

Scapa Deep Water Quay (SDWQ)
Dredging Best Practicable Environmental Option
Report

May 2023



CONTROL SHEET

Client: Orkney Islands Council

Project Title: Scapa Deep Water Quay (SDWQ)

Report Title: Dredging Best Practicable Environmental Option Report

Document number: 13145
Project number: 674795

Issue Record

Issue	Status	Author	Reviewer	Approver	Issue Date
1	Final	CCAS	GD	GD	11/05/2023
2	Rev1	CCAS	GD	IB	18/08/2023

EnviroCentre Limited Office Locations:

Glasgow Edinburgh Inverness Banchory

Registered Office: Craighall Business Park 8 Eagle Street Glasgow G4 9XA Tel 0141 341 5040 info@envirocentre.co.uk www.envirocentre.co.uk

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1 INTRODUCTION

EnviroCentre Ltd. has been appointed by Orkney Islands Council Harbour Authority (OICHA) to undertake a Best Practicable Environmental Options appraisal (BPEO) in support of the dredge licence for capital dredging to help develop the deepwater quay at Scapa. The development of Scapa Deep Water Quay comprises the design and construction of a new harbour facility comprising approx. 597m long main quayside berth with general -15m CD water depth, incorporating a 135m quayside pocket with -20m CD water depth. Further north tug (3No.) and pilot boat (2No.) berth approx. 180m long with depths between -6 and -9m CD. Laydown area directly behind quay face approx. 22.85 Hectares. There will also be an access road from the A961 to the site.

The main purpose of this facility would be to undertake any/multiple industry activity that requires both deep-water berthing and large laydown area. There are specific market opportunities in the offshore wind and oil and gas sectors.

As part of the licensing process applicants are required to undertake a Best Practicable Environmental Option (BPEO) assessment for the disposal routes for the prospective dredge material in conjunction with the assessment of the chemical and physical properties of the same material to ensure that quality of the material is suitable for the identified disposal route(s).

1.1 Background Information

As outlined above, the works will comprise an element of dredging split in to three phase areas

Sampling was undertaken in March and April 2022 which comprised collection of 13 boreholes and Washprobe samples from the dredge areas. The samples were predominately sand with variable silt and gravel content.

The proposed dredge areas and volumes are detailed in Table 1-1 below with the dredge areas presented and sample locations provided in drawing 21-1031-EHL-001 in Appendix A.

Dredge Area

Approximate Total
Dredge Volume (m³)

Phase 1 & 2

Barrel Dredge
Dredge Dredge
Dredge Thickness range
Chart Datum)

-15m

Variable <1.0m to c7m

Table 1-1: Proposed Dredge Areas and Approximate Dredge Volumes

1.2 Scope of Report

The purpose of this report is to review each of the available potential disposal options for the dredged materials. The options which are not considered to be practicable are rejected and the reasons for doing so are explained.

Those options which are practicable are examined in detail and assessed against the following considerations: -

- Environmental;
- Strategic; and

Cost.

The report then compares the practicable disposal options and draws a conclusion on the BPEO.

1.3 Sediment Sampling and Nature of Marine Sediments on Site

Samples from the proposed dredge area were collected in March and April 2022 and submitted for analysis in line with Marine Scotland's guidance and the agreed sampling plan. The sample logs are provided in Appendix B with Laboratory certificates and data summary tables in Appendix C.

Due to extreme weather conditions during the sampling and extensive weather related delays, and associated mounting costs, a number of the original boreholes were abandoned, and samples collected and tested from the ones achieved. Correspondence was undertaken with Marine Scotland in December 2022 to highlight these constraints, and it was agreed that the available information was considered suitable for the dredge application and that no further sampling would be required.

Sediment type across all dredge areas was predominately sand with varying gravel and silt content.

The following sections details the exceedances of the Revised Action Levels (RALs) with further consideration of these exceedances undertaken in Section 3.

1.3.1 Metals

Exceedances of the RALs for metals can be summarised as follows:

- Arsenic –5 of 34 samples recorded arsenic levels above RAL1. The maximum concentration recorded was 27.8mg/kg.
- Cadmium –0 of 34 samples recorded cadmium levels above RAL1. The maximum concentration recorded was 0.13 mg/kg.
- Copper 3 of 34 samples recorded copper levels above RAL1. The maximum concentration recorded was 84.1 mg/kg.
- Chromium 1 of 34 samples recorded chromium levels above RAL1. The maximum concentration recorded was 51.4 mg/kg.
- Lead 1 of 34 samples recorded lead levels above RAL1. The maximum concentration recorded was 50.7 mg/kg.
- Mercury 0 of 34 samples recorded mercury levels above RAL1. The maximum concentration recorded was 0.13 mg/kg.
- Nickel 1 of 34 samples recorded nickel levels above RAL1. The maximum concentration recorded was 31.8 mg/kg.
- Zinc 1 of 34 samples recorded zinc levels above RAL1. The maximum concentration recorded was 161 mg/kg.

There were no exceedances of RAL2 for metals recorded within any of the 34 samples collected.

1.3.2 Tributyl Tin (TBT)

All samples were recorded below the laboratory limit of detection (LOD) and all samples recorded below RAL1.

1.3.3 Polyaromatic Hydrocarbons (PAHs)

No samples recorded PAH concentrations above RAL1.

1.3.4 Polychlorinated Biphenyls (PCBs)

All samples recorded individual PCB congeners below RAL1. The highest recorded total ICES 7 concentration was 0.0019 mg/kg.

1.3.5 Total Hydrocarbons (THC)

1 of 34 samples recoded hydrocarbons above RAL1. The maximum recorded is 123 mg/kg.

1.4 Report Usage

The information and recommendations contained within this report have been prepared in the specific context stated above and should not be utilised in any other context without prior written permission from EnviroCentre Limited.

If this report is to be submitted for regulatory approval more than 12 months following the report date, it is recommended that it is referred to EnviroCentre Limited for review to ensure that any relevant changes in data, best practice, guidance or legislation in the intervening period are integrated into an updated version of the report.

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2 DISCUSSION OF AVAILABLE DISPOSAL OPTIONS

The BPEO process is geared towards identifying a preferred overall strategy from the perspective of the environment as a whole, as opposed to detailed optimisation of any one selected scheme. It is a structured and systematic process to identify and compare strategic options in a transparent manner. Alternatives are evaluated in terms of their projected implications for the environment together with consideration of practicability, social and economic issues as well as within a wider strategic context.

The key stages of a BPEO are:

- · Identification of options;
- · Screening of options;
- Selection of assessment criteria;
- · Analysis and evaluation of criteria; and
- Evaluation of BPEO.

Further details on methodology are provided within each section.

2.1 Identification and Screening of Available Disposal Options

A number of options are available for disposal of dredged sediments. The options considered are provided in Table 2-1 along with justification for screening out those options which have not been taken forward for further consideration.

Table 2-1: Initial Best Practicable Available Options

Location	Options	Screening Assessment	Carry forward?
Shore/Estua ry/	Leave in situ	Not an option due to the project specific requirements to create berthing at the pier and navigable approaches.	No
Riverbank	Infilling of an existing dry dock/harbour facility/develop ment site (reuse)	The project requires a significant amount of infill behind the quay wall for reclamation. It is envisaged that up to 70% of all dredged material from Phase 1 and Phase 2. Will be utilised as infill with the remainder of structurally unsuitable material proposed to be disposed of at sea at a licensed disposal ground.	Yes
	Beach Nourishment	Specific beach nourishment projects would require to be supported by Environmental Assessments as a minimum to inform how the project could affect the environment as a result of disturbance to the intertidal area, changes to the sediment levels, the variable composition and quality of the material and measures devised from the assessment outcomes to minimise impacts on the environment.	No
		The dredge material comprises a mixture of gravel, sand and silt. Fine sediments (i.e. silt) is not suitable for beach nourishment in the traditional sense.	
Land	Landfill Disposal	This is possible but it is unlikely that this option will offer long term solution due to lack of space at landfills. Landfill space is currently at a premium and does not offer a sustainable solution either financially or environmentally for the disposal of dredged arisings. Dredged material likely to require treatment first in a dewatering facility. Significant cost associated with set up of dewatering facility at the quayside plus transportation and additional costs associated with gaining the necessary planning and regulatory consents.	No
		OIC were contacted with regards to landfills in proximity to the site. Bossack Waste Transfer and Landfill Facility near Kirkwall has a daily capacity of 225 tonnes of inert waste or 5,000 tonnes /year so would not be a viable option for disposal. Transporting to another landfill would require marine transport plus road transport.	
	Land Incineration	The dredged material consists of non-combustible material (silts, sands, gravels, shells) with a low combustible component and very high-water content.	No

	Application to Agricultural Land	The dredged material would need to be treated to reduce salt concentrations to acceptable levels. Would require detailed chemical analysis and assessment as well as a Waste Management License Exemption. Would require special precautions during spreading in relation to the risk of odour and watercourses / aquifers. The availability of land for this option will be limited within a reasonable haulage distance of the dredge arisings. Large volumes each year are unlikely to be viable to dispose of in this manner and would potentially have a detrimental effect on existing terrestrial habitats.	No
	Recycling	Recycling of dredged material is theoretically possible, however, due to the varied lithology there would need to be either segregation during dredging works to minimise the entrainment of fine-grained material into the sands, or energy and water rich processing on land.	No
Sea	Aquatic disposal direct to seabed.	Relatively low cost, minimal transportation requirements compared to all other options and potential for low environmental risk. The closest spoil grounds are Stromness B being the closest is located approximately 16km South.	Yes
		It would be proposed that only unsuitable material for construction works would be deposited within the disposal site i.e. material with high silt content.	

2.2 Summary of Identified BPEO Options

Following review of the available options and the proposed construction requirements a combination of proposed reuse/sea disposal has been identified as the BPEO. The remote nature of the site and distance from the mainland, precludes the majority of the other options on the basis of not being practical options.

The chemical quality of the material is typically acceptable for sea based disposal, however further consideration of the RAL1 exceedances outlined previously is provided in Section 3.

3 FURTHER ASSESSMENT

3.1 Chemical Quality

Up to 5 samples from 34 in total recorded exceedances of RAL1 for metals and one sample recorded a marginal exceedance of Total Petroleum Hydrocarbons (TPH).

Further consideration is given to this result using the Canadian Council Ministers of the Environment (CCME) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life considering both the Effects Range Low (ERL) and Probable Effects Level (PEL). This is summarised in the table below.

Table 3-1: Further Assessment Summary

Contaminant	Number of RAL1 Exceedances of 34 samples	Number of ERL Exceedances of 34 samples	Number of PEL Exceedances of 34 samples
Arsenic	5	N/A	0
Copper	3	3	0
Chromium	1	0	0
Lead	1	1	0
Nickle	1	N/A	N/A
Zinc	1	1	0
TPH	1	N/A	N/A

In summary, there are no exceedances of Probable Effect Levels or RAL2 where one is available for review.

3.2 Water Framework Directive Assessment

As outlined in the Water Framework Directive Assessment: estuarine and coastal waters, there are several key receptors which can be impacted upon which need considered.

- Hydromorphology
- Biology habitats
- Biology fish
- Water quality
- Protected areas

A WFD assessment has not been undertaken as the proposed works have an accompanying Environmental Impact Assessment Report detailing all of this information.

3.3 Potential Risk to Water Quality and Marine Life

The potential risks to water quality at the dredge sites and disposal site are further considered below.

Contaminant levels within the proposed dredge material for sea disposal are considered to be very low and not considered to represent a significant risk to the overall water quality either at the dredge site or proposed disposal site(s). The key risks to water quality are from the dredging exercise and also

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disposal where there may be periods of higher suspended solids which are likely to be both localised and temporary in nature. The larger grained material like gravel and sands will drop to the sea floor quickly, and any changes in suspended solids/turbidity will be driven by the finer grained material content, silts and clay sized particles. Where finer grained materials are cohesive, they will sink to the sea floor rapidly. The bulk of the dredge material is to be used for reclamation/construction works, with the unsuitable, higher silt containing material, proposed to be disposed of at Stromness B. The average content of various particle sizes is detailed below om Table 3-2.

Table 3-2: Summary of PSA Data

Dredge Area	Gravel (>2mm)	Sand (0.063mm <sand<2mm)< th=""><th>Silt & Clay (<0.063mm)</th><th>Quantity to be dredged m³</th></sand<2mm)<>	Silt & Clay (<0.063mm)	Quantity to be dredged m ³
SDWQ	17%	60%	23%	83,000
Phase 1 and 2	14,110m ³	49,800m³	19,090m ³	

The dominant sediment type across the majority of the dredge areas is sand. Considering the dredge volume as a whole using averaged particle size analysis data, the dominant sediment type is sand comprising 60% of the total and the remainder made up of 23% silt and 17% comprising gravel sized fractions.

Given that an average of 60% of the sediment across all dredge areas comprises sand and gravel, it is considered that the majority of the deposited sediment will fall out of suspension quickly at the disposal site with limited lateral spread.

The remaining portion of the dredge 23% or 19,090m³ of dredge material comprises silt/clay sized particles. This material is considered to have a longer suspension time than sand and gravel sized particles when in suspension. It is understood that the unsuitable material for engineering purposes may be disposed of and would likely have a larger proportion of silt. Any effects from the disposal of the material is considered to be both localised and temporary.

Marine Scotland do not hold any information on the disposal sites.

In summary, the associated risk with degradation of water quality directly associated with the proposed disposal is considered to be Low i.e. unlikely to cause a change in status of the waterbodies in question at both the dredge and disposal sites.

3.4 Conclusions and Recommendations

Review of available chemical quality information has low level/frequency exceedances for a arsenic (5), copper (3), Total Hydrocarbon content, chromium, lead, nickel and zinc recorded a single exceedance for their respective RAL1. Assessment of key receptors identified from the Water Framework Directive assessment for estuarine and coastal waters concluded that there is a low risk of the sediments impacting upon the overall ecological or chemical status. Additionally, the contaminants of concern levels recorded in the sediment are not considered likely to have a significant adverse impact on the sediment quality already located within the disposal grounds as the majority of the samples and associated contaminants of concern were recorded below RAL1.

Overall, based on the multiple lines of evidence approach adopted to further assess the exceedances identified in the sediment assessment, the material proposed for dredging is considered suitable for sea disposal, however, the majority of the material to be dredged will be re-used within the

construction of the proposed quay, with material which does not meet the requirements for engineering purposes proposed to be of disposed of at the closest disposal site.

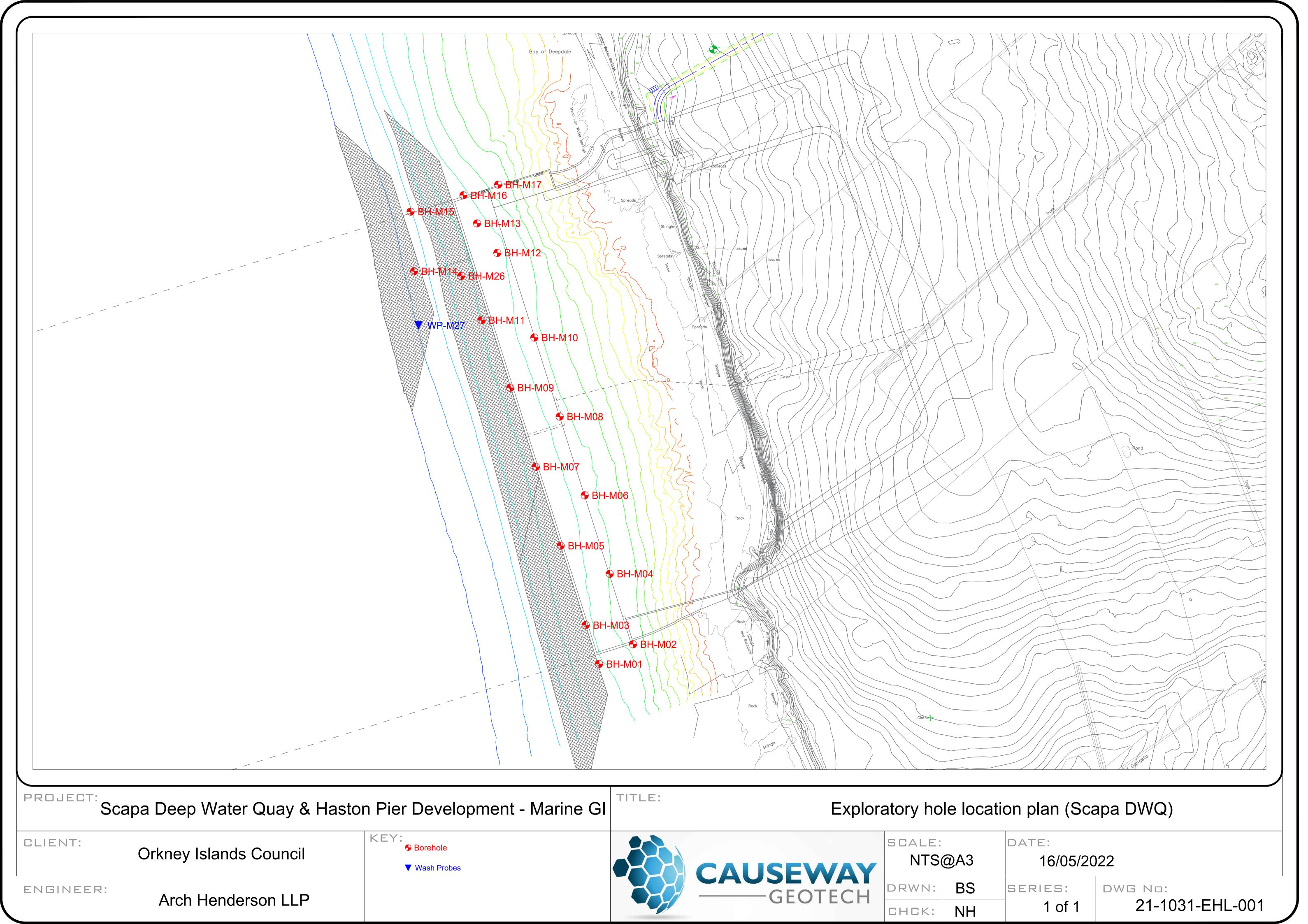
Based on the chemical quality of the sediment samples retrieved and tested from the dredge site, the sea disposal and re-use of the material is considered to have no significant long-term impact on the marine environment.

REFERENCES

Marine Scotland (2017). Pre-Dredge Sampling Guidance Version 2: Scottish Government. Marine Scotland (2015). Guidance for Marine Licence Applicants Version 2: Scottish Government.

APPENDICES

A FIGURES



B SAMPLE LOGS



APPENDIX B
BOREHOLE LOGS



		CAUS	E	W	A	Y			Projec 21-1		Project Name: Scapa Deep Water Quay & Hatston Pier Development - Marine Client: Orkney Islands Council Client's Rep: Arch Henderson LLP	Borehole ID BH-M01
Metho		Plant U					Base		Coord	inates	Final Depth: 12.80 m Start Date: 14/01/2022 Driller: MJ/K\	Sheet 1 of 2
Sonic Dri		Fraste Du Rotoso Fraste Du Rotoso	onic uo C)			00	3.0 12.8		34513 100368		Elevation: -10.10 mCD	Scale: 1:50
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend Description	Backfill
0.00 - 0.50 0.50 0.50 - 1.50	ES9 ES1 B4	Marine Scotl	and -	SS1							Medium dense grey slightly gravelly silty fine to medium SAND with shell fragments (up to 5mm). Gravel is subangular to subrounded fir of various lithologies.	e
1.50 1.50 1.50 - 2.50 1.50 - 1.95 2.00	D7 B5				nmer	SN =	1.50					1.0 —
2.50 - 3.00 2.50 - 3.00	0.50 ES9 Marine Scotland - SS1 ES1 1.50 B4 1.50 ES10 Marine Scotland - SS2 D7 2.50 B5 1.95 SPT (S) N=18 (1,1/3,4,5,6) Hammer SN = 1 1353 ES2 3.00 B6 3.00 ES11 Marine Scotland - SS3 D8 ES3				-12.60	2.50	Orangish brown thinly laminated slightly gravelly silty fine to mediun SAND. Gravel is angular fine to medium of various lithologies.	n 2.5 —				
3.00 3.00 3.00 - 3.45	ES3 SPT(S) N (4,6/7,7	,8,8)	100	19	19		3.00		-13.10 -13.50 -13.80	3.00 (0.40) 3.40 (0.30) 3.70	Dark grey clayey slightly gravelly fine to coarse SAND. Gravel is angular fine to coarse of sandstone. Possible weathered SANDSTONE recovered as light orangish grey clayey gravelly fine to coarse sand. Gravel is angular fine to coarse o	3.0
3.70 3.80 3.80	D8 ES3 3.45 SPT(S) N=30 (4,6/7,7,8,8) Hammer SN = 1353 C1 C2 100 85 47 C3 C4 C5			47	6					Sandstone. Weak (locally medium strong) indistinctly thinly laminated fine grained light brownish orange and whitish grey SANDSTONE. Partiall weathered: reduced strength and much closer fracture spacing. Discontinuities: 1. 0 to 20 degree joints closely spaced (50/110/250) planar, rough,	y 4.0 — 4.0 — 4.5 — 4.5 —	
4.95	(4,6/7,7,8,8) Hammer SN = 1353 C1 C2 10 C3 C4 C5		100 85 47		15					unstained and clean. 2. 55 to 75 degree joints from 4.50m to 4.80m, 5.10m to 5.20m, 5.20m to 5.30m and 6.90m tom 7.00m, planar, rough, unstained and clean.	5.0	
5.30 5.40 5.60			97	81	33					(3.30)		5.5 —
6.80												
7.10 7.25			100	93	53	7			-17.10	- 7.00 -	Medium strong (locally weak) indistinctly thinly laminated fine grained light brownish orange and whitish grey SANDSTONE. Partiall weathered: slightly reduced strength, closer fracture spacing occasional heavy dark orangish brown discolouration and occasiona clay infill. Discontinuities: 1. 0 to 20 degree joints closely spaced (30/140/300) planar, rough, occasional clay infill on joint surfaces up to 40mm deep.	
8.30 8.50	C8			79	27						2. 55 to 75 degree joints from 8.60m to 8.90m, 9.50m to 9.60m and 10.30m to 10.40m, planar, rough and occasional heavy dark orangis brown staining on joint surfaces up to 40mm deep.	8.5 — 9.0 —
	\A/a+a	r Strikes	TCR	SCR	4		rks					
Struck at (m) Ca	asing to (m				n) _N	eck to	Borel Bed	= 19.			nck-up barge	
To (m) Di 3.00 12.80	etails iam (mm) 177 150			ed o (m)			Barre K6L	el	Flush 1			Updated

	C	AUS	E	W OT E	A	Y H			21-	1031			slands Cour nderson LLF					вн-мо	1
Meth Sonic Di		Plant U				(m) 00	_	e (m) 00	Coord	dinates	Final Depth: 12	2.80 m	Start Date:	14/01/2022	Driller:	MJ/KW		Sheet 2 of	
	-	Rotoso	onic						34513	39.28 E								Scale: 1:5	50
Rotary C	Coring	Fraste Di Rotoso		ΧL	3.	00		.80		39.78 N	Elevation: -10.10	0 mCD	End Date:	15/01/2022	Logger:	JG+RC		FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend			cription			Water	Backfill	<u> </u>
70 80 0.45 0.75	C9 C10 C11		83	75	37	9 AZCL				(5.80)	grained ligh weathered: occasional I clay infill. Discontinui: 1. 0 to 20 d occasional d 2. 55 to 75 10.30m to 2 brown stain	at brown slightly neavy da ties: egree jo clay infill degree j 10.40m, ning on jo	ish orange and reduced stren ark orangish br ints closely spi I on joint surfa oints from 8.6 planar, rough oint surfaces u	istinctly thinly lad whittish grey SA gth, closer fractive was discolourated aced (30/140/30 ces up to 40mm 0m to 8.90m, 9.1 and cocasional hip to 40mm deep was and started by the same of the same o	NDSTONE ure spacin ion and of 00) planar, deep. 50m to 9.6 leavy dark	E. Partially g casional rough, 60m and orangish			9.5 10.0 - 10.5
1.50	.50 C13		100 97 67 8											11.5 12.0 -					
2.50 2.65									-22.90	12.80									12.5
																		1 1 1 1 1	13.5 14.0 - 14.5 15.0 - 16.5 17.0 - 18.5
	Water	Strikes	TCR	SCR	RQD	FI	Chis	ellin	g Details	<u> </u>	Remarks								_
Casing [Water From (m)	Add		n) F	rom (_	To (ne (hh:mm)	Marine Borehole drilled Deck to Bed = 19.00m All elevations/reduced			arge					
12.80	150					Core	Barı	rel	Flush	Туре	Termination Reason	l				Last Up	date	ed T	T
						ς	K6L		Poly	mer	Terminated at schedule	d danth				29/06/	'วกวว		Ĭ

	C	AUS		W			_			ct No.	Project Name: Scapa Deep Water Quay & Hatston Pier Development - Marine Client: Orkney Islands Council Client's Rep: Arch Henderson LLP	Borehole ID BH-M02
Meth Sonic D		Plant U				(m)	Base 1.2		Coord	inates	Final Depth: 14.00 m Start Date: 20/01/2022 Driller: KW	Sheet 1 of 2
Rotary (Rotoso Fraste Du Rotoso	onic uo C)			20	14.0		34518 100371	0.32 E 3.59 N	Elevation: -8.78 mCD End Date: 20/01/2022 Logger: JG+F	
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend Description	Backfill Backfill
0.00 - 0.70 0.50 0.70 - 1.00 1.00 - 1.20	ES1 B3 B4								-9.48 -9.78	0.70	Grey very gravelly silty fine to coarse SAND with shell fragments (u to 5mm). Gravel is subangular to subrounded fine to coarse of various lithologies. Orangish brown thinly laminated silty fine to medium SAND. Yellowish brown fine to medium SAND.	0.5 -
						AZCL			-9.98	1.20	Dark brownish grey clayey slightly gravelly fine to coarse SAND. Gravel is subrounded fine to coarse of mixed lithologies.	
1.70	C1		75	18	0	NI			-10.48	1.70	Gravel is subrounded fine to coarse of mixed lithologies. 1.20m to 1.40m: AZCL - Probable bed of sand and gravel washed out during drilling. Very weak thinly laminated fine grained light brownish yellow and	1.5
2.00 2.00	C2					14				(1.20)	brownish white SANDSTONE. Partially weathered: reduced strengt and much closer fracture spacing. Discontinuities: 1. 5 to 15 degree bedding fractures closely spaced (10/65/200)	h 2.0 —
3.00 3.20	C3 C4		100	71	23				-11.68	2.90	planar, smooth, unstained and clean. 2. 55 to 65 degree joints from 2.35m to 2.55m and 2.80m to 2.90n undulating, rough, unstained and clean. Weak indistinctly thinly laminated fine grained light brownish grey and light brownish yellow SANDSTONE. Partially weathered: slightl), y
3.50						>20					reduced strength, much closer fracture spacing and occasional hea brownish black discolouration on fracture surfaces.	vy
3.80	C5		41	25	0					_ (2.10)	Discontinuities: 1. 0 to 20 degree bedding fractures, closely spaced (10/75/200) planar, smooth, unstained, clean. 2. 55 to 65 degree joints from 3.30m to 3.50m, 3.60m to 3.70m an 3.80m to 3.90m, undulating, rough, occasional heavy brow black staining on joint surfaces up to 0.5mm deep and clean. 4.10m to 5.00m: AZCL - Probable bed of extremely weak sandstone washed out during	
						AZCL					drilling.	-
5.00 5.45	C6								-13.78	5.00	Weak (locally medium strong) indistinctly thickly laminated fine grained dark brownish yellow SANDSTONE. Partially weathered: slightly reduced strength, much closer fracture spacing and occasional heavy dark orangish brown discolouration on fracture	5.0 — - - - 5.5 —
			97	74	26	20				(1.35)	surfaces. Discontinuities: 1. 0 to 15 degree bedding fractures very closely spaced (10/50/150) planar, smooth, occasional heavy dark orangish brown staining on))m 6.0—
6.30 6.50	C7								-15.13	6.35	fracture surfaces up to 40mm deep. Medium strong (locally weak) indistinctly thinly laminated fine grained light greyish orange and light brownish orange SANDSTON	6.5 -
6.85	C8		100	95	63	7					Partially weathered: slightly reduced strength, closer fracture space and occasional heavy dark orangish brown discolouration on fracti surfaces. Discontinuities: 1. 0 to 15 degree bedding fractures, closely spaced (10/150/500)	ing
7.60 7.70	C9 C10										planar, smooth, occasional heavy dark orangish brown staining on fracture surfaces up to 100mm deep. 2. 25 to 45 degree joints medium spaced (200/470/1500) planar, smooth, occasional heavy dark orangish brown staining on joint	7.5 -
8.00 8.00	C11		100	00	70	4.6					surfaces up to 5mm deep. 3. 65 to 75 degree joint from 11.40m to 11.65m, planar, rough, heddark brown staining on joint surface., 10mm deep.	8.0 — 8.5 —
9.00	C12		100		79	11						9.0 —
	Water	Strikes	TCR	SCR	_	FI ema	rks					
truck at (m) (Time (min)	Rose	e to (n	n) N	larine eck to	Borel Bed	= 19.			ck-up barge nCD	
Casing I		Water										
To (m) 1.20 14.00	Diam (mm) 177 150	From (m)	Тс	o (m)	_	Coro	Barre	al le	Flush	Type	ermination Reason Las	t Updated
							K6L	-1	riusii	. ype		1/06/2022 AGS

		ALIC			/ A `	_				ct No.	-	Name: Scapa Deep			elopment -	Marine GI		oreho	
		AUS	FC	OT E		Н			21-3	1031	Client:		slands Coui	ncil				BH-M	102
	7										Client's	Rep: Arch He	nderson LLF)					
Meth Sonic D		Plant U			-	(m) 00	Base 1.2		Coord	linates	Final De	pth: 14.00 m	Start Date:	20/01/2022	Driller:	KW		Sheet 2	
		Rotos	onic						34518	30.32 E			-					Scale: 1	1:50
Rotary (Fraste Di Rotos	onic			20	14.		100371	13.59 N Depth	Elevatio	n: -8.78 mCD		20/01/2022	Logger:	JG+RC	'n	FINA	_
(m)		/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	mCD	(m)	Legend	NA1:		cription			Water	Backfi	II .
1.1.00 1.1.00	80 53 34 13 20 20 00 C14 96 82 62 8 50 >20								(7.65)		Medium strong (loc grained light greyisl Partially weathered and occasional hear surfaces. Discontinuities: 1. 0 to 15 degree be planar, smooth, occ fracture surfaces up 2. 25 to 45 degree; smooth, occasional surfaces up to 5mm 3. 65 to 75 degree j dark brown staining 9.50m to 9.70m: AZCL - 1 drilling.	h orange and I : slightly redu- vy dark orangi edding fractur- casional heavy to to 100mm do oints medium heavy dark or heavy dark or n deep. oint from 11.4	ight brownish or ced strength, clo sh brown discolo es, closely space dark orangish breep. spaced (200/47 rangish brown st	range SANI oser fractur ouration or d (10/150, rown stain 0/1500) pl aining on j	ostone. The spacing in fracture (500) The spacing on the space of the			9.5 10.0 -	
2.50	015					>20													12.5 13.0 -
3.20	C15		100	97	45	9	•												13.5
3.75	C16										:::::								
4.00									-22.78	14.00			End of Bore	hole at 14.00m					14.0 -
			TCR	SCR	RQD	FI													15.0 - 15.5 16.0 - 16.5 17.0 - 17.5 18.0 - 18.5
		Strikes						ellin	g Details		Remarks							1	
Casing I		Water From (m)	Add		n) F	rom (To (e (hh:mm)	Deck to Be	rehole drilled off OCI ed = 19.60m ons/reduced levels gi		oarge					
1.20 14.00	150				\vdash	Core	Barr	el	Flush	Туре	Terminat	ion Reason				Last Up	date	ed E	
							K6L	- '		/1		d at scheduled depth				29/06/			G

		CAUS	E	W TTC	A EC	Y H			Projec		Project Name: Scapa Deep Water Quay & Hatston Pier Development - Marine GI Client: Orkney Islands Council Client's Rep: Arch Henderson LLP						вн-моз			
Meth Sonic D		Plant I Fraste D Rotos	uo C	XL	-	(m) 00	Base (Coord 34512		Final De	epth: 11.90 m	Start Date:	24/01/2022	Driller:	МЈ		Sheet 1 o		
Rotary (Coring	Fraste D Rotos		XL	4.	50	11.9	0	100373	6.66 N	Elevatio	on: -10.42 mCD	End Date:	25/01/2022	Logger:	JG+RC		FINA	L	
Depth (m)	Sample / Tests	Fi	eld Re	cords			Casing 1 Depth 1 (m)	Vater Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill		
0.00 - 0.50 0.00 - 1.50	ES11 B5	Marine Scot	land -	SS1							x × x	Loose to medium d with shell fragment				arse SAND				
).50	ES1										× × ×	subrounded fine of							0.5	
.50	LSI										×׈×									
.00 .00 - 1.50	ES2 ES12	Marine Scot	land -	- SS2							*								1.0	
.50 .50 - 3.00	0 - 3.00 B6 0 - 1.95 SPT (S) N=10 (1,0/2,2,3,3) Ham										x								1.5	
.50 - 1.95		N=10 (1,0/2, 1353	,2,3,3) Ham	nmer	SN =	1.50				*								2.0	
00	ES3										×××									
.50 - 3.00	ES13	- SS3							× × × × × × × × × × × × × × × × × × ×								2.5			
.00	D9								-13.42	3.00	×××								3.0	
.00	ES4 3.30 B7								[×××	Medium dense gre- shell fragments (up									
.00 - 4.30 .00 - 3.45	0 B7 .5 SPT (S) N=18 (3,4/4,5,4,5) Hammer SN						3.00				××	various lithologies.							3.5	
		1353									××									
											××								4.0	
											×××								4.0	
									-14.72	4.30	X——	Stiff yellowish brow	n very sandy	silty CLAY. Sand is	s fine to m	edium.	1			
.50 .50 - 4.95	D10 SPT(S) N	J=32					4.50			(0.50)	X								4.5	
.50 - 4.95	(5,6/7,7								-15.22	4.80	X—, —	Very stiff light yello	wish grey sand	dy slightly gravel	ly silty CLA	Y. Sand is	1			
.70	Hamme C1	er SN = 1353	0.6	16	12					(0.90)	<u>×</u> -×	fine to medium. Gr. (Possible weathere		fine to coarse o	f sandston	e.			5.0	
.70	CI		96	16	13					(0.80)	X	(FOSSIBLE WEATHERE	u beurock)							
									-16.02	5.60	X	24 1: //					-		5.5	
. 00												Medium strong (loo grained light yellow								
5.90	63											reduced strength, orangish brown dis				avy dark			6.0	
5.15	C3											Discontinuities:								
												1. 10 to 20 degree l							6.5	
5.80	C4		100	89	56	8						fracture surfaces up	to 2mm dee	p						
.95	C5											2. 65 to 75 degree j							7.0	
										(3.10)		surfaces up to 0.5m	nm.							
.40																			7.5	
																			8.0	
			97	77	33															
						9						Medium strong (loc	cally weak) inc	listinctly thinly la	minated fi	ne			8.5	
3.70	C6								-19.12	8.70		grained light orang					1			
3.90			-	\vdash		-						reduced strength. Discontinuities:							9.0	
3.90 9.20	C7 C8											1. 10 to 20 degree l	-		ced (20/2	10/400)			.	
			TCR	SCR	RQD	FI						, ,							l	
		r Strikes	le-		_	Rema		,												
ruck at (m)	casing to (m	Time (min)	KOSE	: ιο (r	D	eck t	o Bed =	18.6			jack-up baı n mCD	rge								
Casing	Details	Water	· Add	ed	\dashv															
To (m)	Diam (mm		_	o (m)																
4.50 11.90	177 150				\vdash	<u> </u>	D :		F: 1-	B	T	۲ D				1				
						core	Barre	1	Flush	ıype		tion Reason				Last Up			_	
						S	K6L		Polyn	ner	Terminate	ed at scheduled depth	1			29/06,	/2022	≥ / ≜\	(H	

			GEC	ITC	EC	Н			21-1	ct No. 1 031	Project Client: Client's		o Water Quay 8 Islands Cou nderson LLI	ncil	eropment - M	iarine GI		orehole BH-MC	
Meth Sonic D		Plant U				(m) 00	Base 4.5		Coord	inates	Final De	pth: 11.90 m	Start Date:	24/01/2022	Driller:	MJ		heet 2 o	
Rotary (-	Rotos Fraste Di Rotos	onic uo C			50	11.		34512 100373	3.20 E 6.66 N	Elevatio	n: -10.42 mCD	End Date:	25/01/2022	Logger:	JG+RC		FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill	
45 80 0.40	C9 C10		95	95	79	5			-20.82	(1.70)		Medium strong (loc grained light orangi reduced strength. Discontinuities: 1. 10 to 20 degree t planar, rough, unsta	ish grey SAND bedding fractuained and clea	STONE. Partially vures, medium spa	weathered: aced (20/210	slightly D/400)			9.5
).40 1.50	C11		100	83	31	9				(1.50)		orange SANDSTONE and closer fracture Discontinuities: 1. 5 to 15 degree be planar, rough, unsta 2. 55 to 65 degree j 11.90m, planar, rou	E. Partially we spacing. edding fracturained and cleatoints from 11	es closely spaced in. .10m to 11.25m a	reduced stre	ength			11.0
1.90									-22.32	11.90			End of Bore	ehole at 11.90m					12.0
																			12.5 13.0 - 13.5 14.0 - 15.5 16.0 - 16.5
																			18.0
			TCR	SCR	RQD	FI				<u> </u>									L
Casing I	Casing to (m	Strikes Time (min) Water From (m)	Add		n) F	rom (elling To (g Details m) Tim	e (hh:mm)	Deck to Be	rehole drilled off OCI ed = 18.60m ons/reduced levels gi		barge					
4.50 11.90	177 150					Core	Barr	el	Flush	Туре	Terminat	ion Reason			T	Last Upd	late	d 🔳	-
							K6L	-	Polyr			d at scheduled depth	1			29/06/2			늄

			GEC	TC	ECI	Н				1031	Project Client: Client's	,	o Water Quay & slands Cour nderson LLF	ncil	elopment -	- Marin	ie GI	Borehole ID BH-M04
Metho Sonic Dri		Plant U Fraste Du			_	(m) 00	Base 3.0		Coord	inates	Final Dep	oth: 13.50 m	Start Date:	04/03/2022	Driller:	MJ		Sheet 1 of 2
Rotary Co	Ū	Rotoso Fraste Di Rotoso	onic uo C			00	13.		34515 100379		Elevation	-8.97 mCD	End Date:	05/03/2022	Logger	: NP+	+RC	Scale: 1:50 FINAL
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Desc	ription				Backfill
0.00 - 0.50 0.00 - 1.50	ES5 B8	Marine Scotl	and -	- SS1							×. ×.	Loose to medium do with shell fragment medium of various	s (up to 5mm)				ID	
1.00 1.00 - 1.50 1.50 1.50 - 3.00 1.50 - 1.95	ES1 ES2 ES6 D10 B9 SPT (S)	Marine Scotl N=10 (1,1/2,			nmer	SN =	1.50		-10.47	1.50		Very stiff grey slight coarse. Gravel is sub					e to	1.0 -
2.00 2.50 - 3.00	ES3 ES7	1353 Marine Scotl	and -	- SS3							×							2.0 -
3.00 3.00 3.00 - 3.45	D11 3 ES4 AZCL						3.00		-11.87 -11.97	2.90	X-2	Weathered SANDST medium sand. Weathered SANDST sandy gravelly clay. coarse of sandstone 3.00m to 3.55m: AZCL - I	ONE recovere Sand is fine to	d as firm light b coarse. Gravel i	rownish ye s subangu	ellow v ılar fin		3.0 -
3.70	ES4 45 SPT(S) N=48 (5,8/9,9,10,20) Hammer SN = 1353							-13.07	4.10		material. Medium strong (loc grained light brown	ally weak) ind	- istinctly thinly la	ıminated f	fine	ally	4.0 -	
4.50 5.00	(5,8/9,9,10,20) Hammer SN = 1353 C1 58 9 9 NI 11 C2 100 89 30 >20 C3 C4								-13.47	4.50		weathered: reducer occasional clay infill Discontinuities: 1. 0 to 15 degree be planar, rough, unstaup to 20mm thick. 2. 65 to 75 degree junstained, clay infil	d strength, mu I on fracture su edding fracture sined and occa oints from 3.5	ch closer fractu urfaces. es, closely space sional clay infill 5m to 3.85m, pl	d (10/150 on fractur	g and 0/300) re surfa		4.5 5.0 - 5.5
5.00 5.00 5.40										(2.70)		Medium strong (loc grained light yellow Partially weathered spacing and occasio fracture surface. Discontinuities:	ish and brown : slightly reduc	and whitish greed strength, mi	ey SANDST uch closer	ONE. fractu		6.0 -
5.50 5.90 7.20	C5 C6 C7		87	73	29	18			-16.17	7.20		1. 10 to 25 degree by planar, rough, occasifracture surfaces up Medium strong indi	sional heavy di to 20mm thic	ark ornagish bro	wn stainir	ng in		7.0 -
7.50 7.70	C5 87 73 C6 C7 C7			58	AZCL						SANDSTONE. Partia fracture spacing, oc fracture surfaces an Discontinuities: 1. 0 to 20 degree be planar rough, occas surfaces up to 0.5m	casional light of the casional case of the	brownish orang lay infill on frac es, medium spac wnish orange st	e discolou ture surfac ced (30/21 aining on	ration ces. 10/550 fractur	on)) re	7.5	
3.60 9.00	C3 C4 C5 C6 C7 C8 100 89							1	thick. 2. 55 to 75 degree ji 10.50m to 10.80m, staining on joint sur 7.30m to 7.50m: AZCL - F	planar, rough, faces up to 0.1	occasional light 5mm deep.	brownish	orang		8.5 9.0 -			
			TCE	ecp.	POD	E1						drilling.		_				
ruck at (m) Ca	TCR SCR RQD FI Water Strikes Casing to (m) Time (min) Rose to (m) Details Water Added 100 89 58					= 16.	10m			ge								
Casing Do To (m) D 3.00 13.50	etails Diam (mm 177 150	/ater Strikes to (m) Time (min) Rose to (m) Som Row Fi Marine Boreho Deck to Bed = All elevations/ii All elevations/ii Som Row To (m) To (m) To (m)																
15.50	130						Barr K6L	el	Flush Polyr			on Reason d at scheduled depth					st Upda 29/06/20	

			GEC	DTI	EC	Н			21-	ect No. 1031	Client:		slands Cou	ncil				oreholo BH-M	04
Met Sonic D		Plant I				(m) 00	Base 3.0		Coor	dinates	Final De	epth: 13.50 m	Start Date:	04/03/2022	Driller:	MJ		heet 2 o	
	Coring	Rotos Fraste Di Rotos	onic uo C			00	13.			52.16 E 98.70 N	Elevatio	on: -8.97 mCD	End Date:	05/03/2022	Logger:	NP+RC		FINA	
Depth (m)	Sample	s / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill	Τ
0.40	C10											Medium strong indi SANDSTONE. Partia							9.5
.70	C11					4						fracture spacing, oc	casional light	brownish orange	discoloui	ration on			
0.00	C12		100	100	100	4						fracture surfaces an Discontinuities: 1. 0 to 20 degree be planar rough, occas surfaces up to 0.5m	edding fractur ional light bro	es, medium spac wnish orange sta	ed (30/21 aining on f	0/550) racture			10.0
0.50										L.		thick. 2. 55 to 75 degree j. 10.50m to 10.80m, staining on joint sur	oints from 7.5 planar, rough	0m to 7.70m, 8.2 , occasional light	20m to 8.4	40m and			10.5
1.20	C13		97	87	55	13				(6.30)		10.80m to 10.95m: Very v			ish green MUI	DSTONE.			11.5
.2.00										-									12.0
2.25	C14								[
2.45	C15		100	91	77	7													12.5
											: : : : :								13.0
3.25	C16							22.47	42.50										
3.50							-22.47	13.50			End of Bore	hole at 13.50m					13.5		
																	14.0		
										Ē									14.5
																			45.0
																			15.0
										E									15.5
																			15.5
																			16.0
																			10.0
																			16.
										Ē									10
																			17.0
																			17.0
																			17.5
										Ė									17
																			18.0
										Ė									10.0
										<u> </u>									18.5
			TCR	SCR	RQD	FI	-			-									- 15.
		r Strikes			Ţ				g Detail		Remarks								
uck at (m)	Water St		Rose	to (r	n) F	rom (m)	To (m) Tin	ne (hh:mm)	Deck to B	orehole drilled off OCI ed = 16.10m ons/reduced levels gi		oarge					
Casing	Casing Details	Water	Add	ed															
To (m) 3.00	Diam (mm	n) From (m)	To	(m)															
3.00 13.50	150				-	Core	Barr	el	Flush	Туре	Termina	tion Reason				Last Upo	date	d 💻	-
							1			mer						-=== 0			لے

			EC	ITC	EC	Н				1031	Project Client: Client's	•	o Water Quay & Islands Coul Inderson LLF	ncil	elopment	- Marine GI		orehole ID BH-M05
Metho Sonic Dri		Plant U			_	(m) 00	Base 4.5		Coord	inates	Final De	pth: 10.80 m	Start Date:	05/03/2022	Driller:	: MJ		Sheet 1 of 2 Scale: 1:50
Rotary Co		Rotoso Fraste Du Rotoso	onic uo C		4.	50	10.	.80	34509 100383	2.93 E 2.55 N	Elevatio	n: -11.22 mCD	End Date:	06/03/2022	Logger	: NP+EM		FINAL
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill
0.00 - 0.50 0.00 - 1.50	ES5 B8	Marine Scotl	and -	SS1							*	Loose to medium d SAND with shell fra						
0.50	ES1										*. * * * * * * * * *	medium of various	lithologies.					0.5
1.00 1.00 - 1.50	ES2 ES6	Marine Scotl	and -	· SS2							× × × × × × × × × × × × × × × × × × ×							1.0
1.50 1.50 - 3.00 1.50 - 1.95		N=23 (2,5/5,1353	6,6,6) Han	nmer	SN =	1.50				* * * * * * * * *							2.0
2.50 - 3.00	ES3	Marine Scotl	arine Scotland - SS3 =26 (5,6/6,6,7,7) Hammer SN = 3.						-13.72	2.50	* * * * * * * * * *	Stiff grey slightly sa	ndy slightly gr	avelly silty CLAY.	Sand is fi	ne to		2.5
3.00 3.00 3.00 - 4.50	D12 ES4 B10										X - X - X - X - X - X - X - X - X - X -	coarse Gravel is su and shell fragments	ıbangular fine	to medium of va				3.0
3.00 - 3.45		1353 N=50 (8,8/50 AZCL 4.50															3.5	
4.50 4.50 - 4.87	. ,		(5,6/6,6,7,7) Hammer SN = 3.00 8,8/50 1353 60 46 23				-15.72	4.50	X	Very stiff brown slig content. Sand is fin sandstone. Cobbles	e to coarse. Gi are subangul	ravel is subangul ar of sandstone	ar fine to and muds	coarse of stone.		4.5		
	Hamme	er SN = 1353	8/50 AZCL 4.50 AZCL 11 11 5 100 90 53						-16.72	- (1.00) - 5.50		4.50m to 5.00m: AZCL - I material. Weak indistinctly the Partially weathered spacing with discolor	ninly laminated	d well cemented ced strength, sli	SANDSTO ghtly close	ONE. er fracture	\bigvee	5.0
5.60 5.90 6.00	C1 C2								10.72	5.50		surfaces. Discontinuities: 1. 35 to 25 degree b	bedding fractu	res, medium spa	aced (150	/408/450)		6.0
6.30	C3		m)							(1.90)		slightly undulating, brown staining on s 2. 0 to 5 degree join 3. 60 to 80 degree j with strong dark br deposists (up to 4m	some fracture ont at 6.50m, ploint at 6.70m own staining and thick) on jo	surfaces. anar, rough, clea to 7.05m, slight and patchy greyi int surface.	an. ly undulat sh white c	ting, rough	1	6.5
7.50 7.50	C4								-18.62	7.40		Weak thinly lamina moderately cement strength, slightly cle deposits on fracture Discontinuities:	ted SANDSTON oser fracture s e surfaces.	IE. Partially wea pacing with disc	thered: re olouration	educed n and clay		7.5
8 50	C2						(1.45)		1. 20 to 30 degree I plana, rough with p surfaces and light o fracture surfaces. 2. 70 to 80 degree j	atchy orangish range clay dep	n brown staining posits (up to 3m	on few fr m thick) o	racture on most		8.0			
9.00	C5								-20.07	8.85		clean. Weak (locally medium grained we closer fracture space	ell cemented S	ANDSTONE. Par	tially wea	thered:		9.0
9.30	C6										: : : : :	fracture surfaces.						
	Wate		100 90 53 18 100 94 26 100 94 26 10 rikes me (min) Rose to (m) Rose to (m) Water Added				.0m			ge						1 1		
	iam (mm	Marine Scotland - SS2 (S) N=23 (2,5/5,6,6,6) Hammer SN = 1.50 1353 Marine Scotland - SS3 (S) N=26 (5,6/6,6,7,7) Hammer SN = 3.00 1353 (S) N=50 (8,8/50 220mm) nmer SN = 1353 (6) 46 23 11 5 100 90 53 18 100 94 26 10 TOR SCR ROD FI TOR SCR ROD FI Marine Borel Deck to Bed All elevations																
4.50 10.80	177 150							el	Flush			tion Reason d at scheduled depth	1			Last U	-	

			GEC	TC	EC	Н				1031	Client:		slands Cou				١	вн-мс) 5
Meth Sonic Dr		Plant U				(m) .00	Base 4.5		Coor	dinates	Final De	pth: 10.80 m	Start Date:	05/03/2022	Driller:	MJ		Sheet 2 o Scale: 1:	
Rotary C	_	Rotoso Fraste Do Rotoso	onic uo C		4.	.50	10.	80		92.93 E 32.55 N	Elevatio	n: -11.22 mCD	End Date:	06/03/2022	Logger:	NP+EM		FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill	
0.50 0.60 0.80 Casing E	Casing to (m	Strikes) Time (min) Water From (m)	TCR Rose		m) F	FI From (Chis		-22.02	10.80	Remarks Marine Bc Deck to B	weak (locally medium grained we closer fracture space fracture surfaces. 1. 20 to 30 degree by planar, rough, with some fracture surface deposits (up to 3mr 2. 50 to 60 degree julipoint surface. 9.70m to 9.85m: Bed of edgree julipoint surface. 9.70m to 9.85m: Bed of edgree julipoint surface.	ell cemented Sing with disco- pedding fractu- occasional partices and occas in thick) on so- oint at 9.15m rough with partices and of Bore	SANDSTONE. Part slouration and claures closely space tchy dark brown sional patchy light me fracture surfato 9.40m and 9.9 tchy dark brown distance whole at 10.80m	ially weath by deposits and (560/16 discoloura t greyish waces. 90m to 10.	hered: s on 2/300) tion on white clay			9.5 10.0 - 11.0 - 11.5 12.0 - 13.5 14.0 - 15.5 16.0 - 17.5 18.0 -
10.80	150				F	Core	Barr	el	Flush	Туре	Terminat	ion Reason				Last Up	date	ed	Ī
						9	K6L		Poly	mer	Terminate	d at scheduled depth	ı			29/06/	/2022	Λ	H

		AUS	SE GE	\	/A	Y			Projec 21-1 (Project Name: Scapa Deep Water Quay & Hatston Pier Development - Marine GI Client: Orkney Islands Council	Borehole I BH-M06
20.11							.	()			Client's Rep: Arch Henderson LLP	
Meth Sonic Dr		Plant Fraste I			_	(m) .00	Base 3.0		Coordi	nates	Final Depth: 12.00 m Start Date: 06/03/2022 Driller: MJ	Sheet 1 of 2 Scale: 1:50
Rotary C	Coring	Fraste I	sonic Duo C sonic	CXL	3.	.00	12.0	00	345121 1003893		Elevation: -10.51 mCD End Date: 07/03/2022 Logger: NP+RC	
Depth (m)	Sample / Tests	ı	Field R	ecords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend Description	Backfill
0.00 - 0.50	ES5	Marine Sco	tland	- SS1							Loose to medium dense grey slightly gravelly silty fine to coarse SANE	
.00 - 1.50	B8										with shell fragments (up to 4mm). Gravel is subangular fine to medium.	
.50	ES1											0
.00 .00 - 1.50	ES2 ES6	Marine Sco	tland	- SS2					Ē	-		1
.50 .50 - 3.00	D10 B9								-12.01	1.50	Very stiff grey slightly sandy slightly gravelly silty CLAY. Sand is fine to	1
.50 - 1.95		N=11 (1,2/: 1353	2,3,3,3	3) Har	nmer	SN =	1.50		E		coarse. Gravel is subangular fine to medium of various lithologies.	
.00	ES3	1333							-	-	<u> (- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -</u>	2
:				_					Ē			
2.50 - 3.00	ES7	Marine Sco	tland	- SS3					-			2
									Ē			
.00	D11	I	3.						12.74	2 20		3
3.00 3.00 - 3.45	ES4 SPT(S) N	N=32							-13.71	3.20	Weak (locally medium strong) indistinctly thinly laminated fine grained orangish grey SANDSTONE. Partially weathered: reduced	
	(7,7/7,8								Ī		strength, much closer fracture spacing, occasional heavy dark	3
.15	C1	.i JIV - 1333	84			6			Ė		orangish brown discolouration on fracture surfaces and occasional sandy clay infill on fracture surfaces.	
.30	C2								Ē	-	Discontinuities:	\$50 \$ \$ \$ \$ 4 \$ \$ \$ \$ \$ \$ \$
									[1. 5 to 20 degree bedding fractures, closely spaced (10/125/300) planar, smooth, occasional heavy dark orangish brown staining on	
.50									Ę		fracture surfaces up to 1mm deep and occasional sandy clay infill on fracture surfaces up to 30mm thick.	4
1.70	C3								Ē		2. 65 to 75 degree joints from 3.10m to 4.10m, 5.20m to 5.50m to	
									-	-	5.60m, 6.30m to 6.50m, 6.80m to 6.90m, 7.60m to 8.00m, 8.20m to 8.80m, 9.00m ti 9.40m, undulating, smooth and occasional heavy	5
			94						Ē		dark orangish brown staining on joint surfaces up to 1mm thick.	
									Ē			5
						10			Ē			
5.90 5.00	C4					-			1	-		6
5.30	C5								E	(8.80)		
5.55	C6								Ē			6
			88									
									Ė	-		7
7.50												7
7.90	C7								-	-		8
			94									
						9			Ē			8
									Ē			
0.00						1			[_		9
			L						Ē			
		- Cault	TCF	SCR	_							
ruck at (m) C		r Strikes i) Time (mir	n) Ros	e to (_	Rema Marine		nole r	drilled off (OCM 80	ck-up barge	
, , ,	2 × 1			. (Deck t	o Bed =	17.0				
Casing D	Details	Wate	r Ado	ded								
To (m) 0T	Diam (mm 177) From (m)) Т	Го (m)								
12.00	1// 150				\vdash	Core	Barre	1	Flush T	vpe	ermination Reason Last U	Jpdated
						S	K6L		Polym	er	erminated at scheduled depth 29/0	6/2022

Meth		Plant	GEC	OTE	C	Н	Base	(m)		1031	Client: Client's	•	slands Cou nderson LLF					BH-M(
Sonic D		Fraste Du	uo C			00	3.	$\overline{}$			Final Dep	oth: 12.00 m	Start Date:	06/03/2022	Driller:	MJ		neet 2 c Scale: 1:	
Rotary (Coring	Rotoso Fraste Do Rotoso	uo C	ΚL	3.	00	12	.00		21.94 E 93.44 N	Elevation	: -10.51 mCD	End Date:	07/03/2022	Logger:	NP+RC		FINAI	Ĺ
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend			cription			Water	Backfill	
9.50 9.50 9.50	C8		51			7 >20						Weak (locally media grained orangish gri strength, much clos orangish brown disc sandy clay infill on f Discontinuities: 1. 5 to 20 degree be planar, smooth, occ fracture surfaces up fracture surfaces up fracture surfaces up fracture surfaces up 6.50m, 6.30m to 6.5 8.80m, 9.00m ti 9.4 dark orangish brow 10.50m: Firm sandy clay 11.25m to 12.00m: AZCL borehole due to fractured	ey SANDSTON eer fracture sp colouration or fracture surface edding fractur asional heavy to 1mm deel to 30mm thi oints from 3.1 50m, 6.80m tc 0m, undulatir n staining on infill on joint surface to wer half of core to a surface of the surface of t	E. Partially weatlacing, occasional fracture surface less. ess, closely spaced dark orangish brown and occasional ck. Om to 4.10m, 5 of. 6.90m, 7.60m to g., smooth and ooint surfaces up to somm deep.	to 1mm th	aced 'k asional '300) ing on infill on Om to .20m to neavy nick.			9.5
2.00						, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			-22.51	12.00		50.010.0 000 10 //00.0100							12.0
							22.31	12.00			End of Bore	hole at 12.00m							
																	12.5		
								-									13.0		
															13.5				
															14.0				
																	14.5		
																		15.0	
																			15.5
																			16.0
																			16.5
																			17.0
																			17.5
																			18.0
			TOD	SCR	DO.	FI				Ė									18.5
	Water	Strikes	ICK	JUK	r.QD	_ F1	Chis	elling	g Detail:	5	Remarks							<u>I</u>	<u>—</u>
ck at (m)	Water Sti k at (m) Casing to (m) Til) Time (min)	Rose	to (m	n) F	rom (m)	To (m) Tin	ne (hh:mm)	Deck to Bed	ehole drilled off OCI d = 17.00m ns/reduced levels giv		parge					
		Water) From (m)		ed o (m)															
3.00 12.00	177 150				-	Core	Barr	el	Flush	Туре	Terminati	on Reason				Last Up	date	ed 🔳	-
							K6L			mer	Terminated					29/06/			4

		1	GEC	TC	ECI	H			21 -1	ct No.	Project Client: Client's	·	o Water Quay & slands Cour nderson LLF	ncil	elopment - I	Marine GI	Borehole ID BH-M07
Metho Sonic Dr		Plant U Fraste Du				(m) 00	Base 4.5		Coord	inates	Final De	epth: 12.00 m	Start Date:	07/03/2022	Driller:	MJ	Sheet 1 of 2 Scale: 1:50
Rotary Co	oring	Rotoso Fraste Do Rotoso	uo C	XL	4.	50	12.	00	34506 100392	2.99 E 7.90 N	Elevatio	n: -11.32 mCD	End Date:	09/03/2022	Logger:	RC+NP	FINAL
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Mackfill Backfill
0.00 - 0.50 0.00 - 1.50	ES5 B8	Marine Scotl	and -	SS1						Ė	* × ×	Medium dense grey fragments (up to 5r					
0.50	ES1										* * * * * * * * *	various lithologies.					0.5
1.00 1.00 - 1.50	ES2 ES6	Marine Scotl	and -	- SS2							*						1.0
1.50 1.50 - 3.00 1.50 - 1.95	D11 B9 SPT (C)		5,5,6) Ham	nmer	SN =	1.50										1.5
2.00 2.50 - 3.00	ES3 ES7		and -	- SS3					-13.82	2.50	× × × × × × × × ×	Madisus da sa sussi		olla. E	CAND	Name of the	2.0
3.00	D12		=26 (5,6/6,7,6,7) Hammer SN = 3.00								*	Medium dense grey subangular fine of v			se SAND. G	oravel is	3.0
3.00 - 4.50 3.00 - 3.45	D12 ES4 B10 SPT (S) N=26 (5,6/6,7,6,7) Hammer SN = 3.00					3.00		-14.72	3.40	* * * * * * * * * * * * * * * * * * *	Stiff to very stiff bro to coarse. Gravel is					3.5	
		13 PT (S) N=26 (5,6/6,7,6,7) Hammer SN = 3.00 1353 13 PT(S) N=50 (8,9/50 or 280mm) ammer SN = 1353						-15.42	4.10	X	Very stiff dark greyi medium cobble con subangular fine to c	ntent. Sand is f	ine to coarse. G	ravel is ang	ular to	4.0	
4.50 4.50 - 4.93	SPT(S) for 280	ES6 Marine Scotland - SS2 D11 B9 SPT (C) N=20 (3,4/4,5,5,6) Hammer SN = 1.50 ES3 ES7 Marine Scotland - SS3 D12 ES4 B10 SPT (S) N=26 (5,6/6,7,6,7) Hammer SN = 3.00 1353 D13 SPT(S) N=50 (8,9/50 for 280mm) Hammer SN = 1353 33 0 0				4.50					mudstone. 4.50m to 5.50m: AZCL - L material. 6.00m to 6.50m: AZCL - L material		_			4.5	
	Hamme	=50 (8,9/50 am)								(3.00)		Weak indistinctly the light orangish grey strength, much clost orange discolourationfill on fracture sur	SANDSTONE. F ser fracture spa on on fracture	artially weather acing, occasiona	ed: reduce I light brow	d nish	5.5
6.00 6.00 - 6.40	(9,12/5 245mm	0 for) Hammer				AZCL	6.00					Discontinuities: 1. 5 to 20 degree be planar, rough, occas surfaces up to 1mm thick.	sional light bro n deep and occ	wnish orange st asional sandy cl	aining on fo ay infill up	racture to 10mm	6.0
		33	60	9	0	>20			-18.42	7.10		72. 65 to 75 degree j 7.60m to 7.90m, un staining and occasion Very weak (locally weathered: reduced	ndulating, roug onal sandy clay weak) indistinc ed light greyis	h, occasional lig ninfill up to 3mr tly thinly lamina h orange SANDS	ht brownis n thick. Ited fine gra TONE. Part	h orange ained tially	7.0
7.45 7.50	C1					>20				(1.10)		heavy brownish ora Discontinuities: 1. 5 to 20 degree be planar, rough and fr	inge discoloura	etion on fracture	e surfaces. d (30/130/4	150),	7.5
8.20	C2		80	28	0	10			-19.52	8.20		to the entire diame 2. 25 to 45 degree j rough and frequent	ter of core. oints medium	spaced (150/29	0/700) plar	nar,	8.5
9.00	C3					AZCL						diameter of core. 3. 65 to 75 degree j and 10.70m to 11.0 brownish orange sta	0m, undulatin	g, rough and fre	quent heav		9.0
9.10 9.30										-		8.65m to 9.00m: AZCL - F drilling.				uring	
	Wate	ES2 ES6 Marine Scotland - SS2 D11 B9 SPT (C) N=20 (3,4/4,5,5,6) Hammer SN = 1.50 1353 ES7 Marine Scotland - SS3 ES7 Marine Scotland - SS3 D12 ES4 B10 SPT (S) N=26 (5,6/6,7,6,7) Hammer SN = 3.00 1353 SPT(S) N=50 (8,9/50 for 280mm) Hammer SN = 1353 33 0 0 SPT(C) N=50 (9,12/50 for 245mm) Hammer SN = 1353 60 9 0 SPT(C) N=50 (9,12/50 for 245mm) Hammer SN = 1353 C1 C2 80 28 0 10 AZCL C4 C5 TCR SCR RQD FI Water Strikes Sing to (m) Time (min) Rose to (m) Marine Borel Deck to Bed = All elevations			= 22.	00m			ge								
Casing D	etails Diam (mm																
4.50 12.00	177	N=20 (3,4/4,5,5,6) Hammer SN = 1.50 Marine Scotland - SS3 N=26 (5,6/6,7,6,7) Hammer SN = 3.00 N=50 (8,9/50 nm)					el	Flush			tion Reason				Last Up	Peri	
						SI	νρΓ		Polyr	ner	ierminate	d at scheduled depth	1			29/06/	AG

8			EC	OT I	EC	Н	L			1031	Client: Client's F		slands Cour nderson LLF		T			ВН-М	
Meth Sonic D		Plant U Fraste Du		ΧL		(m) .00	Base 4.	e (m) 50	Coor	dinates	Final Dept	th: 12.00 m	Start Date:	07/03/2022	Driller:	MJ		Sheet 2 o Scale: 1	
Rotary (Coring	Rotoso Fraste Do Rotoso	io C	ΧL	4.	.50	12	.00		62.99 E 27.90 N	Elevation:	-11.32 mCD	End Date:	09/03/2022	Logger:	RC+NP		FINA	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill	
0.50	C6		93	59	24	>20				(3.80)	r v v r r v r r r r r r r r r r r r r r	Very weak (locally vinoderately cement weathered: reduced heavy brownish orabliscontinuities: 1. 5 to 20 degree belanar, rough and fro the entire diame? 2. 25 to 45 degree jough and frequent diameter of core. 3. 65 to 75 degree j	ed light greyis d strength, clo inge discolouratedding fractur requent heavy ter of core. ooints medium heavy light broints from 8.2 ooints from 8.2	h orange SANDS ser fracture space ation on fracture es closely spaced light brownish o spaced (150/290 ownish orange s 0m to 8.50m, 10	TONE. Parting and from surfaces. (30/130/brange stain) (7700) plataining up .10m to 1	tially equent 450), ning up nar, to entire			9.5
1.20	C7		53	0	0	AZCL					:::: <u> </u>	and 10.70m to 11.0 prownish orange sta 11.30m to 12.00m: AZCL borehole due to fractured	aining up to er	ntire diameter of	core.				11.5
2.00									-23.32				End of Bore	hole at 12.00m					12.5 13.0 - 13.5 14.0 - 15.5 16.0 - 17.5
		0.1	TCR	SCR	RQD	FI			· · ·	-									18.5
uck at (m)		Strikes) Time (min)	Rose	to (r	n) F	rom (_	elling To (Detail m) Tir	s ne (hh:mm)	Remarks Marine Bore	hole drilled off OCI	M 80 iack-up h	arge					
Casing I		Water	Add			•• (- (. /	Deck to Bed								
12.00	177 150				-	Core	Barr	rel	Flush	Туре	Terminatio	n Reason				Last Up	date	ed 🔳	
							K6L			mer		at scheduled depth				29/06/			,

	<u>c</u>	AUS	E	W OTI	A	Y H			Proje- 21 -1	ct No.	Project Client: Client's		o Water Quay & slands Cou nderson LLF	ncil	elopment -	Marine GI		orehole BH-M0	
Meth Sonic Dr		Plant U	uo C	XL	-	(m) 00	Base 3.0		Coord 34509	inates	Final De	pth: 12.00 m	Start Date:	22/03/2022	Driller:	MJ		heet 1 o	
Rotary C	Coring	Fraste Di Rotos		XL	3.	00	12.	00	100398	8.52 N	Elevatio	n: -10.31 mCD	End Date:	23/03/2022	Logger:	NP+EM		FINAL	-
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill	
0.00 - 1.50 0.50 1.00	ES1 ES2 D7								-11.81	1.50		Medium dense grey fragments (up to 9r lithologies.	mm). Gravel is	subangular fine	to coarse	of various			1.0 -
1.50 - 3.00 1.50 - 1.95 2.00	B6 SPT (S) ES3	N=15 (2,2/4, 1353	(2,2/4,3,4,4) Hammer SN = 1.50 3.00 AZCL									Stiff to very stiff bro CLAY with low cobb subangular fine to r subangular.	le content. Sa	nd is fine to coar	se. Gravel	is			2.0 -
3.00 3.00 3.00 - 3.45	D8 ES4 SPT(S) N (6,7/7,7 Hamme		AZCL AZCL AZCL AZCL A.50						-13.31	3.00		Very stiff dark greyi medium cobble cor fine to coarse of val mudstone. 3.00m to 4.10m: AZCL - I material.	ntent. Sand is f rious lithologi	fine to coarse. Gr es. Cobbles are s	ravel is sub ubrounde	oangular d of			3.5
4.50 4.50 4.50 - 4.65	90mm/5	I=50 (25 for 50 for Hammer SN	1353 26 4.50 AZCL						-15.31	5.00		4.50m to 4.90m: AZCL - i material. Weak (locally medii	um strong) thi	nly laminated lig	ht orangis	h brown			4.5 5.0
i.90 i.85 i.00	= 1353 C1		(25 for rmer SN AZCL									fine to medium gra weathered: slightly with clay deposits of Discontinuities: 1. 10 to 20 degree I planar, rough, with thick) on few fractu	reduced strer on fracture sur pedding fractu patchy light o	ngth, slightly clos faces. Ires, medium spa	er fracture	e spacing, 407/500),			5.5
5.20 5.90 7.05	C3 C4 C5								(4.30)		2. 60 to 90 degree j patchy light greyish 3. Possible 90 degre rough with orangist otherwise clean. 4. 45 degree joint a 7.20m to 7.50m: AZCL - I	oint at 5.50m white clay de ee joint at 6.30 n brown patch t 5.85m, slight	posits on joint su Om to 7.10m, pro y staining on joir tly undulating, ro	urface. bbably und nt surface, bugh, clear	lulating,			7.0 7.5	
7.50	C6 AZCL 100 25 16 12																8.0 8.5		
9.00	TCR SCR ROD FI				-19.61	9.30									9.0 -				
	Water	ter Strikes Remarks																	
ruck at (m) (sing to (m) Time (min) Rose to (m) Marine E Deck to I All eleva						= 16.			jack-up bar n mCD	ge							
To (m) [3.00 12.00	Details Diam (mm) 177 150	n) From (m) To (m)																	
12.00	130					Core S	Barr K6L	el	Flush Polyr			ion Reason d at scheduled depth	ı			29/06			H

-			GEC	DTI	EC	Н	Ь	1		1031	Client: Client's	·	slands Cou nderson LLF					вн-мо	
Meth Sonic Dr		Plant U			_	(m) 00	Base 3.0		Coord	dinates	Final De	pth: 12.00 m	Start Date:	22/03/2022	Driller:	MJ	1	Sheet 2 of Scale: 1:5	
Rotary C	_	Rotoso Fraste Du	onic uo C		3.	00	12.			91.71 E 88.52 N	Elevatio	n: -10.31 mCD	End Date:	23/03/2022	Logger:	NP+EM		FINAL	
Depth	Samples	Rotoso / Field Records		SCR	POD	-	Casing Depth (m)	Water Depth (m)	Level	Depth	Legend		ļ	cription	00		Water	Backfill	_
(m) .35	C7	/ Field Records	ICK	JCK	λQD		(m)	(m)	mCD	(m)	·····	Medium strong (loc			ht orangi	sh hrown	N _a	Dackilli	H
.50 0.50 0.50	C8 C9 C10 C11		100	87	46	4				(2.70)		medium grained we much closer fractur discolouration and Discontinuities: 1. 15 to 25 degree by planar, rough with pstaining on fracture 2. 70 to 90 degree jundulating, rough v surfaces, otherwise 3. 50 to 60 degree j	e spacing, slig clay deposits of pedding fractu- patchy brown as surfaces and oint at 8.10m with patchy fail e clean.	htly reduced stre on fracture surfac- ires, closely spac- clay deposits and d fracture staining to 9.00m, and 9. nt orangish brow	ength with ces. ed (40/16) d orangish g. 90m to 10 v staining o	6/800) brown 0.30m, on joint			9.5 10.0 · 10.5
1.55	C12		100	95	65							slightly undulating,	rough, clean.						11.5
2.00							-		-22.31	12.00			End of Bore	hole at 12.00m					12.0
																			13.0 13.5 14.0 14.5 15.0 15.5 16.0 17.5 18.0
			TCR	SCR	RQD	FI													L
Casing E	Casing to (m	Strikes Time (min) Water From (m)	Add		m) F	rom (To (I	g Details	e (hh:mm)	Deck to Be	rehole drilled off OCI ed = 16.50m ons/reduced levels gi		parge					
3.00 12.00	177 150					<u> </u>	D- 1	-1	F11	Tour	Ta	ian Dagger				1	٠- ام	.a ====	_
	100					core	Barr	eı	Flush	гуре	ierminat	ion Reason				Last Up	aate	ea	

	9	AUS		W					Projec		Project Client: Client's	•	o Water Quay & Islands Coul nderson LLF	ncil	elopment -	Marine GI		orehole BH-M(
Meth	od	Plant l	Jsed		Тор	(m)	Base	(m)	Coord	inates		<u> </u>					5	Sheet 1 c	 of 2
Sonic Dr	rilling	Fraste De Rotos		XL	0.	.00	3.00)	34503	2.04 E	Final De	•	Start Date:	23/03/2022	Driller:	MJ		Scale: 1:	:50
Rotary C	_	Fraste Di Rotos		XL	3.	.00	10.5		100402		Elevatio	n: -12.25 ^{mCD}	End Date:	24/03/2022	Logger:	RC+NP		FINA	L
Depth (m)	Sample / Tests			cords			Casing 1 Depth I (m)	Vater Depth (m)	Level mCD	Depth (m)	Legend			cription			Water	Backfill	
0.00 - 0.50 0.00 - 1.50	ES5 B8	Marine Scotl	land -	SS1							. × × × × ×	Medium dense green fragments (up to 8)							
0.50	ES1										×××	various lithologies.							0.5
											× × ×								
1.00	ES2										X, X, X								1.0 -
L.00 - 1.50	ES6	Marine Scotl	land -	- SS2							× × ×								
L.50 L.50 - 3.00	D10										× × ×								1.5
L.50 - 3.00 L.50 - 1.95	B9 SPT (S)	N=15 (2,3/3,	4,4,4) Ham	nmer	SN =	1.50				`x								
2.00	ES3	1353									. × × × × ×								2.0 -
		Marine Scotland - SS3									$\times \times \times$								
2.50 - 3.00	ES7	Marine Scotl	ine Scotland - SS3						-14.75	2.50		Stiff to very stiff bro							2.5
		3.00							<u> </u>	X 2	to coarse. Gravel is mudstone.	subangular fir	ie to coarse of sa	ınastone a	ına				
.00	D11 ES4	54					-15.25	3.00		Medium strong (log grained, moderatel							3.0		
.00 - 3.45	SPT(S) N											reduced strength, r	nuch closer fra	acture spacing ar	nd occasio				
												brownish black disc Discontinuities:	colouration on	fracture surface	S.				3.5
		/8,8,9,9) AZCL									1. 5 to 20 degree be							4.0	
		9,9) AZCL								fracture surfaces up	o to 10mm dee	ep.					4.0		
.50		8,9,9) er SN = 1353						(3.00)		2. 65 to 75 degree jundulating, rough a							4.5		
.50	C1		27 3 0					(3.00)		joint surfaces up to 3.00m to 4.10m: AZCL -		SPT has lead to subse	quent wash ou	t of					
.60	C2									material.		_					5.0		
.10	C3																		
											: : : : :	5.30m to 6.00m: AZCL - drilling.	Probable bed of ext	remely weak sandstone —	washed out o	during			5.5
						AZCL													
5.00									-18.25	6.00		Madium strang to	etrona (locally	oak) indictinati	دا برامنط ب	minatad	-		6.0
5.10	C4											Medium strong to s fine grained moder	ately cemente	d light orangish	grey SAND	STONE.			
											: : : : :	Partially weathered spacing, occasional							6.5
			100	89	55	10						surfaces and occasi Discontinuities:	onal sandy cla	y infill on fractur	e surfaces				
5.90	C5											1. 5 to 25 degree be							7.0
'.30	C6											planar, rough, occas surfaces up to 1mm	n deep and occ						
.50										(4.50)		surfaces up to 40m 2. 25 to 45 degree j		spaced (200/50	0/1000) pl	anar,			7.5
										(4.50)		rough and frequent up to 2mm deep.	heavy brown	ish orange staini	ng on joint	surfaces			
3.10	C7					12				_		3. 65 to 75 degree j							8.0 -
			100	61	12	12						8.40m to 8.50m, 9. rough and occasion				-			
												deep.							8.5
.00						20													9.0
			TCR	SCR	RQD	FI											1		1
		Strikes	-		,	Rema													
ruck at (m) C	Deck to Be All elevati					o Bed =	19.0	00m		jack-up bar	ge								
Casing D	Details	Water	Add	led	\dashv														
To (m) D	Diam (mm			o (m)	\exists														
3.00 10.50	1// 150				\vdash	Core	Barre	1	Flush	Гуре	Terminat	ion Reason				Last Up	odate	ed 🔳	_
			Core Barrel																

			EC	OTE	ECI	Н	ln :	7. 3		1031	Client:		Islands Coul		1			BH-M09	
Meth Sonic Dr		Plant U	io C)			(m) 00	Base 3.0	(m) 00	Coord	linates	Final De	pth: 10.50 m	Start Date:	23/03/2022	Driller:	MJ		heet 2 of Scale: 1:5	
Rotary C	Coring	Rotoso Fraste Du Rotoso	io C)	ΚL	3.	00	10	.50	34503 100402	2.04 E 3.35 N	Elevatio	n: -12.25 ^{mCD}	End Date:	24/03/2022	Logger:	RC+NP		FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend			cription			Water	Backfill	
(m) 50 70	C8 C9	Strikes Time (min)	100	56	26	14	Chis		-22.75 g Details m) Tim	10.50	Remarks Marine Bc Deck to Bc	Medium strong to sine grained moder: Partially weathered spacing, occasional surfaces and occasi- Discontinuities: 1. 5 to 25 degree be planar, rough, occas surfaces up to 1mm surfaces up to 40mm 2. 25 to 45 degree j rough and frequent up to 2mm deep. 3. 65 to 75 degree j 8.40m to 8.50m, 9.9 rough and occasion deep.	strong (locally ately cemente it slightly reduce the slightly reduce heavy brownional sandy classed ding fracture sional heavy benedicted in the slightly sl	weak) indistinctly d light orangish geed strength, closh ornate discolory infill on fractures closely spaced rownish orange stasional sandy clash orange stanion of the control of the con	grey SAND ser fractur puration or e surfaces (20/140/: taining on ay infill on 0/1000) pl ng on joint 80m to 8.0 .50m, und	stone. e n fracture 300) fracture fracture anar, surfaces Om, ulating,	Ma		9.5 9.5 11.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.
Casing [Water																	
To (m) [3.00 10.50	Diam (mm) 177 150	From (m)	То	(m)	_	Coro	Barr	rol	Flush	Typo	Tormina	ion Reason				Last Up	data	ad 💻	<u> </u>
							K6L	CI	Flusn Polyi			าดก หeason d at scheduled depth				29/06/			4

		G	GEC	TI	ECI	Н				1031	Project Client: Client's		o Water Quay & slands Cour nderson LLF	ncil	elopment	: - M	arine GI		oreho	110
Metho Sonic Dri					_		Base 3.0		Coord	inates	Final De	epth: 12.00 m	Start Date:	24/03/2022	Driller	: 1	MJ		Sheet 1 Scale:	
Rotary Co	Ū	Fraste Du	io C	XL	3.	00	12.	.00	34506 100408		Elevatio	on: -10.05 mCD	End Date:	25/03/2022	Loggei	r:	NP+RC		FIN.	
Depth (m)	Sample / Tests	Rotosonic State Rotosonic Rotosonic Rotosonic State Rotosonic Rotosonic State Rotosonic State		Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription				Water	Backf	ill			
0.00 - 1.50 0.50 1.00	ES1	Plant Used Top (m) Ba Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Frield Records T (S) N=10 (1,1/2,2,3,3) Hammer SN = 1.5 1353 A T(S) N=50 (6,7/50 7275mm) AZCL Immer SN = 1353 67 17 0 12 100 57 0							× × × × × × × × × × × × × × × × × × ×	Loose to medium d with shell fragment medium of various	s (up to 11mn							0.5		
1.50 1.50 - 3.00 1.50 - 1.95 2.00	D7 B6 SPT (S)	Sample Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Sample Field Records Sample Sa				1.50		-11.54	1.50		Stiff to very stiff bro Sand is fine to coars lithologies.								1.5 2.0 -	
		Ing Fraste Duo CXL Rotosonic 3.00 1 Sample / Tests Field Records 585 ES1					-12.54	2.50	× × -	Highly weathered b	rown SANDST	ONE. (Drillers de	escription	1)		-		2.5		
							-12.90	2.85		Light brown and ora					S					
3.00 3.00 3.00 - 3.42	ES4 SPT(S) N				3.00		-13.04	(0.80)		Weathered SANDST sandy gravelly CLAY coarse of sandstone	. Sand is fine t	o coarse. Gravel	is angula	r fir	ne to			3.0 -		
			67	17	0				-13.84	3.80		3.00m to 3.50m: AZCL - I material.	Disturbance due to	–	quent wasn	out o	ır			3.5
		Plant Used				-13.04			Weak thinly lamina Partially weathered spacing, frequent h fracture surfaces.	: significantly	reduced strengt	h, closer	frac	ture			4.0 -			
4.35 4.50 4.50 4.60	C2	Plant Used				(1.15)		Discontinuities: 1. 5 to 20 degree be planar rough, frequ	ent heacy dar	k brownish oran	ge stainir	ng u	ıp to			4.5				
	Nample Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Sample Fraste Duo CXL Sample Sample Fraste Duo CXL Sample Sample Sample Fraste Duo CXL Sample Sample				-15.00	4.95		whole diameter of clay infill on fractur Weak indistinctly th SANDSTONE. Partia fracture spacing an on fracture surface: surfaces.	e surfaces. ninly laminated lly weathered d occasional h	d fine grained da reduced streng eavy brownish b	rk yellow th, much black disc	vish clo olou	grey ser uration			5.0 - 5.5				
6.00 6.20	C4	Plant Used Top (m) Base Top (m)				(2.75)		Discontinuities: 1. 5 to 25 degree by planar, rough, occas of core an occasion occasional sandy cl. 2. 65 to 75 degree j. 5.90m to 6.20m, 6 rough and frequent	sional orangish al brownish bl ay infill up to 1 oints from 4.9 30m to 6.70m	n brown staining ack staining up .0mm thick. 5m to 5.05m, 5. and 6.80m to 7	up to ful to 0.5mm 05m to 5 .35m, und	ll dia n dec 5.45 dula	ameter ep and m, ating,			6.0 - 6.5 7.0 -				
7.30 7.50	C5								-17.74	7.70		Medium strong (loc grained light yellow reduced strength, of black and brownish	rish grey SAND loser fracture	STONE. Partially spacing and occ	weather asional b	red: row	slightly nish			7.5
7.95	C6											Discontinuities: 1. 5 to 15 degree be								8.0 -
8.30	C7		100	85	55	13						planar, rough and o 1mm deep. 2. 45 to 55 degree j and occasional brov	ccasional heav oints at 9.20m wnish black sta	yy brownish blad n, 10.00m and 1 aining up to 10m	k staining 1.70m, pl nm deep.	g up	to or, rough			8.5
9.00												3. 65 to 75 degree j 8.60m to 9.00m and heavy brownish bla up to 3mm deep.	d 9.00m to 9.5	0m, undulating	rough ar	nd fi	requent			9.0 -
	Water	r Strikes	TCR	SCR	Ь		rks												<u> </u>	
struck at (m) Ca		Fraste Duo CXL Rotosonic	e Bore o Bed	= 17.	.00m			rge												
Casing D	etails	Water	Add	ed																
To (m) D	iam (mm 177) From (m)	To	o (m)																
12.00								el	Flush Polyr			tion Reason	1				29/06	-		/GS

Deck to Bed = 17.00m All elevations/reduced levels given in mCD Casing Details Water Added To (m) Diam (mm) From (m) To (m) 3.00 177			CAUS	E	VV DTI	ECI	Н			21	-1031	Client:	•	slands Cou				ı	BH-M	110
Rotary Coring Faster Duo Cit. Rotary					/1				_	Coo	rdinates	Final De	epth: 12.00 m	Start Date:	24/03/2022	Driller:	MJ			
Modelum storeg locally weak) and such as the second of the			Rotos Fraste Di	onic uo C)																
Modelum storeg locally weak) and such as the second of the		Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)			Legend	,	Des	cription	<u>.</u>	1	Water	Backfil	ı
Mater Strikes Mater Strikes Chicelling Details Remarks R	10.00	C9		85	65	32					(4.30)		grained light yellow reduced strength, c black and brownish Discontinuities: 1. 5 to 15 degree be planar, rough and o 1mm deep. 2. 45 to 55 degree j	ish grey SAND loser fracture orange discol edding fractur ccasional hear oints at 9.20n	STONE. Partially spacing and occa- ouration on fractions of the space	weathere asional bro ture surfact (30/190/ k staining	d: slightly ownish ces. (400) up to			9.5
Total Services Water Strikes Truck at [m] Casang to [m] Time (min) Rose 10 (m) From (m) Total Total		611					3						3. 65 to 75 degree jobs 8.60m to 9.00m and heavy brownish bla	oints from 7.7 d 9.00m to 9.5	'0m to 7.80m, 7.9 50m, undulating,	90m to 8.0 rough and	d frequent			7. 11.0
Casing Details Water Added To (m) Diam (mm) From (m) To (m) Time (min) Rose to (m) From (m) To (m) Diam (mm) From (m) To (m) Time (hh:mm) To (m) Time (hh:mm) To (m) Time (hh:mm) Time (hh:mm) Time (hh:mm) All elevations/reduced levels given in mCD Warine Borehole drilled off OCM 80 jack-up barge Deck to Bed = 17.00m All elevations/reduced levels given in mCD	2.00	k at (m) Casing to (m) Time (min)			SCR	RQD		Chic	allia			Parantic		End of Bore	hole at 12.00m					12.5 13.0 13.5 14.0 14.5 15.0 16.5 17.0 17.5
Casing Details Water Added To (m) Diam (mm) From (m) To (m) 3.00 177	ruck at (m)			Rose	to (r	n) F						Marine Bo	orehole drilled off OCI	M 80 jack-up l	oarge					
12.00 150 Core Parrel Elizab Time Termination Descen	To (m) 3.00	Diam (mm												ven in mCD						
12.00 Core Barrel Flush Type Termination Reason Last Updated	12.00	150					Core	Barı	el	Flusi	туре	Termina	tion Reason				Last Up	date	ed	

		ALIC		\A.	/ A ·	V			ect No.		Name: Scapa Deep			elopment -	Marine GI		oreho	
		CAUS		VV ITC				21-	1031	Client:	•	slands Cour nderson LLF					BH-M	11
Meth	nod	Plant l	Jsed	l	Тор	(m)	Base (m	n) Coord	dinates		•					9	Sheet 1	of 2
Sonic D	rilling	Fraste Di			0.	.00	3.00	2//00	97.29 E	Final De	pth: 9.00 m	Start Date:	26/03/2022	Driller:	MJ		Scale: 1	
Rotary (Coring	Fraste Di Rotos	uo C	XL	3.	.00	9.00		04.77 N	Elevatio	n: -14.41 mCD	End Date:	27/03/2022	Logger:	NP		FINA	۸L
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Water Depth Dept (m) (m)	Level mCD	Depth (m)	Legend		Desc	ription			Water	Backfi	ı .
0.00 - 0.50 0.00 - 1.50	ES5 B8	Marine Scotl	land -	- SS1					Ė	$\times \times $	Medium dense grey fragments (up to 6r							
).50	ES1								-	× × ×	various lithologies.							0.5
										× × ×								
1.00	ES2	Marina Castl	اممط	cca					-	*								1.0
1.00 - 1.50	ES6	Marine Scotl	iana -	- 552						× × × ×								
1.50 1.50 - 3.00	D10 B9								-	× × × × ×								1.5
1.50 - 1.95		N=16 (2,3/3, 1353	4,4,5) Han	nmer	SN =	1.50		Ē	* × ×								
2.00	ES3	1333						-16.41	2.00		Highly weathered w			sandy su	bangular			2.0
2.50 - 3.00	ES7	Marine Scotl	land	- cc5					E		mie to coarse grave	anu subangu	iai copples.					2.5
2.30 - 3.00	E3/	iviai iiie SCOTI	ia110 -	- ააპ					Ē									2.5
					ı	1			-		3.00m to 4.10m: AZCL - I	Dioturbanes due 1	EPT has land to	vuont ···o - t-	et of			3.0
3.00 3.00	ES4						3.00		E		3.00m to 4.10m: AZCL - I material. Very weak, probabl					1		
3.00 - 3.29						AZCL			(2.10)		cemented, light ora	ngish brown S	ANDSTONE.	-				3.5
		,	30	0	0				[brown highly fractu	red SANDSTO	NE. Partially wea	thered, re	duced	\mathbb{I}		
								-18.51	4.10	: : : : :	strength, much clos discolouration, clos		acılıg with perva	oive orang	กพอาน เาะเ			4.0
.20	C1					12		15.51	(0.40)		Discontinuities: 1. 10 to 15 degree l							4
.50								-18.91	4.50 (0.25)		planar, smooth, wit surfaces.	h pervasive lig	ht brown stainir	g on fract	ure			4.
						>20		-19.16	4.75		2. 80 to85 degree jo smooth.	oints, probably	very closely spa	ced, undu	llating,			
								-19.51	5.10		Weak, thinly bedde					'		5.
5.30	C2		100	72	40						orangish brown SAI close fracture spaci							
5.60	C3					3			(1.10)		Discontinuities: 1. 10 to 15 degree l	pedding fractu	res, thinly space	d (30/85/	95),			5.5
5.00											planar, rough, with 2. 60 degree joint a	Ü						6.0
5.00								-20.61	6.20		orangish brown fine joint surfaces.							
5.40	C4								E		3. 70 to 80 degree j				gh, with			6.5
			100	97	55						pervasive orangish Extremely weak, pr	obably very th	inly laminated, o	rangish b		1		
									E		greenish grey MUD strength, pervasive		_					7.0
7.30	C5								Ė		6.05m Discontinuities:							
7.50 7.50	CE					5			(2.80)		1. 5 degree bedding pervasive greenish	-						7.5
	CO								[2. 70 degree joints smooth, with perva	at 5.15m to 5.	25m and 5.20m	to 5.40m,				
3.15	C7								E		Medium strong (loc	ally weak), thi	nly laminated to	thinly be	dded, fine	'		8.0
			100	100	34				Ė		grained, well cemer weathered, slightly	closer fracture	-					
8.60	C8								Ē		brown discolouration Discontinuities:	on.						8.5
9.00	C2 100 72 40 C3 3 C4 100 97 55 C5 C6 T7 100 100 34 C8 TCR SCR RQD FI							-23.41	9.00		1. 10 to 25 degree I	-						9.0
		ES4 SPT(S) N=50 (6,8/50 for 140mm) Hammer SN = 1353 C1 C1 100 72 AZCL 112					25.41	[surfaces.							_	
	147 - 1	u CAulline	TCR	SCR	_		ulea											1
ruck at (m)			Rose	e to (r				e drilled of	f OCM 80	jack-up bar	ge							
					D	eck t	o Bed = 2											
Casing I	Details	Water	Add	led														
To (m) 3.00	Diam (mm 177) From (m)	То	o (m)	\dashv													
9.00	150					Core	Barrel	Flush	Туре	Terminat	ion Reason				Last U	pdate	ed	
						ς	K6L	Poly	mer	Terminate	d at scheduled depth	1			29/06	:/202	,	

			iEC	OTE	ECI	Н	ln -			-1031	Client's		Islands Cou nderson LLI					ВН-М1	
Method Sonic Drill		Plant L Fraste Du				(m) 00	Base 3.	e (m) 00	Coo	rdinates	Final De	pth: 9.00 m	Start Date:	26/03/2022	Driller:	MJ		heet 2 o Scale: 1:	
Rotary Co	ring	Rotoso Fraste Du Rotoso	io C)	(L	3.	00	9.	00		997.29 E 104.77 N	Elevatio	n: -14.41 mCD	End Date:	27/03/2022	Logger:	NP		FINAL	
Depth (m)	Samples /	Field Records		SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level	Depth (m)	Legend		Des	cription			Water	Backfill	Π
(m)	Water	Strikes	TCR	SCR	RQD		Chis		_{mCD}	(m)	Remarks	Medium strong (loc grained, well cemer weathered, slightly brown discolouration Discontinuities: 1. 10 to 25 degree I planar, rough, with surfaces. 2. 25 degree joint a 3. 65 to 75 degree j 8.50m to 8.65m, sli on 6.90m to 7.20m strata. 8.25m to 8.65m: 65 to 75	cally weak), the nted, light oracloser fracturen. bedding fracturent dark orangish at 8.00m to 8.0 ioints at 6.90n ghtly undulati joint surfaces is degree probably or End of Born	inly laminated to ngish brown SAN e spacing with or ares, medium spabrown staining of 15m, planar, smoon to 7.20m, 8.10r ng, rough, with dipenetrating to the space of the spa	ced (100/3 on some front oth. n to 8.25m lark brown ne base of	Partially rangish 845/800), acture and staining	Mat	Backfill	9.5 10.0 10.5 11.0 11.5 12.0 13.5 14.0 15.5 16.0 16.5 17.0 18.0
Casing De	·		,		- 1		·	Deck to Be	ed = 20.20m ons/reduced levels gi										
o (m) Dia	am (mm) 177	From (m)				_		_											
9.00	150	1				Core			-1	h Type		ion Reason				Last Up			=

	C	ling Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Sample / Tests Field Records B3 ES1 ES2 D4 SPT(S) N=38 (6,7/7,9,10,12)				Proje 21 -1	ct No. L031	Project Client: Client's	•	o Water Quay & F slands Cound		elopment - Mari	ine GI	Borehole ID BH-M12			
Metl		Description			_		Coord	linates	Final De	•	Start Date:	27/03/2022	Driller: M.	1	Sheet 1 of 2		
Sonic D Rotary (Fraste Duo CXL Rotosonic		1.5		34501 100418	6.39 E 6.20 N	Elevation	•		28/03/2022	Logger: EN		Scale: 1:50 FINAL			
Depth		Fraste Duo CXL Rotosonic Sample / Rests Field Records B3 ES1 ES2 D4 SPT(S) N=38 (6,7/7,9,10,12) Hammer SN = 1353 C1 C2 C3 C4 100 85 38 16 C5 100 82 42 7				Casing Depth (m)	Water Depth (m)	Level	Depth	Legend		Descr	intion			Backfill	
(m) 0.00 - 1.50		rng Fraste Duo CXL Rotosonic 1.50 1			(m)	(m)	mCD	(m)	X X	Medium dense grey	y very gravelly v	ery silty fine to		with	×		
0.50 1.00		Rotosonic Sample / Tests Field Records Signal							-11.34	0.50	× × × × × × × × × × × × × × × × × × ×	shell fragments (up various lithologies. Highly weathered b coarse gravel and si	rown SANDSTO	NE recovered a			0.5
1.50 1.50 - 1.95	Tests Fried Records Fig. Fig.						1.50		-12.34	1.50		Medium strong ind grained moderately closer fracture spac deposits and discol Discontinuities:	cemented SAN ing, slightly red	DSTONE. Partia	ally weathered	1:	1.5
2.35	D4 SPT(S) N=38 (6,7/7,9,10,12) Hammer SN = 1353 C1 C2 C3 C4 100 85 38 16					-					1. 30 to 40 degree l planar, rough with p thick) on rare surfa	oatchy orangish	brown sandy o	lay deposits (1	lmm	2.5	
2.75 3.00	SPT(S) N=38 (6,7/7,9,10,12) Hammer SN = 1353								(2.90)		most fracture surfa 2. 75 to 85 degree j	ces.	, •			3.0-	
3.00	С3	D4 SPT(S) N=38 (6,7/7,9,10,12) Hammer SN = 1353 C1 C2 C3 C4 100 85 38 16									brown staining on j 3. 50 to 60 degree j	oint surface. oint at 3.80m to	o 4.00m, planai			3.0 -	
3.45	(6,7/7,9,10,12) Hammer SN = 1353 C1 C2 G3 C4 100 85 38 16										orangish brown sta 1.50m to 2.25m: AZCL - I material.	ining on joint su Disturbance due to SF	Irface. PT has lead to subse	quent wash out of		3.5 4.0 -	
4.50	SPT(S) N=38 (6,7/7,9,10,12) Hammer SN = 1353 C1				-15.24	4.40		Medium strong (loc					4.5				
4.80	Hammer SN = 1353 C1 C2 6 C3 C4 100 85 38 16 C5 100 82 42 7 C6										fine grained moder closer fracture spac and clay deposits an Discontinuities: 1. 5 to 15 degree be planar, rough with s surfaces, patchy ble orangish brown san	sing, slightly red and clay infill on edding fractures strong orangish ack staining on f	uced strength of fracture surface s medium space brown staining ew fracture sur	with discoloura es. ed (85/400/656 g on most fractor rfaces and patc	o) ure	5.0 -	
5.80 6.00	SPT(S) N=38 (6,7/7,9,10,12) Hammer SN = 1353				-					fracture surfaces. 2. 50 to 60 degree j to 6.95m, 7.50m to	oints at 5.10m t	to 5.40m, 5.60r	m to 5.80m, 6.6	60m	6.0 =		
6.40	D4 SPT(S) N=38 (6,7/7,9,10,12) Hammer SN = 1353 C1 C2 C3 C4 100 85 38 16 C5 100 82 42 7 C6 C7 100 86 38 5						(7.60)		to 10.85m, 10.95m brown staining on r surfaces and occasi surfaces. 3. 80 to 90 degree j 8.90m, planar to sli staining and black s	nost joint surfactional patchy light oint at 5.35m to ghtly undulating	ces, patchy blac it brown clay do o 5.60m, 6.40m g rough with or	ck staining on feposits on few to 6.90m, 8.6 rangish brown	few 60m to	6.5			
7.50 7.70	SPT(S) N=38 (6,7/7,9,10,12) Hammer SN = 1353							7.50m to 7.60m: Light gre					7.5				
3.25	(6,7/7,9,10,12) Hammer SN = 1353 C1 C2 C3 C4 100 85 38 16 C5 100 82 42 7 C6 C7 100 86 38 5												8.0 -				
9.00						-											9.0 -
		C. "	TCR	SCR	_	_	\bigsqcup			-							C 10 (10 (10 (10 (10 (10 (10 (10 (10 (10
ruck at (m)	C2						e Bore o Bed	= 16.			jack-up barı	ge					
Casing To (m)																	
1.50 12.00	177	C7 100 86 38 5 C9 C10 100 96 83 4 TCR SCR RQD FI Water Strikes ing to (m) Time (min) Rose to (m) Etails Water Added Im (mm) From (m) To (m) 177 150 Core				Barr	el e	Flush	Type	Terminat	ion Reason			1 1	ast Upd	ated 💻 🗗	
		Water Strikes Sing to (m) Time (min) Rose to (m) Deck t All ele Petails Water Added am (mm) From (m) To (m)						٠.	Polyr			d at scheduled depth				opu	

Metho	9/ -		GEC	VI OTI	EC	Н	Dec.	(m)		1031	Client: Client's	,	slands Coui nderson LLF					BH-M1	
Sonic Dr		Plant U	uo C	ΧL		(m) 00	Base 1.	: (m) 50		dinates	Final De	pth: 12.00 m	Start Date:	27/03/2022	Driller:	MJ		heet 2 o Scale: 1:	
Rotary C	Coring	Rotoso Fraste Do Rotoso	uo C	ΚL	1.	50	12.	.00		16.39 E 86.20 N	Elevation	n: -10.84 mCD	End Date:	28/03/2022	Logger:	EM+NP		FINAL	-
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend			cription			Water	Backfill	
.10 .50 .70 .30	C11 C12 C13 C14 Water	Strikes Time (min)	93 TCR	84 81	73	4	Chis		-22.84	12.00	Remarks Marine Bol Deck to Be	Medium strong (loc fine grained moders closer fracture space and clay deposits at Discontinuities: 1. 5 to 15 degree be planar, rough with a surfaces, patchy blad orangish brown san fracture surfaces. 2. 50 to 60 degree j to 6.95m, 7.50m to to 10.85m, 10.95m brown staining on r surfaces and occasi surfaces. 3. 80 to 90 degree j 8.90m, planar to sli, staining and black s	ally weak) this ately cementer ing, slightly rementer ing, slightly rementer ind clay infill or edding fracture strong orangistick staining on dy clay depose oints at 5.10m 7.70m, 8.10m to 11.15m, planest joint surfonal patchy ligo int at 5.35m ghtly undulatitatining on son End of Bore	ckly laminated light of SANDSTONE. Produced strength of a fracture surface is medium space in brown staining few fracture surfacture surfacture surfacture, and the substitution of the su	artially we with discoles. ed (85/400 on most f faces and nick) on sc in to 5.80 nin to 8.65 m strong orack staining eposits on to 6.90 m angish broadlists.	eathered: louration 0/650) rracture patchy me n, 6.60m n, 10.70m ingish on few few	M		9.5 10.0 - 10.5 11.0 - 11.5 12.0 - 13.5 14.0 - 15.5 16.0 - 17.5 18.0 - 18.5
12.00	150					Core	Barr	el	Flush	Туре	Terminati	on Reason				Last Up	date	ed	I
						S	K6L		Poly	mer	Terminated	d at scheduled depth				29/06,	/2022	Λ	Н

		ing Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Sample Frests Field Records ESS Marine Scotland - SS1 ES2 Marine Scotland - SS2 D10 B9 SPT (S) N=13 (1,2/3,3,3,4) Hammer SN = 1353 ES7 Marine Scotland - SS3 D11 ES4 SPT(S) N=50 (6,8/50 for 290mm) Hammer SN = 1353 40 0 0				,		1031	roject Name: Scapa Deep Watelient: Orkney Islan lient's Rep: Arch Hender	nds Council	ent - Marine GI	Borehole ID BH-M13		
Metho Sonic Dr		Plant Used Top (m)		Base 3.0		Coord	inates	nal Depth: 10.50 m Sta	ort Date: 28/03/2022 Dril	ler: MJ	Sheet 1 of 2			
Rotary Co		Plant Used			10.		34499 100422	1.90 E 1.83 N	evation: -11.57 mCD End	d Date: 29/03/2022 Log	ger: NP	Scale: 1:50 FINAL		
Depth (m)	Sample / Tests				Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	egend	Description		N Backfill		
0.00 - 0.50 0.00 - 1.50	ES5 B8									y gravelly silty fine to coarse SA . Gravel is subangular fine to coa		_		
0.50	ES1								lithologies.			0.5		
1.00 1.00 - 1.50	ES2 ES6	Rotosonic ample / Tests Field Records S5 Marine Scotland - SS1 S2 S6 Marine Scotland - SS2 D10 PT (s) N=13 (1,2/3,3,3,4) Hammer SN = 1 1353 S7 Marine Scotland - SS3 S7 Marine Scotland - SS3 D11 S4 PT(S) N=50 (6,8/50 or 290mm) lammer SN = 1353 40 0 NI 11 PT (S) P									X X X X X X X X			1.0
1.50 1.50 - 3.00 1.50 - 1.95	D10 B9 SPT (S)	Marine Scotland - SS1 Marine Scotland - SS2 Marine Scotland - SS2 Marine Scotland - SS2 Marine Scotland - SS3 Marine Scotland - SS3 Marine Scotland - SS3 AZCL AZCL NI NI 9 2 3 40 0 0 NI									1.50m to 2.00m: Very silty from	1.50m		1.5
2.00	ES3								-13.57	2.00	Highly weathered brown gravel and subangular co	n SANDSTONE recovered as sub obbles.	angular coarse	2.0 — — —
2.50 - 3.00	Orilling Coring Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic 0.00 Sample / Frests Field Records 3.00 Rotosonic ESS B8 ESS B8 ESS1 Marine Scotland - SS1 ES2 ES6 Marine Scotland - SS2 Marine Scotland - SS2 D10 B9 SPT (S) N=13 (1,2/3,3,3,4) Hammer SN = 1 1353 ES7 Marine Scotland - SS3 D11 ES4 SPT(S) N=50 (6,8/50 for 290mm) Hammer SN = 1353 40 0 0 AZCL C1 NI C2 C3 C4 95 70 16 >20 C5 C6 97 97 53 6 C7 96 80 33 A3									3.00				2.5 — — — —
3.00 3.00 3.00 - 3.44							3.00		-14.57	(1.50)	gravel and subangular co	E recovered as subangular mediobbles. Dance due to SPT has lead to subsequent w		3.5
4.10	Section			-				/	inctly thinly bedded well cemer	1	4.0			
4.50						-16.07	4.50	slightly closer fracture sp discolouration. Discontinuities:	pacing with dark orangish brow	n	4.5 — -			
5.00 5.20 5.25				-		-16.72	5.15	(40/160/215) undulating 2. 70 to 75 degree joints	ree bedding fractures, medium g, smooth. s at 4.55m to 4.80m, 4.80m to 5 dark orangish brown staining or	.00m,	5.0			
c 00	Sample Fraste Duo CXL Rotosonic Fraste Duo CXL Roto				-17.47	5.90	Weak (locally medium st	o to 3mm from joint surfaces. trong) light orangish brown thic rained SANDSTONE. Partially we h, closer fracture spacing with c	athered:	5.5 —				
6.00 6.10	Plant Used							brown discolouration. Discontinuities: 1.0 to 5 degree bedding	g fractures, very closely spaced	(20/50/180)	6.0			
6.60	C6	Sample Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Sample Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Fraste Duo CXL Fraste Duo CXL Rotosonic Fraste Duo CXL Fraste Duo						-	surfaces. 2. 40 to 45 degree joint aplanar, smooth. 3. 70 to 90 degree joints orangish brown staining	angish brown staining on some at 5.15m to 5.20m, an 5.50m to s at 5.65m to 5.90m, undulating s on joint surfaces penetrating u	5.55m , rough with	7.0		
7.50						6				(4.60)	bedded moderately, wel	g light orangish brown indistinc Il cemented fine grained SANDS htly reduced strength, slightly o	TONE.	7.5 — — — —
8.00	C7		96	80	33						spacing with localised per Discontinuities: 1. 15 to 25 degree beddi planar, smooth with oral penetrating up to 6mm f	ervasive orangish brown discolo ling fractures, medium spaced (ingish brown staining on joint su	ouration. 40/350/820) urfaces, locally	8.0 — - - - 8.5 — -
9.00 9.00 9.25			TCP	SCP	Ron	FI					undulating with orangish	h brown staining on joint surfac		9.0 —
	Wate	r Strikes	.or	Jok			rks		<u>I</u>	<u> </u>	l			
Struck at (m) C	Casing to (m	Time (min)	Rose	e to (r	D	eck t	o Bed	= 18	drilled off .00m duced leve					
Casing D	etails	Water	Add	led	\dashv									
To (m) D) From (m)	To	o (m)										
10.50							Barr K6L	el	Flush		rmination Reason		29/06/	

	9/ -		EC	OTE	ECI	Н	la.			1031	Client:		Islands Coul					BH-M13	
Meth Sonic Dr		Plant U				(m) 00	Base 3.0	e (m) 00	Coor	dinates	Final De	pth: 10.50 m	Start Date:	28/03/2022	Driller:	MJ		Sheet 2 of 2 Scale: 1:50	
Rotary C	Coring	Rotoso Fraste Du Rotoso	io C)	ΚL	3.	00	10	.50		91.90 E 21.83 N	Elevatio	n: -11.57 mCD	End Date:	29/03/2022	Logger:	NP		FINAL	_
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill	
.10	C10	Strikes Time (min)	100	96	59		Chis		-22.07	10.50	Remarks Marine Bc Deck to Bc	Medium strong to seed bedded moderately Partially weathered spacing with localis Discontinuities: 1. 15 to 25 degree to planar, smooth with penetrating up to 6 2. 50 to 70 degree jundulating with orapenetrating up to 5	strong light ora, well cements is slightly reduced pervasive of pedding fracture in orangish brown in fracture is significant from Join End of Bore	angish brown ind ed fine grained Sced strength, slig brangish brown dures, medium spawn staining on jourfaces. y medium space: taining on joint staining on 10 to	ANDSTONI thtly closer liscolourati aced (40/3! bint surface d, planar a	F. fracture from from from from from from from from		10. 11. 12. 12. 13. 14. 14. 15. 16. 16. 17. 17.	9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5
Casing D	iam (mm) From (m) To (m)																		
To (m) [3.00 10.50	Diam (mm) 177 150	From (m)	Тс	o (m)	_	Core	Barr	rel	Flush	Туре	Terminat	ion Reason				Last Up	date	ed 🔳 -	_
							K6L			mer		d at scheduled depth				29/06/			ţ

		1	SEC	ITC	EC	Н		,	21-1	ct No.	Project Client: Client's	•	o Water Quay & slands Cour nderson LLF	ncil	elopment	- Marine GI		Boreholo	14
Meth Sonic D					-		Base 3.0		Coord	inates	Final De	pth: 9.00 m	Start Date:	29/03/2022	Driller	. MJ	:	Sheet 1 o Scale: 1	
Rotary (J	Plant Used Top (m) Ba			9.0	00	34491 100416	5.81 E 4.01 N	Elevatio	n: -18.13 mCD	End Date:	30/03/2022	Logger	: EM+NF	>	FINA			
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill	
0.00 - 0.50 0.00 - 1.50	ES5 B8	Marine Scotl	and -	- SS1							×××	Medium dense grey fragments (up to 9r							-
0.50	ES1										* * * * * * * * * *	19mm). Gravel is su	bangular fine	to medium of v	arious lith	ologies.			0.5 - -
1.00 1.00 - 1.50	ES2 ES6	Field Records Marine Scotland - SS1 Warine Scotland - SS2 N=11 (1,1/2,2,3,4) Hammer SN = 1.5 1.353 Marine Scotland - SS3 3.0 28 7,9) SN = 1353 100 63 23 11 >20 100 88 43									X X X X X X X X X X X X X X X X X X X								1.0 — - - -
1.50 1.50 - 3.00 1.50 - 1.95			ine Scotland - SS1 ine Scotland - SS2 1 (1,1/2,2,3,4) Hammer SN = 1.50 ine Scotland - SS3 3.00 = 1353 100 63 23 11 >20 100 88 43								X								1.5 — - - - - 2.0 —
2.50 - 3.00	ES3	Field Records Marine Scotland - SS1 Marine Scotland - SS2 N=11 (1,1/2,2,3,4) Hammer SN = 1.50 1353 Marine Scotland - SS3 N=28 5,7,9) 2r SN = 1353 100 63 23 11 >20 100 88 43									*								2.5
2.00	P.1.	Plant Used							3. . =	3.00	× × ×	0 111	1.16						3.0 —
3.00 3.00 3.00 - 3.45	ES4 SPT(S) N (3,4/6,6	Note							-21.13 -21.43	(0.30)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Greyish brown subr high cobble content Weak thinly lamina SANDSTONE. Partia slightly reduced str	t. Cobbles are ted light brow lly weathered	subrounded of s n fine grained w slightly closer f	sandstone ell cemer ractures s	e. nted spacing,			3.5
3.50 3.70	C1									(1.10)		fracture surfaces. Discontinuities: 1. 30 to 40 degree liplanar, smooth with	pedding fractu	res closely spac	ed (30/92	/120)			4.0 -
4.50		Fraste Duo CXL Rotosonic Fraste Duo CXL Fraste Duo CXL Rotosonic Fraste Duo CXL Fraste Duo CXL Rotosonic Fraste Duo CXL Fraste Duo CXL Fraste Duo CXL Fraste Duo CX Fraste Duo CX Fraste Parket Fraste Duo CX Fraste Parket Fra							-22.53 -22.88	4.40 (0.35) 4.75		surfaces and patchy most fracture surfa 2. 60 to 70 degree j patchy brown andy	light brown s ces. oint at 3.65m	andy clay depos to 3.80m, undu	its (<1mn	n thick) on igh with			4.5 — - - -
5.40	С3	Plant Used							(1.25)		dark brown discolo Weak thinly lamina cemented SANDSTO clay deposits. Discontinuities:	ted orangish b	rown fine grain					5.0 — - - - 5.5 —	
5.80 6.00	C4	Fraste Duo CXL Rotosonic							-24.13	6.00		1. 30 to 40 degree I slightly undulating,							6.0
6.00	C5	Plant Used									deposits (up to 4mi Weak indistinctly th cemented SANDSTO	ickly laminate	d light brown fi	ne graine]		-	
6.50	C6								(1.40)		spacing with clay de Discontinuities: 1. 25 to 35 degree l undulating, rough v	eposits and dis	res closely spac	ed (30/15	0/230)			6.5 — - -	
7.05												some fracture surfa 2. 0 to 5 degree joir	ces.		·	,			7.0 —
7.40 7.50	C8					16			-25.53	7.40		light brown clay de 3. 80 to 85 degree j light brown clay de Medium strong thir	oint at 5.20m posits (<1mm nly laminated l	to 5.30m planar thick) on joint si ight grey fine gr	; rough w urface. ained wel	I			7.5 — - - 8.0 —
3.40	С9		100	92	51	7	-			(1.60)		cemented SANDSTC spacing. Discoloura Discontinuities: 1. 20 to 30 degree I planar, rough with p	tion on fractur pedding fractu pervasive, oran	e surfaces. res closely spac ngish brown stai	ed (10/20 ning pene	0/800) etrating			8.5 — 8.5 —
9.00									-27.13	9.00		from fracture surfacture surfactu	urfaces, other	vise clean.					9.0
	Wate	r Strikes	TCR	SCR	Ч-		rks												<u> —</u>
truck at (m) (ES2 ES56 Marine Scotland - SS2 D10 B9 SPT (S) I 1353 ES7 Marine Scotland - SS3 ES7 Marine Scotland - SS3 D11 ES4 SPT(S) N=28 (3,4/6,6,7,9) Hammer SN = 1353 C1 C2 100 B8 43 7 C4 C5 C6 100 B8 43 7 TCR SCR ROD FI Water Strikes Ing to (m) Time (min) Rose to (m) Marin Deck to All ele SE31 Marine Scotland - SS3 100 B8 43 7 7 TCR SCR ROD FI Marine Scotland - SS2 111					e Bore o Bed	= 25.	.00m		jack-up bar 1 mCD	ge							
Casing I	Details Diam (mm																		
3.00 9.00	177 150	,		···/	-	Core	Barr	el	Flush	Туре	Terminat	ion Reason				Last U	Jpdat	ed T	—
						S	K6L		Polyr	mer	Terminate	d at scheduled depth				29/0	6/202	2 A	GS

	7	ing Fraste Duo CXL 0.00 Rotosonic ing Fraste Duo CXL 3.00 Rotosonic		F	Proje	ct No.	Project	Name: Scapa Deep	Water Quay &	Hatston Pier Deve	elopment - N	Marine GI	В	orehol	e ID				
X		GEOTECH Plant Used Top (m) Ing Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic					21-1	L 031	Client:	Orkney I	slands Cour	ncil				вн-м	14		
	9/ -	GEOTECH Plant Used Top (m) ing Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic Fraste Duo CXL Rotosonic			Н					Client's		nderson LLF							
Metl	hod	GEOTECH d Plant Used Top (m) B ling Fraste Duo CXL 0.00 Rotosonic ring Fraste Duo CXL 3.00 Rotosonic		Base (r	n) (Coord	inates		•					-	heet 2	of 2			
	Drilling			3.00				Final De	pth: 9.00 m	Start Date:	29/03/2022	Driller:	MJ		Scale: 1				
otarv	Coring			00	9.00			5.81 E	FI. ··	40.42 0-	Fuel Date	20/02/2222		EN4:215					
						v416	4.01 N	Elevatio	n: -18.13 mCD	End Date:	30/03/2022	Logger:	EM+NP		FINA	L			
Depth (m)	Samples			Casing Wat Depth Dep (m) (m	er Li	evel nCD	Depth (m)	Legend		Desc	cription			Water	Backfill				
(m)	Water	TCR SCR RQD FI Water Strikes Casing to (m) Time (min) Rose to (m) From (m	Chisell		etails	(m)	Remarks Marine Bc Deck to Be	Weak (locally media grained moderately much closer fractur fracture surfaces. Discontinuities: 1. 0 to 10 degree be smooth with orangi light brown sandy c surfaces. 8.40m: Black staining on 8.70m to 8.72m: Light brown sandy characteristics.	um strong) thin remember SA e spacing with edding fracture ish brown stain lay deposits (under the surface. We sandy clay infill. End of Bore	nly laminated ligi NDSTONE. Partia i discolouration a es, closely spaced ning on some fra up to 20mm thick enhole at 9.00m	lly weathe and clay de d (5/80/180 cture surfa	red: posits on 0) planar, ices and	Wat	Backfill	9.5 10.0 10.5 11.0 11.5 12.0 13.5 14.0 14.5 15.0 16.5 17.0 18.5				
	at (m) Casing to (m) T																		
		Water																	
(m) .00	Diam (mm 177) From (m)	То	(m)	+														
.00	150				-	Core	Barrel	F	lush	Туре	Terminat	ion Reason				Last Up	date	ed T	,
						61	K6L		Polyr		T	d at scheduled depth				29/06/			ᅙ

		1	GEC	TC	EC	Н				.031	Project Client: Client's	•	o Water Quay & slands Cour nderson LLF	ncil	elopment	- Ma	arine GI		oreho	/115	
Metho Sonic Dr					-		Base 3.0	_	Coord	inates	Final De	pth: 9.00 m	Start Date:	30/03/2022	Driller	: 1	MJ		Sheet 1 Scale:		
Rotary C		Plant Used Top (m) Base		9.0		34491 100423	1.66 E 5.99 N	Elevatio	n: -17.71 mCD	End Date:	31/03/2022	Logger	r: N	NP		FIN.					
Depth (m)	Sample / Tests			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription				Water	Backf	ill				
0.00 - 0.50 0.00 - 1.50 0.50	ES5 B8 ES1	Plant Used Top (m) Base						X X X X X X X X	Loose to medium d with shell fragment brachiopod shells (u of various lithologie	s (up to 8mm) up to 31mm).	and unfragmen	ted articu	ulate	ed			0.5	5 —			
1.00 1.00 - 1.50	ES2 ES6								* * * * * * * * * * * * * * * * * * *									1.0	0 -		
1.50 1.50 - 3.00 1.50 - 1.95 2.00	D10 B9 SPT (S) ES3	Fraste Duo CXL Rotosonic 3.00 9.0 Field Records Continue Scotland - SS1 Marine Scotland - SS2 N=11 (1,1/2,3,3,3) Hammer SN = 1.50 1353 Marine Scotland - SS3 N=34 3,8,9,9) mer SN = 1353 33 0 0 AZCL NI NI NI NI NI						-19.21	1.50	X	Medium dense grey content and shell fr gastropod shells (up of various lithologie	agments (up to to 12mm). G	o 7mm) and unf ravel is subangu	ragmente lar fine to	ed o me				2.0		
2.50 - 3.00	ES7	Rotosonic Sample / Tests Field Records Craise C							×. *. ×. ×. ×. ×. ×. ×.									2.5	5 -		
3.00 3.00 3.00 - 3.45	ES4 SPT(S) 1 (4,6/8,8				3.00		-20.71	3.00		Weathered SANDST gravel of sandstone of sandstone. 3.00m to 4.10m: AZCL - I material.	with low cobl	ole content. Cob	bles are s	suba	angular			3.0			
4.35	ES2 ES6 Marine Scotland - SS2 D10 B9 SPT (S) N=11 (1,1/2,3,3,3) Hammer SN = 1.5 1353 ES7 Marine Scotland - SS3 D11 ES4 SPT(S) N=34 (4,6/8,8,9,9) Hammer SN = 1353 C1 C1 C2 C3 100 73 0 11				-22.11	(1.40)		Highly weathered S Medium strong ligh grained moderately slightly reduced stro brown discolouratio	t orangish bro well cemente ength, closer f	wn indistinctly to	hinly bed Partially v	dded weat	thered:			4.0	0				
4.50	Rotosonic Sample / Tests Field Records Casin Dept / Tests Field Records Field Record				-22.21	(\$\frac{4}{5}\text{8})		Discontinuities: 1. 5 to 15 degree be planar, smooth with surfaces ad light brosurfaces.	n patchy dark	orangish brown	staining o	on fr	acture			4.5 5.0	5 — - - 0 —				
5.205.406.00		Rotosonic					(1.80)		2. 70 to 90 degree j 5.65m, 5.70m to 6.: dark orangish brow surfaces and patchy Weak light brown n partly cemented fin	15, and 6.15m n staining, pei r light brown c nottled orangi	to 6.30m, undu netrating up to 5 lay deposits on sh brown indisti	lating, sm mm from some join nctly thin	noot n joi nt su ily b	th with nt urfaces. edded			5.5	5 —			
6.20	C4	Fraste Duo CXL Rotosonic 3.00 Services Sample / Tests Field Records Sample / Tests Field Records Sample / Tests Field Records Sample / Tests Sample / Tests Sample / Services Sample / S				-24.01	6.30		slightly reduced stro orangish brown disc Discontinuities: 1. 15 to 20 degree b	colouration.							6.5	5 —			
		Sample Field Records Casimple Field Records Casimple Field Records				-24.61	6.90		planar, smooth with surfaces and occasi 2. 80 to 85 degree j undulating, smooth	onal light brov oints at 6.30m	vn clay deposits to 6.70m and 6	on joint s 5.35m to 6	surfa 6.70	aces. Im,			7.(0 —			
7.50	ES2 ES6				-25.11	7.40		joint surfaces and o surfaces. 2. 80 to 85 degree j undulating, smooth	oints at 6.30m	to 6.70m and 6	5.35m to 6	6.70)m,			7.5	5 — - -				
g 20	CE								-25.61	7.90		joint surfaces. Medium strong ora	-					1		8.0	0 -
8.20 8.50			100	95	19					(1.10)		fine grained SANDS closer fracture space Discontinuities: 1. 15 to 20 degree by planar, smooth with	ing with perva	re, very closely	rown disc	olou .0/2:	uration. 5/70)			8.5	5 —
9.00			TCR	SCR	RQD	FI			-26.71	9.00		surfaces. 2. 85 to 90 degree j								9.0	0 -
Struck at (m) C		Plant Used Top (m) Bang Fraste Duo CXL Rotosonic Fraste Duo CX			e Bore o Bed	= 24.	.00m			ge											
Casing D To (m) D 3.00	Diam (mm	Rotosonic Roto																			
9.00								el	Flush Polyr			ion Reason d at scheduled depth	1				29/06	pdate 5/2022		A.G	S

	C	AUS		W DTI						ject No. -1031	Project Client: Client's	•	o Water Quay & Islands Coul	ncil	elopment -	Marine GI		orehole BH-M	
Meth Sonic D		Plant U	uo C			(m) 00	Base 3.0			ordinates 911.66 E	Final De	<u> </u>		30/03/2022	Driller:	MJ		Sheet 2 o	
Rotary (Coring	Fraste Di Rotos	uo C	XL	3.	00	9.0	00		235.99 N	Elevatio	n: -17.71 mCD	End Date:	31/03/2022	Logger:	NP		FINA	L
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfill	\perp
ck at (m)		Strikes Time (min)		SCR 2 to (r				ellin, To (g Deta	ils	Remarks Marine Bo	Medium strong ora fine grained SANDS closer fracture space Discontinuities: 1. 15 to 20 degree I planar, smooth with surfaces. 2. 85 to 90 degree I undulating, smooth surfaces. 7.25m: Thick light brown Medium strong lightine grained SANDS strength, slightly clidiscolouration. Discontinuities: 1. 5 to 15 degree biplanar, smooth, with surfaces. Medium strong (lobeded very well conventional compositional compositiona	TONE. Partiallicing with pervasive oral pervasive oral oints at 6.90m a with dark oral soft clay infill on 15 at brown indist TONE. Partiallicoser fracture seedding fractural patchy oran cally weak) light emented fine a reduced strengish brown and pedding fractural patchy orange oints at 8.25m with orangish the matchy orange of the pervasive orange of the pervasive of the perva	y weathered: red sive orangish brown stand to 7.25m and 7 ingish brown stain degree bedding fractur inctly thinly beddy weathered: slig pacing with patches, closely space gish brown staining to orangish brown staining or to 8.34m and 8 income staining or to sufficient at 9.00m.	Juced street own discolouration on for the colouration of the colourat	ngth, louration. /25/70) acture 40m, int emented ted h brown 20) ture tily thinly lily e spacing ion. 0/350) cure 00m, faces,			9.5 10.0 10.5 11.0 11.5 12.0 13.5 14.0 14.5 15.0 16.5 17.0 18.0
							T				Deck to Be	ed = 24.00m ons/reduced levels gi							
Casing	Details	Water	Add	ed															
o (m)	Diam (mm)			o (m)															
3.00 9.00	177 150				\vdash	Core	Barr	rel	Flus	h Type	Terminat	ion Reason				Last Up	odate	ed 🔳	_
							K6L			lymer		d at scheduled depth				29/06,			ក់

		CAUS	E	W	A	Y			ct No. 1031	Project Name: Scapa Deep Water Quay & Hatston Pier Development - Marine GI Client: Orkney Islands Council Client's Rep: Arch Henderson LLP	Borehole ID BH-M16
Metho	od	Plant U					Base (m) Coord	linates	Final Depth: 8.00 m Start Date: 02/04/2022 Driller: KW	Sheet 1 of 1
Sonic Dri		Fraste Du Rotoso Fraste Du Rotoso	onic uo C			00	2.00 8.00	34497 100425	'5.43 E 55.73 N	Elevation: -10.09 mCD	Scale: 1:50
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Water Depth Depth (m) (m)	Level mCD	Depth (m)	Legend Description	Marker Backfill
0.00 - 0.50 0.00 - 1.00 0.50	ES3 B5 ES1	Marine Scotl	and -	SS1						Loose to medium dense grey slightly gravelly silty fine to coarse SAND with shell fragments (up to 5mm) and unfragmented articulated brachiopod shells (up to 25mm). Gravel is subangular fine of various lithologies.	0.5
1.00 1.00 - 1.50 1.00 - 1.50 1.50 1.50 - 1.95	D7	Marine Scotl N=14 (2,4/3,			nmer	SN =	1 50				1.0 —
2.00	C1	1353	5,-,-	,a		>20	1.50	-11.89 -12.09	1.80	Weathered yellowish white banded SANDSTONE. (Drillers description) Medium strong (locally weak) indistinctly thinly laminated fine grained light yellowish grey SANDSTONE. Partially weathered:	2.0
2.85 3.00 3.00 - 3.45 3.50	C2 D8 SPT(S) N (4,5/8,9 Hamme		100	38	13		3.00			reduced strength, closer fracture spacing. occasional light brownish orange discolouration on fracture surfaces and occasional sandy clay infill on fracture surfaces. Discontinuities: 1. 5 to 25 degree bedding fractures closely spaced (10/115/300), planar, rough, occasional light brownish orange staining up to 1mm deep and occasional sandy clay infill on fracture surfaces up to 1mm thick. 2. 25 to 45 degree joints at 2.60m to 2.80m, 3.00m, 3.30m to 4.30m	2.5 - - 3.0 - - - - 3.5 -
4.10	C3		100	65	19	14			(4.30)	and 4.70m, planar, rough and staining on joint surfaces up to 1mm deep. 3. 65 to 75 degree joints from 2.30m to 2.60m, 3.10m to 3.50m, 3.80m to 4.10m, 4.10m to 4.40m, undulating, rough ad occasional light brownish orange staining on joint surfaces up to 1mm deep.	4.5
5.00	C4		100	63	9						5.0 — 5.5 -
6.50						17		-16.39	6.30	Weak (locally medium strong) indistinctly thinly laminated fine grained dark yellowish grey SANDSTONE. Partially weathered: reduced strength, closer fracture spacing and frequent heavy brownish orange discolouration on fracture surfaces. Discontinuities:	6.5 -
7.30 7.50 7.75	C5 C6 C7		100	62	29	9			(1.70)	1.5 to 25 degree bedding fractures closely spaced (10/130/350) planar, rough and frequent heavy brownish orange staining up to 10mm deep. 2. 65 to 75 degree joints from 6.70m to 6.85m and 7.10m to 7.50m, undulating, rough and frequent heavy brownish orange staining up to 1 mm deep.	7.5 -
8.00								-18.09	8.00	End of Borehole at 8.00m	8.0 — — — 8.5 — —
	Wate	r Strikes	TCR	SCR	Ч-	FI Rema	rks		-		9.0
Struck at (m) C		Time (min) Water			D	eck to	o Bed = 1			ack-up barge	
	Diam (mm 177 150			o (m)		Core	Barrel	Flush	Туре	Termination Reason Last Up	dated
						S	K6L	Polyi	mer	Terminated at scheduled depth 29/06/	²⁰²² AGS

			iEC	OTE	EC	Н	ı		21-1	ct No. 1031	Project Client: Client's		o Water Quay & Islands Cou nderson LLF	ncil	elopment -	Marine (GI	Borehole II	7
Metho Sonic Dr		Plant U Fraste Du				(m)		(m) 00	Coord	linates	Final De	epth: 7.00 m	Start Date:	01/04/2022	Driller:	KW		Sheet 1 of 1	
Rotary Co		Rotoso Fraste Du Rotoso	onic uo C)			00		00	34501 100426	.7.31 E 58.57 N	Elevatio	n: -8.53 mCD	End Date:	01/04/2022	Logger:	NP +TMc		Scale: 1:50	
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend			cription			Motor	Backfill	
0.00 - 0.50 0.00 - 0.50 0.50	B3 ES2 ES1	Marine Scotl	and -	SS1					-9.03	0.50	* * * * * * * * * * * * * * * * * * *	Grey very gravelly s to 3mm). Gravel is s Weathered yellowis	subangular fin	e to medium of	various lith			٥	0.5
1.00	C1			1					-9.53	1.00		description) Highly weathered S					у	1	1.0
1.45	C2		100	12	8	NI >20			-9.98	1.45		fine to coarse SANE fine to coarse. Cobb Weak (locally very v brown moderately weathered: slightly orangish brown disc Discontinuities:	bles are suban weak) indistind well cemented reduced strer	gular. ctly thinly bedde d fine grained SA	d light ora	ngish . Partiall	у		1.5 —
2.50 2.65 2.80	C3 C4											1. 15 to 20 degree by planar, smooth with surfaces, penetrating clay deposits on soil 2. 55 to 65 degree ji	. 15 to 20 degree bedding fractures, medium spaced (70/205 lanar, smooth with dark orangish brown staining on fracture urfaces, penetrating up to 3mm from fracture surfaces, light lay deposits on some fracture surfaces. . 55 to 65 degree joints, widely spaced (120/1118/1550) plan ndulating, smooth, with dark orangish brown staining on join						2.5 —
3.30	C5		100	59	0							surfaces. 3. 75 to 85 degree j	joints at 1.65m 4.70m and 4.	n to 2.00m, 1.90 60m to 5.15m, u	m to 2.25n	n, 2.25m smooth	۱		3.5 —
4.00 4.15 4.30	C6 C7		100	30	0	10				(5.55)									4.5
5.50 5.65	C8		65	0	0	14 AZCL						6.10m to 7.00m: AZCL - borehole due to fractured			rieved from bas	se of		5 6	5.5 — - - - 6.0 — - - - 6.5 —
7.00									-15.53	7.00			End of Bore	ehole at 7.00m				7	7.0 —
		r Strikes		SCR	R	lema												8	8.0
Struck at (m) C		Time (min) Water			D	eck to	o Bed	= 15			jack-up bar n mCD	ge							
	Diam (mm			o (m)															
7.00	150					Core S	Barı K6L	el	Flush Polyr			tion Reason d at scheduled depth	1				Upda /06/20:		7

CAUSEWAY GEOTECH Method Plant Used Top (m) Base Sonic Drilling Fraste Duo CXL 0.00 3.0						Н			Projec 21 -1	.031	Project Client: Client's	,	Water Quay & slands Cour	ncil	relopment	- Marine GI		oreho	126
					_				Coord	inates	Final De	epth: 10.50 m	Start Date:	31/03/2022	Driller	: MJ		Sheet 1	
Rotary (J	Rotos Fraste Di Rotos	onic uo C			00	10.		34497 100415		Elevatio	on: -14.83 mCD	End Date:	01/04/2022	Logger	: NP+RC		Scale: 1	
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription			Water	Backfil	1
0.00 - 1.50	B5										×××	Loose grey gravelly s to 3mm). Gravel is s	,		_				<u> </u>
0.50	ES1										* * * * * * * * * * * * * *	,	0						0.5 —
1.50 1.50 - 3.00 1.50 - 1.95 2.00	D7 B6	N=17 (3,4/4, 1353	3,5,5) Ham	nmer	SN =	1.50		-16.03	1.20		Medium dense grey very gravelly silty fine to coarse SAND wi fragments (up to 4mm). Gravel is subangular fine to medium various lithologies. Highly weathered orangish brown SANDSTONE. (Drillers Desc							1.5 —
									-17.33	2.50	* * * * * * *	Weak (locally medium strong) indistinctly thinly bedded fine							2.5 —
3.00 3.00 3.00 - 3.45	D8 ES4 SPT(S) N (5,5/6,6 Hamme		100	6			3.00		-17.83	3.00		light orangish grey S strength, much close orange discolouration	orangish grey SANDSTONE. Partially weathered: reduce ngth, much closer fracture spacing, occasional light browinge discolouration on fracture surfaces and frequent sandon fracture surfaces.						3.0 —
3.40 3.60	C1 C2		100	ь	0	>20						occasional light brow frequent sandy clay	wnish ornate : infill on fracti	staining up to 2r ure surfaces up	n deep ar to 50mm	nd thick.			4.0
4.45 4.50	C3					_				(3.20)		2. 65 to 75 degree jo 6.00m to 6.20m, pla orange staining up t	nar, smooth a						4.5 —
5.25	C4		61	5	0	AZCL	-					5.40m to 6.00m: AZCL - P drilling.		-					5.5 —
6.00 6.10	C5					19	-		-21.03	6.20		Weak indistinctly th SANDSTONE. Partial fractures spacing an discolouration on fra Discontinuities:	lly weathered ad frequent he	reduced streng avy dark brown	th, much	closer			6.0 —
6.60	C6		100	17	0	>20				(1.80)		1. 10 to 25 degree b planar, rough and fre to 30mm deep. 2. 45 to 55 degree journed and frequent heavy 3. 65 to 75 degree journed	equent heavy pints closely s dark brownis	dark brownish paced (50/180/4 h orange stainin	orange sta 450) plana g up to 50	aining up ar, rough Omm deep.			6.5 — - - 7.0 —
7.50									-22.83	8.00		planar, rough and fro to 50mm deep. Weak (locally mediu grained light orangis reduced strength, m	equent heavy um strong) ind sh grey SANDS	dark brownish istinctly thinly la STONE. Partially	orange sta aminated weathere	fine ed: slightly	\setminus		7.5 — - - 8.0 —
8.50	C7		100	19	0	17				(2.50)		dark brownish orang Discontinuities: 1. 15 to 25 degree b planar rough and oc	ge discolourat edding fractu	ion on fracture	surfaces. aced (50/	22/350)			8.5 —
9.00												to 0.5mm deep. 2. 65 to 75 degree jo							9.0 —
9.20	C8										: : : : :	9.30m to 9.70m, pla staining up to 0.5mr	_	a occasional dai	rk prowni	sn orange			
	Water	Strikes	TCR	SCR	Ь—	FI Rema	rks												
itruck at (m)) Time (min)	Rose	e to (r	n) N	/larine	e Bore o Bed	= 21.			jack-up baı ı mCD	rge							
Casing To (m) 3.00 10.50	Details Diam (mm) 177 150	Water) From (m)		ed o (m)														· '=	
							Barr K6L	el	Flush Polyn			tion Reason and at scheduled depth				29/06	-		GS

	9/ -		EC	OTE	EC	Н	L			1031	Client:		Islands Coul nderson LLF		T			BH-M2	
Meth Sonic Dr		Plant U				(m) 00	Base 3.0	e (m) 00	Coord	linates	Final De	pth: 10.50 m	Start Date:	31/03/2022	Driller:	MJ		heet 2 of Scale: 1:5	
Rotary C	Coring	Rotoso Fraste Du Rotoso	io C)	ΚL	3.	00	10	.50	34497 100415	72.76 E 58.34 N	Elevatio	n: -14.83 mCD	End Date:	01/04/2022	Logger:	NP+RC		FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mCD	Depth (m)	Legend		Des	cription	•		Water	Backfill	
.50	C9 Water	Strikes Time (min)	71 TCR	25	RQD	AZCL	Chis		-25.33	10.50	Remarks Marine Bc Deck to B	Weak (locally media grained light orangia reduced strength, rodark brownish oran Discontinuities: 1. 15 to 25 degree land planar rough and or to 0.5mm deep. 2. 65 to 75 degree ja. 9.30m to 9.70m, plastaining up to 0.5mm 10.50m to 10.5	um strong) indish grey SANDi much closer fra ge discolourat beedding fractuccasional heavisints from 8.0 anar, rough an m deep. - Lower section of Inature of material. End of Bore	listinctly thinly la STONE. Partially vacture spacing arion on fracture sures, medium spary dark brownish of the second dark occasional darion or run unable to be respectively.	weathered occasion surfaces. aced (50/2) orange state 40m to 8.8 k brownish	l: slightly nal heavy 2/350) aining up 00m and n orange	W		9.5 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10
Casing D	Details Diam (mm)	Water From (m)		ed (m)															
3.00 10.50	177 150	113111 (111)	10	· (111)	_	Core	Barr	rel	Flush	Type	Terminat	tion Reason				Last Up	date	ed 💻	_
							K6L		Poly			d at scheduled depth	1			29/06/			ż

C DATA SUMMARY TABLES AND LAB CERTIFICATES

Summary Table A

Sampling Results Incorporated with BPEO Assessment (mg/kg)

			, -																		Dd Di	4 I DI	0																						
	AL1 A	AL2 B	BAC ERL	PEL																	Dredge Pi	hase 1 and Pl	lase 2																						
Source		C	CSEMP CSE	MP Canada	BH-M01 (SS1) 0.00- 0.50m	BH-M01 - (SS2) 1.00- 1.50m	BH-M01 (SS3) 2.50 3.00m	BH-M03 (SS1) 0.00- 0.50m	BH-M03 (SS2) 1.00 1.50m	BH-M03 0- (SS3) 2.50 3.00m	BH-M07 0- (SS1) 0.00- 0.50m	BH-M07 - (SS2) 1.00- 1.50m	BH-M07 (SS3) 2.50-3.00m	BH-M09 (SS1) 0.00-0.50m	BH-M09 (SS2) 1.00-1.50m	BH-M09 (SS3) 2.50-3.00m	BH-M11 (SS1) 0.00-0.50m	BH-M11 (SS2 1.00-1.50m	BH-M11 (SS3) 2.50-3.00m	BH-M13 (SS1) 0.00-0.50m	BH-M13 (SS2) 1.00-1.50m	BH-M13 (SS3) 2.50-3.00m	BH-M14 (SS1) 0.00-0.50m	BH-M14 (SS2) 1.00-1.50m	BH-M14 (SS3) 2.50-3.00m	BH-M15 (SS1) 0.00-0.50m	BH-M15 (SS2) 1.00-1.50m	BH-M15 (SS3) 2.50-3.00m	WP-M27 (SS1) 0.00-0.15m	BH-M16 (SS1) 0.00-0.50m	BH-M16 (SS2) 1.00-1.50m	BH-M17 (SS1) 0.00-0.50m	BH-M04 (SS1) 0.00-0.50m	BH-M04 (SS2) 1.00-1.50m	BH-M04 (SS3) 2.50-3.00m	H-M05 (SS1) 0.00-0.50m	BH-M05 (SS2) 1.00-1.50m	BH-M05 (SS3) 2.50-3.00m) MAX	AVERAGE	No. Exceed RAL 1	No. Exceed RAL 2	No.Exceed BAC	? No. Exceed ERL	No. Exceed PEL?
Arsenic	20	70	25	41.	6 3.5	3.7	27.8	7.9	19.5	21	10.4	4.1	5.1	13.3	12.6	19.6	19	17.9	27.8	9.2	5.2	4.9	7.1	6.8	7.2	5.1	5.7	9.3	6.2	10	11.3	7.6	24.6	23.8	19.9	16.6	14.5	11.7	27.8	12.	35 5	0	2	N/A	0
Cadmium	0.4	4	0.31	1.2 4.	2 0.07	0.1	0.07	0.14	0.11	0.11	0.07	0.06	0.05	0.07	0.09	0.13	0.15	0.1	0.16	0.1	0.09	0.31	0.15	0.13	0.15	0.1	0.08	0.11	0.1	0.17	0.14	0.07	0.29	0.19	0.32	0.17	0.11	0.15	0.32	0.	13 0	0	2	0	0
Chromium	50	370	81	81 16	0 6.8	6.9	8.3	10.6	14.6	13.1	14.9	8.1	7.8	11.2	11.8	26.1	27.4	17.6	14.9	11.1	10.1	11.6	14.8	13.1	12.7	9.7	10.3	16.6	11.2	16	19.7	6.4	51.4	34.5	36.5	27.8	24.6	23.3	51.4	16./	1 1 أذ	0	0	0	0
Copper	30	300	27	34 10	8 5.5	5.4	8.4	8.1	12.6	84.1	12.4	5.7	8.2	6.9	7.3	14.7	15	8	21.6	9.5	5.9	46.4	18.3	8.9	10.1	6.2	6	10	8	8.6	11.7	7.1	40	18.4	21.4	11.9	9.9	10.3	84.1	14.	49 3	0	3	3	0
Mercury	0.25	1.5	0.07	0.15 0.	7 0.02	0.01	0.09	0.01	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.03	0.01	0.01	0.13	0.04	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.12	0.04	0.03	0.01	0.01	0.01	0.13	0./	0 3ر	0	3	0	0
Nickel	30	150	36		4.8	4.7	3.2	8.7	16.1	11.4	14.1	6.8	7.6	8.9	9.1	22.9	24.2	11.4	20.6	10.8	8	8.3	12.2	10.7	10.5	7.7	8.8	14.5	9.9	13.6	16.3	5.1	31.8	27.4	29	18.6	16.3	15.7	31.8	13.'	<u> </u>	0	0	N/A	N/A
Lead	50	400	38	47 11	2 4.7	3.5	7.6	5.6	10.8	10.3	12.4	4.9	5.2	7.2	8.1	15.5	17.7	9.8	15.4	7	5	16.6	10.6	7.5	9.3	5.6	5.5	9.1	6.4	8.9	11.5	23.6	50.7	25.8	23.5	12.8	10.2	8.9	50.7	11./	1 8ز	0	1	1	0
Zinc	130	600	122	150 27	1 13.8	11.4	15.5	19	32.4	18.6	32.5	12.6	21	15.6	16.5	46.3	47.3	21.9	46.8	21.8	15	15.8	26.6	23.6	39.7	17.4	17	27.2	24.3	29	33.6	9.1	161	80.8	82.1	46.6	45.8	36.7	161	33.0	7 1	0	1	1	0
Napthalene	0.1		0.08	0.16 0.39	1 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00138	0.00138	0.00143	0.00128	0.00122	0.00402	0.00402	0.0	J <mark>1 0</mark>	N/A	0	0	0
Acenaphthylene	0.1		-	- 0.12	8 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00116	0.00116	0.0	J1 0	N/A	N/A	N/A	0
Acenaphthene	0.1		-	- 0.088	9 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00134	0.00134	0.0′	ر 1 0	N/A	N/A	N/A	0
Fluorene	0.1		-	- 0.14	4 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00177	0.00177	0.0′	0 1 ر	N/A	N/A	N/A	0
Phenanthrene	0.1		0.032	0.24 0.54	4 0.001	0.001	0.001	0.00161	0.00185	0.001	0.00166	0.00166	0.001	0.001	0.0012	0.00157	0.00129	0.00176	0.001	0.00107	0.001	0.001	0.00296	0.00115	0.001	0.001	0.001	0.001	0.00155	0.00415	0.00148	0.001	0.0036	0.00448	0.00281	0.0011	0.00114	0.00667	0.00667	0.0′	J <mark>2 0</mark>	N/A	0	0	0
Anthracene	0.1		0.05	0.085 0.24	5 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00161	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00192	0.00192	0.0′	ر 1 0	N/A	0	0	0
Fluoranthene	0.1		0.039	0.6 1.49	4 0.001	0.001	0.001	0.00152	0.00166	0.001	0.00111	0.00133	0.001	0.00105	0.00142	0.00152	0.00106	0.00216	0.001	0.00159	0.00126	0.001	0.001	0.00205	0.00145	0.001	0.001	0.001	0.00269	0.0114	0.001	0.001	0.00174	0.00179	0.00123	0.00108	0.00154	0.00994	0.0114	0.0′	J2 0	N/A	0	0	0
Pyrene	0.1		0.024	0.665 1.39	8 0.00202	0.00171	0.001	0.00198	0.00212	0.001	0.00218	0.00196	0.001	0.0018	0.00249	0.0029	0.00207	0.00355	0.001	0.00196	0.00181	0.001	0.00133	0.0026	0.00189	0.001	0.00103	0.00131	0.00318	0.0106	0.00108	0.001	0.00288	0.00264	0.00306	0.00305	0.00178	0.00932	0.0106	0.0′	J2 0	N/A	0	0	0
Benzo(a)anthracene	0.1		0.016	0.261 0.69	3 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00127	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00116	0.00526	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00494	0.00526	0.0′	ر 1	N/A	0	0	0
Chrysene	0.1		0.02	0.384 0.84	6 0.00302	0.0026	0.001	0.00381	0.003	0.00133	0.0034	0.00237	0.00106	0.00262	0.00404	0.00479	0.00371	0.00746	0.001	0.00297	0.00273	0.001	0.00167	0.00207	0.00183	0.00137	0.0016	0.00178	0.00257	0.00688	0.00171	0.001	0.00443	0.00383	0.00309	0.00322	0.00209	0.00767	0.00767	0.0′	J3 0	N/A	0	0	0
Benzo(b)fluoranthene	0.1		-		0.00146	0.00113	0.001	0.00157	0.00172	0.001	0.00115	0.00165	0.001	0.00121	0.00185	0.00219	0.00107	0.00286	0.001	0.00222	0.00153	0.001	0.001	0.00234	0.00159	0.001	0.001	0.001	0.00235	0.00494	0.001	0.001	0.00183	0.00145	0.00165	0.0017	0.00184	0.00687	0.00687	0.0′)2 0	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	0.1		-		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00143	0.001	0.001	0.001	0.001	0.00133	0.00289	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00305	0.00305	0.0′	ر 1ر	N/A	N/A	N/A	N/A
Benzo(a)pyrene	0.1		0.03	0.384 0.76	3 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00103	0.001	0.001	0.001	0.001	0.00136	0.00478	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00571	0.00571	0.0′	ر 1ر	N/A	0	0	0
Indeno(1,2,3cd)pyrene	0.1		0.103	0.24 -	0.001	0.001	0.001	0.001	0.00108	0.001	0.001	0.00104	0.001	0.001	0.001	0.001	0.001	0.0011	0.001	0.00119	0.001	0.001	0.001	0.00193	0.001	0.001	0.001	0.001	0.00223	0.00309	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0042	0.0042	0.0′	<i>j</i> 1 0	N/A	0	0	N/A
Benzo(ghi)perylene	0.1		0.08	0.085 -	0.001	0.001	0.001	0.00147	0.00167	0.00138	0.00127	0.00161	0.001	0.00102	0.00116	0.00125	0.00116	0.00176	0.001	0.00153	0.00127	0.001	0.001	0.00232	0.00126	0.001	0.001	0.001	0.00247	0.00394	0.001	0.001	0.00175	0.00145	0.00144	0.00107	0.0013	0.00515	0.00515	0.0	ر 1ر	N/A	0	0	N/A
Dibenzo(a,h)anthracene	0.01		-	- 0.13	5 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00128	0.00128	0.0′	<i>j</i> 1 0	N/A	N/A	N/A	0
TPH	100		-		8.68	10.6	2.58	40.9	25.3	34.4	13.2	12	9.73	9.76	21.2	36.5	14	16.1	38.9	21.5	15.5	3.83	9.28	14.2	18.6	8.15	8.23	11.7	17.4	11.2	13.5	7.09	59.9	46.8	123	42.2	20.2	23.6	123	22./	<i>j</i> 4 1	N/A	N/A	N/A	N/A
PCBs	0.02	0.18	-	- 0.18	9 0.00056		0.00056	_	0.00056				0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	 	0.00075	0.00056	0.00199	0.00056	<u> </u>	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	0.0006	0.00056	0.00056	0.00056	0.00199	0.00	<i>i</i> 6 0	0	N/A	N/A	0
TBT	0.1	0.5	-		<u>0.001</u>	<u>0.001</u>	<u>0.001</u>	<u>0.001</u>	<u>0.001</u>	<u>0.001</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.001</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.005</u>	<u>0.00500</u>	0.00/	,2 0	0	N/A	N/A	N/A									

Note: Underlined Values are LOD. Values highlighted red are equal to or greater than AL1.

PEL Data Source: http://ceqg-rcqe.ccme.ca/en/index.html#void

Summary Table B

SDWQ Phase 1 and Phase 2 Dredge Areas All units in mg/kg

All units in mg/kg	AL1	AL2	BAC	<erl< th=""><th>PEL</th><th>Dredge Average</th><th>Exceed AL1?</th><th>Exceed AL2?</th><th>Exceed BAC?</th><th>Exceed ERL?</th><th>Exceed PEL?</th></erl<>	PEL	Dredge Average	Exceed AL1?	Exceed AL2?	Exceed BAC?	Exceed ERL?	Exceed PEL?
Source			CSEMP	CSEMP	Canada	, ,					
Arsenic	20	70	25	-	41.6	12.4	No	No	No	N/A	No
Cadmium	0.4	4	0.31	1.2	4.2	0.1	No	No	No	No	No
Chromium	50	370	81	81	160	16.5	No	No	No	No	No
Copper	30	300	27	34	108	14.5	No	No	No	No	No
Mercury	0.25	1.5	0.07	0.15	0.7	0.0	No	No	No	No	No
Nickel	30	150	36		-	13.2	No	No	No	N/A	N/A
Lead	50	400	38		112	11.7	No	No	No	No	No
Zinc	130	600	122	150	271	33.1	No	No	No	No	No
Napthalene	0.1	-	0.08	0.16	0.319	0.00	No	N/A	No	No	No
Acenaphthylene	0.1	-	-	-	0.128	0.00	No	N/A	N/A	N/A	No
Acenaphthene	0.1	-	-	-	0.0889	0.00	No	N/A	N/A	N/A	No
Fluorene	0.1	-	-	-	0.144	0.00	No	N/A	N/A	N/A	No
Phenanthrene	0.1	-	0.032	0.24	0.544	0.00	No	N/A	No	No	No
Anthracene	0.1	-	0.05	0.085	0.245	0.00	No	N/A	No	No	No
Fluoranthene	0.1	-	0.039	0.6	1.494	0.00	No	N/A	No	No	No
Pyrene	0.1	-	0.024	0.665	1.398	0.00	No	N/A	No	No	No
Benzo(a)anthracene	0.1	-	0.016	0.261	0.693	0.00	No	N/A	No	No	No
Chrysene	0.1	-	0.02	0.384	0.846	0.00	No	N/A	No	No	No
Benzo(b)fluoranthene	0.1	-	ı	-	-	0.00	No	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	0.1	-	ı	-	-	0.00	No	N/A	N/A	N/A	N/A
Benzo(a)pyrene	0.1	-	0.03	0.384	0.763	0.00	No	N/A	No	No	No
Indeno(1,2,3cd)pyrene	0.1	-	0.103	0.24	-	0.00	No	N/A	No	No	N/A
Benzo(ghi)perylene	0.1	-	0.08	0.085	-	0.00	No	N/A	No	No	N/A
Dibenzo(a,h)anthracene	0.01	-	-	-	0.135	0.00	No	N/A	N/A	N/A	No
TPH	100	-	-	-	-	22.64	No	N/A	N/A	N/A	N/A
PCBs	0.02	0.18	-	-	0.189	0.001	No	No	N/A	N/A	No
TBT	0.1	0.5	1	-	-	0.0042	No	No	N/A	N/A	N/A



Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR1394

Issue Version

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

Customer Reference Scapa Flow Marie Scotland Sediment Testing

Date Sampled 23-Mar- 02-Apr-2022

Date Received 11-Apr-22

Date Reported 09-May-22

Condition of samples Cold Satisfactory

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.



Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR1394

Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	%	%	%	%	%	Mg/m3	N/A
		Method No	ASC/SOP/303	ASC/SOP/303	SUB_01*	SUB_01*	SUB_01*	SOCOTEC Doncaster*	SUB_02*
		Limit of Detection	0.2	0.2	N/A	N/A	N/A	N/A	N/A
		Accreditation	UKAS	UKAS	N	N	N	N	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	Total Moisture @ 120°C	Total Solids	Gravel (>2mm)	Sand (63-2000 μm)	Silt (<63 μm)	Particle Density	Asbestos
BH-M01 (SS1) 0.00-0.50m	MAR1394.01	Sediment	16.3	83.7	7.6	73.8	18.6	2.72	NAIIS
BH-M01 (SS2) 1.00-1.50m	MAR1394.02	Sediment	14.6	85.4	5.5	82.4	12.1	2.69	NAIIS
BH-M01 (SS3) 2.50-3.00m	MAR1394.03	Sediment	11.6	88.4	10.1	47.9	42.0	2.66	NAIIS
BH-M03 (SS1) 0.00-0.50m	MAR1394.04	Sediment	14.3	85.7	8.3	64.6	27.0	2.71	NAIIS
BH-M03 (SS2) 1.00-1.50m	MAR1394.05	Sediment	13.8	86.2	11.0	53.1	35.9	2.74	NAIIS
BH-M03 (SS3) 2.50-3.00m	MAR1394.06	Sediment	14.3	85.7	10.4	25.8	63.9	Not Amenable*	NAIIS
BH-M07 (SS1) 0.00-0.50m	MAR1394.07	Sediment	16.1	83.9	20.9	57.8	21.2	2.51	NAIIS
BH-M07 (SS2) 1.00-1.50m	MAR1394.08	Sediment	18.7	81.3	19.1	60.9	20.0	Not Amenable*	NAIIS
BH-M07 (SS3) 2.50-3.00m	MAR1394.09	Sediment	14.3	85.7	17.6	67.8	14.6	Not Amenable*	NAIIS
BH-M09 (SS1) 0.00-0.50m	MAR1394.10	Sediment	23.0	77.0	23.5	52.9	23.6	0.72	NAIIS
BH-M09 (SS2) 1.00-1.50m	MAR1394.11	Sediment	17.5	82.5	11.6	64.9	23.5	2.76	NAIIS
BH-M09 (SS3) 2.50-3.00m	MAR1394.12	Sediment	12.7	87.3	25.2	54.2	20.7	Not Amenable*	NAIIS
BH-M11 (SS1) 0.00-0.50m	MAR1394.13	Sediment	12.9	87.1	17.8	65.2	17.0	2.69	NAIIS
BH-M11 (SS2) 1.00-1.50m	MAR1394.14	Sediment	13.1	86.9	8.7	61.9	29.4	2.70	NAIIS
BH-M11 (SS3) 2.50-3.00m	MAR1394.15	Sediment	12.6	87.4	20.0	45.3	34.7	Not Amenable*	NAIIS
BH-M13 (SS1) 0.00-0.50m	MAR1394.16	Sediment	19.3	80.7	9.3	75.3	15.4	Not Amenable*	NAIIS
BH-M13 (SS2) 1.00-1.50m	MAR1394.17	Sediment	17.1	82.9	10.3	59.4	30.3	2.71	NAIIS
BH-M13 (SS3) 2.50-3.00m	MAR1394.18	Sediment	12.0	88.0	20.8	40.2	39.0	2.69	NAIIS
BH-M14 (SS1) 0.00-0.50m	MAR1394.19	Sediment	17.9	82.1	22.9	61.9	15.2	Not Amenable*	NAIIS
BH-M14 (SS2) 1.00-1.50m	MAR1394.20	Sediment	23.3	76.7	20.6	63.8	15.6	Not Amenable*	NAIIS
BH-M14 (SS3) 2.50-3.00m	MAR1394.21	Sediment	16.0	84.0	19.9	63.2	16.8	2.66	NAIIS
BH-M15 (SS1) 0.00-0.50m	MAR1394.22	Sediment	20.3	79.7	34.4	47.8	17.9	2.72	NAIIS
BH-M15 (SS2) 1.00-1.50m	MAR1394.23	Sediment	17.2	82.8	28.6	48.8	22.5	2.68	NAIIS
BH-M15 (SS3) 2.50-3.00m	MAR1394.24	Sediment	15.5	84.5	32.4	50.2	17.3	2.71	NAIIS
WP-M27 (SS1) 0.00-0.15m	MAR1394.25	Sediment	22.4	77.6	21.5	57.5	21.0	2.66	NAIIS
BH-M16 (SS1) 0.00-0.50m	MAR1394.26	Sediment	16.5	83.5	27.4	51.7	20.9	2.69	NAIIS
BH-M16 (SS2) 1.00-1.50m	MAR1394.27	Sediment	13.3	86.7	30.4	51.8	17.8	Not Amenable*	NAIIS
BH-M17 (SS1) 0.00-0.50m	MAR1394.28	Sediment	12.2	87.8	20.1	42.9	37.1	2.71	NAIIS
	Reference I	Material (% Recovery)	-	N/A	N/A	N/A	N/A	N/A	N/A
		QC Blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A

^{*} See Report Notes

NAIIS - No Asbestos Identified In Sample



Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR1394

Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	% M/M
		Method No	WSLM59*
		Limit of Detection	0.02
		Accreditation	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	тос
BH-M01 (SS1) 0.00-0.50m	MAR1394.01	Sediment	0.22
BH-M01 (SS2) 1.00-1.50m	MAR1394.02	Sediment	0.17
BH-M01 (SS3) 2.50-3.00m	MAR1394.03	Sediment	0.05
BH-M03 (SS1) 0.00-0.50m	MAR1394.04	Sediment	0.26
BH-M03 (SS2) 1.00-1.50m	MAR1394.05	Sediment	0.18
BH-M03 (SS3) 2.50-3.00m	MAR1394.06	Sediment	0.07
BH-M07 (SS1) 0.00-0.50m	MAR1394.07	Sediment	0.17
BH-M07 (SS2) 1.00-1.50m	MAR1394.08	Sediment	0.25
BH-M07 (SS3) 2.50-3.00m	MAR1394.09	Sediment	0.15
BH-M09 (SS1) 0.00-0.50m	MAR1394.10	Sediment	0.27
BH-M09 (SS2) 1.00-1.50m	MAR1394.11	Sediment	0.25
BH-M09 (SS3) 2.50-3.00m	MAR1394.12	Sediment	0.21
BH-M11 (SS1) 0.00-0.50m	MAR1394.13	Sediment	0.17
BH-M11 (SS2) 1.00-1.50m	MAR1394.14	Sediment	0.23
BH-M11 (SS3) 2.50-3.00m	MAR1394.15	Sediment	0.13
BH-M13 (SS1) 0.00-0.50m	MAR1394.16	Sediment	0.30
BH-M13 (SS2) 1.00-1.50m	MAR1394.17	Sediment	0.28
BH-M13 (SS3) 2.50-3.00m	MAR1394.18	Sediment	0.05
BH-M14 (SS1) 0.00-0.50m	MAR1394.19	Sediment	0.27
BH-M14 (SS2) 1.00-1.50m	MAR1394.20	Sediment	0.23
BH-M14 (SS3) 2.50-3.00m	MAR1394.21	Sediment	0.17
BH-M15 (SS1) 0.00-0.50m	MAR1394.22	Sediment	0.38
BH-M15 (SS2) 1.00-1.50m	MAR1394.23	Sediment	0.36
BH-M15 (SS3) 2.50-3.00m	MAR1394.24	Sediment	0.26
WP-M27 (SS1) 0.00-0.15m	MAR1394.25	Sediment	0.28
BH-M16 (SS1) 0.00-0.50m	MAR1394.26	Sediment	0.24
BH-M16 (SS2) 1.00-1.50m	MAR1394.27	Sediment	0.28
BH-M17 (SS1) 0.00-0.50m	MAR1394.28	Sediment	0.24
	Reference	Material (% Recovery)	95
		QC Blank	<0.02

^{*} See Report Notes

NAIIS - No Asbestos Identified In Sample





Test Report ID MAR1394

Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units				mg/Kg ([Ory Weight)			
		Method No				ICP	MSS*			
		Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc
BH-M01 (SS1) 0.00-0.50m	MAR1394.01	Sediment	3.5	0.07	6.8	5.5	0.02	4.8	4.7	13.8
BH-M01 (SS2) 1.00-1.50m	MAR1394.02	Sediment	3.7	0.10	6.9	5.4	0.01	4.7	3.5	11.4
BH-M01 (SS3) 2.50-3.00m	MAR1394.03	Sediment	27.8	0.07	8.3	8.4	0.09	3.2	7.6	15.5
BH-M03 (SS1) 0.00-0.50m	MAR1394.04	Sediment	7.9	0.14	10.6	8.1	<0.01	8.7	5.6	19.0
BH-M03 (SS2) 1.00-1.50m	MAR1394.05	Sediment	19.5	0.11	14.6	12.6	0.02	16.1	10.8	32.4
BH-M03 (SS3) 2.50-3.00m	MAR1394.06	Sediment	21.0	0.11	13.1	84.1	0.03	11.4	10.3	18.6
BH-M07 (SS1) 0.00-0.50m	MAR1394.07	Sediment	10.4	0.07	14.9	12.4	<0.01	14.1	12.4	32.5
BH-M07 (SS2) 1.00-1.50m	MAR1394.08	Sediment	4.1	0.06	8.1	5.7	<0.01	6.8	4.9	12.6
BH-M07 (SS3) 2.50-3.00m	MAR1394.09	Sediment	5.1	0.05	7.8	8.2	<0.01	7.6	5.2	21.0
BH-M09 (SS1) 0.00-0.50m	MAR1394.10	Sediment	13.3	0.07	11.2	6.9	<0.01	8.9	7.2	15.6
BH-M09 (SS2) 1.00-1.50m	MAR1394.11	Sediment	12.6	0.09	11.8	7.3	<0.01	9.1	8.1	16.5
BH-M09 (SS3) 2.50-3.00m	MAR1394.12	Sediment	19.6	0.13	26.1	14.7	0.05	22.9	15.5	46.3
BH-M11 (SS1) 0.00-0.50m	MAR1394.13	Sediment	19.0	0.15	27.4	15	0.02	24.2	17.7	47.3
BH-M11 (SS2) 1.00-1.50m	MAR1394.14	Sediment	17.9	0.10	17.6	8.0	0.01	11.4	9.8	21.9
BH-M11 (SS3) 2.50-3.00m	MAR1394.15	Sediment	27.8	0.16	14.9	21.6	0.03	20.6	15.4	46.8
BH-M13 (SS1) 0.00-0.50m	MAR1394.16	Sediment	9.2	0.10	11.1	9.5	0.01	10.8	7.0	21.8
BH-M13 (SS2) 1.00-1.50m	MAR1394.17	Sediment	5.2	0.09	10.1	5.9	<0.01	8.0	5.0	15.0
BH-M13 (SS3) 2.50-3.00m	MAR1394.18	Sediment	4.9	0.31	11.6	46.4	0.13	8.3	16.6	15.8
BH-M14 (SS1) 0.00-0.50m	MAR1394.19	Sediment	7.1	0.15	14.8	18.3	0.04	12.2	10.6	26.6
BH-M14 (SS2) 1.00-1.50m	MAR1394.20	Sediment	6.8	0.13	13.1	8.9	0.02	10.7	7.5	23.6
BH-M14 (SS3) 2.50-3.00m	MAR1394.21	Sediment	7.2	0.15	12.7	10.1	0.03	10.5	9.3	39.7
BH-M15 (SS1) 0.00-0.50m	MAR1394.22	Sediment	5.1	0.10	9.7	6.2	0.01	7.7	5.6	17.4
BH-M15 (SS2) 1.00-1.50m	MAR1394.23	Sediment	5.7	0.08	10.3	6.0	<0.01	8.8	5.5	17.0
BH-M15 (SS3) 2.50-3.00m	MAR1394.24	Sediment	9.3	0.11	16.6	10.0	<0.01	14.5	9.1	27.2
WP-M27 (SS1) 0.00-0.15m	MAR1394.25	Sediment	6.2	0.10	11.2	8.0	<0.01	9.9	6.4	24.3
BH-M16 (SS1) 0.00-0.50m	MAR1394.26	Sediment	10.0	0.17	16.0	8.6	0.01	13.6	8.9	29.0
BH-M16 (SS2) 1.00-1.50m	MAR1394.27	Sediment	11.3	0.14	19.7	11.7	0.01	16.3	11.5	33.6
BH-M17 (SS1) 0.00-0.50m	MAR1394.28	Sediment	7.6	0.07	6.4	7.1	0.02	5.1	23.6	9.1
Cert	ified Reference Material SE	, ,,	99	96	93	97	90	99	93	98
		QC Blank	<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

^{*} See Report Notes

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Test Report ID MAR1394

Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (D	ry Weight)
		Method No	ASC/S	OP/301
		Limit of Detection	1	1
		Accreditation	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	Dibutyltin (DBT)	Tributyltin (TBT)
BH-M01 (SS1) 0.00-0.50m	MAR1394.01	Sediment	<1	<1
BH-M01 (SS2) 1.00-1.50m	MAR1394.02	Sediment	<1	<1
BH-M01 (SS3) 2.50-3.00m	MAR1394.03	Sediment	<1	<1
BH-M03 (SS1) 0.00-0.50m	MAR1394.04	Sediment	<1	<1
BH-M03 (SS2) 1.00-1.50m	MAR1394.05	Sediment	<1	<1
BH-M03 (SS3) 2.50-3.00m	MAR1394.06	Sediment	<1	<1
BH-M07 (SS1) 0.00-0.50m	MAR1394.07	Sediment	<5	<5
BH-M07 (SS2) 1.00-1.50m	MAR1394.08	Sediment	<5	<5
BH-M07 (SS3) 2.50-3.00m	MAR1394.09	Sediment	<5	<5
Cer	tified Reference Material QS	P076MS(% Recovery)	51	56
		QC Blank	<1	<1

^{*} See Report Notes



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Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Di	ry Weight)
		Method No	ASC/S	OP/301
		Limit of Detection	1	1
		Accreditation	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	Dibutyltin (DBT)	Tributyltin (TBT)
BH-M09 (SS1) 0.00-0.50m	MAR1394.10	Sediment	<5	<5
BH-M09 (SS2) 1.00-1.50m	MAR1394.11	Sediment	<5	<5
BH-M09 (SS3) 2.50-3.00m	MAR1394.12	Sediment	<5	<5
BH-M11 (SS1) 0.00-0.50m	MAR1394.13	Sediment	<5	<5
BH-M11 (SS2) 1.00-1.50m	MAR1394.14	Sediment	<5	<5
BH-M11 (SS3) 2.50-3.00m	MAR1394.15	Sediment	<5	<5
BH-M13 (SS1) 0.00-0.50m	MAR1394.16	Sediment	<5	<5
BH-M13 (SS2) 1.00-1.50m	MAR1394.17	Sediment	<5	<5
BH-M13 (SS3) 2.50-3.00m	MAR1394.18	Sediment	<5	<5
Certifi	ed Reference Material QSF	076MS (% Recovery)	85	60
		QC Blank	<1	<1

^{*} See Report Notes

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Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Dry Weight) ASC/SOP/301		
		Method No			
		Limit of Detection	1	1	
		Accreditation	UKAS	UKAS	
Client Reference:	SOCOTEC Ref:	Matrix	Dibutyltin (DBT)	Tributyltin (TBT)	
BH-M14 (SS1) 0.00-0.50m	MAR1394.19	Sediment	<5	<5	
BH-M14 (SS2) 1.00-1.50m	MAR1394.20	Sediment	<5	<5	
BH-M14 (SS3) 2.50-3.00m	MAR1394.21	Sediment	<1	<1	
BH-M15 (SS1) 0.00-0.50m	MAR1394.22	Sediment	<5	<5	
BH-M15 (SS2) 1.00-1.50m	MAR1394.23	Sediment	<5	<5	
BH-M15 (SS3) 2.50-3.00m	MAR1394.24	Sediment	<5	<5	
WP-M27 (SS1) 0.00-0.15m	MAR1394.25	Sediment	<5	<5	
BH-M16 (SS1) 0.00-0.50m	MAR1394.26	Sediment	<5	<5	
BH-M16 (SS2) 1.00-1.50m	MAR1394.27	Sediment	<5	<5	
BH-M17 (SS1) 0.00-0.50m	MAR1394.28	Sediment	<5	<5	
Cer	tified Reference Material QSF	077MS (% Recovery)	116	169	
		QC Blank	<1	<1	

^{*} See Report Notes

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Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)					
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF
BH-M01 (SS1) 0.00-0.50m	MAR1394.01	Sediment	<1	<1	<1	<1	<1	1.46
BH-M01 (SS2) 1.00-1.50m	MAR1394.02	Sediment	<1	<1	<1	<1	<1	1.13
BH-M01 (SS3) 2.50-3.00m	MAR1394.03	Sediment	<1	<1	<1	<1	<1	<1
BH-M03 (SS1) 0.00-0.50m	MAR1394.04	Sediment	<1	<1	<1	<1	<1	1.57
BH-M03 (SS2) 1.00-1.50m	MAR1394.05	Sediment	<1	<1	<1	<1	<1	1.72
BH-M03 (SS3) 2.50-3.00m	MAR1394.06	Sediment	<1	<1	<1	<1	<1	<1
BH-M07 (SS1) 0.00-0.50m	MAR1394.07	Sediment	<1	<1	<1	<1	<1	1.15
BH-M07 (SS2) 1.00-1.50m	MAR1394.08	Sediment	<1	<1	<1	<1	<1	1.65
BH-M07 (SS3) 2.50-3.00m	MAR1394.09	Sediment	<1	<1	<1	<1	<1	<1
BH-M09 (SS1) 0.00-0.50m	MAR1394.10	Sediment	<1	<1	<1	<1	<1	1.21
BH-M09 (SS2) 1.00-1.50m	MAR1394.11	Sediment	<1	<1	<1	<1	<1	1.85
BH-M09 (SS3) 2.50-3.00m	MAR1394.12	Sediment	<1	<1	<1	<1	<1	2.19
BH-M11 (SS1) 0.00-0.50m	MAR1394.13	Sediment	<1	<1	<1	<1	<1	1.07
BH-M11 (SS2) 1.00-1.50m	MAR1394.14	Sediment	<1	<1	<1	1.27	<1	2.86
Certified Referen	ce Material Quasimeme QPI	1105MS (% Recovery)	82	140	90	81	86	70
		QC Blank	<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

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Test Report ID MAR1394

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Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)					
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	BENZGHIP	BKF	CHRYSENE	DBENZAH	FLUORANT	FLUORENE
BH-M01 (SS1) 0.00-0.50m	MAR1394.01	Sediment	<1	<1	3.02	<1	<1	<1
BH-M01 (SS2) 1.00-1.50m	MAR1394.02	Sediment	<1	<1	2.60	<1	<1	<1
BH-M01 (SS3) 2.50-3.00m	MAR1394.03	Sediment	<1	<1	<1	<1	<1	<1
BH-M03 (SS1) 0.00-0.50m	MAR1394.04	Sediment	1.47	<1	3.81	<1	1.52	<1
BH-M03 (SS2) 1.00-1.50m	MAR1394.05	Sediment	1.67	<1	3.00	<1	1.66	<1
BH-M03 (SS3) 2.50-3.00m	MAR1394.06	Sediment	1.38	<1	1.33	<1	<1	<1
BH-M07 (SS1) 0.00-0.50m	MAR1394.07	Sediment	1.27	<1	3.40	<1	1.11	<1
BH-M07 (SS2) 1.00-1.50m	MAR1394.08	Sediment	1.61	<1	2.37	<1	1.33	<1
BH-M07 (SS3) 2.50-3.00m	MAR1394.09	Sediment	<1	<1	1.06	<1	<1	<1
BH-M09 (SS1) 0.00-0.50m	MAR1394.10	Sediment	1.02	<1	2.62	<1	1.05	<1
BH-M09 (SS2) 1.00-1.50m	MAR1394.11	Sediment	1.16	<1	4.04	<1	1.42	<1
BH-M09 (SS3) 2.50-3.00m	MAR1394.12	Sediment	1.25	<1	4.79	<1	1.52	<1
BH-M11 (SS1) 0.00-0.50m	MAR1394.13	Sediment	1.16	<1	3.71	<1	1.06	<1
BH-M11 (SS2) 1.00-1.50m	MAR1394.14	Sediment	1.76	<1	7.46	<1	2.16	<1
Certified Reference	e Material Quasimeme QPI	H105MS (% Recovery)	100	85	80	87	82	87
		QC Blank	<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

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Test Report ID MAR1394

Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)				
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/306
		Limit of Detection	1	1	1	1	100
		Accreditation	UKAS	UKAS	UKAS	UKAS	N
Client Reference:	SOCOTEC Ref:	Matrix	INDPYR	NAPTH	PHENANT	PYRENE	THC
BH-M01 (SS1) 0.00-0.50m	MAR1394.01	Sediment	<1	<1	<1	2.02	8680
BH-M01 (SS2) 1.00-1.50m	MAR1394.02	Sediment	<1	<1	<1	1.71	10600
BH-M01 (SS3) 2.50-3.00m	MAR1394.03	Sediment	<1	<1	<1	<1	2580
BH-M03 (SS1) 0.00-0.50m	MAR1394.04	Sediment	<1	<1	1.61	1.98	40900
BH-M03 (SS2) 1.00-1.50m	MAR1394.05	Sediment	1.08	<1	1.85	2.12	25300
BH-M03 (SS3) 2.50-3.00m	MAR1394.06	Sediment	<1	<1	<1	<1	34400
BH-M07 (SS1) 0.00-0.50m	MAR1394.07	Sediment	<1	<1	1.66	2.18	13200
BH-M07 (SS2) 1.00-1.50m	MAR1394.08	Sediment	1.04	<1	1.66	1.96	12000
BH-M07 (SS3) 2.50-3.00m	MAR1394.09	Sediment	<1	<1	<1	<1	9730
BH-M09 (SS1) 0.00-0.50m	MAR1394.10	Sediment	<1	<1	<1	1.80	9760
BH-M09 (SS2) 1.00-1.50m	MAR1394.11	Sediment	<1	<1	1.20	2.49	21200
BH-M09 (SS3) 2.50-3.00m	MAR1394.12	Sediment	<1	<1	1.57	2.90	36500
BH-M11 (SS1) 0.00-0.50m	MAR1394.13	Sediment	<1	<1	1.29	2.07	14000
BH-M11 (SS2) 1.00-1.50m	MAR1394.14	Sediment	1.10	<1	1.76	3.55	16100
Certified Reference	e Material Quasimeme QPF	I105MS (% Recovery)	88	100	85	88	98~
		QC Blank	<1	<1	<1	<1	<100

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For full analyte name see method summaries

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Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)					
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF
BH-M11 (SS3) 2.50-3.00m	MAR1394.15	Sediment	<1	<1	<1	<1	<1	<1
BH-M13 (SS1) 0.00-0.50m	MAR1394.16	Sediment	<1	<1	<1	<1	<1	2.22
BH-M13 (SS2) 1.00-1.50m	MAR1394.17	Sediment	<1	<1	<1	<1	<1	1.53
BH-M13 (SS3) 2.50-3.00m	MAR1394.18	Sediment	<1	<1	<1	<1	<1	<1
BH-M14 (SS1) 0.00-0.50m	MAR1394.19	Sediment	<1	<1	<1	<1	<1	<1
BH-M14 (SS2) 1.00-1.50m	MAR1394.20	Sediment	<1	<1	<1	<1	1.03	2.34
BH-M14 (SS3) 2.50-3.00m	MAR1394.21	Sediment	<1	<1	<1	<1	<1	1.59
BH-M15 (SS1) 0.00-0.50m	MAR1394.22	Sediment	<1	<1	<1	<1	<1	<1
BH-M15 (SS2) 1.00-1.50m	MAR1394.23	Sediment	<1	<1	<1	<1	<1	<1
BH-M15 (SS3) 2.50-3.00m	MAR1394.24	Sediment	<1	<1	<1	<1	<1	<1
WP-M27 (SS1) 0.00-0.15m	MAR1394.25	Sediment	<1	<1	<1	1.16	1.36	2.35
BH-M16 (SS1) 0.00-0.50m	MAR1394.26	Sediment	<1	<1	1.61	5.26	4.78	4.94
BH-M16 (SS2) 1.00-1.50m	MAR1394.27	Sediment	<1	<1	<1	<1	<1	<1
BH-M17 (SS1) 0.00-0.50m	MAR1394.28	Sediment	<1	<1	<1	<1	<1	<1
Certified Reference	ce Material Quasimeme QPI	H105MS (% Recovery)	81	113	92	76	78	66
		QC Blank	<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

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Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)					
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	BENZGHIP	BKF	CHRYSENE	DBENZAH	FLUORANT	FLUORENE
BH-M11 (SS3) 2.50-3.00m	MAR1394.15	Sediment	<1	<1	<1	<1	<1	<1
BH-M13 (SS1) 0.00-0.50m	MAR1394.16	Sediment	1.53	<1	2.97	<1	1.59	<1
BH-M13 (SS2) 1.00-1.50m	MAR1394.17	Sediment	1.27	<1	2.73	<1	1.26	<1
BH-M13 (SS3) 2.50-3.00m	MAR1394.18	Sediment	<1	<1	<1	<1	<1	<1
BH-M14 (SS1) 0.00-0.50m	MAR1394.19	Sediment	<1	<1	1.67	<1	<1	<1
BH-M14 (SS2) 1.00-1.50m	MAR1394.20	Sediment	2.32	1.43	2.07	<1	2.05	<1
BH-M14 (SS3) 2.50-3.00m	MAR1394.21	Sediment	1.26	<1	1.83	<1	1.45	<1
BH-M15 (SS1) 0.00-0.50m	MAR1394.22	Sediment	<1	<1	1.37	<1	<1	<1
BH-M15 (SS2) 1.00-1.50m	MAR1394.23	Sediment	<1	<1	1.60	<1	<1	<1
BH-M15 (SS3) 2.50-3.00m	MAR1394.24	Sediment	<1	<1	1.78	<1	<1	<1
WP-M27 (SS1) 0.00-0.15m	MAR1394.25	Sediment	2.47	1.33	2.57	<1	2.69	<1
BH-M16 (SS1) 0.00-0.50m	MAR1394.26	Sediment	3.94	2.89	6.88	<1	11.4	<1
BH-M16 (SS2) 1.00-1.50m	MAR1394.27	Sediment	<1	<1	1.71	<1	<1	<1
BH-M17 (SS1) 0.00-0.50m	MAR1394.28	Sediment	<1	<1	<1	<1	<1	<1
Certified Referen	ce Material Quasimeme QPF	1105MS (% Recovery)	83	85	78	74	83	80
		QC Blank	<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

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Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)				
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/306
		Limit of Detection	1	1	1	1	100
		Accreditation	UKAS	UKAS	UKAS	UKAS	N
Client Reference:	SOCOTEC Ref:	Matrix	INDPYR	NAPTH	PHENANT	PYRENE	THC
BH-M11 (SS3) 2.50-3.00m	MAR1394.15	Sediment	<1	<1	<1	<1	38900
BH-M13 (SS1) 0.00-0.50m	MAR1394.16	Sediment	1.19	<1	1.07	1.96	21500
BH-M13 (SS2) 1.00-1.50m	MAR1394.17	Sediment	<1	<1	<1	1.81	15500
BH-M13 (SS3) 2.50-3.00m	MAR1394.18	Sediment	<1	<1	<1	<1	3830
BH-M14 (SS1) 0.00-0.50m	MAR1394.19	Sediment	<1	<1	2.96	1.33	9280
BH-M14 (SS2) 1.00-1.50m	MAR1394.20	Sediment	1.93	<1	1.15	2.60	14200
BH-M14 (SS3) 2.50-3.00m	MAR1394.21	Sediment	<1	<1	<1	1.89	18600
BH-M15 (SS1) 0.00-0.50m	MAR1394.22	Sediment	<1	<1	<1	<1	8150
BH-M15 (SS2) 1.00-1.50m	MAR1394.23	Sediment	<1	<1	<1	1.03	8230
BH-M15 (SS3) 2.50-3.00m	MAR1394.24	Sediment	<1	<1	<1	1.31	11700
WP-M27 (SS1) 0.00-0.15m	MAR1394.25	Sediment	2.23	<1	1.55	3.18	17400
BH-M16 (SS1) 0.00-0.50m	MAR1394.26	Sediment	3.09	<1	4.15	10.6	11200
BH-M16 (SS2) 1.00-1.50m	MAR1394.27	Sediment	<1	<1	1.48	1.08	13500
BH-M17 (SS1) 0.00-0.50m	MAR1394.28	Sediment	<1	<1	<1	<1	7090
Certified Reference N	Naterial Quasimeme QPF	,	76	93	90	87	100~
		QC Blank	<1	<1	<1	<1	<100

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.





MAR1394 Test Report ID

Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)						
		Method No	ASC/SOP/302						
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	UKAS						
Client Reference:	SOCOTEC Ref:	Matrix	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180
BH-M01 (SS1) 0.00-0.50m	MAR1394.01	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M01 (SS2) 1.00-1.50m	MAR1394.02	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M01 (SS3) 2.50-3.00m	MAR1394.03	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M03 (SS1) 0.00-0.50m	MAR1394.04	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M03 (SS2) 1.00-1.50m	MAR1394.05	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M03 (SS3) 2.50-3.00m	MAR1394.06	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M07 (SS1) 0.00-0.50m	MAR1394.07	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M07 (SS2) 1.00-1.50m	MAR1394.08	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M07 (SS3) 2.50-3.00m	MAR1394.09	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M09 (SS1) 0.00-0.50m	MAR1394.10	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M09 (SS2) 1.00-1.50m	MAR1394.11	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M09 (SS3) 2.50-3.00m	MAR1394.12	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M11 (SS1) 0.00-0.50m	MAR1394.13	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M11 (SS2) 1.00-1.50m	MAR1394.14	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M11 (SS3) 2.50-3.00m	MAR1394.15	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M13 (SS1) 0.00-0.50m	MAR1394.16	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M13 (SS2) 1.00-1.50m	MAR1394.17	Sediment	<0.08	<0.08	<0.08	<0.08	0.13	0.22	<0.08
BH-M13 (SS3) 2.50-3.00m	MAR1394.18	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M14 (SS1) 0.00-0.50m	MAR1394.19	Sediment	0.21	0.26	0.28	0.31	0.30	0.29	0.34
Certified Reference N	laterial Quasimeme QOI	` ,	103~	87	96~	96~	98~	97~	96~
		QC Blank	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

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For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.





Test Report ID MAR1394

Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

		T I				I		1	I
		Units	μg/Kg (Dry Weight)						
		Method No	ASC/SOP/302						
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	UKAS						
Client Reference:	SOCOTEC Ref:	Matrix	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180
BH-M14 (SS2) 1.00-1.50m	MAR1394.20	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M14 (SS3) 2.50-3.00m	MAR1394.21	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M15 (SS1) 0.00-0.50m	MAR1394.22	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M15 (SS2) 1.00-1.50m	MAR1394.23	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M15 (SS3) 2.50-3.00m	MAR1394.24	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
WP-M27 (SS1) 0.00-0.15m	MAR1394.25	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M16 (SS1) 0.00-0.50m	MAR1394.26	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M16 (SS2) 1.00-1.50m	MAR1394.27	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M17 (SS1) 0.00-0.50m	MAR1394.28	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Certified Reference	e Material Quasimeme QOI	R145MS (% Recovery)	97~	87	98~	88	97~	98~	98~
		QC Blank	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

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For full analyte name see method summaries

[~] Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

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Test Report ID MAR1394

Issue Version 1

Customer Reference Scapa Flow Marie Scotland Sediment Testing

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
WSLM59*	MAR1394.01-28	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ICPMSS*	MAR1394.01-28	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
SOCOTEC Doncaster*	MAR1394.01-28	Analysis was conducted by an internal SOCOTEC laboratory.
SOCOTEC Doncaster*	MAR1394.06, 08, 09, 12, 15, 16, 19, 20, 27	Unsuitable to test due to Gravel and Shell content.
SUB_01*	MAR1394.01-28	Analysis was conducted by an approved subcontracted laboratory.
SUB_02*	MAR1394.01-28	Analysis was conducted by an approved subcontracted laboratory.
ASC/SOP/301	MAR1394.07-20, 22-28	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303/304		Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene). This should be taken into consideration when utilising the data.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Sample Contaminated through Damaged Packaging	N/A	N/A
D3	Sample Contaminated through Sampling	N/A	N/A
D4	Inappropriate Container/Packaging	N/A	N/A
D5	Damaged in Transit	N/A	N/A
D6	Insufficient Quantity of Sample	N/A	N/A
D7	Inappropriate Headspace	N/A	N/A
D8	Retained at Incorrect Temperature	N/A	N/A
D9	Lack of Date & Time of Sampling	N/A	N/A
D10	Insufficient Sample Details	N/A	N/A
D11	Sample integrity compromised or not suitable for analysis	N/A	N/A

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Test Report ID MAR1394

Issue Version

Customer Reference Scapa Flow Marie Scotland Sediment Testing

Method	Sample and Fraction Size	Method Summary			
Total Solids	Wet Sediment	Calculation (100%-Moisture Content). Moisture content determined by drying a portion of the sample at 120°C to constant weight.			
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.			
Total Organic Carbon (TOC)	Air dried and ground	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.			
Metals	Air dried and seived to <63μm	Aqua-regia extraction followed by ICP analysis.			
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.			
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.			
Total Hydrocarbon Content (THC)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.			
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.			
Organochlorine Pesticides (OCPs)	Air dried and seived to <2mm	olvent extraction and clean up followed by GC-MS-MS analysis.			

		Analyte Defir	itions		
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation Full Analyte name		Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorcyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorcyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Dibenzo[ah]anthracene	GHCH	gamma-Hexachlorcyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	НСВ	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	DDD	p,p'-Dichlorodiphenyldichloroethane
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	DDE	p,p'-Dichlorodiphenyldichloroethylene
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	DDT	p,p'-Dichlorodiphenyltrichloroethane
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		



Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01357

Issue Version

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

Customer Reference Scapa Flow Marine Scotland Sediment Testing

Date Sampled 04-05-Mar-2022

Date Received 16-Mar-22

Date Reported 12-Apr-22

Condition of samples Cold Satisfactory

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ





Test Report ID MAR01357

Issue Version

Customer Reference Scapa Flow Marine Scotland Sediment Testing

	<u>.</u>								
		Units	%	%	%	%	%	Mg/m3	N/A
		Method No	ASC/SOP/303	ASC/SOP/303	SUB_01*	SUB_01*	SUB_01*	SOCOTEC Doncaster*	SUB_02*
		Limit of Detection	0.2	0.2	N/A	N/A	N/A	N/A	N/A
		Accreditation	UKAS	UKAS	N	N	N	N	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	Total Moisture @ 120°C	Total Solids	Gravel (>2mm)	Sand (63-2000 µm)	Silt (<63 µm)	Particle Density	Asbestos
BH-M04 (SS1) 0.00-0.50m	MAR01357.001	Sediment	15.6	84.4	14.1	69.1	16.8	2.66	NAIIS
BH-M04 (SS2) 1.00-1.50m	MAR01357.002	Sediment	13.3	86.7	14.2	66.6	19.2	2.72	NAIIS
BH-M04 (SS3) 2.50-3.00m	MAR01357.003	Sediment	13.3	86.7	20.0	65.8	14.2	2.67	NAIIS
BH-M05 (SS1) 0.00-0.50m	MAR01357.004	Sediment	12.7	87.3	15.1	59.5	25.4	2.73	NAIIS
BH-M05 (SS2) 1.00-1.50m	MAR01357.005	Sediment	12.9	87.1	14.2	69.6	16.2	2.72	NAIIS
BH-M05 (SS3) 2.50-3.00m	MAR01357.006	Sediment	21.0	79.0	10.9	72.6	16.5	2.54	NAIIS
	Reference I	Material (% Recovery)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		QC Blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A

^{*} See Report Notes

NAIIS - No Asbestos Identified In Sample





Test Report ID MAR01357

Issue Version

Customer Reference Scapa Flow Marine Scotland Sediment Testing

		Units	% M/M
		Method No	WSLM59*
		Limit of Detection	0.02
		Accreditation	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	TOC
BH-M04 (SS1) 0.00-0.50m	MAR01357.001	Sediment	0.26
BH-M04 (SS2) 1.00-1.50m	MAR01357.002	Sediment	0.21
BH-M04 (SS3) 2.50-3.00m	MAR01357.003	Sediment	0.23
BH-M05 (SS1) 0.00-0.50m	MAR01357.004	Sediment	0.22
BH-M05 (SS2) 1.00-1.50m	MAR01357.005	Sediment	0.25
BH-M05 (SS3) 2.50-3.00m	MAR01357.006	Sediment	0.27
	Reference N	Material (% Recovery)	105
		QC Blank	<0.02

^{*} See Report Notes

NAIIS - No Asbestos Identified In Sample



Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01357

Issue Version

Customer Reference Scapa Flow Marine Scotland Sediment Testing

		Units				mg/Kg (D	ry Weight)			
		Method No				ICP	MSS*			
		Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc
BH-M04 (SS1) 0.00-0.50m	MAR01357.001	Sediment	24.6	0.29	51.4	40.0	0.12	31.8	50.7	161
BH-M04 (SS2) 1.00-1.50m	MAR01357.002	Sediment	23.8	0.19	34.5	18.4	0.04	27.4	25.8	80.8
BH-M04 (SS3) 2.50-3.00m	MAR01357.003	Sediment	19.9	0.32	36.5	21.4	0.03	29.0	23.5	82.1
BH-M05 (SS1) 0.00-0.50m	MAR01357.004	Sediment	16.6	0.17	27.8	11.9	<0.01	18.6	12.8	46.6
BH-M05 (SS2) 1.00-1.50m	MAR01357.005	Sediment	14.5	0.11	24.6	9.9	<0.01	16.3	10.2	45.8
BH-M05 (SS3) 2.50-3.00m	MAR01357.006	Sediment	11.7	0.15	23.3	10.3	<0.01	15.7	8.9	36.7
Cert	ified Reference Material SET	OC 774 (% Recovery)	107	105	109	108	101	107	103	103
		QC Blank	<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

^{*} See Report Notes



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Test Report ID MAR01357

Issue Version

Customer Reference Scapa Flow Marine Scotland Sediment Testing

		Units	μg/Kg (Di	ry Weight)		
		Method No	ASC/S	OP/301		
		Limit of Detection	1	1		
		Accreditation	UKAS	UKAS		
Client Reference:	SOCOTEC Ref:	Matrix	Dibutyltin (DBT)	Tributyltin (TBT)		
BH-M04 (SS1) 0.00-0.50m	MAR01357.001	Sediment	<5	<5		
BH-M04 (SS2) 1.00-1.50m	MAR01357.002	Sediment	<5	<5		
BH-M04 (SS3) 2.50-3.00m	MAR01357.003	Sediment	<5	<5		
BH-M05 (SS1) 0.00-0.50m	MAR01357.004	Sediment	<5	<5		
BH-M05 (SS2) 1.00-1.50m	MAR01357.005	Sediment	<5	<5		
BH-M05 (SS3) 2.50-3.00m	MAR01357.006	Sediment	<5	<5		
Certified F	Certified Reference Material QSP076MS (% Recovery)					
		QC Blank	<1	<1		

^{*} See Report Notes

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Test Report ID MAR01357

Issue Version

Customer Reference Scapa Flow Marine Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)					
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF
BH-M04 (SS1) 0.00-0.50m	MAR01357.001	Sediment	<1	<1	<1	<1	<1	1.83
BH-M04 (SS2) 1.00-1.50m	MAR01357.002	Sediment	<1	<1	<1	<1	<1	1.45
BH-M04 (SS3) 2.50-3.00m	MAR01357.003	Sediment	<1	<1	<1	<1	<1	1.65
BH-M05 (SS1) 0.00-0.50m	MAR01357.004	Sediment	<1	<1	<1	<1	<1	1.70
BH-M05 (SS2) 1.00-1.50m	MAR01357.005	Sediment	<1	<1	<1	<1	<1	1.84
BH-M05 (SS3) 2.50-3.00m	MAR01357.006	Sediment	1.34	1.16	1.92	4.94	5.71	6.87
Certified Referen	ce Material Quasimeme QPF	1105MS (% Recovery)	88	127	97	89	91	73
		QC Blank	<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ



Test Report ID MAR01357

Issue Version

Customer Reference Scapa Flow Marine Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)					
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	BENZGHIP	BKF	CHRYSENE	DBENZAH	FLUORANT	FLUORENE
BH-M04 (SS1) 0.00-0.50m	MAR01357.001	Sediment	1.75	<1	4.43	<1	1.74	<1
BH-M04 (SS2) 1.00-1.50m	MAR01357.002	Sediment	1.45	<1	3.83	<1	1.79	<1
BH-M04 (SS3) 2.50-3.00m	MAR01357.003	Sediment	1.44	<1	3.09	<1	1.23	<1
BH-M05 (SS1) 0.00-0.50m	MAR01357.004	Sediment	1.07	<1	3.22	<1	1.08	<1
BH-M05 (SS2) 1.00-1.50m	MAR01357.005	Sediment	1.30	<1	2.09	<1	1.54	<1
BH-M05 (SS3) 2.50-3.00m	MAR01357.006	Sediment	5.15	3.05	7.67	1.28	9.94	1.77
Certified Referer	nce Material Quasimeme QPH	105MS (% Recovery)	96	99	90	96	98	86
		QC Blank	<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.





Test Report ID MAR01357

Issue Version

Customer Reference Scapa Flow Marine Scotland Sediment Testing

		Units	μg/Kg (Dry Weight)				
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/306
		Limit of Detection	1	1	1	1	100
		Accreditation	UKAS	UKAS	UKAS	N	N
Client Reference:	SOCOTEC Ref:	Matrix	INDPYR	NAPTH	PHENANT	PYRENE	THC
BH-M04 (SS1) 0.00-0.50m	MAR01357.001	Sediment	<1	1.38	3.60	2.88	59900
BH-M04 (SS2) 1.00-1.50m	MAR01357.002	Sediment	<1	1.38	4.48	2.64	46800
BH-M04 (SS3) 2.50-3.00m	MAR01357.003	Sediment	<1	1.43	2.81	3.06	123000
BH-M05 (SS1) 0.00-0.50m	MAR01357.004	Sediment	<1	1.28	1.10	3.05	42200
BH-M05 (SS2) 1.00-1.50m	MAR01357.005	Sediment	<1	1.22	1.14	1.78	20200
BH-M05 (SS3) 2.50-3.00m	MAR01357.006	Sediment	4.20	4.02	6.67	9.32	23600
Certified Reference	Material Quasimeme QPH	I105MS (% Recovery)	90	103	94	101	92~
		QC Blank	<1	<1	<1	<1	<1

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For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.





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		Units	μg/Kg (Dry Weight)						
		Method No	ASC/SOP/302						
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	UKAS						
Client Reference:	SOCOTEC Ref:	Matrix	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180
BH-M04 (SS1) 0.00-0.50m	MAR01357.001	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M04 (SS2) 1.00-1.50m	MAR01357.002	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M04 (SS3) 2.50-3.00m	MAR01357.003	Sediment	<0.08	0.12	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M05 (SS1) 0.00-0.50m	MAR01357.004	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M05 (SS2) 1.00-1.50m	MAR01357.005	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BH-M05 (SS3) 2.50-3.00m	MAR01357.006	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Certified Reference M	laterial Quasimeme QOF	R143MS (% Recovery)	79	103	96	108	98	101	91
		QC Blank	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

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For full analyte name see method summaries

[~] Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

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REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
WSLM59*	MAR01357.001-006	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ICPMSS*	MAR01357.001-006	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
SOCOTEC Doncaster*	MAR01357.001-006	Analysis was conducted by an internal SOCOTEC laboratory.
SUB_01*	MAR01357.001-006	Analysis was conducted by an approved subcontracted laboratory.
SUB_02*	MAR01357.001-006	Analysis was conducted by an approved subcontracted laboratory.
ASC/SOP/301	MAR01357.001-006	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303/304		Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene). This should be taken into consideration when utilising the data.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A
D12	Sample integrity compromised or not suitable for analysis	N/A	N/A





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Method	Sample and Fraction Size	Method Summary		
Total Solids	Wet Sediment	Calculation (100%-Moisture Content). Moisture content determined by drying a portion of the sample at 120°C to constant weight.		
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.		
Total Organic Carbon (TOC)	Air dried and ground	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.		
Metals	Air dried and seived to <63μm	Aqua-regia extraction followed by ICP analysis.		
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.		
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.		
Total Hydrocarbon Content (THC)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.		
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.		

Analyte Definitions								
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name			
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content			
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorcyclohexane			
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorcyclohexane			
BAA	Benzo[a]anthracene	DBENZAH	Dibenzo[ah]anthracene	GHCH	gamma-Hexachlorcyclohexane			
ВАР	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin			
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene			
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	DDD	p,p'-Dichlorodiphenyldichloroethane			
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	DDE	p,p'-Dichlorodiphenyldichloroethylene			
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	DDT	p,p'-Dichlorodiphenyltrichloroethane			
C1N	C1-naphthalenes	PHENANT	Phenanthrene					
C1PHEN	C1-phenanthrene	PYRENE	Pyrene					