# Great Harbour Repair Quay, Inchgreen Dredge Licence
# BPEO Report

## December 2022

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# 1 INTRODUCTION

## 1.1 Scope of Report

Peel Ports Limited/Clydeport Operations Ltd (PPG) are required to undertake a Best Practicable Environmental Option (BPEO) assessment to accompany the licence for the disposal of dredge arisings from a proposed dredging operation at Great Harbour Repair Quay, Inchgreen.

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

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

- Environmental;
- Strategic; and
- Cost.

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

## 1.2 Background to Application

At the ports of Glasgow, Greenock and Hunterston routine Maintenance Dredging is required to maintain depths in the Common Navigable Channels, Docks and Riverside Berths to allow for the safety of navigation for shipping using these facilities, as required under the Port Marine Safety Code.

The current method of disposal for the dredged material is to sea at the existing Marine Scotland licensed disposal site 1.6 nautical Miles North of Cloch Point in the Firth of Clyde, ref Cloch Point Spoil Ground, MA021.

The Average Annual Maintenance Dredging Commitment is made up from approximately 32% sand and 67% silt and clay(mud), and results from natural erosion of the hinterland, which is, carried into the common Navigable Channel, Docks and Riverside Berths by the River Clyde and its tributaries. Wave and tidal action puts materials into suspension and thereafter is accumulated in certain parts of the above areas.

The dredging works are carried out by Dredging Contractors to a programme determined by Clydeport Operations Limited in association with Peel Ports group dredging operations.

This programme takes account of current and future dredging requirements against financial budgets. To allow full commercial flexibility in terms of responding to urgent dredging requirements, taking advantage of commercially available dredging plant (often at short notice), removal of dredging backlog, new projects etc., all areas are included in the licence application.

This report covers the Great Harbour Repair Quay which has historically been on licence, but has not been so for c. 10 years. As a result, this application is deemed to be a capital dredge application.

**Table 1-1:Proposed Dredge Site and Dredge Volumes**

| Site Name | Total Dredge Volume (m3) | Dredge Depth (CD) |
|---|---|---|
| Great Harbour Repair Quay | 12,500m3 | -8.8 |
| Optional volume for sea disposal* | 10,000m3 | Up to 1m below surface in area detailed in drawing 174485-GIS020 |

Note * - At the time of submission, based on the current layout it is envisaged that all the material will be disposed of to land, however, to ensure flexibility the licence application has been submitted to include up to 10,000$m^3$ of the material which has been identified as being suitable for this disposal route, as per the original variation request submitted in August 2022. The material west of the midpoint between GS01 and GS02 on Drawing 174485-GIS020 in appendix A up to a depth of 1.0m below surface is considered suitable for sea disposal. All material below this depth, would also need to be disposed of on land.

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# 2 NATURE OF MARINE SEDIMENTS

Samples from the proposed dredge area were collected in March 2022 for the Inchgreen Site and submitted for analysis in line with Marine Scotland's Guidance. The results from this exercise are provided in Appendix B.

Sediments sampled within the proposed dredge areas are reported as ranging from silt to sand.

## 2.1 Chemical Analysis Assessment Criteria

All chemical analytical results were assessed against Revised Action Levels (RAL) criteria as adopted by Marine Scotland. The results are summarised in Table 2-1 below. Full summary reports detailing exceedances in the Marine Scotland format have been submitted along with the supporting information for the application. The full sediment sampling report is provided in Appendix B.

Where contaminants have RALs as adopted by Marine Scotland, exceedances above these criteria are summarised in Table 2-1, along with the maximum concentration recorded for each parameter.

**Table 2-1: Exceedances of Revised Action Levels and Maximum Concentrations**

| Contaminant | No. of Exceedances (of 9samples)* | | Maximum Concentration (mg/kg) and Location |
|---|---|---|---|
| | RAL 1 | RAL 2 | |
| **Arsenic** | 5 | 0 | 28.4 ( Grab GS01) |
| **Cadmium** | 7 | 0 | 2.02 ( BH02 0.95-1.45m) |
| **Copper** | 8 | 0 | 465.9 ( BH01 1.7-2.2m) |
| **Chromium** | 8 | 2 | 369.3 (BH02 0.95-1.45m) |
| **Lead** | 8 | 0 | 363.3 (BH02 0.95-1.45m) |
| **Mercury** | 6 | 0 | 1.39 (BH02 0.95-1.45m) |
| **Nickel** | 8 | 0 | 75.2 (BH01 1.7-2.2m) |
| **Zinc** | 7 | 4 | 1624 (BH01 1.7-2.2m) |
| **PAH (All Species)** | 9 | - | 17.1 (Benzo(b)fluoranthene – BH02 0.95-1.45m) |
| **PCBs** | 8 | 0 | 0.124 (BH02 0.95-1.45m) |
| **TBT** | 3 | 1 | 1.31 (BH01 1.7-2.2m) |
| **TPH** | 9 | - | 4210 (BH02 0.45-0.95m) |

Multiple exceedances above RAL 1 were noted for metals, TBT, TPH, PAHs and PCBs.

One or more exceedances of RAL2 were recorded for copper (2 samples), zinc (4 samples) and TBT (1 sample).

## 2.2 Physical Characteristics

The samples collected were very similar in composition with an average sand content of 27.5 % and the remainder silt at 72.5%.

# 3 DISCUSSION OF AVAILABLE DISPOSAL OPTIONS

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

The key stages of a BPEO are:

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

Further details on methodology are provided within each section.

## 3.1 Identification and screening of Available Disposal Options

A number of options are available for disposal of dredged sediments. The options considered are provided in Table 3-1 along with justification for screening out those options which have not been taken forward for further consideration.

**Table 3-1: Initial Best Practicable Available Options**

| Location | Options | Screening Assessment | Carry forward? |
|---|---|---|---|
| **Estuary/ Riverbank** | Leave in situ | Not an option due to the project specific requirements to maintain the depth of the shipping channel in the River Clyde. | No |
| | Infilling of an existing dry dock/harbour facility/development site (re-use) | There are no projects underway which would accept the type of material present which is predominately silt. | No |
| | Beach Nourishment | Large areas of the Firth of Clyde and Inner Estuary are designated sites (SSSI, SPA, Ramsar) and hold both national and international importance to nature conservation. Specific beach nourishment projects would require to be supported by Environmental Assessments as a minimum to inform how the project could affect the environment as a result of disturbance to the intertidal area, changes to the sediment levels, the variable composition and quality of the material and measures devised from the assessment outcomes to minimise impacts on the environment.<br>The dredge material is predominately silt. Fine sediments (i.e. silt) is not suitable for beach nourishment in the traditional sense. | No |
| **Land** | Landfill Disposal | The material recording contaminants in exceedance of AL2 will not be accepted for sea disposal so will need to be treated or disposed of with a terrestrial solution. | Yes |
| | Land Incineration | The dredged material consists of non-combustible material (silts, sands) with a low combustible component and very high-water content. | No |
| | Application to Agricultural Land | The dredged material would need to be treated to reduce salt concentrations to acceptable levels. Would require detailed chemical analysis and assessment as well as a Waste Management License Exemption. Would require special precautions during spreading in relation to the risk of odour and watercourses / aquifers. The availability of land for this option will be limited within a reasonable haulage distance of the dredge arisings. Large volumes each year are unlikely to be viable to dispose of in this manner and would potentially have a detrimental effect on existing terrestrial habitats. | No |

| | | | |
|---|---|---|---|
| | Recycling | Recycling of dredged material is theoretically possible, however, due to the varied lithology there would need to be either segregation during dredging works to minimise the entrainment of fine-grained material into the sands, or energy and water rich processing on land. This is not currently understood to be an established disposal and reuse route in the Clyde estuary at present and is not likely to be something which could be established in the project timeframes due to the requirement for various permitting requirements including waste management licencing, discharge consents for process water as well as increased road transportation for delivery of waste material and collection of processed material. | No |
| **Sea** | Aquatic disposal direct to seabed. | Relatively low cost, minimal transportation requirements compared to all other options and potential for low environmental risk. The closest spoil ground Cloch Point (MA021) is located approximately 7 km from the closest proposed dredge site with an assigned licensed annual capacity of 830,000 tonnes. | Yes |

## 3.2 Summary of Identified BPEO Options

Two options were taken forward for further detailed BPEO assessment as follows:-

- Landfill Disposal; and
- Sea Disposal.

A brief summary of the necessary works or methodology for each option being taken forward for detailed BPEO assessment is provided below.

### 3.2.1 Landfill Disposal

Dredged material is considered to be controlled waste for the purpose of transport, storage and disposal as per Section 34 (7) of the Environmental Protection Act 1990. The Landfill (Scotland) Regulations 2003 require the classification and characterisation (i.e. inert, non-hazardous or hazardous) of the dredged material to be determined prior to landfill acceptance.

Disposal to landfill would require several stages in material handling operations:-

- Dredging and transport to shore;
- Transfer to shore to a dewatering/drying facility;
- Dewatering;
- Transfer of dewatered material to storage area for stockpiling;
- Loading of lorries and transport to landfill site; and
- Disposal at Landfill site.

Transport to the shore would require the identification of an available jetty facility suitable for receiving material directly to the dewatering facility. Two options are available for off-loading; namely grabbing the spoil from the barge or hopper or pumping directly ashore.

The dewatering facility would require being purpose built and capable of receiving large quantities of bulk material. Currently no facility exists on the Clyde. Settlement tanks, with the aid of sluices and rotational management, would allow solids to settle out and the water element drain off and return to the River Clyde. Temporary mobilisation of bespoke mechanical dewatering equipment could also be utilised but at greater cost. The dewatered dredged sediment would then be removed from the facility and stockpiled for transfer via lorry to a suitably licensed landfill.

Another option for dewatering is creation of stockpiles if space is available, whereby the material is allowed to dry over a period of time until it is ready for transport offsite.

The number of landfills within a viable distance of the River Clyde is considered to be low. In addition, the available capacity of each site is limited by the amount of material it can receive per annum. Due to the proposed quantity of material to be dredged it is therefore unlikely that any landfill within viable distance of the River Clyde will have the capacity to receive the dredged material. Two options have been identified further afield which includes Port Clarence operated by Augean or Frodsham MSC which is operated by Peel Ports Group which is considered the most likely option for the disposal of material with contaminants above AL2.

### 3.2.2 Sea Disposal

This option only handles material at one stage namely transport to the disposal site. The existing licensed disposal site is 1.6 nautical miles North of Cloch Point. It is located in naturally deep water with ease of access, has a large capacity and is anticipated to be active for the foreseeable future.

# 4 FURTHER CONSIDERATION OF REMAINING DISPOSAL OPTIONS

## 4.1 Detailed BPEO Assessment

Each of the identified options was assessed against the criteria detailed in Table 4-1 below.

**Table 4-1: BPEO Detailed Assessment Criteria**

| Primary Criteria | Description and Attributes |
|---|---|
| Strategic | • Operational aspects, including handling, transport etc.<br>• Availability of suitable sites/facilities<br>• General Public/local acceptability<br>• Legislative Implications<br>• Summary of the outcome of consultation with third parties |
| Environmental | • Safety Implications<br>• Public Health Implications<br>• Pollution/ Contamination Implications<br>• General Ecological Implications<br>• Interference with other legitimate activities e.g. fishing<br>• Amenity/Aesthetic Implications |
| Costs | • Operating costs e.g. labour, site operations, environmental monitoring<br>• Capital e.g. Transport, equipment hire |

### 4.1.1 BPEO Strategic Assessment

Table 4-2below provides details of the strategic assessment for each option taken forward for the detailed BPEO assessment: BPEO Environmental Assessment.

Table 4-3 details the environmental assessment for each option taken forward for detailed BPEO assessment.

**Table 4-2: BPEO Strategic Assessment**

| Criteria | Landfill | Sea Disposal |
|---|---|---|
| **Operational Aspects (inc. handling and transport)** | Would involve double handling of material through dewatering and transportation to landfill. A facility would need to be built for dewatering purposes. Would also increase the number of HGV's on the road network. | There would be no double handling of the dredged material. Transportation to the disposal site would be by dredger or barge(s) depending on methodology. |
| **Availability of suitable sites/facilities** | The geotechnical composition of the dewatered River Clyde dredged material is considered to be suitable for disposal via this route. However, there is typically a limit to the amount of waste that can be accepted both on a daily and annual basis at a landfill. The landfill capacity will therefore not be able to accommodate the quantity of material generated by the River Clyde dredging activities and another disposal option will be required for the surplus material. | The marine disposal site has been designed to accommodate the quantities typically generated by dredging operations. The chemical analysis of the sediments from the proposed dredge sites would indicate that the material is likely to be acceptable for testing pending further risk assessment for contaminants present at levels between Action Level 1 and Action Level 2. |
| **General Public /Local acceptability** | Increase traffic on haul routes therefore potential for increase in public complaints. | Traditionally accepted disposal route for dredged material and limited public impact. |
| **Legislative Implications** | Contravenes the principles of minimising waste and long term commitments by the government to reduce land filling. | Material falls under jurisdiction of SEPA when it is brought to land. A Waste Management Exemption will likely be required. |

**Table 4-3:: BPEO Environmental Assessment**

| Criteria | Landfill | Sea Disposal |
|---|---|---|
| **Safety Implications** | Double handling of material increases the potential for accidents to occur.<br>Work would be undertaken in accordance with H&S legislation. | Minimal handling of material required as it is directly placed at the disposal site.<br><br>Work would be undertaken in accordance with H&S legislation. |
| **Public Health** | Measures will be required to limit human contact during transfer of material from dredger to dewatering facility and transportation to landfill.<br>Security measures typically employed at licensed landfills which will minimise human contact once accepted and emplaced at site. | Low potential for human contact during dredging and disposal operations. Once deposited at disposal site pathways for human contact greatly reduced. |
| **Pollution/contamination** | Pumping ashore to dewatering facility and transportation to landfill will all require energy. Road transport increases the carbon footprint of this disposal option. Potential for spillages to occur.<br><br>Material would need to meet specific acceptability requirements in terms of water content and contaminant loading. | Pollutant concentrations in dredged material to be disposed are limited to acceptable levels through regulatory licensing processes. Information with regards to the type of disposal site with regards to its effects on sediments has not been provided. Correspondence with Marine Scotland has previously concluded that disposal sites in Scotland are Dispersive. |
| **General Ecological Implications** | Licensed landfill would be away from protected species and habitats with measures in place to prevent or minimise pollution of the surrounding environment. | Disposal at Cloch Point site has historically been used and is the closest licensed disposal site. |
| **Interference with other legitimate activities** | Potential for limited short term local impact to commercial operations in the area of the dredged material handling and road hauling principally related to noise and dust potential. | Designated disposal site, as such there is considered no significant impact to commercial vessels or commercial fishing. |
| **Amenity / Aesthetic Implications** | Odour release from dewatering facility. Increase traffic noise during transportation from dewatering facility to landfill facility. Potential for spillages on haul route.<br>No significant additional visual/ odour/noise effects as using existing landfill site. | Limited short term visual / odour / noise effects as dredged material is transported by dredger and disposed of below sea level. |

## 4.2 BPEO Cost Assessment

Costs were assessed for each of the options taken forward for detailed BPEO assessment. The BPEO A project costing exercise has been undertaken with the costs for each disposal option outlined below.

**Table 4-4: BPEO Cost Estimates**

| Activity | Frodsham MSC Land Based Disposal (£) | Sea Disposal (£) |
|---|---|---|
| Estimated Cost | £2,040,000 | £81,345 |

Table 4-4 provides details on the Cost assessment for each option taken forward for detailed BPEO assessment.

**Table 4-5: BPEO Summary**

| Criteria | Landfill Disposal | Sea Disposal |
|---|---|---|
| Environment | 4 | 2 |
| Strategic | 4 | 2 |
| Costs | 4 | 1 |
| **TOTAL SCORE** | **12** | **5** |

## 4.3 Conclusions

The Best Practicable Environmental Option for disposal of the Great Harbour Repair Quay sediment has therefore been assessed as a combination of sea disposal and land disposal for the material present at Inchgreen which is known to have contamination levels in exceedance of RAL2.

As identified in the sediment chemical quality section, further assessment is deemed necessary to confirm the suitability of the sediment for sea disposal. The following section details this assessment.

# 5 FURTHER ASSESSMENT

As detailed in Section 2 on the basis of the exceedances of Action Level 1, further assessment to determine the suitability of the material for sea disposal is deemed a requirement.

The approach for this further assessment is outlined as follows:

- Provide an overview of the proposed dredge works and the identified disposal site including existing chemical monitoring data for the site where available; and
- Compare existing chemical data with other recognised sediment assessment criteria including those listed below. Summary tables are provided in Appendix B.

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

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

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

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

## 5.1 Background Data – Dredge and Disposal Site

Cloch Point Disposal site is located in the Firth of Clyde and is licensed annually to receive close to 830,000 tonnes of dredge material. Less than half of the annual licensed capacity has been used in the past 3 years. The proposed variation to the dredge licence will add another 19 discrete dredge areas into the Clyde maintenance dredge programme with an associated annual combined disposal volume of 111,990 $m^3$. Drawing No. 173842-GIS010 in Appendix C details the location and footprint of the Cloch Point Disposal site.

Marine Scotland noted that in Scotland the preference for disposal site selection is those which are dispersive, and as such it is assumed that the Cloch Point disposal ground is dispersive.

Chemical analysis data for samples collected from the disposal ground in 1995, 1997, 2003, and 2005 were provided for review by Marine Scotland, to enable an assessment of the existing conditions at the site to be undertaken. A high-level review of these data highlights the following with the summary table presented as Table C in Appendix C with observations as follows:

- Average concentrations at Cloch Point exceed the ERL for chromium, copper, mercury, lead, zinc and benzo(a)pyrene (PAHs)
- Average concentrations at Cloch Point exceed the PEL for lead and benzo(a)pyrene (PAHs)
- The maximum concentrations of the following contaminants exceed the PEL at Cloch Point chromium, copper, mercury, lead and zinc as well as PCBs (ICEs 7) and various PAH species including benzo(a)pyrene.

## 5.2 Analytical Data Review

Existing analytical data for the proposed dredge site is provided in Summary Table A in Appendix C. This data has been summarised against RAL 1 & 2, the BAC, ERL and PEL. As detailed previously, the data has not been reviewed against the Canadian TEL as these numbers are typically lower than RAL1. A summary of the exceedances is detailed below:

**Table 5-1: Exceedances of Revised Action Levels**

| Contaminant | No. of Exceedances (of 44 samples)* | | RAL Exceedance Location |
|---|---|---|---|
| | RAL 1 | RAL 2 | Sample ID and Depth |
| **Arsenic** | 5 | 0 | – |
| **Cadmium** | 7 | 0 | – |
| **Chromium** | 8 | 0 | – |
| **Copper** | 8 | 2 | BH01 0.7-1.2m, BH01 1.7-2.2m BH02 0.95-1.45m, and Grab GS01 (Surface) |
| **Lead** | 8 | 0 | – |
| **Mercury** | 6 | 0 | – |
| **Nickel** | 8 | 0 | – |
| **Zinc** | 7 | 4 | BH01 1.7-2.2m and Grab GS01 (Surface) |
| **PAH (All Species)** | 9 | - | – |
| **PCBs** | 8 | 0 | – |
| **TBT** | 3 | 1 | BH01 1.7-2.2m |
| **TPH** | 9 | - | – |

### 5.2.1 ERL & PEL Review

Exceedances of the ERL and PEL (where one is available) is summarised in Table 5-2. Full summary tables are provided in Table B in Appendix C : Note any contaminant of concern with N/A indicates no corresponding ERL or PEL value currently available.

**Table 5-2: Exceedances of ERL and PEL**

| Contaminant | No. of Exceedances (of 53 samples)* | |
|---|---|---|
| | ERL | PEL |
| **Arsenic** | N/A | 0 |
| **Cadmium** | 2 | 0 |
| **Chromium** | 7 | 5 |
| **Copper** | 7 | 5 |
| **Mercury** | 8 | 5 |
| **Nickel** | N/A | N/A |
| **Lead** | 8 | 6 |
| **Zinc** | 7 | 6 |
| **PAH (All Species)** | 9 | 9 |
| **PCBs** | N/A | 0 |
| **TBT** | N/A | N/A |
| **TPH** | N/A | N/A |

## 5.3 Averages

Review of the averaged data for all the data has been undertaken i.e. considering the material as a single volume for disposal. The concentrations of the various contaminants of concern are quite variable, the review of average data against the available adopted assessment criteria are as follows:

- Averaged concentrations exceeded RAL1 for all metals except for arsenic;
- Averaged concentrations exceeded RAL1 for TBT, PAHs, TPH and PCBs
- Averaged concentrations exceeded the BAC for for all metals except for arsenic and 10 PAH species;
- Averaged concentrations exceeded the ERL chromium, copper, mercury, lead, zinc and numerous PAH species;
- Average concentrations exceeded the PEL chromium, copper, mercury, lead, zinc and numerous PAH species;
- Average concentrations recorded RAL2 exceedances for Zinc.

## 5.4 Chemical Assessment Conclusions

All of the samples tested recorded an exceedance for RAL1 for one or more contaminants of concern.

RAL2 exceedance are primarily recorded at depth and within the eastern extent of the dredge, with the upper sediments in the western area of the dredge noted to be considered suitable for sea disposal from surface to c. 1.0m below surface. All material with RAL2 exceedances would need to be disposed of on land. Figure 174485-GIS020 details these two extents.

Average concentrations across the dredge site are similar to the average concentrations recorded within the sediments in Cloch Point disposal grounds.

Review of the background contaminant levels at the disposal site has identified that there are contaminants of concern with individual sample exceedances of the adopted ERL and PELs for the key contaminants of concern identified within this recent sampling exercise. There is no PEL currently available for Nickel but the average concentration of the proposed dredge material is 38.9 mg/kg compared to 35.3 mg/kg at Cloch Point, based on available data. Additionally, the average concentrations of lead, zinc and various PAH species across the disposal site are noted to be above the PEL.

In summary, the material that is earmarked for sea disposal (material <RAL2) and represented by the samples collected during this recent sampling campaign are similar in chemical composition to the site where it is proposed to be deposited.

Material which has been identified to contain contaminant levels in exceedance of RAL2 are not considered suitable for sea disposal and will be treated/disposed of on land.

Further consideration of the potential risks associated with the proposed disposal is considered in the following sections.

## 5.5 Water Framework Directive Assessment

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

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

Each of these points are considered in Table 5-3 below:

**Table 5-3: Receptor Risk Assessment**

| Key Receptor[1] | Brief Summary of Potential Effects on Receptor | Further Consideration Required? | Comment |
|---|---|---|---|
| Hydromorphology (Source Area and Disposal Site) | Morphological conditions, for example depth variation, the seabed and intertidal zone structure tidal patterns, for example dominant currents, freshwater flow and wave exposure | No | The areas proposed to be dredged have previously been subjected to routine maintenance dredging. The dredge sites are within the Inner and Outer Clyde Estuary which is classified as a Heavily Modified Water Body (HWMB) of Moderate Status/Potential[2].<br>The disposal site is located within the Firth of Clyde Inner - Dunoon and Wemyss Bay area which is Classified as Good and is not considered to be heavily Modified. The classification of this water body takes into account the presence of the disposal site, so no further assessment is considered to be required. |
| Biology - habitats | Included to assess potential impacts to sensitive/high value habitats. | No | The inner and outer Clyde Estuary and Firth of Clyde Inner - Dunoon and Wemyss Bay are all classified as Good Potential/Status or pass for Coastal and Transitional Waters for fish. The outer Clyde Estuary has been classified as High Potential Status for macro invertebrates. There was no classification for the inner estuary. Clyde Inner - Dunoon and Wemyss Bay are all classified as Good Potential/Status or pass for Coastal waters for macro invertebrates. Proposed material to be deposited as part of dredging campaign(s) similar in nature with material previously deposited. No further assessment considered necessary. |

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

| Key Receptor[1] | Brief Summary of Potential Effects on Receptor | Further Consideration Required? | Comment |
|---|---|---|---|
| Biology – fish | Consideration of fish both within the estuary and also potential effects on migratory fish in transit through the estuary | No | The inner and outer Clyde Estuary and Firth of Clyde Inner - Dunoon and Wemyss Bay are all classified as Good Potential/Status or pass for Coastal and Transitional Waters for fish. Proposed material to be deposited as part of dredging campaign(s) similar in nature with material previously deposited. No further assessment considered necessary.<br>It is noted that under periods of exceptionally hot and dry weather the potential for oxygen related issues to arise i.e. oxygen depletion and it is proposed that dredging works will be avoided as far as practicable during such times. |
| Water Quality | Consideration must be given to water quality when contaminants are present in exceedance of CEFAS RAL1. | No | The inner Clyde Estuary is classified as Bad potential/status or fail for “specific pollutants”. The outer estuary and Firth of Clyde Inner - Dunoon and Wemyss Bay are classified as Good potential/status or pass for “specific pollutants”.<br>No classification is provided for the inner Clyde Estuary for status for “priority pollutants”. The Outer estuary and Firth of Clyde Inner - Dunoon and Wemyss Bay both are both classified as Good Potential/Status or pass for Coastal and Transitional Waters.<br>Contaminants are noted to exceed CEFAS RAL1 within sediment samples. It is noted that sediments with comparable contaminant levels have been deposited at Cloch Point historically, chemical status has not been affected. Potential effects are considered to be both local and temporary. Further consideration of potential effects is discussed in section 5.6 for completeness. |

| Key Receptor[1] | Brief Summary of Potential Effects on Receptor | Further Consideration Required? | Comment |
|---|---|---|---|
| Protected Areas | If your activity is within 2km of any WFD protected area, include each identified area in your impact assessment.<br>• special areas of conservation (SAC)<br>• special protection areas (SPA)<br>• shellfish waters<br>• bathing waters<br>• nutrient sensitive areas | Yes | The proposed disposal site is not located within 2km of an SAC or SPA, marine protected area or Ramsar sites.<br>The disposal site is located approximately 4.5km from the closest designated bathing water at Lunderston Bay.<br>The dredge and disposal sites are not designated as shellfish water. The closest Shellfish Waters Protected Areas are located at Kyles of Bute and Loch Striven over 20km to the south and west; and Loch Long located approximately 20km north of the disposal site.<br>The locations of dredging activity area are within close proximity to (but not within) the Inner Clyde SPA and River Clyde Ramsar site. The minimum distance between any of the dredge areas and the designated SPA/Ramsar is approximately 40m.<br>The Inner Clyde Estuary has been notified as a Special Protection Area (SPA) under the EC Wild Birds Directive and as a Ramsar site under international designation.<br>The dredging activities are focussed to the existing and adjacent to the maintained channel area of the River Clyde. The birds of the estuary feed on the eelgrass, mussel beds, and on the abundant invertebrate fauna of the intertidal mudflats, sandflats and saltmarsh which are not included with the proposed works.<br>However, given the close proximity of the works to the Ramsar/SPA, Scottish Natural Heritage (SNH) were consulted. Dredging works undertaken between mid-March and mid-September would have ‘no likely significant effect’ as birds would be absent. If dredging is to occur in the winter months then SNH state that a Habitat Regulations Appraisal will be required. The SNH response is included in Appendix D. |

## 5.6 Potential Risk to Water Quality and Marine Life

The potential risks to water quality at the dredge sites and disposal site are further considered as all other receptors have been screened out of the assessment.

SEPA classified the coastal water body Firth of Clyde Inner - Dunoon and Wemyss in the area of the disposal ground as "good" for both specific and priority pollutants in 2018[3]. The dredge areas are all on the Inner and Outer Clyde estuary, which has an estuarine classification of "moderate ecological potential" (SEPA, 2018). No further information was available relating to the reason for the moderate status.

Although there are contaminants of concern above the RAL1 within the sediment for disposal, it is considered that these levels will not contribute to an overall degradation of water quality in proximity to the disposal site. While any effects are considered to be both localised and temporary, the potential for dilution in the Firth of Clyde (Firth of Clyde Inner - Dunoon and Wemyss) is considerable when comparing the size of disposal site in relation to the wider Firth of Clyde. Additionally, when the sediment results are reviewed as an average to assess the sediment mass as a single unit for disposal then only the PEL chromium and acenapthene are slightly exceeded. On this basis the risks from the sediment are considered to be low, with the associated dilution potential providing further mitigation.

Material with contaminant levels in exceedance of RAL2 will not be disposed of at sea.

The key contaminants for impacting water quality are considered to be metals as these have the potential to dissolve/desorb from sorption sites, whereas the organic contaminants (e.g. PAHs and PCBs) have a greater affinity for the organic materials which they are bound to, and are more likely to remain strongly bound to the sediment, or if become dissolved, quickly adsorbed onto organic matter within the water column or sediments.

Additionally, the sediment quality within the disposal ground which is also noted to contain levels of contaminants of concern, with some recorded to exceed the PEL, does not appear to have impacted on the Water Quality classification of good in this area.

The key risk is considered to be an increase in turbidity/suspended solids during the disposal activity either at Cloch Point or at the trial site at Langdyke, although this is likely to cause localised degradation in water quality, it is considered that this will be a local and temporary event and has been factored in to the selection and location of the agreed disposal ground. The material is similar in chemical nature to material previously deposited.

The sediment material primarily ranges silt to gravel with the dominant fraction recorded as sand. Table 5-4 summarises the physical sediment type on average by each dredge area versus the proposed dredge volume.

[3] https://map.environment.gov.scot/sewebmap/

**Table 5-4: Summary of PSA Data – Averages by Dredge Area**

| Dredge Area | Gravel (>2mm) | Sand (0.063mm<Sand<2mm) | Silt & Clay (<0.063mm) | Quantity to be dredged $m^3$ |
|---|---|---|---|---|
| Great Harbour Repair Quay | 0.00 | 27.5 | 72.5 | 12,500 |

Consultation previously undertaken with Marine Scotland in November 2017 indicated there was no recent information regarding modelling or dispersion studies for the area. On this basis, there is no current information available to inform the potential for dispersion of sediment out with the disposal grounds (i.e. water current velocity, stratification in water column, weather impacts etc). The disposal site is a sacrificial disposal ground and as such there is considered to be an allowance for some lateral dispersal of materials within the area of disposal.

The dominant grain sizes in the dredge are sand and silt, with silt representing c. 72.5% of the total dredge.

Sands and gravel will fall from suspension quickly, along with any clumps of cohesive material. Silts and clays, being finer grained will suspend and have the potential for dispersal due to longer times in suspension, however it is expected that the majority will quickly fall quickly to the seabed. It is noted that the Cloch Point disposal grounds have been utilised for the maintenance dredge disposal from the River Clyde for a number of previous exercises (including the period of the most recent SEPA water quality classification for chemical status of the waterbody which accommodates the disposal grounds as “good”).

On the basis of the information from dredge disposal to the Cloch Point site, it is considered that the potential for impact to the Water Environment out with the disposal grounds from the clay/silt sediment fractions is considered to be low.

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

## 5.7 Conclusions and Recommendations

Review of available information has highlighted that although several contaminants of concern exceed RAL1 in sediment samples, assessment of key receptors identified from the Water Framework Directive assessment for estuarine and coastal waters concluded that there is a low risk of the sediments impacting upon the overall ecological or chemical status. Additionally, the contaminants of concern levels recorded in the sediment which is proposed to be disposed of at sea are not considered likely to have a significant adverse impact on the sediment quality already located within the disposal grounds and are at similar levels previously deposited at Cloch Point.

Sediments identified with contaminant levels in exceedance of RAL2 will be excluded from sea disposal and will be treated/disposed of on land.

Overall, based on the multiple lines of evidence approach adopted to further assess the exceedances identified in the sediment assessment, the recommendation for sea disposal is considered to be the preferred option for the material within the western extent of the dredge area from surface to c.1.0m below surface. All material below this depth in the western extent, and all area within the eastern extent will need to be disposed of at a land based facility which has been identified as Frodsham MSC.

### 5.7.1 Dredged Material Segregation

As outlined above, and previously communicated with Marine Scotland, some of the material is suitable for sea disposal, and the remainder not considered suitable would need to be disposed of on land.

The total dredge volume and splits for sea and land disposal are summarised below:

**Table 5-5:Proposed Dredge Site and Dredge Volumes**

| Site Name | Total Dredge Volume (m3) | Dredge Depth (CD) |
|---|---|---|
| Great Harbour Repair Quay | 12,500m3 | -8.8 |
| Optional volume for sea disposal* | 10,000m3 | Up to 1m below surface in area detailed in drawing 174485-GIS020 |

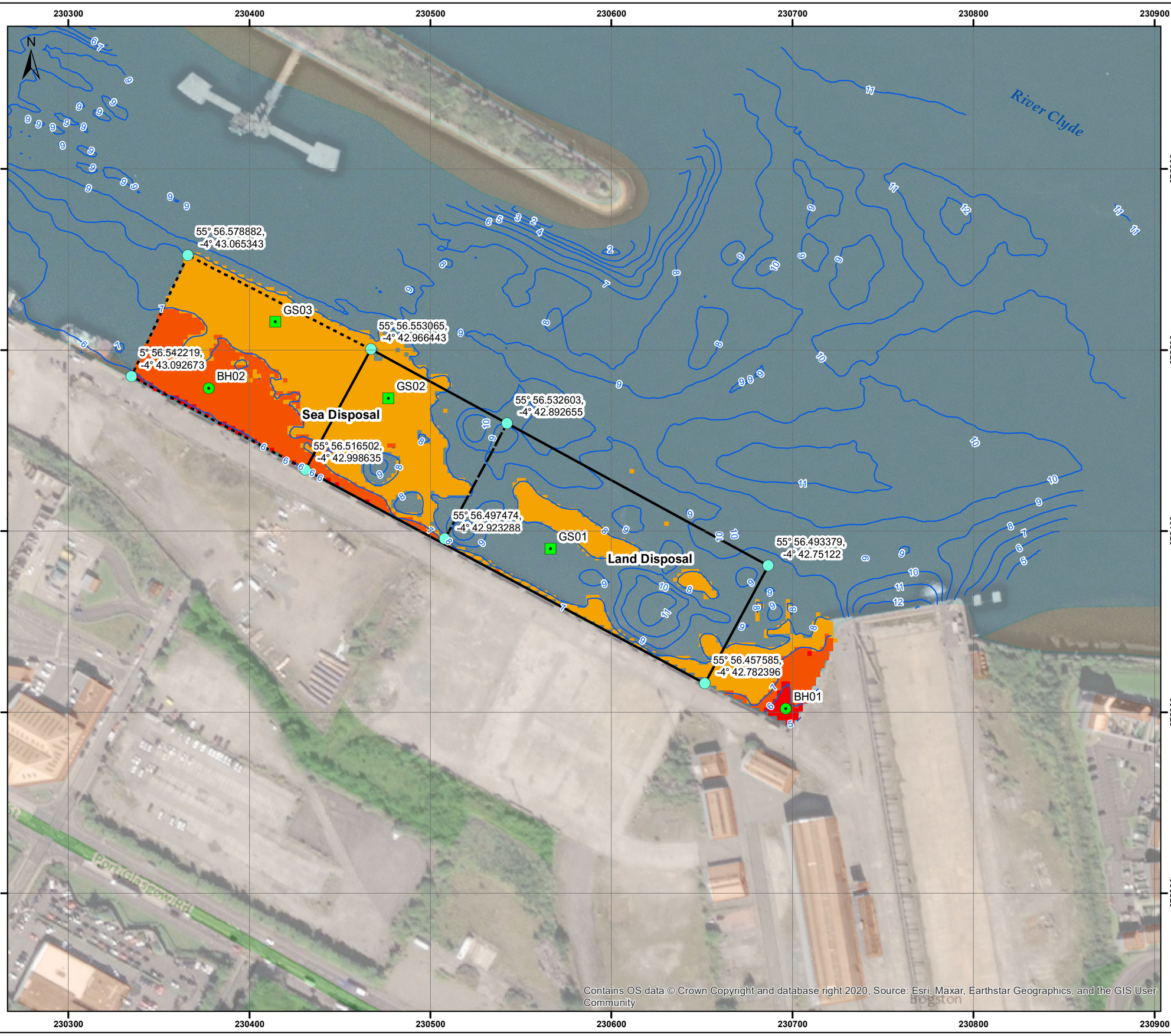
Note * - At the time of submission, based on the current layout it is envisaged that all the material will be disposed of to land, however, to ensure flexibility the licence application has been submitted to include up to 10,000$m^3$ of the material which has been identified as being suitable for this disposal route, as per the original variation request submitted in August 2022. The material west of the midpoint between GS01 and GS02 on Drawing 174485-GIS020, in appendix A up to a depth of 1.0m below surface is considered suitable for sea disposal. All material below this depth, would also need to be disposed of on land.

# REFERENCES

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

# APPENDICES

# A FIGURES




**Legend**

**Sample Stations**

- Core
- Grab
- Disposal Area Boundary Points
- Revised Dredge Area (at Dec 2022)
- Optional Area for Disposal
- Boundary for Sea and Land Disposal
- Surveyed Bathymetric Contour (-m CD)

**Dredge Depth**

**-m CD**

- No dredge
- 0 - 1m
- >1 - 2m
- >2 - 3.16 m

Notes
1. Displayed contours and dredge depths calculated from 2009 bathymetric survey provided by Peel Ports.

Do not scale this map

**Client**
Peel Ports Group

**Project**
Inchgreen, Greenock
Pre-Dredge Sampling

**Title**
Revised Disposal Areas and Boundary Points

**Status**
Final

| Drawing No. | Revision | Date |
|---|---|---|
| 174485-GIS020 | - | 07 Dec 2022 |
| **Drawn** | **Checked** | **Approved** |
| FR | CCAS | CCAS |

**Scale**
1:2,000 @A3
0 10 20 40 60 Metres

| Rev | Date | Amendment | Initials |
|---|---|---|---|
| A | 15/12/22 | Add Optional Area | FR |

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# B DATA SUMMARY TABLES

**Summary Table A**

**Sampling Results Incorporated with BPEO Assessment (mg/kg)**

| | | | | | | Inchgreen (Great Harbour Repair Quay) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AL1 | AL2 | BAC | ERL | PEL | BH01 0-0.15m | BH01 0.7-1.2m | BH01 1.7-2.2m | BH02 0-0.15m | BH02 0.45-0.95m | BH02 0.95-1.45m | Grab GS01 | Grab GS02 | Grab GS03 | AVERAGE | MAX | No. Exceed RAL 1 | No. Exceed RAL 2 | No.Exceed BAC? | No. Exceed ERL | No. Exceed PEL? |
| Source | | | CSEMP | CSEMP | Canada | | | | | | | | | | | | | | | | |
| Arsenic | 20 | 70 | 25 | | 41.6 | 20.4 | 19.5 | 26.4 | 5 | 6.6 | 22.8 | 28.4 | 20.6 | 6 | 17.30 | 28.40 | 5 | 0 | 2 | N/A | 0 |
| Cadmium | 0.4 | 4 | 0.31 | 1.2 | 4.2 | 0.66 | 0.94 | 1.88 | 0.19 | 0.58 | 2.02 | 0.72 | 0.9 | 0.25 | 0.90 | 2.02 | 7 | 0 | 7 | 2 | 0 |
| Chromium | 50 | 370 | 81 | 81 | 160 | 133.7 | 236.4 | 313 | 40.1 | 104.4 | 369.3 | 175 | 189.7 | 52.3 | 179.32 | 369.30 | 8 | 0 | 7 | 7 | 5 |
| Copper | 30 | 300 | 27 | 34 | 108 | 97.6 | 211.8 | **465.9** | 29 | 52.5 | 192.2 | **404.9** | 183.7 | 33.2 | 185.64 | 465.90 | 8 | 2 | 9 | 7 | 5 |
| Mercury | 0.25 | 1.5 | 0.07 | 0.15 | 0.7 | 0.66 | 0.79 | 1.16 | 0.14 | 0.28 | 1.39 | 0.72 | 0.71 | 0.25 | 0.68 | 1.39 | 8 | 0 | 9 | 8 | 5 |
| Nickel | 30 | 150 | 36 | - | - | 44.8 | 46.8 | 75.2 | 10.8 | 12.3 | 46.9 | 52.5 | 49.3 | 11.8 | 38.93 | 75.20 | 6 | 0 | 6 | N/A | N/A |
| Lead | 50 | 400 | 38 | 47 | 112 | 144.7 | 222.4 | 362.7 | 41.4 | 86.1 | 363.3 | 204.8 | 191.8 | 58.8 | 186.22 | 363.30 | 8 | 0 | 9 | 8 | 6 |
| Zinc | 130 | 600 | 122 | 150 | 271 | 309.1 | **678.8** | **1624** | 106.7 | 160.1 | **624.2** | **1384** | 505.1 | 119.3 | 612.37 | 1624.00 | 7 | 4 | 7 | 7 | 6 |
| | | | | | | | | | | | | | | | | | | | | | |
| Napthalene | 0.1 | | 0.08 | 0.16 | 0.391 | 0.114 | 0.188 | 0.308 | 0.122 | 0.557 | 0.714 | 0.197 | 0.148 | 0.3 | 0.29 | 0.71 | 9 | N/A | 9 | 6 | 2 |
| Acenaphthylene | 0.1 | | - | - | 0.128 | 0.0598 | 0.153 | 0.161 | 0.0622 | 0.411 | 1.53 | 0.33 | 0.152 | 0.545 | 0.38 | 1.53 | 7 | N/A | N/A | N/A | 7 |
| Acenaphthene | 0.1 | | - | - | 0.0889 | 0.257 | 0.304 | 0.472 | 0.211 | 1.46 | 3.78 | 0.239 | 0.257 | 0.99 | 0.89 | 3.78 | 9 | N/A | N/A | N/A | 9 |
| Fluorene | 0.1 | | - | - | 0.144 | 0.496 | 0.686 | 1.22 | 0.578 | 3.61 | 7.93 | 0.952 | 0.653 | 2.38 | 2.06 | 7.93 | 9 | N/A | N/A | N/A | 9 |
| Phenanthrene | 0.1 | | 0.032 | 0.24 | 0.544 | 0.678 | 1.56 | 1.45 | 0.783 | 3.95 | 7.27 | 1.9 | 1.08 | 3.71 | 2.49 | 7.27 | 9 | N/A | 9 | 9 | 9 |
| Anthracene | 0.1 | | 0.05 | 0.085 | 0.245 | 0.605 | 1.49 | 1.13 | 0.713 | 3.75 | 6.52 | 1.69 | 1.04 | 3.33 | 2.25 | 6.52 | 9 | N/A | 9 | 9 | 9 |
| Fluoranthene | 0.1 | | 0.039 | 0.6 | 1.494 | 0.561 | 1.11 | 1.15 | 0.665 | 2.78 | 4.4 | 1.25 | 0.873 | 2.64 | 1.71 | 4.40 | 9 | N/A | 9 | 8 | 3 |
| Pyrene | 0.1 | | 0.024 | 0.665 | 1.398 | 0.341 | 0.835 | 0.784 | 0.355 | 2.45 | 3.18 | 0.649 | 0.523 | 1.78 | 1.21 | 3.18 | 9 | N/A | 9 | 5 | 3 |
| Benzo(a)anthracene | 0.1 | | 0.016 | 0.261 | 0.693 | 0.513 | 0.761 | 1.18 | 0.615 | 3.65 | 7.41 | 0.946 | 0.684 | 2.54 | 2.03 | 7.41 | 9 | N/A | 9 | 9 | 6 |
| Chrysene | 0.1 | | 0.02 | 0.384 | 0.846 | 0.074 | 0.165 | 0.229 | 0.106 | 0.467 | 0.936 | 0.216 | 0.184 | 0.576 | 0.33 | 0.94 | 8 | N/A | 9 | 3 | 1 |
| Benzo(b)fluoranthene | 0.1 | | - | - | - | 0.971 | 1.38 | 2.19 | 1.13 | 7.23 | 17.1 | 1.52 | 0.946 | 4.24 | 4.08 | 17.10 | 9 | N/A | N/A | N/A | N/A |
| Benzo(k)fluoranthene | 0.1 | | - | - | - | 0.0992 | 0.174 | 0.288 | 0.11 | 0.706 | 1.25 | 0.175 | 0.14 | 0.456 | 0.38 | 1.25 | 8 | N/A | N/A | N/A | N/A |
| Benzo(a)pyrene | 0.1 | | 0.03 | 0.384 | 0.763 | 0.523 | 1.18 | 1.19 | 0.645 | 3.04 | 4.92 | 1.43 | 0.826 | 2.78 | 1.84 | 4.92 | 9 | N/A | 9 | 9 | 7 |
| Indeno(1,2,3cd)pyrene | 0.1 | | 0.103 | 0.24 | - | 0.0951 | 0.134 | 0.24 | 0.12 | 0.788 | 1.26 | 0.262 | 0.163 | 0.491 | 0.39 | 1.26 | 8 | N/A | 8 | 5 | N/A |
| Benzo(ghi)perylene | 0.1 | | 0.08 | 0.085 | - | 0.564 | 0.977 | 0.949 | 0.589 | 3.28 | 3.99 | 0.677 | 0.547 | 2.62 | 1.58 | 3.99 | 9 | N/A | 9 | 9 | N/A |
| Dibenzo(a,h)anthracene | 0.01 | | - | - | 0.135 | 1.21 | 2.06 | 2.27 | 1.24 | 7.77 | 15.3 | 1.73 | 1.6 | 8.22 | 4.60 | 15.30 | 9 | N/A | N/A | N/A | 9 |
| TPH | 100 | | - | - | - | 702 | 1660 | 2560 | 1210 | 4210 | 2920 | 1050 | 1560 | 1440 | 1923.56 | 4210.00 | 9 | N/A | N/A | N/A | N/A |
| | | | | | | | | | | | | | | | | | | | | | |
| PCBs | 0.02 | 0.18 | - | - | 0.189 | 0.020 | 0.038 | 0.057 | 0.021 | 0.107 | 0.124 | 0.019 | 0.031 | 0.022 | 0.0489 | 0.1245 | 8 | 0 | N/A | N/A | 0 |
| TBT | 0.1 | 0.5 | - | - | - | 0.0136 | 0.155 | **1.31** | 0.0441 | 0.0652 | 0.0129 | 0.0108 | 0.13 | 0.0931 | 0.2039 | 1.3100 | 3 | 1 | N/A | N/A | N/A |

Note: Underlined Values are < LOD. Values highlighted red are equal to or greater than AL1.
PEL Data Source: http://ceqg-rcqe.ccme.ca/en/index.html#void

**Summary Table B**

**River Clyde Average Concentrations**

All units in mg/kg

| | AL1 | AL2 | BAC | <ERL | PEL | Dredge Average | Exceed AL1? | Exceed AL2? | Exceed BAC? | Exceed ERL ? | Exceed PEL? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Source | | | CSEMP | CSEMP | Canada | | | | | | |
| Arsenic | 20 | 70 | 25 | - | 41.6 | 17.3 | No | No | No | N/A | No |
| Cadmium | 0.4 | 4 | 0.31 | 1.2 | 4.2 | 0.9 | **Yes** | No | **Yes** | No | No |
| Chromium | 50 | 370 | 81 | 81 | 160 | 179.3 | **Yes** | No | **Yes** | **Yes** | **Yes** |
| Copper | 30 | 300 | 27 | 34 | 108 | 185.6 | **Yes** | No | **Yes** | **Yes** | **Yes** |
| Mercury | 0.25 | 1.5 | 0.07 | 0.15 | 0.7 | 0.7 | **Yes** | No | **Yes** | **Yes** | No |
| Nickel | 30 | 150 | 36 | - | - | 38.9 | **Yes** | No | **Yes** | N/A | N/A |
| Lead | 50 | 400 | 38 | 47 | 112 | 186.2 | **Yes** | No | **Yes** | **Yes** | **Yes** |
| Zinc | 130 | 600 | 122 | 150 | 271 | 612.4 | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| | | | | | - | | | | | | |
| Napthalene | 0.1 | - | 0.08 | 0.16 | 0.319 | 0.29 | **Yes** | N/A | **Yes** | **Yes** | No |
| Acenaphthylene | 0.1 | - | - | - | 0.128 | 0.38 | **Yes** | N/A | N/A | N/A | **Yes** |
| Acenaphthene | 0.1 | - | - | - | 0.0889 | 0.89 | **Yes** | N/A | N/A | N/A | **Yes** |
| Fluorene | 0.1 | - | - | - | 0.144 | 2.06 | **Yes** | N/A | N/A | N/A | **Yes** |
| Phenanthrene | 0.1 | - | 0.032 | 0.24 | 0.544 | 2.49 | **Yes** | N/A | **Yes** | **Yes** | **Yes** |
| Anthracene | 0.1 | - | 0.05 | 0.085 | 0.245 | 2.25 | **Yes** | N/A | **Yes** | **Yes** | **Yes** |
| Fluoranthene | 0.1 | - | 0.039 | 0.6 | 1.494 | 1.71 | **Yes** | N/A | **Yes** | **Yes** | **Yes** |
| Pyrene | 0.1 | - | 0.024 | 0.665 | 1.398 | 1.21 | **Yes** | N/A | **Yes** | **Yes** | No |
| Benzo(a)anthracene | 0.1 | - | 0.016 | 0.261 | 0.693 | 2.03 | **Yes** | N/A | **Yes** | **Yes** | **Yes** |
| Chrysene | 0.1 | - | 0.02 | 0.384 | 0.846 | 0.33 | **Yes** | N/A | **Yes** | No | No |
| Benzo(b)fluoranthene | 0.1 | - | - | - | - | 4.08 | **Yes** | N/A | N/A | N/A | N/A |
| Benzo(k)fluoranthene | 0.1 | - | - | - | - | 0.38 | **Yes** | N/A | N/A | N/A | N/A |
| Benzo(a)pyrene | 0.1 | - | 0.03 | 0.384 | 0.763 | 1.84 | **Yes** | N/A | **Yes** | **Yes** | **Yes** |
| Indeno(1,2,3cd)pyrene | 0.1 | - | 0.103 | 0.24 | - | 0.39 | **Yes** | N/A | **Yes** | **Yes** | N/A |
| Benzo(ghi)perylene | 0.1 | - | 0.08 | 0.085 | - | 1.58 | **Yes** | N/A | **Yes** | **Yes** | N/A |
| Dibenzo(a,h)anthracene | 0.01 | - | - | - | 0.135 | 4.60 | **Yes** | N/A | N/A | N/A | **Yes** |
| TPH | 100 | - | - | - | - | 1923.56 | **Yes** | N/A | N/A | N/A | N/A |
| Benzo(b)fluoranthene | | | | | | | | | | | |
| PCBs | 0.02 | 0.18 | - | - | 0.189 | 0.049 | **Yes** | No | N/A | N/A | No |
| TBT | 0.1 | 0.5 | - | - | - | 0.2039 | **Yes** | No | N/A | N/A | N/A |

## Summary Table C

**Cloch Point Contaminant Summary - Source: Marine Scotland**

| | Site Name | As mg/kg | Cd mg/kg | Cr mg/kg | Cu mg/kg | Hg mg/kg | Ni mg/kg | Pb mg/kg | Zn mg/kg | ICES7 ug/kg | TBT+ mg/kg | Benzo (a)Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ERL | Cloch Point | - | 1.2 | 81 | 34 | 0.15 | - | 47 | 150 | - | - | 0.384 |
| PEL | | 41.6 | 4.2 | 160 | 108 | 0.7 | - | 112 | 271 | 189 | - | 0.763 |
| Min | | 0.00 | 0.08 | 43.08 | 3.83 | 0.01 | 15.89 | 45.74 | 43.97 | 8.61 | 9.82 | 0.17 |
| Average | | 15.18 | 0.69 | 151.51 | 68.83 | 0.61 | 35.25 | 154.58 | 259.60 | 46.89 | 55.93 | 0.84 |
| Max | | 28.36 | 1.52 | 243.03 | 163.31 | 2.84 | 54.56 | 302.99 | 1214.74 | 191.05 | 342.71 | 3.09 |

**Summary Table D**
**Disposal Site Average Data (mg/kg)**

| | AL1 | AL2 | BAC | <ERL | ISQG/TEL | PEL | Clyde Dredge Average | Cloch Point Average |
|---|---|---|---|---|---|---|---|---|
| Source | | | CSEMP | CSEMP | Canada | | | |
| Arsenic | 20 | 70 | 25 | - | 7.2 | 41.6 | 17.3 | 15.18 |
| Cadmium | 0.4 | 4 | 0.31 | 1.2 | 0.7 | 4.2 | 0.9 | 0.69 |
| Chromium | 50 | 370 | 81 | 81 | 52.3 | 160 | 179.3 | 151.51 |
| Copper | 30 | 300 | 27 | 34 | 18.7 | 108 | 185.6 | 68.83 |
| Mercury | 0.25 | 1.5 | 0.07 | 0.15 | 0.13 | 0.7 | 0.7 | 0.61 |
| Nickel | 30 | 150 | 36 | - | - | - | 38.9 | 35.25 |
| Lead | 50 | 400 | 38 | 47 | 30.2 | 112 | 186.2 | 154.58 |
| Zinc | 130 | 600 | 122 | 150 | 124 | 271 | 612.4 | 259.60 |
| | | | | | | | | |
| | 0.1 | | 0.08 | 0.16 | - | 0.319 | 0.29 | |
| Acenaphthylene | 0.1 | | - | - | 0.00587 | 0.128 | 0.38 | |
| Acenaphthene | 0.1 | | - | - | 0.00671 | 0.0889 | 0.89 | |
| Fluorene | 0.1 | | - | - | 0.0212 | 0.144 | 2.06 | |
| Phenanthrene | 0.1 | | 0.032 | 0.24 | 0.0867 | 0.544 | 2.49 | |
| Anthracene | 0.1 | | 0.05 | 0.085 | 0.0469 | 0.245 | 2.25 | |
| Fluoranthene | 0.1 | | 0.039 | 0.6 | 0.113 | 1.494 | 1.71 | |
| Pyrene | 0.1 | | 0.024 | 0.665 | 0.153 | 1.398 | 1.21 | |
| Benzo(a)anthracene | 0.1 | | 0.016 | 0.261 | 0.0748 | 0.693 | 2.03 | |
| Chrysene | 0.1 | | 0.02 | 0.384 | 0.108 | 0.846 | 0.33 | |
| Benzo(b)fluoranthene | 0.1 | | - | - | - | - | 4.08 | |
| Benzo(k)fluoranthene | 0.1 | | - | - | - | - | 0.38 | |
| Benzo(a)pyrene | 0.1 | | 0.03 | 0.384 | 0.0888 | 0.763 | 1.84 | 0.837 |
| Indeno(1,2,3cd)pyrene | 0.1 | | 0.103 | 0.24 | - | - | 0.39 | |
| Benzo(ghi)perylene | 0.1 | | 0.08 | 0.085 | - | - | 1.58 | |
| Dibenzo(a,h)anthracene | 0.01 | | - | - | 0.00622 | 0.135 | 4.60 | |
| | | | | | | | | |
| PCBs | 0.02 | 0.18 | - | - | 0.0215 | 0.189 | 0.049 | 0.047 |
| TBT | o(b)fluoran | 0.5 | - | - | - | - | 0.204 | 0.056 |

# C SNH CONSULTATION RESPONSE

## Campbell Stewart

**From:** [redacted]
**Sent:** 23 August 2022 13:08
**To:** Campbell Stewart
**Subject:** RE: Clyde Maintenance Dredge Revisions

In that case I can again confirm on behalf of NatureScot that there will be no likelihood of adverse impacts to the qualifying interests of the Inner Clyde SSSI & SPA Campbell.
I think we are pretty settled in the view now that most cases of dredging in the Clyde will not raise any issues of that kind.
Hopefully that is sufficient to your current requirements, but let me know if there is anything else.

Yours,

Dave Lang
Operations Officer
West Central Scotland

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**From:** [redacted]
**Sent:** 22 August 2022 13:25
**To:** [redacted]
**Subject:** RE: Clyde Maintenance Dredge Revisions

Hi Dave,

As far as I am aware there are no novel dredging techniques proposed, and it would be industry standard methods using cutter suction or barge mounted excavator and barges.

Campbell

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**From:** [redacted]
**Sent:** 22 August 2022 13:23
**To:** [redacted]
**Subject:** RE: Clyde Maintenance Dredge Revisions

Hello Campbell.

This is likely to be no kind of problem from our perspective. But I would maybe just ask the same question as last time – is there anything novel or unusual being proposed in terms of the equipment and/or vessels that will undertake this dredging? Or is it intended that the same kind of machinery will be used as was used in the previous projects that you have consulted us over?

Many thanks,

Dave Lang
Operations Officer
West Central Scotland