Port Babcock Rosyth

Best Practicable Environmental Option

for

Maintenance Dredging of Port Approaches

31st August 2022

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Contents

1. Introduction

1.1 Purpose of Report

This Report presents the Best Practicable Environmental Option (BPEO) assessment for the maintenance dredging and disposal of arisings associated with the approaches and tidal berths at Port Babcock Rosyth. BPEO assessment is a method aimed at identifying the option that provides increased environmental benefit or limited environmental damage. It assesses the performance of alternative options against a range of criteria such as environmental impact, technical feasibility, and cost.

The report has drawn on information provided by the Scottish Government National Marine Plan which identifies the need for development of marine industry to achieve sustainable growth. The plan also acknowledges the requirement for measures to achieve navigational safety to assure access to ports to achieve required growth. Arrangements for marine activity must also give due consideration to other users of and environmental impact on the marine environment.

1.2 Project Background

This BPEO is produced in support of the application for a dredging licence in accordance with the Marine Scotland Act 2010. Capital dredging of the Rosyth Channel and Dockyard tidal berths was undertaken in the early part of the 20th Century during the construction of the Naval Dockyard and Base. Regular maintenance dredging of all Dockyard tidal berths and approaches was subsequently undertaken from time to time to sustain charted depths. On transfer of ownership of the Dockyard to Babcock Marine in 1997 responsibility for dredging the tidal waters remained with the Ministry of Defence until 2008 when a final major dredge of the tidal berths and approaches to the Port was undertaken by the Ministry. Since that date areas of tidal waters and berths has taken place from time to time in support of the Queen Elizabeth Class aircraft carrier project.

[redacted]

1.3 Licensing Requirements

Under the provisions of the Marine (Scotland) Act 2010, a licence issued by Marine Scotland (MS) is required for the deposit of substances or articles in waters adjacent to Scotland. Applications for a MS licence require to be accompanied by supporting information, including a BPEO assessment, which demonstrates that: alternatives to sea disposal have been investigated, sea disposal does not pose an unacceptable risk to the marine environment and sea disposal does not interfere with other legitimate uses of the sea.
Material originating from maintenance dredging of the approach channel and tidal berths has to be removed for disposal elsewhere. This assessment considers a number of options available for disposal and clearly identifies the BPEO, in accordance with the requirements of MS.

1.4 Structure of Report

This report is structured as follows:
• Section 2 summarises the dredging requirements.
• Section 3 describes each of the available disposal options and rejects those which are considered impractical.
• Section 4 assesses the viable options; and
• Section 5 presents a summary of the findings of this study and concludes by identifying the BPEO.

1.5 Sources of Information

In compiling this report, the following information sources have been consulted:

- MS-LOT
- SEPA
- Scottish Government

2. Dredging Requirements

2.1 Programme of Work

The aircraft carrier HMS Queen Elizabeth & Prince of Wales will be unable to return to Port Babcock Rosyth for class survey docking unless the Port's approaches and supporting tidal berths are dredged to restore charted Depths at these critical locations.

The programme of work involves removal of a maximum of 114,037 tonnes of naturally occurring upstream (river) and downstream (estuarial) materials brought into the area in suspension by tidal flows and distributed by tidal currents and vessel movements. The dredged area extends too far from the shore to enable the dredging to be undertaken by shore-based plant; therefore, marine plant will be utilised. A trailing suction hopper dredger will be used to undertake the dredging works, supported by a bed levelling multiact vessel.
The first phase dredging activity is planned to commence in September 2022 (subject to licence approval and scheduling agreement with our marine contractor) and is estimated to take Fourteen Days to complete, based on 24-hour 7 day working.

2.2 Material to be dredged

The total volume of material to be dredged is anticipated to be naturally occurring upstream (river) and downstream (estuarial) materials, predominantly soft silt river muds, brought into the area in suspension by tidal flows and distributed by tidal currents and vessel movements.

2.3 Area to be dredged

The periphery of the tidal approaches to and tidal berths within Port Babcock Rosyth having the coordinates:

(A) 56.01.33N: 03.26.74W, (B) 56.01.29N: 03.26.54W, (C) 56.01.25N: 03.26.57W,
(D) 56.01.22N : 03.26.66W, (E) 56.01.16N : 03.26.70W, (F) 56.01.15N : 03.26.71W,
(G) 56.01.16N : 03.26.73W, (H) 56.01.18N : 03.26.71W, (I) 56.01.23N : 03.26.70W,
(J) 56.01.28N : 03.26.94W, (K) 56.01.30N : 03.26.93W, (L) 56.01.29N : 03.26.89W,

(Appendix A Marked up site plan and Admiralty Chart 728 detail)

2.4 Future Maintenance Dredging

On completion of the initial dredge programme further periodic maintenance dredging will be undertaken to sustain the required depth of water [redacted] with a yearly evolutional cycle expected.

3. Available Disposal Options

3.1 Introduction

A range of disposal options for the dredge spoil have been identified and assessed. The options have been assessed based on strategic, environmental and cost implications. Options that are considered to be impracticable on these grounds have been discounted from further consideration

Conversely, options that have been considered as potentially practicable are further considered in Section 4. The options are listed below and described in more detail in the following subsections.

1. Reuse in land based construction on site;
2. Reuse as construction material off site;
3. Disposal to Landfill;
4. Beach restoration/other coastal protection;
5. Offshore sea disposal;
6. Spreading on agricultural land, and
7. Incineration

There are a number of steps common to the land-based disposal options which would be required to be undertaken within Option(s) 1, 2, 3 and 6, as listed above. These steps are:

Landing the dredged material. All of the land-based options would require transfer to on-shore facilities. This could be via pumped discharge, conveyor or grab and would be dependent on the water content of the dredged material.

Dewatering the dredged material. Given the soft silty nature of a significant proportion of the dredge spoil, it would require to be dewatered to render it suitable for off-site transportation. It is anticipated that this would be achieved through the establishment of on-site settling ponds.

Storing the dredged material. Once landed and sufficiently dewatered (if required) the material would require to be stockpiled prior to being loaded onto heavy goods vehicles (HGV's) for off-site transportation

Loading and transportation for reuse/disposal. A loading facility would be required adjacent to the storage or dewatering area to load the material into HGV's for transportation to reuse/disposal sites. The need for the material to be dewatered prior to being transported off-site would be dependent on its dredged water content. As the maximum depth of silt does not exceed 3m it is conservatively anticipated that the material would first need to be dewatered. This equates to approximately 57000 m^3.

3.1.1 On-Site Land Based Construction

There are presently no on site construction projects and material arising from the maintenance dredge programme is not suitable for backfilling of quay wall voids as these works require coarse materials such as sands and gravels. The vast majority of the material to be dredged has been identified as being soft silts and river muds which are unsuitable for land reclamation due to their need to be dewatered and long term susceptibility to settlement, particularly in situations where significant live loads are applied such as a container stacking yard.

3.1.2 Off-Site Land Based Construction

As outlined in 3.1.1, soft, silty material is not ideally suited for use as a construction material due to the need for it to be dewatered and its ongoing propensity to consolidate over time. Notwithstanding this, a proportion of the material to be dredged could potentially be used as a general fill material on projects within the Firth of Forth region, or further afield in situations where live loading on the fill was limited or where long term consolidation would not present a significant issue.
Due to the large volumes of material to be dredged and the lack of space within the Port for dewatering and stockpiling of the material, there is limited opportunity for processing and the material prior to its reuse off-site. Consequently, this option, whilst a possibility, would require storage of relatively poor quality material highly dependent on demand for it on other projects in the region, at the time of dredging.

3.1.3 Landfill

The soft, silty nature of the material to be dredged would make it unsuitable for disposal to landfill without first being dewatered in shore side settlement ponds. It is envisaged that this soft cohesive material, from the upper 3m of the seabed, would be pumped ashore into settlement ponds from barges. Once in the settlement ponds, the material would be left to settle with the supernatant filtered and returned to the estuary. The settlement process could take several months before the water content of the dredged material drops to the level at which it becomes suitable for transport and disposal to landfill. The number and capacity of the settlement ponds will be dependent on the settlement rate of the material but acknowledging the silty nature of the cohesive seabed deposits, the settlement ponds could be required to be quite extensive in order to accommodate the material for the required duration.
Land side storage within the Port site would severely impact on the Ports ability to offer services to both shipping and engineering customers as these partners require significant storage capacity for their activities.

3.1.4 Beach Nourishment or other Coastal Protection

Dredged material can occasionally be used as beach restoration/recharge material, or for other coastal protection works. Whilst the soft, silty nature of the dredged spoil is not considered suitable for beach nourishment, it is sometimes possible to utilise this type of material for the replenishment of mudflats. The intertidal area near by the dredged channel forms part of the Firth of Forth Special Protection Area (SPA), and though some of the low shore habitat may have a similar sediment type to that of the dredged channel, at least from the uppermost layers of the channel, much of the mid and upper shore at Bruce Haven and Windy law Bays consists of firm muddy sands. Furthermore, large patches of eelgrass *Zostera noltei* cover the mid shore and though this feature can tolerate reasonable levels of sedimentation, the disposal of large quantities of dredged material would undoubtedly have a negative effect on this Scottish Priority Marine Feature.

Further afield in the Firth of Forth, much of the intertidal area constitutes the SPA. Specific dumping of the material on the intertidal zone could potentially affect the qualifying features of the SPA (e.g. over-wintering birds) through disturbance and smothering of food sources. The large-scale ongoing maintenance dredging at Grangemouth does not, to our knowledge, contribute towards any managed realignment schemes in the Forth. Consequently, this option does not merit further consideration.

3.1.5 Sea Disposal

The nature of the dredged material in conjunction with the proximity, and ease of access to previously authorised sea disposal sites render this option viable. No new disposal sites are proposed. There are a number of sites in the vicinity which are currently used for the disposal of dredged material in the Forth Estuary. The soft, silty material could be disposed of in the deep water disposal ground at

Oxcars, approximately 5 NM downstream from the Port. This option will be considered in further detail.

3.1.6 Spreading on Agricultural Land

The as-dredged spoil would have a high water and saline content and is not considered capable of supporting vegetative growth. Consequently, it would not be suitable for soil conditioning or spreading on agricultural land without extensive treatment. Dredged spoil would require the treatment steps outlined in section 3.1 prior to transfer to a suitable site. Aside from requiring treatment to render it suitable for spreading on agricultural land, the low nutrient content of the material means it would offer very little benefit to the agricultural industry. Therefore, it is concluded that this option should not be considered further within this assessment and shall be discounted.

3.1.7 Incineration

Incineration would first involve the treatment of material through the steps outlined in section 3.1 before transporting it to an incinerator. The ash from the incineration process would then require to be disposed of, along with the non-combustible components of the dredged material.
The material comprises of river muds, silts and clay small proportion of glacial till. Therefore, it is unlikely to be suitable for incineration because of the low proportion of combustible (organic) content. Consequently, this option does not merit further consideration.

4. Assessment of Shortlisted Options

4.1 Introduction

This section of the report considers the strategic, environmental and cost implications associated with the disposal options judged to be practicable in Section 3, namely: re-use in off-site land-based construction, disposal to landfill and disposal at sea.

4.2 Reuse in Off-Site Land-Based Construction

4.2.1 Strategic Considerations

Operational Aspects

As there is no requirement for the use of additional fill material within Port Babcock, the dredged spoil could not be used to support any site project. As such, the material would have to be taken off-site, rendering the process considerably more complex due to the need for it to be processed for transportation.
Although the reuse of dredged material as a construction material for projects in the vicinity of the Port is considered to be technically feasible, the nature of the dredged material means it is likely to require considerable handling, treatment and stockpiling before being transported off-site. This soft upper cohesive material would require to be dewatered in settling ponds prior to transportation off-site. Once sufficiently dewatered, the material would be excavated from the settling ponds and stockpiled for reuse.
This process would involve pumping the material ashore into settling ponds to reduce the water content to acceptable levels for onward transportation. Based on previous maintenance dredge campaigns, it would be reasonable to assume that the upper 3m of seabed material would need to undergo this dewatering process. This would equate to around 88,000 m^3 of seabed material. Notwithstanding this, it should be noted that there is no known market for this volume of dewatered silts and muds in the vicinity of Rosyth at present.

Availability of Treatment Area

Acknowledging that up to 115,000 tonnes material is expected to be dredged from the Port Babcock approach channel, a considerable amount of space for the dewatering, handling and temporary
storage of this material would be required; there will be limited suitable space within the Port to establish an extensive dewatering and temporary storage facility for this volume of material. The

availability of sufficient suitable space to dewater, handle and stockpile the dredged material on site is therefore likely to present a significant challenge to this disposal option.

Safety Implications

Transferring the dredged arisings ashore to be dewatered and/or stockpiled prior to transporting it off-site for use in construction projects, rather than opting for sea disposal would introduce a number of additional steps, as outlined in section 3.1. Each step in the process would introduce health and safety risks in comparison to the sea disposal option; in particular, transportation of dewatered material off-site would significantly increase the volume of HGV's using local roads for the duration of the operation thereby increasing risks to both pedestrians and other road users. Dewatering and treatment facilities such as settling ponds would also require to be kept safe and secure for the duration of the treatment process.

4.2.2 Environmental Considerations

The environmental considerations associated with the reuse of the dredged material for use in off-site construction projects include pollution issues arising from dewatering the dredge spoil; excessive vehicle movements which could be in the order of 3600 each way to and from the Port to the destination site; and associated air quality issues along transit routes.
The material to be dredged has been subject to chemical testing in line with Marine Scotland's requirements. It is considered that the dredged material would become homogenised as a result of it being transferred ashore, dewatered, stockpiled and handled prior to transportation off-site. Therefore, as the homogenised material is considered acceptable for disposal at sea, no chemical pollution risks are envisaged in relation to disposing of the material on land.

4.2.3 Summary

This option is considered to be unfavourable as there is no known market for this material and there are significant special constraints on site in addition to transportation and logistical concerns associated with the disposal of the dredged material in this manner. This approach is not considered to be the BPEO and is therefore discounted from further appraisal.

4.3 Disposal to Landfill

4.3.1 Strategic Considerations

Operational Aspects

The option to dispose of the bulk of the dredged material to landfill, would involve many of the processes described in Section 4.2.1 for the reuse of the dredged spoil as a construction material in off-site projects. The dredged material would again need to be transferred ashore, dewatered and/or stockpiled and handled on site prior to being transported HGV to a local landfill site(s).

Availability of Treatment Area and Waste Disposal Facilities

As with the previous option, there is limited suitable space within the Port estate to establish an extensive dewatering facility capable of handling 115,000 tonnes of dredged material.
The availability of sufficient suitable space to dewater, handle and stockpile the dredged material on site is therefore likely to present a significant challenge to this disposal option.

Furthermore, the disposal of this quantity of material would put pressure on remaining landfill capacities in the vicinity of Rosyth therefore it is anticipated that landfill operators would reluctant to accept significant quantities of the processed material. Spreading the material between multiple landfill sites could be an option; however, such approaches would also have significant time and cost implications for the project.

Enquiries have been previously made to a number of waste management sites in the vicinity of Rosyth and the surrounding area to establish whether they would be able to accommodate some or all of the dewatered dredged spoil. The only facility that showed an interest in the project was Hamilton Waste and Recycling Centre on the outskirts of Musselburgh. Notwithstanding the 28 mile distance by road over which the dredged material would have to be transported, Hamilton Waste and Recycling Centre advised that the material would be required to be 100% inert, not blended, and approved by SEPA for disposal at an exempt site.

Safety Implications

Transferring the dredged arisings to landfill rather than depositing the material at sea would introduce a number of additional steps, as outlined in section 3.1. Each step in the process would introduce health and safety risks in comparison to the sea disposal option; in particular, transportation of

dredged material off-site would significantly increase the number of HGV's using local roads for the duration of the operation thereby increasing risks to both pedestrians and other road users. Dewatering and treatment facilities such as settling ponds would also require to be kept safe and secure for the duration of the treatment process.

4.3.2 Environmental Considerations

Pollution / Contamination

Disposal of the supernatant liquid resulting from the settlement process could present difficulties due to its high salinity level. It is unlikely that SEPA would accept disposal of this liquid to a fresh watercourse or as a direct discharge to the sea; additional treatment of the fluid may be necessary to render it suitable for discharge under consent. As discussed in Section 4.2.2, as the homogenised dredged material is considered acceptable for disposal at sea, no chemical pollution risks are envisaged in relation to disposing of the material on land.

Amenity / Aesthetic Implications

There would be no long-term amenity or aesthetic implications at the site arising from the disposal of material to either landfill or reclamation. However, it is likely that there would be a short-term impact on the amenity value of the area local due to the establishment of settlement ponds and subsequent stockpiling and handling of the dredged material for onward transportation to landfill. The transport of the material would also lead to a short-term increase in noise odour and vibration in the immediate vicinity of the material processing facility.

Sustainability Considerations

In addition to the dewatering and handling processes on site, the transportation of the dredged material to landfill will involve a significant amount of road haulage. Given the quantity of material involved, it is estimated that around 3600 HGV movements would be required to and from the landfill site. Assuming this was the Hamilton Waste and Recycling Centre on the outskirts of Musselburgh, the movement of the material by road would generate in excess of 329k road miles. Therefore, this option has significant drawbacks from a sustainability perspective.

4.4.1 Strategic Considerations

Operational Aspects

Offshore sea disposal is known to be technically feasible with a number of existing licenced shallow and deep-water sea disposal sites in close proximity to Rosyth which have been used for maintenance and capital dredging operations in the Forth Estuary for many years.

Acknowledging that the dredging requirements lend themselves to trailing suction hopper dredging, it is anticipated that the dredging would be carried out by the UKD Marlin with a hopper capacity of 2968m^3.

Availability of Sea Disposal Sites

Having assessed the suitability of the local sea disposal sites, as indicated in Figure 4.1, the site at Oxcars (approximately 5 NM downstream from Port Babcock) has been identified as the preferred location for disposal of the material. With respect to cumulative impacts, the benefit of using Oxcars dispersal site would allow it to remain within the overall sediment balance of the Forth either during the deposition descent phase or after erosion and re-suspension following settlement. Deposition of the dredged material at this site would not have significant strategic implications for the available sea disposal capacity in the Forth Estuary.

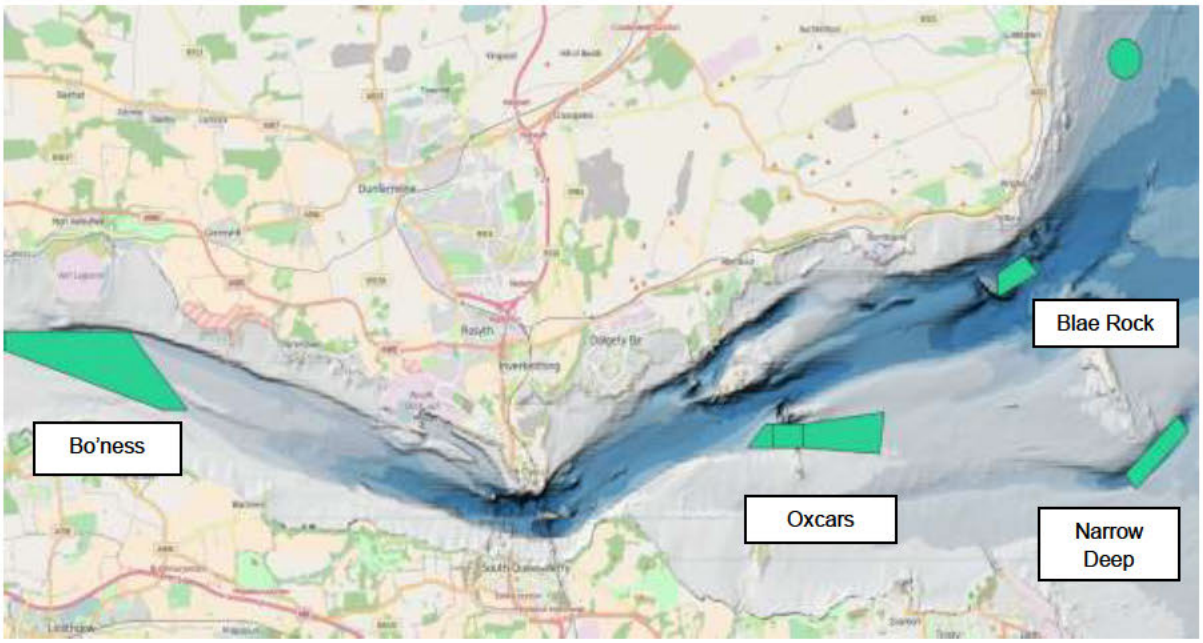


Figure 4.1: Disposal at Sea Sites in the Forth Estuary (Marine Scotland).

4.4.2 Environmental Considerations

The Port Babcock Rosyth Environmental Management System is certified and externally audited under ISO 14001. All marine and shore-based activity within the Port is fully compliant with the requirements of this accreditation.

Pollution / Contamination

Consideration has been given to the results from the Babcock commissioned analysis of silt within the area to be dredged. Sampling and analysis were compliant with MS-LOT guidelines and established which exceeded AL1:

Mercury	Action Level	0.25 mg / kg
	Analysed sample	0.84 mg / kg
Chromium	Action Level	50.00 mg / kg
	Analysed Sample	69.20 mg / kg
Copper	Action Level	30.00 mg / kg
	Analysed sample	38.40 mg / kg
Lead	Action level	50.00 mg / kg
	Analysed sample	71.40 mg / kg

Although the levels exceed AL1 SEPA Water Body Assessment Sheets for Babcock waters (Lower Forth Estuary – 200435 (App A)) and those in which the Oxcars deposit ground is located (Kinghorn to Leith Docks – 200041 (App A)) indicate that in all significant classifications area 200435 has a higher status than that of 200041. Therefore, movement of material from the Port approaches to the deposit location will not increase pollution or contamination within the receiving area. Also, dredging has been taking place in the Forth estuary for over 100 years with no apparent adverse effects on the overall suspended solids concentrations. Additionally, the dredged material arising at the Port approach channel and the anticipated methods of discharging the Dredger at the disposal site will not differ significantly from current sea disposal operations at other sites on the Firth of Forth.

Amenity / Aesthetic Implications

Maintenance dredging is planned to take place as soon as October 22 – February 23 and will therefore have little to no adverse impact on leisure activity in bathing waters on the Forth.

Sustainability Considerations

Dredging of the Port approaches and tidal berths is necessary to principally facilitate the safe passage of HMS Queen Elizabeth & Price of Wales, with the first planned to return to Port Babcock for class docking in March 2022. (Current emergent issues suggest the Price of Wales is looking for emergency docking as soon as practicable with available tides and daylight windows being available in September 2022 and October 2022) Following this the Port approaches and tidal berths will, as in the past, undergo maintenance dredging to maintain conditions for the safe passage and manoeuvring of vessels within Port waters. This activity will be undertaken only to support Port activity and the safety of shipping.

It is estimated that around 30 to 35 return dredger journeys to Oxcars disposal site would be required to dispose of up to 100,000 tonnes of material. This would result in a temporary localised increase in exhaust emissions from the dredging and disposal vessel, though this is not likely to cause a significant adverse environmental impact.

Furthermore, sea disposal allows the dredging plant to work efficiently and economically with minimal disruption or delay to ongoing port activities and the public.

Under this option, all the dredged material would be disposed of at sea. From an environmental perspective, by disposing of the material at sea, the natural sediment budget of the estuary is maintained

Interference with other Legitimate Activities

There are a number of ongoing sea disposal operations within the Firth of Forth with the potential to interfere with other marine traffic during the transport and deposit phases of dredging operations. It is considered that, providing all appropriate navigation and maritime procedures are observed, disposal at sea is not considered to generate significant additional adverse safety implications.

4.5 Economic Considerations

This section considers the cost implications for the disposal to landfill option and the disposal at sea option. The use of the material in land-based construction projects has been ruled out earlier in this section and so does not warrant economic evaluation.

The adoption of the disposal to landfill option would necessitate that the dredged material was transferred ashore for onward transportation to landfill. Due to the soft silty nature of the upper cohesive seabed material, it is envisaged that the sediments would need to be dewatered in settling ponds prior to being transported off-site. On the basis that the material would require to undergo this process, the economic assessment of the two remaining options presents two estimated rates for disposal to landfill and sea disposal.

In order to dewater the dredged material, lined settling ponds would require to be constructed on shore in the vicinity of the dredging works. In addition to increasing the cost of the dredging works, the timescales associated with pumping material ashore, transferring dewatered material to HGV's and then transporting this to landfill would also increase the overall time-scale for completion of the project.
A sea disposal option is significantly less complex and the costs associated with this option are also detailed below.

Cost Comparison Landfill / Sea Disposal			
Activity		**Land Disposal**	**Sea Disposal**
Dredging	£/m3	9.50	4.29
Transfer Ashore	£/m3	1	
Bund and Filter Liner	£/m3	6	
Supernatant Management	£/m3	0.25	
Material Handling	£/m3	4	
Haulage	£/m3	15	
Disposal Costs	£/m3	25	
Total	**£/m3**	**60.75**	**4.29**

Table 4-1: Cost Comparison between Landfill and Sea Disposal Options

Note that in addition to a Marine Licence, the option to dispose of the material to landfill would require a Pollution Prevention Control (PPC) licence and Controlled Activities Regulations (CAR) licence. However, the cost of these licences is negligible in comparison to the overall cost to dispose of the material to landfill.

In the above cost estimates, the dredging costs include allowances for items such as mobilisation and demobilisation of dredging plant and barges, insurances, method related charges and environmental mitigation measures.

The haulage and disposal costs for the land-based disposal option are based on the disposal of the dredged material to the landfill site identified in Musselburgh. This site is approximately 28 miles from Rosyth by road on the south side of the Firth of Forth estuary. However, despite having previously made an initial enquiry to the Hamilton Waste and Recycling Centre, given the quality and quantity of

the material involved, there is no guarantee that they would accept all or any of the dredged arisings. Clearly the cost estimates have the potential to increase further if the material required to be transported further afield for disposal.

It is clear from the high-level estimates presented in Table 4-1 that the costs associated with disposal to landfill would be significantly greater than disposal at sea and acknowledging the quantity of material to be dredged, would by all accounts be prohibitive.

On the basis of the cost estimates presented in table 4-1, the costs associated with the disposal of the dredged material to landfill would be restrictively high to achieve restoration of charted depths to support the arrival of HMS Prince of Wales.

5. Conclusions

5.1 Statement of Requirement for Maintenance Dredging

Removal of the accumulated silt at the Port Babcock Rosyth tidal berths and approaches is necessary to achieve safe under keel clearance for the arrival of HMS Queen Elizabeth and the subsequent departure of HMS Prince of Wales planned to sail in autumn 2019. Due to the volume of silt within

Port waters the options of doing nothing or bed levelling will not provide the required minimum safe under keel clearance for carrier transit and therefore removal of the silt is the only option available.

5.2 Summary of Shortlisted Options

Section 3 provides an outline of the six options considered at preliminary appraisal stage for the disposal or reuse of the dredged arisings from the maintenance dredging of the Port Babcock Rosyth approach channel and tidal berths. Following this initial appraisal, three options were identified as having merit and were assessed in more detail in Section 4. During this more detailed appraisal, the option to reuse of the dredged material in land based construction projects was ruled out due to the poor quality of the material, the dewatering, handling and transportation costs and the lack of any current projects that would have a use for such material. The table below presents a summary of the comparison between the two remaining practicable options.

Operational Considerations		
	Landfill	Sea Disposal
Operational Aspects	Additional processes required to: transfer the material ashore, dewater, handle and transfer to disposal site. Potentially 6000 HGV return trips from Port Babcock Rosyth to landfill site	Sea transport only. Material disposed of at Oxcars disposal ground 5 NM downstream from Port Babcock
Availability of sites	Limited space on shore to establish a dewatering and material storage / handling facility. Low moderate likelihood of close by suitable landfill site.	Oxcars sea disposal site is available
Safety Implications	High number of HGV's on local roads would increase risk to road users and pedestrians.	No significant safety implications
Environmental Considerations		
	Landfill	Sea Disposal
Pollution / Contamination	No significant pollution / contamination issues are envisaged. PPC and CAR licences would be required to control deposit of supernatant from dewatering process on non-tidal basin quayside.	The chemical quality of the dredged sediments would have no probable effects on local ecosystems either during dredging or during disposal at sea. Although detectable changes in the suspended solids concentrations would occur, these would be highly transient in nature.
Interference with other legitimate activity	Disruption to on-going port activities during transfer operations, and heavy vehicle movements would cause disturbance to local residents.	Negligible impacts on other marine traffic in Firth of Forth dredging vessel will be under the control of river VTS and dredging is not within a main channel.

Amenity / Aesthetic Considerations	Short-term impact on amenity value of the area local due to establishment of dewatering and storage facility. Short term noise during dredging and material handling operations.	Short term noise during dredging operations. Area to be dredged is remote from other activities and unlikely to have significant impact.
Sustainability	Material not being used for beneficial purposes. Each stage of handling, as described previously, would require the use of energy and, in particular, road haulage to disposal site.	Dredged material remains within the overall sediment balance of the Firth of Forth
Economic Considerations		
Estimated Costs	Costs estimated to be significantly higher than for sea disposal. Costs associate with this disposal option would be restrictively high	Costs estimates are in line with expectations for a project of this nature

Table 5-1: Comparison of Practicable Options. (Red shading indicates relative disadvantage; green shading indicates neutral or relative advantage.)

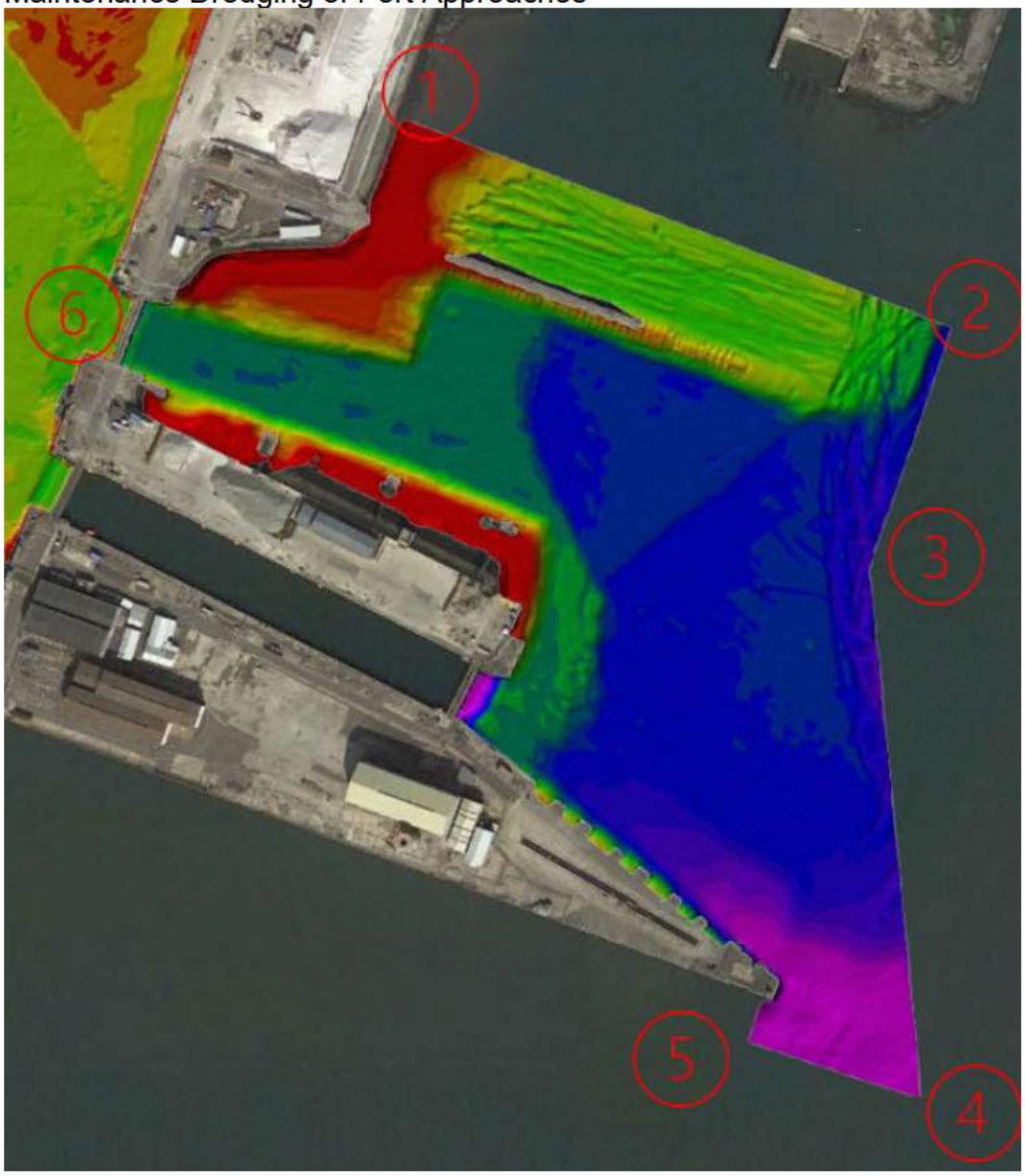
5.3 Identification of the BPEO

As Table 5-1 shows that the disposal to landfill option has several operational, environmental and economic drawbacks in comparison to disposal at sea the BPEO for clearance of the dredged material is considered to be at sea with the material being disposed of at Oxcars disposal site, approximately 5 NM downstream of Port Babcock Rosyth.

Appendix A

Detail of Admiralty Chart 728 showing boundary of area for maintenance dredging

Plan showing boundary coordinates of area for maintenance dredging



SEPA Water Body Information Sheet For Water Body 200041 Kinghorn to Leith Docks

ID NUMBER	LATITUDE	LONGITUDE
1	56° 1.359'N	3° 26.779'W
2	56° 1.291'N	3° 26.463'W
3	56° 1.211'N	3° 26.509'W
4	56° 1.042'N	3° 26.481'W
5	56° 1.061'N	3° 26.581'W
6	56° 1.288'N	3° 26.937'W

SEPA water body infomraiton sheet fo rwater body 200041 Kinghorn to Leith Docks

Water body information sheet for water body 200041 in Forth

General details

Water body name:	Kinghorn to Leith Docks
Water body Identifier code:	200041
Area:	166.76 km^2
Water body category:	Coastal
River basin district:	Scotland
Area advisory group:	Forth
Associated protected areas:	Firth of Forth - SPECIAL PROTECTION AREA Inchmickery - SSSI Aberdour Water contact activity - RECREATIONAL WATER Drum Sands, Silverknowes Water contact activity - RECREATIONAL WATER Imperial Dock Lock, Leith - SPECIAL PROTECTION AREA Aberdour Harbour (Black Sands) - EC BATHING WATER Dalgety Bay Water contact activity - RECREATIONAL WATER Firth of Forth - SSSI Kinghorn Water contact activity - RECREATIONAL WATER Forth Islands - SPECIAL PROTECTION AREA Kinghorn (Pettycur) - EC BATHING WATER Kinghorn (Harbour beach) - EC BATHING WATER Burntisland - EC BATHING WATER Aberdour (Silversands) - EC BATHING WATER Lothian / Borders - NITRATE VULNERABLE ZONE Granton Harbour Water contact activity - RECREATIONAL WATER
Responsible body:	SEPA Edinburgh & Lothians, Fife
Heavily modified:	No
Artificial:	No
Typology:	CW8
National Grid Reference:	NT 25613 81661
Latitude:	56.02206
Longitude:	-3.19497

This sheet was created based on data current as at 21/02/2014
RBMP cycle 2009-2015

Page: 1

Water body information sheet for water body 200041 in Forth

Current status of this water body

Classification results are updated annually, as part of SEPA's commitment to monitor and assess the condition of the environment.

Once the classification is agreed, as part of river basin management planning, the pressure and measures for every water body are reviewed to ensure that they reflect this improved understanding of the environment. Objectives are reviewed as part of the six yearly plannir cycle and any proposed changes to objectives will be presented in the draft river basin plan http://sepa.org.uk/water/river_basin_planning.aspx.

This worksheet was produced using the most up to date classification results but the measu pressures and objectives shown may not yet align to these classification results. Please cor rbmp@sepa.org.uk if you require further information on this water body.

We have classified this water body as having an overall status of Good with High confidenc 2012 with overall ecological status of Good and overall chemical status of Pass.

The overall classification of status is made up of many different tiers of classification data. A complete set of classification data for 2012 is shown at the end of this document.

Targets for the future status of this water body

We have set environmental objectives for this water body over future river basin planning cy in order that sustainable improvements to its status can be made over time, or alternatively no deterioration in status occurs, unless caused by a new activity providing significant speci benefits to society or the wider environment.

For this water body we have set the overall environmental objectives for the first, second ar third River Basin Management Planning (RBMP) cycles as:

Year	2012	2015	2021	2027
Status	Good	Moderate	Moderate	Good
Year	2012	2015	2021	2027
Status	Good	Pass	Pass	Pass

Pressures and measures on this water body

We have established an ongoing programme of monitoring in order to identify pressures on water bodies.

This sheet was created based on data current as at 21/02/2014
RBMP cycle 2009-2015
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Water body information sheet for water body 200041 in Forth

The pressures listed below contribute to this water body's failure to meet good ecological st or potential. River basin planning allows us to plan improvements for particular parameters time. We have collaborated with others to identify measures which will act to protect or impr our water environment in order that all water bodies reach good status over successive RBM cycles.

The following table shows our collated information on the pressures on this water body, thei causes and the measures which could be introduced to mitigate their effects. We have also indicated the current funding status of the measure; with projected measures being potentia funded and agreed measures having funding in place. Finally, we have included information on the potential or actual owner of the measure, the date it will be effective and information on the justification for extending the deadlines or for setting an alternative objective, where appropriate.

Pressure	As a Result of	Assessment Parameter	Objective	Reasons for Fai
	Measure	**Funding**	**Owner**	**Effective date**
Morphological Alterations	Mining and quarrying of aggregates Dredging - resulting in removal of sediment	Multiple pressure - Subtidal	Moderate by 2015	Unfavourable balance of costs benefits: measur worthwhile
Morphological Alterations	Water transport (sea, coastal or inland water transport)	Multiple pressure - Intertidal	Moderate by 2015	Unfavourable balance of costs benefits: measur worthwhile
	Improve Modified Habitat	Neither Agreed nor Projected	Landowner(s)	31/12/2026
Morphological Alterations	Water transport (sea, coastal or inland water transport) Dredging - deposition of dredged material	Multiple pressure - Subtidal	Moderate by 2015	Unfavourable balance of costs benefits: measur worthwhile
	Improvement to sediment management maintenance regime	Neither Agreed nor Projected	Operator	31/12/2026

Footnote – These results show current classification but the measures, pressures and objectives shown may not yet align to these classification results. Please contact rbmp@sepa.org.uk if you require further information on this water body.

Future work

Water body information sheet for water body 200041 in Forth

Additional work to identify pressures and to develop and implement measures to mitigate th impacts will continue over subsequent river basin cycles.

Complete classification for this water body in 2012

Parameter	Status	Confidence of Clas
OVERALL STATUS	GOOD	HIGH
Pre-HMWB status	Good	High
Overall chemistry	Pass	High
Priority substances	Pass	High
Cadmium	Pass	Low
Hexachlorobenzene	Pass	Low
Lead	Pass	Low
Nickel	Pass	Low
pp-DDT	Pass	High
Hexachlorobutadiene	Pass	Low
Overall ecology	Good	High
Physico-Chem	High	High
Dissolved Oxygen	High	High
Dissolved inorganic nitrogen	High	Medium
DIN (field salinity)	High	Medium
DIN (laboratory salinity)	High	Medium
Biological elements	Good	High
Benthic invertebrates	Good	High
Imposex assessment	High	Low
Benthic invertebrates (IQI)	Good	High
Alien species	High	Low
Phytoplankton	High	Low
Macroalgae	Good	High
Macroalgae (FSL)	High	Low
Macroalgae (RSL)	Good	High
Specific pollutants	Pass	High
Copper	Pass	Low

This sheet was created based on data current as at 21/02/2014
RBMP cycle 2009-2015

Water body information sheet for water body 200041 in Forth

Parameter	Status	Confidence of Clas
Zinc	Pass	Low
Unionised ammonia	Pass	High
Hydromorphology	Good	Medium
Morphology	Good	Medium
Water quality	Good	High

Location of this water body

You can find the geographical location of this water body by searching on water body ID in t interactive maps at www.sepa.org.uk/water/river_basin_planning.aspx

SEPA Contact Details: rbmp@sepa.org.uk

SEPA Water Body Information Sheet For Water Body 200435 Lower Forth Estuary

Water body information sheet for water body 200435 in Forth

General details

Water body name:	Lower Forth Estuary
Water body Identifier code:	200435
Area:	38.60 km^2
Water body category:	Transitional
River basin district:	Scotland
Area advisory group:	Forth
Catchment:	
Associated protected areas:	Long Craig Island - SSSI Firth of Forth - SSSI Firth of Forth - SPECIAL PROTECTION AREA St Margaret's Marsh - SSSI Dalgety Bay Water contact activity - RECREATIONAL WATER Forth Islands - SPECIAL PROTECTION AREA
Associated groundwater:	
Responsible body:	SEPA Edinburgh & Lothians, Fife, F.A.S.T
Heavily modified:	No
Artificial:	No
Typology:	TW2
National Grid Reference:	NT 07888 81233
Latitude:	56.01513
Longitude:	-3.47909

This sheet was created based on data current as at 21/02/2014
RBMP cycle 2009-2015

Page: 1

Water body information sheet for water body 200435 in Forth

Current status of this water body

Classification results are updated annually, as part of SEPA's commitment to monitor and assess the condition of the environment.

Once the classification is agreed, as part of river basin management planning, the pressure and measures for every water body are reviewed to ensure that they reflect this improved understanding of the environment. Objectives are reviewed as part of the six yearly plannir cycle and any proposed changes to objectives will be presented in the draft river basin plan http://sepa.org.uk/water/river_basin_planning.aspx.

This worksheet was produced using the most up to date classification results but the measu pressures and objectives shown may not yet align to these classification results. Please cor rbmp@sepa.org.uk if you require further information on this water body.

We have classified this water body as having an overall status of Good with High confidenc 2012 with overall ecological status of Good and overall chemical status of Pass.

The overall classification of status is made up of many different tiers of classification data. A complete set of classification data for 2012 is shown at the end of this document.

Targets for the future status of this water body

We have set environmental objectives for this water body over future river basin planning cy in order that sustainable improvements to its status can be made over time, or alternatively no deterioration in status occurs, unless caused by a new activity providing significant speci benefits to society or the wider environment.

For this water body we have set the overall environmental objectives for the first, second ar third River Basin Management Planning (RBMP) cycles as:

Year	2012	2015	2021	2027
Status	Good	Good	Good	Good
Year	2012	2015	2021	2027
Status	Good	Pass	Pass	Pass

Pressures and measures on this water body

We have established an ongoing programme of monitoring in order to identify pressures on water bodies.

Water body information sheet for water body 200435 in Forth

The pressures listed below contribute to this water body's failure to meet good ecological st or potential. River basin planning allows us to plan improvements for particular parameters time. We have collaborated with others to identify measures which will act to protect or impr our water environment in order that all water bodies reach good status over successive RB cycles.

The following table shows our collated information on the pressures on this water body, thei causes and the measures which could be introduced to mitigate their effects. We have also indicated the current funding status of the measure; with projected measures being potentia funded and agreed measures having funding in place. Finally, we have included information on the potential or actual owner of the measure, the date it will be effective and information on the justification for extending the deadlines or for setting an alternative objective, where appropriate.

Pressure	As a Result of	Assessment Parameter	Objective	Reasons for Fai
	Measure	**Funding**	**Owner**	**Effective date**
Abstraction	Production of non-renewable electricity (eg: by coal, gas, nuclear or pumped hydro)	Change from natural flow conditions	Good by 2015	
	Reduce risk of fish mortality at intakes or screens	Neither Agreed nor Projected	Scottish Power	31/12/2010
Point Source Pollution	Sewage disposal	Unknown Organics	Good by 2015	
	Change timing or frequency of discharge	Agreed	Scottish Water	31/12/2006

Footnote – These results show current classification but the measures, pressures and objectives shown may not yet align to these classification results. Please contact rbmp@sepa.org.uk if you require further information on this water body.

Future work

Additional work to identify pressures and to develop and implement measures to mitigate th impacts will continue over subsequent river basin cycles.

Complete classification for this water body in 2012

This sheet was created based on data current as at 21/02/2014
RBMP cycle 2009-2015

Water body information sheet for water body 200435 in Forth

Parameter	Status	Confidence of Clas
OVERALL STATUS	GOOD	HIGH
Pre-HMWB status	Good	High
Overall chemistry	Pass	High
Priority substances	Pass	High
Benzo-a-pyrene	Pass	High
Hexachlorobenzene	Pass	High
Overall ecology	Good	High
Physico-Chem	Good	High
Dissolved Oxygen	High	High
DO (lab. salinity)	High	High
DO (field salinity)	High	High
Dissolved inorganic nitrogen	Good	High
Biological elements	Good	High
Benthic invertebrates	Good	High
Alien species	High	Low
Fish	High	Low
Macroalgae	High	Low
Specific pollutants	Pass	High
Copper	Pass	Low
Unionised ammonia	Pass	High
Hydromorphology	Good	Medium
Morphology	Good	Medium
Water quality	Good	High

This sheet was created based on data current as at 21/02/2014
RBMP cycle 2009-2015

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Water body information sheet for water body 200435 in Forth

Location of this water body

You can find the geographical location of this water body by searching on water body ID in t interactive maps at www.sepa.org.uk/water/river_basin_planning.aspx

SEPA Contact Details: rbmp@sepa.org.uk