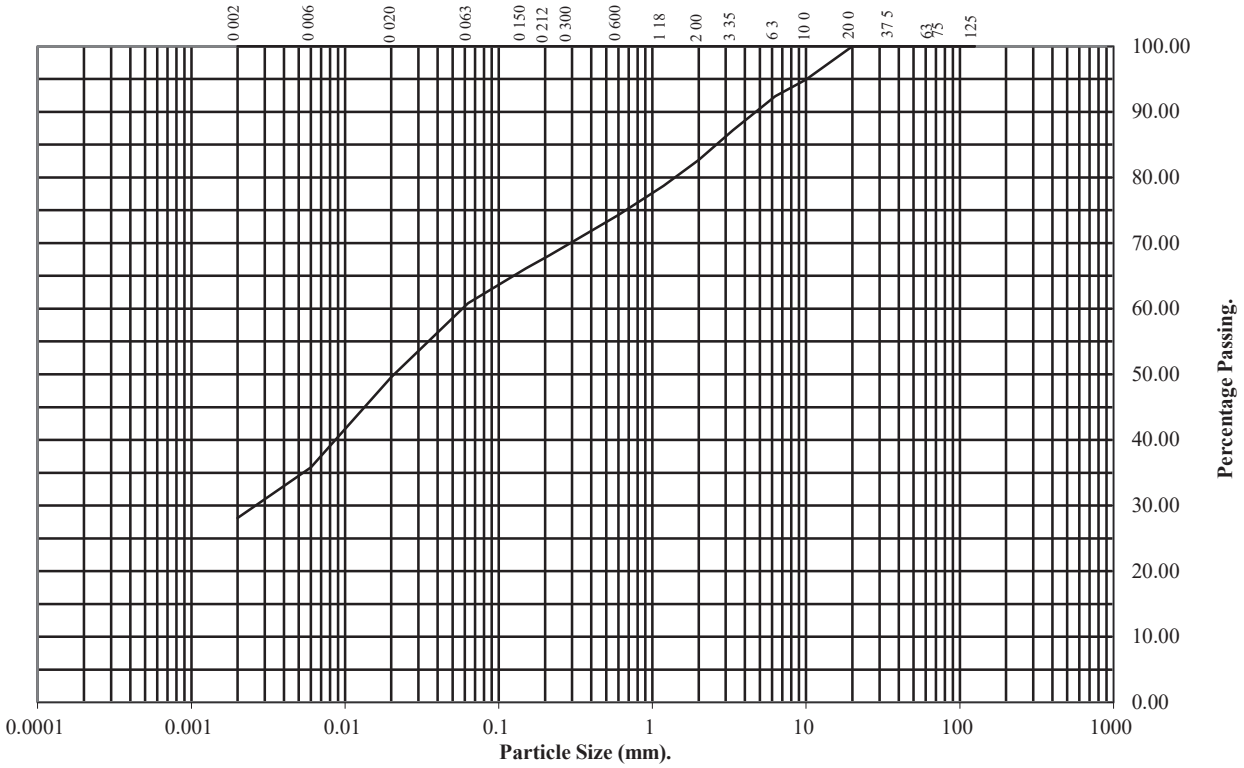
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH36**	**Top Depth (m):**	**4.00**
Sample Number:	**32**	**Base Depth(m):**	**5.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	95
6.3	92
3.35	87
2	83
1.18	79
0.6	74
0.3	70
0.212	68
0.15	66
0.063	61

Particle Diameter	Percentage Passing
0.02	50
0.006	36
0.002	28

Soil Fraction	Total Percentage
Cobbles	0
Gravel	17
Sand	22
Silt	33
Clay	28

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

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Stornoway Deep Water Berth G.I.

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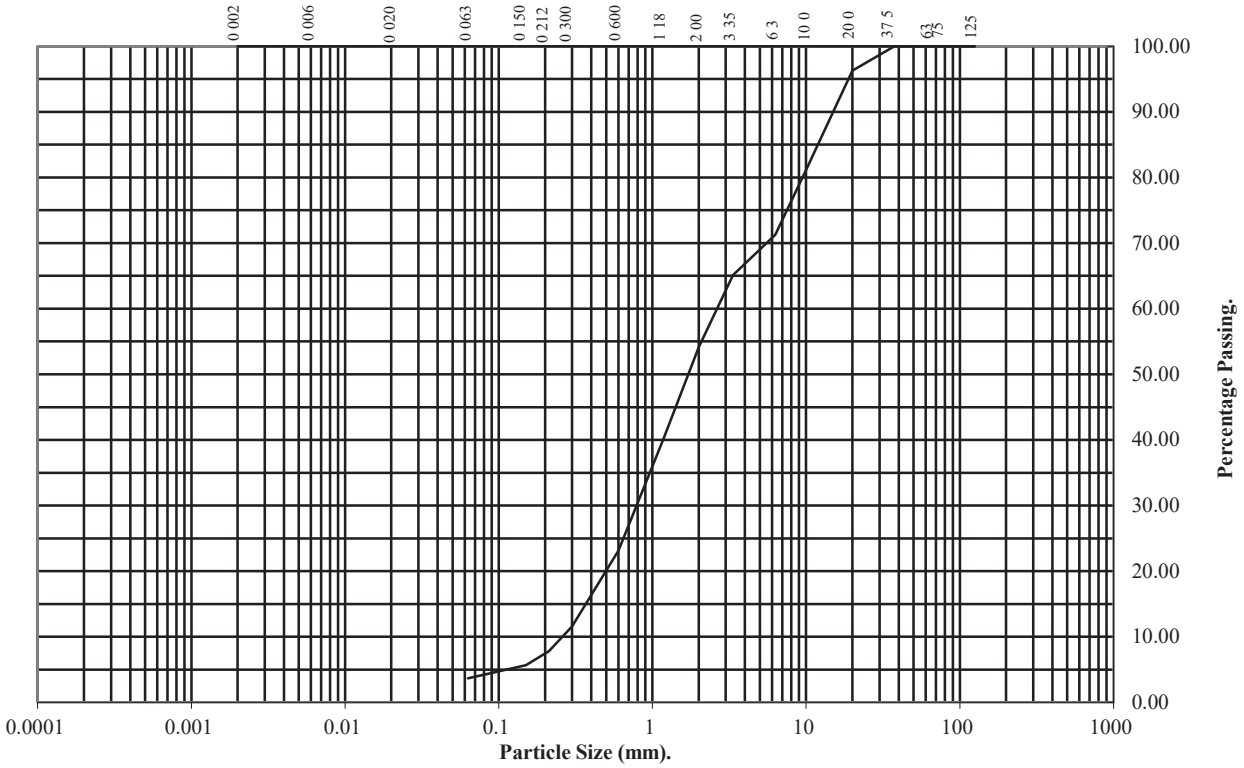
PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH36**	**Top Depth (m):**	**6.00**
Sample Number:	**34**	**Base Depth(m):**	**6.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	81
6.3	71
3.35	65
2	54
1.18	40
0.6	23
0.3	12
0.212	8
0.15	6
0.063	4

Soil Fraction	Total Percentage
Cobbles	0
Gravel	46
Sand	50
Silt/Clay	4

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

Contract No:
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Client Ref:
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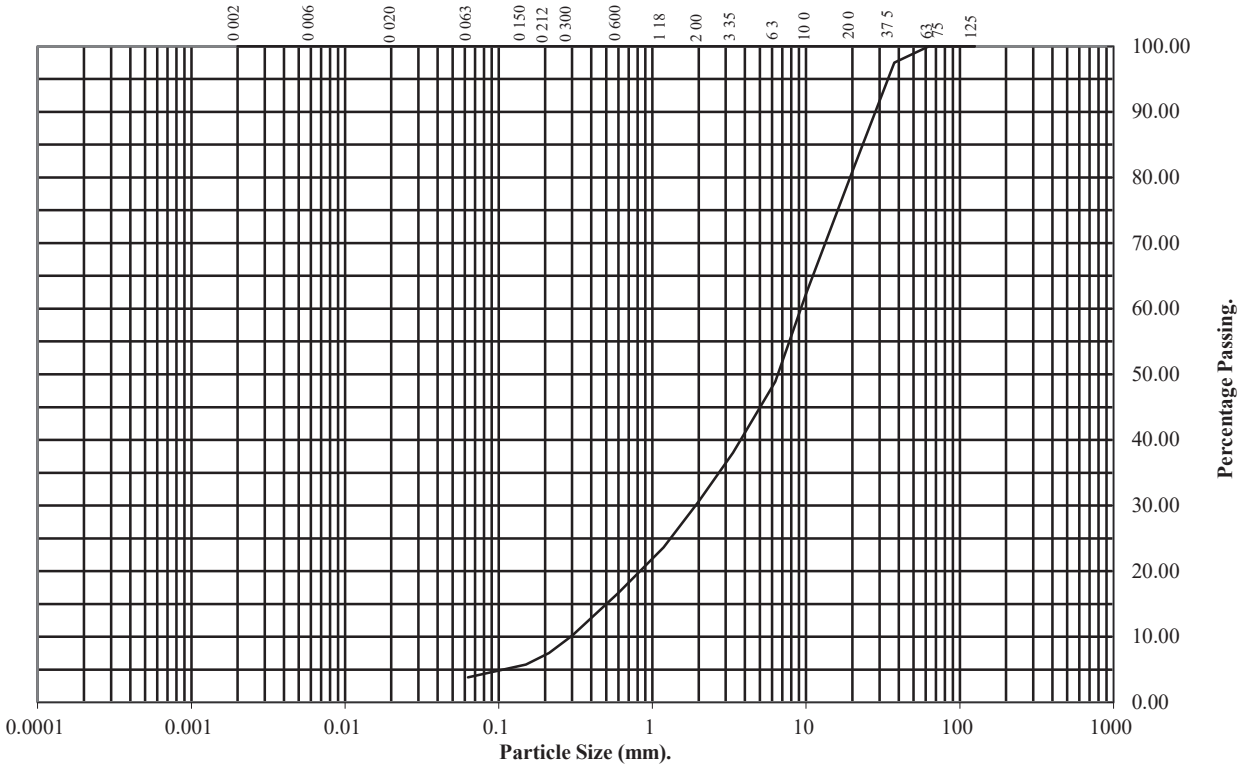
PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH36**	**Top Depth (m):**	**6.50**
Sample Number:	**36**	**Base Depth(m):**	**7.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	97
20	81
10	62
6.3	49
3.35	38
2	31
1.18	24
0.6	17
0.3	10
0.212	8
0.15	6
0.063	4

Soil Fraction	Total Percentage
Cobbles	0
Gravel	69
Sand	27
Silt/Clay	4

Remarks:
See Summary of Soil Descriptions

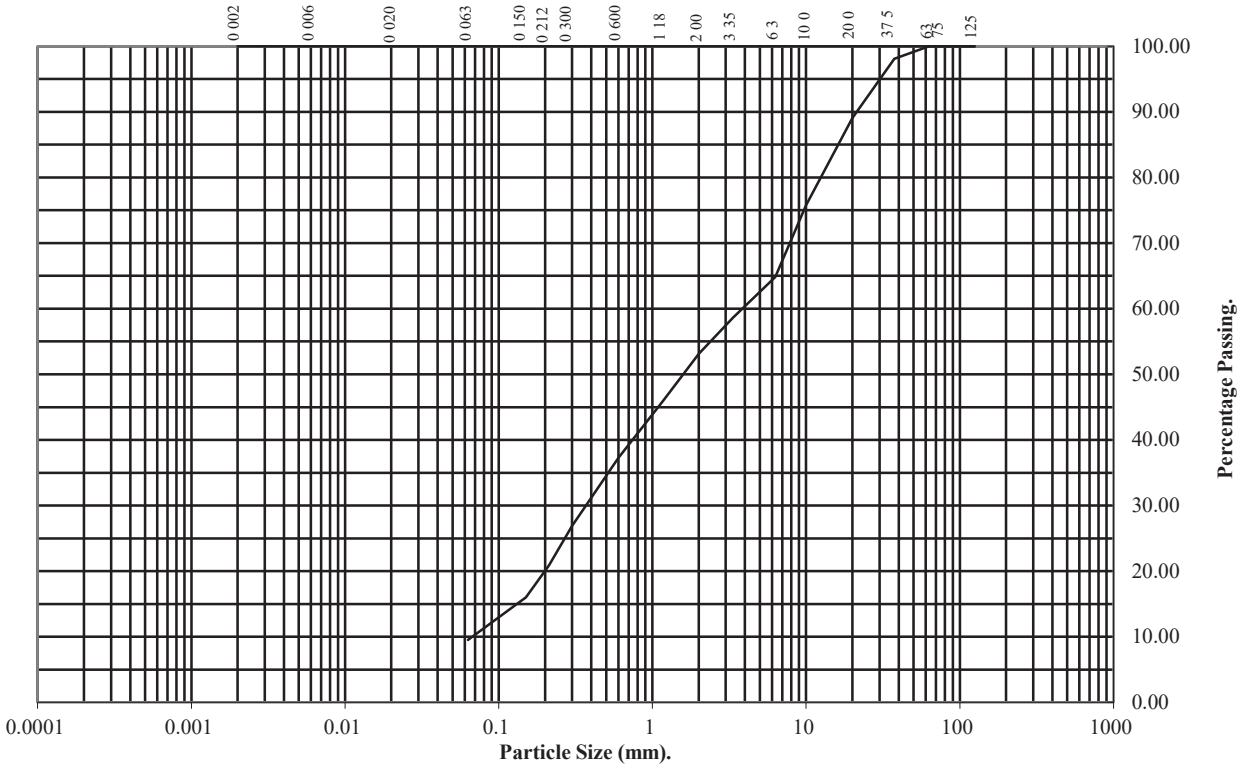
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH36**	**Top Depth (m):**	**7.00**
Sample Number:	**39**	**Base Depth(m):**	**8.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	98
20	89
10	76
6.3	65
3.35	59
2	53
1.18	46
0.6	37
0.3	27
0.212	21
0.15	16
0.063	10

Soil Fraction	Total Percentage
Cobbles	0
Gravel	47
Sand	43
Silt/Clay	10

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

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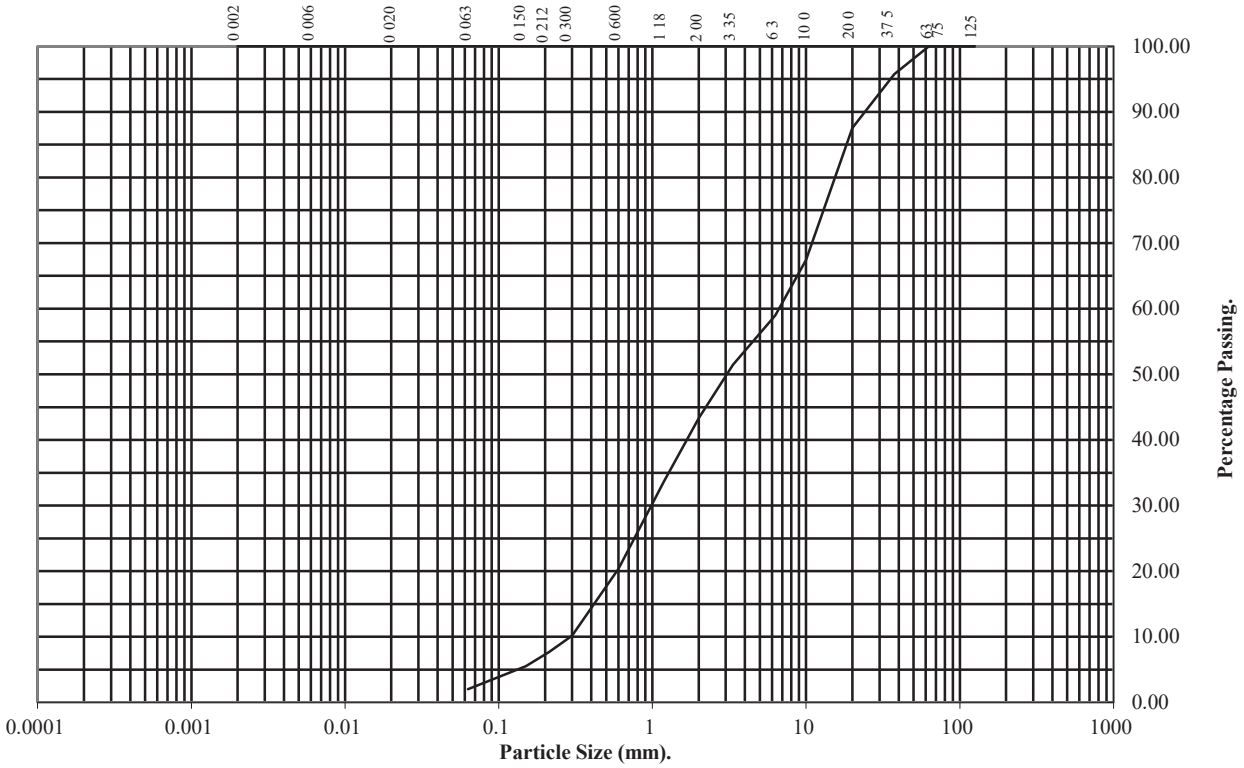
Client Ref:
17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH36**	**Top Depth (m):**	**9.00**
Sample Number:	**41**	**Base Depth(m):**	**9.80**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	96
20	88
10	67
6.3	59
3.35	51
2	43
1.18	34
0.6	20
0.3	10
0.212	8
0.15	6
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	57
Sand	41
Silt/Clay	2

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

Contract No:
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Client Ref:
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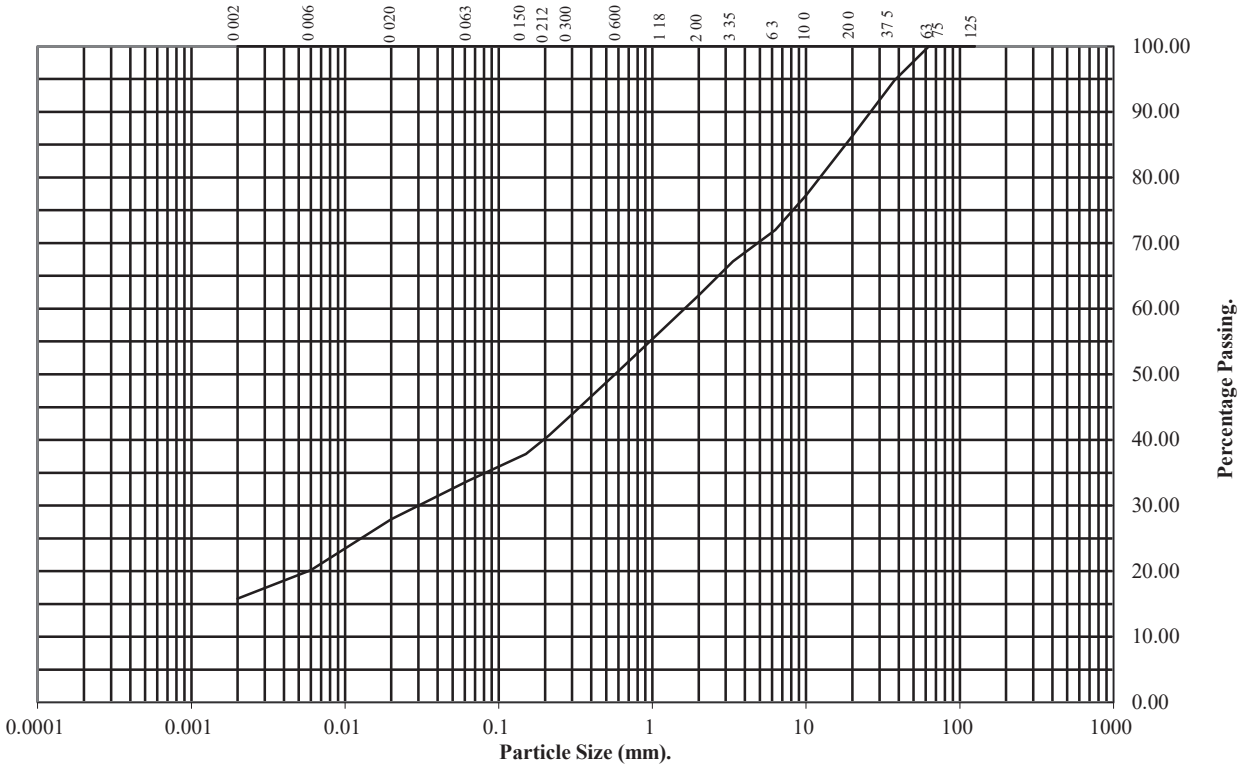
PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH36**	**Top Depth (m):**	**9.80**
Sample Number:	**42**	**Base Depth(m):**	**11.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	95
20	86
10	77
6.3	72
3.35	67
2	62
1.18	57
0.6	51
0.3	44
0.212	41
0.15	38
0.063	34

Particle Diameter	Percentage Passing
0.02	28
0.006	20
0.002	16

Soil Fraction	Total Percentage
Cobbles	0
Gravel	38
Sand	28
Silt	18
Clay	16

Remarks:
See Summary of Soil Descriptions

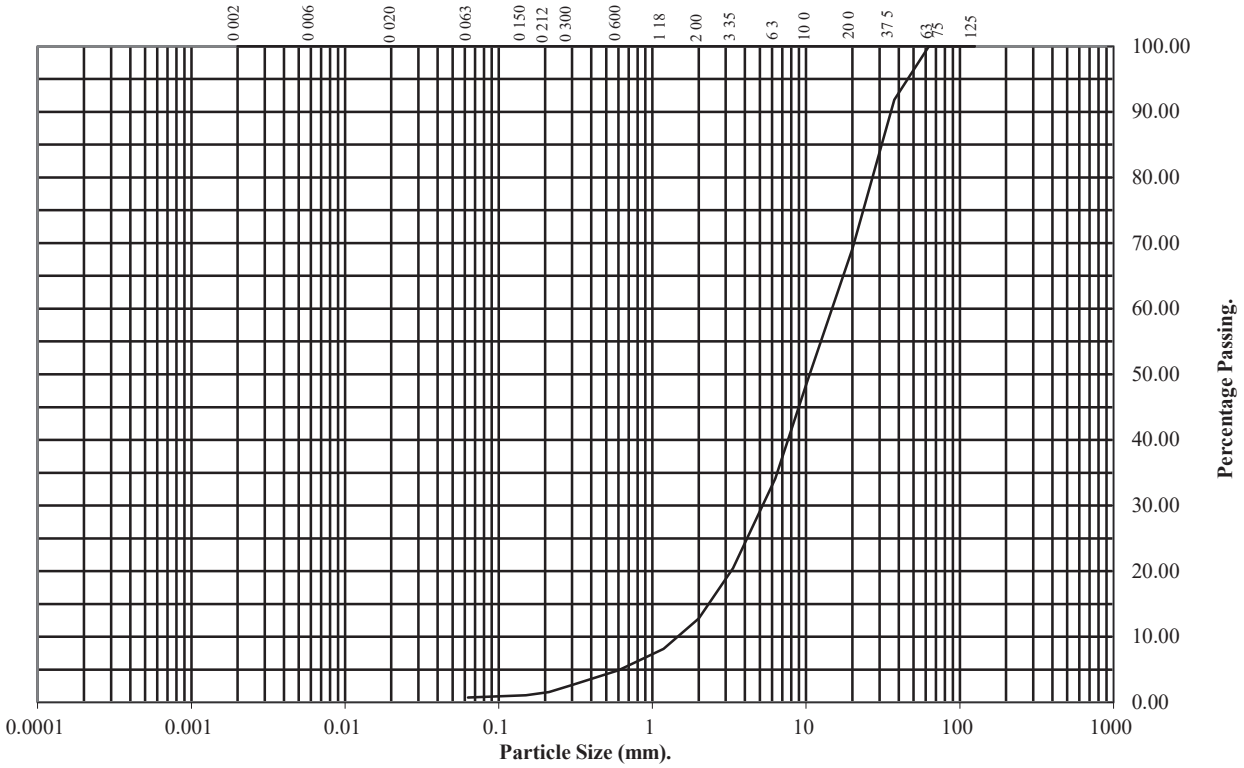
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH37**	**Top Depth (m):**	**0.00**
Sample Number:	**13**	**Base Depth(m):**	**1.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	92
20	69
10	48
6.3	34
3.35	20
2	13
1.18	8
0.6	5
0.3	3
0.212	2
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	87
Sand	12
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

Contract No:
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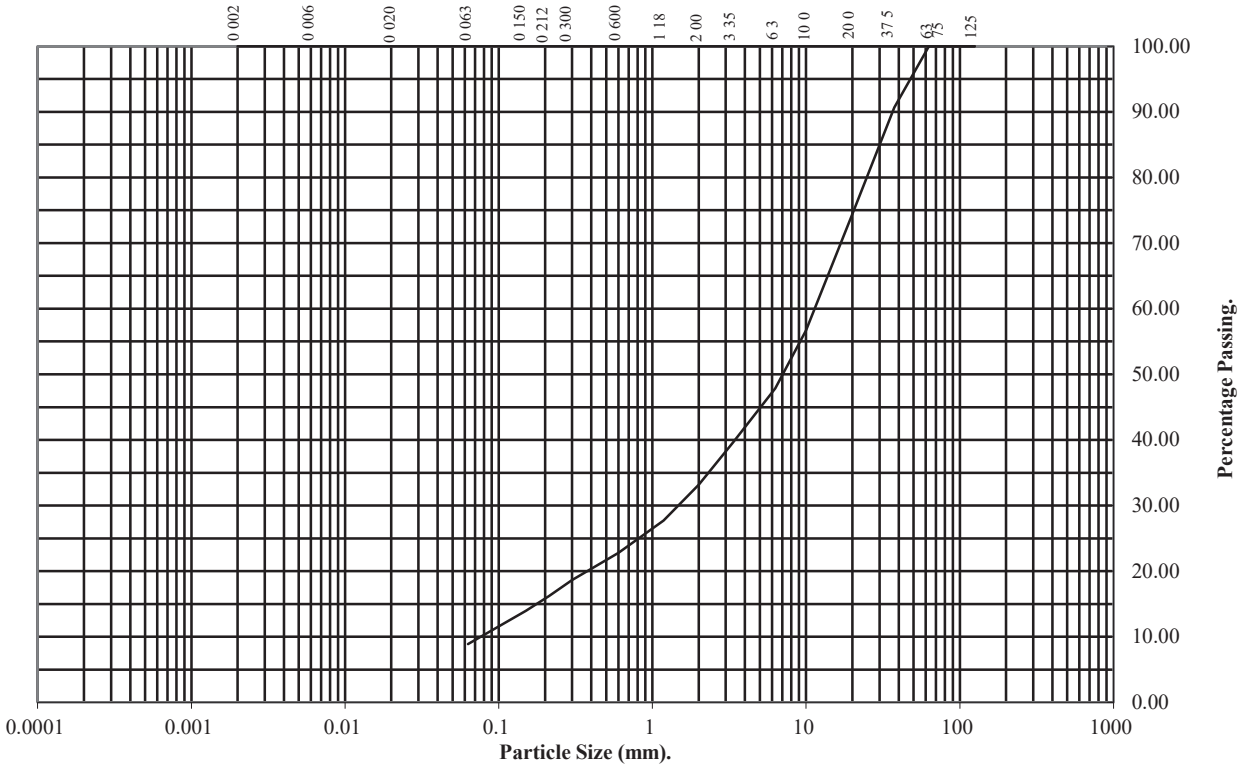
17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH37**	**Top Depth (m):**	**2.70**
Sample Number:	**18**	**Base Depth(m):**	**3.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	91
20	74
10	57
6.3	48
3.35	40
2	33
1.18	28
0.6	23
0.3	19
0.212	16
0.15	14
0.063	9

Soil Fraction	Total Percentage
Cobbles	0
Gravel	67
Sand	24
Silt/Clay	9

Remarks:
See Summary of Soil Descriptions

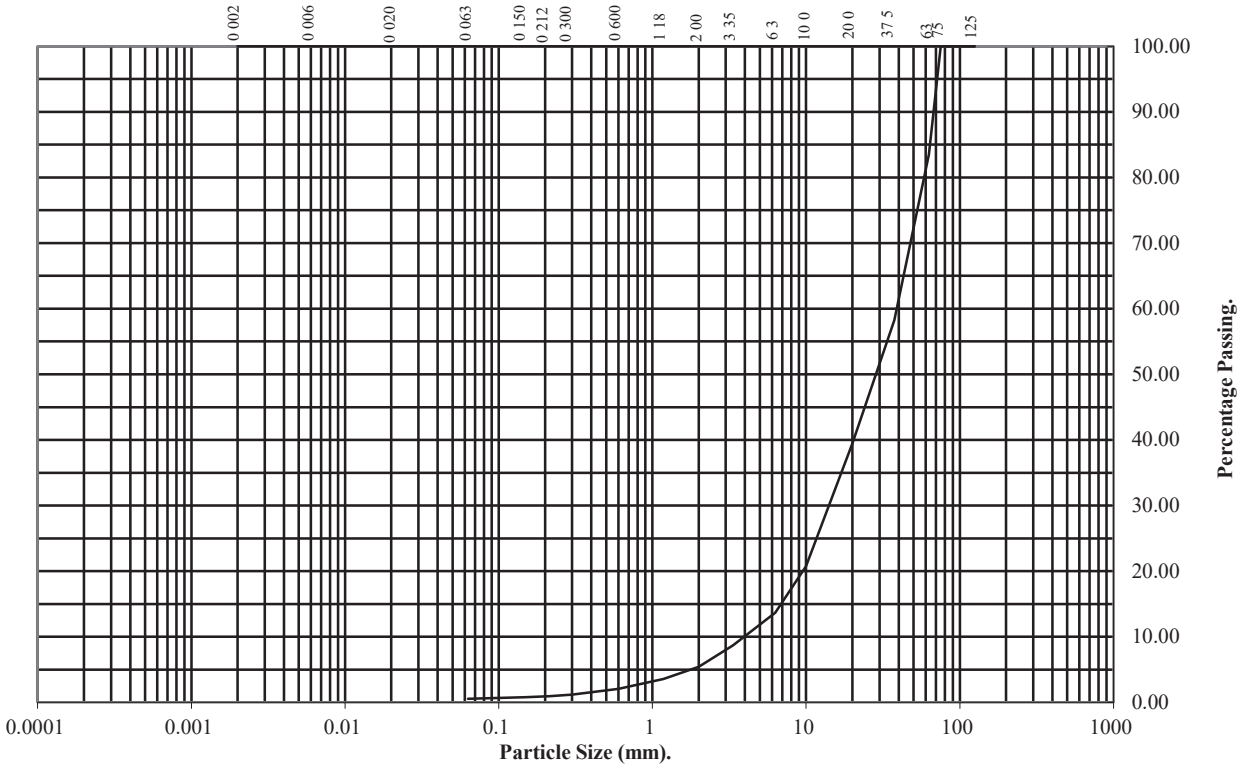
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH37**	**Top Depth (m):**	**3.00**
Sample Number:	**19**	**Base Depth(m):**	**3.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	84
37.5	58
20	39
10	21
6.3	14
3.35	9
2	5
1.18	4
0.6	2
0.3	1
0.212	1
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	16
Gravel	79
Sand	4
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

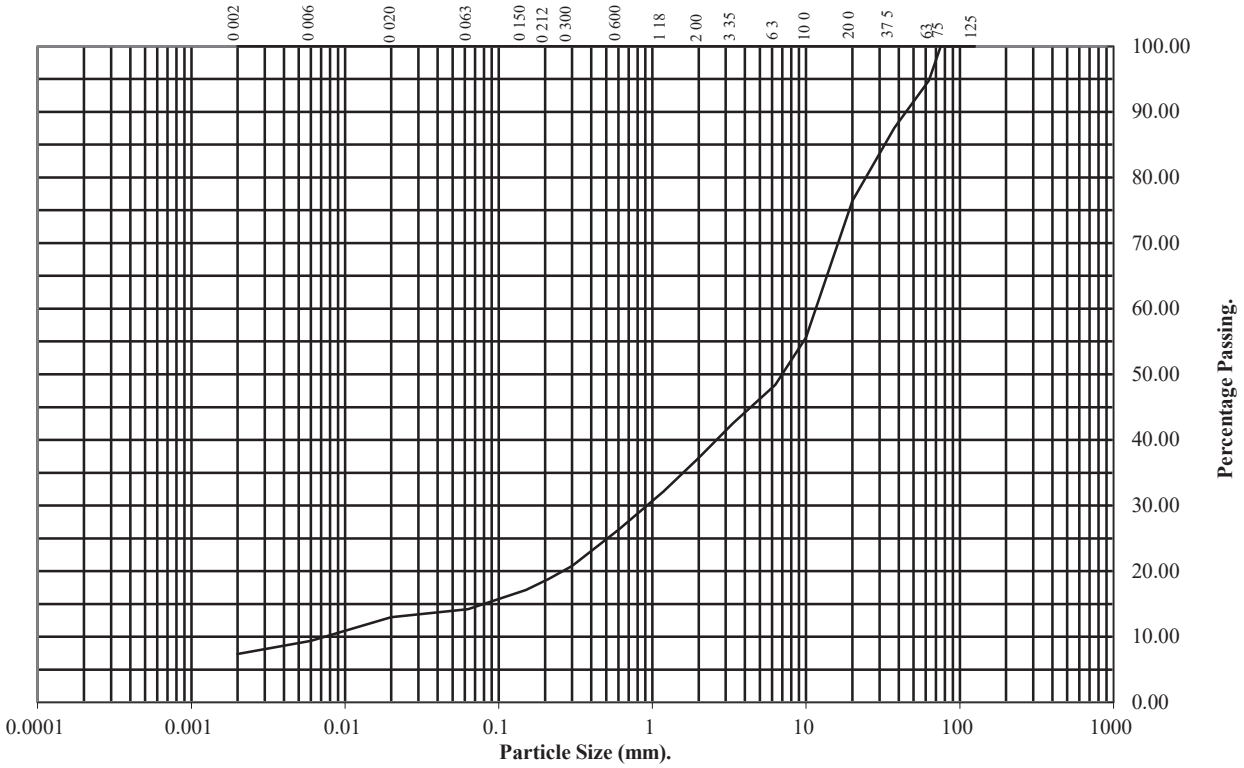
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312
			Client Ref: 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH37**	**Top Depth (m):**	**4.00**
Sample Number:	**20**	**Base Depth(m):**	**5.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	95
37.5	88
20	76
10	56
6.3	48
3.35	43
2	37
1.18	32
0.6	26
0.3	21
0.212	19
0.15	17
0.063	14

Particle Diameter	Percentage Passing
0.02	13
0.006	9
0.002	7

Soil Fraction	Total Percentage
Cobbles	5
Gravel	58
Sand	23
Silt	7
Clay	7

Remarks:
See Summary of Soil Descriptions

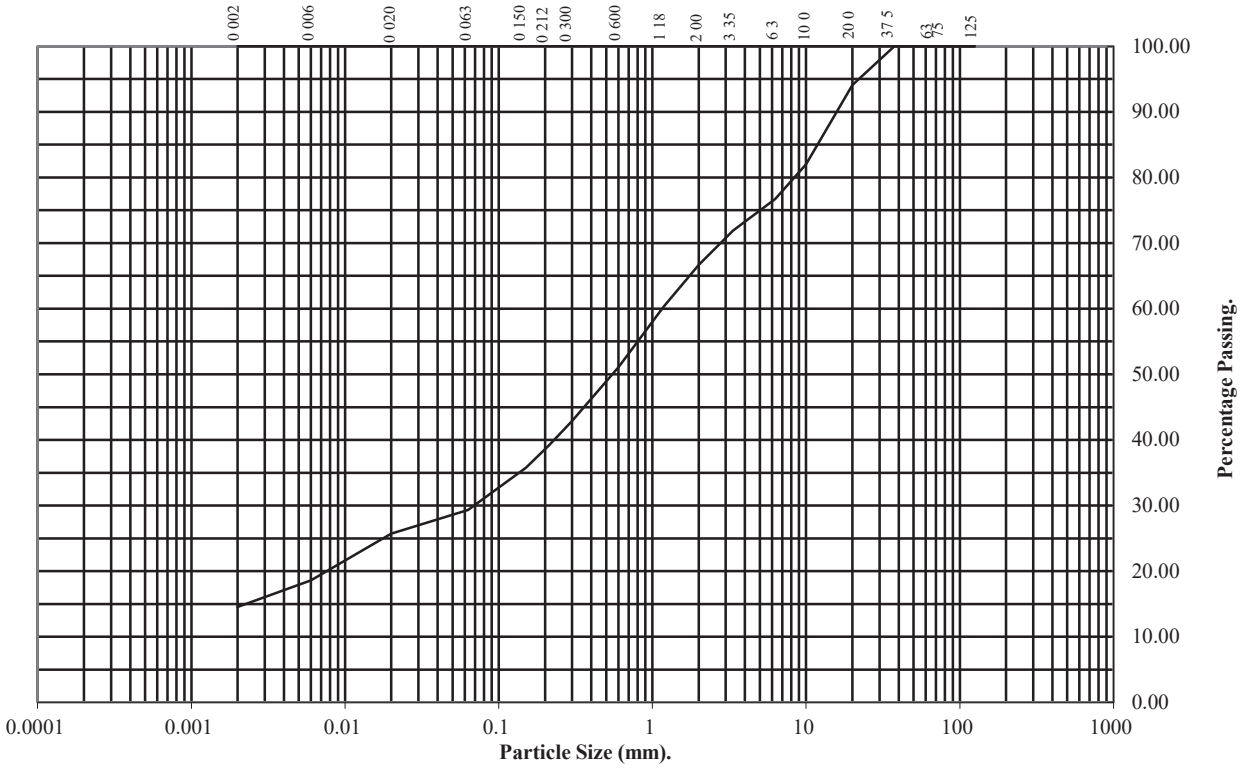
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH37**	**Top Depth (m):**	**5.40**
Sample Number:	**25**	**Base Depth(m):**	**6.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	94
10	82
6.3	77
3.35	72
2	67
1.18	60
0.6	51
0.3	43
0.212	39
0.15	36
0.063	29

Particle Diameter	Percentage Passing
0.02	26
0.006	19
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	33
Sand	38
Silt	14
Clay	15

Remarks:
See Summary of Soil Descriptions

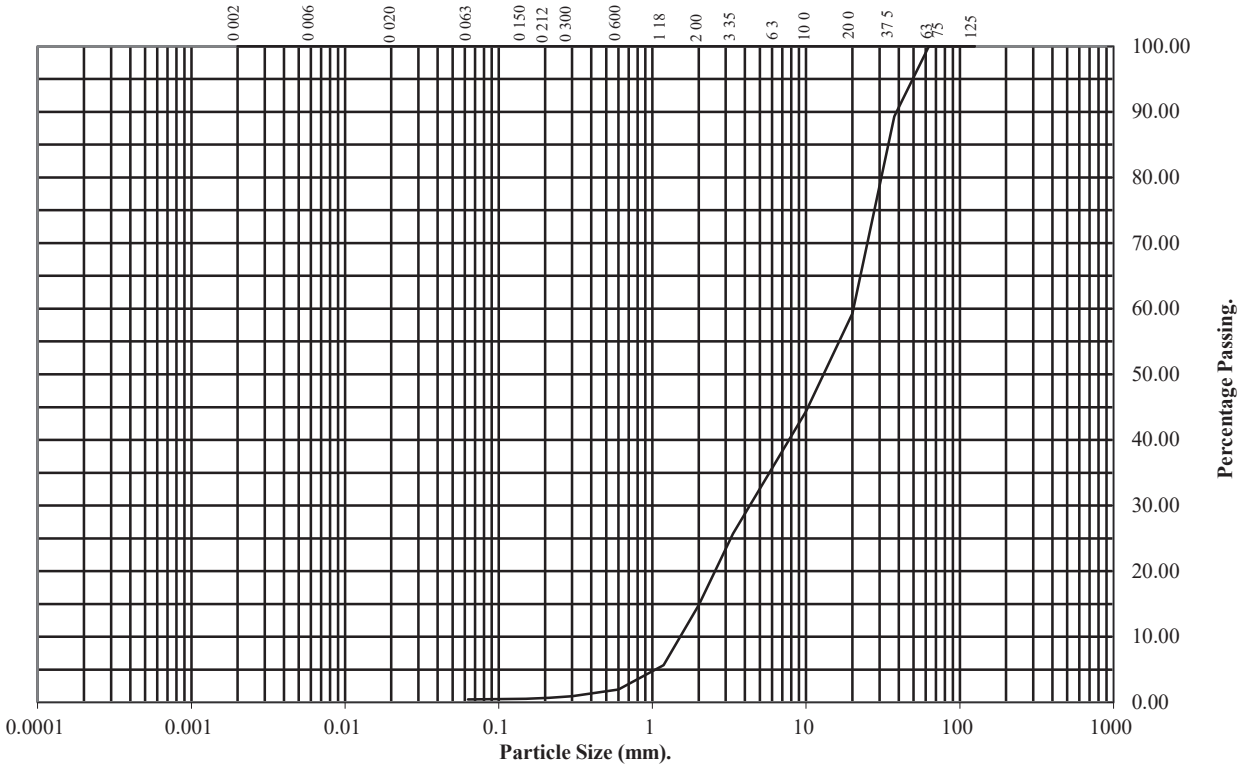
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH38**	**Top Depth (m):**	**1.00**
Sample Number:	**8**	**Base Depth(m):**	**2.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	89
20	59
10	44
6.3	36
3.35	26
2	15
1.18	6
0.6	2
0.3	1
0.212	1
0.15	1
0.063	0

Soil Fraction	Total Percentage
Cobbles	0
Gravel	85
Sand	15
Silt/Clay	0

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

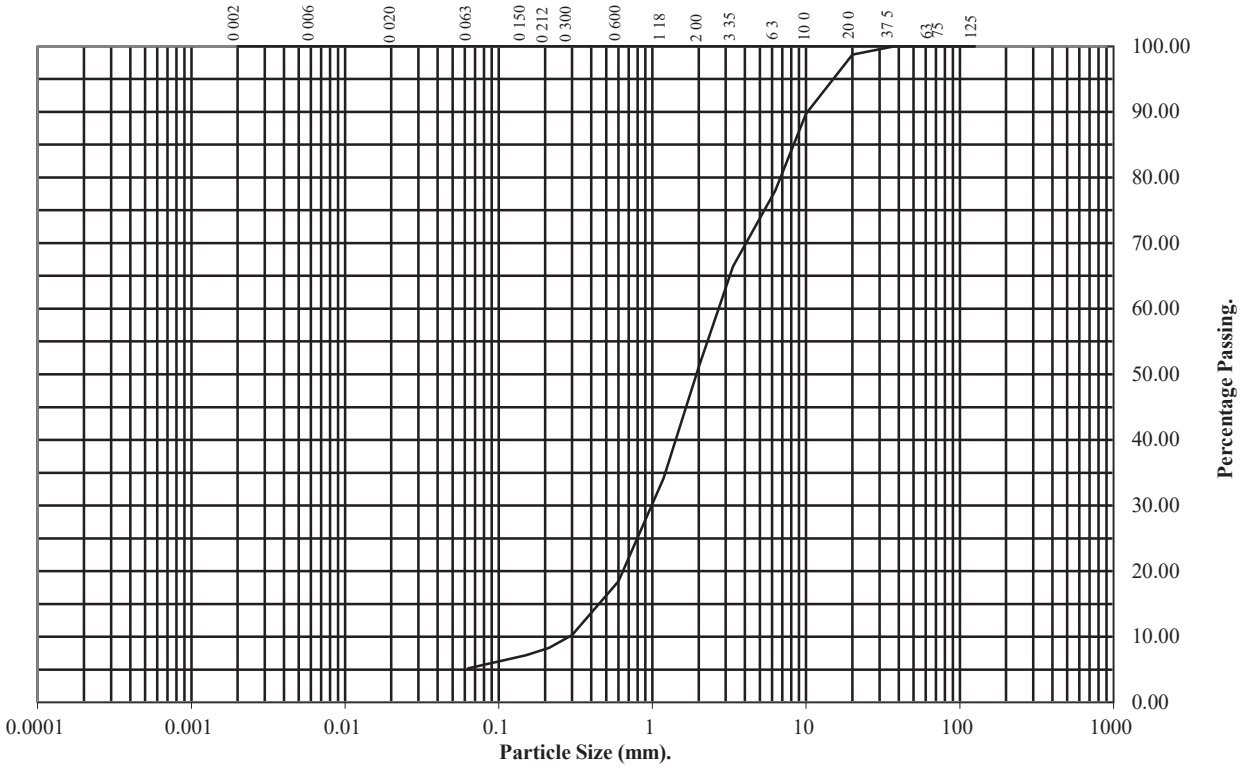
Contract No:
PSL18/1312
Client Ref:
17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH38**	**Top Depth (m):**	**3.50**
Sample Number:	**11**	**Base Depth(m):**	**4.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	99
10	90
6.3	78
3.35	66
2	51
1.18	34
0.6	18
0.3	10
0.212	8
0.15	7
0.063	5

Soil Fraction	Total Percentage
Cobbles	0
Gravel	49
Sand	46
Silt/Clay	5

Remarks:
See Summary of Soil Descriptions

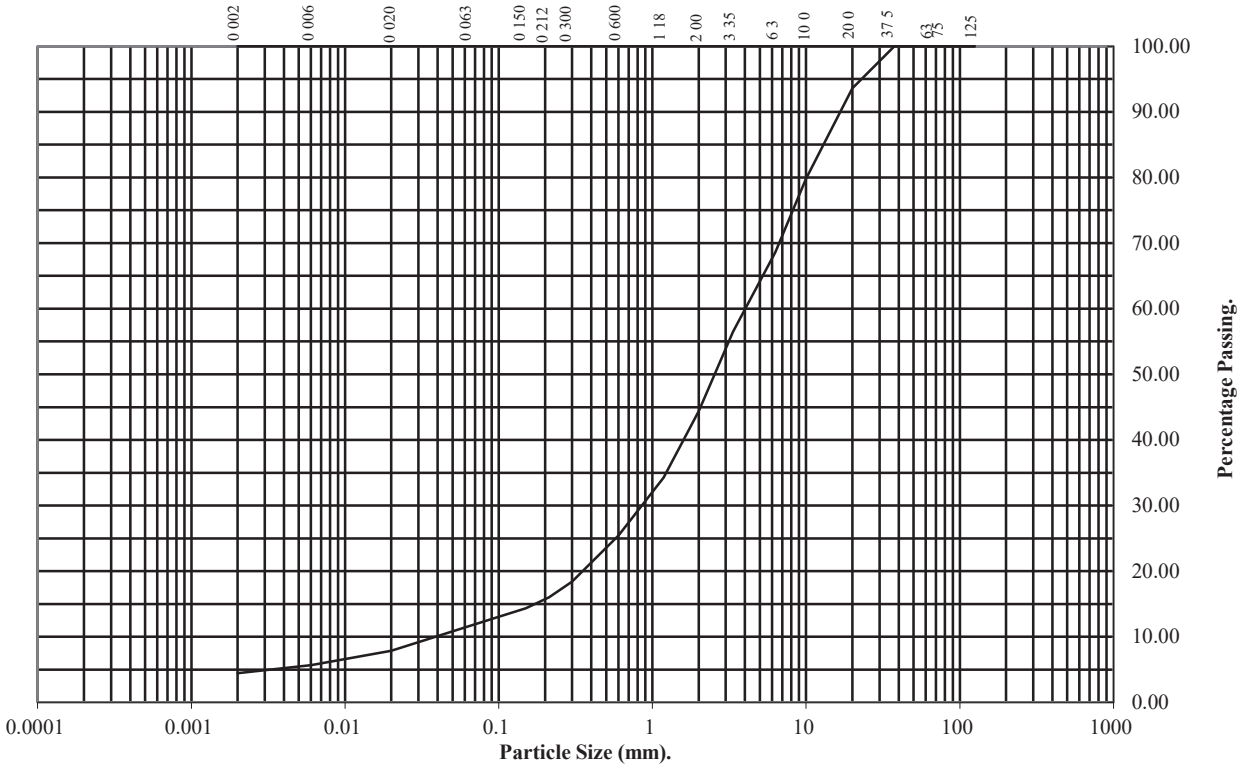
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH38**	**Top Depth (m):**	**4.00**
Sample Number:	**12**	**Base Depth(m):**	**5.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	94
10	80
6.3	69
3.35	56
2	44
1.18	34
0.6	25
0.3	18
0.212	16
0.15	14
0.063	12

Particle Diameter	Percentage Passing
0.02	8
0.006	6
0.002	4

Soil Fraction	Total Percentage
Cobbles	0
Gravel	56
Sand	32
Silt	8
Clay	4

Remarks:
See Summary of Soil Descriptions

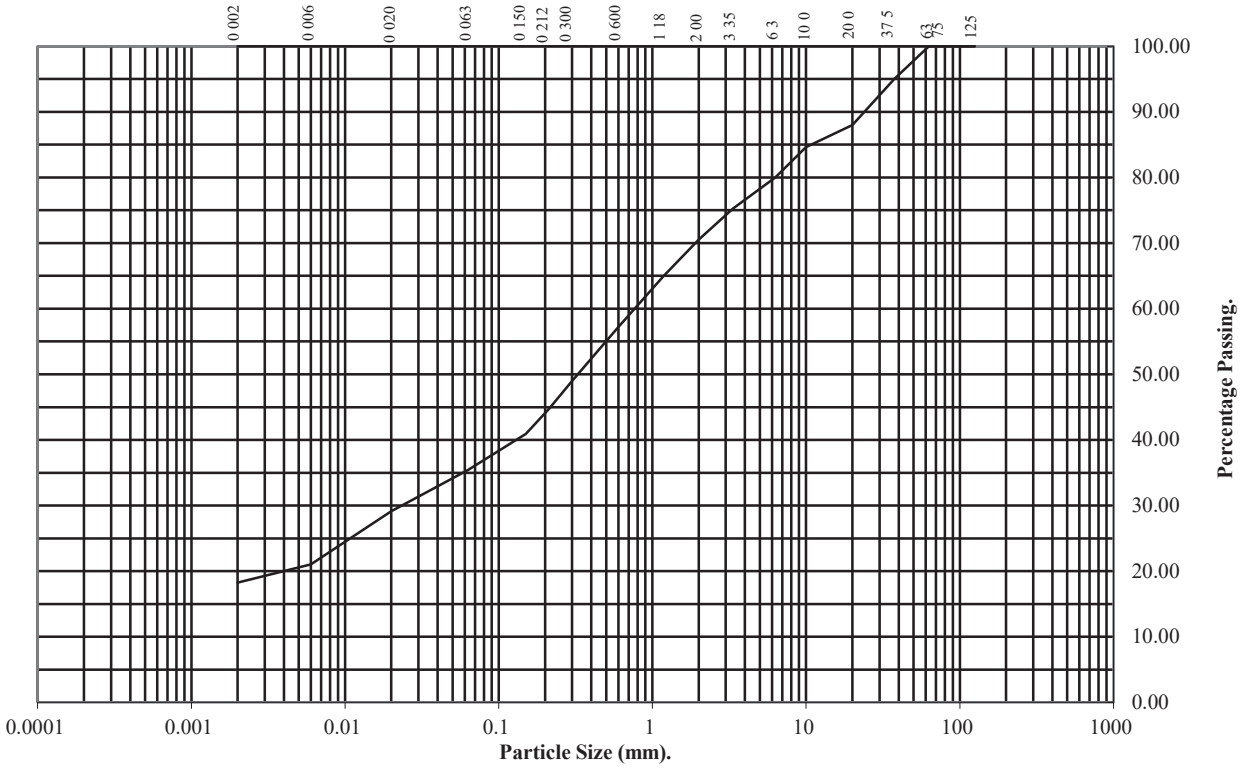
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH38**	**Top Depth (m):**	**5.10**
Sample Number:	**13**	**Base Depth(m):**	**5.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	95
20	88
10	85
6.3	80
3.35	75
2	71
1.18	65
0.6	57
0.3	49
0.212	45
0.15	41
0.063	35

Particle Diameter	Percentage Passing
0.02	29
0.006	21
0.002	18

Soil Fraction	Total Percentage
Cobbles	0
Gravel	29
Sand	36
Silt	17
Clay	18

Remarks:
See Summary of Soil Descriptions

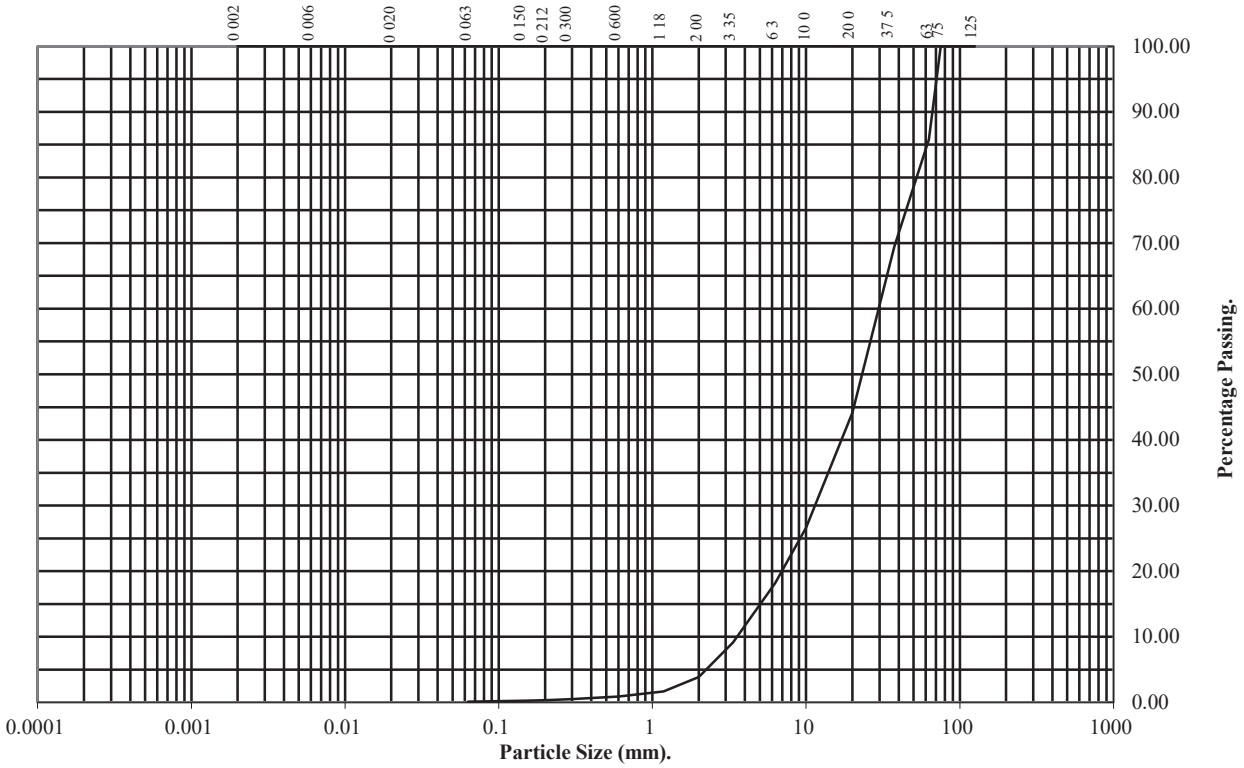
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH39**	**Top Depth (m):**	**1.00**
Sample Number:	**2**	**Base Depth(m):**	**2.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	86
37.5	69
20	44
10	27
6.3	18
3.35	9
2	4
1.18	2
0.6	1
0.3	0
0.212	0
0.15	0
0.063	0

Soil Fraction	Total Percentage
Cobbles	14
Gravel	82
Sand	4
Silt/Clay	0

Remarks:
See Summary of Soil Descriptions

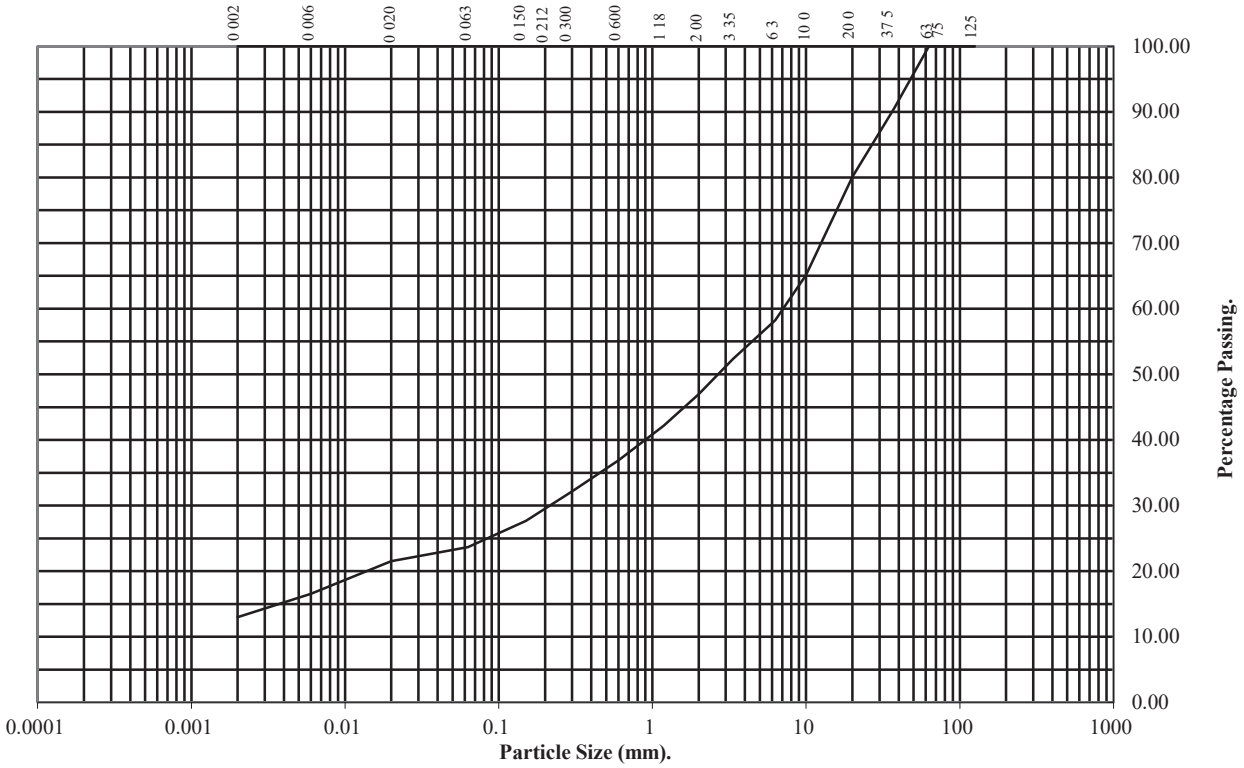
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH39**	**Top Depth (m):**	**2.40**
Sample Number:	**3**	**Base Depth(m):**	**3.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	91
20	80
10	65
6.3	58
3.35	52
2	47
1.18	42
0.6	37
0.3	32
0.212	30
0.15	28
0.063	24

Particle Diameter	Percentage Passing
0.02	22
0.006	17
0.002	13

Soil Fraction	Total Percentage
Cobbles	0
Gravel	53
Sand	23
Silt	11
Clay	13

Remarks:
See Summary of Soil Descriptions

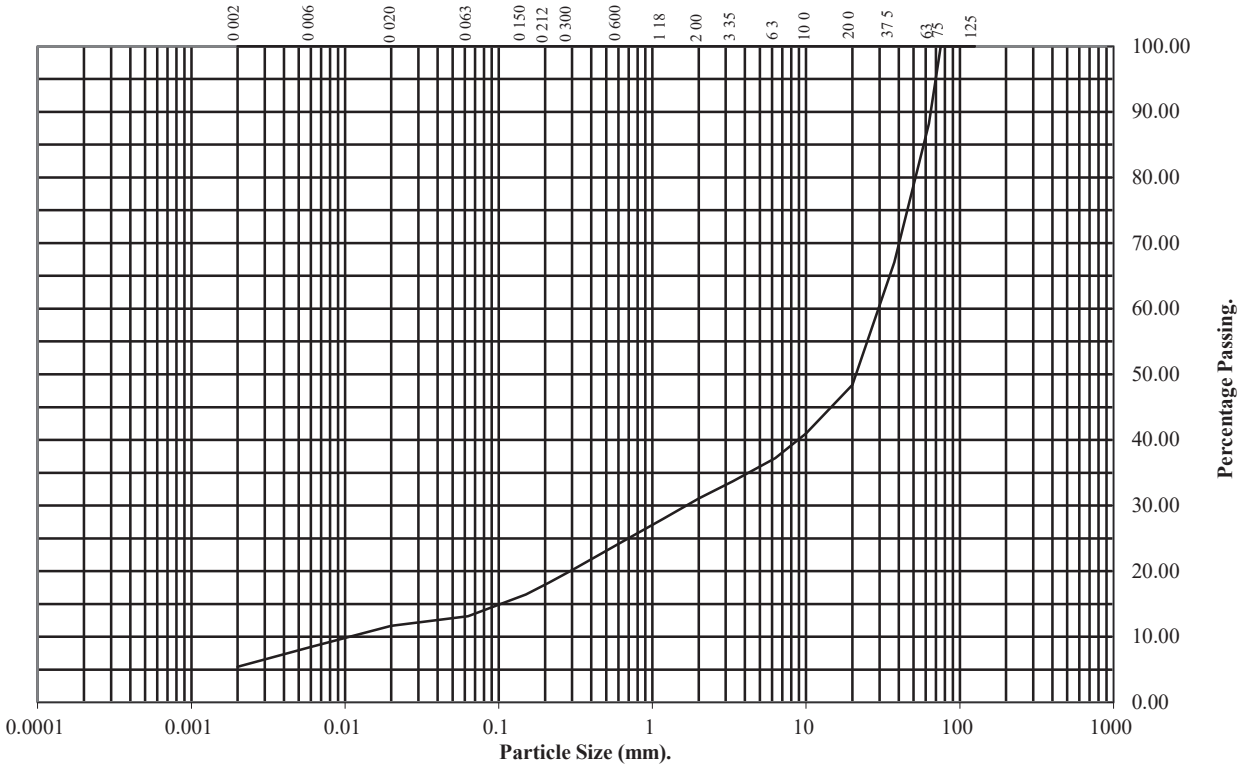
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH39**	**Top Depth (m):**	**4.50**
Sample Number:	**8**	**Base Depth(m):**	**5.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	88
37.5	67
20	48
10	41
6.3	37
3.35	34
2	31
1.18	28
0.6	24
0.3	20
0.212	18
0.15	16
0.063	13

Particle Diameter	Percentage Passing
0.02	12
0.006	8
0.002	5

Soil Fraction	Total Percentage
Cobbles	12
Gravel	57
Sand	18
Silt	8
Clay	5

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

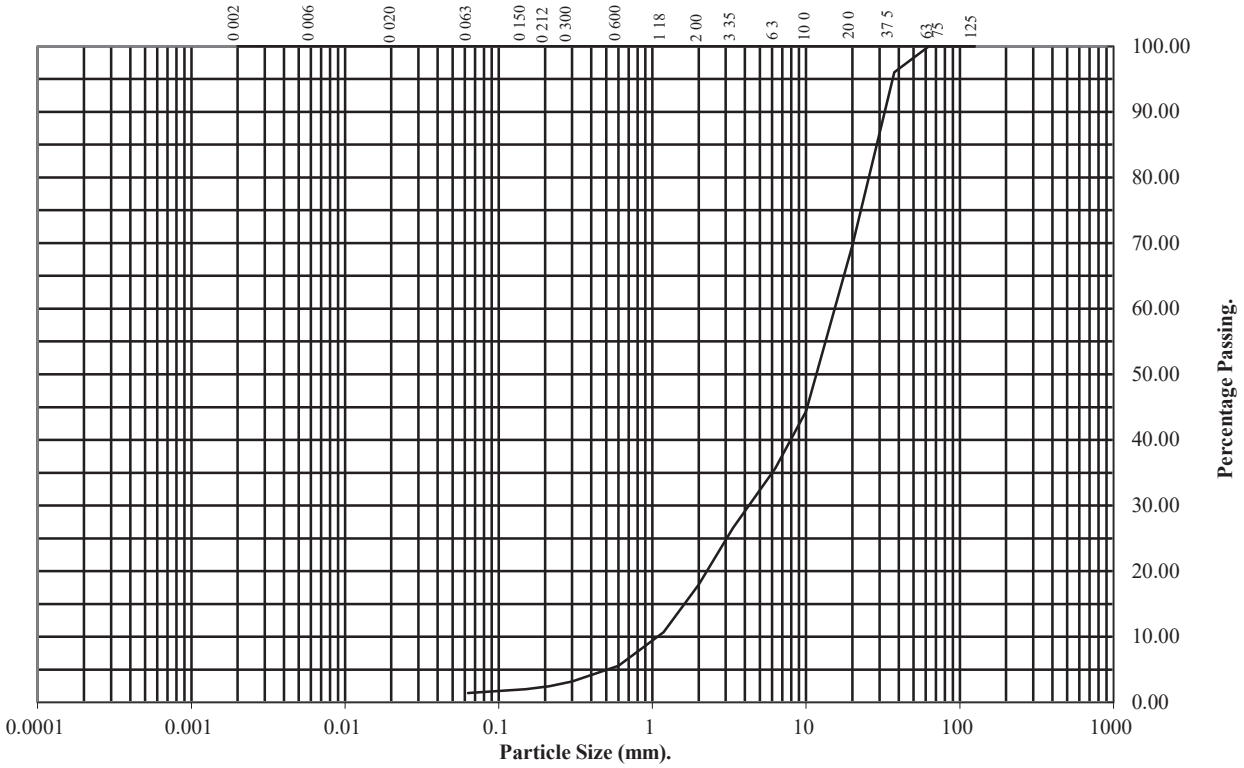
Contract No:
PSL18/1312
Client Ref:
17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH39**	**Top Depth (m):**	**5.60**
Sample Number:	**10**	**Base Depth(m):**	**6.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	96
20	70
10	44
6.3	36
3.35	27
2	18
1.18	11
0.6	6
0.3	3
0.212	2
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	82
Sand	17
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

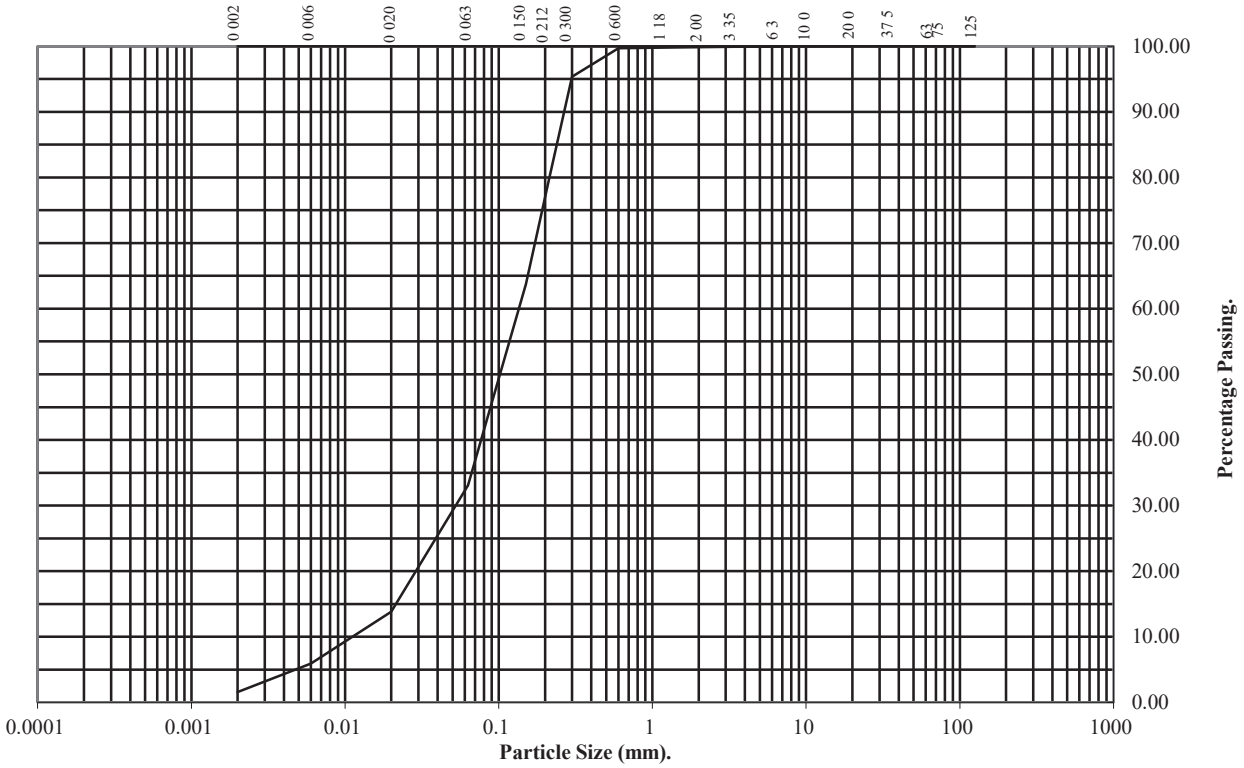
Contract No:
PSL18/1312
Client Ref:
17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH39**	**Top Depth (m):**	**8.00**
Sample Number:	**13**	**Base Depth(m):**	**9.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	95
0.212	80
0.15	64
0.063	33

Particle Diameter	Percentage Passing
0.02	14
0.006	6
0.002	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	67
Silt	31
Clay	2

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

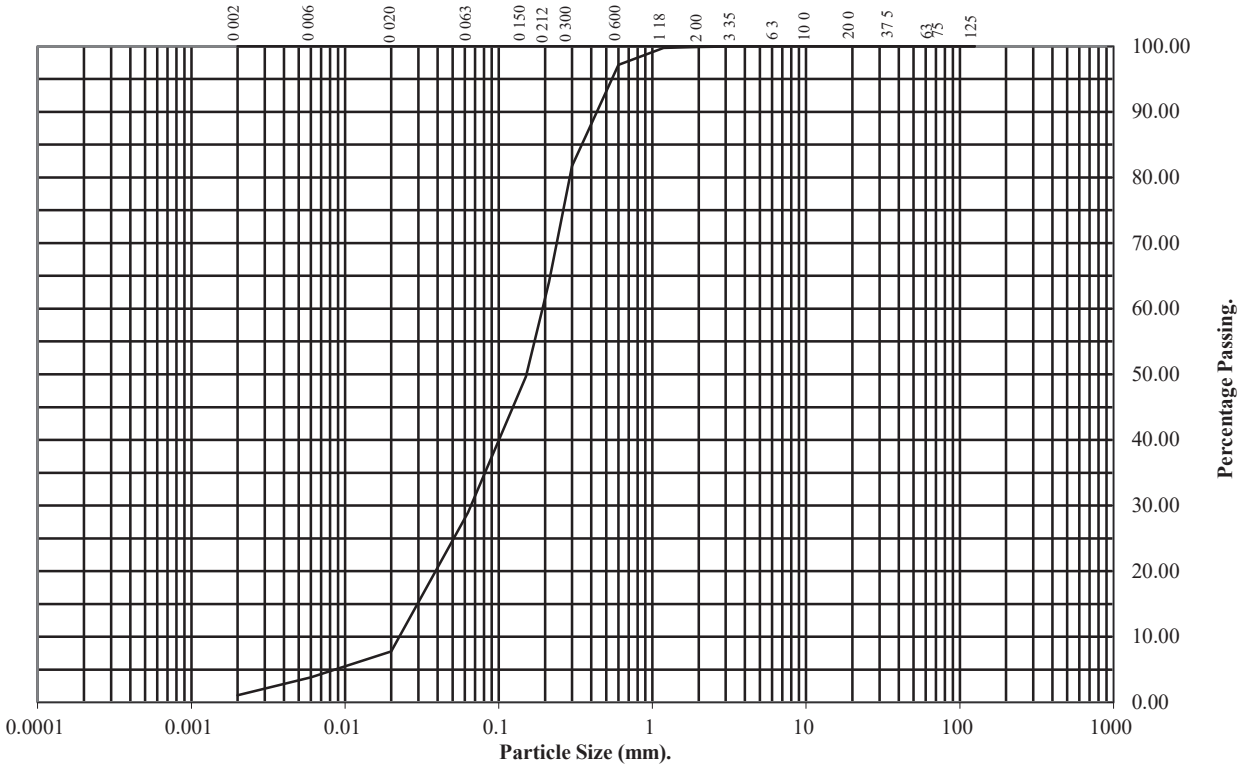
Contract No:
PSL18/1312
Client Ref:
17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH39**	**Top Depth (m):**	**12.00**
Sample Number:	**15**	**Base Depth(m):**	**13.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	97
0.3	82
0.212	64
0.15	50
0.063	29

Particle Diameter	Percentage Passing
0.02	8
0.006	4
0.002	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	71
Silt	28
Clay	1

Remarks:
See Summary of Soil Descriptions

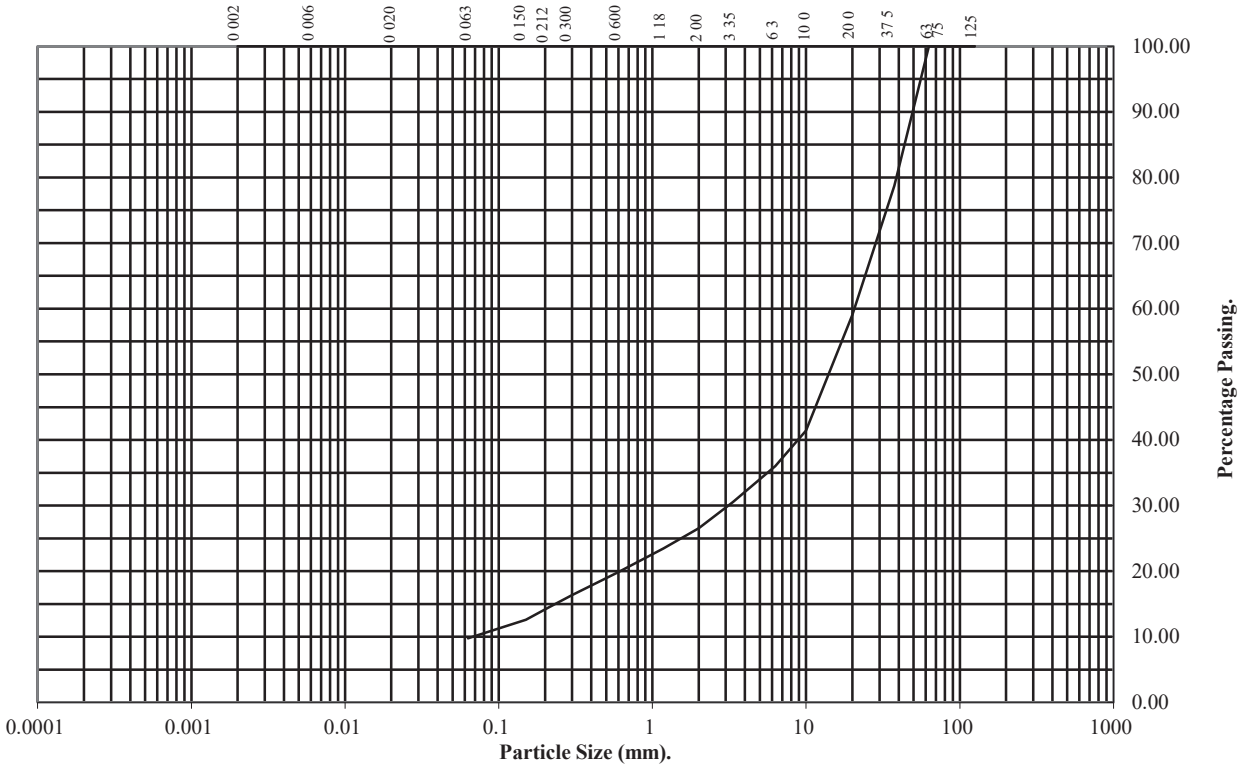
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH40**	**Top Depth (m):**	**0.00**
Sample Number:	**4**	**Base Depth(m):**	**1.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	79
20	59
10	41
6.3	36
3.35	31
2	27
1.18	23
0.6	20
0.3	16
0.212	15
0.15	13
0.063	10

Soil Fraction	Total Percentage
Cobbles	0
Gravel	73
Sand	17
Silt/Clay	10

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

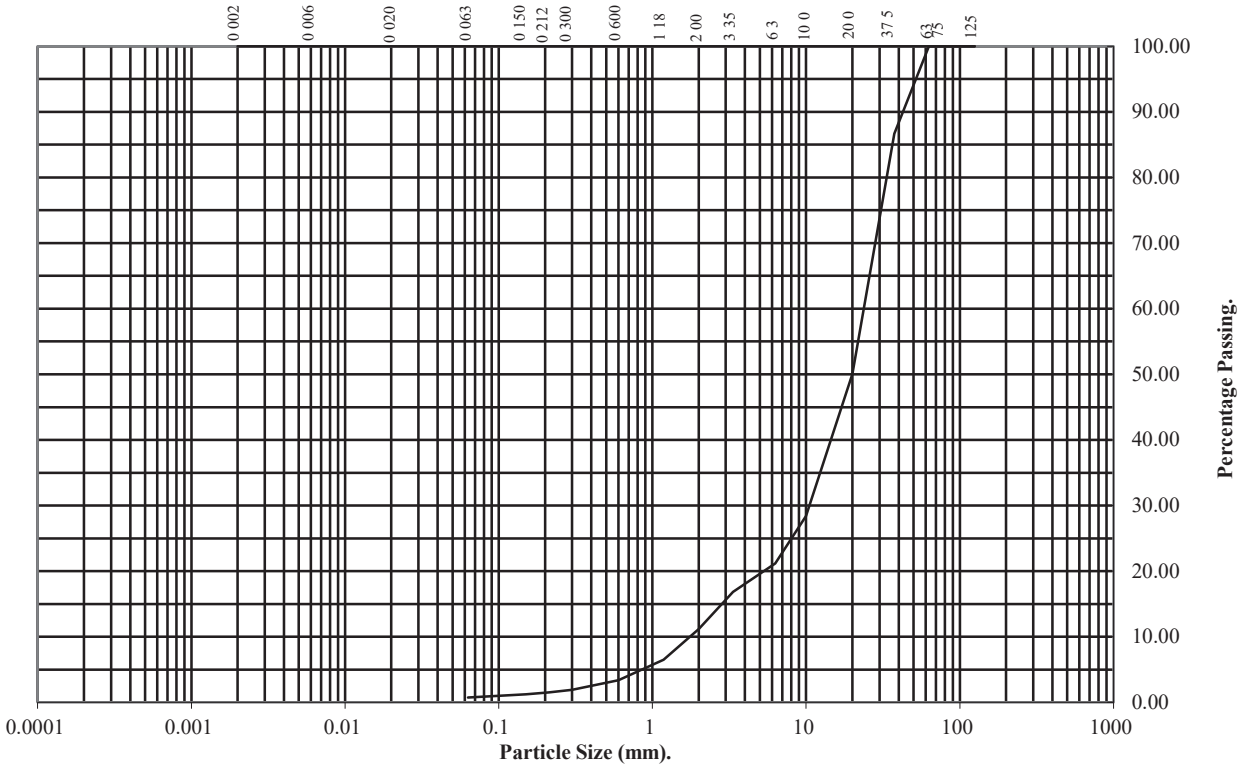
Contract No:
PSL18/1312
Client Ref:
17-0769

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH40**	**Top Depth (m):**	**2.40**
Sample Number:	**6**	**Base Depth(m):**	**3.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	87
20	50
10	28
6.3	21
3.35	17
2	11
1.18	7
0.6	3
0.3	2
0.212	2
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	89
Sand	10
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Stornoway Deep Water Berth G.I.

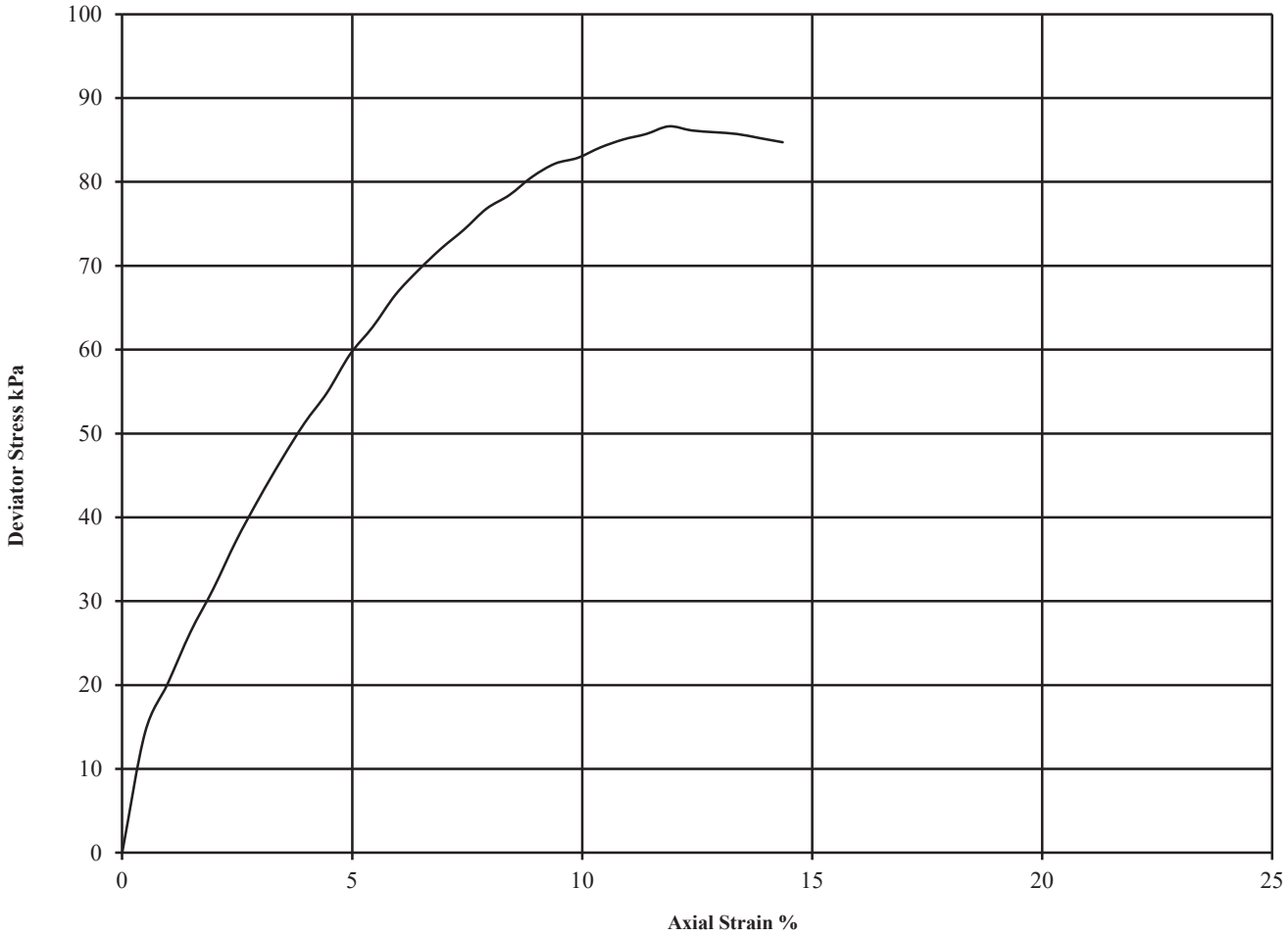
Contract No:
PSL18/1312
Client Ref:
17-0769

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**BH36**	**Top Depth (m):**	**4.00**
Sample Number:	**35**	**Base Depth (m):**	**4.45**
Sample Type	**UT**		



Diameter (mm):		102.0	Height (mm):		206.0	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35
1	55	1.68	1.09	80	87	43	11.9	Plastic	See summary of soil descriptions

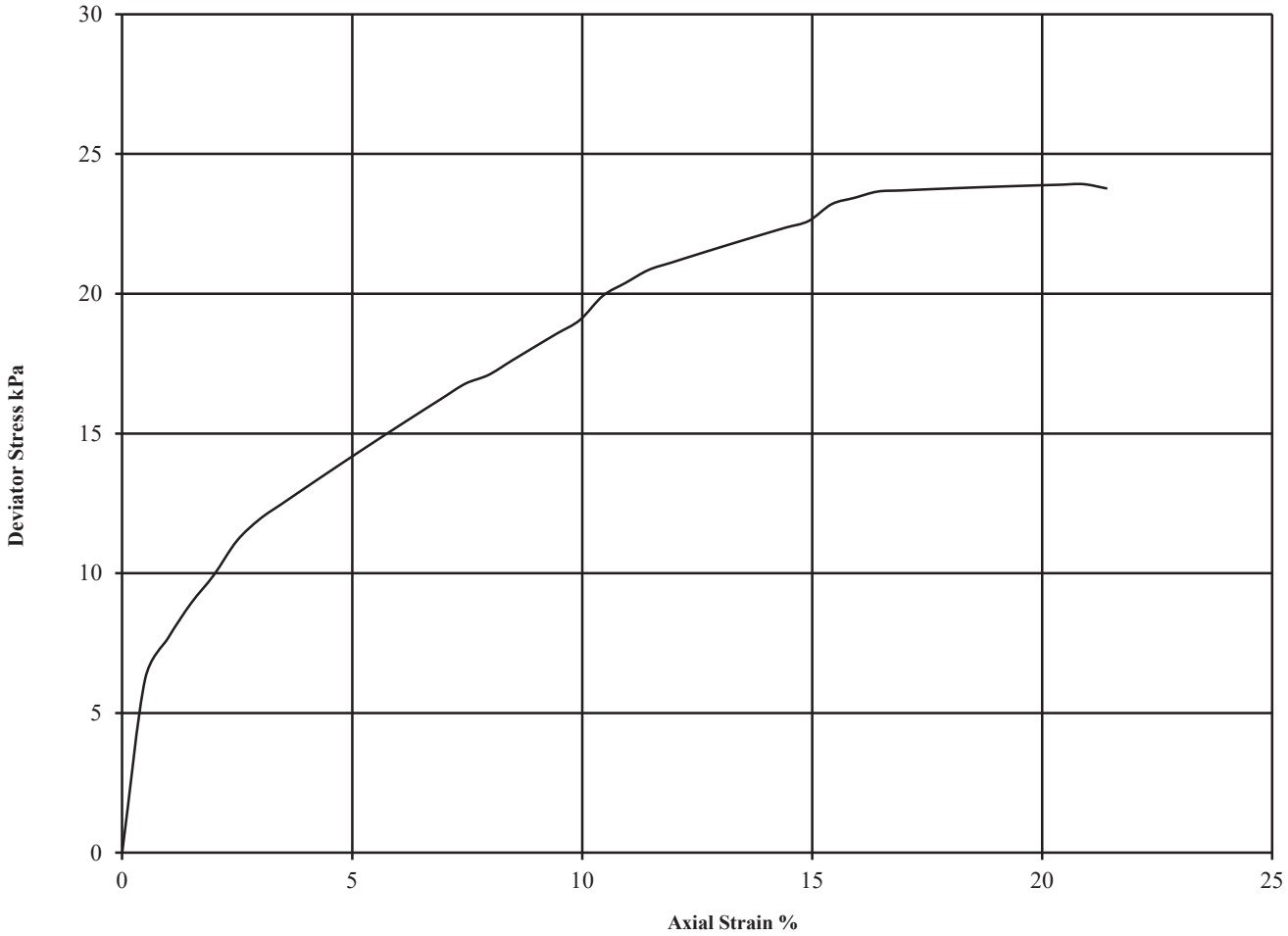
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312
			Client Ref: 17-0769

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**BH38**	**Top Depth (m):**	**3.10**
Sample Number:	**19**	**Base Depth (m):**	**3.55**
Sample Type	**UT**		



Diameter (mm):		102.0	Height (mm):		205.0	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33
1	43	1.80	1.26	62	24	12	20.9	Plastic	See summary of soil descriptions

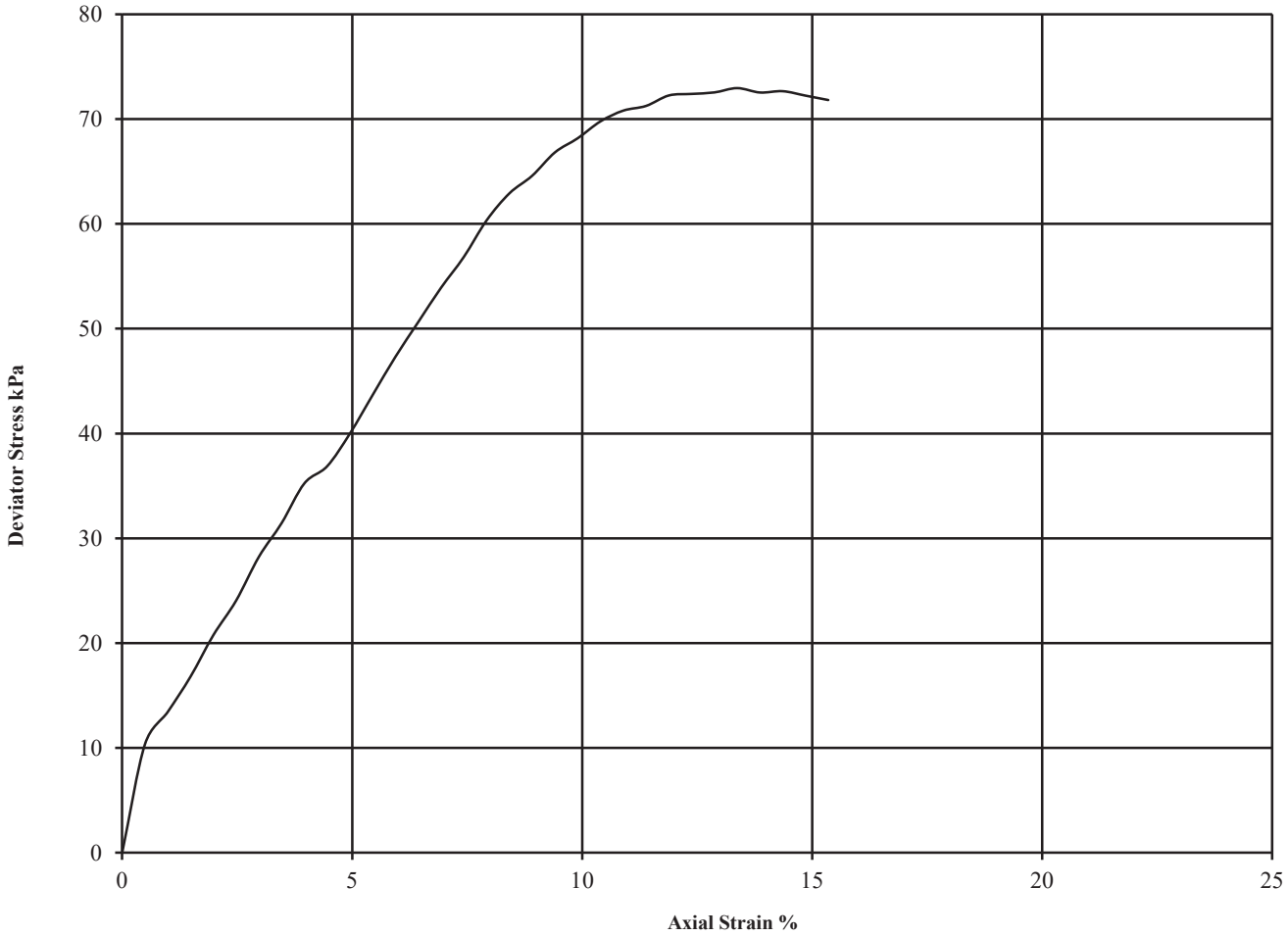
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312
			Client Ref: 17-0769

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**BH39**	**Top Depth (m):**	**3.00**
Sample Number:	**12**	**Base Depth (m):**	**3.45**
Sample Type	**UT**		



Diameter (mm):		102.0	Height (mm):		206.0	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35
1	44	1.81	1.26	60	73	36	13.4	Plastic	See summary of soil descriptions

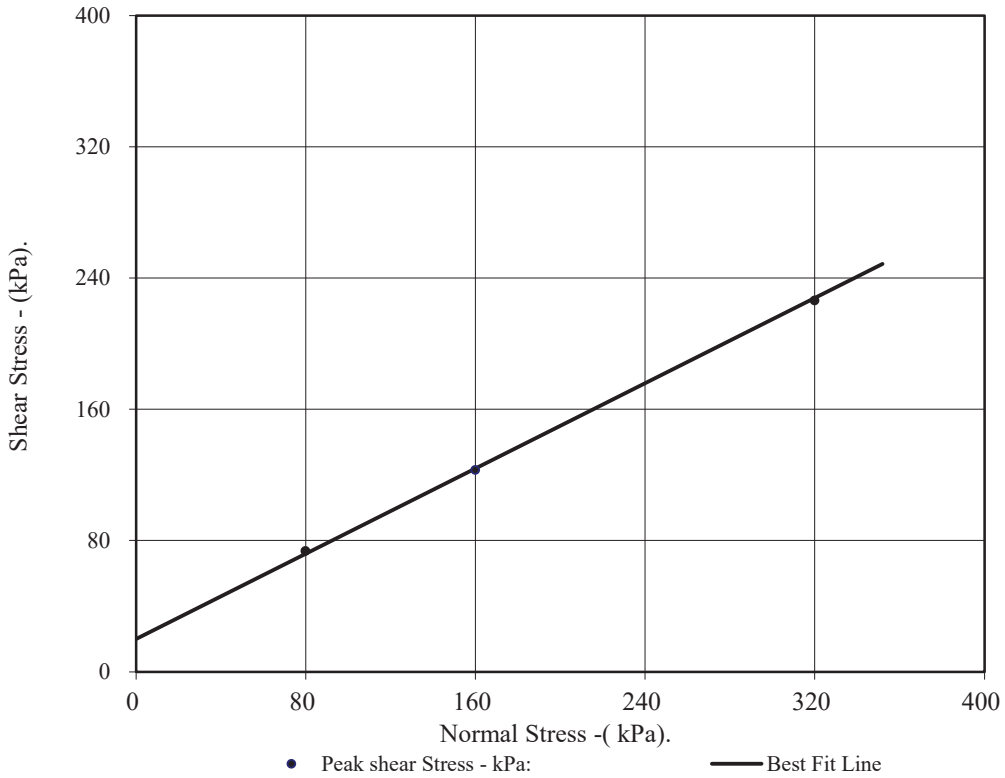
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312
			Client Ref: 17-0769

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	**BH36**		Top Depth:	**7.00**
Sample Number:	**39**		Base Depth:	**8.00**
Sample Conditions:	Submerged		Sample Type	**B**
Particle Density - Mg/m3:	2.65	Assumed	**Remarks:**	
Sample Preparation:	Remoulded using hand tamped effort. Material tested passing 2mm sieve			
Sample Description:	**See summary of soil descriptions.**			

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	19.54	19.54	19.54
Length - mm:	60.03	60.03	60.03
Moisture Content - %:	14	14	14
Bulk Density - Mg/m3:	2.03	2.04	2.04
Dry Density - Mg/m3:	1.78	1.79	1.79
Voids Ratio:	0.487	0.483	0.479
Normal Pressure- kPa	80	160	320
Consolidation Stage			
Consolidated Height - mm:	18.50	18.34	17.76
Shearing Stage			
Rate of Strain (mm/min)	1.090	1.090	1.090
Displacement at peak shear stress (mm)	3.00	4.00	6.00
Peak shear Stress - kPa:	74	123	226
Final Consolidated Conditions			
Moisture Content - %:	16	16	16
Bulk Density - Mg/m3:	2.15	2.17	2.25
Dry Density - Mg/m3:	1.85	1.87	1.93
Peak			
Angle of Shearing Resistance:(~~θ~~)	**33**		
Effective Cohesion - kPa:	**20**		

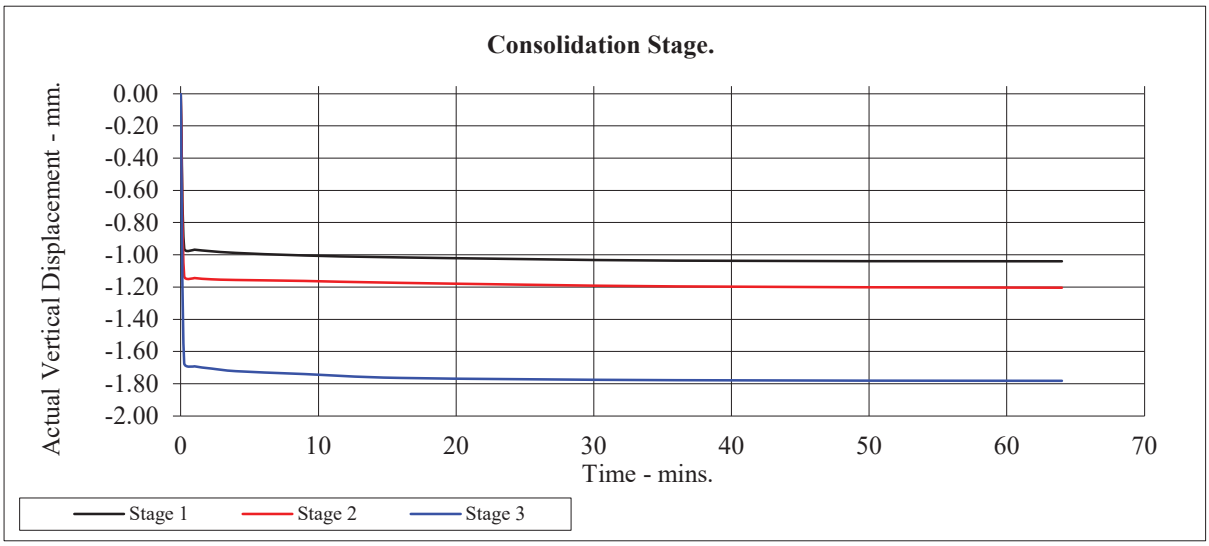


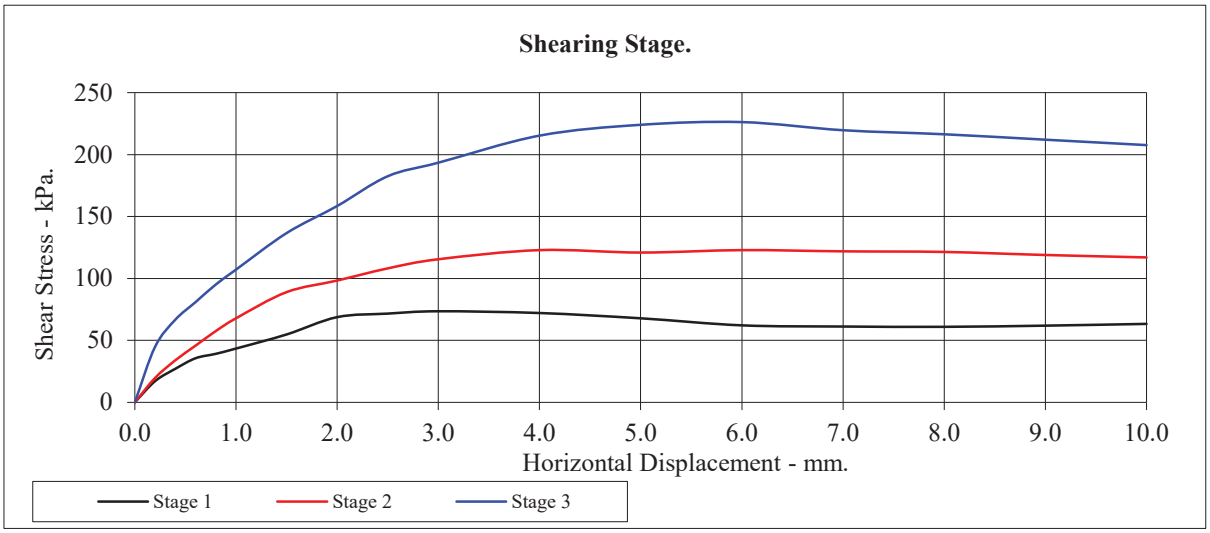
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

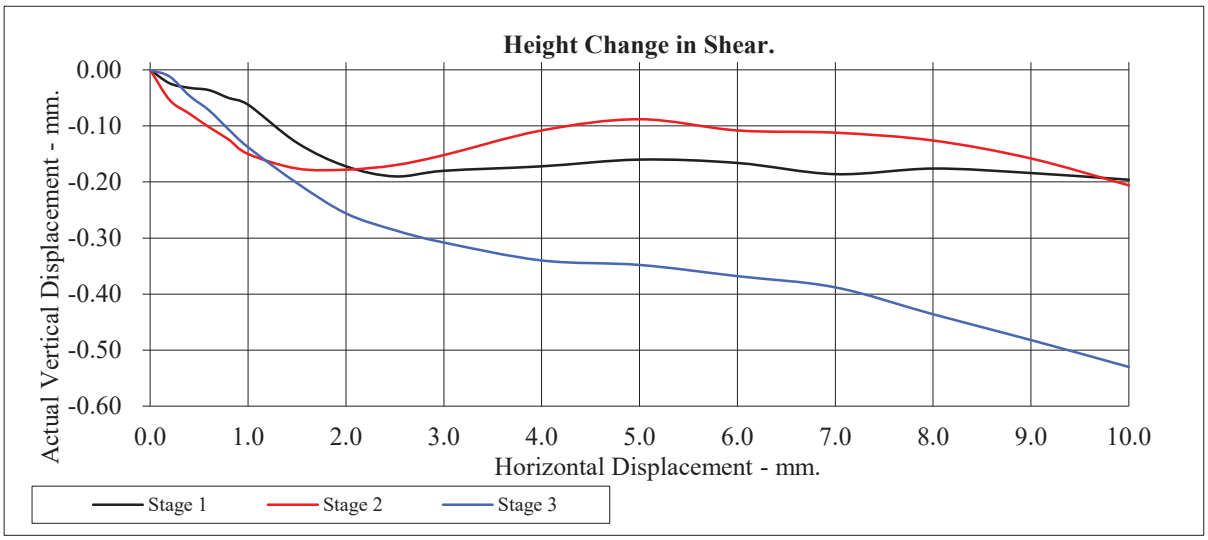
CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	**BH36**	Top Depth:	**7.00**
Sample Number:	**39**	Base Depth:	**8.00**







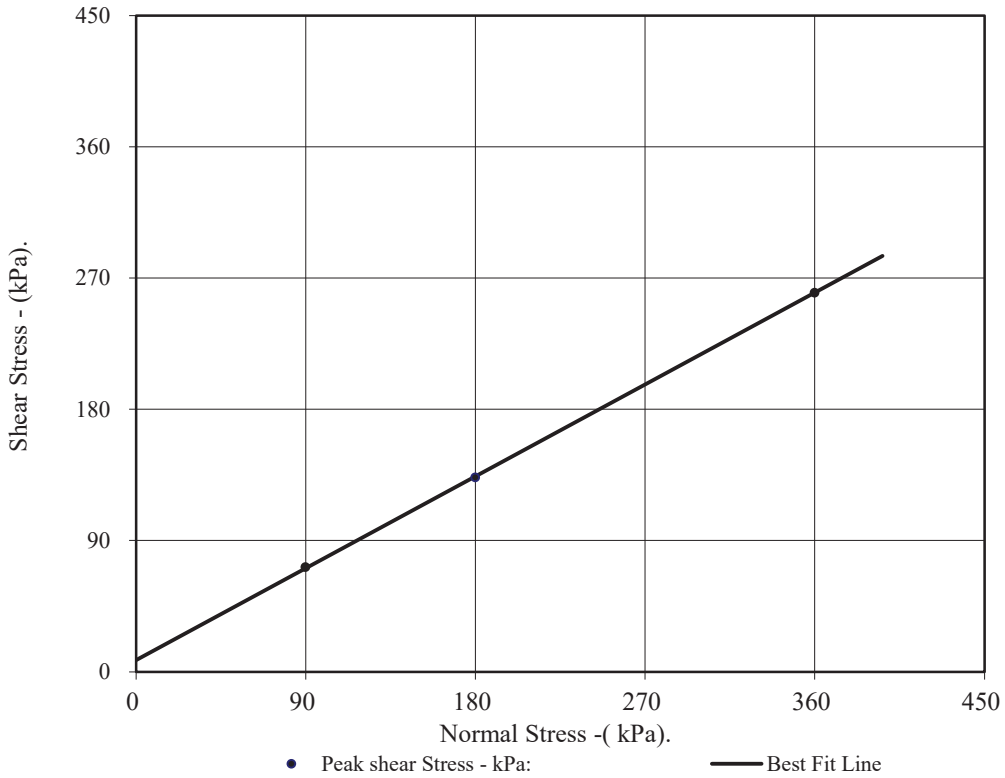
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312
			Client Ref: 17-0769

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	**BH39**		Top Depth:	**8.00**
Sample Number:	**13**		Base Depth:	**9.00**
Sample Conditions:	Submerged		Sample Type	**B**
Particle Density - Mg/m3:	2.65	Assumed	**Remarks:**	
Sample Preparation:	Remoulded using hand tamped effort. Material tested passing 2mm sieve			
Sample Description:	**See summary of soil descriptions.**			

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	19.54	19.54	19.54
Length - mm:	60.03	60.03	60.03
Moisture Content - %:	25	25	25
Bulk Density - Mg/m3:	1.86	1.87	1.87
Dry Density - Mg/m3:	1.49	1.50	1.50
Voids Ratio:	0.777	0.772	0.772
Normal Pressure- kPa	90	180	360
Consolidation Stage			
Consolidated Height - mm:	18.60	18.37	18.13
Shearing Stage			
Rate of Strain (mm/min)	0.803	0.803	0.803
Displacement at peak shear stress (mm)	4.00	6.00	5.00
Peak shear Stress - kPa:	72	133	260
Final Consolidated Conditions			
Moisture Content - %:	25	25	23
Bulk Density - Mg/m3:	1.96	1.99	2.02
Dry Density - Mg/m3:	1.57	1.59	1.63
Peak			
Angle of Shearing Resistance:(θ)	**35**		
Effective Cohesion - kPa:	**8**		

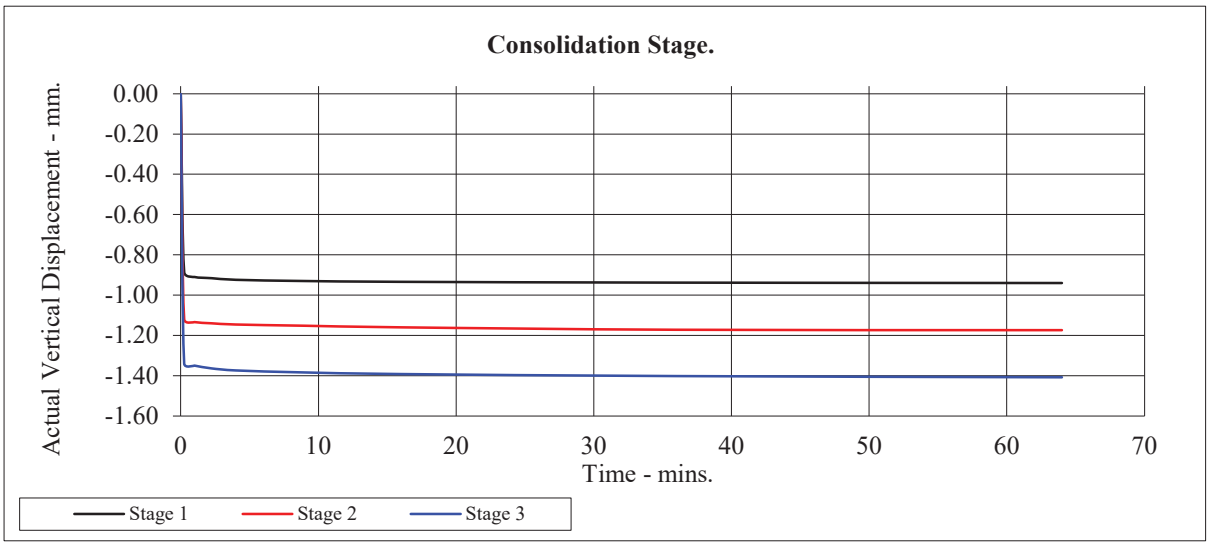


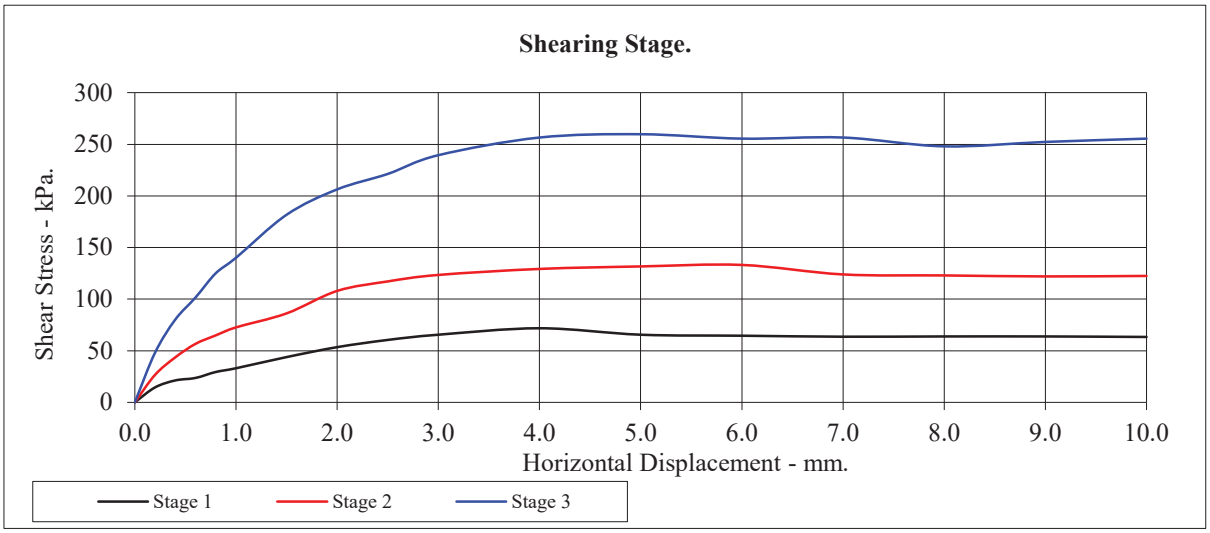
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

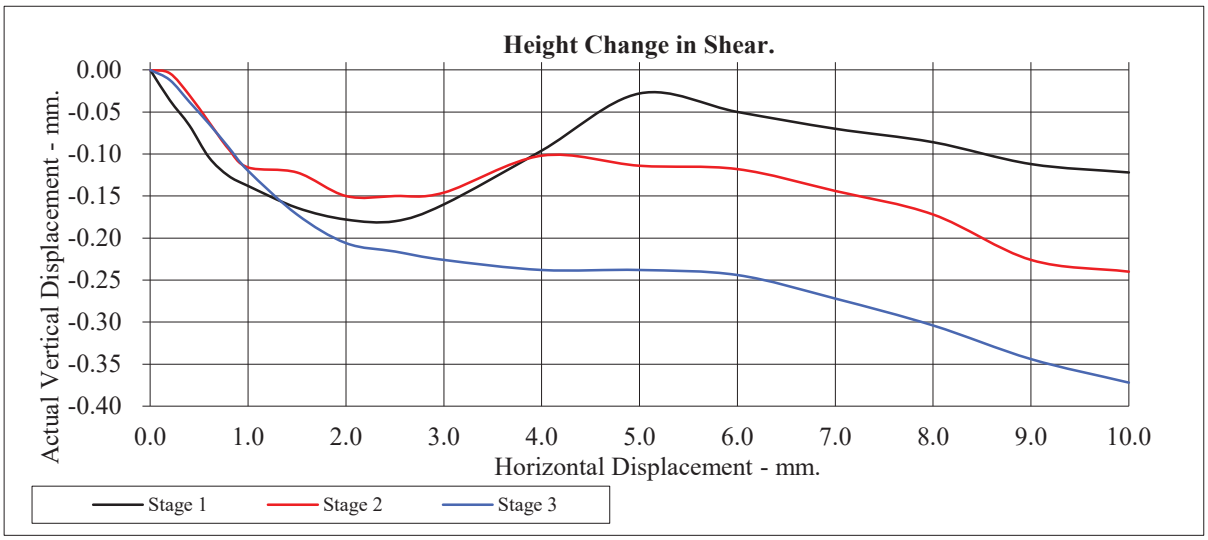
CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	**BH39**	Top Depth:	**8.00**
Sample Number:	**13**	Base Depth:	**9.00**







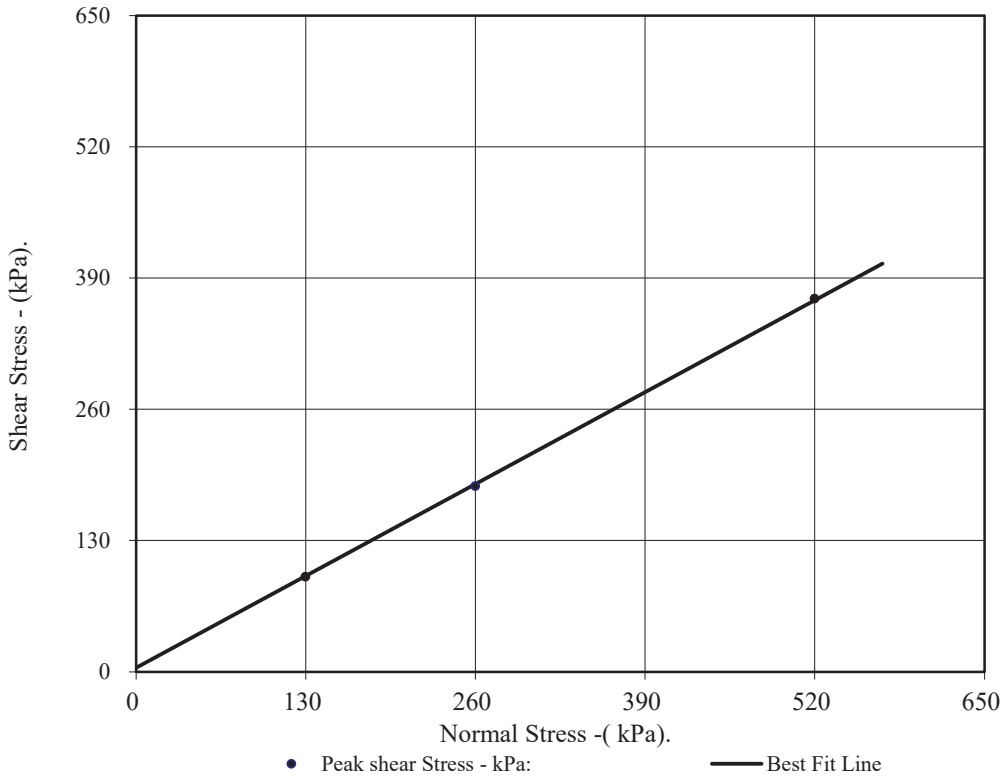
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312
			Client Ref: 17-0769

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	**BH39**		Top Depth:	**12.00**
Sample Number:	**15**		Base Depth:	**13.00**
Sample Conditions:	Submerged		Sample Type	**B**
Particle Density - Mg/m3:	2.65	Assumed	**Remarks:**	
Sample Preparation:	Remoulded using hand tamped effort. Material tested passing 2mm sieve			
Sample Description:	**See summary of soil descriptions.**			

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	19.54	19.54	19.54
Length - mm:	60.03	60.03	60.03
Moisture Content - %:	26	26	26
Bulk Density - Mg/m3:	1.90	1.91	1.90
Dry Density - Mg/m3:	1.52	1.52	1.51
Voids Ratio:	0.748	0.746	0.750
Normal Pressure- kPa	130	260	520
Consolidation Stage			
Consolidated Height - mm:	18.57	18.36	18.10
Shearing Stage			
Rate of Strain (mm/min)	1.090	1.090	1.090
Displacement at peak shear stress (mm)	6.00	6.00	8.00
Peak shear Stress - kPa:	94	184	370
Final Consolidated Conditions			
Moisture Content - %:	27	26	24
Bulk Density - Mg/m3:	2.00	2.03	2.05
Dry Density - Mg/m3:	1.58	1.61	1.65
Peak			
Angle of Shearing Resistance:(~~θ~~)	**35**		
Effective Cohesion - kPa:	**4**		

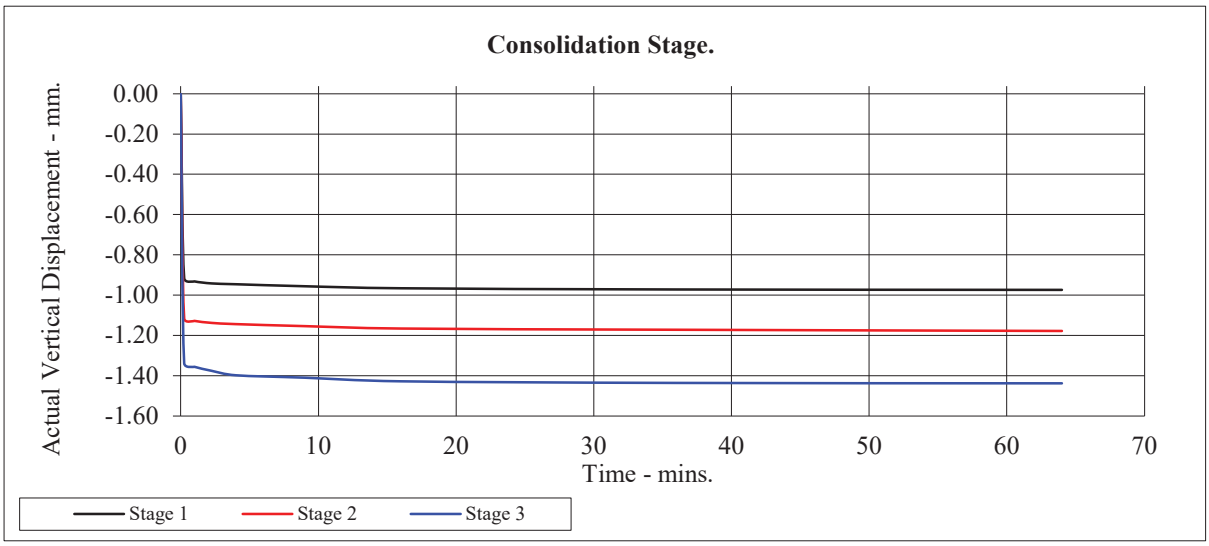


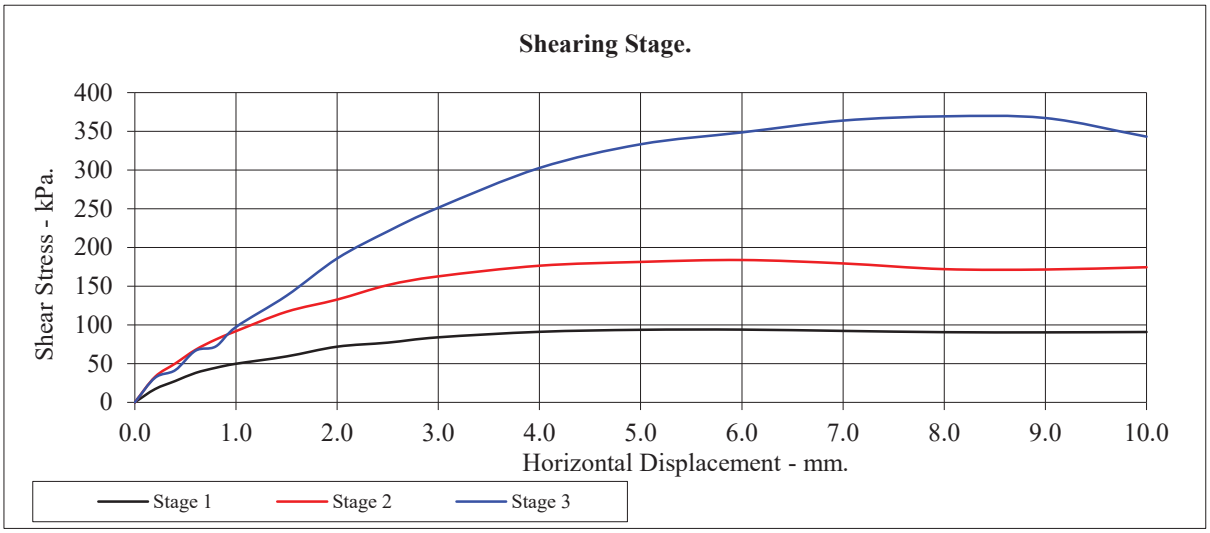
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312 **Client Ref:** 17-0769

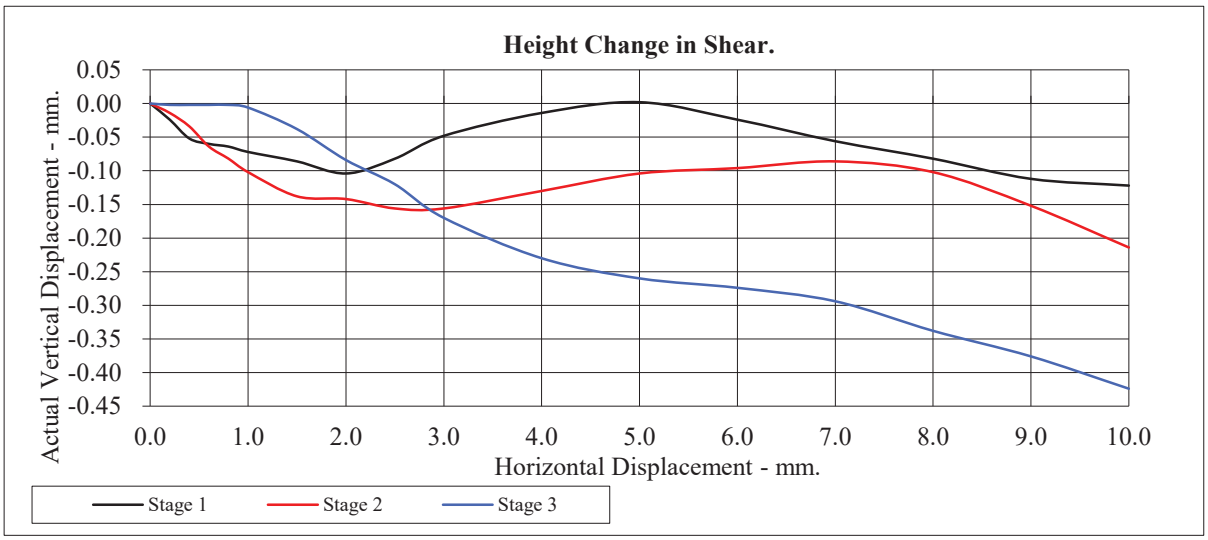
CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	**BH39**	Top Depth:	**12.00**
Sample Number:	**15**	Base Depth:	**13.00**







UKAS TESTING 4043	PSL Professional Soils Laboratory	**Stornoway Deep Water Berth G.I.**	**Contract No:** PSL18/1312
			Client Ref: 17-0769

Certificate of Analysis

Certificate Number 18-07192

03-Apr-18

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 18-07192

Client Reference PSL18/1312

Order No (not supplied)

Contract Title STORNOWAY DEEP WATER BERTH G.I

Description 9 Soil samples.

Date Received 27-Mar-18

Date Started 27-Mar-18

Date Completed 03-Apr-18

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]

Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 18-07192
Client Ref PSL18/1312
Contract Title STORNOWAY DEEP WATER BERTH G.I

			Lab No	1317055	1317056	1317057	1317058	1317059	1317060	1317061	1317062	1317063
			Sample ID	BH33	BH35	BH36	BH36	BH36	BH37	BH38	BH39	BH40
			Depth	0.00-0.40	3.00	1.00-2.00	4.00-4.45	11.00	4.00	3.10-3.55	3.00-3.45	0.00-1.00
			Other ID	3	23	22	35	43	21	19	12	4
			Sample Type	B	D	B	UT	D	D	U	UT	B
			Sampling Date	23/03/18	23/03/18	23/03/18	23/03/18	23/03/18	23/03/18	23/03/18	23/03/18	23/03/18
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**									
Inorganics												
pH	DETSC 2008#			9.1	9.4	9.6	7.7	9.4	8.9	8.2	7.9	9.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	68	130	53	1800	87	140	1300	1100	320

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

Information in Support of the Analytical Results

Our Ref 18-07192
Client Ref PSL18/1312
Contract STORNOWAY DEEP WATER BERTH G.I

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1317055	BH33 0.00-0.40 SOIL	23/03/18	PT 500ml		
1317056	BH35 3.00 SOIL	23/03/18	PT 500ml		
1317057	BH36 1.00-2.00 SOIL	23/03/18	PT 500ml		
1317058	BH36 4.00-4.45 SOIL	23/03/18	PT 500ml		
1317059	BH36 11.00 SOIL	23/03/18	PT 500ml		
1317060	BH37 4.00 SOIL	23/03/18	PT 500ml		
1317061	BH38 3.10-3.55 SOIL	23/03/18	PT 500ml		
1317062	BH39 3.00-3.45 SOIL	23/03/18	PT 500ml		
1317063	BH40 0.00-1.00 SOIL	23/03/18	PT 500ml		

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

CAUSEWAY GEOTECH

+44 (0)28 2766 6640
info@causewaygeotech.com
www.causewaygeotech.com

SOIL AND ROCK SAMPLE ANALYSIS
LABORATORY TEST REPORT

Client:	**Stornoway Port Authority**
Engineer:	**Wallace Stone Consulting Civil Engineers**
From:	[Redacted] **Laboratory Manager** **Causeway Geotech Ltd**
Tel:	[Redacted]
E-mail:	[Redacted]
Date:	**04/04/18**
Ref:	**17-0769 – Rock Schedule 2**

Stornoway Deep Water Berth G.I.

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the *Contents page(s)*.

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

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

Approved Signatory

[Redacted]

Laboratory Manager

Causeway Geotech Ltd
8 Drumahiskey Road, Ballymoney
Co. Antrim, N. Ireland, BT53 7QL

Registered in Northern Ireland. Company Number: NI610766
Approved: ISO 9001 • ISO 14001 • OHSAS 18001

CAUSEWAY GEOTECH

+44 (0)28 2766 6640
info@causewaygeotech.com
www.causewaygeotech.com

Project Name **Stornoway Deep Water Berth G.I.**

Report Reference. **17-0769 – Rock Schedule 2**

The table below details the tests carried out, the specifications used, and the number of tests included in this report:

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	Number of test results included in the report
ROCK	Point load index	ISRM Commission on Testing Methods. Suggested Method for Determining Point Load Strength 1985	15

CAUSEWAY GEOTECH

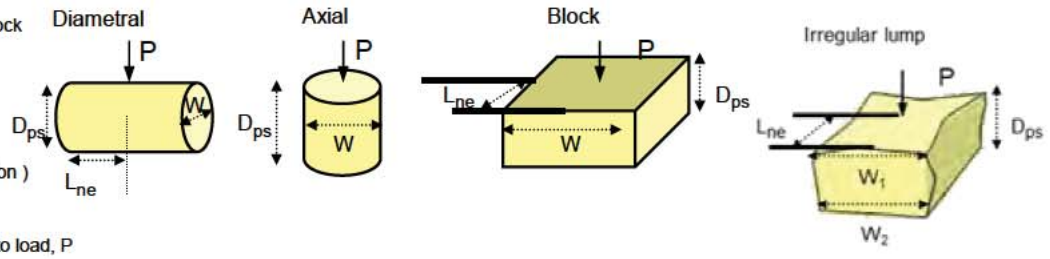
Point Load Strength Index Tests
Summary of Results

Project No.: 17-0769

Project Name: Stornoway Deep Water Berth G.I.

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth m	Ref.	Type	Ref.	Depth m		Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm	kN	mm	Is MPa	Is(50) MPa	
BH33	1.00		C	1	1 00	CONGLOMERATE	D	U	YES	60.1	101.9	101.9	95.0	34.1	98.4	3.5	4.8	
BH33	2.85		C	1	2 85	CONGLOMERATE	D	U	YES	79.3	101.3	101.3	99.0	6.8	100.1	0.7	0.9	
BH34	4.00		C	1	4 00	CONGLOMERATE	I	U	YES	31.1	44.3	25.0	24.0	0.1	36.8	0.1	0.1	
BH34	5.20		C	1	5 20	CONGLOMERATE	I	U	YES	54.5	79.9	50.0	49.0	0.1	70.6	0.0	0.0	
BH35	4.80		C	1	4 80	CONGLOMERATE	I	U	YES	55.1	86.1	58.0	55.0	1.3	77.6	0.2	0.3	
BH35	6.60		C	1	6.60	CONGLOMERATE	I	U	NO	58.5	74.0	69.0	64.0	29.2	77.6	4.8	5.9	
BH37	6.00		C	1	6 00	CONGLOMERATE	I	U	YES	45.3	62.7	58.0	56.0	3.5	66.9	0.8	0.9	
BH38	6.60		C	1	6.60	CONGLOMERATE	I	U	YES	67.9	64.8	73.0	71.0	0.2	76.5	0.0	0.0	
BH38	8.10		C	1	8.10	CONGLOMERATE	I	U	YES	41.5	63.8	42.0	40.0	4.8	57.0	1.5	1.6	
BH38	9.70		C	1	9.70	CONGLOMERATE	I	U	YES	39.3	61.3	48.0	46.0	3.3	59.9	0.9	1.0	
BH39	15.80		C	1	15.80	GNEISS	I	U	YES	57.8	80.1	62.0	60.0	0.1	78.2	0.0	0.0	
BH39	16.30		C	1	16.30	GNEISS	A	U	YES		101.0	52.0	50.0	3.8	80.2	0.6	0.7	
BH39	17.70		C	1	17.70	CONGLOMERATE	I	U	YES	78.1	91.8	55.0	51.0	36.3	77.2	6.1	7.4	
BH39	18.00		C	1	18.00	CONGLOMERATE	I	U	NO	44.2	67.5	57.0	55.0	3.0	68.8	0.6	0.7	
BH39	18.50		C	1	18.50	CONGLOMERATE	I	U	YES		65.5	76.0	72.0	16.5	77.5	2.7	3.3	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise
Detailed legend for test and dimensions, based on ISRM, is shown above.
Size factor, F = (De/50)0.45 for all tests.

Date Printed: 26/03/2018

Approved By: [Redacted]

Table: 1

sheet: 1

LABORATORY RESTRICTION REPORT

Project Reference	17-0769	To	[Redacted]
Project Name	Stornoway Deep Water Berth GI	Position	Project Manager
TR reference	17-0769 / 2	From	[Redacted]
		Position	Laboratory Manager

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

Hole Number	Sample			Test Type	Reason for Restriction	Required Action
	Number	Depth (m)	Type			
BH39		16.30-17.80	C	Uniaxial Compressive Strength	No suitable test specimen. Core too fractured/broken. Insufficient intact core to allow length to diameter ratio.	Cancelled
BH39		17.80-19.30	C	Uniaxial Compressive Strength	No suitable test specimen. Core too fractured/broken. Insufficient intact core to allow length to diameter ratio.	Cancelled

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

Laboratory Signature	Project Manager Signature
[Redacted]	[Redacte
Date 22 March 2018	Date 22 March 2018

CAUSEWAY GEOTECH

APPENDIX E

Dredge analysis laboratory test results

Table 2 Action Levels

Contaminant	Revised AL1 mg/kg dry weight (ppm)	Revised AL2 mg/kg dry weight (ppm)
Arsenic	20	70
Cadmium	0.4	4
Chromium	50	370
Copper	30	300
Mercury	0.25	1.5
Nickel	30	150
Lead	50	400
Zinc	130	600
Tributyltin	0.1	0.5
Polychlorinated Biphenyls	0.02	0.18
Polyaromatic Hydrocarbons		
Acenaphthene	0.1	
Acenaphthylene	0.1	
Anthracene	0.1	
Fluorene	0.1	
Naphthalene	0.1	
Phenanthrene	0.1	
Benzo[a]anthracene	0.1	
Benzo[b]flouranthene	0.1	
Benzo[k]fluoranthene	0.1	
Benzo[a]pyrene	0.1	
Benzo[g,h,i]perylene	0.1	
Dibenzo[a,h]anthracene	0.01	
Chrysene	0.1	
Fluoranthene	0.1	
Pyrene	0.1	
Indeno(1,2,3cd)pyrene	0.1	
Total Hydrocarbons	100	
Booster Biocide and		
Brominated Flame Retardents*		

*Provisional Action Levels for these compounds are subject to further investigation.

Results which exceed the Contaminant Action Levels are highlighted in blue or red, as appropriate, on the following pages

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Certificate of Analysis

Report No.: 18-69863-1

Issue No.: 1
Date of Issue 09/04/2018

Customer Details: Causeway Geotech Ltd, 8 Drumahiskey Road, Ballymoney, Co. Antrim, BT53 7QL

Customer Contact: [Redacted]

Customer Order No.: 1711-360

Customer Reference: 17-0769

Quotation Reference: 171120/02

Description: 45 sediment samples

Date Received: 09/03/2018

Date Started: 14/03/2018

Date Completed: 09/04/2018

Test Methods: Details available on request (refer to SOP code against relevant result/s)

Notes: None
[Redacted]

Approved By:

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UKAS TESTING
1663

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH33 0.40**	**BH34 0.50**	**BH34 1.0**	**BH34 2.0**	**BH34 2.0**
					Customer Sample ID											
					RPS Sample No							357017	357018	357019	357020	357021
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							0.40m	0.50m	1 0m	1 5m	2.0m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			01/03/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	90.6	91.7	92.6	92 0	90.4
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	0 6	0.4	0.5	< 0.3	< 0.3
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH34 2.5**	**BH34 3.0**	**BH35 0.50**	**BH35 1.0**	**BH35 1.5**
					Customer Sample ID											
					RPS Sample No							357022	357023	357024	357025	357026
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							2.5m	3.0m	50m	1 0m	1.5m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			28/02/2018	28/02/2018	27/02/2018	27/02/2018	27/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	96.2	94.5	99.0	97.7	96 0
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	< 0.3	< 0 3	< 0 3	< 0.3	< 0.3
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH35 2.0**	**BH35 2.5**	**BH35 3.0**	**BH35 3.5**	**BH35 4.0**
					Customer Sample ID											
					RPS Sample No							357027	357028	357029	357030	357031
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							2.0m	2.5m	3 0m	3 5m	4.0m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	88.1	94.1	86.1	90.7	90 8
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	< 0.3	< 0 3	< 0 3	< 0.3	< 0.3
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH36 .50**	**BH36 1.0**	**BH36 1.5**	**BH36 2.0**	**BH36 2.5**
					Customer Sample ID											
					RPS Sample No							357032	357033	357034	357035	357036
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							.50m	1.0m	1 5m	2 0m	2.5m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	94.4	97.3	95.7	86 0	94 2
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	< 0.3	< 0 3	< 0 3	< 0.3	< 0.3
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH36 3.0**	**BH36 3.5**	**BH36 4.0**	**BH37 .50**	**BH37 1.0**
					Customer Sample ID											
					RPS Sample No							357037	357038	357039	357040	357041
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							3.0m	3.5m	4 0m	50m	1.0m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			24/02/2018	24/02/2018	24/02/2018	23/02/2018	23/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	97.2	96.6	78.0	98 3	95 2
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	< 0.3	< 0 3	1.6	< 0.3	< 0.3
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH37 1.5**	**BH37 2.0**	**BH37 2.5**	**BH37 3.0**	**BH37 3.5**
					Customer Sample ID											
					RPS Sample No							357042	357043	357044	357045	357046
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							1.5m	2.0m	2 5m	3 0m	3.5m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	95.2	96.3	96.3	86.1	95.4
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	< 0.3	< 0 3	< 0 3	1.3	< 0.3
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH37 4.0**	**BH38 0.50**	**BH38 1.0**	**BH38 1.5**	**BH38 2.0**
					Customer Sample ID											
					RPS Sample No							357047	357048	357049	357050	357051
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							4.0m	.50m	1 0m	1 5m	2.0m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			23/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	91.5	98.4	96.3	98 6	97.9
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	< 0.3	< 0 3	< 0 3	< 0.3	< 0.3
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH38 2.5**	**BH38 3.0**	**BH38 3.5**	**BH39 2.0**	**BH39 2.5**
					Customer Sample ID											
					RPS Sample No							357052	357053	357054	357055	357056
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							2.5m	3.0m	3 5m	2 0m	2.5m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			15/02/2018	15/02/2018	15/02/2018	20/02/2018	20/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	97.5	92.0	58.2	97.9	81.9
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	< 0.3	< 0 3	3.1	< 0.3	1.5
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Dry Weights, Moisture, Total Organic Carbon, TPH, Organotins & Density

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH39 3.0**	**BH39 3.50**	**BH39 .50**	**BH39 1.0**	**BH39 1.5**
					Customer Sample ID											
					RPS Sample No							357057	357058	357059	357060	357061
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							3.0m	3.5m	50m	1 0m	1.50m
					Sampling Date	**CRM BCR-646**			**Spike on clean sediment**			20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
dry solids (at 105°C)		N	397	%		n/a	n/a	n/a	n/a	n/a	n/a	58.4	72.5	98.3	98 8	98 8
total organic carbon		U	404	%	0.3	n/a	n/a	n/a	n/a	n/a	n/a	2 5	1.4	< 0 3	< 0.3	< 0.3
dibutyltin (DBT)	1002-53-5	U	395	ug/kg DW	5	770	605.5	78 6%	40	40.85	102.1%	< 5.00	< 5.00	< 5.00	< 5.00	< 5 00
tributyltin (TBT)	56573-85-4	U	395	ug/kg DW	2	480	509.9	106.2%	40	48.37	120.9%	< 2.00	< 2.00	< 2.00	< 2.00	< 2 00

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Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH33 0.40**	**BH34 0.50**	**BH34 1.0**	**BH34 1.5**	**BH34 2.0**
					Customer Sample ID								
					RPS Sample No				357017	357018	357019	357020	357021
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				0.40m	0.50m	1.0m	1.5m	2.0m
					Sampling Date				01/03/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	4.35	2.49	3.07	2.93	2.67
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	65.8	39.7	44.5	43.4	44.6
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	37.4	12.1	12.2	12.8	13.7
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	10.5	9.68	9.98	9.79	10.0
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	0.02	0.02	0.03	0.02	0.02
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	30.9	20.8	22.2	21.7	22.6
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	49.6	33.1	35.1	34.7	36.0

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Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH34 2.5**	**BH34 3.0**	**BH35 0.50**	**BH35 1.0**	**BH35 1.5**
					Customer Sample ID								
					RPS Sample No				357022	357023	357024	357025	357026
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				2.5m	3.0m	.50m	1.0m	1.5m
					Sampling Date				28/02/2018	28/02/2018	27/02/2018	27/02/2018	27/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	2.54	1.49	1.90	1.74	1.81
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	34.5	46.5	26.4	23.5	30.0
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	11.3	28.9	9.44	19.2	9.34
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	9.26	9.66	9.06	8.47	8.41
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	0.02	< 0.01	0.01	0.01	0.01
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	18.8	26.1	18.4	16.3	17.6
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	32.7	42.5	34.5	30.3	31.1

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Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH35 2.0**	**BH35 2.5**	**BH35 3.0**	**BH35 3.5**	**BH35 4.0**
					Customer Sample ID								
					RPS Sample No				357027	357028	357029	357030	357031
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				2.0m	2.5m	3.0m	3.5m	4.0m
					Sampling Date				27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	5.94	6.32	1.42	2.46	1.34
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	0.11	0.15	< 0.10	< 0.10	< 0.10
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	48.2	48.6	112	80.9	47.0
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	11.4	12.1	49.3	30.8	24.3
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	6.75	6.88	9.30	9.08	8.41
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	< 0.01	0.01	0.01	0.01	0.01
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	23.9	24.9	46.4	38.2	25.9
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	32.8	33.7	57.6	49.9	40.9

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH36 .50**	**BH36 1.0**	**BH36 1.5**	**BH36 2.0**	**BH36 2.5**
					Customer Sample ID								
					RPS Sample No				357032	357033	357034	357035	357036
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				.50m	1.0m	1.5m	2.0m	2.5m
					Sampling Date				24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	1.27	1.47	1.56	1.51	1.41
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	12.7	20.6	15.3	23.9	18.1
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	6.95	7.20	6.94	7.46	6.57
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	8.29	8.29	8.49	8.13	7.48
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	0.01	0.01	0.02	0.02	0.01
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	10.9	13.4	12.3	14.3	12.6
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	23.2	25.4	24.0	25.7	21.5

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Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH36 3.0**	**BH36 3.5**	**BH36 4.0**	**BH37 .50**	**BH37 1.0**
					Customer Sample ID								
					RPS Sample No				357037	357038	357039	357040	357041
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				3.0m	3.5m	4.0m	.50m	1.0m
					Sampling Date				24/02/2018	24/02/2018	24/02/2018	23/02/2018	23/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	1.67	1.62	8.44	1.69	1.99
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	< 0.10	< 0.10	0.27	< 0.10	< 0.10
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	19.2	17.3	77.9	18.1	31.5
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	7.34	7.12	16.7	8.72	10.6
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	7.85	7.30	9.73	8.27	8.48
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	0.02	0.01	0.02	0.01	0.02
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	13.3	12.1	34.0	14.0	17.6
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	23.5	23.9	53.7	28.1	30.8

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Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH37 1.5**	**BH37 2.0**	**BH37 2.5**	**BH37 3.0**	**BH37 3.5**
					Customer Sample ID								
					RPS Sample No				357042	357043	357044	357045	357046
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				1.5m	2.0m	2.5m	3.0m	3.5m
					Sampling Date				23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	2.04	1.77	1.74	10.4	0.85
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	< 0.10	< 0.10	< 0.10	0.21	< 0.10
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	37.2	27.1	28.9	156	70.2
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	13.2	8.67	22.0	25.8	26.5
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	8.75	7.96	8.44	11.0	8.87
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	0.02	0.03	< 0.01	0.02	0.01
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	18.0	16.3	20.8	60.1	32.5
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	35.5	28.4	30.0	73.8	48.6

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Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH37 4.0**	**BH38 0.50**	**BH38 1.0**	**BH38 1.5**	**BH38 2.0**
					Customer Sample ID								
					RPS Sample No				357047	357048	357049	357050	357051
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				4.0m	.50m	1.0m	1.5m	2.0m
					Sampling Date				23/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	1.65	1.33	1.17	1.18	1.48
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	75.3	25.2	19.5	28.3	17.3
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	25.0	9.40	8.33	8.56	7.63
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	11.2	7.87	8.00	8.15	7.94
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	< 0.01	0.03	0.03	< 0.01	0.02
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	38.0	15.8	13.7	16.6	13.2
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	53.8	30.1	24.6	25.7	23.8

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Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH38 2.5**	**BH38 3.0**	**BH38 3.5**	**BH39 2.0**	**BH39 2.5**
					Customer Sample ID								
					RPS Sample No				357052	357053	357054	357055	357056
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				2.5m	3.0m	3.5m	2.0m	2.5m
					Sampling Date				15/02/2018	15/02/2018	15/02/2018	20/02/2018	20/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	1.38	1.39	8.60	1.46	9.28
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	< 0.10	< 0.10	0.47	< 0.10	0.24
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	18.2	16.8	137	20.6	116
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	7.88	6.93	33.3	8.17	21.5
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	8.20	7.22	13.2	7.82	8.66
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	0.02	< 0.01	0.02	0.02	0.03
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	13.7	12.2	61.1	13.7	46.1
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	23.0	22.2	82.9	25.8	57.7

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Results Summary - Metals

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Standard Reference Material**			**BH39 3.0**	**BH39 3.50**	**BH39 .50**	**BH39 1.0**	**BH39 1.5**
					Customer Sample ID								
					RPS Sample No				357057	357058	357059	357060	357061
					Sample Type	**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**SRM-2702**							
					Sample Depth (m)				3.0m	3.5m	.50m	1.0m	1.50m
					Sampling Date				20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018
					Sampling Time								
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**					
arsenic	7440-38-2	USI	M-129	mg/kg DW	0.5	45.3	42.1	92.9%	9.75	8.23	1.81	1.24	1.71
cadmium	7440-43-9	USI	M-129	mg/kg DW	0.1	0.817	0.86	105.3%	0.39	0.25	< 0.10	< 0.10	< 0.10
chromium	7440-47-3	USI	M-129	mg/kg DW	0.5	352	293	83.2%	124	130	22.7	19.6	28.3
copper	7440-50-8	USI	M-129	mg/kg DW	0.5	Not certified	n/a	n/a	29.5	28.8	9.19	14.6	10.6
lead	7439-92-1	USI	M-129	mg/kg DW	0.5	132.8	111	83.6%	12.7	11.9	7.94	8.17	8.23
mercury	7439-97-6	USI	M-129	mg/kg DW	0.01	0.4474	0.43	96.1%	0.04	0.02	0.07	0.03	< 0.01
nickel	7440-02-0	USI	M-129	mg/kg DW	0.5	75.4	63.4	84.1%	55.2	56.5	15.3	13.4	18.3
zinc	7440-66-6	USI	M-129	mg/kg DW	2	485.3	428	88.2%	79.4	75.1	29.3	27.1	31.8

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup com, **W** rpsgroup.com

Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH33 0.40**	**BH34 0.50**	**BH34 1.0**	**BH34 1.5**
					Customer Sample ID										
					RPS Sample No							357017	357018	357019	357020
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							0.40m	0 50m	1.0m	1.5m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			01/03/2018	28/02/2018	28/02/2018	28/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	3.26
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	< 1.6	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9	< 3.9	< 3.9	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	2.94
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	6.18	8.40	< 2.4	15.1
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	9.71	9.82	3.13	15.8
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	3.20	4.25	< 1 6	11.7
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	2.32	3.49	< 1.7	8.26
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	10.4	17.0	8.32	39.4
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	4.64	7.42	3.24	19.1
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	3.86	7.74	3.02	17.5
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	6.65	3.35	13.3
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	< 1 6	4.02
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	3.75	7.42	3.67	14.4

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup com, **W** rpsgroup.com

Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH34 2.0**	**BH34 2.5**	**BH34 3.0**	**BH35 0.50**
					Customer Sample ID										
					RPS Sample No							357021	357022	357023	357024
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							2.0m	2.5m	3.0m	.50m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			28/02/2018	28/02/2018	28/02/2018	27/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	< 2 6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	< 1.6	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	10.2	< 3.9	< 3.9	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	19.0	< 2.4	5.40	< 2.4
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	13.8	< 2.8	4.13	< 2 8
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	14.8	< 1.6	1.80	< 1 6
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	12.2	< 1.7	< 1.7	< 1.7
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	70.3	< 1.6	4.66	< 1 6
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	34.9	< 2.0	< 2 0	< 2 0
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	33.5	< 0.9	< 0.9	< 0.9
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	26.7	< 2.2	< 2 2	< 2 2
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	8.85	< 1.6	< 1 6	< 1 6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	32.8	< 1.4	1.80	< 1.4

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup com, **W** rpsgroup.com

Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH35 1.0**	**BH35 1.5**	**BH35 2.0**	**BH35 2.5**
					Customer Sample ID										
					RPS Sample No							357025	357026	357027	357028
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							1.0m	1.5m	2.0m	2.5m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			27/02/2018	27/02/2018	27/02/2018	27/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	< 2 6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	< 1.6	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9	< 3.9	< 3.9	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	< 2.4	< 2.4	< 2.4	< 2.4
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	< 2.8	< 2.8	< 2 8	< 2 8
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	< 1.6	< 1.6	< 1 6	< 1 6
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	< 1.7	< 1.7	< 1.7	< 1.7
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	< 1.6	< 1.6	< 1 6	< 1 6
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	< 2.0	< 2.0	< 2 0	< 2 0
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	< 0.9	< 0.9	< 0.9	< 0.9
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	< 2.2	< 2 2	< 2 2
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	< 1 6	< 1 6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	< 1.4	< 1.4	< 1.4	< 1.4

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup com, **W** rpsgroup.com

Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH35 3.0**	**BH35 3.5**	**BH35 4.0**	**BH36 .50**
					Customer Sample ID										
					RPS Sample No							357029	357030	357031	357032
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							3.0m	3.5m	4.0m	.50m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			27/02/2018	27/02/2018	27/02/2018	24/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	3.28
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	3.53	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	< 1.6	< 1 6	3.60
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9	< 3.9	< 3.9	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	< 2.4	< 2.4	< 2.4	76.8
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	< 2.8	< 2.8	< 2 8	54.2
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	< 1.6	< 1.6	< 1 6	9.42
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	< 1.7	< 1.7	< 1.7	17.9
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	< 1.6	< 1.6	< 1 6	47.3
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	< 2.0	< 2.0	< 2 0	24.1
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	< 0.9	< 0.9	< 0.9	21.7
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	< 2.2	< 2 2	17.3
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	< 1 6	4.13
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	< 1.4	< 1.4	< 1.4	19.8

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup com, **W** rpsgroup.com

Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH36 1.0**	**BH36 1.5**	**BH36 2.0**	**BH36 2.5**
					Customer Sample ID										
					RPS Sample No							357033	357034	357035	357036
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							1.0m	1.5m	2.0m	2.5m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			24/02/2018	24/02/2018	24/02/2018	24/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	< 2 6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	< 1.6	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9	< 3.9	< 3.9	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	< 2.4	< 2.4	< 2.4	< 2.4
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	< 2.8	< 2.8	< 2 8	< 2 8
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	< 1.6	< 1.6	< 1 6	< 1 6
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	< 1.7	< 1.7	< 1.7	< 1.7
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	2.16	2.30	< 1 6	2.02
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	< 2.0	< 2.0	< 2 0	< 2 0
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	< 0.9	< 0.9	< 0.9	< 0.9
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	< 2.2	< 2 2	< 2 2
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	< 1 6	< 1 6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	< 1.4	< 1.4	< 1.4	< 1.4

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup com, **W** rpsgroup.com

Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH36 3.0**	**BH36 3.5**	**BH36 4.0**	**BH37 .50**
					Customer Sample ID										
					RPS Sample No							357037	357038	357039	357040
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							3.0m	3.5m	4.0m	.50m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			24/02/2018	24/02/2018	24/02/2018	23/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	< 2 6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	< 1.6	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9	< 3.9	< 3.9	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	< 2.4	< 2.4	< 2.4	< 2.4
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	< 2.8	< 2.8	< 2 8	< 2 8
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	< 1.6	< 1.6	< 1 6	< 1 6
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	< 1.7	< 1.7	< 1.7	< 1.7
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	2.16	< 1.6	2.44	< 1 6
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	< 2.0	< 2.0	< 2 0	< 2 0
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	< 0.9	< 0.9	< 0.9	< 0.9
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	< 2.2	< 2 2	< 2 2
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	< 1 6	< 1 6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	< 1.4	< 1.4	< 1.4	< 1.4

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Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH37 1.0**	**BH37 1.5**	**BH37 2.0**	**BH37 2.5**
					Customer Sample ID										
					RPS Sample No							357041	357042	357043	357044
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							1.0m	1.5m	2.0m	2.5m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			23/02/2018	23/02/2018	23/02/2018	23/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	< 2 6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	3.47	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	17.7	< 1.6	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	153	< 3.9	4.88	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	30.1	< 2.4	< 2.4	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	251	4.62	3.95	7.27
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	147	< 2.8	3.01	5.61
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	60.5	1.79	< 1 6	2.49
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	59.4	< 1.7	< 1.7	3.01
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	118	5.04	3.43	8.94
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	54.2	< 2.0	< 2 0	3.12
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	52.1	< 0.9	< 0.9	3.12
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	37.4	< 2.2	< 2 2	3.12
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	9.46	< 1.6	< 1 6	< 1 6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	38.7	1.89	1.77	4.68

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Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH37 3.0**	**BH37 3.5**	**BH37 4.0**	**BH38 0.50**
					Customer Sample ID										
					RPS Sample No							357045	357046	357047	357048
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							3.0m	3.5m	4.0m	.50m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			23/02/2018	23/02/2018	23/02/2018	15/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	3.66
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	4.57
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	< 1.6	< 1 6	7.12
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9	< 3.9	9.40	74.2
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	49.2
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	5.81	< 2.4	< 2.4	170
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	4.30	< 2.8	8.41	133
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	2.32	< 1.6	< 2 0	78.1
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	1.98	< 1.7	< 1.7	44.7
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	4.41	< 1.6	< 1 6	112
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	< 2.0	< 2.0	< 2 0	52.9
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	< 0.9	< 0.9	< 0.9	52.9
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	< 2.2	< 2 2	37.6
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	< 1 6	11.2
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	1.74	< 1.4	< 1.4	44.7

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup com, **W** rpsgroup.com

Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH38 1.0**	**BH38 1.5**	**BH38 2.0**	**BH38 2.5**
					Customer Sample ID										
					RPS Sample No							357049	357050	357051	357052
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							1.0m	1.5m	2.0m	2.5m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			15/02/2018	15/02/2018	15/02/2018	15/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	< 2 6	< 2 6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	< 1.6	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9	< 3.9	< 3.9	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	3.53	2.84	< 2.4	< 2.4
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	2.91	< 2.8	< 2 8	< 2 8
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	< 1.6	< 1.6	< 1 6	< 1 6
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	< 1.7	< 1.7	< 1.7	< 1.7
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	4.16	3.24	< 1 6	< 1 6
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	< 2.0	< 2.0	< 2 0	< 2 0
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	< 0.9	< 0.9	< 0.9	< 0.9
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	< 2.2	< 2 2	< 2 2
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	< 1 6	< 1 6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	< 1.4	< 1.4	< 1.4	< 1.4

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Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH38 3.0**	**BH38 3.5**	**BH39 2.0**	**BH39 2.5**
					Customer Sample ID										
					RPS Sample No							357053	357054	357055	357056
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							3.0m	3.5m	2.0m	2.5m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			15/02/2018	15/02/2018	20/02/2018	20/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	4.81	< 2 6	< 2 6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6	3.95	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9	14.6	< 3.9	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	< 2.4	20.6	< 2.4	< 2.4
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	< 2.8	11.2	< 2 8	< 2 8
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	< 1.6	3.27	< 1 6	< 1 6
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	< 1.7	5.84	< 1.7	< 1.7
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	< 1.6	12.5	< 1 6	< 1 6
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	< 2.0	3.95	< 2 0	< 2 0
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	< 0.9	4.81	< 0.9	< 0.9
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	< 2.2	< 2 2	< 2 2
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	< 1 6	< 1 6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	< 1.4	4.81	< 1.4	< 1.4

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Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH39 3.0**	**BH39 3.50**	**BH39 .50**	**BH39 1.0**
					Customer Sample ID										
					RPS Sample No							357057	357058	357059	357060
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location										
					Sample Depth (m)							3.0m	3.5m	.50m	1.0m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			20/02/2018	20/02/2018	20/02/2018	20/02/2018
					Sampling Time										
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**				
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6	< 2.6	5.39	< 2 6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0	< 2.0	< 2 0	< 2 0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7	< 1.7	< 1.7	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	6.67	< 1.6	< 1 6	< 1 6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	14.0	5.52	4.58	5.67
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4	< 2.4	< 2.4	3.24
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	5.13	< 2.4	6.31	15.2
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	5.82	< 2.8	7.33	12.0
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	< 1.6	< 1.6	4.48	6.88
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	3.25	< 1.7	2.75	4.15
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	9.93	5.24	15.9	10.8
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	4.45	< 2.0	9.46	5.37
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	9.58	5.52	8.34	4.46
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2	< 2.2	5.80	4.05
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6	< 1.6	1.83	< 1 6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	8.56	4.14	8.04	4.56

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Results Summary - Polycyclic Aromatic Hydrocarbons (EPA 16 PAHs)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH39 1.5**
					Customer Sample ID							
					RPS Sample No							357061
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**
					Sample Location							
					Sample Depth (m)							1.50m
					Sampling Date	**NMIJ CRM-7307a**			**Spike on clean sediment**			20/02/2018
					Sampling Time							
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**	
naphthalene	91-20-3	U	396	ug/kg DW	3	Not certified	n/a	n/a	50	52.19	104.4%	< 2.6
acenaphthylene	208-96-8	U	396	ug/kg DW	2	Not certified	n/a	n/a	50	49.05	98.1%	< 2.0
acenaphthene	83-32-9	U	396	ug/kg DW	1.7	Not certified	n/a	n/a	50	50 8	101.6%	< 1.7
fluorene	86-73-7	U	396	ug/kg DW	1.7	5.98	5.26	88.0%	50	54.91	109.8%	< 1.6
phenanthrene	85-01-8	U	396	ug/kg DW	4	24.5	20.26	82.7%	50	51.1	102.2%	< 3.9
anthracene	120-12-7	U	396	ug/kg DW	2.5	3.59	2.17	60.4%	50	45.02	90 0%	< 2.4
fluoranthene	206-44-0	U	396	ug/kg DW	2.5	25.1	17.51	69.8%	50	50.98	102.0%	< 2.4
pyrene	129-00-0	U	396	ug/kg DW	2.8	22.2	15.03	67.7%	50	46 8	93 6%	< 2.8
benzo(a)anthracene	56-55-3	U	396	ug/kg DW	1.6	7.15	5.27	73.7%	50	50.73	101.5%	< 1.6
chrysene	218-01-9	U	396	ug/kg DW	1.7	8.39	6.57	78.3%	50	51.4	102.8%	< 1.7
benzo(b+j)fluoranthene	205-99-2	U	396	ug/kg DW	1.6	31.9	28.43	89.1%	50	50.26	100.5%	< 1.6
benzo(k)fluoranthene	207-08-9	U	396	ug/kg DW	2	5.28	5.65	107.0%	50	50.51	101.0%	< 2.0
benzo(a)pyrene	50-32-8	U	396	ug/kg DW	0.9	4.57	4.81	105.3%	50	63.26	126.5%	< 0.9
indeno(1,2,3-c,d)pyrene	193-39-5	U	396	ug/kg DW	2.2	5 6	3.92	70.0%	50	45.22	90.4%	< 2.2
dibenzo(a h)anthracene	53-70-3	U	396	ug/kg DW	1.6	Not certified	n/a	n/a	50	42.57	85.1%	< 1.6
benzo(g h i)perylene	191-24-2	U	396	ug/kg DW	1.4	6.76	4.89	72.3%	50	45 5	91 0%	< 1.4

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH33 0.40**	**BH34 0.50**	**BH34 1.0**	**BH34 1.5**	**BH34 2.0**
					Customer Sample ID											
					RPS Sample No							357017	357018	357019	357020	357021
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							0.40m	0.50m	1.0m	1.5m	2.0m
					Sampling Date	**CRM BCR-536**			**Spike on clean sediment**			01/03/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH34 2.5**	**BH34 3.0**	**BH35 0.50**	**BH35 1.0**	**BH35 1.5**
					Customer Sample ID											
					RPS Sample No							357022	357023	357024	357025	357026
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**CRM BCR-536**			**Spike on clean sediment**							
					Sample Depth (m)							2.5m	3.0m	.50m	1.0m	1.5m
					Sampling Date							28/02/2018	28/02/2018	27/02/2018	27/02/2018	27/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH35 2.0**	**BH35 2.5**	**BH35 3.0**	**BH35 3.5**	**BH35 4.0**
					Customer Sample ID											
					RPS Sample No							357027	357028	357029	357030	357031
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							2.0m	2.5m	3.0m	3.5m	4.0m
					Sampling Date	**CRM BCR-536**			**Spike on clean sediment**			27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH36 .50**	**BH36 1.0**	**BH36 1.5**	**BH36 2.0**	**BH36 2.5**
					Customer Sample ID											
					RPS Sample No							357032	357033	357034	357035	357036
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)	**CRM BCR-536**			**Spike on clean sediment**			.50m	1.0m	1.5m	2.0m	2.5m
					Sampling Date							24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH36 3.0**	**BH36 3.5**	**BH36 4.0**	**BH37 .50**	**BH37 1.0**
					Customer Sample ID											
					RPS Sample No							357037	357038	357039	357040	357041
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)	**CRM BCR-536**			**Spike on clean sediment**			3.0m	3.5m	4.0m	.50m	1.0m
					Sampling Date							24/02/2018	24/02/2018	24/02/2018	23/02/2018	23/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH37 1.5**	**BH37 2.0**	**BH37 2.5**	**BH37 3.0**	**BH37 3.5**
					Customer Sample ID											
					RPS Sample No							357042	357043	357044	357045	357046
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)	**CRM BCR-536**			**Spike on clean sediment**			1.5m	2.0m	2.5m	3.0m	3.5m
					Sampling Date							23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH37 4.0**	**BH38 0.50**	**BH38 1.0**	**BH38 1.5**	**BH38 2.0**
					Customer Sample ID											
					RPS Sample No							357047	357048	357049	357050	357051
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							4.0m	.50m	1.0m	1.5m	2.0m
					Sampling Date	**CRM BCR-536**			**Spike on clean sediment**			23/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH38 2.5**	**BH38 3.0**	**BH38 3.5**	**BH39 2.0**	**BH39 2.5**
					Customer Sample ID											
					RPS Sample No							357052	357053	357054	357055	357056
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location											
					Sample Depth (m)							2.5m	3.0m	3.5m	2.0m	2.5m
					Sampling Date	**CRM BCR-536**			**Spike on clean sediment**			15/02/2018	15/02/2018	15/02/2018	20/02/2018	20/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

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T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - Organochlorine Pesticides & Polychlorinated Biphenyls (ICES 7)

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

					Customer Sample No	**Certified Reference Material**			**AQC spike**			**BH39 3.0**	**BH39 3.50**	**BH39 .50**	**BH39 1.0**	**BH39 1.5**
					Customer Sample ID											
					RPS Sample No							357057	357058	357059	357060	357061
					Sample Type	**SEDIMENT**			**SEDIMENT**			**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
					Sample Location	**CRM BCR-536**			**Spike on clean sediment**							
					Sample Depth (m)							3.0m	3.5m	.50m	1.0m	1.50m
					Sampling Date							20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018
					Sampling Time											
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**	**Assigned Value**	**Measured Value**	**Recovery %**	**Assigned Value**	**Measured Value**	**Recovery %**					
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	U	396	ug/kg DW	0.1	44	53.31	121.2%	25	26.2	104.8%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	U	396	ug/kg DW	0.2	38	42.49	111.8%	25	26.05	104.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	U	396	ug/kg DW	0.2	44	55.55	126.3%	25	27.45	109.8%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	U	396	ug/kg DW	0.2	27.5	33.66	122.4%	25	26.52	106.1%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	U	396	ug/kg DW	0.2	44.2	57.9	131.0%	25	27	108.0%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	U	396	ug/kg DW	0.2	50	64.58	129.2%	25	26.65	106.6%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	U	396	ug/kg DW	0.2	22.4	32.85	146.7%	25	24.56	98.2%	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

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T +44 (0)1462 480 400, F +44 (0)1462 480 403, E rpsmh@rpsgroup.com, W rpsgroup.com

Results Summary - PSA Results

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

				Customer Sample No	**BH33 0.40**	**BH34 0.50**	**BH34 1.0**	**BH34 1.5**	**BH34 2.0**	**BH34 2.5**	**BH34 3.0**	**BH35 0.50**	**BH35 1.0**	**BH35 1.5**	**BH35 2.0**	**BH35 2.5**	**BH35 3.0**	**BH35 3.5**	**BH35 4.0**
				Customer Sample ID															
				RPS Sample No	357017	357018	357019	357020	357021	357022	357023	357024	357025	357026	357027	357028	357029	357030	357031
				Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
				Sample Location															
				Sample Depth (m)	0.40m	0.50m	1.0m	1.5m	2.0m	2.5m	3.0m	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m	4.0m
				Sampling Date	01/03/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
				Sampling Time															
Determinand	**CAS No**	**Codes**	**SOP**	**Units**															
sample type		S	In-house		Bimodal, Poorly Sorted	Bimodal, Poorly Sorted	Trimodal, Very Poorly Sorted	Polymodal, Very Poorly Sorted	Trimodal, Very Poorly Sorted	Unimodal, Poorly Sorted	Unimodal, Poorly Sorted	Bimodal, Moderately Sorted	Unimodal, Moderately Sorted	Trimodal, Poorly Sorted	Trimodal, Poorly Sorted	Trimodal, Very Poorly Sorted	Polymodal, Extremely Poorly Sorted	Polymodal, Very Poorly Sorted	Unimodal, Poorly Sorted
textural group (GRADISTAT)		S	In-house		Gravel	Gravel	Sandy Gravel	Sandy Gravel	Sandy Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Sandy Gravel	Sandy Gravel	Gravelly Muddy Sand	Muddy Sandy Gravel	Gravel
sediment name		S	In-house		Very Coarse Gravel	Medium Gravel	Sandy Very Fine Gravel	Sandy Medium Gravel	Sandy Coarse Gravel	Coarse Gravel	Coarse Gravel	Coarse Gravel	Coarse Gravel	Medium Gravel	Sandy Coarse Gravel	Sandy Coarse Gravel	Fine Gravelly Coarse Silty Coarse Sand	Very Coarse Silty Sandy Coarse Gravel	Coarse Gravel
arithmetic mean (method of moments)		S	In-house	um	21200	12300	3640	6700	12000	24500	17000	31100	17000	12200	11800	7600	2680	7980	15400
arithmetic sorting (method of moments)		S	In-house	um	14800	8270	3790	6350	11500	13200	10700	15000	6860	10100	10200	9180	4790	9610	8770
arithmetic skewness (method of moments)		S	In-house	um	0.006	0.183	1.21	0.759	1.13	-0.598	0.407	0.626	-0.355	1.10	0.445	1.20	2.20	1.09	-0.423
arithmetic kurtosis (method of moments)		S	In-house	um	1.36	2.14	3.48	2.25	3.39	2.07	2.43	1.97	2.60	4.00	1.55	2.97	6.93	2.65	1.99
geometic mean (method of moments)		S	In-house	um	12500	7200	1780	3220	6010	15500	11800	26800	14400	6960	6370	2920	271	2270	9900
geometic sorting (method of moments)		S	In-house	um	3.80	3.91	3.80	4.17	4.17	3.93	2.93	1.79	2.00	3.66	3.65	4.60	17.3	8.16	3.57
geometic skewness (method of moments)		S	In-house	um	-1.47	-1.45	-0.349	-0.577	-0.909	-1.99	-1.86	-2.17	-2.83	-1.05	-0.659	-0.118	-0.492	-1.12	-1.79
geometic kurtosis (method of moments)		S	In-house	um	4.89	4.21	2.15	2.32	3.29	6.04	7.10	17.0	14.1	3.28	2.73	2.03	2.36	4.74	5.64
logarithmic mean (method of moments)		S	In-house	phi	-3.64	-2.85	-0.834	-1.69	-2.59	-3.95	-3.57	-4.75	-3.85	-2.80	-2.67	-1.55	1.88	-1.18	-3.31
logarithmic sorting (method of moments)		S	In-house	phi	1.93	1.97	1.93	2.06	2.06	1.97	1.55	0.837	0.998	1.87	1.87	2.20	4.11	3.03	1.84
logarithmic skewness (method of moments)		S	In-house	phi	1.47	1.45	0.349	0.577	0.909	1.99	1.86	2.17	2.83	1.05	0.659	0.118	0.493	1.12	1.79
logarithmic kurtosis (method of moments)		S	In-house	phi	4.89	4.21	2.15	2.32	3.29	6.04	7.10	17.0	14.1	3.28	2.73	2.03	2.36	4.74	5.64
mean (Folk and Ward method - um)		S	In-house	um	13900	7600	1850	3310	6310	17800	13100	28600	15600	7050	6780	3070	293	2860	10200
sorting (Folk and Ward method - um)		S	In-house	um	3.38	3.70	4.04	4.31	4.05	3.18	2.59	1.64	1.70	3.67	3.51	4.86	20.4	7.25	3.15
skewness (Folk and Ward method - um)		S	In-house	um	-0.502	-0.626	-0.153	-0.263	-0.340	-0.705	-0.410	0.228	-0.415	-0.520	-0.203	0.084	-0.230	-0.147	-0.725
kurtosis (Folk and Ward method - um)		S	In-house	um	1.02	1.34	0.791	0.796	1.05	2.17	1.40	0.704	1.44	1.19	0.706	0.755	0.876	0.876	1.64
mean (Folk and Ward method - phi)		S	In-house	phi	-3.80	-2.93	-0.888	-1.73	-2.66	-4.16	-3.72	-4.84	-3.97	-2.82	-2.76	-1.62	1.77	-1.52	-3.35
sorting (Folk and Ward method - phi)		S	In-house	phi	1.76	1.89	2.01	2.11	2.02	1.67	1.37	0.712	0.762	1.88	1.81	2.28	4.35	2.86	1.66
skewness (Folk and Ward method - phi)		S	In-house	phi	0.502	0.626	0.153	0.263	0.340	0.705	0.410	-0.228	0.415	0.520	0.203	-0.084	0.230	0.147	0.725
kurtosis (Folk and Ward method - phi)		S	In-house	phi	1.02	1.34	0.791	0.796	1.05	2.17	1.40	0.704	1.44	1.19	0.706	0.755	0.876	0.876	1.64
mean description (Folk and Ward method)		S	In-house		Medium Gravel	Fine Gravel	Very Coarse Sand	Very Fine Gravel	Fine Gravel	Coarse Gravel	Medium Gravel	Coarse Gravel	Medium Gravel	Fine Gravel	Fine Gravel	Very Fine Gravel	Medium Sand	Very Fine Gravel	Medium Gravel
sorting description (Folk and Ward method)		S	In-house		Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Poorly Sorted	Moderately Sorted	Moderately Sorted	Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Extremely Poorly Sorted	Very Poorly Sorted	Poorly Sorted
skewness description (Folk and Ward method)		S	In-house		Very Fine Skewed	Very Fine Skewed	Fine Skewed	Fine Skewed	Very Fine Skewed	Very Fine Skewed	Very Fine Skewed	Coarse Skewed	Very Fine Skewed	Very Fine Skewed	Fine Skewed	Symmetrical	Fine Skewed	Fine Skewed	Very Fine Skewed
kurtosis description (Folk and Ward method)		S	In-house		Mesokurtic	Leptokurtic	Platykurtic	Platykurtic	Mesokurtic	Very Leptokurtic	Leptokurtic	Platykurtic	Leptokurtic	Leptokurtic	Platykurtic	Platykurtic	Platykurtic	Platykurtic	Very Leptokurtic

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, F +44 (0)1462 480 403, E rpsmh@rpsgroup.com, W rpsgroup.com

Results Summary - PSA Results

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

				Customer Sample No	**BH36 .50**	**BH36 1.0**	**BH36 1.5**	**BH36 2.0**	**BH36 2.5**	**BH36 3.0**	**BH36 3.5**	**BH36 4.0**	**BH37 .50**	**BH37 1.0**	**BH37 1.5**	**BH37 2.0**	**BH37 2.5**	**BH37 3.0**	**BH37 3.5**
				Customer Sample ID															
				RPS Sample No	357032	357033	357034	357035	357036	357037	357038	357039	357040	357041	357042	357043	357044	357045	357046
				Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
				Sample Location															
				Sample Depth (m)	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m	4.0m	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m
				Sampling Date	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018
				Sampling Time															
Determinand	**CAS No**	**Codes**	**SOP**	**Units**															
sample type		S	In-house		Bimodal, Poorly Sorted	Unimodal, Poorly Sorted	Bimodal, Poorly Sorted	Trimodal, Very Poorly Sorted	Bimodal, Poorly Sorted	Polymodal, Poorly Sorted	Trimodal, Poorly Sorted	Polymodal, Extremely Poorly Sorted	Bimodal, Poorly Sorted	Polymodal, Very Poorly Sorted	Trimodal, Poorly Sorted	Trimodal, Poorly Sorted	Bimodal, Poorly Sorted	Polymodal, Extremely Poorly Sorted	Unimodal, Poorly Sorted
textural group (GRADISTAT)		S	In-house		Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Muddy Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Muddy Sandy Gravel	Gravel
sediment name		S	In-house		Coarse Gravel	Coarse Gravel	Medium Gravel	Medium Gravel	Medium Gravel	Very Coarse Gravel	Coarse Gravel	Coarse Silty Fine Gravel	Coarse Gravel	Very Coarse Gravel	Coarse Gravel	Very Coarse Gravel	Coarse Gravel	Very Coarse Silty Sandy Coarse Gravel	Coarse Gravel
arithmetic mean (method of moments)		S	In-house	um	22700	20700	26000	16200	11200	16300	13400	5000	15800	19500	16800	19600	11300	9130	21300
arithmetic sorting (method of moments)		S	In-house	um	11500	9840	18400	16200	8440	14200	12200	8020	10900	19900	13200	15800	8660	11900	10300
arithmetic skewness (method of moments)		S	In-house	um	0.014	-0.068	0.551	1.37	0.429	0.621	0.773	1.87	0.489	0.873	0.433	0.197	0.483	1.31	0.024
arithmetic kurtosis (method of moments)		S	In-house	um	2.06	2.90	1.74	3.88	2.08	1.82	2.36	5.31	2.38	2.21	1.86	1.25	1.96	3.53	2.59
geometic mean (method of moments)		S	In-house	um	17200	15700	17800	8140	6690	8760	7110	451	10600	8630	9140	10300	6850	1180	15800
geometic sorting (method of moments)		S	In-house	um	2.67	2.74	2.86	4.10	3.41	3.76	3.69	19.8	2.91	4.61	4.02	4.09	3.36	18.8	2.98
geometic skewness (method of moments)		S	In-house	um	-2.49	-2.55	-1.71	-0.852	-0.974	-0.799	-0.622	-0.324	-1.30	-0.655	-1.14	-0.997	-1.13	-0.661	-2.95
geometic kurtosis (method of moments)		S	In-house	um	9.86	9.35	7.38	3.03	3.04	2.87	2.54	1.89	4.74	2.69	3.60	3.38	3.93	2.30	12.2
logarithmic mean (method of moments)		S	In-house	phi	-4.10	-3.97	-4.16	-3.03	-2.74	-3.13	-2.83	1.15	-3.41	-3.11	-3.19	-3.36	-2.78	-0.241	-3.99
logarithmic sorting (method of moments)		S	In-house	phi	1.42	1.46	1.52	2.04	1.77	1.91	1.88	4.31	1.54	2.20	2.01	2.03	1.75	4.23	1.58
logarithmic skewness (method of moments)		S	In-house	phi	2.49	2.55	1.71	0.852	0.974	0.799	0.622	0.325	1.30	0.655	1.14	0.997	1.13	0.661	2.95
logarithmic kurtosis (method of moments)		S	In-house	phi	9.86	9.35	7.38	3.03	3.04	2.87	2.54	1.89	4.74	2.69	3.60	3.38	3.93	2.30	12.2
mean (Folk and Ward method - um)		S	In-house	um	20800	19300	20400	7980	6820	8980	7470	550	11800	9720	10100	11000	7460	1420	19800
sorting (Folk and Ward method - um)		S	In-house	um	2.20	2.19	2.51	4.31	3.44	3.94	3.76	19.9	2.70	4.88	3.95	3.85	3.23	17.9	2.23
skewness (Folk and Ward method - um)		S	In-house	um	-0.235	-0.365	0.106	-0.392	-0.484	-0.248	-0.247	-0.316	-0.483	-0.209	-0.452	-0.359	-0.339	-0.404	-0.322
kurtosis (Folk and Ward method - um)		S	In-house	um	1.72	2.94	1.08	1.13	0.920	0.841	0.828	0.706	1.05	0.906	1.01	0.828	1.02	0.714	2.29
mean (Folk and Ward method - phi)		S	In-house	phi	-4.38	-4.27	-4.35	-3.00	-2.77	-3.17	-2.90	0.863	-3.57	-3.28	-3.33	-3.46	-2.90	-0.502	-4.31
sorting (Folk and Ward method - phi)		S	In-house	phi	1.14	1.13	1.33	2.11	1.78	1.98	1.91	4.32	1.43	2.29	1.98	1.94	1.69	4.16	1.16
skewness (Folk and Ward method - phi)		S	In-house	phi	0.235	0.365	-0.106	0.392	0.484	0.248	0.247	0.316	0.483	0.209	0.452	0.359	0.339	0.404	0.322
kurtosis (Folk and Ward method - phi)		S	In-house	phi	1.72	2.94	1.08	1.13	0.920	0.841	0.828	0.706	1.05	0.906	1.01	0.828	1.02	0.714	2.29
mean description (Folk and Ward method)		S	In-house		Coarse Gravel	Coarse Gravel	Coarse Gravel	Fine Gravel	Fine Gravel	Medium Gravel	Fine Gravel	Coarse Sand	Medium Gravel	Medium Gravel	Medium Gravel	Medium Gravel	Fine Gravel	Very Coarse Sand	Coarse Gravel
sorting description (Folk and Ward method)		S	In-house		Poorly Sorted	Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Extremely Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Extremely Poorly Sorted	Poorly Sorted
skewness description (Folk and Ward method)		S	In-house		Fine Skewed	Very Fine Skewed	Coarse Skewed	Very Fine Skewed	Very Fine Skewed	Fine Skewed	Fine Skewed	Very Fine Skewed	Very Fine Skewed	Fine Skewed	Very Fine Skewed	Very Fine Skewed	Very Fine Skewed	Very Fine Skewed	Very Fine Skewed
kurtosis description (Folk and Ward method)		S	In-house		Very Leptokurtic	Very Leptokurtic	Mesokurtic	Leptokurtic	Mesokurtic	Platykurtic	Platykurtic	Platykurtic	Mesokurtic	Mesokurtic	Mesokurtic	Platykurtic	Mesokurtic	Platykurtic	Very Leptokurtic

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, F +44 (0)1462 480 403, E rpsmh@rpsgroup.com, W rpsgroup.com

Results Summary - PSA Results

Report No.: 18-69863
Customer Reference: 17-0769
Customer Order No: 1711-360

				Customer Sample No	**BH37 4.0**	**BH38 0.50**	**BH38 1.0**	**BH38 1.5**	**BH38 2.0**	**BH38 2.5**	**BH38 3.0**	**BH38 3.5**	**BH39 2.0**	**BH39 2.5**	**BH39 3.0**	**BH39 3.50**	**BH39 .50**	**BH39 1.0**	**BH39 1.5**
				Customer Sample ID															
				RPS Sample No	357047	357048	357049	357050	357051	357052	357053	357054	357055	357056	357057	357058	357059	357060	357061
				Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
				Sample Location															
				Sample Depth (m)	4.0m	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m	2.0m	2.5m	3.0m	3.5m	.50m	1.0m	1.50m
				Sampling Date	23/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018
				Sampling Time															
Determinand	**CAS No**	**Codes**	**SOP**	**Units**															
sample type		S	In-house		Unimodal, Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Poorly Sorted	Trimodal, Poorly Sorted	Polymodal, Poorly Sorted	Bimodal, Poorly Sorted	Unimodal, Poorly Sorted	Unimodal, Very Poorly Sorted	Trimodal, Poorly Sorted	Polymodal, Very Poorly Sorted	Polymodal, Very Poorly Sorted	Polymodal, Very Poorly Sorted	Unimodal, Well Sorted	Trimodal, Poorly Sorted	Unimodal, Moderately Well Sorted
textural group (GRADISTAT)		S	In-house		Gravel	Gravel	Gravel	Sandy Gravel	Gravel	Gravel	Gravel	Slightly Gravelly Sandy Mud	Gravel	Muddy Sandy Gravel	Gravelly Mud	Gravelly Mud	Gravel	Gravel	Gravel
sediment name		S	In-house		Medium Gravel	Very Coarse Gravel	Coarse Gravel	Sandy Very Fine Gravel	Very Coarse Gravel	Medium Gravel	Coarse Gravel	Fine Gravelly Very Fine Sandy Coarse Silt	Medium Gravel	Very Coarse Silty Sandy Fine Gravel	Coarse Gravelly Coarse Silt	Very Fine Gravelly Medium Silt	Coarse Gravel	Medium Gravel	Very Coarse Gravel
arithmetic mean (method of moments)		S	In-house	um	13200	21200	18200	9980	25900	11100	22800	149	12400	10900	2190	1080	25000	14800	29300
arithmetic sorting (method of moments)		S	In-house	um	5830	15300	9810	12200	21200	9130	13400	623	12000	17600	5620	2790	8020	12800	9730
arithmetic skewness (method of moments)		S	In-house	um	-0.905	0.006	-0.547	1.56	0.252	0.987	-0.302	10.6	1.22	1.89	2.61	3.45	-0.527	0.808	-0.781
arithmetic kurtosis (method of moments)		S	In-house	um	2.94	1.27	1.74	3.93	1.39	3.09	1.75	142	3.32	4.94	8.00	14.7	3.84	2.30	2.78
geometic mean (method of moments)		S	In-house	um	9640	12600	12900	4860	13300	7050	14800	25.4	7030	1640	78.0	77.8	22200	8680	26000
geometic sorting (method of moments)		S	In-house	um	3.08	3.45	2.83	3.44	4.04	2.91	3.36	5.91	3.26	15.5	15.4	11.8	1.87	3.21	1.84
geometic skewness (method of moments)		S	In-house	um	-2.57	-0.972	-1.62	-0.042	-0.766	-0.806	-1.59	0.075	-0.535	-0.917	0.517	0.255	-4.45	-0.676	-4.08
geometic kurtosis (method of moments)		S	In-house	um	9.25	3.13	5.07	2.72	2.53	3.59	4.77	3.49	2.91	3.16	2.56	2.45	29.3	3.07	26.5
logarithmic mean (method of moments)		S	In-house	phi	-3.27	-3.65	-3.69	-2.28	-3.74	-2.82	-3.89	5.29	-2.81	-0.717	3.68	3.68	-4.47	-3.12	-4.70
logarithmic sorting (method of moments)		S	In-house	phi	1.62	1.79	1.50	1.78	2.02	1.54	1.75	2.56	1.70	3.95	3.95	3.56	0.901	1.68	0.878
logarithmic skewness (method of moments)		S	In-house	phi	2.57	0.972	1.62	0.042	0.766	0.806	1.59	-0.068	0.535	0.917	-0.516	-0.254	4.45	0.676	4.08
logarithmic kurtosis (method of moments)		S	In-house	phi	9.25	3.13	5.07	2.72	2.53	3.59	4.77	3.49	2.91	3.16	2.55	2.45	29.3	3.07	26.5
mean (Folk and Ward method - um)		S	In-house	um	12600	12600	13300	5490	13200	7690	15100	25.3	7180	1550	71.3	81.5	23500	9640	27600
sorting (Folk and Ward method - um)		S	In-house	um	2.19	3.27	2.61	3.70	3.99	2.91	3.12	5.57	3.19	15.1	15.6	12.8	1.41	3.24	1.49
skewness (Folk and Ward method - um)		S	In-house	um	-0.538	-0.437	-0.760	0.160	-0.381	-0.176	-0.640	-0.001	-0.172	-0.417	0.285	0.155	-0.297	-0.198	-0.383
kurtosis (Folk and Ward method - um)		S	In-house	um	3.29	0.731	1.45	1.01	0.691	0.976	1.47	1.06	0.973	1.11	0.952	0.958	1.28	0.835	1.07
mean (Folk and Ward method - phi)		S	In-house	phi	-3.65	-3.65	-3.74	-2.46	-3.72	-2.94	-3.92	5.31	-2.85	-0.632	3.81	3.62	-4.56	-3.27	-4.79
sorting (Folk and Ward method - phi)		S	In-house	phi	1.13	1.71	1.38	1.89	2.00	1.54	1.64	2.48	1.67	3.92	3.96	3.68	0.492	1.70	0.575
skewness (Folk and Ward method - phi)		S	In-house	phi	0.538	0.437	0.760	-0.160	0.381	0.176	0.640	0.001	0.172	0.417	-0.285	-0.155	0.297	0.198	0.383
kurtosis (Folk and Ward method - phi)		S	In-house	phi	3.29	0.731	1.45	1.01	0.691	0.976	1.47	1.06	0.973	1.11	0.952	0.958	1.28	0.835	1.07
mean description (Folk and Ward method)		S	In-house		Medium Gravel	Medium Gravel	Medium Gravel	Fine Gravel	Medium Gravel	Fine Gravel	Medium Gravel	Coarse Silt	Fine Gravel	Very Coarse Sand	Very Fine Sand	Very Fine Sand	Coarse Gravel	Medium Gravel	Coarse Gravel
sorting description (Folk and Ward method)		S	In-house		Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Well Sorted	Poorly Sorted	Moderately Well Sorted
skewness description (Folk and Ward method)		S	In-house		Very Fine Skewed	Very Fine Skewed	Very Fine Skewed	Coarse Skewed	Very Fine Skewed	Fine Skewed	Very Fine Skewed	Symmetrical	Fine Skewed	Very Fine Skewed	Coarse Skewed	Coarse Skewed	Fine Skewed	Fine Skewed	Very Fine Skewed
kurtosis description (Folk and Ward method)		S	In-house		Extremely Leptokurtic	Platykurtic	Leptokurtic	Mesokurtic	Platykurtic	Mesokurtic	Leptokurtic	Mesokurtic	Mesokurtic	Leptokurtic	Mesokurtic	Mesokurtic	Leptokurtic	Platykurtic	Mesokurtic

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, F +44 (0)1462 480 403, E rpsmh@rpsgroup.com, W rpsgroup.com

Results Summary - PSA Results

Report No.: 18-69863
Customer Reference: 17-0769
Customer Order No: 1711-360

				Customer Sample No	BH33 0.40	BH34 0.50	BH34 1.0	BH34 1.5	BH34 2.0	BH34 2.5	BH34 3.0	BH35 0.50	BH35 1.0	BH35 1.5	BH35 2.0	BH35 2.5	BH35 3.0	BH35 3.5	BH35 4.0
				Customer Sample ID															
				RPS Sample No	357017	357018	357019	357020	357021	357022	357023	357024	357025	357026	357027	357028	357029	357030	357031
				Sample Type	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
				Sample Location															
				Sample Depth (m)	0.40m	0.50m	1.0m	1.5m	2.0m	2.5m	3.0m	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m	4.0m
				Sampling Date	01/03/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
				Sampling Time															
Determinand	**CAS No**	**Codes**	**SOP**	**Units**															
MODE 1 - um		S	In-house	um	38300	13600	9600	13600	19200	38300	19200	27000	19200	19200	27000	27000	604	27000	19200
MODE 2 - um		S	In-house	um	19200	4800	4800	4800	38300			54000		38300	2400	1200	6800	9600	
MODE 3 - um		S	In-house	um			604	1700	4800					604	9600	13600	2400	3400	
MODE 1 - phi		S	In-house	phi	-5.24	-3.74	-3.24	-3.74	-4.24	-5.24	-4.24	-4.73	-4.24	-4.24	-4.73	-4.73	0.750	-4.73	-4.24
MODE 2 - phi		S	In-house	phi	-4.24	-2.24	-2.24	-2.24	-5.24			-5.74		-5.24	-1.24	-0.243	-2.74	-3.24	
MODE 3 - phi		S	In-house	phi			0.750	-0.743	-2.24					0.750	-3.24	-3.74	-1.24	-1.74	
D10 - um		S	In-house	um	1980	719	264	376	707	1550	2930	16500	6790	750	1160	411	3.8	195	1420
D50 - um		S	In-house	um	19000	12600	2100	4170	8330	26600	15800	25500	17400	11400	7570	2560	458	2910	17300
D90 - um		S	In-house	um	40900	24000	9690	16800	32900	40600	31600	55800	26200	21700	27300	24500	10300	25400	26400
(D90/D10) - um		S	In-house	um	20.7	33.5	36.7	44.8	46.5	26.2	10.8	3.38	3.87	29.0	23.6	59.7	2690	130	18.7
(D90 - D10) - um		S	In-house	um	38900	23300	9420	16400	32200	39100	28700	39300	19500	21000	26200	24100	10300	25200	25000
(D75/D25) - um		S	In-house	um	5.29	3.92	8.75	9.81	6.57	2.33	2.76	2.37	1.75	4.54	8.99	13.0	76.7	19.1	2.66
(D75 - D25) - um		S	In-house	um	28700	12800	4770	10100	15200	19800	15100	27000	9100	13400	19400	11000	2440	11700	13300
D10 - phi		S	In-house	phi	-5.35	-4.59	-3.28	-4.07	-5.04	-5.34	-4.98	-5.80	-4.71	-4.44	-4.77	-4.62	-3.36	-4.66	-4.72
D50 - phi		S	In-house	phi	-4.25	-3.66	-1.07	-2.06	-3.06	-4.73	-3.98	-4.68	-4.12	-3.51	-2.92	-1.36	1.13	-1.54	-4.11
D90 - phi		S	In-house	phi	-0.985	0.477	1.92	1.41	0.499	-0.630	-1.55	-4.05	-2.76	0.416	-0.213	1.28	8.04	2.36	-0.501
(D90/D10) - phi		S	In-house	phi	0.184	-0.104	-0.586	-0.347	-0.099	0.118	0.311	0.697	0.586	-0.094	0.045	-0.278	-2.39	-0.505	0.106
(D90 - D10) - phi		S	In-house	phi	4.37	5.06	5.20	5.49	5.54	4.71	3.43	1.76	1.95	4.86	4.56	5.90	11.4	7.02	4.22
(D75/D25) - phi		S	In-house	phi	0.533	0.519	-0.287	0.058	0.348	0.762	0.679	0.775	0.818	0.468	0.288	-0.035	-3.79	-0.175	0.681
(D75 - D25) - phi		S	In-house	phi	2.40	1.97	3.13	3.29	2.72	1.22	1.47	1.25	0.804	2.18	3.17	3.70	6.26	4.26	1.41
% gravel		S	In-house	%	89.9	82.5	51.2	64.4	79.9	88.7	92.5	99.3	97.6	81.9	79.8	55.0	27.5	56.8	86.7
% sand		S	In-house	%	9.97	17.3	48.5	35.3	19.9	11.3	7.43	0.67	2.43	18.1	20.2	44.9	42.8	37.9	13.0
% mud		S	In-house	%	0.09	0.20	0.38	0.26	0.23	0.05	0.11	0.00	0.01	0.02	0.01	0.14	29.7	5.36	0.31
% very coarse gravel (>32<64mm or <-5>-6phi)		S	In-house	%	35.7	0.00	0.00	0.00	10.9	33.1	9.65	27.9	0.00	7.65	0.00	0.00	0.00	0.00	0.00
% coarse gravel (>16<32mm or <-4>-5phi)		S	In-house	%	19.4	28.2	0.00	11.8	21.0	41.0	39.6	64.7	60.2	21.8	37.1	18.4	3.70	21.2	58.9
% medium gravel (>8<16mm or <-3>-4phi)		S	In-house	%	17.0	38.9	16.0	24.8	19.3	7.88	27.3	5.47	27.7	30.1	11.9	14.2	7.73	13.2	16.2
% fine gravel (>4<8mm or <-2>-3phi)		S	In-house	%	11.0	9.30	17.3	14.3	16.1	3.49	10.8	0.58	7.18	14.8	13.9	9.90	8.31	9.55	4.41
% very fine gravel (>2<4mm or <-1>-2phi)		S	In-house	%	6.86	6.19	18.0	13.6	12.7	3.21	5.11	0.64	2.51	7.59	16.9	12.5	7.80	12.8	7.27
% very coarse sand (>1<2mm or <0>-1phi)		S	In-house	%	3.88	5.48	15.4	13.0	7.82	3.32	3.17	0.26	0.88	5.80	12.3	18.2	7.99	11.9	5.72
% coarse sand (>0.5<1mm or <1>0phi)		S	In-house	%	2.13	4.41	12.6	9.34	4.66	2.90	1.86	0.17	0.75	6.33	4.40	14.4	12.7	10.9	3.21
% medium sand (>0.25<0.5mm or <2>1phi)		S	In-house	%	1.73	3.86	11.7	7.57	3.70	2.68	1.27	0.14	0.53	4.78	1.77	7.36	11.2	8.45	1.93
% fine sand (>0.125<0.25mm or <3>2phi)		S	In-house	%	1.77	2.85	7.17	4.47	2.86	1.84	0.76	0.07	0.22	0.97	1.36	3.66	6.47	4.67	1.36
% very fine sand (>0.0625<0.125mm or <4>3phi)		S	In-house	%	0.47	0.68	1.54	0.91	0.86	0.51	0.36	0.03	0.05	0.19	0.42	1.29	4.37	2.01	0.73
% very coarse silt (>0.03125<0.0625mm or <5>4phi		S	In-house	%	0.09	0.20	0.38	0.26	0.23	0.05	0.11	0.00	0.01	0.02	0.01	0.14	4.96	1.19	0.31
% coarse silt (>0.015625<0.03125mm or <6>5phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.06	0.93	0.00
% medium silt (>0.007813<0.015625mm or <7>6phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.05	0.87	0.00
% fine silt (>0.003906<0.007813mm or <8>7phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.52	0.78	0.00
% very fine silt (>0.001953<0.003906mm or <9>8phi		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.51	0.60	0.00
% clay (<0.001953mm or >9phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.62	0.99	0.00

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, F +44 (0)1462 480 403, E rpsmh@rpsgroup.com, W rpsgroup.com

Results Summary - PSA Results

Report No.: 18-69863
Customer Reference: 17-0769
Customer Order No: 1711-360

				Customer Sample No	BH36 .50	BH36 1.0	BH36 1.5	BH36 2.0	BH36 2.5	BH36 3.0	BH36 3.5	BH36 4.0	BH37 .50	BH37 1.0	BH37 1.5	BH37 2.0	BH37 2.5	BH37 3.0	BH37 3.5
				Customer Sample ID															
				RPS Sample No	357032	357033	357034	357035	357036	357037	357038	357039	357040	357041	357042	357043	357044	357045	357046
				Sample Type	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
				Sample Location															
				Sample Depth (m)	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m	4.0m	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m
				Sampling Date	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018
				Sampling Time															
Determinand	**CAS No**	**Codes**	**SOP**	**Units**															
MODE 1 - um		S	In-house	um	19200	19200	13600	13600	13600	38300	27000	27000	19200	54000	38300	38300	19200	19200	19200
MODE 2 - um		S	In-house	um	38300		54000	27000	1200	19200	4800	3400	9600	27000	19200	13600	4800	38300	
MODE 3 - um		S	In-house	um				54000		9600	604	107		6800	3400	6800		4800	
MODE 1 - phi		S	In-house	phi	-4.24	-4.24	-3.74	-3.74	-3.74	-5.24	-4.73	-4.73	-4.24	-5.74	-5.24	-5.24	-4.24	-4.24	-4.24
MODE 2 - phi		S	In-house	phi	-5.24		-5.74	-4.73	-0.243	-4.24	-2.24	-1.74	-3.24	-4.73	-4.24	-3.74	-2.24	-5.24	
MODE 3 - phi		S	In-house	phi				-5.74		-3.24	0.750	3.25		-2.74	-1.74	-2.74		-2.24	
D10 - um		S	In-house	um	8510	7150	8180	815	955	1110	1080	7.6	2410	1010	1100	1510	1310	15.2	9820
D50 - um		S	In-house	um	20100	19900	16000	12100	10300	10500	8940	1150	16000	10900	14100	13800	8960	3060	20000
D90 - um		S	In-house	um	39600	34100	55200	47800	23500	39200	32100	18900	30900	54000	37200	41200	24200	28900	36200
(D90/D10) - um		S	In-house	um	4.66	4.76	6.74	58.7	24.7	35.4	29.8	2470	12.8	53.2	33.7	27.3	18.5	1900	3.69
(D90 - D10) - um		S	In-house	um	31100	26900	47000	47000	22600	38100	31000	18900	28500	53000	36100	39600	22900	28900	26400
(D75/D25) - um		S	In-house	um	2.24	1.67	3.73	5.64	5.55	7.69	7.76	170	3.68	9.29	6.39	8.64	4.97	155	1.95
(D75 - D25) - um		S	In-house	um	18200	10600	33100	18500	14000	27800	19100	5720	16100	25500	22600	31800	14500	14700	13600
D10 - phi		S	In-house	phi	-5.31	-5.09	-5.79	-5.58	-4.56	-5.30	-5.00	-4.24	-4.95	-5.76	-5.22	-5.36	-4.60	-4.85	-5.18
D50 - phi		S	In-house	phi	-4.33	-4.32	-4.00	-3.60	-3.37	-3.39	-3.16	-0.204	-4.00	-3.44	-3.82	-3.78	-3.16	-1.61	-4.32
D90 - phi		S	In-house	phi	-3.09	-2.84	-3.03	0.296	0.067	-0.150	-0.106	7.03	-1.27	-0.021	-0.143	-0.591	-0.390	6.04	-3.30
(D90/D10) - phi		S	In-house	phi	0.582	0.558	0.524	-0.053	-0.015	0.028	0.021	-1.66	0.256	0.004	0.027	0.110	0.085	-1.25	0.636
(D90 - D10) - phi		S	In-house	phi	2.22	2.25	2.75	5.88	4.62	5.14	4.90	11.3	3.68	5.73	5.08	4.77	4.21	10.9	1.88
(D75/D25) - phi		S	In-house	phi	0.768	0.844	0.655	0.444	0.396	0.411	0.336	-1.93	0.579	0.335	0.436	0.398	0.447	-0.870	0.799
(D75 - D25) - phi		S	In-house	phi	1.17	0.737	1.90	2.50	2.47	2.94	2.96	7.41	1.88	3.22	2.68	3.11	2.31	7.27	0.963
% gravel		S	In-house	%	93.9	92.4	94.8	81.0	80.3	83.5	81.5	44.3	92.0	81.9	84.9	87.2	85.4	55.2	93.6
% sand		S	In-house	%	6.14	7.58	5.16	18.9	19.6	16.5	18.5	24.8	7.98	18.0	15.0	12.7	14.6	25.2	6.17
% mud		S	In-house	%	0.01	0.00	0.01	0.03	0.03	0.02	0.02	30.9	0.01	0.07	0.07	0.07	0.05	19.6	0.27
% very coarse gravel (>32<64mm or <-5>-6phi)		S	In-house	%	26.9	12.2	33.6	12.2	0.00	24.9	10.1	0.00	8.74	21.9	18.0	38.1	0.00	7.94	15.7
% coarse gravel (>16<32mm or <-4>-5phi)		S	In-house	%	43.5	62.5	16.4	15.0	28.1	16.0	26.1	11.1	41.4	20.0	27.1	6.46	32.0	15.6	52.7
% medium gravel (>8<16mm or <-3>-4phi)		S	In-house	%	20.0	15.0	40.5	37.9	30.4	20.9	16.1	8.32	17.5	14.8	20.0	17.3	21.0	13.4	22.6
% fine gravel (>4<8mm or <-2>-3phi)		S	In-house	%	1.61	1.20	2.99	9.85	12.8	13.8	15.2	12.5	15.9	13.6	10.6	13.9	20.2	9.55	1.15
% very fine gravel (>2<4mm or <-1>-2phi)		S	In-house	%	1.92	1.46	1.28	6.07	8.98	7.86	14.0	12.3	8.55	11.7	9.26	11.4	12.1	8.69	1.34
% very coarse sand (>1<2mm or <0>-1phi)		S	In-house	%	2.19	2.59	1.68	7.14	9.17	7.67	9.38	6.74	4.24	8.22	5.82	5.50	6.68	6.40	1.40
% coarse sand (>0.5<1mm or <1>0phi)		S	In-house	%	2.13	2.74	1.66	6.43	6.84	5.73	5.78	1.14	1.79	4.07	3.52	2.65	3.05	2.18	1.40
% medium sand (>0.25<0.5mm or <2>1phi)		S	In-house	%	1.23	1.69	1.25	4.15	2.80	2.47	2.65	2.51	1.30	3.72	3.59	2.74	2.95	2.36	1.60
% fine sand (>0.125<0.25mm or <3>2phi)		S	In-house	%	0.43	0.41	0.47	1.02	0.69	0.50	0.57	6.37	0.56	1.71	1.78	1.50	1.58	5.69	1.17
% very fine sand (>0.0625<0.125mm or <4>3phi)		S	In-house	%	0.16	0.15	0.10	0.18	0.14	0.10	0.11	8.05	0.10	0.28	0.29	0.30	0.32	8.61	0.61
% very coarse silt (>0.03125<0.0625mm or <5>4phi		S	In-house	%	0.01	0.00	0.01	0.03	0.03	0.02	0.02	6.66	0.01	0.07	0.07	0.07	0.05	5.76	0.27
% coarse silt (>0.015625<0.03125mm or <6>5phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.06	0.00	0.00	0.00	0.00	0.00	3.67	0.00
% medium silt (>0.007813<0.015625mm or <7>6phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.98	0.00	0.00	0.00	0.00	0.00	3.61	0.00
% fine silt (>0.003906<0.007813mm or <8>7phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98	0.00	0.00	0.00	0.00	0.00	2.89	0.00
% very fine silt (>0.001953<0.003906mm or <9>8phi		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53	0.00	0.00	0.00	0.00	0.00	1.67	0.00
% clay (<0.001953mm or >9phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67	0.00	0.00	0.00	0.00	0.00	1.98	0.00

RPS

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, F +44 (0)1462 480 403, E rpsmh@rpsgroup.com, W rpsgroup.com

Results Summary - PSA Results

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

				Customer Sample No	BH37 4.0	BH38 0.50	BH38 1.0	BH38 1.5	BH38 2.0	BH38 2.5	BH38 3.0	BH38 3.5	BH39 2.0	BH39 2.5	BH39 3.0	BH39 3.50	BH39 .50	BH39 1.0	BH39 1.5
				Customer Sample ID															
				RPS Sample No	357047	357048	357049	357050	357051	357052	357053	357054	357055	357056	357057	357058	357059	357060	357061
				Sample Type	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
				Sample Location															
				Sample Depth (m)	4.0m	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m	2.0m	2.5m	3.0m	3.5m	.50m	1.0m	1.50m
				Sampling Date	23/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018
				Sampling Time															
Determinand	**CAS No**	**Codes**	**SOP**	**Units**															
MODE 1 - um		S	In-house	um	13600	38300	27000	38300	54000	13600	38300	37.7	13600	54000	19200	13.3	27000	38300	38300
MODE 2 - um		S	In-house	um		13600	13600	2400	19200	27000			38300	6800	13.3	37.7		13600	
MODE 3 - um		S	In-house	um				13600	1700				3400	13600	854	75.5		3400	
MODE 1 - phi		S	In-house	phi	-3.74	-5.24	-4.73	-5.24	-5.74	-3.74	-5.24	4.75	-3.74	-5.74	-4.24	6.25	-4.73	-5.24	-5.24
MODE 2 - phi		S	In-house	phi		-3.74	-3.74	-1.24	-4.24	-4.73			-5.24	-2.74	6.25	4.75		-3.74	
MODE 3 - phi		S	In-house	phi				-3.74	-0.743				-1.74	-3.74	0.250	3.75		-1.74	
D10 - um		S	In-house	um	2020	1990	2390	1160	1620	1650	2060	2.9	1490	19.6	3.7	4.0	13900	1830	14400
D50 - um		S	In-house	um	13800	17500	21800	4360	18700	8280	23700	25.3	8140	3440	44.3	61.9	25200	10800	30200
D90 - um		S	In-house	um	20200	41200	29400	34100	56100	26000	40300	207	35100	49200	8590	3280	34900	36700	41700
(D90/D10) - um		S	In-house	um	10.0	20.7	12.3	29.5	34.7	15.8	19.6	71.1	23.6	2510	2300	810	2.51	20.1	2.90
(D90 - D10) - um		S	In-house	um	18200	39200	27000	33000	54500	24400	38200	204	33600	49100	8590	3270	21000	34900	27300
(D75/D25) - um		S	In-house	um	1.57	7.18	2.35	5.36	10.7	4.12	2.84	9.65	5.10	28.3	54.0	33.1	1.48	5.73	1.63
(D75 - D25) - um		S	In-house	um	6320	31100	15200	9280	42800	11400	22100	70.7	12800	9660	575	396	9480	17600	14400
D10 - phi		S	In-house	phi	-4.34	-5.37	-4.88	-5.09	-5.81	-4.70	-5.33	2.27	-5.13	-5.62	-3.10	-1.71	-5.13	-5.20	-5.38
D50 - phi		S	In-house	phi	-3.79	-4.13	-4.44	-2.12	-4.23	-3.05	-4.57	5.30	-3.02	-1.78	4.50	4.02	-4.66	-3.44	-4.92
D90 - phi		S	In-house	phi	-1.01	-0.994	-1.26	-0.212	-0.693	-0.723	-1.04	8.43	-0.574	5.68	8.07	7.95	-3.80	-0.872	-3.84
(D90/D10) - phi		S	In-house	phi	0.234	0.185	0.257	0.042	0.119	0.154	0.195	3.71	0.112	-1.01	-2.60	-4.64	0.741	0.168	0.714
(D90 - D10) - phi		S	In-house	phi	3.33	4.37	3.62	4.88	5.12	3.98	4.29	6.15	4.56	11.3	11.2	9.66	1.33	4.33	1.54
(D75/D25) - phi		S	In-house	phi	0.842	0.450	0.739	0.310	0.384	0.479	0.704	1.89	0.411	-0.451	8.47	4.90	0.885	0.429	0.865
(D75 - D25) - phi		S	In-house	phi	0.653	2.84	1.23	2.42	3.42	2.04	1.51	3.27	2.35	4.82	5.76	5.05	0.560	2.52	0.706
% gravel		S	In-house	%	90.1	90.0	92.1	77.2	86.5	87.5	90.3	1.56	85.6	61.0	14.1	13.4	98.3	88.8	98.4
% sand		S	In-house	%	9.52	10.0	7.88	22.8	13.5	12.5	9.73	28.1	14.4	23.7	30.1	36.4	1.66	11.2	1.62
% mud		S	In-house	%	0.43	0.01	0.01	0.03	0.01	0.04	0.02	70.4	0.02	15.3	55.8	50.2	0.01	0.01	0.01
% very coarse gravel (>32<64mm or <-5>-6phi)		S	In-house	%	0.00	38.6	0.00	12.3	42.2	1.72	30.6	0.00	13.7	13.6	0.00	0.00	13.4	16.8	44.3
% coarse gravel (>16<32mm or <-4>-5phi)		S	In-house	%	33.1	12.9	57.5	4.59	14.2	20.7	38.9	0.00	11.1	1.31	9.48	0.00	72.3	18.8	42.6
% medium gravel (>8<16mm or <-3>-4phi)		S	In-house	%	50.7	16.5	19.7	15.2	11.3	28.9	8.16	0.23	25.5	14.6	0.65	4.05	10.8	22.3	10.8
% fine gravel (>4<8mm or <-2>-3phi)		S	In-house	%	2.73	10.5	6.24	20.6	8.67	21.6	5.92	0.13	17.5	17.4	1.49	4.53	0.59	15.3	0.03
% very fine gravel (>2<4mm or <-1>-2phi)		S	In-house	%	3.55	11.4	8.61	24.5	10.2	14.6	6.58	1.20	17.8	14.2	2.50	4.85	1.21	15.6	0.61
% very coarse sand (>1<2mm or <0>-1phi)		S	In-house	%	2.98	6.72	5.00	14.9	9.41	7.50	4.73	1.59	8.40	9.52	3.12	3.92	0.76	7.28	0.87
% coarse sand (>0.5<1mm or <1>0phi)		S	In-house	%	2.43	1.79	1.54	4.21	2.62	2.92	2.82	1.69	3.65	2.76	9.63	5.28	0.16	2.01	0.30
% medium sand (>0.25<0.5mm or <2>1phi)		S	In-house	%	1.85	1.10	0.95	2.65	1.07	1.47	1.70	2.80	1.81	3.04	2.73	7.12	0.35	1.36	0.25
% fine sand (>0.125<0.25mm or <3>2phi)		S	In-house	%	1.45	0.34	0.32	0.80	0.34	0.43	0.38	9.08	0.43	4.30	5.70	9.73	0.30	0.47	0.16
% very fine sand (>0.0625<0.125mm or <4>3phi)		S	In-house	%	0.80	0.09	0.07	0.16	0.08	0.12	0.10	12.9	0.11	4.06	8.93	10.4	0.08	0.09	0.04
% very coarse silt (>0.03125<0.0625mm or <5>4phi		S	In-house	%	0.43	0.01	0.01	0.03	0.01	0.04	0.02	15.6	0.02	3.25	11.9	10.6	0.01	0.01	0.01
% coarse silt (>0.015625<0.03125mm or <6>5phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.7	0.00	3.03	12.3	10.8	0.00	0.00	0.00
% medium silt (>0.007813<0.015625mm or <7>6phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.0	0.00	3.14	12.1	10.9	0.00	0.00	0.00
% fine silt (>0.003906<0.007813mm or <8>7phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.0	0.00	2.58	9.05	8.29	0.00	0.00	0.00
% very fine silt (>0.001953<0.003906mm or <9>8phi		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.10	0.00	1.52	4.98	4.58	0.00	0.00	0.00
% clay (<0.001953mm or >9phi)		S	In-house	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.93	0.00	1.77	5.42	5.05	0.00	0.00	0.00

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - PSA Size Class & Statistics

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

			Customer Sample No	**BH33 0.40**	**BH34 0.50**	**BH34 1.0**	**BH34 1.5**	**BH34 2.0**	**BH34 2.5**	**BH34 3.0**	**BH35 0.50**	**BH35 1.0**	**BH35 1.5**	**BH35 2.0**	**BH35 2.5**	**BH35 3.0**	**BH35 3.5**	**BH35 4.0**
			Customer Sample ID															
			RPS Sample No	357017	357018	357019	357020	357021	357022	357023	357024	357025	357026	357027	357028	357029	357030	357031
			Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
			Sample Location															
			Sample Depth (m)	0.40m	0.50m	1.0m	1.5m	2.0m	2.5m	3.0m	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m	4.0m
			Sampling Date	01/03/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	28/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
			Sampl ng Time															
Sediment	**mm**	**phi ϕ**	**Units**															
Very coarse gravel	>32<64	<-5>-6	%	35.70	0.00	0.00	0.00	10.90	33.10	9.65	27.90	0.00	7.65	0.00	0.00	0.00	0.00	0.00
Coarse gravel	>16<32	<-4>-5	%	19.40	28.20	0.00	11.80	21.00	41.00	39.60	64.70	60.20	21.80	37.10	18.40	3.70	21.20	58.90
Medium gravel	>8<16	<-3>-4	%	17.00	38.90	16.00	24.80	19.30	7.88	27.30	5.47	27.70	30.10	11.90	14.20	7.73	13.20	16.20
Fine gravel	>4<8	<-2>-3	%	11.00	9.30	17.30	14.30	16.10	3.49	10.80	0.58	7.18	14.80	13.90	9.90	8.31	9.55	4.41
Very fine gravel	>2<4	<-1>-2	%	6.86	6.19	18.00	13.60	12.70	3.21	5.11	0.64	2.51	7.59	16.90	12.50	7.80	12.80	7.27
Very coarse sand	>1<2	<0>-1	%	3.88	5.48	15.40	13.00	7.82	3.32	3.17	0.26	0.88	5.80	12.30	18.20	7.99	11.90	5.72
Coarse sand	>0.5<1	<1>0	%	2.13	4.41	12.60	9.34	4.66	2.90	1.86	0.17	0.75	6.33	4.40	14.40	12.70	10.90	3.21
Medium sand	>0.25<0.5	<2>1	%	1.73	3.86	11.70	7.57	3.70	2.68	1.27	0.14	0.53	4.78	1.77	7.36	11.20	8.45	1.93
Fine sand	>0.125<0.25	<3>2	%	1.77	2.85	7.17	4.47	2.86	1.84	0.76	0.07	0.22	0.97	1.36	3.66	6.47	4.67	1.36
Very fine sand	>0.0625<0.125	<4>3	%	0.47	0.68	1.54	0.91	0.86	0.51	0.36	0.03	0.05	0.19	0.42	1.29	4.37	2.01	0.73
Very coarse s lt	>0.03125<0.0625	<5>4	%	0.09	0.20	0.38	0.26	0.23	0.05	0.11	0.00	0.01	0.02	0.01	0.14	4.96	1.19	0.31
Coarse s lt	>0.015625<0.03125	<6>5	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.06	0.93	0.00
Medium silt	>0.007813<0.015625	<7>6	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.05	0.87	0.00
Fine silt	>0.003906<0.007813	<8>7	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.52	0.78	0.00
Very fine silt	>0.001953<0.003906	<9>8	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.51	0.60	0.00
Clay	<0.001953	>9	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.62	0.99	0.00
Statistics*	Mean (phi)			-3.80	-2.93	-0.888	-1.73	-2.66	-4.16	-3.72	-4.84	-3.97	-2.82	-2.76	-1.62	1.77	-1.52	-3.35
	Sorting			1.76	1.89	2.01	2.11	2.02	1.67	1.37	0.712	0.762	1.88	1.81	2.28	4.35	2.86	1.66
	Skewness			0.502	0.626	0.153	0.263	0.340	0.705	0.410	-0.228	0.415	0.520	0.203	-0.084	0.230	0.147	0.725
	Kurtosis			1.02	1.34	0.791	0.796	1.05	2.17	1.40	0.704	1.44	1.19	0.706	0.755	0.876	0.876	1.64
	% Silt/Clay		%	0.09	0.20	0.38	0.26	0.23	0.05	0.11	0.00	0.01	0.02	0.01	0.14	29.72	5.36	0.31
	Textural Group**			Gravel	Gravel	Sandy Gravel	Sandy Grave	Sandy Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Sandy Grave	Sandy Gravel	velly Muddy S	dy Sandy Gr	Gravel

* Folk & Ward

** GRADISTAT class f cation system (Blott, S. J. & Pye, K., 2001)

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Results Summary - PSA Size Class & Statistics

Report No.: **18-69863**
Customer Reference: 17-0769
Customer Order No: 1711-360

			Customer Sample No	**BH36 .50**	**BH36 1.0**	**BH36 1.5**	**BH36 2.0**	**BH36 2.5**	**BH36 3.0**	**BH36 3.5**	**BH36 4.0**	**BH37 .50**	**BH37 1.0**	**BH37 1.5**	**BH37 2.0**	**BH37 2.5**	**BH37 3.0**	**BH37 3.5**
			Customer Sample ID															
			RPS Sample No	357032	357033	357034	357035	357036	357037	357038	357039	357040	357041	357042	357043	357044	357045	357046
			Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
			Sample Location															
			Sample Depth (m)	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m	4.0m	.50m	1.0m	1.5m	2.0m	2.5m	3.0m	3.5m
			Sampling Date	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	24/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018	23/02/2018
			Sampl ng Time															
Sediment	**mm**	**phi φ**	**Units**															
Very coarse gravel	>32<64	<-5>-6	%	26.90	12.20	33.60	12.20	0.00	24.90	10.10	0.00	8.74	21.90	18.00	38.10	0.00	7.94	15.70
Coarse gravel	>16<32	<-4>-5	%	43.50	62.50	16.40	15.00	28.10	16.00	26.10	11.10	41.40	20.00	27.10	6.46	32.00	15.60	52.70
Medium gravel	>8<16	<-3>-4	%	20.00	15.00	40.50	37.90	30.40	20.90	16.10	8.32	17.50	14.80	20.00	17.30	21.00	13.40	22.60
Fine gravel	>4<8	<-2>-3	%	1.61	1.20	2.99	9.85	12.80	13.80	15.20	12.50	15.90	13.60	10.60	13.90	20.20	9.55	1.15
Very fine gravel	>2<4	<-1>-2	%	1.92	1.46	1.28	6.07	8.98	7.86	14.00	12.30	8.55	11.70	9.26	11.40	12.10	8.69	1.34
Very coarse sand	>1<2	<0>-1	%	2.19	2.59	1.68	7.14	9.17	7.67	9.38	6.74	4.24	8.22	5.82	5.50	6.68	6.40	1.40
Coarse sand	>0.5<1	<1>0	%	2.13	2.74	1.66	6.43	6.84	5.73	5.78	1.14	1.79	4.07	3.52	2.65	3.05	2.18	1.40
Medium sand	>0.25<0.5	<2>1	%	1.23	1.69	1.25	4.15	2.80	2.47	2.65	2.51	1.30	3.72	3.59	2.74	2.95	2.36	1.60
Fine sand	>0.125<0.25	<3>2	%	0.43	0.41	0.47	1.02	0.69	0.50	0.57	6.37	0.56	1.71	1.78	1.50	1.58	5.69	1.17
Very fine sand	>0.0625<0.125	<4>3	%	0.16	0.15	0.10	0.18	0.14	0.10	0.11	8.05	0.10	0.28	0.29	0.30	0.32	8.61	0.61
Very coarse s lt	>0.03125<0.0625	<5>4	%	0.01	0.00	0.01	0.03	0.03	0.02	0.02	6.66	0.01	0.07	0.07	0.07	0.05	5.76	0.27
Coarse s lt	>0.015625<0.03125	<6>5	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.06	0.00	0.00	0.00	0.00	0.00	3.67	0.00
Medium silt	>0.007813<0.015625	<7>6	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.98	0.00	0.00	0.00	0.00	0.00	3.61	0.00
Fine silt	>0.003906<0.007813	<8>7	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98	0.00	0.00	0.00	0.00	0.00	2.89	0.00
Very fine silt	>0.001953<0.003906	<9>8	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53	0.00	0.00	0.00	0.00	0.00	1.67	0.00
Clay	<0.001953	>9	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67	0.00	0.00	0.00	0.00	0.00	1.98	0.00
Statistics*	Mean (phi)			-4.38	-4.27	-4.35	-3.00	-2.77	-3.17	-2.90	0.863	-3.57	-3.28	-3.33	-3.46	-2.90	-0.502	-4.31
	Sorting			1.14	1.13	1.33	2.11	1.78	1.98	1.91	4.32	1.43	2.29	1.98	1.94	1.69	4.16	1.16
	Skewness			0.235	0.365	-0.106	0.392	0.484	0.248	0.247	0.316	0.483	0.209	0.452	0.359	0.339	0.404	0.322
	Kurtosis			1.72	2.94	1.08	1.13	0.920	0.841	0.828	0.706	1.05	0.906	1.01	0.828	1.02	0.714	2.29
	% Silt/Clay		%	0.01	0.00	0.01	0.03	0.03	0.02	0.02	30.88	0.01	0.07	0.07	0.07	0.05	19.58	0.27
	Textural Group**			Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Muddy Grave	Gravel	Gravel	Gravel	Gravel	Gravel	ddy Sandy Gr	Gravel

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