



RNLI Kirkcudbright Maintenance Dredge

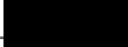
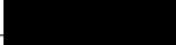
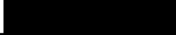
Best Practicable Environmental Opinion Report



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1 Introduction

This Best Practicable Environmental Option (BPEO) report has been produced to support the dredge and disposal marine licence application under the Marine Works (Scotland) Act 2010 for the proposed Royal National Lifeboat Institution (RNLI) Kirkcudbright Slipway Maintenance Dredge.

1.1 Report Aims and Objectives

The purpose of this report is to identify and assess the available options for the use/disposal of dredged materials, arising from the proposed RNLI Kirkcudbright Slipway Maintenance Dredge.

The objectives are:

- To provide an overview of the required dredging works;
- Describe the proposed areas for which a dredging campaign is required, including estimated quantity of dredged material likely to be removed;
- Describe the BPEO methodology employed to complete the assessment; and
- To identify and assess options for disposal of dredged material to determine the BPEO for disposal of dredge spoil.

2 Background

Affric Limited has been commissioned by Wallace Stone on behalf of the Royal National Lifeboat Institution to undertake a BPEO Assessment in support of a dredging and disposal marine licence application at Kirkcudbright Lifeboat Station. The proposed dredging works are Maintenance Dredging Works and comprise of the removal of the build-up of seabed materials at the toe of the Lifeboat Station slipway, Kirkcudbright.

Each year material builds up underneath, on the sides of and on top of the slipway limiting the lifeboat launching and therefore a maintenance dredge is undertaken every year to keep the toe of the slipway free from deposited sea-bed material. This application is to enable consent for annual dredging works for of the next three years to ensure the lifeboat can launch at all states of tide and maintain the 24/7/365 lifesaving service.

2.1 Dredge Areas and Volumes

The proposed dredge area is shown in Drawing KDLA-WS2320-XX-XX-DR-C-1001-P01. A total of up to 160m³ dredge material will arise annually from the maintenance dredge, with a total of 480m³ over the three years.

A range of specific gravities have been identified within the proposed dredge area ranging from 2.64 and 2.74. To be conservative a gravity of 2.7 has been assumed, therefore the mass of the dredge material over the three-year period amounts to 1,296 tonnes.

2.1.1 Sampling

Sampling was conducted by Aspect Land & Hydrographic Surveys LTD in May 2021 conforming to Marine Scotland Guidance notes on Pre-Disposal Sampling (Marine Scotland, 2017). Marine Scotland Guidance requires, as a minimum, three sample stations in relation to the proposed volume of the dredge. As the proposed dredge depth will not exceed 1m, grab

samples were needed at each of these stations. Table 2.1.1. details the positions of the grab samples.

Table 2.1.1: Coordinates of Sampling Locations

| Sample ID | Latitude (N) | Longitude (W) |
|-----------|--------------|---------------|
| 1 | 54°47.700 | 4°03.773 |
| 2 | 54°47.701 | 4°03.775 |
| 3 | 54°47.699 | 4°03.779 |

2.1.2 Sample Analysis

All grab samples were analysed at SOCOTEC UK who are accredited to ISO17025. All samples were tested for a suite of chemical parameters analysed against the Action Levels (AL) prescribed by Marine Scotland in the Pre-Disposal Sampling Guidance (Marine Scotland, 2017).

2.1.3 Results

The results of the grab samples have been summarised in this section. The full sample results are available in the spreadsheet RNLI Kirkcudbright Pre-Disposal Sampling Results, which has been supplied with the dredge licence application.

2.1.3.1 Particulate Size Distribution

Particulate size distribution (PSD) analysis identified that the samples comprised 66.20% solids of which 1.73% was gravel, 55.57% was sand and 42.70% was silt on average across the samples.

2.1.3.2 Trace Metals and Organotins

As shown in the RNLI Kirkcudbright Pre-Disposal Sampling Results spreadsheet, across the three samples analysed, there were only three minor exceedances of AL1. Samples 1 and 3 had concentrations of arsenic (As) of 29.6 and 39.6 mg/kg dry weight respectively, which exceeds the AL1 of 20 mg/kg dry weight, however, these are well below the AL2 of 70 mg/kg dry weight. The average As concentrations across the total dredge area is 20.9 mg/kg dry weight, which only just exceeds the AL1.

Concentrations of nickel (Ni) at Sample 3 were detected at 30 mg/kg dry weight, which is AL1 but is well below the AL2 of 150 kg/mg dry weight. The average Ni concentrations across the total dredge area is 20.6 mg/kg dry weight and is therefore under AL1.

The concentrations of As and Ni within the samples are likely to be a result of historic industrial processes further upstream as the nature of the area immediately surrounding the Lifeboat Station has no known potential heavy metal pollution sources. According to the Plan of the Town of Kirkcudbright circa 1841, there was a Tannery within the Town of Kirkcudbright, with a direct discharge point into the River Dee (National Library of Scotland, 2021). Ni, As and Cadmium (Cd) are all associated with tannery operations and are present within tannery effluents (Tadesse and Guya, 2017). The contaminants will migrate at various speeds downstream and therefore concentrations of contaminants can vary over time. This could explain why in 2017 the levels of As and Ni were lower than in 2021 and the concentrations of Cd has decreased between 2017 and 2021.

2.1.3.3 Polyaromatic Hydrocarbons (PAHs)

Of the three samples taken, there were minor exceedances of AL1 for Benzo(a)pyrene (BAP), Benzo(b)fluoranthene (BBF), Benzo(ghi)perylene (BENZGHIP), Chrysene, Diben(ah)anthracene (DBENZA), Fluoranthene (FLUORANT), Phenanthrene (PHENANT) and Pyrene concentrations in Sample 2. However, the Total Hydrocarbon Content (THC) for Sample 2 was below the AL1. This can be seen in detail in the spreadsheet entitled RNLI Kirkcudbright Pre-Disposal Sampling Results, which has been supplied with the dredge licence application. When the results are combined as a dry weight average across the dredge area, there are no exceedances of AL1 detection limit.

3 BPEO Method

3.1 Introduction

In identifying the BPEO for this proposed dredge campaign the following methodology has been employed:

- Identification of options available for the disposal of material;
- Screening to eliminate unsuitable options;
- Scoring of remaining options; and
- Comparison of options and identification of the BPEO.

3.1.1 Option Identification

Options for disposal of the material were identified through discussions with Royal National Lifeboat Institution, and their engineers Wallace Stone.

3.1.2 Screening

All options have been screened against minimum criteria which each option had to meet in order to be taken forward for detailed consideration. Any option which failed to meet one or more of the criteria was not taken forward to the detailed assessment. The criteria used were:

- The proposed option must be suitable for the characteristics of the dredge material;
- It must be technically viable; and
- Allow for continued use of the RNLI Kirkcudbright Lifeboat Station.

3.1.3 Scoring

Options were scored against a list of attributes; this approach ensures that the same considerations are given to each option so that they can be compared fairly. Attributes were identified to ensure that environmental, technical and cost considerations were taken account of in the decision-making process.

Attributes were scored out of 5 with 1 being the worst performing and 5 being the best, the definitions for each attribute were decided prior to the options being assessed. Each score has been designated a colour to aid visual comparison. The attributes and scoring definitions are provided in Appendix 2.

Options meeting the minimum criteria were scored against each of the attributes (Appendix 3) and reasoning for this scoring provided (Appendix 4).

3.1.4 Comparison of Options and Identification of the BPEO

Following the scoring of the options detailed comparison was undertaken to identify the BPEO.

4 Assessment of Options

4.1 Identification of Options Available

Several options were initially identified for the disposal of the proposed dredge material including both terrestrial and marine based options. The options identified are outlined below. A “do nothing” scenario is included for consideration in line with standard practice for BPEO assessments.

- Do Nothing;
- Disposal to landfill;
- Spreading on Agricultural Land;
- Re-use for Developments;
- Plough Dredging;
- Dispersion Dredging; and
- Deposit to Sea at the Existing Drummore Deposit Site (IS285).

4.2 Screening of Options

Options were screened against the minimum criteria as outlined in Section 3.1.2. This process eliminated five of the seven options as they do not meet one or more of the screening criteria. The reasons why the five options have been discounted are discussed below.

4.2.1 Do Nothing

To not undertake dredging would significantly impact on the use of the Lifeboat Station as the boat will eventually not be able to launch due to the siltation at the toe of the slipway. Not being able to safely launch the boat for life saving rescues, would greatly impede the rescue response time for those in need. Hence, to do nothing would not allow for the continued use of the RNLI Kirkcudbright Lifeboat Station.

4.2.2 Disposal to Landfill

The option to dispose the dredge spoil to landfill was not considered further as the only non-hazardous landfill site in Dumfries and Galloway is Auchenlosh Landfill Site. Auchenlosh Landfill Site is located approximately 35km from the Lifeboat Station but it's estimated closing date is December 2021 (SEPA, 2021). This will not be a viable option as the maintenance dredge will occur over a period of three years (i.e. until 2024). The Straid Farm Landfill Site, located in Girvin, is approximately 95km by road from the Lifeboat Station. As with the Auchenlosh landfill site, it is anticipated to cease landfill operations in December 2021 (SEPA, 2021).

4.2.3 Spreading on Agricultural Land

While the area surrounding the Lifeboat Station comprises agricultural land, this option has not been considered due to the high saline content, which, makes material unsuitable for spreading onto agricultural land without significant further treatment. Salinity is a key environmental limiting factor for the productivity of plant growth and many crops are salt sensitive, making excess salinity a threat to agriculture (Flowers, 2005). This option was therefore screened out based on the chemical characteristics of the dredge spoil.

4.2.4 Reuse of the Material

For material to be suitable for re-use from a construction perspective, it needs to be both chemically and physically suitable. As discussed in Section 2.1.3, the dredge spoil has a very high silt content, which would make the dredge spoil unsuitable for re-use as aggregate, hence the option to re-use the dredge spoil for development has not been taken forward.

4.2.5 Plough Dredging

This option has not been considered further due to the design of the slipway and the location of the areas that need to be dredged. Dredging is required underneath the slipway, between the piles, which cannot be completed with a plough. This option is therefore not technically viable.

4.3 Assessment of Feasible Options

Following the screening process, the options taken forward for further analysis are:

- Dispersion Dredging; and
- Deposit at the Existing Drummore Deposit Site (IS285).

Each of these options have been analysed against the attributes identified in Appendix 2. The options scoring is provided in Appendix 3 with the reasoning for attribute scoring provided in Appendix 4. Where referred to, scores are provided in brackets below.

4.3.1 Dispersion Dredging

Dispersion dredging is completed using a land-based long reach plant which would be located in the north side of the slipway, utilising the access track down to Mean Low Water Springs (MLWS) (Drawing KDLA-WS2320-XX-XX-DR-C-1001-P01). Once material is excavated the long reach plant would deposit the dredge spoil approximately 20m away from the dredged area in the main channel of the River Dee. The dredge spoil would be carried by the current and settle downstream. Dredging would be carried out at a low spring tide within a 2-hour period around low tide, this is to allow access to the dredge area by the land-based plant. It is anticipated that dredging campaigns would last 3 to 4 days each year.

Dispersion dredging has been undertaken for previous maintenance dredging at the Lifeboat Station so is known to be technically feasible, however it needs to be undertaken at the spring low tide to ensure that the toe of the slipway is exposed (4). This option would be permitted via a dredging marine licence. No further licences or permits are required (5).

The only costs associated with this option is for the hire of the land-based plant and associated fuel, as the long reach arm would also be able to release the dredge spoil 20m from the dredge area into the river. It is anticipated that this cost would not exceed £10,000 (5).

The Torrs to Mason's Walk, designated as a Site of Special Scientific Interest (SSSI), starts in the northern most corner of the Lifeboat Station site. The SSSI is designated for wenlock, maritime cliffs, saltmarsh, shingle and vascular plant assemblage. As the proposed maintenance dredge activities are only for the removal of sediment build up at the toe of the slipway, it is unlikely to impact on any natural features within the SSSI. The land-based plant would only sit to the east of the slipway on the existing access track to ensure that it does not enter the SSSI.

The dispersion of dredge spoil could potentially impact on water quality and marine biodiversity due to the high silt content and slightly elevated arsenic levels identified within the dredge spoil. The silt will temporarily increase solids in the water column and increase turbidity, however this will be a short-term reversible effect. It is noted that the wider River Dee area is likely to contain similar concentrations of the trace metals identified in the dredge spoil, as these metals are thought to have migrated downstream over time from the historic tannery upstream. Therefore, the option to disperse the dredge spoil would not change to composition of the seabed further downstream (4).

Assuming the dredge licence is obtained in time for the next low spring tides then there is unlikely to be any impact on the Lifeboat Station both during the dredging window or once it is complete. The land-based plant would not impede on boat launching activities during the 2-3 hour dredging window as it can easily be moved out of the way if the boat needs to be launched (5).

This option scored very highly with a total of 23 out of 25.

4.3.2 Deposit at the Existing Drummore Sea Spoil Deposit Site (IS285)

There are numerous open dredge and disposal sites located within Scottish Waters for deposition of dredged material. The closest site to the proposed dredge is the Drummore Spoil Deposit Site (IS285), located approximately 50km southwest of the Lifeboat Station. Dredging of the slipway toe would need to be undertaken by a land-based plant due to the shallow water depths and need to avoid damaging the slipway. The dredge spoil would then be loaded onto a hooper, located on a barge, which once full, would transport the spoil to IS285 for deposit.

The depositing of dredge spoil to sea is an established and well-practised technique, however, the foreshore area would need to be prepared to create a landing platform for the barge required to transport the dredge spoil to IS285 (2). This option would therefore be costly (1) and, while the deposit of the dredge spoil would be licenced under the dredging marine licence, the works to the foreshore would require additional licencing (3).

Due to the composition of the dredge spoil, there could be a short-term reversible effect on water quality at the dredge spoil deposit site. The preparation of the foreshore area would likely result in further environmental impacts to both the terrestrial and marine environment, these would need to be considered as part of the relevant licencing processes (3).

As this option requires the use of a barge to transport the material to the deposit site, it would interfere with boat launching activities at the slipway during the dredge window (3).

This option scored a low 12 out of 25.

4.4 Comparison of Options

Of the two options assessed within this BPEO, the highest scoring option is dispersion dredging. Ultimately the option of depositing dredge spoil to IS285, while not technically unfeasible, is impractical for the location, nature and scale of the proposed maintenance dredge. The additional work to the foreshore would be costly and require an additional licence prior to the commencing of works. The requirement for a barge within the slipway would impact on boat launching activities from the lifeboat station. Further consideration on the

environmental impacts associated with the construction activities will need to be given during the licence application process.

In comparison, dispersion dredging, is easily implementable over the three-year period. The land-based plant can easily access the site utilising the existing access track with no impacts on the Lifeboat Station during the dredging window. This option is cost effective, requires no further licence or permits with limited environmental impacts.

5 Conclusion

The pre-disposal sample results have informed this assessment in terms of providing an understanding of both the chemical and physical status of the sediments to be dredged. The material is deemed suitable for both dispersion and deposit at sea. Multiple options were considered, a number of which were screened out early in the process. Of the two options taken forward for full assessment, only dispersion dredging scored well, with deposit at the existing Drummore Spoil Deposit Site scoring poorly against all attributes. The BPEO for the very small volume maintenance dredge at the RNLI Kirkcudbright Lifeboat Station is dispersion dredging utilising land-based plant at low tide.

6 References

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Marine Scotland. 2017. Pre-disposal sampling Guidance. Version 2.

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Scottish Environmental Protection Agency. 2021. Landfill Sites and Capacity Map. Retrieved from <https://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/>. Accessed on 5 July 2021

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The Scottish Government. 2010. Scotland's Zero Waste Plan.

7 Glossary

| Acronym | Definition |
|----------|--|
| AL | Action Levels |
| As | Arsenic |
| BAP | Benzo(a)pyrene |
| BBF | Benzo(b)fluoranthene |
| BENZGHIP | Benzo(ghi)perylene |
| BPEO | Best Practicable Environmental Option |
| CD | Chart Datum |
| Cd | Cadmium |
| DBENZA | Diben(ah)anthracene |
| FLUORANT | Fluoranthene |
| km | Kilometres |
| MLWS | Mean Low Water Springs |
| MPA | Marine Protected Area |
| Ni | Nickel |
| PAHs | Polyaromatic Hydrocarbons |
| PHENANT | Phenanthrene |
| PSD | Particulate Size Distribution |
| RNLI | Royal National Lifeboat Institution |
| SEPA | Scottish Environmental Protection Agency |
| SSSI | Site of Special Scientific Interest |

Appendix 1: Sediment Sampling and Laboratory Analysis Report



SEDIMENT SAMPLING & LABORATORY ANALYSIS

RNLI SLIPWAY, KIRKCUDBRIGHT

MAY 2021

PROJECT REF: A7706

REV: 00

Client:

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1. INTRODUCTION

On the instructions of Wallace Stone LLP, Aspect Land & Hydrographic Surveys Ltd (herein ALHS) undertook seabed sediment sampling within the intertidal area adjacent the RNLI Station at Kirkcudbright, Dumfriesshire.

The samples were to be analysed by an accredited laboratory and the information used to obtain a dredge disposal licence.

2. SCOPE OF WORKS

No. 3 sediment samples were required from pre-determined locations adjacent the RNLI Station at Kirkcudbright, as provided by the client.

The samples were collected during a low water tidal state and stored in suitable receptacles prior to being transported to ALHS offices, where they were sub-sampled into jars and containers provided by SOCOTEC UK Ltd.

During recovery, the location of each sample was recorded using RTK GPS instrumentation aligned to OSTN15 positioning and Ordnance Datum level. All laboratory analysis was completed in accordance with Marine Scotland Guidelines.

3. GEODESY & DATUM

The horizontal datum used throughout the data gathering phase of the survey was OSGB36 (OSTN15). Data has been rendered in OSGB36 Datum, British National Grid.

The vertical datum for all data is Ordnance Datum. At Kirkcudbright Bay is 3.70m below OD. OSTN15 defines OSGB36 National Grid in conjunction with the National GPS Network.

In this regard OSTN15 can be considered error free (not including any GPS positional errors). The agreement between OSTN15 and the old triangulation network stations (down to 3rd order) is 0.1m rms.

A Trimble R10 base station was established on site to provide RTK positioning for the samples. Chart Datum at Kirkcudbright Bay is 3.70m below OD.

| POINT NAME | EASTING (M) | NORTHING (M) | ELEVATION (M) OD |
|------------|-------------|--------------|------------------|
| BASE | 267516.471 | 546385.335 | 5.640 |



FIGURE 1 - TRIMBLE R10 BASE STATION, KIRKCUDBRIGHT BAY

4. CONDUCT OF SAMPLING

The samples were collected on 5th May 2021 at Low Water. Low Water was at 14:02 with a predicted height of 1.88m. The locations of the samples, detailed in the table below, were taken as close to the proposed locations as was safely possible.

| Sample | Easting | Northing | Level OD | Level CD | Water Level OD | Time(BST) |
|--------|------------|------------|----------|----------|----------------|-----------|
| 1 | 267472.172 | 546407.836 | -2.051 | +1.649 | -1.766 | 14:34 |
| 2 | 267469.177 | 546410.124 | -3.632 | +0.068 | -1.766 | 14:12 |
| 3 | 267465.596 | 546406.874 | -3.531 | +0.169 | -1.766 | 14:25 |

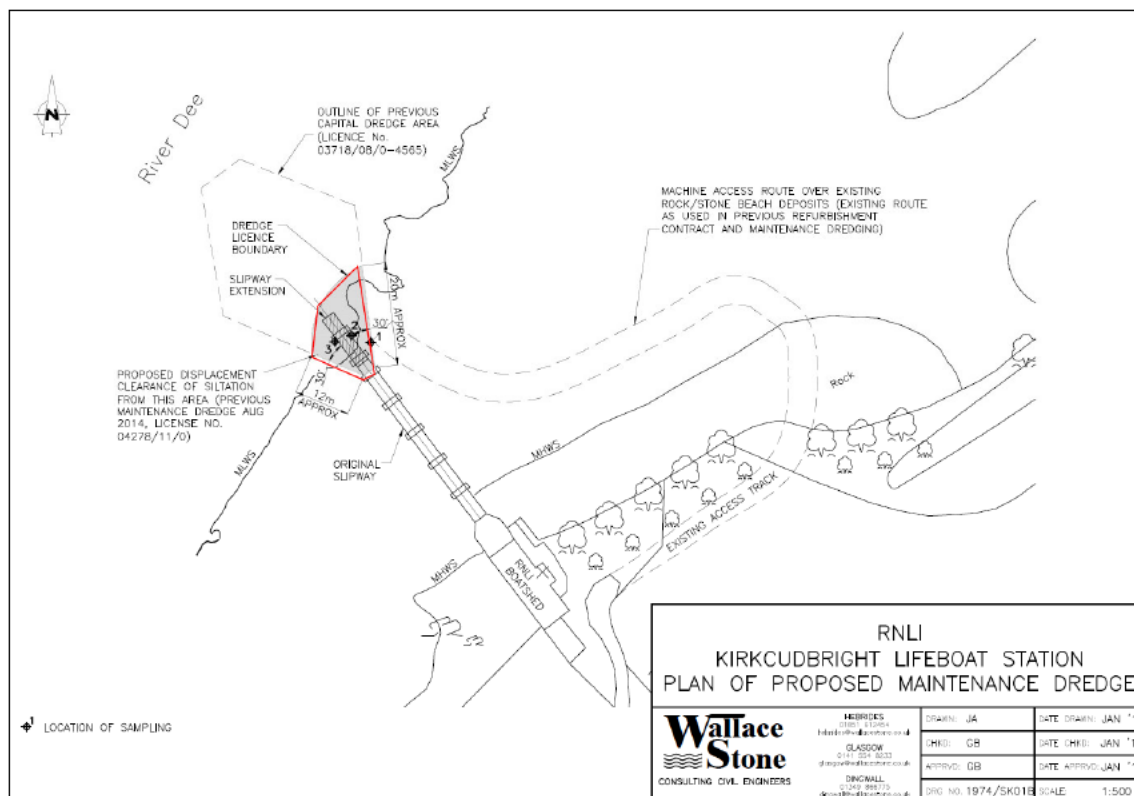


FIGURE 2 - SAMPLE LOCATION (PROVIDED BY THE CLIENT)

A photographic record of each sample was taken to aid identification and material classification.



| | |
|---|--|
| SAMPLE NUMBER | 1 |
| SAMPLE ID [SOCOTEC] | MAR01009.001 |
|  |  |

FIGURE 3 - SEDIMENT SAMPLE 1, KIRKCUDBRIGHT BAY

| | |
|---|--|
| SAMPLE NUMBER | 2 |
| SAMPLE ID [SOCOTEC] | MAR01009.002 |
|  |  |

FIGURE 4 - SEDIMENT SAMPLE 2, KIRKCUDBRIGHT BAY



| | |
|---|--|
| SAMPLE NUMBER | 3 |
| SAMPLE ID [SOCOTEC] | MAR01009.003 |
|  |  |

FIGURE 5 - SEDIMENT SAMPLE 3, KIRKCUDBRIGHT BAY

Upon receipt of the sediment samples, SOCOTEC UK completed sample analysis in accordance with requirements outlined in the Marine Scotland Pre-disposal Sampling Guidance Version 2 - November 2017.

Figure 6, below, details the full suite of analysis that the laboratory offer, in respect of Marine Scotland analysis with those undertaken as part of the Kirkcudbright Ba works highlighted GREEN, as agreed with Wallace Stone LLP on 13.05.2021.

The samples have been analysed against the Action Levels quoted by Marine Scotland and where detected levels were above Action Levels, they have been highlighted in the summary reports.

| MATRIX | DETERMINAND | LOD | METHOD / INSTRUMENT | TURNAROUND [WORKING DAYS] | QUALITY MANAGEMENT SYSTEM | SOP |
|-----------|---|---------------|---|---------------------------|---------------------------|----------------------------------|
| SEDIMENTS | CRM / In-House Reference Material to be run with each batch and data included in report | | | | | |
| | Moisture Content | 0.2% | Oven drying @ 120°C | 15 | UKAS 17025 | ASC/SOP/303 |
| | Total Organic Carbon (TOC) | 0.02% | Carbonate removal and sulphurous acid / combustion at 1600°C/NDIR | 15 | UKAS 17025 | SOCOTEC Environmental Chemistry* |
| | Particle Size Analysis | % | Distribution by wet & dry sieving and laser diffraction | 15 | NMBAQC | SUB |
| | Density | N/A | Density | 15 | Not Accredited | SOCOTEC Doncaster* |
| | Metals Suite, Sieving <63µm, inc. low level Hg at 0.01mg/kg (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) | 0.01 - 2mg/kg | Aqua-regia extraction & ICP-MS | 15 | UKAS 17025 | SOCOTEC Environmental Chemistry* |
| | Organotins (DBT, TBT) | 1µg/kg | Acid digest and solvent extraction GC-MS | 15 | UKAS 17025 | ASC/SOP/301 |
| | PAHs (DTI 2-6 ring aromatics + EPA 16) <i>For full list of compounds see table over page</i> | 1µg/kg | Solvent extraction & GC-MS | 15 | UKAS 17025 | ASC/SOP/304 |
| | PAHs (EPA 16 only) <i>For full list of compounds see table over page</i> | 1µg/kg | Solvent extraction & GC-MS | 15 | UKAS 17025 | ASC/SOP/304 |
| | PCBs (ICES 7) <i>For full list of compounds see table over page</i> | 0.08µg/kg | Solvent extraction & GC Triple Quad | 15 | UKAS 17025 | ASC/SOP/302 |
| | PCBs (25 congeners inc. ICES 7) <i>For full list of compounds see table over page</i> | 0.08µg/kg | Solvent extraction & GC Triple Quad | 15 | UKAS 17025 | ASC/SOP/302 |
| | Total Hydrocarbon Content | 100µg/kg | Solvent extraction & GC-FID | 15 | Not Accredited | ASC/SOP/306 |
| | Organochlorine Pesticides <i>For full list of compounds see table over page</i> | 0.1µg/kg | Solvent extraction & GC Triple Quad | 15 | UKAS 17025 | ASC/SOP/302 |
| | Asbestos Identification | N/A | Presence or absence | 15 | UKAS 17025 | SOCOTEC Asbestos* |
| | PBDEs | 0.1µg/kg | SUB | 15 | Not Accredited | SUB |

FIGURE 6 - MARINE SCOTLAND SEDIMENT ANALYSIS SUITE

5. SURVEY PERSONNEL

The following personnel were involved in the conduct of the survey and delivery of the report:

| NAME | POSITION |
|-------------|-----------------------------|
| S. DAVIDSON | SURVEYOR / SAMPLING |
| G. THOMSON | CLIENT & LABORATORY LIASION |
| S. NORMAN | HSE COORDINATOR |
| R. MAIDER | QA REVIEW / DATA RELEASE |

6. SOCOTEC LABORATORY ANALYSIS

On completion of the agreed laboratory analysis, the physical and chemical properties of the sediment samples recovered at Kirkcudbright Bay can be viewed within the following summary report.



MAR01009.pdf

Further detailed analysis can be viewed with the accompanying Excel files;



MAR01009.xls



Marine Scotland - Results Template MAR01009.xlsx



OEL_SOC2970521_PSD_V01_ Data Submission - MAR01009.xls

Annex A
Standard Disclaimer

A7706

1. All client-supplied data is taken on trust as being accurate and correct, and the subcontractor cannot be held responsible for the quality and accuracy of that data set.
2. Geophysical interpretation of bathymetry and sonar is based on an informed opinion of the supplied data and is subject to inherent errors out with the control of the interpretational hydrographer or geophysicist, which include but are not limited to GPS positioning errors, navigation busts, data quality, assumed speed velocity sediment profiles in the absence of Geotechnical data, sub bottom profile pulse width, and induced scaling errors therein associated with seismic signature. Seabed geomorphology and sub-seabed geology should be further investigated by visual or intrusive methods.
3. The limits of this survey are defined by the data set; out with the survey limits are not covered at any level by the subcontractor.
4. The data is accurate at the time of data acquisition, the subcontractor cannot be held responsible for environmental changes, and the client by accepting this report accepts that the environment of the seabed is subject to continuous change, that items of debris, hard contacts etc. may move, appear, be relocated or removed, thickness of surficial sediment change out with the knowledge of the subcontractor and they will not be held responsible for such actions at any level.

Certificate of Analysis

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| | |
|----------------------|---|
| Test Report ID | MAR01009 |
| Issue Version | 1 |
| Customer | Aspect Land & Hydrographic Surveys Ltd |
| Customer Reference | Kirkcudbright Marine Scotland Sediment Analysis |
| Date Sampled | 05-May-21 |
| Date Received | 21-May-21 |
| Date Reported | 16-Jun-21 |
| 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.

This report shall not be reproduced, except in full, without the written permission of the laboratory
Results contained herewith only apply to the samples tested

Certificate of Analysis



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Test Report ID MAR01009

Issue Version 1

Customer Reference Kirkcudbright 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 |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | 22.8 | 77.2 | 4.2 | 69.8 | 26.0 | 2.70 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | 51.6 | 48.4 | 0.0 | 21.4 | 78.6 | 2.64 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | 27.0 | 73.0 | 1.0 | 75.5 | 23.5 | 2.74 |
| 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

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Issue Version 1

Customer Reference Kirkcudbright Marine Scotland Sediment Analysis

| | | Units | N/A | % M/M |
|--|--------------|---------------------------------|----------|-------------------|
| | | Method No | SUB_02* | SOCOTEC Env Chem* |
| | | Limit of Detection | N/A | 0.02 |
| | | Accreditation | UKAS | UKAS |
| Client Reference: | SOCOTEC Ref: | Matrix | Asbestos | TOC |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | NAIIS | 0.34 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | NAIIS | 1.93 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | NAIIS | 0.29 |
| | | Reference Material (% Recovery) | N/A | 99 |
| | | QC Blank | N/A | <0.02 |

* See Report Notes

NAIIS - No Asbestos Identified In Sample

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Issue Version 1

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| | | 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 |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | 29.6 | 0.14 | 25.4 | 12.9 | 0.08 | 28.1 | 34.5 | 101 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | 12.7 | 0.32 | 33.3 | 20.3 | 0.16 | 27.0 | 37.6 | 115 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | 39.6 | 0.14 | 28.2 | 22.8 | 0.05 | 30.0 | 42.6 | 123 |
| Certified Reference Material SETOC 774 (% Recovery) | | | 105 | 105 | 91 | 105 | 94 | 97 | 101 | 102 |
| QC Blank | | | <0.5 | <0.04 | <0.5 | <0.5 | <0.01 | <0.5 | <0.5 | <2 |

* See Report Notes

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 Issue Version 1
 Customer Reference Kirkcudbright 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) |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | <5 | <5 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | <5 | <5 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | <5 | <5 |
| Certified Reference Material BCR-646 (% Recovery) | | | 86 | 59 |
| QC Blank | | | <1 | <1 |

* See Report Notes

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 Customer Reference Kirkcudbright 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 | N* | UKAS | UKAS | UKAS |
| Client Reference: | SOCOTEC Ref: | Matrix | ACENAPTH | ACENAPHY | ANTHRACN | BAA | BAP | BBF |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | <1 | <1 | 2.57 | 10.1 | 15.1 | 14.7 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | 15.6 | 7.64 | 38.3 | 97.2 | 108 | 110 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | 4.59 | 1.98 | 16.4 | 40.4 | 39.0 | 33.2 |
| Certified Reference Material Quasimeme QPH099MS (% Recovery) | | | 80 | 144 | 104 | 98 | 92 | 84 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries
 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 MAR01009
 Issue Version 1
 Customer Reference Kirkcudbright 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 | BENZGHIP | BKF | CHRYSENE | DBENZAH | FLUORANT | FLUORENE |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | 12.4 | 8.95 | 11.7 | 2.55 | 14.7 | 1.78 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | 107 | 79.8 | 120 | 18.0 | 168 | 27.2 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | 24.8 | 21.1 | 41.9 | 5.32 | 71.6 | 6.47 |
| Certified Reference Material Quasimeme QPH099MS (% Recovery) | | | 105 | 106 | 93 | 79 | 92 | 111 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries
 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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| | | 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 | N* | UKAS | N |
| Client Reference: | SOCOTEC Ref: | Matrix | INDPYR | NAPTH | PHENANT | PYRENE | THC |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | 13.7 | 4.71 | 11.20 | 15.4 | 13500 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | 99.3 | 71.6 | 200 | 153 | 99500 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | 25.9 | 8.38 | 52.4 | 60.4 | 7200 |
| Certified Reference Material Quasimeme QPH099MS (% Recovery) | | | 99 | 101 | 120 | 103 | 106~ |
| QC Blank | | | <1 | <1 | <1 | <1 | <100 |

For full analyte name see method summaries
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 MAR01009

Issue Version 1

Customer Reference Kirkcudbright 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 | UKAS |
| Client Reference: | SOCOTEC Ref: | Matrix | PCB28 | PCB52 | PCB101 | PCB118 | PCB138 | PCB153 | PCB180 |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | 0.12 | 0.09 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | 0.19 | 0.17 | 0.13 | 0.15 | 0.15 | 0.13 | <0.08 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| Certified Reference Material Quasimeme QOR142MS (% Recovery) | | | 89 | 101 | 88 | 83 | 91 | 95 | 72 |
| 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 available.

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| | | 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 |
| Sample 1 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.001 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | 0.12 | <0.1 | <0.1 | <0.1 |
| Sample 2 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.002 | Sediment | <0.1 | <0.1 | <0.1 | 0.18 | 0.16 | 0.38 | <0.1 | 0.47 |
| Sample 3 - RNLI Slipway, Kirkcudbright [A7706] | MAR01009.003 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Certified Reference Material Quasimeme QOR142MS (% Recovery) | | | 107~ | 84~ | 101~ | 106~ | 123 | 105 | 102 | 84 |
| 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 available.

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Test Report ID MAR01009

Issue Version 1

Customer Reference Kirkcudbright 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* | MAR01009.001-003 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| SOCOTEC Doncaster* | MAR01009.001-003 | Analysis was conducted by an internal SOCOTEC laboratory. |
| SUB_01* | MAR01009.001-003 | Analysis was conducted by an approved subcontracted laboratory. |
| SUB_02* | MAR01009.001-003 | Analysis was conducted by an approved subcontracted laboratory. |
| ASC/SOP/301 | MAR01009.001-003 | The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated. |
| ASC/SOP/303/304 | MAR01009.001-003 | 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 | MAR01009.001-003 | 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 (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 | Handling Time Exceeded | N/A | N/A |
| D3 | Sample Contaminated through Damaged Packaging | N/A | N/A |
| D4 | Sample Contaminated through Sampling | N/A | N/A |
| D5 | Inappropriate Container/Packaging | N/A | N/A |
| D6 | Damaged in Transit | N/A | N/A |
| D7 | Insufficient Quantity of Sample | N/A | N/A |
| D8 | Inappropriate Headspace | N/A | N/A |
| D9 | Retained at Incorrect Temperature | N/A | N/A |
| D10 | Lack of Date & Time of Sampling | N/A | N/A |
| D11 | Insufficient Sample Details | N/A | N/A |
| D12 | Sample integrity compromised or not suitable for analysis | N/A | N/A |

Certificate of Analysis



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Test Report ID MAR01009
 Issue Version 1
 Customer Reference Kirkcudbright 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. |
| Total Organic Carbon (TOC) | Air dried and ground | Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR. |
| Metals | Air dried and seived to <63µm | Aqua-regia extraction followed by ICP analysis. |
| Organotins | Wet Sediment | Solvent extraction and derivatisation followed by GC-MS analysis. |
| Polyaromatic Hydrocarbons (PAH) | Wet Sediment | Solvent extraction and clean up followed by GC-MS analysis. |
| Total Hydrocarbon Content (THC) | Wet Sediment | Solvent extraction and clean up followed by GC-FID analysis. |
| Polychlorinated Biphenyls (PCBs) | Air dried and seived to <2mm | Solvent extraction and clean up followed by GC-MS-MS analysis. |
| Organochlorine Pesticides (OCPs) | Air dried and seived to <2mm | 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-Hexachlorocyclohexane |
| ANTHRACN | Anthracene | CHRYSENE | Chrysene | BHCH | beta-Hexachlorocyclohexane |
| BAA | Benzo[a]anthracene | DBENZA | Dibenzo[ah]anthracene | GHCH | gamma-Hexachlorocyclohexane |
| BAP | Benzo[a]pyrene | FLUORANT | Fluoranthene | DIELDRIN | Dieldrin |
| BBF | Benzo[b]fluoranthene | FLUORENE | Fluorene | HC | 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 2: Attributes

| Attribute | Description | 1 | 2 | 3 | 4 | 5 |
|------------------------------------|--|--|--|--|--|---|
| Cost | Financial Cost of the Option | >£ 75,000 | £50,000-75,000 | £35,000- 50,000 | £10,000 – 35,000 | <£10,000 |
| Technical Feasibility | Is the option within the capabilities of RNLI to carry out? | Technology not proven. | Complex requirements, but proven technology. | Simple proven technology available. | Practicable with basic management. | Proven simple practicable technology |
| Environmental Effects | Potential environmental effects associated with implementing the option. | Very Significant | Significant | Minimal | Trivial | None |
| Impacts on Lifeboat station | Level of interference with normal boat launching activities. | Very Significant – unable to operate lifeboat | Significant – Longer / operational impact | Minimal – short term / tidal constraints | Trivial - Impact during dredging | None |
| Legislative Complexity | How complex are the regulator requirements and what risks are posed. | Significant risk additional permits, licences or consents will not be granted. | Requires significant additional permits, licences or consents. | Requires additional permits, licences or consents. | Minor management required to comply with legislation | Complies with all relevant legislation. |

Appendix 3: Options Scoring

| Attribute | Displacement Dredge | Deposit at Sea to Drummore |
|-----------------------------|---------------------|----------------------------|
| Cost | 5 | 1 |
| Technically Feasibility | 4 | 2 |
| Environmental Effects | 4 | 3 |
| Impacts on Lifeboat Station | 5 | 3 |
| Legislative Complexity | 5 | 3 |
| Total | 23 | 12 |

Appendix 4: Reasoning for Attribute Scoring

| Attribute | Displacement Dredge | Deposit at Sea to Drummore |
|------------------------------------|--|---|
| Cost | The cost of displacement dredging is low as it is only the land-based plant that needs to be hired. | Costs associated with mobilisation works, creation of a landing area and deposit of spoil. |
| Technically Feasibility | Proven technology previously utilised for maintenance dredging at the slipway. Has to be done at the low spring tide to allow access to the lower end of the dredge area by the land-based plant. | Deposit to sea is an established and well-practised method of disposing of spoil. A landing platform would need to be created for the landing of a barge, which will require design and implementation. |
| Environmental Effects | While there are slightly elevated levels of arsenic, it is likely that the wider River Dee already contains concentrations of similar trace metals to the dredge spoil. The silt will temporarily increase solids in the water column, however this will be a short-term reversible effect. The land-based equipment will remain to the east of the slipway to avoid the SSSI. | Due to the composition of the dredge spoil, there could be a short-term reversible effect on water quality at the dredge spoil deposit site. Work to the foreshore to be able to land the barge will result in environmental impacts. |
| Impacts on Lifeboat Station | The plant-based vessel will not impede on boat launching activities during the 2-3 hour dredging windows, the plant could be quickly moved to allow the boat to be launched. | As this option requires the use of a barge to transport the material to the deposit site, it would interfere with boat launching activities at the slipway during the dredge window |
| Legislative Complexity | This option would be permitted under the dredging marine licence. No further licences or permits are required. | The option to dispose at sea would be permitted under the dredging marine licence. The works to the foreshore for the landing platform will require further marine licensing and potentially planning consent. |