Port Edgar Marina

Marine Scotland Licence Application for Maintenance Dredging

Best Practicable Environmental Option Report

March 2022

FAIRHURST

CONTROL SHEET

CLIENT: Port Edgar Marina Ltd

PROJECT TITLE: Marine Scotland Licence Application for Maintenance Dredging

REPORT TITLE: Best Practicable Environmental Option Report

PROJECT REFERENCE: 130774B

DOCUMENT NUMBER: 130774B/WE/CP/03/22

STATUS: FINAL

Issue & Approval Schedule		Name	Signature	Date
	Prepared by	Chris Paton	[redacted]	28th March 2022
	Checked by	Josh Murphy	[redacted]	28th March 2022
	Approved by	Dominic Waugh	[redacted]	28th March 2022

Revision Record	Rev.	Date	Status	Description	Signature	
	1				By	
					Check	
					Approve	
	2				By	
					Check	
					Approve	

This document has been prepared in accordance with procedure OP/P02 of the *Fairhurst Quality and Environmental Management System*

CONTENTS

Appendices

1. Introduction

This report has been prepared to set out the best practicable environmental option (BPEO) in support of a marine licence application for maintenance dredging and disposal at sea of dredge arising. It is proposed that dredge arising will be disposed at sea within the boundary of Port Edgar Marina ('the marina'). The aim of the BPEO is to provide reassurance, following pre-disposal sampling required by Marine Scotland (MS), that the dredge arising is suitable for disposal within the confines of Port Edgar Marina. The pre-disposal sampling is detailed in **Section 2** below.

The objectives of the BPEO report are to:

- Describe dredge arising material
- Interpret pre-disposal sampling results
- Demonstrate consideration for disposal options
- Identify, minimise, manage and mitigate for potential environmental impacts
- Demonstrate consideration for and a commitment to manage (through a bio-security plan) invasive non-native species (INNS) within the site

2. Background

Port Edgar Marina Ltd ('the operator'), is seeking to obtain a maintenance dredging licence to carry out maintenance dredging by plough. Maintenance dredging is required within two areas of the marina. The two areas are referred to as Dredge Area A and Dredge Area B. Dredge Area A is the area surrounding the West Pier; whilst Dredge Area B is the main area of the Marina. The dredge areas (A and B) are shown on the Port Edgar Marina Sediment Sampling Plan ('the plan'), **Appendix A**. The plan also incorporates the information listed below

- Pre-disposal Sampling Stations
- Dredge Arising Disposal Location
- Designated Sites (SSSI, SPA and RAMSAR)

Current marine licences associated with the marina are listed below:

- Dredge Area A - Marine Licence for Capital Dredging (MS-00008766)
- Dredge Area A - Marine Licence for the Construction of Pontoons (MS-00008879)
- Dredge Area B – Marine Licence for Maintenance Dredging (06629/19/0) - *expired*

The operator has until recently been undertaking annual maintenance dredging (licence 06629/19/0) within Dredge Area B to maintain a sufficient depth for the continued operation of the marina, however this licence expired 9th January, 2022. Further, following capital dredging and construction of pontoons, maintenance dredging will also be required within Dredge Area A. Therefore it is considered appropriate that any future maintenance dredging licence for the Marina should cover both of these dredging areas as described.

The foreshore within Port Edgar Marina is a Site of Special Scientific Interest (SSSI) (SNH site code 8163, Firth of Forth). It is also covered by a Special Protection Area (SPA) (SNH site code 8499, Firth of Forth) designation, and is in close proximity to a RAMSAR[1] site. These designations apply due to the

[1] [1]RAMSAR Convention on wetlands of international importance, Ramsar, Iran, 1971

area supporting a number of migratory overwintering, breeding and non-breeding bird populations. Maintenance dredging, which may affect the designated sites, will be to a maximum of 1.5 m (variable) depending on depth encountered. The maintenance dredging undertaken will remove silt some of which is anoxic with low level contamination from hydrocarbons. Contamination is the result of build-up over preceding decades since the West Pier was last utilised. Post-dredging, mud and silt will remain exposed at low-tide and will continue to provide valuable habitat as regards the qualifying features of the designated sites.

3. Pre-disposal Sampling

Pre-disposal sampling was carried out to support the BPEO and marine licence application as required by MS. Six grab samples were obtained from the sampling stations shown on the plan, **Appendix A**.

The pre-disposal sampling stations were accessed at high tide using a small displacement work boat approximately six meters in length, and powered by an air-cooled diesel engine. The grab samples were obtained using a small stainless steel grab-bucket. The boat was positioned using a handheld global positioning system (GPS) device over the pre-determined sampling stations and the grab lowered to the sea bed by hand over the side of the boat using a length of rope. Once the grab was on the sea bed it was activated so the two sides closed to collect the sample. The grab was then recovered onto the boat where the samples were removed and placed into the collection pots. The grab bucket was cleaned over the side of the boat to avoid contamination at each subsequent site.

Results of the pre-disposal sampling are provided in **Section 6**.

4. Proposed Dredging

Potential options considered as regards dredging are listed and considered below:

- Do-nothing
- Dredging via water injection
- Dredging via excavator and hopper-barge
- Dredging via plough

Do-nothing: If dredging does not take place, a gradual build-up of sediment within the marina would impact on the size of vessel able to utilise the marina. This would have an economic impact reducing the viability of the marina as a port. Do nothing is therefore not considered to be a viable option.

Dredging via water injection: Dredging via water injection (within Port Edgar Marina) has previously proven to be ineffective. This is due to there being an insufficient tidal current within the marina to remove and redistribute excavated sediment. This method has therefore been discounted.

Dredging via excavator and hopper-barge: Dredging via excavator and hopper-barge (within Port Edgar Marina) has previously proven to be inefficient when considering the commercial cost-benefit to the marina operator. This method has therefore also been discounted.

Dredging via plough: Dredging via plough is in line with current practice which has been consented for use by MS at the marina associated with aforementioned licences for capital dredging and maintenance dredging. Plough dredging is also considered to be the most suitable option for moving dredge arising to the disposal location within the marina.

It is anticipated that annual maintenance dredging will total approximately 13,300m^3 of dredge arising. Dredge arising to be removed is predominantly of estuarine fine-grained sediments including silts and

clays. The dredge arising will be deposited at the disposal location which sits within the inter-tidal zone of the Forth Estuary, within the boundary of the marina. A dredging method statement is detailed in **Section 5** below.

5. Dredging Method Statement

Following consideration of potential dredging methods (**Section 4**), it is considered that dredging via plough is the most appropriate. As such, plough dredging operations will only take place when there is an adequate tide height for vessels to operate, with consideration given to the height of the vessels propeller above the plough, to prevent materials being washed out of the plough.

- Ploughing chains will be set to suit the dredge depth required
- Plough hoisting wires are pre-marked and calibrated to cope with varied water depth
- Dredging operations shall only commence when it is assessed that there is an adequate depth of water below the keel
- The dredging vessel will deploy the dredging plough to the seabed with sufficient slack on the hosting wires to allow for final dredge depth
- The vessel will work from north to south with the tide to achieve maximum working time
- The dredging process will be continued until the required dredge depth has been achieved
- Dredge arising will be moved to the proposed disposal location at the entrance to the marina adjacent to the main channel of the Forth where tidal movements and fast currents will aid the redistribution of sediment

The dredging method as described is in line with current licenced practice at Port Edgar Marina.

6. Pre-disposal Sediment Sampling Results

Pre-disposal sediment sampling was carried out 24th January, 2022. Sediment samples obtained from the sampling stations were tested in accordance with the guidelines set out in the MS document, Pre-disposal Sampling Guidance, Version 2 - November 2017.

A summary of results is provided below. Results that exceed MS AL 1 are highlighted blue, whilst results that exceed MS AL 2 are highlighted red. Full laboratory results are provided, **Appendix B**. Additionally, the full laboratory results will be submitted (alongside this BPEO report) to MS using the Pre-disposal Sampling Results Form referred to within the above MS guidance.

Physical characteristics for each of the samples analysed are shown, **Table 1**.

Table 1 Physical Characteristics

Parameter	Unit	S1-A	S2-A	S3-A	S4-B	S5-B	S6-B
Total Solids	%	33.1	39.4	37.3	35.9	39.5	37.6
Gravel	%	0	0	0	0	0	0
Sand	%	12.1	16	14.3	17.8	12.5	8.3
Silt	%	87.9	84	85.7	82.2	87.5	91.7
TOC	%	4.82	4.56	4.96	4.72	4.87	4.99
Specific Gravity	-	2.57	2.64	2.65	2.65	2.64	2.62
Asbestos	-	No	No	No	No	No	No

As shown (**Table 1**) no traces of asbestos were recorded at any of the sampling stations. The material sampled was relatively homogenous across each of the sampling stations and predominantly consisted of silt 90% and sand 10% and had minimal organic content <5%.

Concentrations of trace metals and organotins for each of the samples analysed are shown, **Table 2**. There were no trace metals or organotin concentrations which exceeded AL2; whilst of those shown to exceed AL1, all are below AL2.

Table 2 Trace Metals and Organotins Concentrations

Parameter	Units	AL1	AL2	S1-A	S2-A	S3-A	S4-B	S5-B	S6-B
Arsenic (As)	mg/kg	20	70	18.2	17	16.2	16.6	17	17.9
Cadmium (Cd)		0.4	4	0.29	0.18	0.22	0.21	0.21	0.22
Chromium (Cr)		50	370	64.4	58.9	66.4	61.3	61.9	69.7
Copper (Cu)		30	300	36.6	33.4	42.4	33.3	33.4	42
Mercury (Hg)		0.25	1.5	0.87	0.83	1.02	0.75	0.77	0.96
Nickel (Ni)		30	150	33.5	30.2	31.5	32.4	32.3	34.7
Lead (Pb)		50	400	62	56.3	61.8	56.6	56	62.2
Zinc (Zn)		130	600	177	134	141	139	142	169
Dibutyltin (DBT)				<0.005	0.018	<0.005	<0.005	<0.005	<0.005
Tributyltin (TBT)		0.1	0.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Polycyclic aromatic hydrocarbon (PAH) concentrations for each of the samples analysed are shown, **Table 3**. There is not currently an AL2 threshold for these parameters. There were no PAH concentrations which exceeded AL2.

Table 3 PAH Concentrations

Parameter	Units	AL1	AL2	S1-A	S2-A	S3-A	S4-B	S5-B	S6-B
ACENAPTH	µg/kg (Dry Weight)	0.1	-	57.9	46.4	131	40.1	80.7	46.5
ACENAPHY		0.1	-	108	83.2	80.6	71.5	57.1	67.8
ANTHRACN		0.1	-	319	195	307	161	227	202
BAA		0.1	-	361	323	537	305	371	327
BAP		0.1	-	392	347	579	338	389	360
BBF		0.1	-	455	411	661	391	424	437
BEP		-	-	423	359	577	340	378	376
BENZGHIP		0.1	-	439	381	552	364	383	399
BKF		0.1	-	214	174	377	204	197	177
C1N		-	-	839	720	813	566	646	693
C1PHEN		-	-	726	556	739	464	563	542
C2N		-	-	725	613	734	490	553	606
C3N		-	-	812	633	855	531	614	636
CHRYSENE		0.1	-	406	352	627	339	394	364
DBENZAH		0.01	-	66.1	69.1	118	54.9	75.9	60.3
FLUORANT		0.1	-	625	530	1010	549	676	553
FLUORENE		0.1	-	148	104	197	91.3	121	110
INDPYR		0.1	-	341	325	493	303	346	334
NAPTH		0.1	-	341	264	370	200	243	251
PERYLENE		-	-	293	287	406	226	250	294

Parameter	Units	AL1	AL2	S1-A	S2-A	S3-A	S4-B	S5-B	S6-B
PHENANT		-	-	487	380	707	373	524	387
PYRENE		0.1	-	797	675	1090	616	760	704
THC		100	-	635000	506000	697000	475000	493000	755000

Organohalogens concentrations for each of the samples analysed are shown, **Table 4**. MS guidance does not provide AL for organohalogens. Further, as regards brominated flame retardants (BFRs) MS guidance states (at the time of publication, 2017) that provisional action levels for these compounds are subject to further investigation. Overall, levels of BFRs are relatively low. The presence of these within the sediment samples is considered reflective of historical uses flame retardants in paints and other materials used in the construction and maintenance of marine vessels, now largely prohibited.

Table 4 Organohalogens Concentrations

Parameter	Units	S1-A	S2-A	S3-A	S4-B	S5-B	S6-B
PCB28	µg/kg (Dry Weight)	2.24	1.54	2.13	1.21	1.34	1.62
PCB52		1.78	1.13	1.36	1.09	1.23	1.5
PCB101		1.75	1.43	2.23	1.56	1.7	2
PCB118		1.53	1.03	1.64	1.23	1.35	1.44
PCB138		2.1	1.76	1.75	1.79	1.75	2.27
PCB153		1.76	2.09	2.63	1.6	1.87	2.65
PCB180		1.54	1.14	1.62	1.25	1.21	1.69
ICES7		12.7	10.12	13.36	9.73	10.45	13.17
AHCH		<0.1	<0.1	<0.1	<0.1	0.12	<0.1
BHCH		<0.1	<0.1	<0.1	<0.1	0.16	<0.1
GHCH		0.13	0.14	0.14	0.11	0.19	0.15
DIELDRIN		1.04	0.81	1.5	0.82	0.65	0.99
HCB		8.33	7.17	13.9	6.24	6.55	10.4
DDE		1.41	1.53	2.16	1.39	1.49	1.85
DDT		0.12	0.9	1.92	1.47	0.13	0.2
TDE		2.74	2.4	4.05	2.2	2.63	3.18
BDE100		0.10	0.09	0.06	0.12	0.12	0.13
BDE138		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE153		0.12	0.13	0.10	0.12	0.12	0.11
BDE154		0.14	0.14	0.09	0.15	0.12	0.12
BDE17		0.04	0.04	0.08	0.04	0.02	0.05
BDE183		0.21	0.09	0.14	0.19	0.11	0.17
BDE209		69	60	40	77	54	50
BDE28		0.07	0.11	0.09	0.09	0.11	0.08
BDE47		0.43	0.40	0.44	0.39	0.36	0.45
BDE66		0.05	0.04	0.03	0.07	0.06	0.05
BDE85		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE99		0.33	0.21	0.30	0.32	0.31	0.38

7. Environmental Impact

Consideration has been given to options as regards the disposal of dredge arising from the dredging activities. The options considered are listed below:

- Agricultural spreading
- Beach nourishment
- Uses within the construction industry
- Land reclamation, landfill and incineration
- Sea disposal

Sampling undertaken has shown that the dredge arising is likely to contain some contaminants in excess of MS action levels. As such this means that dredge arising is likely to be unsuitable in respect of a number of the options outlined above. Considerations for each of the options have been outlined below:

Agricultural spreading: potential dredge arising material be pre-treated before it could be considered suitable for use, contamination also presents a health and safety risk; combined with costs associated with transportation and handling of the material this option is not considered suitable.

Beach nourishment: potential dredge arising material was shown to consist entirely of fine silts and clays. This would make it unsuitable for beach nourishment purposes as the fine particle sizes are less stable and prone to accelerated rates of erosion.

Uses within the construction industry: the potential dredge arising material consists soft and silty material and is therefore not considered to be suitable for use within the onshore construction industry e.g. for cement manufacture.

Land reclamation, landfill and incineration: given the likelihood of contamination within potential dredge arising material, costs associated with handling the anticipated volumes of material, and the fine nature of particle sizes, makes the material unsuitable for engineering purposes, therefore this option was also discounted.

Sea disposal: bathymetric survey data (**Appendix C**) indicates that there is a significant change in depth where the main channel of the River Forth begins; this is immediately outwith the bounds of the marina where the dredge arising disposal location is proposed.

The change in depth, combined with the fast flowing currents which empty into the estuary, make this the preferred location for the disposal of dredge arising.

Given the likely contaminated nature of the material, the relatively short distance from where the material is required to be dredged from, and where it is proposed to be deposited for redistribution – **sea disposal** was considered to represent the most appropriate with the least environmental impact.

Further, as the marina has been routinely dredged within the past seven years it is considered that the material will be largely similar in composition to that which has previously been plough dredged from within the marina and which has been disposed of at the identified location.

As such, it is not considered likely that the disposal of further dredge arising at this location would result in any adverse environmental impact.

8. Consultation

Consultation with, and feedback received from, NatureScot has been included as **Appendix D**.

9. Bio-security

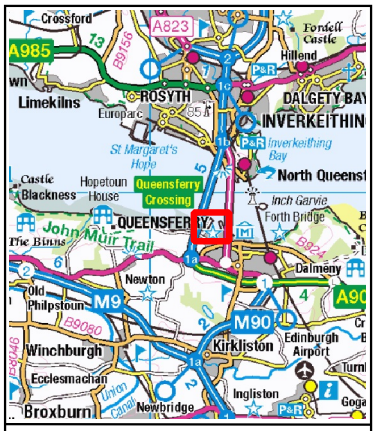
The marina previously adopted a bio-security plan in October 2018 (**Appendix E**) in respect of the control and removal of invasive non-native species, specifically Japanese Wakame seaweed. This plan follows the 'simple approach' outlined by Scottish Natural Heritage (SNH) [now NatureScot] Biosecurity Planning Guidance (2014). The operator is fully committed to the continued implementation of the measures as outlined within the bio-security plan cognisant of their proposed maintenance dredging operations.

10. Conclusions

We note the following conclusions with cognisance given to environmental impact in relation to the dredging and disposal of dredge arising:

- The primary objective of the proposed maintenance dredging is to maintain the operational effectiveness of the marina by maintaining a safe and navigable depth for vessels.
- Pre-disposal sampling of proposed dredge arising has shown that the material consists almost entirely of fine estuarine silts deposited by tidal movements within the marina.
- Laboratory results have indicated some exceedances of AL 1 thresholds; however there were no exceedances of AL 2 thresholds.
- Relatively low level of contaminants were detected. The presence of contaminants, particularly brominated flame retardants, within the sediment samples is considered reflective of historical uses flame retardants in paints and other materials used in the construction and maintenance of marine vessels, now largely prohibited.
- Plough dredging is considered to be the most appropriate dredging method and is in-line with current practice at the marina.
- The proposed dredge arising disposal location is considered to be the option with the least environmental impact.
- Following dredging operations and the removal of silt, mud which provides valuable habitat, as regards the qualifying features of the designated sites (e.g. Firth of Forth SPA and SSSI), will remain exposed at low-tides.

Appendix A – Sediment Sampling Plan



Legend

- Disposal Location
- Sampling Stations
- Setting Out Point
- SSSI_SCOTLAND
- SPA_SCOTLAND
- RAMSAR_SCOTLAND
- Dredge Area A
- Dredge Area B

Location co-ordinates:

ID	Lat-Deg	Lat-Min	Lat-Sec
S1-A	55	59	36.592800
S2-A	55	59	38.144400
S3-A	55	59	40.945200
S4-B	55	59	45.000000
S5-B	55	59	39.000000
S6-B	55	59	40.000000
SO-1	55	59	37.600000
SO-2	55	59	44.990000
SO-3	55	59	46.840000
SO-4	55	59	42.000000
SO-5	55	59	41.710000
SO-6	55	59	39.320000
SO-7	55	59	35.000000
SO-8	55	59	35.000000
SO-9	55	59	41.000000
SO-10	55	59	41.000000
D1	55	59	50.280000

SCALE: 1:5000

REV	SUIT	DATE	DESCRIPTION	BY	APP

FAIRHURST

CLIENT: Port Edgar Marina Ltd

Port Edgar Marina
Sediment Sampling Plan

DRAWN:	CHK:	APP:
AH	CP	DW

DATE: 31 / 08 / 2021

PROJ: Port Edgar Marina 130774B

TITLE: Sediment Sampling Plan

SHEET:	VERSION:	STATUS:
1 OF 1	P01	FOR INFORMATION ONLY

Appendix B – Laboratory Results

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	**MAR01288**	
Issue Version	1	
Customer	Port Edgar Marina Ltd, Shore Road, South Queensferry, Edinbirgh, EH30 9SQ	
Customer Reference	Marine Scotland Sediment Analysis	
Date Sampled	25-Jan-22	
Date Received	26-Jan-22	
Date Reported	24-Feb-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.

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	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

		Units	%	%	%	%	%	Mg/m3
		Method No	ASC/SOP/303	ASC/SOP/303	SUB_01*	SUB_01*	SUB_01*	SOCOTEC Doncaster*
		Limit of Detection	0.2	0.2	N/A	N/A	N/A	N/A
		Accreditation	UKAS	UKAS	N	N	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Total Moisture @ 120°C**	**Total Solids**	**Gravel (>2mm)**	**Sand (63-2000 µm)**	**Silt (<63 µm)**	**Particle Density**
S1-A	MAR01288.001	Sediment	66.9	33.1	0.0	12.1	87.9	2.57
S2-A	MAR01288.002	Sediment	60.6	39.4	0.0	16.0	84.0	2.64
S3-A	MAR01288.003	Sediment	62.7	37.3	0.0	14.3	85.7	2.65
S4-B	MAR01288.004	Sediment	64.1	35.9	0.0	17.8	82.2	2.65
S5-B	MAR01288.005	Sediment	60.5	39.5	0.0	12.5	87.5	2.64
S6-B	MAR01288.006	Sediment	62.4	37.6	0.0	8.3	91.7	2.62
		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

NAIIS - No Asbestos Identified In Sample

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	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

		Units	% M/M	N/A
		Method No	SOCOTEC Env Chem*	SUB_02*
		Limit of Detection	0.02	N/A
		Accreditation	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**TOC**	**Asbestos**
S1-A	MAR01288.001	Sediment	4.8	NAIIS
S2-A	MAR01288.002	Sediment	4.6	NAIIS
S3-A	MAR01288.003	Sediment	5.0	NAIIS
S4-B	MAR01288.004	Sediment	4.7	NAIIS
S5-B	MAR01288.005	Sediment	4.9	NAIIS
S6-B	MAR01288.006	Sediment	5.0	NAIIS
		Reference Material (% Recovery)	110	N/A
		QC Blank	<0.02	N/A

* See Report Notes

NAIIS - No Asbestos Identified In Sample

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

Test Report ID	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

		Units	mg/Kg (Dry Weight)							
		Method No	SOCOTEC Env Chem*							
		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**
S1-A	MAR01288.001	Sediment	18.2	0.29	64.4	36.6	0.87	33.5	62.0	177
S2-A	MAR01288.002	Sediment	17.0	0.18	58.9	33.4	0.83	30.2	56.3	134
S3-A	MAR01288.003	Sediment	16.2	0.22	66.4	42.4	1.02	31.5	61.8	141
S4-B	MAR01288.004	Sediment	16.6	0.21	61.3	33.3	0.75	32.4	56.6	139
S5-B	MAR01288.005	Sediment	17.0	0.21	61.9	33.4	0.77	32.3	56.0	142
S6-B	MAR01288.006	Sediment	17.9	0.22	69.7	42.0	0.96	34.7	62.2	169
Certified Reference Material SETOC 774 (% Recovery)			107	103	100	98	97	101	90	104
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	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

		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)**
S1-A	MAR01288.001	Sediment	<5	<5
S2-A	MAR01288.002	Sediment	17.9	<5
S3-A	MAR01288.003	Sediment	<5	<5
S4-B	MAR01288.004	Sediment	<5	<5
S5-B	MAR01288.005	Sediment	<5	<5
S6-B	MAR01288.006	Sediment	<5	<5
Certified Reference Material BCR-646 (% Recovery)			56	45
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 MAR01288
Issue Version 1
Customer Reference Marine Scotland Sediment Analysis

		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**
S1-A	MAR01288.001	Sediment	57.9	108	319	361	392	455
S2-A	MAR01288.002	Sediment	46.4	83.2	195	323	347	411
S3-A	MAR01288.003	Sediment	131	80.6	307	537	579	661
S4-B	MAR01288.004	Sediment	40.1	71.5	161	305	338	391
S5-B	MAR01288.005	Sediment	80.7	57.1	227	371	389	424
S6-B	MAR01288.006	Sediment	46.5	67.8	202	327	360	437
Certified Reference Material Quasimeme QPH097MS (% Recovery)			73	91	84	81	82	78
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 MAR01288
Issue Version 1
Customer Reference Marine Scotland Sediment Analysis

		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	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BEP**	**BENZGHIP**	**BKF**	**C1N**	**C1PHEN**	**C2N**
S1-A	MAR01288.001	Sediment	423	439	214	839	726	725
S2-A	MAR01288.002	Sediment	359	381	174	720	556	613
S3-A	MAR01288.003	Sediment	577	552	377	813	739	734
S4-B	MAR01288.004	Sediment	340	364	204	566	464	490
S5-B	MAR01288.005	Sediment	378	383	197	646	563	553
S6-B	MAR01288.006	Sediment	376	399	177	693	542	606
Certified Reference Material Quasimeme QPH097MS (% Recovery)			84	89	92	91	76	98
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 MAR01288
Issue Version 1
Customer Reference Marine Scotland Sediment Analysis

		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	N	UKAS	UKAS	UKAS	N*	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
S1-A	MAR01288.001	Sediment	812	406	66.1	625	148	341
S2-A	MAR01288.002	Sediment	633	352	69.1	530	104	325
S3-A	MAR01288.003	Sediment	855	627	118	1010	197	493
S4-B	MAR01288.004	Sediment	531	339	54.9	549	91.3	303
S5-B	MAR01288.005	Sediment	614	394	75.9	676	121	346
S6-B	MAR01288.006	Sediment	636	364	60.3	553	110	334
Certified Reference Material Quasimeme QPH097MS (% Recovery)			81	84	92	75	61	87
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 MAR01288
Issue Version 1
Customer Reference Marine Scotland Sediment Analysis

		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	N	N*	UKAS	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
S1-A	MAR01288.001	Sediment	341	293	487	797	635000
S2-A	MAR01288.002	Sediment	264	287	380	675	506000
S3-A	MAR01288.003	Sediment	370	406	707	1090	697000
S4-B	MAR01288.004	Sediment	200	226	373	616	475000
S5-B	MAR01288.005	Sediment	243	250	524	760	493000
S6-B	MAR01288.006	Sediment	251	294	387	704	755000
Certified Reference Material Quasimeme QPH097MS (% Recovery)			98	93	73	78	102~
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	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

		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	N*
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB28**	**PCB52**	**PCB101**	**PCB118**	**PCB138**	**PCB153**	**PCB180**
S1-A	MAR01288.001	Sediment	2.24	1.78	1.75	1.53	2.10	1.76	1.54
S2-A	MAR01288.002	Sediment	1.54	1.13	1.43	1.03	1.76	2.09	1.14
S3-A	MAR01288.003	Sediment	2.13	1.36	2.23	1.64	1.75	2.63	1.62
S4-B	MAR01288.004	Sediment	1.21	1.09	1.56	1.23	1.79	1.60	1.25
S5-B	MAR01288.005	Sediment	1.34	1.23	1.70	1.35	1.75	1.87	1.21
S6-B	MAR01288.006	Sediment	1.62	1.50	2.00	1.44	2.27	2.65	1.69
Certified Reference Material Quasimeme QOR146MS (% Recovery)			79	107	96	100	109	89	42
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.

*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	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

		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)	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	ASC/SOP/302
		Limit of Detection	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**AHCH**	**BHCH**	**GHCH**	**DIELDRIN**	**HCB**	**DDE**	**DDT**	**DDD**
S1-A	MAR01288.001	Sediment	<0.1	<0.1	0.13	1.04	8.33	1.41	0.12	2.74
S2-A	MAR01288.002	Sediment	<0.1	<0.1	0.14	0.81	7.17	1.53	0.90	2.40
S3-A	MAR01288.003	Sediment	<0.1	<0.1	0.14	1.50	13.9	2.16	1.92	4.05
S4-B	MAR01288.004	Sediment	<0.1	<0.1	0.11	0.82	6.24	1.39	1.47	2.20
S5-B	MAR01288.005	Sediment	0.12	0.16	0.19	0.65	6.55	1.49	0.13	2.63
S6-B	MAR01288.006	Sediment	<0.1	<0.1	0.15	0.99	10.4	1.85	0.20	3.18
Certified Reference Material Quasimeme QOR146MS (% Recovery)			119~	110~	122~	108~	79	95	140~	63
QC Blank			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

		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	IHM	IHM	IHM	IHM	IHM	IHM	IHM
		Limit of Detection	0.01	0.01	0.01	0.01	0.01	0.01	0.01
		Accreditation	N	N	N	N	N	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PBDE 17**	**PBDE 28**	**PBDE 47**	**PBDE 66**	**PBDE 100**	**PBDE 99**	**PBDE 85**
S1-A	MAR01288.001	Sediment	0.04	0.07	0.43	0.05	0.10	0.33	<0.01
S2-A	MAR01288.002	Sediment	0.04	0.11	0.40	0.04	0.09	0.21	<0.01
S3-A	MAR01288.003	Sediment	0.08	0.09	0.44	0.03	0.06	0.30	<0.01
S4-B	MAR01288.004	Sediment	0.04	0.09	0.39	0.07	0.12	0.32	<0.01
S5-B	MAR01288.005	Sediment	0.02	0.11	0.36	0.06	0.12	0.31	<0.01
S6-B	MAR01288.006	Sediment	0.05	0.08	0.45	0.05	0.13	0.38	<0.01

* See Report Notes

Certificate of Analysis

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

Test Report ID	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	IHM	IHM	IHM	IHM	IHM
		Limit of Detection	0.01	0.01	0.01	0.01	0.1
		Accreditation	N	N	N	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PBDE 154**	**PBDE 153**	**PBDE 138**	**PBDE 183**	**PBDE 209**
S1-A	MAR01288.001	Sediment	0.14	0.12	<0.01	0.21	69.0
S2-A	MAR01288.002	Sediment	0.14	0.13	<0.01	0.09	60.0
S3-A	MAR01288.003	Sediment	0.09	0.10	<0.01	0.14	40.0
S4-B	MAR01288.004	Sediment	0.15	0.12	<0.01	0.19	77.0
S5-B	MAR01288.005	Sediment	0.12	0.12	<0.01	0.11	54.0
S6-B	MAR01288.006	Sediment	0.12	0.11	<0.01	0.17	50.0

* 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 MAR01288
Issue Version 1
Customer Reference Marine Scotland Sediment Analysis

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
SOCOTEC Env Chem*	MAR01288.001-006	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
SUB_01*	MAR01288.001-006	Analysis was conducted by an approved subcontracted laboratory.
ASC/SOP/301	MAR01288.001-006	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/302	MAR01288.001-006	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 (PCB180) . These circumstances should be taken into consideration when utilising the data.
ASC/SOP/303/304	MAR01288.001-006	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.
ASC/SOP/303/304	MAR01288.001-006	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 (FLUORENE, PHENANT) . These circumstances 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

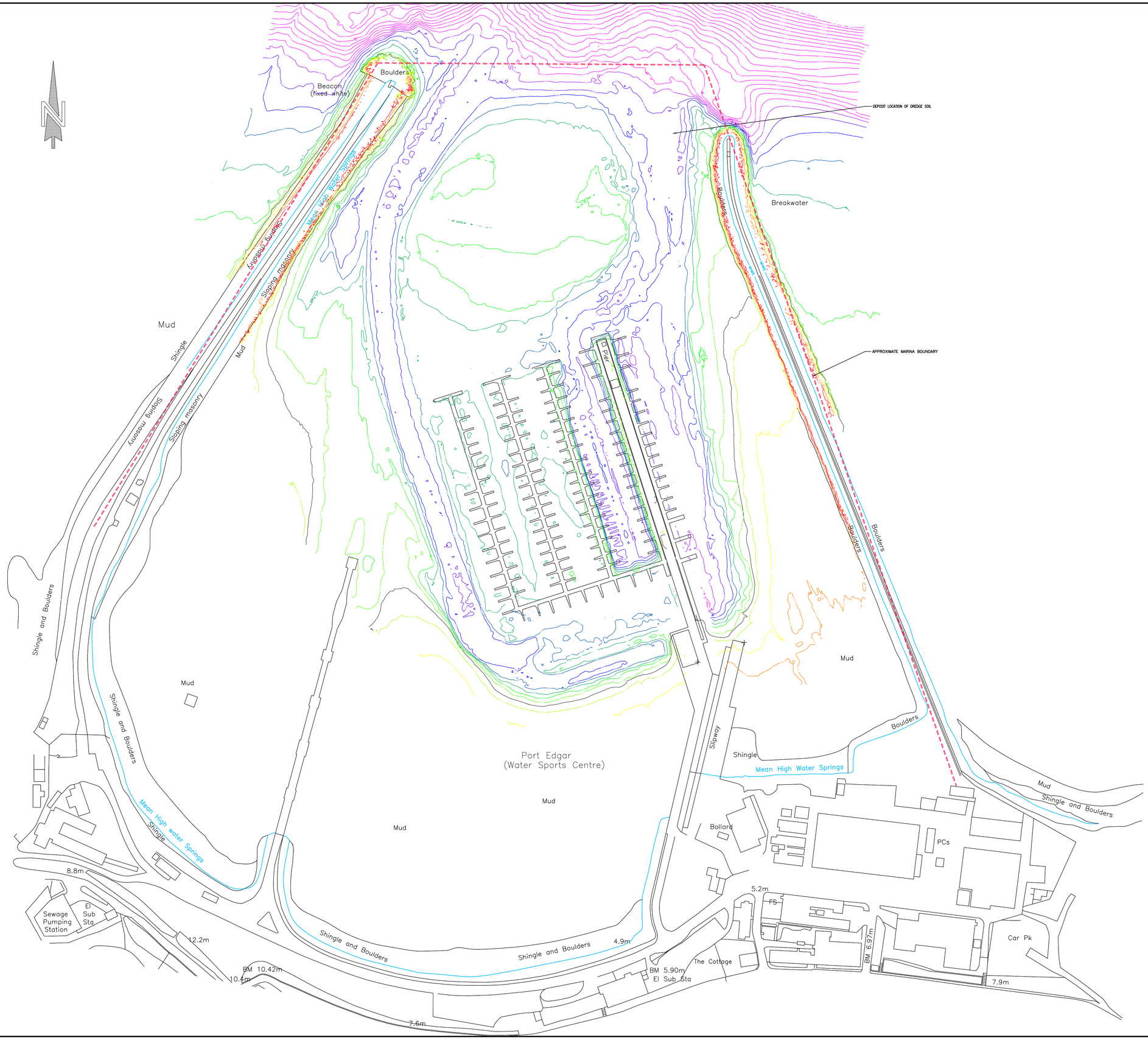
Test Report ID	MAR01288
Issue Version	1
Customer Reference	Marine Scotland Sediment Analysis

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.
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	Solvent extraction and clean up followed by GC-MS-MS analysis.
PBDEs	Air dried and seived to <2mm	Solvent extraction and 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		

Appendix C – Bathymetric Survey



Do not scale from this drawing.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARD/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION.

RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO DESIGN ASSESSMENT FORM NO.

CONSTRUCTION

DEMOLITION

FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

Rev.	Date	Description	Drwn.	Chkd.	Appd.

FAIRHURST
225 Bath Street
GLASGOW
G2 4GZ
Tel: 0141 204 8800
Fax: 0141 204 8801

Client:
PORT EDGAR MARINA

Project Title:
PORT EDGAR MARINA
PLOUGH DREDGING

Drawing Title:
PLOUGH DREDGING
LOCATION OF DREDGE SPOIL DEPOSITS

Scale at A1:	Status:	
1:500	For Information	
Drawn: GB	Checked: CJN	Approved:
Date: 25/01/18	Date: 25/1/18	Date:

Drawing No.: 122592/7004
Revision:

Appendix D – Consultation

Chris Paton

From: MS.MarineLicensing@gov.scot
Sent: 15 September 2021 13:21
To: Chris Paton
Subject: RE: 130774B: Sediment Sampling and Analysis - Marine Scotland

Good afternoon Chris,

Thank you for submitting your sampling plan and providing the response from Nature Scot confirming their advice that there will be no likely significant effects. Please take this email as approval of the sampling plan.

Kind regards,

Judith

Marine Licensing Casework Officer
Marine Scotland - Marine Planning & Policy

Scottish Government | Marine Laboratory | 375 Victoria Road | Aberdeen | AB11 9DB

Website: http://www.gov.scot/Topics/marine/Licensing/marine

COVID-19: Marine Scotland - Licensing Operations Team(MS-LOT) is working from home and as a result determination of applications may take longer than our stated timelines. In addition MS-LOT is unable to respond to phone enquiries, please communicate with MS- LOT via email. Email addresses are MS.MarineRenewables@gov.scot for marine renewables correspondence or MS.MarineLicensing@gov.scot for all licensing queries.

From: Chris Paton <chris.paton@fairhurst.co.uk>
Sent: 13 September 2021 16:31
To: MS Marine Licensing <MS.MarineLicensing@gov.scot>
Cc: Josh Murphy <josh.murphy@fairhurst.co.uk>; Dominic Waugh <dominic.waugh@fairhurst.co.uk>
Subject: FW: 130774B: Sediment Sampling and Analysis - Marine Scotland

Good Afternoon Mark,

I hope you continue to be well.

Further to my previous email please see the attached correspondence we have received back from NatureScot.
NatureScot have confirmed to us that there will not be any 'likely significant effects' arising from the proposed sediment sampling.

I would be very grateful if you could again please call me to discuss as we very are keen to progress towards sampling as soon as can be agreed.

Best Regards,

From:	**Malcolm Fraser** <Malcolm.Fraser@nature.scot>
To:	**Chris Paton** <chris.paton@fairhurst.co.uk>
CC:	**Josh Murphy** <josh.murphy@fairhurst.co.uk>; **Dominic Waugh** <dominic.waugh@fairhurst.co.uk>
Subject:	RE: 130774B | Sediment Sampling, Port Edgar Marina - NatureScot
Date:	07.09.2021 12:54:56 (+02:00)

Chris –

I'm good, thanks.

Thanks for contacting us about sediment sampling at Port Edgar.

The proposal will see one additional vessel operating within a busy marina for a short period of time.- As such I confirm that the proposal will not have 'likely significant effects' upon any European site, and doesn't raise any other issues for NatureScot.

I hope this short email is adequate for you and Marine Scotland.

All the best.

--
Malcolm Fraser (he/ him) | Area Officer - Forth | Marine Ecology Advisor
NatureScot | Silvan House, 3rd Floor East, 231 Corstorphine Road, Edinburgh, EH12 7AT | 0131 316 2629
nature.scot | @nature_scot | *Scotland's Nature Agency* | *Buidheann Nàdair na h-Alba*

From: Chris Paton < chris.paton@fairhurst.co.uk>
Sent: 31 August 2021 15:12
To: Malcolm Fraser < Malcolm.Fraser@nature.scot>
Cc: Josh Murphy < josh.murphy@fairhurst.co.uk> ; Dominic Waugh < dominic.waugh@fairhurst.co.uk>
Subject: 130774B | Sediment Sampling, Port Edgar Marina - NatureScot

Good Afternoon Malcolm,

I hope you are well.

I am contacting you on behalf of our client who is applying for a maintenance dredging marine licence within Port Edgar Marina. As part of the application process we are required to carry out pre-dredge sediment sampling to obtain six grab-samples from the sampling stations as shown on the **Sediment Sampling Plan** attached. Designated sites (SPA, SSSI and RAMSAR) are shown on the plan as well as the dredging areas currently licenced (A and B) and which have been recently dredged. I have outlined the proposed sediment sampling method below. The method follows that which was adopted at the previous time of sampling c.2018.

Sediment Sampling Methodology:

- Sampling stations will be accessed at high tide using a small displacement work boat (6 meter boat powered by an air cooled diesel engine) or similar
- The grab used is a small scale stainless steel bucket grab
- The boat will be positioned using a handheld GPS over the pre-determined sampling station
- The grab will be lowered to the sea bed by hand over the side of the boat using a length of rope
- Once the grab is on the sea bed it is activated so the two sides can come together to collect the sample
- The grab is recovered onto the boat where the samples is removed and placed into the collection pots
- The grab will be cleaned over the side of the boat to avoid contamination at the next site
- The process is completed at each site as required

We are required to obtain written confirmation from NatureScot that the proposed sampling will not have a likely significant effect on designated sites. We would be very grateful if you could provide a response at your earliest opportunity.

Please contact me should you require any additional information in the meantime.

Best Regards

Chris

Chris Paton
MA (Hons) MSc
Graduate Water Engineer

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Appendix E – Biosecurity Plan

Port Edgar Marina Biosecurity Plan

Fairhurst

APEM Ref P000002984

October 2018

Ashley Cordingley, Dr Natalie Hold and Dr Marc Hubble

Client:	**Fairhurst**
Address:	**225 Bath Street**
	Glasgow, G2 4GZ
Project reference:	**P2984**
Date of issue:	**October 2018**

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"This is a draft document and should not be cited"

Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
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02	28/09/2018	All	All	Internal review	**DH**
03	10/09/2018	All	All	Client review	**MH**

Contents

1. Project background

Out of over 90 marine non-native species (NNS) in the UK and Ireland (Payne *et al*. 2014) 23 are established in Scotland (Nall 2015), with their spread primarily due to shipping (ballast water, biofouling of hulls) and imported consignments of cultured species (Nall *et al.* 2016; Cook *et al.* 2016). Recently, the NNS, *Undaria pinnatifida* (Japanese wakame) has been found in Port Edgar Marina but further surveys of locations along the Firth of Forth found no other occurrences of wakame and therefore Marine Scotland conclude that there is merit in seeking to control the NNS at Port Edgar. Whilst the non-native seaweed has been removed from the hard structures in the marina, full eradication of marine NNS is difficult and a precautionary approach should be adopted so that control and containment measures are considered for all activities and sites (Scottish Government 2012)[1], including prevention of new introductions of other NNS. As such, the Scottish Government requires a Biosecurity Plan to risk assess the routine dredging operations at the marina to avoid further spread of existing NNS or introduction of new NNS as part of its precautionary approach to biosecurity.

Within this approach there are two types of biosecurity plans: 'Site' and 'Operations'.

- A site biosecurity plan covers the long-term, on-going activities at a single location such as a marina (e.g. routine anti-fouling or routine dredging activities).
- The operation biosecurity plan is for a particular activity or set of activities which are time-limited (e.g. construction of a new jetty or one-off dredging activities) (Payne *et al.* 2014). Site biosecurity plans are likely to be in place for a longer period of time and suited to periodic monitoring and review.

There are three levels of biosecurity plan, two of which are described in detail in the Scottish Natural Heritage guidance (Payne *et al.* 2014); a simple approach and a more in-depth approach (using a simplified Hazard Analysis and Critical Control Point (HACCP) technique). The third approach is a full HACCP technique and is not included in the guidelines. The simple approach for this project would list the activities which make up the dredging operation that may carry a risk of introducing or spreading NNS and control measures are proposed for each activity. Following liaison with Marine Scotland in September 2018 the simple approach was deemed suitable to accompany the dredge license application at Port Edgar Marina, with the primary aim of the Biosecurity Plan being to identify best practice for the control of spread of wakame.

[1] Scottish Government non-native species code of practice: https://www.gov.scot/Publications/2012/08/7367

2. Methodology

The preparation of the Port Edgar Biosecurity Plan following the simple approach outlined by Scottish Natural Heritage Biosecurity Planning Guidance (Payne *et al.* 2014) involves the following aspects:

- Defining the dredging operations to be undertaken – frequency, size of operation, location, methods etc.
- Site description – description of physical site components (e.g. permanent hard structures) and environmental description (water flow, salinity etc.) and how these affect the risk of new NNS introductions and the spread of NNS.
- Review of current status of NNS in the marina.
- Review of proposed dredging activities (e.g. arrival, activity, disposal, leaving site).
- Assigning a risk level for each activity (High, Medium, Low).
- Proposing biosecurity control measures for the medium and high risk tasks associated with the dredging activity along with instructions for staff and contractors.
- Proposing contingency plan e.g. rapid response and containment measures if monitoring detects high risk incidents or new NNS.

3. Marine Biosecurity Plan

3.1 Introduction

This operation biosecurity plan has been prepared to assess the biosecurity risks associated with routine dredging operations within Port Edgar Marina.

3.1.1 Description of operation

The scope of the dredging operation is defined in the dredging Marine Licence Application submitted to Marine Scotland as:

“Port Edgar Marina undertakes regular (annual) dredging as a result of sedimentation within the confines of the protected area, which has increased as a result of the construction of nearby bridge piers in recent years. The material to be dredged from the vicinity of the marina berths will not be removed off site; plough dredging will be carried out to move the material from the high spots at the marina to an area at the north east corner of the area for which Port Edgar Marina is responsible”

.

3.1.2 Site Description

Location

Port Edgar is situated on the southern shore of the Firth of Forth on the east coast of Scotland, between the Queensferry Crossing Bridge and the new Forth Road Bridge (please refer to Figure 1). The Firth of Forth is a busy industrial estuary with large commercial dockyards at Rosyth and Leith, which are located approximately XXX km from Port Edgar (both receive substantial shipping traffic from Europe and around the world). Furthermore, the oil refinery at Grangemouth receives boat traffic from around the world. The Firth of Forth is fed by the River Forth and flows into the North Sea along the coasts of Fife and East Lothian. The estuary is considered to be well-mixed to partially mixed, depending on the river flow and tidal range (Webb & Metcalfe 1987). The salinity varies from 18-31[2] at the surface to 26-32 at the bottom in the wider estuary (Webb & Metcalfe 1987). Salinity intrusion into the Forth estuary is highly dependent on river flow and tidal range (Webb & Metcalfe 1987). The Firth of Forth has a moderate but variable current speed of between 2.5 and 4.5 knots at peak flow depending on location (Admiralty Chart 734).

Port Edgar Marina

The marina at Port Edgar consists of three main structural components (the outer breakwaters, floating pontoons and the piers) and each should be considered separately (see Figure 1). Each structural component is subjected to similar environmental conditions, however, the habitats associated with them and the physical characteristics of the structures are different. Therefore, each of the three structures will have different risk factors and control measures associated with them specific to their physical characteristics.

Outer breakwaters

The outer breakwater sections are the oldest part of the marina and a remnant of the original naval base. The breakwaters are solid structures extending from the seabed to above the surface and are approximately 450 metres (m) long on each side of the marina with a further 150 m stretch at the front of the marina. The breakwaters are constructed from caissons and rubble and provide a large subtidal and intertidal area with high levels of structural complexity. The structural complexity created by the outer breakwater provides large areas of habitat suitable for colonisation by marine organisms.

[2] Salinity values determined by conductivity measurement are calculated as a ratio of measured conductivity to standard KCl conductivity. Since Salinity is a ratio, the value is actually dimensionless (no units)

Floating pontoons

The floating pontoons are the newest addition to the harbour and consist of seven floating arms, comprising of 3 x 150 m, 2 x 200 m and 2 x100 m sections, supporting 300 floating berths. The floating platforms have various designs and provide large areas of subtidal habitat that can be colonised by marine organisms.[3]

Piers

The two piers are also remnants of the original naval base. The piers comprise one 230 m and one 350 m section supported by numerous piles. The piles create a large subtidal and intertidal area with high habitat complexity, capable of supporting diverse intertidal and subtidal communities.

Dredge site

The proposed dredging operation will take place within the marina, between the pontoons and piers within the confines of the breakwaters Figure 1. The actual dredged extent will likely be a smaller section within the dredge area outlined in Figure 1 which will be informed by depth conditions at the site and the needs of the marina berth holders. The seabed within the marina is predominantly soft sediment and described as SS.SMu.CSaMu 'Circalittoral sandy mud' under the EUNIS classification system (EmodNET)[4]. The mud habitats are not considered to provide suitable substrate for colonisation by the NNS currently found in Port Edgar Marina (see Section 3.2.4). However, debris and other hard substrata amongst the mud could provide potential settlement habitats and a precautionary approach requires the assumption that NNS could be present in the sediment.

3.1.3 Plan period

Proposed dredging operations are planned between 1st January 2019 and 31st January 2022 on an annual or biannual (twice yearly) basis. It is anticipated that the dredger (provided by Briggs Marine) will be able to carry out the required volume of dredging within approximately ten – twelve days.

3.1.4 Biosecurity Manager

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[3] Port Edgar Marina: https://www.portedgarmarina.co.uk/
[4] EmodNET: http://www.emodnet-seabedhabitats.eu/

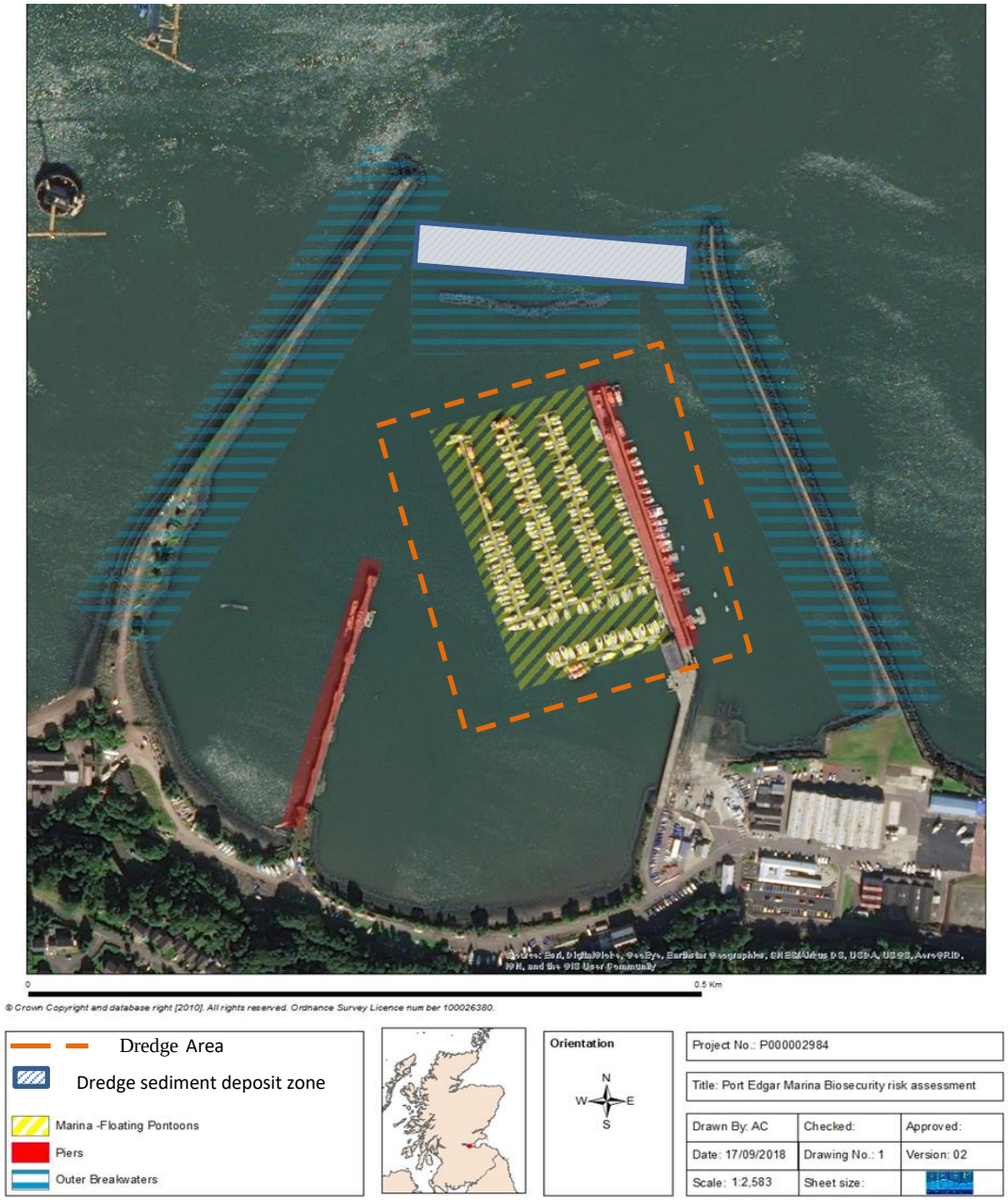

Figure 1 Plan view of Port Edgar indicating the location of the outer breakwaters, marina, piers and dredge area.

3.2 Information related to the environmental conditions affecting biosecurity

3.2.1 Salinity, temperature, tidal flow

Port Edgar can be considered a fully marine site, with a salinity regime capable of supporting fully marine species. The effects of any freshwater inputs are not evident within Port Edgar, which has a salinity of between 31 and 33 (Catarino *et al*. 2018). In addition, the temperature range within Port Edgar is favourable for most European-habituated NNS with an annual variation of between 15.7 °C in the summer and 5.6 °C in the winter (Catarino *et al.* 2018). The tidal flow within the marina is also minimal, making larval retention times high but possible dispersal potential is low. Due to the fully marine environment, favourable temperature and tidal conditions the marina is categorised as high risk for the colonisation of NNS according to the Scottish Natural Heritage Non-Native Species guidelines (Payne *et al*. 2014).

3.2.2 Submerged structures

Port Edgar has a variety of different submerged structures without anti-fouling coating, that are submerged for longer than 6 months at a time and that can only be cleaned *in situ*. Therefore these submerged structures all present a high-risk under the Scottish Natural Heritage Non-Native Species guidelines (Payne *et al*. 2014).

Breakwaters

The breakwaters present the greatest risk to biosecurity, because of their age, structural complexity, lack of antifouling measures and limited cleaning / eradication potential. As such, they provide a large area of colonisable habitat suitable for most NNS present in Scottish waters.

Floating pontoons

The pontoons provide a submerged hard-structure for NNS settlement and are in close proximity to recreational boating traffic (which is a primary transportation vector for NNS). However, the pontoons can be cleaned *in situ* and can be removed and treated further if necessary. The marina carries out biannual scraping and removal of seaweed using a method approved by Marine Scotland for containment of the NNS seaweed Japanese wakame. During this removal the wakame is gathered into a large net on a pole prior to scraping, the weed is then scraped off into the net, removed from the water, dried on the breakwater and disposed of in landfill or used for composting. The pontoons are therefore considered low risk due to the ongoing biosecurity management routine already in place.

Piers

The piers present a high risk settlement structure, because of their age, structural complexity, lack of antifouling measures and limited cleaning / eradication potential. Furthermore, the piers are in close proximity to high risk areas of NNS transportation such as recreational boating and the fuel berth.

3.2.3 Dredge site

The dredging site (Figure 1) can be considered low risk in terms the spread of NNS that are already present due to the dominance of sandy mud substrate which is not favourable for the NNS recorded at the site (see Section 3.2.4), particularly wakame.

3.2.4 Non-native species at Port Edgar

There are currently 23 known non-native species (NNS) in Scotland (Nall *et al*. 2015). Their distribution is uneven and available data are mainly restricted to that obtained from marinas (Nall *et al*. 2015). Currently three non-native species have previously been recorded within Port Edgar (Table 1). Two species (Green fingers seaweed *Codium fragile* subsp. *tomentosoides* and the Japanese skeleton shrimp *Caprella mutica*) were recorded in Port Edgar in 2006 during a survey of the ten largest marinas in Scotland to determine the presence of the seven marine non-native species highlighted in the Marine Aliens programme[5] (Ashton *et al.* 2006). The Japanese brown kelp known as wakame *Undaria pinnatifida* was not found in 2006 but has subsequently been identified on the floating pontoons in Port Edgar with containment measures introduced in collaboration with Marine Scotland. These consist of twice annual removal of biofouling seaweed from the floating pontoons as described above. Wakame has not been found to be growing on the piers.

Although only three NNS have been reported in Port Edgar, many other NNS are widespread and common across the UK. The Scottish Government advocates a precautionary approach with the Marine Biosecurity Planning document (Payne *et al*. 2014) recommending that biosecurity plans and measures assume the presence of potential NNS as well as those recorded, and that operations should be planned and biosecurity measures identified accordingly. This approach has been followed for the biosecurity assessment for the dredging operations at Port Edgar Marina.

[5] (http://www.marlin.ac.uk/marine_aliens/)

Table 1: Non-native species recorded within Port Edgar (as recorded in Ashton *et al*. 2006 and by Port Edgar Marina and Marine Scotland).

Species	Description	Habitat and ecology
Undaria pinnatifida	Japanese wakame, a brown kelp which can out compete native species[6].	A fouling species which attaches to hard substrate and is often found on man-made structures such as floating marina pontoons. Reproduction occurs in late spring or early summer[5].
Codium. fragile subsp. tomentosoides	Green sea-fingers, a spongy green seaweed which can displace native seaweeds, considered invasive by Scottish Natural Heritage[7]	Occurs on rock and coralline algae in pools and on open rock, often found on man-made structures[5]. Reproduction likely occurs towards the end of the summer / beginning of autumn[5].
Caprella mutica	Japanese skelton shrimp, which is considered invasive by Scottish Natural Heritage[5]	Often found on biogenic reefs and in areas of human activity on natural and artificial substrate such as hydroids, mooring ropes and buoys[5]. Fully benthic lifecycle with limited dispersal potential although can disperse along coasts on drifting algae[5].

4. Dredge activities which have a significant risk of introducing or spreading non-native species

The dredge operation has been broken down into three main activities: vessel arrival, dredging and vessel departure. Within each of these activities the biosecurity risks for each task have been identified and the risk assessed using the Marine Biosecurity Planning guidelines (Payne *et al*. 2014), to aid expert judgement. As a precautionary approach the overall activity risk was categorised at the highest risk level of any of the component tasks. Internal quality control for the risk categorisation consisted of review of the risk table by a senior marine taxonomist with expertise in non-native species.

[6] GB Non Native Secretariat species factsheets (http://www.nonnativespecies.org/home/index.cfm).
[7]https://www.nature.scot/professional-advice/land-and-sea-management/managing-coasts-and-seas/marine-non-native-species

Table 2 Risk assessment of introduction and spread of NNS during dredge operations. Risk categories were assigned using guidelines in Payne *et al.* (2014), additional scientific literature and expert judgement.

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium /Low)
Arrival of dredge vessel.	Introduction of new NNS.	The vessel will be provided by Briggs Marine which are located locally in the Forth of Firth (north shore). Movements for commercial purposes will be unknown but will likely consist of regular movements between different ports along the east coast of Scotland.	Medium	Medium
		The vessel "Forth Sentinel" has a running speed of 9.5 knots and is therefore not considered slow moving.	Low	
		The biofouling removal regime is unknown at present.	Medium	
Dredging	Spreading on NNS via fragmentation or dispersal of NNS into the water column from hard structures due to physical disturbance or propwash	The dredge vessel will be operated by a very experienced company (Briggs Marine) minimising the risk of contact with hard structures.	Low	High
		The floating pontoons will be removed from the piers and rafted together providing opportunity for fragmentation, especially wakame which has been found on the pontoons.	High	
		Propwash from the dredge vessel could fragment NNS from hard structures.	Low	
	Dispersal of NNS from dredged sediment	The sandy-mud sediment that is to be dredged is not a favourable habitat of any of the NNS known to be present in Port Edgar, however using the precautionary approach it is assumed that some soft sediment NNS may be present. Hard debris such as shells and rocks can provide substrate for wakame and green sea fingers[1].	Medium	Medium

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium/ Low)	Overall activity risk (High/Medium /Low)
Departure of vessel.	Spread of NNS from Port Edgar Marina on the hull of the dredge vessel.	The dredge vessel is expected to be present for approximately ten - twelve days in January or February each year and it is expected that the planktonic dispersal phase of most NNS will occur outside this timeframe. For example wakame releases zoospores in late spring or early summer[1], after the anticipated dredging. Japanese skeleton shrimp spend their entire lifecycle on substrate and lack a free swimming planktonic stage, dispersal can occur on drifting algae[1]. Green sea fingers are thought to have reproduction peaks in late summer / early autumn[2].	Low	Low

[1]GB non-native species secretariat: http://www.nonnativespecies.org/factsheet/index.cfm.

[2]Watanabe *et al.* (2009)

5 Biosecurity Control Measures

5.1 Existing measure

Port Edgar already adopts best practice biosecurity measures for the removal of wakame under an agreement with Marine Scotland. Pontoons are regularly checked by Port Edgar Marina for biofouling and cleaned twice annually to remove wakame and other bio-fouling organisms as described above.

5.2 Additional proposed measures

Additional biosecurity control measures have been identified for the specific medium and high risk activities indicated in Table 3. Consideration has also been given to using any movement of the floating pontoons to scrape wakame and other fouling biota from areas of the hard structure that would otherwise be inaccessible. Whilst it is not anticipated that access will be changed, any opportunities observed during operation will be taken. The control measures in Table 3 will be listed in a biosecurity log and the date when each control measure is carried out will be recorded in the log. This process will allow the identification of any breaches in control measures. If such a breach occurs it will be recorded in the biosecurity log and the contingency plan triggered.

Table 3 Biosecurity control measures proposed for Port Edgar dredging activity

Activity and biosecurity risk	Risk	Control measure	Where	When
Arrival of dredger - introduction of new NNS.	Dredge vessel is a commercial vessel with regular movement between unknown ports, biofouling removal regime is unknown.	Briggs Marine is a large respected marine services company and their boats are used by the Environment Agency who require stringent biosecurity measures and carry out inspections regularly.	NA	Ongoing
		Request anti-fouling treatment and bio-fouling removal record from Briggs Marine. If biofouling removal does not occur at intervals appropriate for the type of antifoul applied then refuse entry until bio-foul is removed.	Port Edgar Marina	Prior to dredge activity
		Use the rapid visual inspection scheme (see Table 5) on vessel arrival. If vessel is ranked at level 3 or higher the vessel should be refused entry.	Port Edgar Marina	On vessel arrival
Dredging - Fragmentation and dispersal of NNS.	Fragmentation of NNS especially wakame when floating pontoons are moved and rafted together.	Port Edgar Marina already carries out twice annual removal of bio-foul, including wakame from the floating pontoons. This procedure will be carried out no earlier than six weeks prior to the dredging activities.	Floating pontoons, Port Edgar Marina	Within 6 weeks prior to dredging
	Dispersal of NNS from dredged sediment.	All dredged material will be disposed of inside the marina breakwater to avoid any NNS being transported outside of the marina.	Port Edgar Marina	During dredge activities
		Any larger rock dredged and spotted by the dredge workers will be inspected for NNS including wakame, which will be removed and disposed of in landfill or composting.	Port Edgar Marina	During dredge activities
All	All	Training will be given to key staff at Port Edgar in the identification of NNS (e.g. see Firth of Clyde Forum Marine Invasive Non-Native Species Identification Guide[1]) and using the visual inspection scheme (Table 5). These references should be printed off and placed in the biosecurity plan folder along with this plan.	Port Edgar Marina	Prior to dredge activity

6. Contingency Plan

In the event of any of any control measures being breached or the detection of a new NNS all necessary steps should be made to control the spread and dispersal of the NNS. Contingency plans for specific scenarios are provided in Table 4.

Table 4 Port Edgar Contingency Plan

Issue	Action	Responsibility	Equipment
Fragmentation or dispersal of NNS into the water column.	Remove debris from the water column and dispose to landfill. Use the same procedures in place for routine cleaning.	Port Edgar should instruct dredge operatives to inform management of any observed fragmentation.	Hand nets
Dredge vessel is ranked at class 3 or above in the visual inspection (see Table 5).	The vessel is not allowed entry to port Edgar. Remove from water at home port, clean and antifoul. Inspect surrounding berths.	Port Edgar staff to carry out visual inspection prior to entry. Port Edgar Marina to refuse entry if required.	Laminated copy of visual inspection table to be available in marina office.
Debris with NNS are dredged off the seabed.	Remove from water and allow to air dry or dispose to landfill.	Port Edgar	NA
New non-native species found.	Inform Marine Scotland. Follow Marine Scotland and SNH instructions.	Port Edgar	Copy of Marine Scotland contact available in marina office.

7. Site surveillance and reporting procedure

The Marine Biosecurity Planning guidelines (Payne *et al*. 2014) require the use of a biosecurity logbook to record training, surveillance, control measures carried out and any other activities or concern regarding the biosecurity of the operation. The pontoons will be routinely scraped of bio-foul which will occur twice a year with one scraping occurring within six weeks prior to the dredging operation. This should be recorded in the biosecurity logbook. In addition, a visual inspection of the hard structures (using the visual inspection method in Table 5) within the marina should take place at Port Edgar prior to any dredging operation. This is to determine the presence and extent of any biofouling (specifically NNS), so that any adjustment can be made to procedure or biosecurity action plans.

Surveillance and biosecurity procedures should be assessed annually to ensure they are still relevant and up to date. In addition, procedure should be revised if any significant changes occur to the structure of the marina or if new NNS are recorded.

Following the guidance given by the Scottish Government under the Marine Scotland Act, any new NNS or a significant increase of existing NNS should be reported to Marine Scotland and Scottish Natural Heritage. The Marine Scotland contact for reporting invasive non-native species is the Scottish Environment and Rural Services telephone number: 08452 30 20 50 and email: info@sears.scotland.gov.uk

The GB Non-native Species Secretariat should also be informed so they can update species distribution and abundance databases for NNS.Relevant details are located on their website:

http://www.nonnativespecies.org

Table 5 Biofouling visual assessment (Payne *et al.* 2014)

Rank	Description	Visual estimate of biofouling cover
0	No visible fouling. Hull entirely clean, no biofilm on visible submerged parts of the hull.	Nil
1	Slime fouling only. Submerged hull areas partially or entirely covered in biofilm, but the absence of any plants or animals.	Nil
2	Light fouling. Hull covered in biofilm and one to two very small patches of one type of plant or animal.	1–5 % of visible submerged surfaces
3	Considerable fouling. Presence of biofilm, and fouling still patchy, but clearly visible and comprised of either one or more types of plant and/or animal.	6–15 % of visible submerged surfaces
4	Extensive fouling. Presence of biofilm and abundant fouling assemblages consisting of more than one type of plant or animal.	16–40 % of visible submerged surfaces
5	Very heavy fouling. Many different types of plant and / or animal covering most of visible hull surfaces.	41–100 % of visible submerged surfaces

8 Key sources of Advice

- GB NNSS Website
  - Biosecurity in the field (including biosecurity for boat users, submerged structures and event biosecurity support pack) http://www.nonnativespecies.org/index.cfm?pageid=174
- RYA
  - www.rya.org.uk/go/alienspecies
- The Green Blue
  - Antifoul and Invasive Species
  - http://thegreenblue.org.uk/Boat-Users/Antifoul-and-Invasive-Species
  - The Green Guide to Boat Washdown
  - http://thegreenblue.org.uk/Leaflets-and-Resources/Resources-for-Clubs-Training-Centres-and-Marinas
- Cefas Biosecurity Measures Guidance
  - Shellfish biosecurity measures plan
  - http://www.defra.gov.uk/aahm/files/Book-Shellfish-BMP.pdf
  - Finfish biosecurity measures plan
  - https://www.gov.uk/prevent-fish-or-shellfish-diseases#prevent-the-spread-of-disease-in-fish-and-shellfish
- Invasive Species Ireland
  - Aquaculture Code of Good Practice http://invasivespeciesireland.com/cops/aquaculture/
  - Marina Operators Code of Good Practice http://invasivespeciesireland.com/cops/marina-operators/
  - Water Users Code of Good Practice http://invasivespeciesireland.com/cops/water-users/
- Firth of Clyde Biosecurity Plan
  - Invasive non-native species – A biosecurity plan for the Firth of Clyde http://clydeforum.com/index.php/projects/invasive-species
- IMO Guidelines For The Control And Management Of Ships' Biofouling To Minimize The Transfer Of Invasive Aquatic Species
  - http://www.imo.org/blast/blastDataHelper.asp?data_id=30766&filename=207(62).pdf
- IMO Guidance For Minimizing The Transfer Of Invasive Aquatic Species As Biofouling (Hull Fouling) For Recreational Craft
  - http://www.imo.org/en/OurWork/Environment/Biofouling/Documents/MEPC.1-Circ.792.pdf

9 Annex: Glossary

Biofouling: Biological growth which develops on manmade structures in the aquatic environment.

Biosecurity: Taking action in order to minimise the introduction or spread of invasive non-native species or disease.

Biosecurity Plan: A written document which details site / operation activities and actions that will be undertaken to minimise the introduction or spread of a specified threat (i.e. invasive non-native species).

Control Measures: Refers to actions which are undertaken in order to prevent the introduction or spread of an invasive non-native species.

Establishment: Refers to the process of a non-native species in a new location successfully producing viable offspring with the likelihood of continued survival.

EUNIS: The European Nature Information System (EUNIS) habitat classification is a pan-European system, which was developed between 1996 and 2001 by the European Environment Agency (EEA) in collaboration with experts from throughout Europe. It covers all types of natural and artificial habitats, both aquatic and terrestrial.

Introduction: Refers to the movement by human means, indirect or direct, of a species outside its natural range. This movement can be within a country or between countries.

Native Species: Also known as indigenous species, means a species occurring within its natural range (past or present) and dispersal potential, i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or intervention by humans.

Non-Native Species: Non-native species (also known as alien, non-indigenous, foreign or exotic) means a species or subspecies occurring outside its native range i.e. the range it occupies naturally without the intervention of human activity. This includes any part of the species that might survive and subsequently reproduce.

Prop Wash: An aviation and nautical term used to define a mass of air or water pushed aft or fore by the propeller of an aircraft or propeller-driven watercraft. This term is synonymous with any water disturbance created by a vessel's propulsion systems.

10 References

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