



ASSETS, TRANSPORTATION & ENVIRONMENT

**Marine (Scotland) Act 2010**

**Disposal of Dredgings from  
Crail Harbour**

**Best Practical Environmental Option (BPEO)  
Assessment**

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# 1 **INTRODUCTION**

## 1.1 **Background to Application**

Fife Council is the harbour authority for the East Neuk harbours of Anstruther, St Monans, Cellardyke, Pittenweem and Crail. They are classified as fisheries harbours with Anstruther being predominantly populated by leisure boats with some licensed small independent creel boats.

In order to maintain depths in the harbour basins and the approach channels dredging has to be undertaken at regular intervals to maintain efficient use of the basins. The accumulation of sand and silt varies from year to year but, in general, maintenance dredging is required approximately every five to seven years.

Dredging is now required at Crail Harbour (harbour basin only, not the approach channel) and is programmed to be undertaken during the April – August 2020 period. Accompanying this report is a plan showing the areas to be dredged.

This report assesses the options available for such disposal and examines the Best Practicable Environment Option (BPEO) in accordance with the requirement of the Marine (Scotland) Act 2010.

## 1.2 **Source of Materials**

The dredge material is a mixture of sand, silt, and pebbles. These sediments enter the harbours as a result of wave action. At each harbour, the coarser sandy material accumulates in the approach channel and around the heads of the breakwaters. The finer sand and silt placed in suspension by the waves is carried into the harbour basins by tidal currents. The relatively still conditions then allow settlement and deposition. Apart from the discharge from local surface water drains, it is believed that no other material enters the basins or channels and this is supported by data obtained in previous dredging works.

## 1.3 **Description of Materials**

As described in 1.2, the dredge material is a mixture of sand (average 62%), silt (average 34%), and pebbles (average 4%). It is estimated that approximately 1500 cubic metres of material requires to be removed from Crail Harbour.

## 1.4 **Options for Relocation / Removal of Materials**

In order to maintain depths within the Council's harbours acceptable to the harbour users it is believed that the Council will continue to have a requirement for dredging and, therefore, for disposal of the material removed. It would appear that two options for disposal then exist: -

- (i) Relocation of the material in the sea; or
- (ii) Disposal on land.

## 1.5 **Details of Previous Related Operations**

The last dredging at Crail Harbour completed under a Marine Licence was February 2010 (0382210910 – 4674), and around 240m<sup>3</sup> was removed at that

time over approximately 2 days. The works were completed using land-based plant i.e. excavators and dumper trucks. The excavated material was deposited over the lowered section of the harbour wall onto the inter tidal area adjacent to the harbour, as per historic practices. An emergency dredge was carried out with the approval of Marine Scotland in March 2013 to remove a ridge of sand that had built up near the entrance to the harbour. There are no detailed records of this latter dredge but it is thought to have been smaller in scale compared to the 2010 dredging operations. The dredged material for this latter dredge was disposed of in the same manner as the 2010 dredge.

Various other dredging operations have occurred across the other East Neuk Harbours over the past 10years, and these have all been licenced with Marine Scotland or its predecessors. However, these other dredging operations have typically involved disposal of dredged material at a disposal site in the Forth south east of Anstruther Harbour. The estimated quantity of material dredged (in cubic metres) from these other harbours is noted below: -

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Anstruther	11000					662				
St Monans						610		9885		
Pittenweem		6550								6857

## **2 DISCUSSION OF AVAILABLE DISPOSAL OPTIONS**

### **2.1 Introduction**

This section of the report discusses all available disposal options for the dredge spoil. Where an option is considered to be impracticable, the reason is given and the option discounted from further consideration. Those options which are considered to be practicable are considered in Section 3 of this report.

### **2.2 Land Incineration & Subsequent Disposal of Residue**

Incineration of the material is not possible. This option for disposal has therefore been discounted.

### **2.3 Sacrificial Landfill**

No landfill sites are located within easy reach of any of the Council's harbours and the Environmental Health Service of Fife Council was approached to identify suitable sites elsewhere. The nearest dump site to Crail is located north west of Ladybank, a distance of around 24 miles from the harbour. This option has therefore been considered further in Section 3.

### **2.4 Spreading on Agricultural Land or for Soil Conditioning of Reclaimed Land**

Spreading on agricultural land has been investigated and no demand from farmers found. The material is not suitable, being non-alluvial and the sand has no nutritional properties. The chloride salts would leach out from the spoil over a period of years rendering the land unusable and the discharge of saline water and solids in suspension into the local watercourses would need to be controlled. No projects have been identified where soil conditioning of reclaimed land is required. This option for disposal has therefore been discounted.

## 2.5 **Reclamation**

It has not been possible to identify any local current sites of land reclamation within Fife and this option for disposal has therefore been discounted.

## 2.6 **Beach Nourishment / Disposal to Local Environment**

Due to the grading of the dredge material (i.e. moderate proportion of fines), it is not particularly suitable for beach nourishment. However, it is naturally occurring and is washed in from the Estuary so is likely to relatively closely match the seabed material in the inter tidal and sub tidal zones around the harbour. Therefore, re-disposal of this material into the local sediment cell, for subsequent re-working onto adjacent foreshores is likely to have a beach nourishment type effect on the areas of coast immediately either side of the harbour. This option has therefore been considered further in Section 3.

## 2.7 **Other Beneficial Uses**

The finely graded sands and silt content of the dredged material make it unsuitable as a building material. Extensive pre-treatment of the spoil would be required to remove the contamination by fine sediments in order to utilise the coarser sand fractions and therefore render this option unviable. No local current projects could be identified where the dredged material could be used either as a building material (after treatment on site) or in reclamation work. This option has therefore been discounted.

## 2.8 **Sea Disposal**

Given the small size of Crail Harbour (around 50 x 50m square), the typical minimum size of grab dredgers (circa 20 – 25m in length and 8m in width), and the relatively limited volume of material to be dredged it is not considered practical nor economic dredge Crail Harbour using marine plant and thus dispose of the dredged material at sea in a licensed dump site. This option has therefore been discounted.

## 2.9 **Do Nothing Approach**

This approach is not a viable option as, if left un-dredged, the harbour would become inaccessible for considerable periods of the tidal range. This option has therefore been discounted.

# 3 **ASPECTS TO BE TAKEN INTO CONSIDERATION**

## 3.1 **Introduction**

This section of the report considers the strategic, environmental and cost implications associated with each of the disposal options judged to be practicable in Section 2.

## 3.2 **Strategic Considerations**

### 3.2.1 **Sacrificial Landfill**

## **Operational Aspects**

The present dredging requirements at Crail Harbour necessitate the use of land-based plant (i.e. excavators and dumpers) due to the small size and limited access to the harbour. This means the most practical and cost-effective means is to load the material into dumpers (i.e. trucks with large low-pressure tyres that don't sink into the harbour bed, not road going haulage lorries) operating in and out of the harbour using the existing slipway (which is also not suitable for road going haulage lorries). Historically the dredged material is then tipped over a specially lowered section of the harbour wall onto the inter tidal area below. The material then disperses over the next few tidal cycles.

However, if material was to be subject to sacrificial landfill, it would need to be re-handled from the dumpers into road going haulage lorries for transport to landfill 24miles distant. This obviously adds a time and cost implication for the works, and also a more practical issue of space, as the area around the harbour is relatively limited when considering a stockpile area to allow the material to dewater, an extra excavator, and a pick-up area for road going haulage lorries. In addition, it is noted that the access down to the harbour along Shoregate is very narrow and not suitable for multiple trips by heavy goods vehicles without significant parking restrictions and potential vibration damage to historic properties due to the weight of lorries required.

Depending on the method employed, disposal to landfill could therefore be achieved by a three-stage material handling operation as follows: -

- ◆ excavation from harbour bed and loading onto dumpers for transfer to stockpile on shore
- ◆ once sufficiently dewatered the material would be loaded to lorries
- ◆ transport and disposal at landfill site 24miles distant

The type of vehicle suitable for transporting the material is likely to be along the lines of a rigid bodied tipper with an 18-tonne load capacity. It is estimated that around 150 lorry loads would be needed to complete this task.

## **Availability of Suitable Sites / Facilities**

As reported in 2.3, the nearest dump site is located some 24 miles from the harbour to the north west of Ladybank. This is a landfill site owned by Fife Council. Subject to the results of a Waste Management 3 Assessment (WM3) confirming that the dredge material can be deposited at the site, a handling charge would be applicable and the material must be free of excess water.

## **General Public Acceptability**

The disposal of the spoil to landfill would be undertaken in a similar manner to the disposal of municipal waste. However, the significant increase in lorry movements in this small community would undoubtedly give rise to public concern because of danger to pedestrians and other road users, impact on the environment and interruption to traffic flow on the access road and around the harbour.

## **Local Acceptability**

The road infrastructure of North East Fife, in particular, is not suited to a relatively large number of heavy lorry loads of spoil being transported. The road accessing the harbour is very narrow and on a steep gradient, significant traffic congestion

could be caused and the unavoidable smell and spillage would no doubt prove unacceptable to the local population. There is also likely to be a need for parking restrictions on the narrow access road during the works, and given the narrowness of the access road and the size of vehicles required there is also a potential for vibration damage to the historic properties along the harbour side and along Shoregate (the access road).

### **Legislative Implications**

The spoil would be a controlled waste material for the purpose of transport, storage and disposal. As such Part II (34) of the Environmental Protection Act 1990, Part I of The Control of Pollution Act 1974 and Part III (43) of the Finance Act 1996 will apply.

### **Consultations**

The following have been previously consulted on the disposal to land option: - Fife Resource Solutions, Resource Recovery (Waste Management)

## **3.2.2 Beach Nourishment / Disposal to Local Environment**

### **Operational Aspects**

The present dredging requirements at Crail Harbour necessitate the use of land-based plant (i.e. excavators and dumpers) due to the small size and limited access to the harbour. This means the most practical and cost-effective means is to load the material into dumpers (i.e. trucks with large low-pressure tyres that don't sink into the harbour bed, not road going haulage lorries) operating in and out of the harbour using the existing slipway (which is also not suitable for road going haulage lorries). Historically the dredged material is then tipped over a specially lowered section of the harbour wall onto the inter tidal area below. The material then disperses over the next few tidal cycles onto the adjacent shorelines and sub tidal areas.

### **Availability of Suitable Sites / Facility**

The harbour has historically been dredged and the material excavated has been tipped over the harbour wall to disperse over subsequent tides to return the material to the inter tidal and sub tidal areas surrounding the harbour. Anecdotal evidence suggests this activity has contributed to the formation of a narrow sandy strip to the east of the harbour, which provides some protection to base of the existing seawalls in this area. Therefore, it is considered that there is a suitable site for the beneficial disposal of the dredged material.

### **General Public Acceptability**

Longstanding members of the community will have seen this practice many times, and there are no historic records of complaints against this practice. The works are limited to the harbour area and therefore the disturbance to the public and residents is minimal. Based on previous experience, any turbidity in the water typically disappears a few tidal cycles after the tipping operations are completed.

### **Local Acceptability**

See comments above regarding public acceptability. It is likely this option would be favoured by residents around the harbour and on the harbour access road compared to a transportation to landfill.

### **Summary of Consultations With Third Parties**

Given the localised extent of the operation there is limited consultation anticipated with third parties.

## **3.3 Environmental Considerations**

### **3.3.1 Sacrificial Landfill**

The transport of the spoil would require an estimated 150 return lorry trips on public roads. The impact to other road users including cyclists and pedestrians will include increased noise and dust levels.

#### **Safety Implications**

As described in 3.2.1, the rural roads of North East Fife and the very narrow steep residential street accessing the harbour are not suitable for the transport by large, heavy lorries of several hundred tons of spoil. Such lorry movements would pose an increase in risk to other road users and pedestrians as well as risking vibration damage to historic buildings.

#### **Public Health Implications**

The increase in lorry movements on the public roads and, in particular, the narrow steep residential street accessing the harbour would pose an increase in health risk to the public from exhaust emissions and dust.

#### **Pollution / Contamination Implications**

Acceptance of the WM3 sample testing results by Fife Resource Solutions that the material is suitable, would mean there would be little or no risk of pollution or contamination from disposal of the material to landfill.

#### **General Ecological Implications**

There would be little or no risk of ecological impact arising from disposal to an existing landfill.

#### **Interference With Other Legitimate Activities**

There would be no amenity or aesthetic implications arising from disposal to an existing landfill.

### **3.3.2 Beach Nourishment / Disposal to Local Environment**

The tipping of the dredged material over the harbour wall onto the adjacent inter tidal area would retain all operations within the harbour area and the immediately adjacent inter tidal zone.

#### **Safety Implications**

Disposal over the harbour wall is considered to have negligible implications for safety providing that normal construction controls are put in place for the safety of the contractor's employees and segregation of the public from the works / traffic movements.

#### **Public Health Implications**

There are no known threats to public health associated with disposal of the dredged material over the harbour wall, subject to the controls noted above.



### **Pollution / Contamination Implications**

As there are only some sources of low-level contamination in the samples tested by RPS, the relatively small amount of dredged material is considered unlikely to pose a pollution risk to the environment. An “Additional Risk Assessment” has been undertaken for Fife Council by Envirocentre in regard to the potential risk to the environment from the proposed activity based on the sampling results, and this is included in Appendix A to this report.

### **General Ecological Implications**

As there are only some sources of low-level contamination in the samples tested by RPS, the relatively small amount of dredged material is considered unlikely to pose a risk to the local ecology. An “Additional Risk Assessment” has been undertaken for Fife Council by Envirocentre in regard to the potential risk to the local ecology from the proposed activity based on the sampling results, and this is included in Appendix A to this report.

### **Interference With Other Legitimate Activities**

There would be no amenity or aesthetic implications arising from disposal to landfill.

### **Amenity / Aesthetic Implications**

It is considered unlikely that disposal will cause any disturbance to local recreational boating and angling activities.

## 3.4 **Cost Considerations**

### 3.4.1 **Land Disposal**

#### **Capital Costs**

There would be no capital costs associated with disposal to landfill.

#### **Operating Costs**

The operating costs associated with disposal to landfill are tabulated below.

<b>Activity Description</b>	<b>Volume (m<sup>3</sup>)</b>	<b>Unit Cost (£)</b>	<b>Cost (£)</b>
Excavate by excavator	1500	9.40	14,100
Transfer to lorries	1500	4.00	6,000
Transport by lorries	1500	10.00	15,000
Disposal to landfill	1500	40.60	60,900
<b>Total</b>	<b>-</b>	<b>64.00</b>	<b>96,000</b>

### 3.4.2 **Beach Nourishment / Disposal to Local Environment**

#### **Capital Costs**

There would be no capital costs associated with disposal to sea.

#### **Operating Costs**

Would effectively just be the first item identified in the table above i.e. around £14,100.

## 4 **CONCLUSIONS**

### 4.1 **Summary of Available Options**

Seven options have been considered for the disposal of dredge spoil material from Crail Harbour. The options of sea disposal, incineration, disposal to agricultural land, reclamation, and use in construction are discounted due to the unsuitability of the material and the impractical nature of some of the options. As previously explained, the “do nothing” option is not a viable consideration. The two remaining options, disposal to land and beach nourishment / disposal to local environment are reviewed in the summary below.

Acceptability descriptors: Low = significant effect  
 Moderate = slight effect  
 High = insignificant effect

<b>Aspect</b>	<b>Disposal to Land</b>	<b>Beach Nourishment / Disposal to Local Environment</b>
<b><u>Strategic Acceptability</u></b>		
Strategic acceptability	Low	High
Operational acceptability (including transport, availability of sites handling etc)	Moderate	High
General public and local acceptability	Low	High
<b><u>Environmental Acceptability</u></b>		
Health & Safety	Moderate	High
Public Health	Moderate	High
Pollution	Moderate	Moderate
Ecological Implications	High	High
Interference	High	High
Amenity	High	High
<b><u>Costs</u></b>		
Cost per cubic metre	£64.00	£9.40

#### 4.2 **Summary of Primary Objections to Each Option**

##### 4.2.1 **Disposal to Land**

This is the least preferred of the two options on each of strategic, environmental and cost considerations.

Strategically this option is not favoured due to the rapidly increasing pressures on available landfill space. It is the view of local authorities and landfill operators that, where possible, current facilities should be conserved for municipal waste.

In environmental terms, the additional lorry movements are likely to give rise to increases in noise, dust and exhaust emission levels and interference for other road users.

In cost terms, this option is estimated to be about 6 times more expensive than the beach nourishment / disposal to local environment option. The significant element of the cost of this option is attributable to landfill costs.

#### 4.2.2 **Beach Nourishment / Disposal to Local Environment**

This is the preferred option on overall strategic terms and is also slightly preferable to the land disposal option on environmental terms given that there will be significantly less impacts to air quality, public safety, and vibration. The low levels of contaminants and the relatively small volume to be dredged are not expected to pose an ecological concern to the Firth of Forth. The increase in airborne emissions from the process will be short lived, minimalistic in nature and insignificant in comparison to the lorry movements of the land disposal option. In cost terms this is easily the preferred option.

#### 4.3 **Identification of BPEO**

It is concluded that the assessment of the BPEO, for disposing of the dredged material from Crail Harbour, is the controlled excavation of the material and disposal over the harbour wall to the inter tidal area below.

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