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Wyre, Orkney
Dredging Best Practicable Environmental Option Report



October 2026

CONTROL SHEET

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Report Title: Dredging Best Practicable Environmental Option Report
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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 maintenance dredging to help maintain the navigable channel and approaches to Wyre Harbour, Orkney.

The proposed dredging works will be undertaken to achieve a depth of -2.5m CD on the navigable channel on approach to Wyre Harbour. Up to 3,000m^3 of material of material is estimated to be dredged, including a small volume (40m^3) within the harbour noted as the ZEVI berth on the accompanying drawing from Orkney Islands Council (Ref 1004188 B). This volume also includes a contingency volume.

Dredge area and sampling locations are detailed in within Drawing Orkney Islands Council (Ref 1004188 B and 684445-GIS001 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 was agreed with MDLOT to collect 3 grab samples from the dredge area.

Following a request from MDLOT, additional samples were collected in June 2026, 3 in total, to provide data for the ZEVI Berth in the inner harbour, and to try and get additional data from the wider dredge area.

Sampling within the dredge pocket recovered a mixture of coarse (cobble to boulder size rock) material, marl and seaweed in the first sampling event, and a mixture of sand and gravel in the second event when actively targetting open areas of sand in the outer dredge area. See logs in Appendix B.

A drop down camera survey was undertaken on behalf of OICHA by SULA Diving, the findings of which are provided in Appendix D. This details information of habitats/biotopes in both the

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.

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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

The sample logs are provided in Appendix B.

Sampling within the dredge pocket recovered a mixture of coarse (cobble to boulder size rock) material, marl and seaweed. See logs in Appendix B.

Review of aerial photos indicates that seaweed is present across the wider area which is indicative of the presence of hard substrate. An example of material recovered is provided in Figure 1.1 below.

Drop down video undertaken by Sula Diving confirms the findings of both the sampling campaigns with the report (Appendix D) summarising that "*Dredge area: seabed comprised mainly hard substrates (gravel, cobbles and boulder) with some sandy substrates in the eastern slope area. The mixed community of seaweeds corresponded to the biotope "Kelp and seaweed communities on sublittoral sediment" (SS.Smp.KSwss). The main species present were bootlace weed (Chorda filum), Codium sp., filamentous brown algae, Ulva sp. and sugar kelp (Saccharina latissimi)".*

These sandy substrates were encountered when sampling within the side slope area in June 2026, with samples issued for analysis. Samples are summarised as follows:

- SS04 – 6 grab attempts, nultiple cobbles. Grabs2 -6 sand fractions retained for analysis fine to coarse sand
- SS05 – 5 Grab attempts recovering large cobbles, coarse gravel with limited volumes of fine to coarse sand
- SS06 – Coarse Grey sand with shells, cobbles and Maerl.

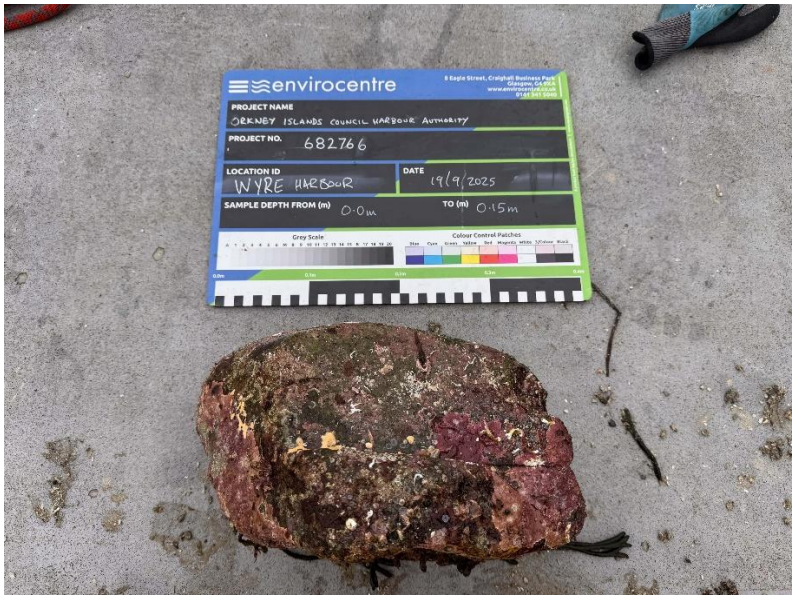


Figure 1.1: Example of material recovered from Wyre dredge area during First Visit

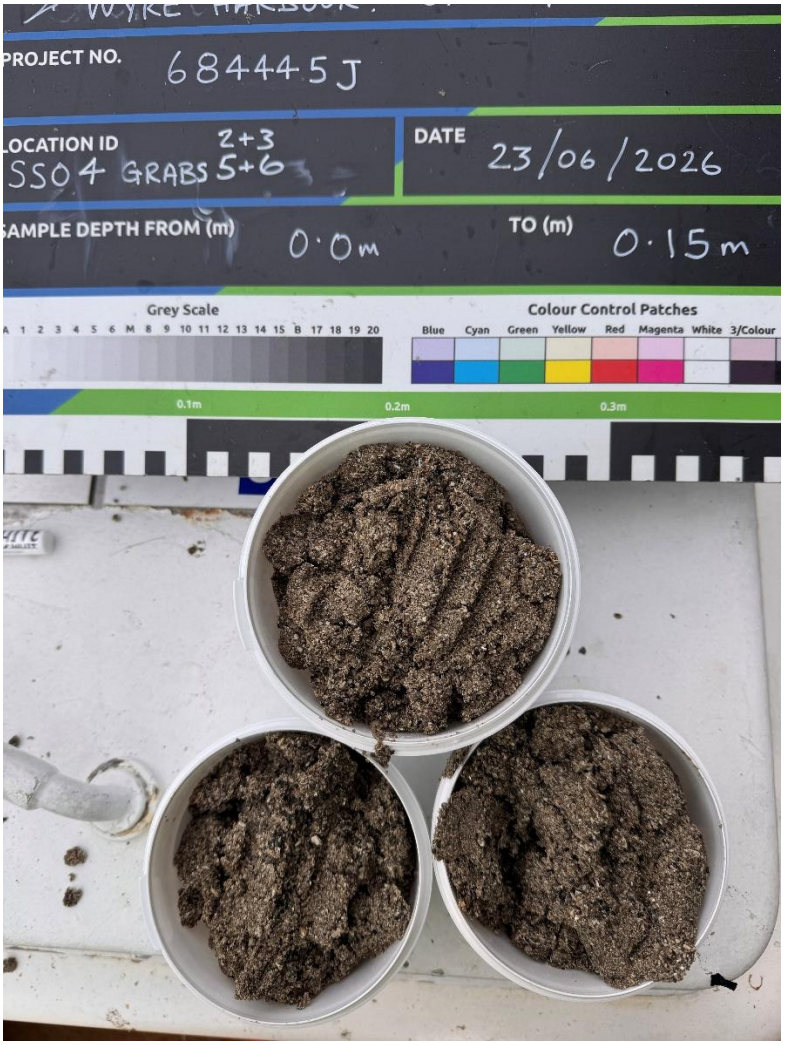


Figure 1.2: SS04 - Samples



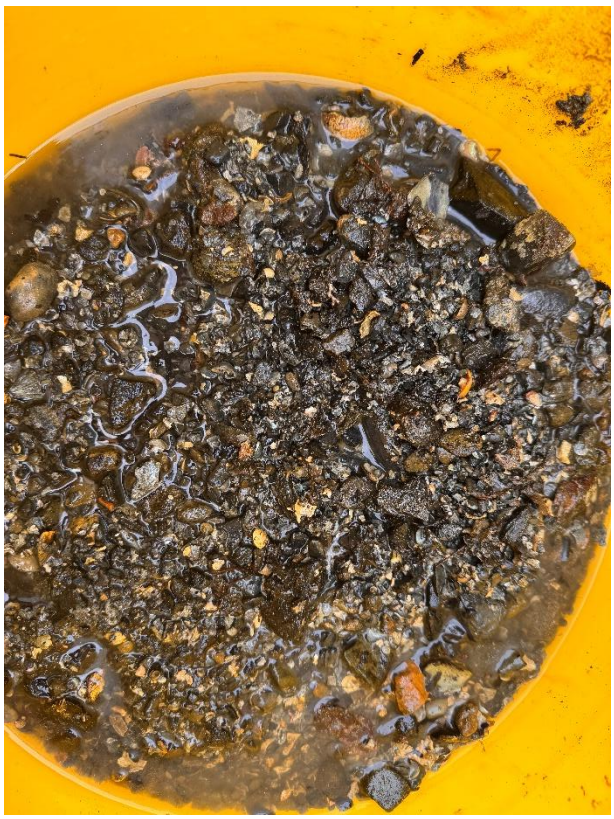


Figure 1.3: SS05 Sample (Left) SS06 Sample (Right)

1.5 Sediment Sampling Results

As agreed with MDLOT, 3 additional samples were collected from the wider dredge area. SS04 and SS05, as well as sample SS06 from the ZEVI berth within the harbour. Analytical certificates are provided in Appendix C and completed data form accompanies this application.

Analysis of all three samples did not record any contaminants of concern above CEFAS Action Level1.

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 Wyre which require this material. Also, the nature of the material makes this type of end use unlikely.	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 cobbles and boulders and is considered unsuitable material for beach nourishment in the traditional sense.	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 cobbles, boulders and seaweed with a negligible combustible component. This is not considered suitable for treatment in this manner.	No
	Application to Agricultural Land	Given the coarse nature of the material, it is considered unsuitable for application to agricultural land	No

	Recycling	Recycling of dredged material is theoretically possible, however, due to the coarse nature of the material, usual screening of material to create a recycled aggregate are considered unlikely. This is also compounded by the remote nature of the site as well as the small volume of material anticipated to be removed.	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 through plough dredging within the local environment if considered a viable option. Plough dredging is currently the preferred diposal option. Chemical analysis highlights that what fine grained sediment is present, has key contaminants of concern below CEFAS Action Level 1, and considered suitable for sea deposit without any additional assessment.	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.

Due to the nature of the material recovered within the dredge area, chemical testing was not possible on the first sampling exercise, and the fine grained material recovered on the return visit highlighted very low levels of contaminants present

Given the nature of the material present (cobbles and boulders), and the remote nature of the dredge site and limited potential for contaminative activities, the potential for contamination at this site is considered to be low.

3 FURTHER ASSESSMENT

3.1 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.	No	No samples were tested due to the coarse nature of material. However, given the type of material within the dredge area it is considered that there would not be any significant impact on water quality from dredging or deposition of the coarse material at site. 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 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 features, 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.

3.2 Potential Risk to Water Quality

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

Considering the grain sizes of the material within the dredge pocket, there is not considered to be a risk to the overall water quality due to the largely monolithic nature of the material and the limited contamination potential associated with this. 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.

3.3 Conclusions and Recommendations

Based on the physical characteristics of the sediment samples retrieved and tested from the dredge site, the sea disposal of the material, either locally from plough dredging, or from disposal at a disposal site is considered to have no significant long-term impact on the marine environment.

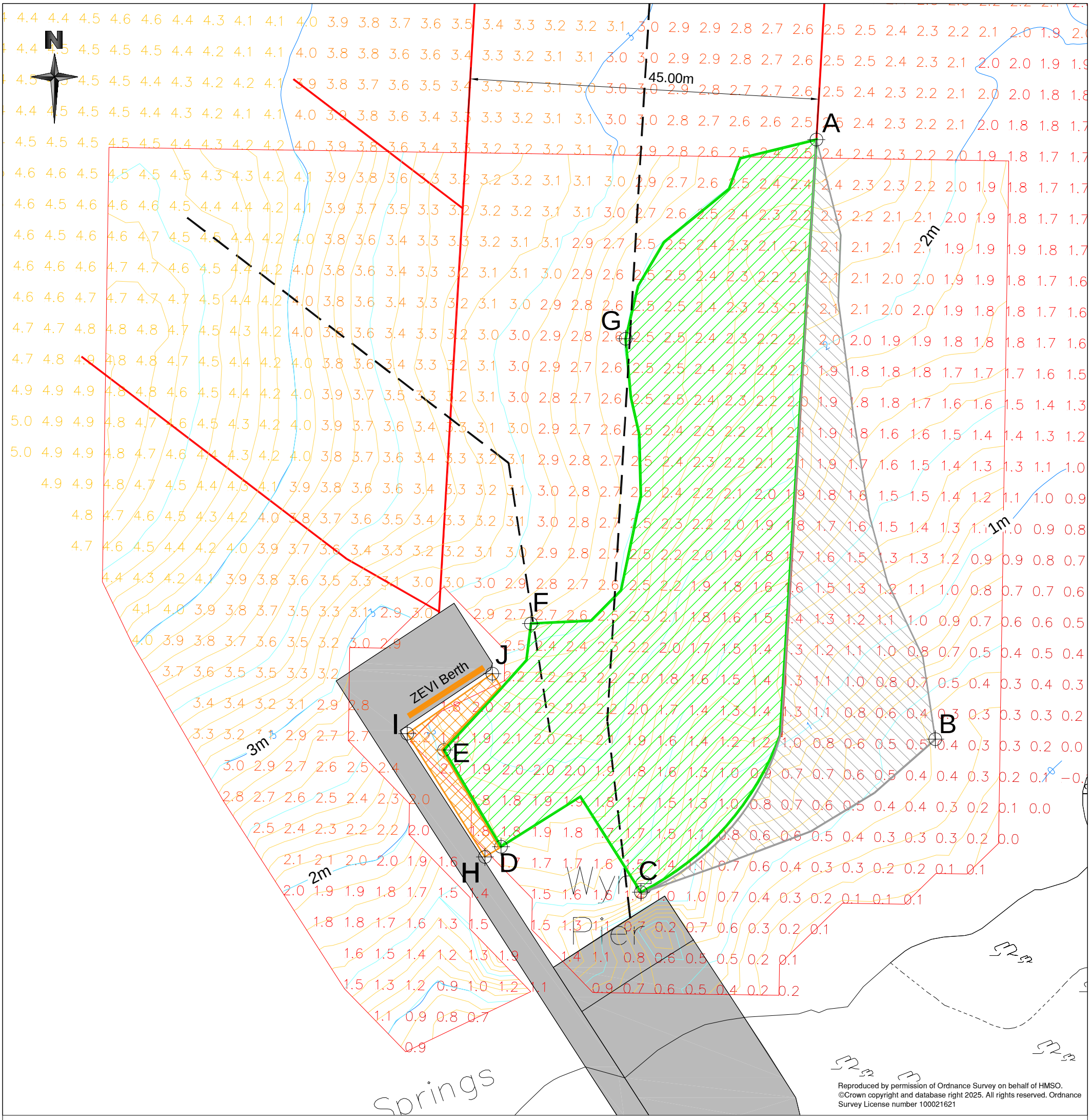
REFERENCES

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



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Wyre Dredging Coordinates				
Pt	Easting	Northing	Latitude	Longitude
A	344401.079	1026970.215	059° 7.5545N	002° 58.3816W
B	344416.416	1026892.909	059° 7.5126N	002° 58.3647W
C	344378.457	1026873.189	059° 7.5021N	002° 58.4043W
D	344360.435	1026879.060	059° 7.5052N	002° 58.4232W
E	344353.082	1026891.522	059° 7.5116N	002° 58.4307W
F	344364.282	1026907.827	059° 7.5203N	002° 58.4194W
G	344376.492	1026944.509	059° 7.5403N	002° 58.4074W
H	344358.357	1026877.749	059° 7.5041N	002° 58.4253W
I	344348.343	1026893.631	059° 7.5126N	002° 58.4360W
J	344359.303	1026901.372	059° 7.5170N	002° 58.4246W

Assumed shipping channels based on line of approach supplied by Orkney Ferries

Ship movements supplied by Orkney Ferries

Extents of area shallower than 2.5m requiring dredging within shipping channel (2235m² area at average 0.55m depth = **1230m³ volume**)

Extents of dredged side slopes required (1 in 10)
Volume = **500m³**

Extents of potential additional dredging (to 2.2m) at ZEVI berth. Pending further investigation. **(40m³)**

Rev	Desc	Date	By	Chk	App
B	Additional coordinates added	08/12/25	SG	DC	DC
A	Information issue	**27/08/25**	**SG**	**DC**	**DC**

File Ref. 1004188	Drawing No. II 01	Maintenance Dredging 2024 Wyre Pier Dredging Plan	ENGINEERING
Revision ~~A~~ B			
Date 27/08.24	Drawn SG		
Scale 1:500 Original drawing size 420mm x 297mm (A3)	Checked DC Approved DC		

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ORKNEY ISLANDS COUNCIL



Legend

- Dredge Area
- Previous Sampling Stations
- Additional Sample Stations

Do not scale this map

Client
Orkney Islands Council Harbour Authority

Project
Wyre Harbour, Orkney

Title
Sediment Sampling Stations Plan

Status
FINAL

Drawing No.	Revision	Date
684445-GIS001	-	03 Jun 2026
Drawn	**Checked**	**Approved**
MMF	CCAS	CCAS

Scale
1:750 @A3
0 5 10 20 Metres

Rev	Date	Amendment	Initials
-	-	-	-

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B SAMPLE LOGS

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Project Name	Wyre Harbour, Orkney	**Location ID**
Project No.	682776	**RS01 – RS03**
Client	Orkney Islands Council Harbour Authority	

GRAB SAMPLE LOG

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

Remarks: No fine sediment recovered at any of the 3 locations. Predominately boulders and cobbles

Biota: Maerl and codium (seaweed)

Odours: -

Anthropogenic Inputs: -

Notes: Multiple attempts across the entire of the dredge area with no fine grained material recovered for analysis. Photos from each of samples locations provided below.









C LABORATORY CERTIFICATES

Certificate of Analysis

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

SOCOTEC

Test Report ID MAR03151

Issue Version: 1

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

Customer Reference: Wyre - 682766

Date Sampled: 23-Jun-26

Date Samples Received: 09-Jul-26

Test Report Date: 27-Aug-26

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

UKAS TESTING
1252

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Test Report ID	MAR03151
Issue Version	1
Customer Reference	Wyre - 682766

		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**
SS04 (0.0-0.15)	MAR03151.001	Sediment	20.7	79.3	10.29	85.11	4.61	NAD
SS05 (0.0-0.15)	MAR03151.002	Sediment	24.7	75.3	18.62	76.66	4.72	NAD
SS06 (0.0-0.15)	MAR03151.003	Sediment	20.4	79.6	75.71	22.83	1.46	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

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Test Report ID	MAR03151
Issue Version	1
Customer Reference	Wyre - 682766

		Units	% M/M
		Method No	WSLM59*
		Limit of Detection	0.02
		Accreditation	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**TOC**
SS04 (0.0-0.15)	MAR03151.001	Sediment	0.39
SS05 (0.0-0.15)	MAR03151.002	Sediment	0.98
SS06 (0.0-0.15)	MAR03151.003	Sediment	0.96
		Reference Material (% Recovery)	100
		QC Blank	<0.02

* See Report Notes

NAD - No Asbestos Detected

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Test Report ID	MAR03151
Issue Version	1
Customer Reference	Wyre - 682766

		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**
SS04 (0.0-0.15)	MAR03151.001	Sediment	1.7	0.08	12.8	3.2	0.05	9.9	4.1	24.0
SS05 (0.0-0.15)	MAR03151.002	Sediment	11.8	0.23	20.6	14.1	0.05	17.5	7.8	42.0
SS06 (0.0-0.15)	MAR03151.003	Sediment	11.0	0.15	33.4	21.7	0.02	27.1	9.8	67.6
Certified Reference Material SETOC 768 (% Recovery)			101	101	102	98	95	94	93	97
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	MAR03151
Issue Version	1
Customer Reference	Wyre - 682766

		Units	µg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	1	1
		Accreditation	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
SS04 (0.0-0.15)	MAR03151.001	Sediment	<1	<1
SS05 (0.0-0.15)	MAR03151.002	Sediment	4.75	9.02
SS06 (0.0-0.15)	MAR03151.003	Sediment	<1	<1
Certified Reference Material BCR-646 (% Recovery)			78	77
QC Blank			<1	<1

* See Report Notes

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Test Report ID MAR03151
Issue Version 1
Customer Reference Wyre - 682766

		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	N*	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
SS04 (0.0-0.15)	MAR03151.001	Sediment	<1	<1	<1	<1	<1	2.56
SS05 (0.0-0.15)	MAR03151.002	Sediment	<1	4.15	3.73	6.04	9.66	9.45
SS06 (0.0-0.15)	MAR03151.003	Sediment	<1	<1	<1	<1	2.47	3.03
Certified Reference Material Quasimeme SED42 (% Recovery)			36	100	94	60	69	92
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

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Test Report ID MAR03151
Issue Version 1
Customer Reference Wyre - 682766

		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**
SS04 (0.0-0.15)	MAR03151.001	Sediment	1.79	2.12	2.22	<1	3.78	<1
SS05 (0.0-0.15)	MAR03151.002	Sediment	10.6	12.0	10.0	1.68	15.0	1.51
SS06 (0.0-0.15)	MAR03151.003	Sediment	1.96	3.65	3.17	<1	4.07	<1
Certified Reference Material Quasimeme SED42 (% Recovery)			81	78	95	76	86	53
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

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Test Report ID MAR03151
Issue Version 1
Customer Reference Wyre - 682766

		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**
SS04 (0.0-0.15)	MAR03151.001	Sediment	1.81	<1	1.69	2.77	12300
SS05 (0.0-0.15)	MAR03151.002	Sediment	10.7	7.62	7.73	13.5	30600
SS06 (0.0-0.15)	MAR03151.003	Sediment	2.04	2.90	2.32	4.49	32300
Certified Reference Material Quasimeme SED42 (% Recovery)			88	91	71	86	88~
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

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Test Report ID	MAR03151
Issue Version	1
Customer Reference	Wyre - 682766

		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**
SS04 (0.0-0.15)	MAR03151.001	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SS05 (0.0-0.15)	MAR03151.002	Sediment	<0.08	0.099	0.090	0.124	0.116	<0.08	<0.08
SS06 (0.0-0.15)	MAR03151.003	Sediment	<0.08	<0.08	0.137	0.124	0.122	0.142	<0.08
Certified Reference Material Quasimeme SED28 (% Recovery)			68	100	95	91	89	83	61
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.

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Test Report ID MAR03151
Issue Version 1
Customer Reference Wyre - 682766

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
WSLM59*	MAR03151.001-003	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ICPMSS*	MAR03151.001-003	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
SUB_01*	MAR03151.001-003	Analysis was conducted by an approved subcontracted laboratory.
SUB_02*	MAR03151.001-003	Analysis was conducted by an approved subcontracted laboratory. UKAS accredited analysis by this laboratory is under UKAS number 7758.
ASC/SOP/303/304	MAR03151.001-003	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 (BAA) . These circumstances should be taken into consideration when utilising the data.
ASC/SOP/303/304	MAR03151.001-003	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	MAR03151.001-003	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

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Test Report ID	MAR03151
Issue Version	1
Customer Reference	Wyre - 682766

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		

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D WYRE PIER, ORKNEY: PRE-DREDGE SURVEY OF MARINE HABITATS

Wyre Pier, Orkney: pre-dredge survey of marine habitats

July 2026

Document version:	01
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	M. Thomson (Director)
Date	27/8/2026

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1. Introduction & Methodology

This report provides the results of a marine seabed survey in the vicinity of Wyre Pier, Orkney, which was carried out in July 2026. The purpose of the survey was to identify and map seabed habitats to inform future dredging activity at the pier, which is necessary to maintain navigable channels for ferries and other marine traffic. This information is necessary to support the licencing requirements for marine dredging.

The survey included a visual appraisal of the seabed at various sites around the pier, specifically focussing on the planned dredge areas and the spoil areas, where dredged material will be deposited. The planned dredge and spoil areas for Wyre Pier are shown in Figure 1.

Visual information was gathered using a vessel mounted drop video system (Submertec Spyball) combined with a GoPro unit that together collected video footage and still images. Video footage was monitored in real time on the survey vessel and still images were downloaded after each day of survey. Artificial lighting was also provided where necessary. Positioning information was obtained from the vessel GPS system.

The video system was deployed in two ways:

- Spot sites: the video system was deployed at a fixed coordinate. Several minutes of video footage was collected of the seabed while the vessel kept position over the site. This strategy was used to survey the dredge and associated slope sites, where space to manoeuvre was limited.

- Transect sites: video and still images of the seabed were collected as the vessel moved over the seabed. The route of the vessel was dictated by the wind and tidal conditions on the day. Start and end co-ordinates were recorded for each transect, as well as intermediate locations as the direction of drift was not always straight. This strategy was used to survey the spoil site which was greater in size and in more open water.

Survey notes were recorded for each site, including co-ordinates (WGS84 datum), water depth, substrate type and the main types of seaweed and/or animals seen in the video footage. Later review of the video footage and still images allowed each site to be characterised in terms of the marine biotope(s) according to JNCC Marine Habitat Classification Scheme for Britain and Ireland[1]. The abundance of obvious species was classified according to the SACFOR scale, i.e. super-abundant, abundant, common, frequent, occasional, rare, and present[2]. Seaweeds were identified according to Bunker *et al.* (2017)[3].

[1] JNCC (2022) The Marine Habitat Classification for Britain and Ireland Version 22.04. [Accessed 15/8/2026] Available from: https://mhc.jncc.gov.uk/

[2] Hiscock, K (ed.) (1996) Marine Nature Conservation Review: Rationale and methods. Coasts and seas of the United Kingdom. MNCR series. Joint Nature Conservation Committee, Peterborough.

[3] Bunker, F., Maggs, C.A., Brodie, J.A. and Bunker, A.R., 2017. Seaweeds of Britain and Ireland. Second Edition. Wild Nature Press, Plymouth, UK.

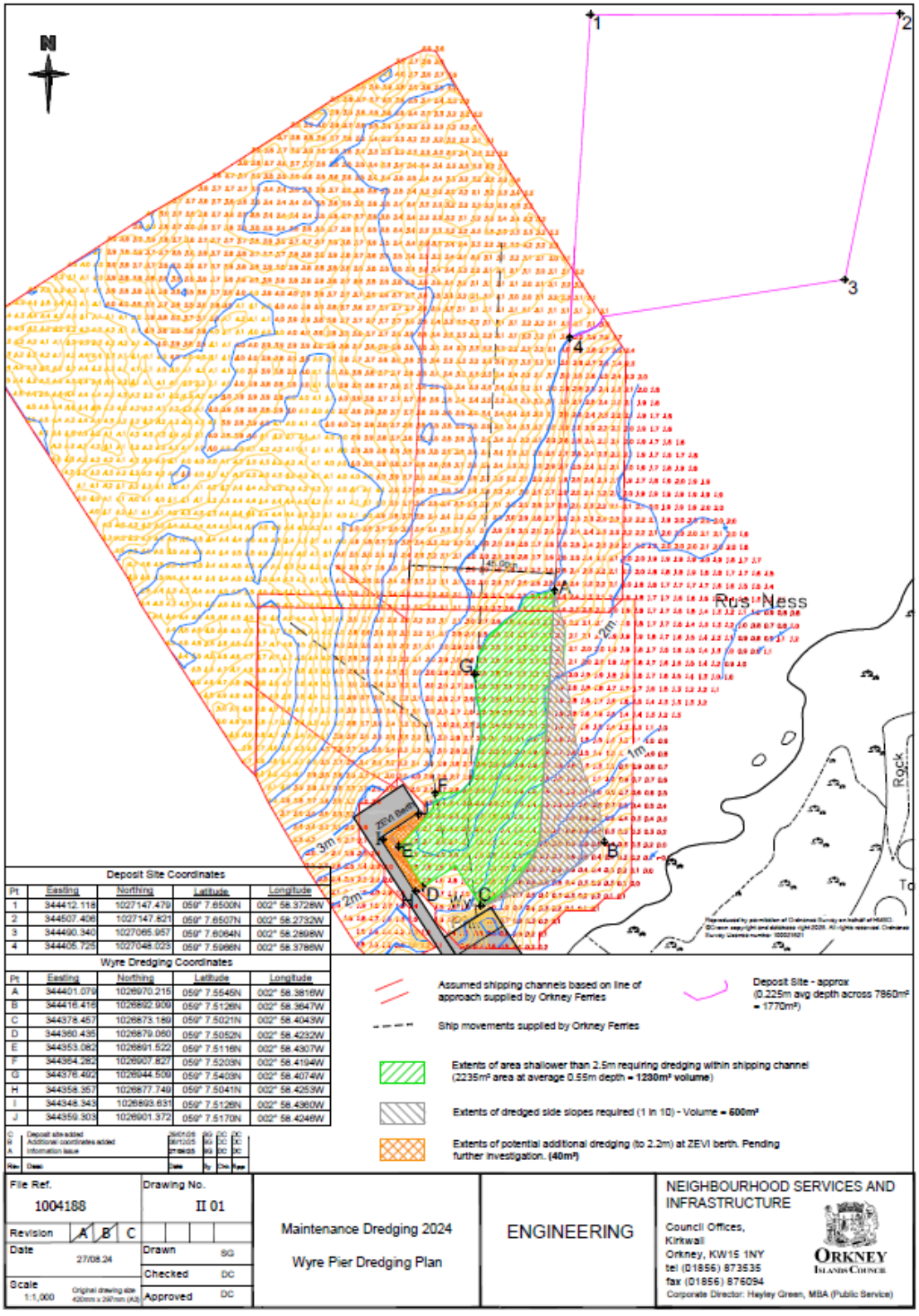


Figure 1: Proposed dredge at spoil areas at Wyre Pier, Orkney. Orkney Islands Council Wyre Pier Dredging Plan. The dredge area is shown as the orange, green and grey hatches areas, delineated by letters A – J. The spoil site is delineated in pink and defined by the numbers 1 – 4.

2. Results

The Wyre Pier seabed survey was carried out on 16th July 2026. Weather conditions were favourable with light variable winds and water visibility was good.

A total of 15 spot sites were surveyed, spread evenly through the dredge and slope areas. Five transect surveys were carried out to ensure coverage of the spoil area located north of the pier. The location of spot and transect sites are shown in Figure 2. A description of the dredge and spoil areas is provided below. Specific information for each site, including species and biotope data, are shown in Table 1.

2.1 Dredge area

The dominant substrates in the dredge area were gravel, cobbles and boulders (Figure 3 & 4). The slope area to the east was composed mainly of sand and cobbles (Figure 5). The seaweed community in the dredge and slope areas was dominated by bootlace weed (*Chorda filum*), *Codium* sp., filamentous brown algae, *Ulva* sp. and sugar kelp (*Saccharina latissimi*) on cobbles. Sugar kelp increased in abundance further from the pier (Figure 6). Some evidence of maerl gravels was seen but was sparse in nature (Figure 7).

Based on this species assemblage, the dredge site biotope was classified as "Kelp and seaweed communities on sublittoral sediment" (SS.Smp.KSwss).

2.2 Spoil area

The spoil site was located north of the pier and more exposed to tidal currents. All five transects through the spoil site showed well-formed maerl beds, comprising large areas of living material (pink/brown) interspersed with areas of dead maerl gravel (white). The transect results suggest that the entire spoil area was floored with maerl (Figures 8-11). Bootlace weed (*Chorda filum*) and sugar kelp (*Saccharina latissimi*) were also present in the spoil area.

The spoil site biotope was classified as "Maerl beds" (SS.SMp.Mrl). The dominant maerl species in full salinity habitats is usually *Phymatolithon calcareum*, in which case the biotope would be SS.SMp.Mrl.Pcal), but more detailed sampling would be required to confirm this. Maerl beds are one of the main features of the Rousay and Wyre Marine Protected Area (MPA)[4].

[4] https://www.nature.scot/sites/default/files/nature-conservation-mpa/10413/mpa-site-summary-english.pdf

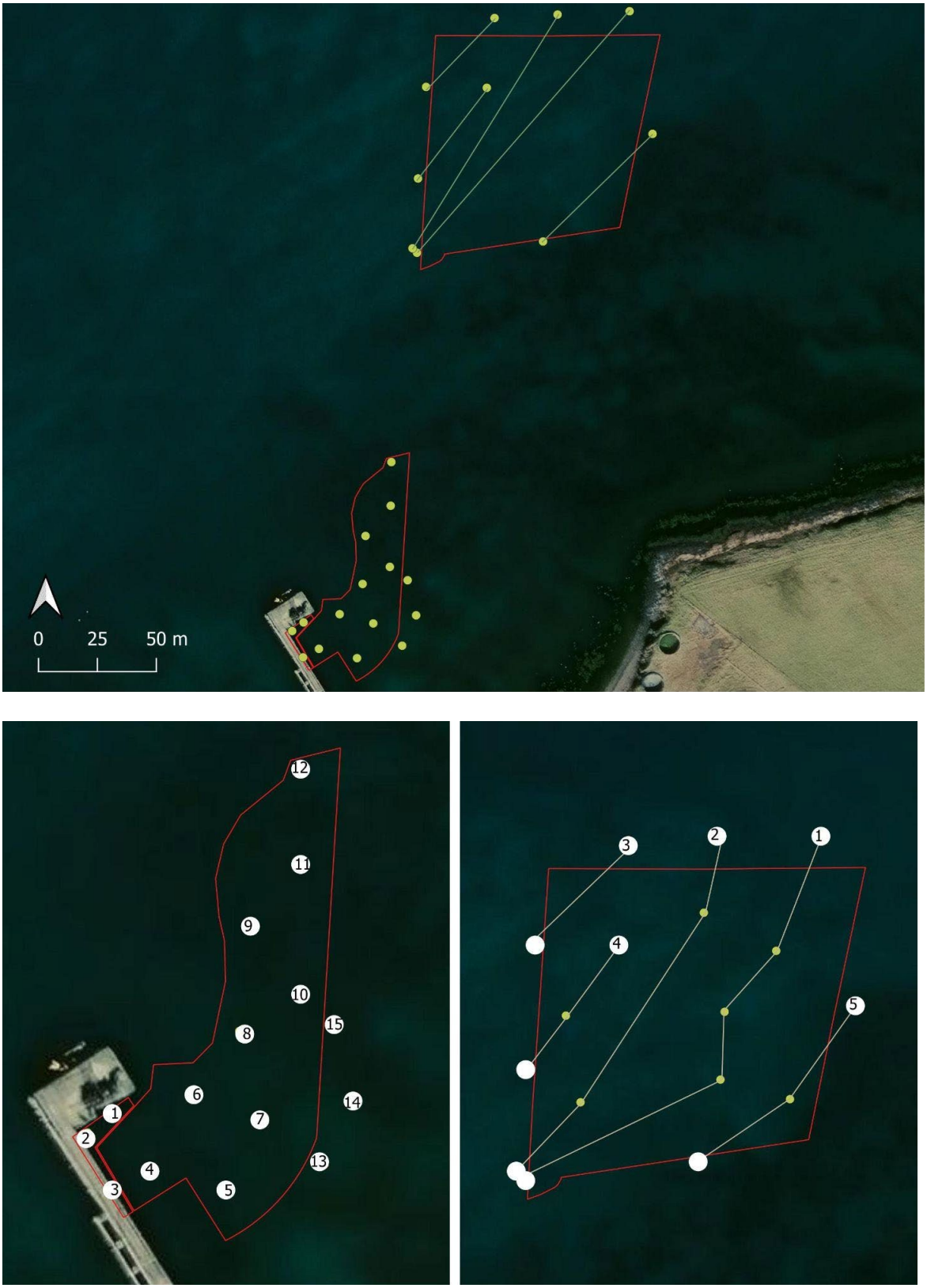


Figure 2: Wyre survey area, showing dredge and spoil sites outlined by red polygons (top). Numbered dots show seabed survey locations with spot surveys in the dredge area (bottom left) and transects in the spoil area (bottom right). Numbers on transects indicate the starting location with the tracks showing the actual route of the survey vessel.

Table 1: Detailed information for survey sites in the proposed dredge and spoil sites off Wyre pier. Latitude and longitude are relative to WGS84 datum. Each site is classified into biotopes, based on substrate and seaweed present. The SACFOR scale describes seaweed abundance: S = super abundant, A = abundant, C = common, F - frequent, O = occasional and R = rare. See JNCC biotope classification for full descriptions.

Site ID	Latitude	Longitide	Substrate	Biota	SACFOR	Biotope
wyre_s1_dredge	59.12525	-2.9738	cobbles	*Chorda filum* *Codium* sp. Filamentous browns	F O	SS.Smp.KSwss
wyre_s2_dredge	59.12521667	-2.973883333	boulders	*C. filum* *Codium* sp. Filamentous browns	C O	SS.Smp.KSwss
wyre_s3_dredge	59.12511667	-2.9738	mix cobble gravel shell	filamentous browns *Codium* sp. *Saccharina latissima*	 A F	SS.Smp.KSwss
wyre_s4_dredge	59.12515	-2.973683333	mix gravel, cobbles, boulders	*C. filum* *Codium* sp. Filamentous browns algal turf	F O	SS.Smp.KSwss
wyre_s5_dredge	59.12511667	-2.9734	mix gravel cobble boulders	*C. filum* *Codium* sp. Filamentous browns	F O	SS.Smp.KSwss
wyre_s6_dredge	59.12528333	-2.973533333	boulders	*Codium* sp. *C. filum* *Halidrys siliquosa* Filamentous browns	O O R	SS.Smp.KSwss

wyre_s7_dredge	59.12525	-2.973283333	mix cobble boulder	*H. siliquosa* *C. filum* *S. latissima*	O O O	SS.Smp.KSwss
wyre_s8_dredge	59.1254	-2.973366667	mix cobble gravel shell	*C. filum* filamentous brown *S. latissima*	O O	SS.Smp.KSwss
wyre_s9_dredge	59.12558333	-2.97335	cobbles	*C. filum* *S. latissima*	C C	SS.Smp.KSwss
wyre_s10_dredge	59.12546667	-2.973166667	cobbles, coarse sand mix	*C. filum* *C. fragile* Filamentous browns *S. latissima*	C O O	SS.Smp.KSwss
wyre_s11_dredge	59.1257	-2.973166667	boulders cobbles	*S. latissimi* *C. filum* filamentous browns	A C	SS.Smp.KSwss
wyre_s12_dredge	59.12586667	-2.973166667	boulder cobble maerl gravel	green seaweed, *S. latissima,* *C. filum* Maerl	 F F O	SS.Smp.KSwss
wyre_s13_slope	59.12516667	-2.973066667	sand	*Fucus* sp.	O	SS.Smp.KSwss
wyre_s14_slope	59.12528333	-2.972966667	sand	*Fucus* sp. *H. siliquosa* filamentous browns	R R	SS.Smp.KSwss
wyre_s15_slope	59.12541667	-2.973033333	sand cobble mix	*C. filum,* filamentous brown	O	SS.Smp.KSwss

wyre_t1_spoil_start	59.1276	-2.97145	maerl gravel	*C. filum* filamentous brown, Live maerl	F A	SS.SMp.Mrl
wyre_t1_spoil	59.12728333	-2.971683333	maerl gravel	*S. latissima,* *C. filum,* Live maerl	F C A	SS.SMp.Mrl
wyre_t1_spoil	59.12711667	-2.97195	maerl gravel	*S. latissima,* *C. filum,* Live maerl	F C A	SS.SMp.Mrl
wyre_t1_spoil	59.12693333	-2.971966667	maerl gravel	*S. latissima,* *C. filum,* Live maerl	F C A	SS.SMp.Mrl
wyre_t1_spoil_end	59.12666667	-2.973	maerl gravel	*S. latissima,* *C. filum,* Live maerl	F C A	SS.SMp.Mrl
wyre_t2_spoil_start	59.12758333	-2.971983333	maerl gravel	*S. latissima,* *C. filum,* Live maerl filamentous browns	O A A	SS.SMp.Mrl
wyre_t2_spoil	59.12738333	-2.972066667	maerl gravel	*S. latissima,* *C. filum,* Live maerl filamentous browns	O A A	SS.SMp.Mrl

wyre_t2_spoil	59.12716667	-2.974016667	maerl gravel	*S. latissima,* *C. filum,* Live maerl filamentous browns	O A A	SS.SMp.Mrl
wyre_t2_spoil	59.12686667	-2.9727	maerl gravel	*S. latissima,* *C. filum,* Live maerl filamentous browns	O A A	SS.SMp.Mrl
wyre_t2_spoil_end	59.12668333	-2.973033333	maerl gravel	*S. latissima,* *C. filum* Live maerl	O C A	SS.SMp.Mrl
wyre_t3_spoil_start	59.12756667	-2.97245	maerl gravel	*C. filum* Live maerl	C A	SS.SMp.Mrl
wyre_t3_spoil_end	59.1273	-2.97295	maerl gravel	*C. filum* Live maerl	C A	SS.SMp.Mrl
wyre_t4_spoil_start	59.1273	-2.9725	maerl gravel	*C. filum* Live maerl	C A	SS.SMp.Mrl
wyre_t4_spoil	59.1271	-2.972783333	maerl gravel	*C. filum* Live maerl	C A	SS.SMp.Mrl
wyre_t4_spoil_end	59.12695	-2.973	maerl gravel	*C. filum* Live maerl	C A	SS.SMp.Mrl
wyre_t5_spoil_start	59.12713333	-2.971266667	maerl gravel	*S. latissima,* *C. filum,* Live maerl	A A A	SS.SMp.Mrl

wyre_t5_spoil	59.12688333	-2.9716	maerl gravel	*S. latissima,* *C. filum,* Live maerl	O C A	SS.SMp.Mrl
wyre_t5_spoil_end	59.12671667	-2.972066667	maerl gravel	*S. latissima,* *C. filum,* Live maerl	O C A	SS.SMp.Mrl



Figure 3: Boulder and cobble substrate at Spot site 2, Wyre dredge site.



Figure 4. Boulder and cobble substrate at Spot site 6, Wyre dredge site.

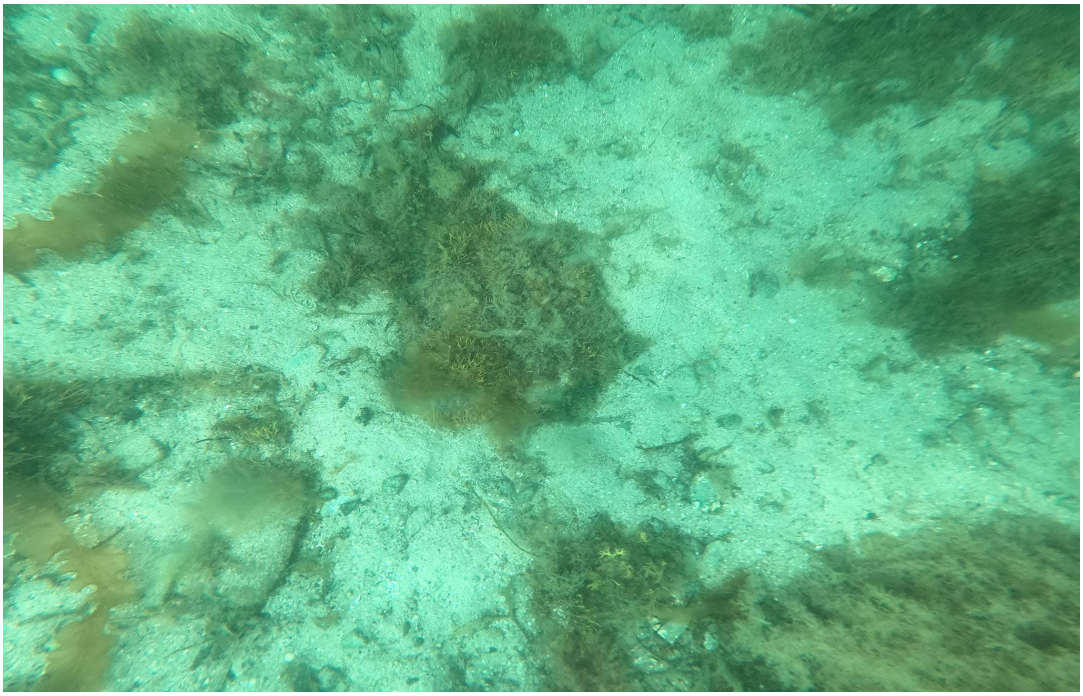


Figure 5. Sand and cobble mix substrate at Spot site 15, Wyre dredge site (slope area).



Figure 6. Sugar kelp increased in abundance further from the pier. Spot site 9, Wyre dredge site.



Figure 7: Some evidence of maerl gravel was present in the dredge area but this was sparse. Spot site 9, Wyre dredge site.



Figure 8. Maerl gravel substrate with abundant live maerl. Wyre spoil site, Transect 1.

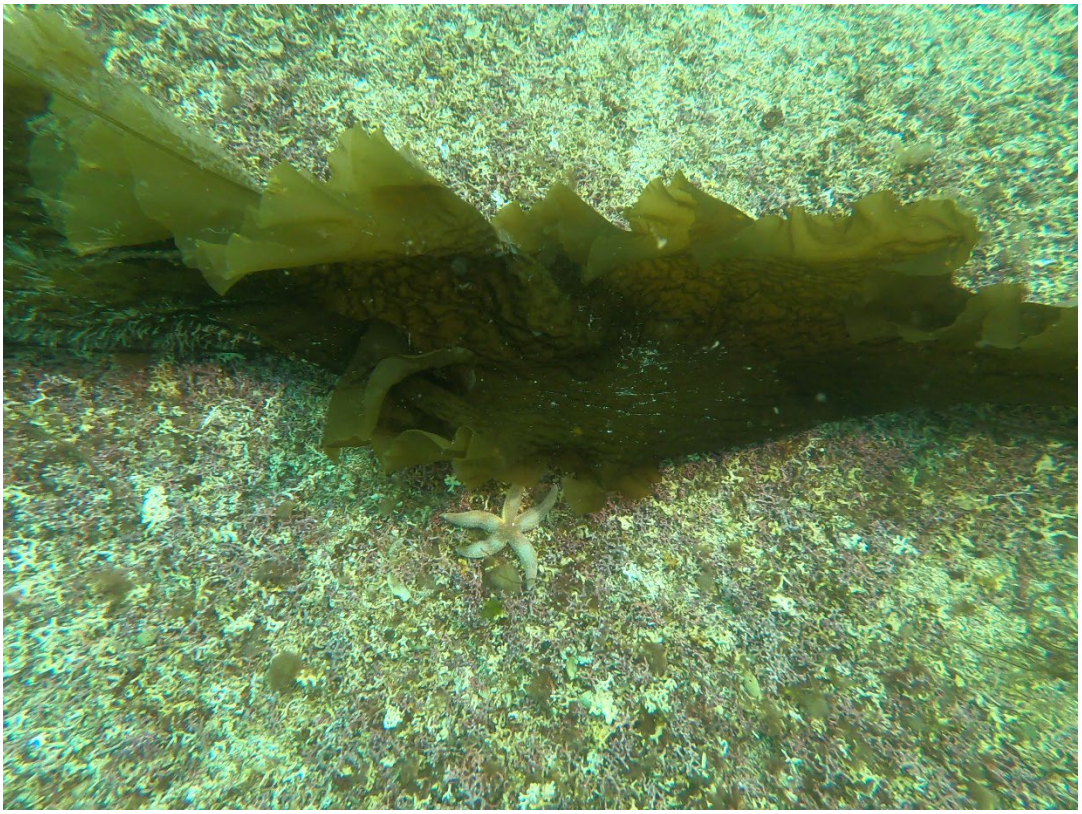


Figure 9: Maerl and sugar kelp (*Saccharina latissimi*). Wyre spoil site, Transect 2.



Figure 10: Boundary between areas of dead maerl (left) and pink living maerl gravel (right). Wyre spoil site, Transect 3.

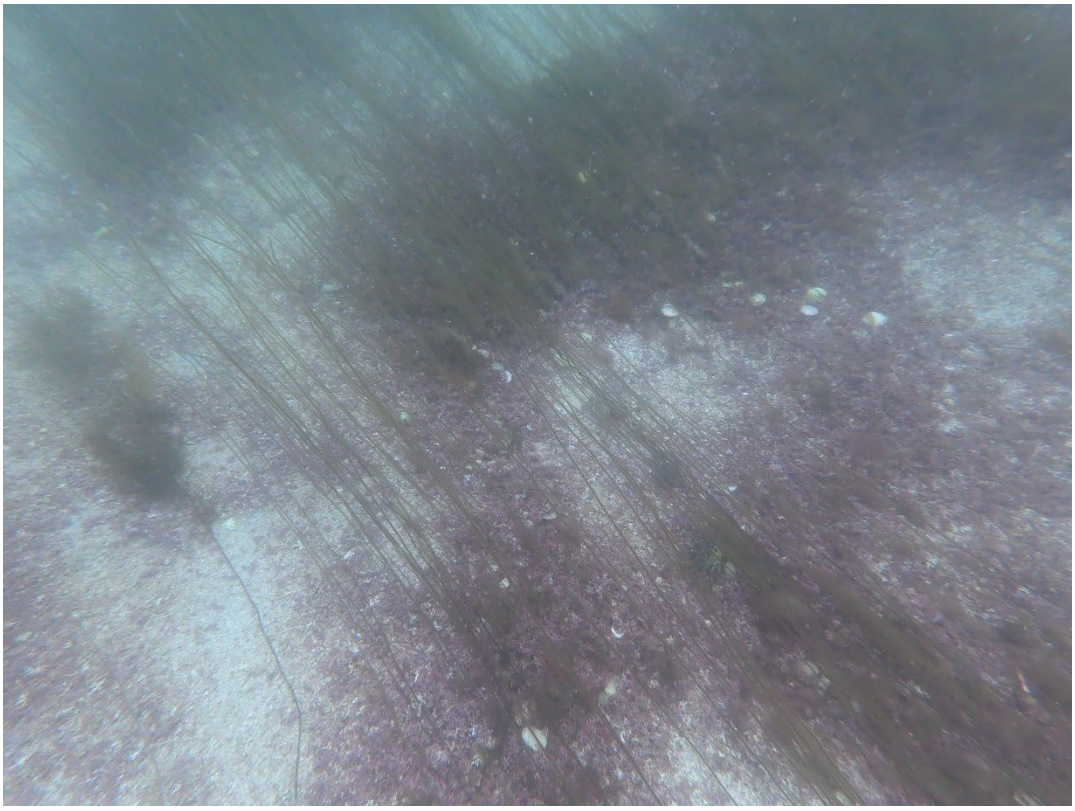


Figure 11: Maerl and bootlace weed (*Chorda filum*). Wyre spoil site, Transect 4.

3. Summary

A seabed survey around the Wyre Pier was carried out on 16th July 2026. The objective of the survey was to identify the seabed habitats in the area to inform the planning process for future dredging works. The main findings were as follows:

- Dredge area: seabed comprised mainly hard substrates (gravel, cobbles and boulder) with some sandy substrates in the eastern slope area. The mixed community of seaweeds corresponded to the biotope "Kelp and seaweed communities on sublittoral sediment" (SS.Smp.KSwss). The main species present were bootlace weed (*Chorda filum*), *Codium* sp., filamentous brown algae, *Ulva* sp. and sugar kelp (*Saccharina latissimi*).

- Spoil area: entire area was floored in a well-defined mearl bed, comprising large area of living maerl material. The seabed biotope was "Maerl beds" (SS.SMp.Mrl) characterised by abundant live maerl. Bootlace weeds (*Chorda filum*) and sugar kelp (*Saccharina latissimi*) were also present