



**BEST PRACTICABLE ENVIRONMENTAL OPTION (BPEO) ASSESSMENT:**

**DREDGING APPLICATION FOR ROTHESAY OUTER HARBOUR**

**Revision 1**

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## **1. INTRODUCTION**

### **1.1 Background to application**

This Best Practicable Environmental Option (BPEO) assessment supports an application for dredging under the Marine (Scotland) Act 2010, Part 4, Marine licensing.

Rothesay harbour provides leisure and commercial access to mariners for the Isle of Bute.

Between 2006 and 2008 Rothesay Inner Harbour was redeveloped and dredged.

Material, mainly consisting of sand and silt has built up around the berthing area since 2008 and the berthing envelope now has a reduced draft of as low as 0.0m. C.D. It is proposed to carry out dredging to a depth of 2.5m below Chart Datum to allow safe use by the vessels which operate from the harbour.

The material to be dredged to -2.5m Chart Datum; up to 2.9m of material with a volume of around 4500m<sup>3</sup>. The type of dredger used and the associated dredging methodology will be dependent on which contractor is successful in securing the contract to carry out the dredging and on availability of equipment.

### **1.2 Materials to be disposed**

There will be approximately 4,500m<sup>3</sup> of material that will be generated through dredging that will require disposal.

### **1.3 Description (nature and volume) of materials**

Sediment characteristics on site are as a whole consist of a mixture of silty sands – slightly gravelly clay.

#### **1.3.1 Trace Metals and Organotins**

On the whole, the majority of the testing that took place at Rothesay Outer Harbour were below AL1. The following results were above AL1:

- Chromium (Cr) – 2 out of 8 samples were found to be higher than AL1, with the highest concentration being 77 mg/kg
- Copper (Cu) – 1 out of 8 samples were found to be higher than AL1, with the highest concentration being 32.5 mg/kg
- Mercury (Hg) – 2 out of 8 samples were found to be higher than AL1, with the highest concentration being 0.55 mg/kg
- Tributyltin (TBT) 1 out 8 samples were found to be higher than AL1, with the highest concentration being 0.129 mg/kg

No results were above AL2.

### 1.3.2 Poly Aromatic Hydrocarbons

- Of the 8 samples taken, 3 had no PAH's over the AL1 limit.
- One sample was above AL1 in 6 out of 17 tests.
- The remaining 4 samples were consistently over AL1 in nearly all tests.
- The highest concentrations being PYRENE at 1.3 mg/kg and then FLUORANT at 1.16 mg/kg.

### 1.3.3 Organohalogens - Polychlorinated Biphenyls

All samples of the PCBs from were below AL1.

The highest individual result was 0.9 µg/kg which was the same result for PCB 101 and PCB 138.

## 1.4 Discussion about sampling and testing results

Rothesay harbour has been in use since the Victorian times, with the pier in its current form dating back to the late 1800s. The pier has been used by many vessels in this time, which is believed to be the cause for some of the testing results being above AL1 – in particular the Poly Aromatic Hydrocarbons and Metals.

Sources such as anti-fouling from both leisure craft and fishing vessels, as well as the paint on these vessels could have contributed to these increased levels. These activities are no longer permitted within the Outer Harbour.

Sources such as fuel spills and engine oil may also be a contributing factor to the cause for some of the tests to have shown higher than AL1 levels. There are no facilities to purchase fuel within Rothesay Harbour. The berthing facility owners are required to ensure that their vessels meet the environmental and safety guidelines to prevent this from happening in the future.

Argyll and Bute Council acknowledge these results, and will take the best course of action by following Marine Scotland's guidelines to minimize any potential for environmental impact on any dredge disposal location.

## 2 OPTIONS

In this section the different available options will be looked into and if necessary will be described in more detail if the option is found to be feasible.

### 2.1 Do nothing approach

The seabed level is currently such that a purely 'do nothing' option would not allow the future safe use of the pontoons by the vessels which currently use it. Use of the pontoons at low tides would become impractical, hence the need to dredge the surrounding area.

In order for the pontoons to remain accessible to vessels a 'do nothing approach' is not considered a viable option and therefore will not be considered any further.

## **2.2 Beach Replenishment**

It is expected that 4,500m<sup>3</sup> of dredged material would have a negative impact to the area surrounding Rothesay Harbour.

To ensure there is no detrimental effect to the continued visual appeal of this area of Bute, Beach Replenishment is not considered a viable option and therefore will not be considered any further.

## **2.3 Sea Disposal – Plough Dredging**

The depth of the seabed gradually increases from around -2.5m CD at the dredge site in Rothesay Outer Harbour to approximately -20m CD at the open disposal site MA016, greatly increasing the complexity of the plough dredging operation.

Due to the complexity and distance from between the dredge site and disposal location, it is assumed that there will be an increase in fuel usage and greater impact to the local marine environment.

This option would likely be detrimental to the local environment, due to the distance from the dredging site to the open disposal site MA016.

Due to the distance of the closest open disposal site MA016 being 1.3Km away, it is understood that plough dredging to a location of this distance from the dredge site would be considered unsuitable.

## **2.4 Sea Disposal below -100m Chart Datum**

The proposed deposit area is below the -100m Chart Datum. This would involve a number of round trips of at least 2.6km, this would be expected to increase costs over the other options presented, and would involve additional fuel use and environmental impact; however would remove any risk of build-up of silt in areas which form navigation channels or risk of material returning to dredged area through drift.

## **2.5 Sea Disposal at Licenced Site – via back-hoe dredging or suction dredging.**

Disposal at sea would appear to be allowable from the results of the Analysis of Sediment Samples carried out by Holequest Ltd (see attached documents “19-88770-1.pdf” and “Pre-disposal Sampling Results Form Excel – Rothesay Outer Harbour Dredge GI 2019”).

Test results were generally below Action Level 1; with some above Action Level 1 but below Action Level 2; none were above Action Level 2.

Disposal at the closest Open Disposal Site, MA016, appears to be the most suitable option, given the relative proximity to the area that is being dredged and the minimal environmental impact. This site is located 1.3Km away from the dredge site at Rothesay Harbour, and in an area

## **2.6 Landfill Disposal – at Licenced Site**

Disposal to landfill would appear to be allowable from the results of the Analysis of Sediment Samples carried out by Holequest Ltd (see attached documents “19-88770-1.pdf” and “Pre-disposal Sampling Results Form Excel – Rothesay Outer Harbour Dredge GI 2019”). Test results were generally below Action Level 1; with some above Action Level 1 but below Action Level 2; none were above Action Level 2.

## **2.7 Other beneficial uses**

Currently no viable recipient for the material has been identified. It is assumed the material will have a limited capacity for reuse and therefore other beneficial uses are not considered further.

### **3. OPTIONS UNDER CONSIDERATION**

#### **3.1 Sea Disposal – Plough Dredging**

##### **3.1.1 STRATEGIC CONSIDERATION**

###### **3.1.1.1 Operational aspects, including handling, transport, etc.**

Dredging and disposal can be carried out with no effect on the public. Suitable vessel(s) & equipment will be obtained through a tender process.

Plough dredging will not be permitted for the works at Rothesay Harbour.

###### **3.1.1.2 Availability of suitable sites/facilities**

Open dredge disposal site MA016 is located 1.3km from the proposed dredge location.

###### **3.1.1.3 Legislative implications, both national and international**

Marine Licence sought.

###### **3.1.1.4 Summary of the outcome of discussions with third parties (If possible, copies of consultees replies should be appended to the assessment)**

Dredging is proposed primarily to avoid any disruption to third parties although no discussions as yet as dredging will negate any issues.

##### **3.1.2 Environmental considerations**

###### **3.1.2.1 Safety implications**

Tender submissions will be accompanied by relevant Health & Safety documentation.

###### **3.1.2.2 Public health implications**

No Public Health implications identified.

###### **3.1.2.3 Pollution/contamination implications, including discussion on: accumulation, toxicity, hazards, persistence, short and long-term impacts, dilution and dispersion, etc.**

Sampling and testing was carried out in November 2019. 3 cores were taken and analysed by RPS laboratories.

These results can be seen on attached documents “19-88770-1.pdf” and “Pre-disposal Sampling Results Form Excel – Rothesay Outer Harbour Dredge GI 2019”). Test results were generally below Action Level 1; with some above Action Level 1 but below Action Level 2; none were above Action Level 2.

It is believed that the reason that some of these results are above AL1 is due to the previous use of Rothesay Outer Harbour over the decades. Historically Rothesay harbour has been used by pleasure craft and fishing vessels – which can explain the increased levels of PAH's and metals found in the samples.

Due to the nature of plough dredging, these contaminated materials would contaminate the marine environment between the dredge site at Rothesay harbour and the Disposal site MA106 – which is deemed not suitable.

#### **3.1.2.4 Interference with other legitimate activities, e.g. fishing operations, other aquaculture interests**

Sea disposal by Plough Dredging will be managed in such a way as to not interfere with the Caledonian MacBrayne ferry service to Rothesay and will minimise disruption to leisure craft visiting Rothesay Harbour.

#### **3.1.2.5 Amenity/aesthetic implications**

No amenity / aesthetic implications identified at this stage.

#### **3.1.2.6 Best practice guidance and mitigation measures**

Chemical analysis has detailed that some of the samples taken from Rothesay Harbour (3 cores) have levels higher than AL1 in some Poly Aromatic Hydrocarbons and Metals. No levels are above AL2.

Argyll and Bute Council will take all necessary steps to minimise any disruption to the marine environment throughout the process of the dredging operation. This will be accomplished by following Marine Scotland's guidelines with close cooperation with the dredging contractor.



## **3.2 Sea Disposal at Licenced Site - Rothesay Bay (MA016) – via back hoe or suction dredge**

### **3.2.1 STRATEGIC CONSIDERATION**

#### **3.2.1.1 Operational aspects, including handling, transport, etc.**

Dredging and disposal can be carried out with no effect on the public. Suitable vessel(s) & equipment will be obtained through a tender process.

#### **3.2.1.2 Availability of suitable sites/facilities**

Suitable Licenced Disposal Site is available at Rothesay Harbour.

#### **3.2.1.3 Legislative implications, both national and international**

Marine Licence sought.

#### **3.2.1.4 Summary of the outcome of discussions with third parties (If possible, copies of consultees replies should be appended to the assessment)**

The proposed dredging is primarily to avoid any disruption to third parties going forwards; therefore no discussions at this stage as dredging is expected to avoid any impact on third parties.

### **3.2.2 ENVIRONMENTAL CONSIDERATIONS**

#### **3.2.2.1 Safety implications**

Tender submissions will be accompanied by relevant Health & Safety documentation.

#### **3.2.2.2 Public health implications**

It is expected that there will be minimal public health implications as a result of the dredging works proposed at Rothesay Outer Harbour.

#### **3.2.2.3 Pollution/contamination implications, including discussion on: accumulation, toxicity, hazards, persistence, short and long-term impacts, dilution and dispersion, etc.**

Sampling and testing was carried out in November 2019. 3 cores were taken and analysed by RPS laboratories.

These results can be seen on attached documents “19-88770-1.pdf” and “Pre-disposal Sampling Results Form Excel – Rothesay Outer Harbour Dredge GI 2019”). Test results were generally below Action Level 1; with some above Action Level 1 but below Action Level 2; none were above Action Level 2.

It is believed that the reason that some of these results are above AL1 is due to the previous use of Rothesay Outer Harbour over the decades. Historically Rothesay

harbour has been used by pleasure craft and fishing vessels – which can explain the increased levels of PAH's and metals found in the samples.

It is assumed that there should be minimal impact at the Dredging disposal site MA016 if dredge material is to be disposed of here.

#### **3.2.2.4 Interference with other legitimate activities, e.g. fishing operations, other aquaculture interests**

Interference will be minimised at every opportunity. Close communication between the Harbour Master at Rothesay and with Caledonian Macbrayne will minimise the impact to the ferry service between Rothesay and Weymss bay. Close communication with the Rothesay Harbour master and other vessels, such as fishing, will be maintained throughout the dredge disposal process to lower the potential for interference.

#### **3.2.2.5 Amenity/aesthetic implications**

No amenity / aesthetic implications identified at this stage.

#### **3.2.2.6 Best practice guidance and mitigation measures**

Chemical analysis has detailed that some of the samples taken from Rothesay Harbour (3 cores) have levels higher than AL1 in some Poly Aromatic Hydrocarbons and Metals. No levels are above AL2.

Argyll and Bute Council will take all necessary steps to minimise any disruption to the marine environment throughout the process of the dredging operation. This will be accomplished by following Marine Scotland's guidelines with close cooperation with the dredging contractor.

### **3.3 Sea Disposal below -100m Chart Datum**

#### **3.3.1 STRATEGIC CONSIDERATION**

##### **3.3.1.2 Operational Aspects, including handling, transport, etc.**

Dredging and disposal can be carried out with no effect on the public. Suitable vessel(s) & equipment will be obtained through a tender process.

##### **3.3.1.3 Availability of suitable sites/facilities**

Suitable pocket areas are available within 1.3km of Rothesay Outer Harbour.

##### **3.3.1.4 Legislative implications, both national and international**

Marine Licence sought.

#### **3.3.2 ENVIRONMENTAL CONSIDERATIONS**

##### **3.3.2.2 Safety implications**

Tender submissions will be accompanied by relevant Health & Safety documentation.

##### **3.3.2.3 Summary of the outcome of discussions with third parties (If possible, copies of consultees replies should be appended to the assessment)**

The proposed dredging is primarily to avoid any disruption to third parties going forwards; therefore no discussions at this stage as dredging is expected to avoid any impact on third parties.

##### **3.3.2.5 Public health implications**

If sea disposal below -100m chart datum was used then it would be up to a 2.6km round trip to deposit site. This would require multiple journeys that could potentially be a danger to other users within the loch and sea.

Air pollution, fuel use and environmental impact all increased.

##### **3.3.2.6 Pollution/contamination implications, including discussion on: accumulation, toxicity, hazards, persistence, short and long-term impacts, dilution and dispersion, etc.**

Sampling and testing was carried out in November 2019. 3 cores were taken and analysed by RPS laboratories.

These results can be seen on attached documents "19-88770-1.pdf" and "Pre-disposal Sampling Results Form Excel – Rothesay Outer Harbour Dredge GI 2019"). Test results were generally below Action Level 1; with some above Action Level 1 but below Action Level 2; none were above Action Level 2.

It is believed that the reason that some of these results are above AL1 is due to the previous use of Rothesay Outer Harbour over the decades. Historically Rothesay

harbour has been used by pleasure craft and fishing vessels – which can explain the increased levels of PAH's and metals found in the samples.

It is assumed that there would be minimal impacts, due to the relatively low concentrations of contaminants in the dredge material and the dispersal of material which would take place if deposited at -100CD. However, the licenced site MA016 is the chosen option.

### **3.3.2.7 Interference with other legitimate activities, e.g. fishing operations, other aquaculture interests**

Any dredging activity will be managed in order to minimise any potential for disruption. Close communication with the Rothesay Harbour Master and Caledonian Macbrayne will allow for further minimising of any potential disruption.

### **3.3.2.8 Amenity/aesthetic implications**

No amenity / aesthetic implications identified at this stage.

### **3.2.2.6 Best practice guidance and mitigation measures**

Chemical analysis has detailed that some of the samples taken from Rothesay Harbour (3 cores) have levels higher than AL1 in some Poly Aromatic Hydrocarbons and Metals. No levels are above AL2.

Argyll and Bute Council will take all necessary steps to minimise any disruption to the marine environment throughout the process of the dredging operation. This will be accomplished by following Marine Scotland's guidelines with close cooperation with the dredging contractor.

### **3.4 Landfill Disposal at Licensed Site – Rothesay Dump, Rothesay**

#### **3.4.1 STRATEGIC CONSIDERATION**

##### **3.4.1.2 Operational aspects, including handling, transport, etc.**

Disposal to landfill would require around 4,550m<sup>3</sup> / 7,565 tons of dredged material to be transported from the dredged site to an appropriate commercial waste facility, which is 1.1 miles away. It should be noted that this disposal site, Rothesay Dump, is not expected to have the capacity to take this amount of material. Therefore it would have to be transported via ferry off the island to the mainland, increasing the environmental impacts drastically. Further to this, the added wear to the island's roads would be undesirable.

In order to make the sediment suitable for landfill disposal, several processes would need to be undertaken. Dredged material would require offloading to shore and undergo a dewatering process, ideally prior to transportation to minimise the weight to be transported. It is unlikely that the harbour would have sufficient space available to undertake the dewatering processes on site and hence another area would need to be found for this process to take place.

Due to the rural nature of the site, the dewatering process is likely to be technically challenging and could result in significant disruption to the area. Full methods have not yet been provided by a contractor, the following assessments are made using potential working methods. It is considered that undertaking dewatering will in reality be impractical, disruptive to local residents and traffic and ultimately cost prohibitive. Dredged material from Rothesay would need transporting by HGV's to the mainland. The transportation alone would increase the cost substantially and add to significant disruption to locals on roads and ferries.

Suitable vessel(s) & equipment would be obtained through a tender process.

##### **3.4.1.3 Availability of suitable sites/facilities**

Due to the weight of material to be disposed of being 7,565 tonnes, and the nearest suitable site being on the mainland this option has been discounted at this stage. Assuming 25 tonnes of material can be loaded onto a 40 tonne truck, this would require 303 lorry loads to be transported via ferry to the mainland. This would drastically increase cost and environmental pollution, as well as impacting the Island roads and communities.

##### **3.4.1.4 Legislative implications, both national and international**

Marine License sought.

##### **3.4.1.5 Summary of the outcome of discussions with third parties (If possible, copies of consultees replies should be appended to the assessment)**

The proposed dredging is primarily to avoid any disruption to third parties going forwards; therefore no discussions at this stage as dredging is expected to avoid any impact on third parties.

### **3.4.2 ENVIRONMENTAL CONSIDERATIONS**

#### **3.4.2.2 Safety implications**

Tender submissions will be accompanied by relevant Health & Safety documentation.

#### **3.4.2.3 Public health implications**

If landfill disposal of the contaminated material was the option taken forward, there is no site on the island with capacity for such material. The material would have to be transported on up to 303 vehicle movements across the island, on ferry to the mainland to Scotland's central belt.

#### **3.4.2.4 Pollution/contamination implications, including discussion on: accumulation, toxicity, hazards, persistence, short and long-term impacts, dilution and dispersion, etc.**

Chemical Analysis of the seabed has been carried out and results can be seen on attached documents "19-88770-1.pdf" and "Pre-disposal Sampling Results Form Excel – Rothesay Outer Harbour Dredge GI 2019").

Test results were generally below Action Level 1; with some above Action Level 1 but below Action Level 2; none were above Action Level 2.

#### **3.4.2.5 Interference with other legitimate activities, e.g. fishing operations, other aquaculture interests**

There would likely be interference with fishing vessels and pleasure craft using the pontoons at Rothesay Harbour.

The expected requirement of 303 movements to transport the material along Bute's road network would interfere with local traffic and would involve an increased burden on the island's roads.

#### **3.4.2.6 Amenity/aesthetic implications**

No amenity / aesthetic implications identified at this stage.

#### **3.4.2.7 Best practice guidance and mitigation measures**

Chemical analysis has detailed that some of the samples taken from Rothesay Harbour (3 cores) have levels higher than AL1 in some Poly Aromatic Hydrocarbons and Metals. No levels are above AL2.

Argyll and Bute Council will take all necessary steps to minimise any disruption to the marine environment throughout the process of the dredging operation. This will be accomplished by following Marine Scotland's guidelines with close cooperation with the dredging contractor.

## 4. APPROXIMATE COSTS

### 4.1 Capital / Revenue costs

- Estimated cost for Plough Dredging and disposal of material below -2.5m Chart Datum is estimated at **£60,000**.
  
- Estimated cost for Dredging and disposal of material below -100m Chart Datum is estimated at **£200,000**.
  
- Estimated cost for Dredging and disposal of material at Licensed Site (MA016) via back hoe or suction dredge is estimated at **£140,000**.
  
- Tender for disposal of material on land is estimated at **£220,000**:

*Costs are based on comparing the options to previous schemes and consultation for those methods not before costed.*



## 5. CONCLUSIONS

### 5.1 Summary of available options

Only one option is considered to be suitable to dredge Rothesay Outer Harbour. This is after close consideration of the costs and the environmental impact that these options may incur.

### 5.2 Summary of Options

The following table summarizes aspects of each scenario:

OPTION	VIABILITY	JUSTIFICATION
Do Nothing Approach	Not viable	To do nothing would make the harbour unusable which is not a viable option.
Beach Replenishment	Not viable	Beach replenishment would require the movement of the sediment a short distance and is likely to be highly unpopular with residents.
Plough Dredging	Not Viable (not permitted)	Plough dredging 1.3km to the disposal site, is thought to be unacceptable. There will be an increased potential for disruption to the CalMac ferry service and impact to the environment.
<b>Sea Disposal at a Licenced Site –via back hoe or suction dredge</b>	<b>Feasible</b>	<b>Low environmental impact compared to plough dredging.</b>  <b>Minimal to no impact between the dredging location at Rothesay Harbour and the disposal location.</b>
Sea Disposal below -100m Chart Datum	Not Viable	High environmental impact due to multiple sea journeys to -100m CD site.
Landfill Disposal	Not Viable	The process is majorly impractical due to the transport of many vehicles and plant on an already congested ferry service and a local roads network which would have unnecessary additional wear and tear.
Other Beneficial Use	Not viable	Currently no viable recipient for the material has been identified. It is assumed the material will have a limited capacity for reuse and therefore other beneficial uses are not considered further.

### 5.3 Identification of BPEO

The “**Sea disposal at licenced site**” option has been chosen as the Best Practicable Environmental Option due to a number of factors:

- Minimising use of the Island’s road network and the trunk road network on the mainland.
- Minimising fuel use.
- Minimising Environmental impact.
- Avoiding unnecessary journeys to allow disposal of material in licenced site on land.

Overall, based on this report Sea Disposal at the Licenced site MA016 via back hoe dredging or suction dredging provides the best practicable and environmental option for disposal. This report was based on environmental and strategic considerations.

## 6 APPENDIX

### Appendix D – Analytical Chemistry Data

19-88770-1.pdf

19-88770-1.xls

Pre-disposal Sampling Results Form Excel - Rothesay Harbour.xls

Rothesay Harbour Dredge GI Final Logs 06.12.2019