envirocentre

part of CuraTerrae

Rousay Harbour, Orkney
Dredging Best Practicable Environmental Option Report

November 2025

CONTROL SHEET

Client: Orkney Islands Council
Project Title: Rousay Harbour, Orkney
Report Title: Dredging Best Practicable Environmental Option Report
Document number: 15595
Project number: 682766

Issue Record

Issue	Status	Author	Reviewer	Approver	Issue Date
1	Final	MMF	FR	CCAS	20/11/2025
2					

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

EnviroCentre Limited is registered in Scotland under no. SC161777.

VAT no. GB 348 6770 57.

Contents

Appendices

Tables

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 maintenance dredging to help maintain the navigable channel and approaches to Rousay Harbour, Orkney.

Dredging will be undertaken to a maximum depth of 1.0m or less from the existing bed level across the dredge areas to be licenced. The proposed dredging works will be undertaken to achieve a depth of -2.5m CD on the navigable channel on approach to Rousay Harbour. Approximately up to 120 m^3 of material is estimated to be dredged which includes a small contingency volume.

The dredge area and sampling locations are detailed in within Drawing No. 682766-GIS001 and 682766-GIS002 provided in Appendix A.

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 proposed dredging requirements are throughout the navigable channel.

Sampling was undertaken in September 2025 which comprised collection of 3 grab samples from the dredge area as per the agreed sample plan. The samples were predominately gravel with a high sand and low silt content.

1.2 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.

Whilst the Client has a right to use the information as appropriate, EnviroCentre Limited retains ownership of the copyright and intellectual content of this report. Any distribution of this report should be managed to avoid compromising the validity of the information or legal responsibilities held by both the Client and EnviroCentre Limited (including those of third-party copyright). EnviroCentre Limited does not accept liability to any third party for the contents of this report unless written agreement is secured in advance, stating the intended use of the information.

EnviroCentre Limited accepts no liability for use of the report for purposes other than those for which it was originally provided, or where EnviroCentre Limited has confirmed it is appropriate for the new context.

1.3 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.

1.4 Sediment Sampling and Nature of Marine Sediments on Site

Samples from the proposed dredge area were collected in September 2025 and submitted for analysis in line with the Marine Directorate's guidance and the agreed sampling plan. The sample logs are provided in Appendix B with analytical results summary and laboratory certificates in Appendix C.

1.4.1 Sample Results

Laboratory certificates are included in Appendix B.

The majority of samples recorded contaminants of concern below Revised Action Level 1 (RAL1), with the following exceptions:

- Copper – 3 of 3 samples recorded concentrations above RAL1
- Mercury – 2 of 3 samples recorded concentrations above RAL1
- PAHs – 1 of 3 samples recorded concentrations above RAL1 for one or more PAH species
- TPH – 3 of 3 samples recorded concentrations above RAL1

No asbestos was recorded within the samples.

No samples recorded contaminants above Revised Action Level 2 where one is available for review.

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/ Estuary/ Riverbank	Leave in situ	Not an option due to the project specific requirements to maintain access to the pier for the marine traffic/pier users.	No
	Infilling of an existing dry dock/harbour facility/ development site (re-use)	There are currently no projects on Rousay which require this material.	No
	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. The dredge material comprises a mixture of gravel and sand which is dominated by the presence of gravel. There are currently no known requirements for beach nourishment local to the source of material.	No
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. OIC were previously contacted with regards to landfill capacity in the area. 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.	No
	Land Incineration	The dredged material consists of non-combustible material (silts, sands, gravels,) with a low combustible component and very high-water content. The remote nature of the sites does not make this tangible option as material would need transported to the mainland.	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 the appropriate Environmental Authorisation from SEPA. 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 proposed spoil grounds are at Stromness C (FIO45) or plough dredging with relocation of material to deeper water adjacent to the harbour.	Yes

2.2 Summary of Identified BPEO Options

Following review of the available options within the screening process, due to the remote nature of the site, there are no other viable disposal routes available for consideration beyond the traditional sea disposal approach. 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 is typically considered suitable for sea based disposal with additional assessment of data due to the presence of exceedances above RAL1. Further consideration of the potential impacts associated with the disposal of dredged material are considered within Section 3.

3 FURTHER ASSESSMENT

On the basis of the exceedances of Action Level 1, further assessment to determine the suitability of the material for sea disposal is deemed a requirement.

The approach for this further assessment is outlined as follows:

- Provide an overview of the proposed dredge works and the identified disposal site including any available existing chemical monitoring data for the site; and
- Compare existing chemical data with other recognised sediment assessment criteria including those listed below. Summary tables are provided in Appendix **Error! Reference source not f ound.**.

Background Assessment Concentration (BAC) - BACs were developed by the OSPAR Commission (OSPAR) for testing whether concentrations are near background levels. Mean concentrations significantly below the BAC are said to be near background. However, it should be noted that river catchments have their own unique geochemical fingerprints and are also governed by the geology within the catchment, so in theory one set of background level values is not applicable to all situations;

Effects Range Low (ERL) - ERLs were developed by the United States Environmental Protection Agency (USEPA) for assessing the ecological significance of sediment concentrations. Concentrations below the ERL rarely cause adverse effects in marine organisms. Concentrations above the ERL will often cause adverse effects in some marine organisms;

Probable Effects Level (PEL) – PELs (Marine) have been adopted from the Canadian Environmental Quality Guidelines (http://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/) If a concentration is recorded above the PEL this is the probable effect range within which adverse effects frequently occur. The Threshold Effect levels (TELs), which are related to the PELs have been not been included in the summary table in Appendix **Error! Reference source not found.** or used as part o f the further assessment as they typically fall below the RAL1.

Review of potential risks to the list of receptors identified in “Water Framework Directive Assessment: estuarine and coastal waters (https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters) to draw conclusions from available information and provide recommendation for proposed disposal routes.

3.1 Analytical Data Review

Laboratory certificates and data summary tables for the data are provided in Appendix B.

3.1.1 Action Level 1

- Copper – 3 of 3 samples recorded concentrations above RAL1
- Mercury – 2 of 3 samples recorded concentrations above RAL1
- PAHs – 1 of 3 samples recorded concentrations above RAL1 for one or more PAH species
- TPH – 3 of 3 samples recorded concentrations above RAL1

3.1.2 ERL & PEL Review

Exceedances of the ERL can be summarised as follows:

- 3 of 3 samples exceeded the ERL for Copper of 34 mg/kg
- 2 of 3 samples exceed the ERL for Mercury of 0.15mg/kg
- 1 of 3 samples exceeded the ERL for one or more individual PAH species where one exists.

Exceedances of the PEL can be summarised as follows:

- 0 of 3 samples exceeded the PEL for Copper of 108 mg/kg
- 0 of 3 samples exceed the PEL for Mercury of 0.7 mg/kg
- 1 of 3 samples exceeded the PEL for various individual PAH species where one exists.

3.1.3 Action Level 2

There were no exceedances of RAL 2 where one exists for contaminants of concern.

3.1.4 Averages

Average concentrations of the key contaminants of concern compared to the various screening criteria can be summarised as follows

- Average concentrations of Copper, Mercury and specific PAHs exceed RAL1
- Average concentrations of Copper, Mercury and specific PAHs exceed the ERL
- No average concentrations exceed the PEL where one is available for review
- No average concentrations exceed 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 including the following:

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

Each of these points are considered in Table 3-1 below:

Table 3-1: Receptor Risk Assessment

Key Receptor[1]	Brief Summary of Potential Effects on Receptor	Further Consideration Required?	Comment
Hydromorphology (Source Area and Disposal Site)	Morphological conditions, for example depth variation, the seabed and intertidal zone structure tidal patterns, for example dominant currents, freshwater flow and wave exposure	No	The dredge sites are within the Westray Firth (water body ID 200243) which has an overall classification of "good" and hydromorphological classification of "High". The proposed Disposal site is at Stromness C (FI045) is located within the Tor Ness to Breck Ness Waterbody which has an overall classification of "High" and is not considered to be heavily modified. The classification of this water body takes into account the presence of the disposal site, so no further assessment is considered to be required.
Biology - habitats	Included to assess potential impacts to sensitive/high value habitats.	No	The dredge site has been previously dredged so not considered further as it is not a new dredge site. The proposed disposal site Stromness C (FI045) has previously been used for the disposal of suitable dredged material therefore not considered further in the assessment. This site was used for the last dredge campaign at Sutherland Pier approaches.
Biology – fish	Consideration of fish both within the estuary and also potential effects on migratory fish in transit through the estuary	No	The dredge sites and disposal sites are within coastal waters and not located within an estuary. The works are unlikely to have a significant or sustained effect on the migration of fish. No further assessment considered necessary.
Water Quality	Consideration must be given to water quality when contaminants are present in exceedance of CEFAS RAL1.	Yes	Some limited exceedances of RAL1 were recorded for some metals, PAHs and TPH. Consideration of these exceedances is considered further below. According to SEPA, the Wyre and Rousay Sounds water body has "good" status for water quality in 2023.

[1] https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

Key Receptor[1]	Brief Summary of Potential Effects on Receptor	Further Consideration Required?	Comment
Protected Areas	If your activity is within 2km of any WFD protected area, include each identified area in your impact assessment. • special areas of conservation (SAC) • special protection areas (SPA) • shellfish waters • bathing waters • nutrient sensitive areas	No	The dredge site is located within the Wyre and Rousay Sounds Marine Protection Area (MPA) and the North Orkney Special Protection Area (SPA). The North Orkney SPA designation is for the following qualifying interests supports a non-breeding population of Great northern diver (*Gavia immer*) and Slavonian grebe (*Podiceps auritus*). In addition to this the site also has breeding populations of Red-throated diver (*Gavia stellata*) as well as populations of migratory velvet scoter (*Melanitta fusca)*. The disposal site is within 2 km of the Scapa Flow SPA and Hoy SPA and not within 2km of any SAC. The Scapa Flow SPA designation is for the following non-breeding birds Black-throated diver (*Gavia arctica*), Eider (*Somateria mollissima*), Great northern diver (*Gavia immer*) and Long-tailed duck (*Clangula hyemalis*), Red-breasted merganser (*Mergus serrator*), Shag (*Phalacrocorax aristotelis*), Slavonian grebe (*Podiceps auritus*) and breeding populations of Red-throated diver (*Gavia stellata*). The Hoy SPA designation is for populations of various breeding seabird species. The proposed dredging and disposal works are considered unlikely to have an impact on the qualifying features of the designated sites, particularly that the dredge site is adjacent to an operational pier and that the disposal site is within an area of existing vessel movements. The dredge and disposal site are not located within 2km of any designated bathing waters, with all bathing waters noted to be on the Scottish Mainland. The dredge and disposal sites are not designated as shellfish water or within 2km of a designated shellfish water.

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 low and not considered to represent a significant risk to the overall water quality either at the dredge site or proposed disposal site at the levels present.

Although there are contaminants of concern above the RAL1 the sediment for disposal, it is considered that these levels will not contribute to an overall degradation of water quality at the sea disposal site. While any effects are considered to be both localised and temporary, the potential for both dilution and natural attenuation in the open waters is considerable.

The key contaminants for impacting water quality are considered to be metals as these have the potential to dissolve or desorb from sorption sites within the sediment. However, natural geochemical processes will limit their solubility along with the large dilution potential it is not expected that this would have a long-term impact on water quality. PAHs are hydrophobic with low aqueous solubility and will naturally remain associated with organic sediment fractions, rather than become dissolved within the water column. On this basis, the risks associated with impact to water quality from chemical contaminants in sediment are considered to be low, with the associated dilution potential providing further mitigation. The key risk to water quality is considered to be a short-term increase in turbidity/suspended solids during the sea disposal activity. Although this is likely to cause a localised increase in suspended solids, it is considered that this will be both local and temporary in nature and has been factored into the selection and location of the agreed sea disposal ground. 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 average content of various particle sizes is detailed below in Table 3-2.

Table 3-2: Summary of PSA Data

Dredge Area	Gravel (>2mm)	Sand (0.063mm<Sand<2mm)	Silt & Clay (<0.063mm)	Quantity to be dredged m^3
Rousay	61.5%	37%	1.5%	120
	74 m^3	44m^3	2m^3	

Given that an average of 98.5 % 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 91.5 % or 2 m^3 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. Any effects from the disposal of the material either locally from plough dredging, or from disposal at a disposal site are considered to be both localised and temporary.

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

The samples collected across the dredge site recorded concentrations of the key contaminants of concern below RAL1, with some minor exceedances of copper, mercury and PAH species.

As a result, risks to the marine environment and water quality associated with the dredging and disposal are considered to be low, with the main risk being identified as the temporary and localised increases in suspended sediments as per any dredging exercise.

Based on the chemical quality of the sediment samples retrieved and tested from the dredge site, the sea disposal (either to the Stromness C disposal ground or by ploughing)of the material is considered to have no significant long-term impact on the marine environment.

REFERENCES

Marine Scotland (2015). Guidance for Marine Licence Applicants Version 2: Scottish Government.

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

APPENDICES

A DRAWINGS

343650

343700

N

RS01

RS03

RS02

1027450

1027450

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

343650

343700

Legend

- Rousay Dredge Area
- Rousay Sampling Stations

Do not scale this map

Client
Orkney Islands Council Harbour Authority

Project
Rousay Harbour, Orkney

Title
Sediment Sampling Stations Plan

Status
FINAL

Drawing No.	Revision	Date
682766-GIS002	-	11 Aug 2025
Drawn	**Checked**	**Approved**
MMF	CCAS	CCAS

Scale
1:250 @A3
0 1.25 2.5 5 7.5 Metres

Rev	Date	Amendment	Initials
-	-	-	-

envirocentre
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA.
T: 0141 341 5040 E: info@envirocentre.co.uk
W: www.envirocentre.co.uk

B SAMPLE LOGS

envirocentre part of CuraTerrae 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Rousay Harbour, Orkney	**Location ID**
	Project No.	682776	**RS01**
	Client	Orkney Islands Council Harbour Authority	

GRAB SAMPLE LOG

Date/Time	19/09/2025	**Latitude**	59° 07.816276341
Dredge Area	Rousay Harbour	**Longitude**	-2° 59.141293286
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	AK

Remarks: Black gravelly coarse sand with shell fragments and maerl.

Biota: Maerl.

Odours: -

Anthropogenic Inputs: -

Notes: Grab sample obtained on 3rd attempt.

envirocentre part of CuraTerrae 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Rousay Harbour, Orkney	**Location ID**
	Project No.	682776	**RS02**
	Client	Orkney Islands Council Harbour Authority	

GRAB SAMPLE LOG

Date/Time	19/09/2025	**Latitude**	59° 07.808484682
Dredge Area	Rousay Harbour	**Longitude**	-2° 59.150289677
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	AK

Remarks: Black gravelly coarse sand with shell fragments and maerl.

Biota: Maerl.

Odours: -

Anthropogenic Inputs: Two fragments of glass.

Notes: Grab sample obtained on 3rd attempt.

envirocentre part of CuraTerrae 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Rousay Harbour, Orkney	**Location ID**
	Project No.	682776	**RS03**
	Client	Orkney Islands Council Harbour Authority	

GRAB SAMPLE LOG

Date/Time	19/09/2025	**Latitude**	59° 07.812855596
Dredge Area	Rousay Harbour	**Longitude**	-2° 59.141024075
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	AK

Remarks: Black gravelly coarse sand with shell fragments and maerl.

Biota: Maerl.

Odours: -

Anthropogenic Inputs: Singular piece of glass.

Notes: Grab sample obtained on 5th attempt.

C DATA SUMMARY TABLES AND LAB CERTIFICATES

Summary Table A

Sampling Results Incorporated with BPEO Assessment (mg/kg)

Source	AL1	AL2	BAC CSEMP	ERL CSEMP	PEL Canada	RS01 (0.0-0.15)	RS02 (0.0-0.15)	RS03 (0.0-0.15)	AVERAGE	No. Exceed RAL 1	No. Exceed RAL 2	No.Exceed BAC?	No. Exceed ERL	No. Exceed PEL?
Arsenic	20	70	25	8.2	41.6	11.6	8.8	8.5	9.63	0	0	0	-	0
Cadmium	0.4	4	0.31	1.2	4.2	0.15	0.24	0.17	0.19	0	0	0	0	0
Chromium	50	370	81	81	160	26	29.8	28.5	28.10	0	0	0	0	0
Copper	30	300	27	34	108	69	41.0	52.3	54.10	3	0	3	3	0
Mercury	0.25	1.5	0.07	0.15	0.7	0.48	0.05	0.27	0.27	2	0	2	2	0
Nickel	30	150	36	-	-	21.7	24.8	23.2	23.23	0	0	0	N/A	N/A
Lead	50	400	38	47	112	29.7	12.6	25.1	22.47	0	0	0	0	0
Zinc	130	600	122	150	271	85.7	98.4	76.1	86.73	0	0	0	0	0
Napthalene	0.1		0.08	0.16	0.391	0.016	0.004	0.139	0.05	1	-	1	0	0
Acenaphthylene	0.1				0.128	0.007	0.003	0.007	0.01	0	-	N/A	N/A	0
Acenaphthene	0.1				0.0889	0.005	0.001	0.142	0.05	1	-	N/A	N/A	0
Fluorene	0.1				0.144	0.006	0.002	0.126	0.04	1	-	N/A	N/A	0
Phenanthrene	0.1		0.032	0.24	0.544	0.017	0.004	0.765	0.26	1	-	1	1	1
Anthracene	0.1		0.05	0.085	0.245	0.008	0.003	0.191	0.07	1	-	1	1	0
Fluoranthene	0.1		0.039	0.6	1.494	0.026	0.009	1.200	0.41	1	-	1	1	0
Pyrene	0.1		0.024	0.665	1.398	0.062	0.046	0.951	0.35	1	-	3	1	0
Benzo(a)anthracene	0.1		0.016	0.261	0.693	0.012	0.004	0.862	0.29	1	-	1	1	1
Chrysene	0.1		0.02	0.384	0.846	0.037	0.024	0.993	0.35	1	-	3	1	1
Benzo(b)fluoranthene	0.1		-	-	-	0.031	0.016	1.020	0.36	1	-	N/A	N/A	N/A
Benzo(k)fluoranthene	0.1		-	-	-	0.017	0.009	0.832	0.06	1	-	N/A	N/A	N/A
Benzo(a)pyrene	0.1		0.03	0.384	0.763	0.025	0.014	1.110	0.38	1	-	1	1	1
Indeno(1,2,3cd)pyrene	0.1		0.103	0.24	-	0.013	0.005	0.677	0.23	1	-	1	1	N/A
Benzo(ghi)perylene	0.1		0.08	0.085	-	0.027	0.014	0.644	0.23	1	-	1	1	N/A
Dibenzo(a,h)anthracene	0.01		-	-	0.135	0.006	0.004	0.188	0.07	1	-	N/A	N/A	1
THC	100		-	-	-	420.0	320.0	229.0	323.00	3	-	N/A	N/A	N/A
PCBs	0.02	0.18	-	-	0.189	0.00452	0.00434	0.02442	0.0022	0	0	N/A	N/A	0
TBT	0.1	0.5	-	-	-	0.03100	0.01320	0.02650	0.0236	0	0	N/A	N/A	N/A

Note: Underlined Values are < LOD

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

Summary Table B

Stranraer Harbour Average Concentrations

All units in mg/kg

	AL1	AL2	BAC	<ERL	PEL	Dredge Average	Exceed AL1?	Exceed AL2?	Exceed BAC?	Exceed ERL ?	Exceed PEL?
Source			CSEMP	CSEMP	Canada						
Arsenic	20	70	25	-	41.6	9.6	No	No	No	N/A	No
Cadmium	0.4	4	0.31	1.2	4.2	0.2	No	No	No	No	No
Chromium	50	370	81	81	160	28.1	No	No	No	No	No
Copper	30	300	27	34	108	54.1	**Yes**	No	**Yes**	**Yes**	No
Mercury	0.25	1.5	0.07	0.15	0.7	0.3	**Yes**	No	**Yes**	**Yes**	No
Nickel	30	150	36	-	-	23.2	No	No	No	N/A	N/A
Lead	50	400	38	47	112	22.5	No	No	No	No	No
Zinc	130	600	122	150	271	86.7	No	No	No	No	No
					-						
Napthalene	0.1	-	0.08	0.16	0.319	0.05	No	N/A	No	No	No
Acenaphthylene	0.1	-	-	-	0.128	0.01	No	N/A	N/A	N/A	No
Acenaphthene	0.1	-	-	-	0.0889	0.05	No	N/A	N/A	N/A	No
Fluorene	0.1	-	-	-	0.144	0.04	No	N/A	N/A	N/A	No
Phenanthrene	0.1	-	0.032	0.24	0.544	0.26	**Yes**	N/A	**Yes**	**Yes**	No
Anthracene	0.1	-	0.05	0.085	0.245	0.07	No	N/A	**Yes**	No	No
Fluoranthene	0.1	-	0.039	0.6	1.494	0.41	**Yes**	N/A	**Yes**	No	No
Pyrene	0.1	-	0.024	0.665	1.398	0.35	**Yes**	N/A	**Yes**	No	No
Benzo(a)anthracene	0.1	-	0.016	0.261	0.693	0.29	**Yes**	N/A	**Yes**	**Yes**	No
Chrysene	0.1	-	0.02	0.384	0.846	0.35	**Yes**	N/A	**Yes**	No	No
Benzo(b)fluoranthene	0.1	-	-	-	-	0.36	**Yes**	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	0.1	-	-	-	-	0.06	No	N/A	N/A	N/A	N/A
Benzo(a)pyrene	0.1	-	0.03	0.384	0.763	0.38	**Yes**	N/A	**Yes**	No	No
Indeno(1,2,3cd)pyrene	0.1	-	0.103	0.24	-	0.23	**Yes**	N/A	**Yes**	No	N/A
Benzo(ghi)perylene	0.1	-	0.08	0.085	-	0.23	**Yes**	N/A	**Yes**	**Yes**	N/A
Dibenzo(a,h)anthracene	0.01	-	-	-	0.135	0.07	**Yes**	N/A	N/A	N/A	No
Total Hydrocarbons (THC)	100	-	-	-	-	323.00	**Yes**	N/A	N/A	N/A	N/A
PCBs	0.02	0.18	-	-	0.189	0.002	No	No	N/A	N/A	No
TBT	0.1	0.5	-	-	-	0.0236	No	No	N/A	N/A	N/A

Certificate of Analysis

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

Test Report ID MAR02829

Issue Version: 1

Customer: Envirocentre Ltd, 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA

Customer Reference: 682766 - Rousay

Date Sampled: 19-Sep

Date Samples Received: 29-Sep-25

Test Report Date: 05-Nov-25

Condition of samples: Ambient Satisfactory

Opinions and Interpretations expressed herein are outside the scope of our UKAS accreditation
The results reported relate only to the sample tested
The results apply to the sample as received

[Redacted]

Authorised by: Jane Colbourne

Position: Customer Service Specialist

1252

Certificate of Analysis

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

Test Report ID MAR02829
Issue Version 1
Customer Reference 682766 - Rousay

		Units	%	%	%	%	%	N/A
		Method No	ASC/SOP/303	ASC/SOP/303	SUB_01*	SUB_01*	SUB_01*	SUB_02*
		Limit of Detection	0.2	0.2	N/A	N/A	N/A	N/A
		Accreditation	UKAS	UKAS	N	N	N	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Total Moisture @ 120°C**	**Total Solids**	**Gravel (>2mm)**	**Sand (63-2000 µm)**	**Silt (<63 µm)**	**Asbestos**
RS01 (0.0-0.15)	MAR02829.001	Sediment	28.6	71.4	69.48	29.18	1.34	NAD
RS02 (0.0-0.15)	MAR02829.002	Sediment	26.5	73.5	60.52	38.31	1.18	NAD
RS03 (0.0-0.15)	MAR02829.003	Sediment	26.2	73.8	54.90	43.06	2.04	NAD
Reference 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

* See Report Notes
NAD - No Asbestos Detected

Certificate of Analysis

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

Test Report ID	MAR02829
Issue Version	1
Customer Reference	682766 - Rousay

		Units	% M/M
		Method No	WSLM59*
		Limit of Detection	0.02
		Accreditation	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**TOC**
RS01 (0.0-0.15)	MAR02829.001	Sediment	1.66
RS02 (0.0-0.15)	MAR02829.002	Sediment	1.31
RS03 (0.0-0.15)	MAR02829.003	Sediment	1.51
		Reference Material (% Recovery)	100
		QC Blank	<0.02

* See Report Notes

NAD - No Asbestos Detected

Certificate of Analysis

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

Test Report ID MAR02829
Issue Version 1
Customer Reference 682766 - Rousay

		Units	mg/Kg (Dry Weight)							
		Method No	ICPMSS*							
		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**
RS01 (0.0-0.15)	MAR02829.001	Sediment	11.6	0.15	26.0	69.0	0.48	21.7	29.7	85.7
RS02 (0.0-0.15)	MAR02829.002	Sediment	8.8	0.24	29.8	41.0	0.05	24.8	12.6	98.4
RS03 (0.0-0.15)	MAR02829.003	Sediment	8.5	0.17	28.5	52.3	0.27	23.2	25.1	76.1
Certified Reference Material SETOC 768 (% Recovery)			98	98	104	103	95	106	94	97
QC Blank			<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

* See Report Notes

Certificate of Analysis

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

Test Report ID	MAR02829
Issue Version	1
Customer Reference	682766 - Rousay

		Units	µg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	1	1
		Accreditation	UKAS	N*
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
RS01 (0.0-0.15)	MAR02829.001	Sediment	4.95	31.0
RS02 (0.0-0.15)	MAR02829.002	Sediment	5.54	13.2
RS03 (0.0-0.15)	MAR02829.003	Sediment	11.3	26.5
Certified Reference Material BCR-646 (% Recovery)			106	113
QC Blank			<1	<1

* See Report Notes

Certificate of Analysis

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

Test Report ID MAR02829
Issue Version 1
Customer Reference 682766 - Rousay

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	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**
RS01 (0.0-0.15)	MAR02829.001	Sediment	5.13	7.43	8.25	11.7	24.5	31.1
RS02 (0.0-0.15)	MAR02829.002	Sediment	<1	2.51	3.17	3.68	14.0	16.1
RS03 (0.0-0.15)	MAR02829.003	Sediment	142	7.43	191	862	1110	1020
Certified Reference Material Quasimeme SED42 (% Recovery)			38	117	89	83	75	96
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 Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.
*See report notes

Certificate of Analysis

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

Test Report ID MAR02829
Issue Version 1
Customer Reference 682766 - Rousay

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	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**
RS01 (0.0-0.15)	MAR02829.001	Sediment	26.6	17.4	36.5	5.71	25.8	6.43
RS02 (0.0-0.15)	MAR02829.002	Sediment	13.5	9.36	24.3	4.47	9.08	1.69
RS03 (0.0-0.15)	MAR02829.003	Sediment	644	832	993	188	1200	126
Certified Reference Material Quasimeme SED42 (% Recovery)			90	81	98	78	95	62
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 Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.
*See report notes

Certificate of Analysis

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

Test Report ID MAR02829
Issue Version 1
Customer Reference 682766 - Rousay

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	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**
RS01 (0.0-0.15)	MAR02829.001	Sediment	12.9	16.1	16.7	62.0	420000
RS02 (0.0-0.15)	MAR02829.002	Sediment	4.81	3.78	4.34	46.2	320000
RS03 (0.0-0.15)	MAR02829.003	Sediment	677	139	765	951	229000
Certified Reference Material Quasimeme SED42 (% Recovery)			91	101	84	95	78~
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.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.
*See report notes

Certificate of Analysis

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

Test Report ID MAR02829
Issue Version 1
Customer Reference 682766 - Rousay

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB28**	**PCB52**	**PCB101**	**PCB118**	**PCB138**	**PCB153**	**PCB180**
RS01 (0.0-0.15)	MAR02829.001	Sediment	0.54	0.46	0.69	0.78	0.91	0.67	0.47
RS02 (0.0-0.15)	MAR02829.002	Sediment	0.25	0.55	0.90	0.72	0.90	0.80	0.22
RS03 (0.0-0.15)	MAR02829.003	Sediment	0.28	3.40	6.30	6.25	3.94	3.55	0.70
Certified Reference Material Quasimeme SED28 (% Recovery)			98	96	101	101	98	96	91
QC Blank			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

Certificate of Analysis

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

Test Report ID MAR02829
Issue Version 1
Customer Reference 682766 - Rousay

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
WSLM59*	MAR02829.001-003	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ICPMSS*	MAR02829.001-003	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
SUB_01*	MAR02829.001-003	Analysis was conducted by an approved subcontracted laboratory.
SUB_02*	MAR02829.001-003	Analysis was conducted by an approved subcontracted laboratory.
ASC/SOP/301	MAR02829.001-003	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected.However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (TBT) . These circumstances should be taken into consideration when utilising the data.
ASC/SOP/303/304	MAR02829.001-003	Benzo[k]fluoranthene is known to coelute with Benzo[j]fluoranthene and these peaks can not be resolved. It is believed Benzo[j]fluoranthene is present in these samples therefore it is suggested that the Benzo[k]fluoranthene results should be taken as a Benzo[k]fluoranthene (inc. Benzo[j]fluoranthene). Benzo[j]fluoranthene is not UKAS accredited. This should be taken into consideration when utilising the data.
ASC/SOP/303/304	MAR02829.001-003	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. Triphenylene may be 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

Certificate of Analysis

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

Test Report ID	MAR02829
Issue Version	1
Customer Reference	682766 - Rousay

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
BAP	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		