FORTH PORTS

Newhaven Harbour Maintenance Dredging Marine License Application

Best Practicable Environmental Option Report

29 April 2019

Project No: 0496046

The business of sustainability

ERM

Document title	Newhaven Harbour Maintenance Dredging Marine License Application
Document subtitle	Best Practicable Environmental Option Report
Project No.	0496046
Date	29 April 2019
Version	1.0
Author	Catriona Munro, Mark Irvine
Client Name	Forth Ports Ltd

Document history

				ERM approval to issue		
Version	Revision	Author	Reviewed by	Name	Date	Comments
Draft	00	Catriona Munro	Mark Irvine	Mark Irvine	12.04.2019	Client Review
Draft	01	Catriona Munro	Mark Irvine	Mark Irvine	29.04.2019	For submission

Newhaven Harbour Maintenance Dredging Marine License Application

Best Practicable Environmental Option Report

Approved for Issue by ERM

[Redacted]

Mark Irvine
Technical Director

Environmental Resources Management Limited
6th Floor
102 West Port
Edinburgh
EH3 9DN

CONTENTS

List of Tables

List of Figures

1. INTRODUCTION

1.1 Background

This report has been prepared by Environmental Resources Management Ltd (ERM) on behalf of Forth Ports Ltd (Forth Ports) in support of a Marine Licence application for disposal of dredged material at sea. It compares various options for the disposal of dredge material and identifies the Best Practicable Environmental Option (BPEO).

Under the *Marine (Scotland) Act 2010,* a Marine Licence issued by Marine Scotland is required for the deposit of substances or articles within waters adjacent to Scotland. Under Part 4, Section 27(2), Marine Scotland has an obligation to consider the availability of practical alternatives when considering applications involving disposal of material at sea. Applications for a Marine Licence to dispose of dredged spoil at sea require a BPEO assessment, demonstrating that alternatives to sea disposal have been investigated and that sea disposal does not pose an unacceptable risk to the marine environment and other legitimate users.

In 2015 Forth Ports Ltd undertook a capital dredge of Newhaven Harbour and the approach channel, which proved successful in allowing the safe navigation of Newhaven Harbour by tenders from cruise liners. Forth Ports followed this with maintenance dredging works in 2016 within the footprint of the original capital dredge to continue to ensure the safe navigation of vessels into and out of the harbour throughout the tidal cycle.

As with the dredge spoil from the 2015 capital dredge and the 2016 maintenance dredge, it is proposed that the dredged material resulting from the 2019 maintenance dredge will be disposed of at sea at the licenced marine disposal site at Oxcars. Forth Ports has been using the Oxcars disposal site for the disposal of dredged material from a number of harbours in the Firth of Forth since 1905. Port Edgar has also used Oxcars for capital and maintenance dredge spoil disposal since 2014, and material arising from the construction of the Queensferry Crossing was also disposed of at Oxcars between 2011 and 2016.

Marine Licences for maintenance dredging activities are currently valid in Scotland for up to three years (1). This application is expected to cover the period from June 2019 to June 2022.

1.2 The Need for Dredging

Newhaven Harbour is located on the south bank of the Firth of Forth, north of Edinburgh, and has been owned by Forth Ports since 1967, prior to that by its predecessor bodies. It is located between Leith and Granton harbours and is the smallest of the three. Half of Newhaven Harbour is currently leased to the Leith Motor Boat Club, who installed pontoons in 2013 to accommodate the boats resident there throughout the year. A single crab/lobster fishing vessel operates out of Newhaven Harbour five days a week throughout the year, with several others fishing for mackerel on a recreational basis (2). The entrance to the harbour is accessed by a 0.2 nautical mile approach with a maximum depth of 1.7 m below Chart Datum (CD).

Figure 1.1 shows the proposed dredging area.

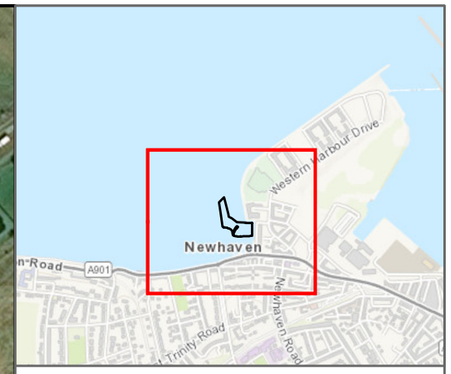
The harbour entrance lies west of Leith Sands and the action of the waves on the sediments, combined with turbulence created by the movement of tide against the breakwaters at Leith Docks, results in the transport of suspended sediments into Newhaven Harbour. There is no known sediment accretion as a result of the harbour breakwater to the west of the mouth of the harbour or elsewhere (3). Forth Ports proposes to undertake a single maintenance dredge campaign per annum for three years to remove up to approximately 15,000 m^3 of material per annum.

(1) Marine (Scotland) Act 2010, Part 4 Marine Licencing. General Guidance for Applicants. Available online http://www.scotland.gov.uk/Resource/0043/00435338.pdf
(2) Leith Harbour Master, Ashley Nicholson, pers comms, February 2019
(3) Bruce Pybus, Forth Ports pers comm, February 2019

3°12'0"W

3°11'30"W

55°59'0"N



Newhaven Dredge Area

Sediment Sampling Points (2019)

Reference	Longitude (UTM30N)	Latitude (UTM30N)
A	3° 11' 51.324"W	55° 59' 0.096"N
B	3° 11' 52.692"W	55° 58' 59.304"N
C	3° 11' 51.504"W	55° 58' 55.344"N
D	3° 11' 48.84"W	55° 58' 54.336"N
E	3° 11' 47.616"W	55° 58' 55.56"N
F	3° 11' 47.292"W	55° 58' 55.452"N
G	3° 11' 47.616"W	55° 58' 55.2"N
H	3° 11' 48.696"W	55° 58' 54.12"N
I	3° 11' 43.404"W	55° 58' 54.012"N
J	3° 11' 43.404"W	55° 58' 56.064"N
K	3° 11' 45.204"W	55° 58' 56.028"N
M	3° 11' 47.688"W	55° 58' 56.136"N
N	3° 11' 49.956"W	55° 58' 57"N
L	3° 11' 45.204"W	55° 58' 56.1"N

0 20 40 60 80 100

Metres

N

SCALE: 1:2,500

SIZE: A3

PROJECT: 0496046

DATE: 11/02/2019

VERSION: A02

DRAWN: GB

CHECKED: CM

APPROVED: MI

Figure 1.1

Newhaven Sediment Sampling Sites (2019)

ERM

CLIENT:

Forth Ports Ltd.

PROJECTION: WGS 1984 UTM Zone 30N

SOURCE: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community;
Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Path: P:\Projects\0496046 Forth Ports PLC Forth Ports BPEO 2019.MI\GIS\MAPS\0496046_NewhavenApproach_A02.mxd

1.2.1 Previous Dredging Activities

Newhaven Harbour was used as a naval dockyard at the beginning of the 16th century, and comprised of an ordinary harbour and a shipbuilding yard. By 1560 there were two piers built out from the shore, with the western pier inclining towards the eastern pier to create a narrow entrance to the harbour. It is understood that there was no dredging works undertaken at this time and the harbour was left to silt up and allow vessels to be beached and thus secured at low water (1).

Between 1572 and 1890, Newhaven Harbour was a major port for landing oysters and played a role in the whaling industry. In 1792, an Act was passed to improve the ferry service between Leith and Burntisland, which included improving access and berthing at Newhaven Harbour. It is considered that this is the earliest period during which maintenance dredging was undertaken at Newhaven Harbour. Under the Act, the sloping jetty was built and the height of the pier was raised (2), with the pier and breakwater competed by 1878 (3).

In 2015, ERM undertook a BPEO on behalf of Forth Ports to support the application for a capital dredge licence to Marine Scotland to dredge the eastern Harbour and approach. This dredging campaign was required to allow shuttle vessels from cruise liners moored in deeper waters in the Firth of Forth to safely land at Newhaven. Marine Scotland granted Forth Ports a Marine Licence for the capital dredge of up to 11,200 m^3 sediment in March 2015. The capital dredge took place between March and May 2015 and 10,705 m^3 spoil was disposed of at Oxcars disposal site, which was determined by the BPEO to be the best option for disposal.

In 2016, a second BPEO was undertaken, this time to support the application for a maintenance dredge licence to Marine Scotland to dredge the eastern harbour and approach, within the footprint of the previous capital dredge. Marine Scotland granted Forth Ports a licence to dredge up to 15,000 m^3 per year for three years. The latest dredging campaign was undertaken in July 2018 and, as with the capital dredge spoil, the spoil was disposed of at Oxcars.

1.3 Intended Dredging Operations

To continue to allow vessels to berth alongside the pontoon jetty at Newhaven Harbour, Forth Ports requires to dredge the berthing area and approach channel to a depth of 1.0 m below CD. As with the previous maintenance dredging campaign, the proposed dredging operations are normally undertaken over four to eight weeks between February and the end of April, removing up to approximately 15,000 m^3 each year for three years. The maintenance dredge is anticipated to be undertaken using a grab, backhoe and/or plough dredger.

The boundary co-ordinates of the proposed dredge area shown in *Figure 1.1* are presented in Table 1.1.

(1) Graham, A (1971) 'Archaeological notes on some harbours in eastern Scotland', Proc Soc Antiq Scot, vol.101 Page(s): 256-7 fig. 7b Held at RCAHMS J.6.4.GRA

(2) Graham, A (1971) 'Archaeological notes on some harbours in eastern Scotland', Proc Soc Antiq Scot, vol.101 Page(s): 256-7 fig. 7b Held at RCAHMS J.6.4.GRA

(3) Hume, J R (1976) The industrial archaeology of Scotland, 1, Lowlands and Borders London Page(s): 189 Held at RCAHMS J.4.11.HUM

Table 1.1 Co-ordinates of Proposed Dredge Sites at Newhaven Harbour

Node	Latitude	Longitude
A	55.98336	-3.19759
B	55.98314	-3.19797
C	55.98204	-3.19764
D	55.98176	-3.19690
E	55.98210	-3.19656
F	55.98207	-3.19647
G	55.98200	-3.19656
H	55.98170	-3.19686
I	55.98167	-3.19539
J	55.98224	-3.19539
K	55.98223	-3.19589
L	55.98225	-3.19589
M	55.98226	-3.19658
N	55.98250	-3.19721

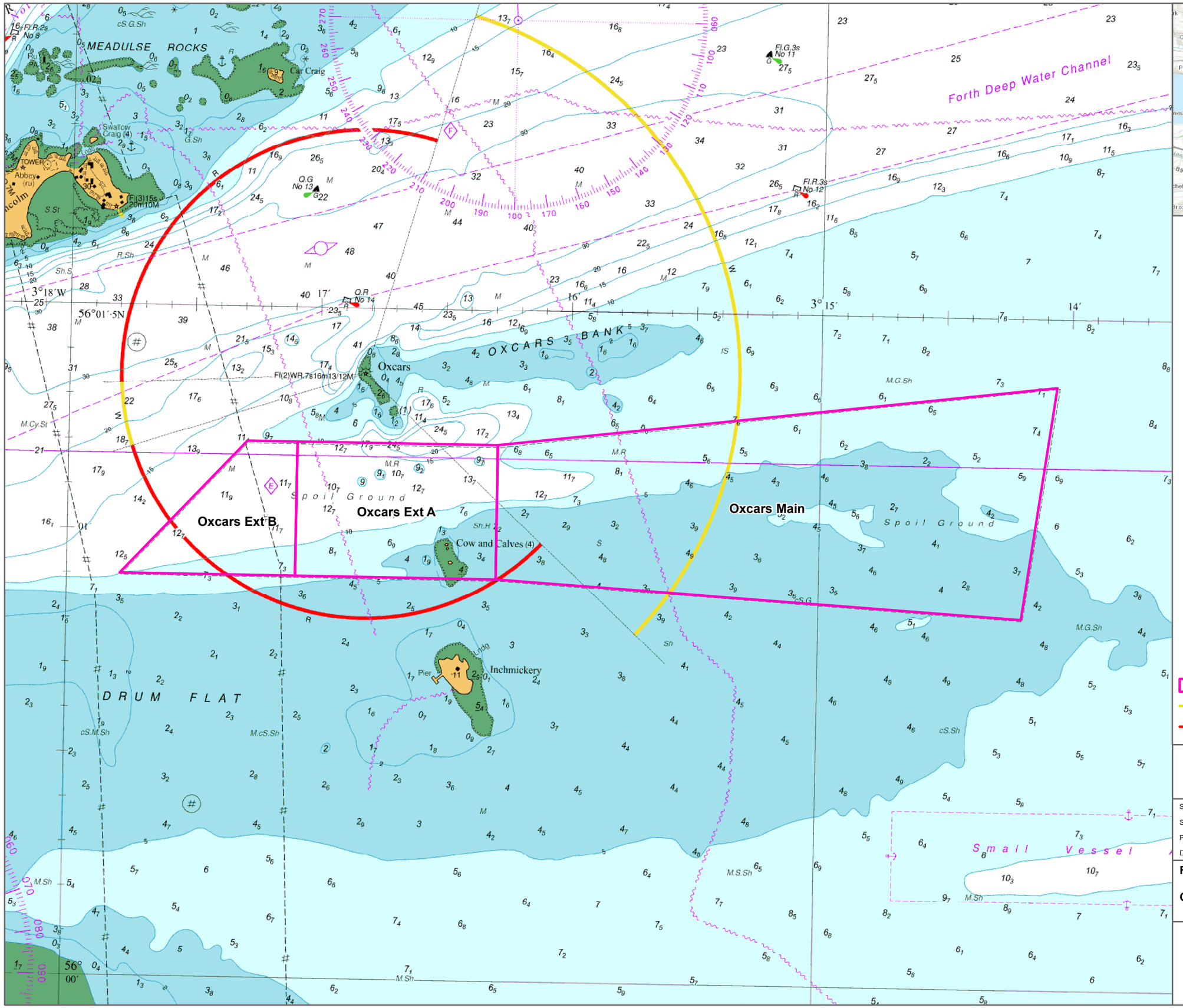
Coordinates in WGS84, UTM Zone 30N, decimal degrees

1.4 Proposed Disposal Operations

The boundary co-ordinates of the Oxcars disposal site shown in *Figure 1.2* are presented in *Table 1.2.* The site has previously been extended to the west (Extension A and Extension B) and the coordinates of these extensions are also shown in *Figure 1.2* and provided in *Table 1.2.* Forth Ports intends to use all sections of the spoil ground to dispose of dredged spoil. The water depth within the Oxcars disposal site ranges from 2.1 m below CD at the centre of the site and increases to 13.7 m below CD towards the west of the site. As discussed above, the Oxcars disposal site was used in 2015 and 2016 for the disposal of sediment arising from the dredging operations in Newhaven Harbour. It has also used by Forth Ports for the disposal of dredged material from Rosyth since 1996 (1).

The Oxcars disposal site is located within the Forth Islands Special Protection Area (SPA), designated due to its qualifying features of seabirds, including gannets, puffins and terns (2). The Forth Islands SPA was designated many decades after the Oxcars disposal site had been licenced, and as such, it is not likely that disposal operations at Oxcars have a detrimental effect on the qualifying species of this SPA. Oxcars is located approximately 2.3 km from the Firth of Forth SPA, Ramsar site and Site of Special Scientific Interest (SSSI), all of which were also designated some time after Oxcars was licenced as a spoil site.

(1) When Forth Ports took over the management of the Port of Rosyth from the Ministry of Defence
(2) SNH (1990). Site Details for Forth Islands Special Protection Area. Available online http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8500



SCALE: 1:15,000	VERSION: A01
SIZE: A3	DRAWN: GB
PROJECT: 0332190	CHECKED: CM
DATE: 07/01/2016	APPROVED: MI

Figure 1.2

Oxcars Spoilground

CLIENT:

Forth Ports Ltd.

ERM

PROJECTION: British National Grid

Path: P:\Projects\0332190 Newhaven Harbour Licence.CM\GIS\MAPS\0332190_OxcarsSpoilground_A01.mxd

Table 1.2 Coordinates of Oxcars Disposal Site

Site	Latitude	Longitude
Oxcars Main		
	56.02000	-3.27150
	56.01383	-3.23650
	56.02250	-3.23433
	56.01500	-3.27150
Oxcars Extension A		
	56.02000	-3.28483
	56.01500	-3.27150
	56.02000	-3.27150
	56.01500	-3.28483
Oxcars Extension B		
	56.02000	-3.28817
	56.01500	-3.28483
	56.02000	-3.28483
	56.01500	-3.29650

All coordinates in WGS84, UTM 30N, decimal degrees

1.5 Description of Sediment to be Dredged

In line with Marine Scotland guidelines on pre-dredge sampling protocol (1), a survey programme was undertaken on 26th February 2019 to sample the soft sediments within Newhaven Harbour and its approach.

A hand held van-Veen grab was used to take a surface sample from two stations within the harbour and one in the approach channel. Sediments were analysed for:

- sediment particle size distribution;
- the sediment solids content;
- presence of asbestos;
- a suite of metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead, zinc);
- Tributyl Tin (TBT);
- Poly Chlorinated Biphenyls (PCB); and
- Polycyclic Aromatic Hydrocarbons (PAH).

The physico-chemical analysis is presented in *Appendix A*.

The sediment to be dredged from the channel and harbour is composed of material deposited within the last three years (since the last maintenance dredge) and comprises sandy mud, with gravel recorded at station N1.

There are elevated concentrations of some metals, PAHs and TBT within the dredged material, consistent with historic industrial discharges to the Firth of Forth and Forth Estuary (refer to Table 3.2 for comparison of historical discharges to the Forth). No samples recorded concentrations of contaminants above Marine Scotland Action Level 2 (2).

(1) Guidance for the sampling and analysis of sediment and dredged material to be submitted in support of applications for sea disposal of dredged material. Available online http://www.scotland.gov.uk/Resource/0044/00443832.pdf

(2) Action Levels for metals, PCBs, TBT and PAHs are used by Marine Scotland to assess the suitability for disposal of sediments at sea.

Historic sediment analysis data from Oxcars disposal site is presented in *Appendix A.* Concentrations of metals and PCBs are found to be slightly higher than those from the other spoil disposal sites in the Firth of Forth.

1.6 Scope of the Study

This report provides an appraisal of available disposal options and short-lists those that are considered to be practicable. Options are reviewed according to the Waste Hierarchy, as outlined in the European Waste Framework Directive (2008/98/EC) (1). The options on the short-list are then reviewed against strategic, environmental and cost considerations. The options are then compared and the BPEO identified.

The remainder of this report is structured as follows.

- *Section 2* describes the BPEO assessment method.
- *Section 3* describes each of the available disposal options and summarises their respective advantages and disadvantages.
- *Section 4* compares the disposal options.
- *Section 5* identifies the BPEO.

Further supporting information is provided in the three Appendixes.

- *Appendix A:* Sediment Sample Chemical Analysis Results.
- *Appendix B:* Environmental Impacts of Disposal Operations.
- *Appendix C:* Consultee Responses.

(1) Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098

2. BPEO ASSESSMENT METHOD

2.1 Introduction

The BPEO study was undertaken using the following method.

- Identification of potential disposal options.
- Preliminary appraisal and short-listing of options based on practicability.
- Assessment of the short-listed options based on:
  - strategic considerations;
  - environmental considerations *ie* what the environmental impacts would be; and
  - cost, in terms of capital and maintenance/operating costs.
- Comparison of the relative merits and performance of the options and identification of the BPEO.

Information was obtained through literature review and consultation with the following consultees.

- Forth Ports Ltd;
- Marine Scotland;
- Scottish Environment Protection Agency (SEPA);
- Northern Lighthouse Board (NLB);
- Forth District Salmon Fisheries Board (FDSFD);
- Scottish Natural Heritage (SNH);
- City of Edinburgh Council; and
- Maritime and Coastguard Agency (MCA).

2.2 Identification of Options

The following seven potential treatment/disposal options for the dredged material were identified:

- beach nourishment;
- coastal reclamation and construction fill;
- spreading on agricultural land;
- sacrificial landfill;
- incineration;
- other disposal options and reuse; and
- sea disposal.

2.3 Preliminary Appraisal

A preliminary appraisal of each of the options identified above was undertaken, including an assessment of the practicability of each option with regard to availability of disposal sites. Following the preliminary appraisal those options that are considered to be practicable were short-listed for further consideration.

2.4 Assessment of Options

The short-listed options were then subject to detailed assessment. The parameters which were used to assess the short-listed options are described below.

2.4.1 Strategic Considerations

Strategic considerations included the following.

- Operational practicability - focusing on whether the option is technically and operationally practicable.
- Availability of sites/facilities - considering whether there are any sites or facilities which can take the dredge spoil.
- Security of option - examining whether Forth Ports will have control over all stages of the disposal.
- Established practice - considering whether technologies and techniques proposed are established and therefore whether the performance and potential difficulties of the technologies and techniques can be anticipated.
- General public acceptability - gauging whether the public are likely to object to or support the proposals.
- Likely agency acceptability - gauging whether public agencies are likely to have any major concerns when consulted on the Marine Licence application.
- Legislative implications - assessing compliance with relevant legislation and the potential management control required.

2.4.2 Health, Safety and Environmental Considerations

The factors used to assess the health, safety and environmental performance of the options are summarised below.

- Safety. Considering potential sources of hazard and probability that there would be any risk to the general public or workers.
- Public health. Assessing whether there would be any risk of a detrimental effect on public health, based on predicted pathways and receptors.
- Contamination/Pollution. Evaluating whether there is potential for pollution or contamination that could result in failure to meet Water Framework Directive (WFD) objectives and associated Environmental Quality Standards (EQSs: the amount or concentration of a substance that should not be exceeded in an environmental system). Contamination is defined as the presence of an unwanted constituent in the natural environment whilst pollution is the introduction of contaminants into the natural environment that causes adverse change.
- Ecological impact. Assessing the significance of any potential impact on important habitats or species, including designed sites.
- Interference with other legitimate users. Considering whether there are likely to be impacts on other activities, such as users of the estuary, docks or roads.
- Amenity/aesthetic. Assessing whether there is likely to be a visual, olfactory or noise impact resulting from the disposal or any impact on local amenity.

2.4.3 Cost Considerations

Cost of disposing of dredged material was considered in terms of the following.

- Capital cost (site costs, construction and equipment hire /purchase costs).
- Maintenance/operational cost (transport costs, disposal costs including site operation).

2.5 Comparison of Options

The performance of each option was evaluated on a scale from Low to High according to definitions presented in *Table 2.1*. Intermediate grades (Low to Medium and Medium to High) were also used where the assessment was marginal between Low, Medium or High. The results of the assessment process are presented in *Section 3* and *Section 4*.

Table 2.1 Definitions of Performance

Consideration	High	Medium	Low
Strategic Considerations			
Operational Feasibility	Practical, easy to operate and achievable as process is robust and established. Low number of stages and each stage easy to control.	Some practical difficulties. Moderate number of stages with some difficulties.	Major practical difficulties. Large number of steps with some major difficulties.
Availability of Sites/Facilities	Suitable site/facility available within 1 km of the docks by road and 10 km by sea.	Suitable site/facility available within 10 km of the docks by road and 20 km by sea.	No suitable sites/facilities within the vicinity (over 10 km by road and 20 km by sea).
Security of option	In complete operational control of Forth Ports.	Is mainly in control of Forth Ports with some outside involvement for which there are alternative sources of supply.	Has elements that are out of Forth Ports control for which there are no practical alternative sources of supply.
Established Practice	Technology and techniques are clearly established with no foreseeable significant problems.	Technology and techniques have been tested but not applied to dredge material.	Technologies and techniques are untested and unforeseen problems are likely.
General Public Acceptability	Likely to be generally acceptable to the public based on reaction to similar developments.	Unlikely to provoke a strong negative or positive reaction based on reaction to similar developments.	Likely to provoke a strong negative reaction based on reaction to similar operations.
Likely Agency Acceptability	Likely to be generally acceptable to statutory bodies after consultation.	Statutory bodies may have some concerns that may be overcome through further consultation.	Statutory bodies may have major concerns that may not be overcome through consultation.
Legislative Implications	Would easily comply with legislation with a low level of management and physical control.	Requires some control/intervention to achieve compliance.	Requires a high level of management control and intervention to achieve compliance.
Health, Safety and Environmental Considerations			
Safety	No significant risk to workers and the general public.	Low risk to workers and the general public which is easily controlled.	Moderate to high risk to workers and general public.
Public Health	Will not cause workers or public to be exposed to substances potentially hazardous to health.	May cause some low level intermittent exposure to substances potentially hazardous to health.	Risk of exposing workers and general public to substances potentially hazardous to health.
Pollution/Contamination	Compliant with emission standards and water quality objectives. Low risk of harm from substances released to environment.	Environmental quality standards may be approached or breached occasionally. Some risk of harm to environment.	Environmental quality standards may be breached regularly and there is a moderate or high risk of harm to environment.

Consideration	High	Medium	Low
Ecological Impact	Priority species and habitats under the UK Biodiversity Action Plan and qualifying features and species under the EU Habitats and Birds Directives will not be affected.	Priority species and habitats under the UK Biodiversity Action Plan and qualifying features and species under the EU Habitats and Birds Directives may be slightly affected.	Priority species and habitats under the UK Biodiversity Action Plan and qualifying features and species under the EU Habitats and Birds Directive are likely to be significantly affected.
Interference with other Legitimate Activities	Little potential for interference with other activities.	Some potential for interference with other activities.	High potential for interference with other activities.
Amenity/Aesthetic	No significant impact on local amenity or aesthetic qualities.	Potential for impacts of moderate significance on local amenity or aesthetic qualities.	Potential for impacts of high significance on local amenity or aesthetic qualities.
Cost			
Capital and maintenance	£0.5m or less.	Between £0.5m and £1m.	More than £1m.

3. DESCRIPTION AND PRELIMINARY ASSESSMENT OF AVAILABLE DISPOSAL OPTIONS

3.1 Introduction

This section describes the seven identified disposal options, reviewing the steps required for each option, namely:

- beach nourishment;
- coastal reclamation;
- spreading on agricultural land;
- sacrificial landfill;
- incineration;
- other disposal options and reuse; and
- disposal at sea.

A description of the predicted impacts of the disposal operations is presented in *Appendix B* and copies of significant correspondence are provided in *Appendix C*.

The identified disposal options are described and issues and requirements associated with each option are discussed below. The section concludes by identifying those options that are short-listed for further consideration in the BPEO process.

There are a number of steps that are common to some of the land-based options and these are described in *Section 3.2* to avoid repetition.

3.2 Common Steps to Land-Based Disposal Options

The disposal options that have land-based components include:

- beach nourishment (if material transported by road);
- coastal reclamation and construction fill (if material transported by road);
- spreading on agricultural land;
- sacrificial landfill;
- incineration; and
- other disposal options and reuse (such as brick making/concrete aggregate/top soil production).

The steps that are common to the land-based disposal options are:

- landing the dredge material;
- storage of dredge material;
- dewatering the dredge material; and
- loading and transport for disposal.

These steps are described below along with some discussion of the practicalities of undertaking these steps at Newhaven Harbour.

3.2.1 Landing the Dredged Material

All of the land based options require transport to on-shore facilities. This could be via a pumped discharge, conveyor or grab. As there are no existing suitable landing facilities at Newhaven Harbour a new landing facility would be required to enable the materials to be off-loaded.

3.2.2 Storage of Dredged Material

Once the dredged material has been landed, it will require storage prior to onward transport for final disposal. A storage facility may therefore require construction at the site, capable of retaining the dredged material and associated run-off and dust.

3.2.3 Dewatering the Dredged Material

The land disposal options require dewatering of the dredged material either to make transport more feasible or to create a material which is suitable for disposal to land or incineration *ie*, disposal of a more solid sludge rather than a liquid. The contents of the grab/backhoe dredger are likely to average 85% solids (by volume).

There are three approaches that are typically used for drying marine sediments: construction of settling lagoons, use of a mobile centrifuge unit and filter press as described below.

Settling Lagoons

Settling lagoons are likely to be large, ring-dammed structures into which the dredged material would be pumped. These could be built within the intertidal area or on land. The material would be piled up in the lagoon and the water drained out under gravity. The lagoons would have a drainage system to collect the water and watery sludge from the dredged material for further treatment (usually by hydrocyclone) or to be transported offsite for disposal. The lagoons must be of sufficient size to contain the dredged material prior to transport. They must also be accessible by road and must have facilities to load the dredged material into tankers or sealed heavy goods vehicles (HGVs) for movement to the disposal/treatment centre. To minimise the distance the wet dredge material has to be transported from the dredger they must be located near the quayside.

Setting up settling lagoons would require assessment to ensure that any leachate from them would not contaminate groundwater and a licence would be required from SEPA under the Water Environment (Controlled Activities) Regulations (2011). Furthermore, as the material contains metals, PAHs and TBT (see *Appendix A* for sample analysis data) it might be additionally necessary to construct the lagoons with special liners to retain the contaminants and consider treatment of the supernatant water draining out of the lagoons.

Due to the dense urban nature of Newhaven and the ongoing development of Leith waterfront to the east of Newhaven there is no space in the vicinity of Newhaven Harbour for the construction of settling lagoons. The majority of the intertidal area falls within the Firth of Forth Site of Special Scientific Interest (SSSI), Firth of Forth Ramsar site and Forth Islands Special Protection Area (SPA). The SPA is a complex of estuarine and coastal habitats stretching east from Alloa to the coasts of Fife and East Lothian. SNH has previously expressed the view on similar BPEO assessments that further loss of intertidal habitats is not considered a realistic option.

Centrifuge or Hydrocyclone System

The use of a centrifuge or hydrocyclone system to dewater the material to a level suitable for disposal to landfill (approximately 10% water content) may be required, depending on the final water content of the recovered material. One mobile unit system was reported as being capable of treating up to 150 m^3hr^{-1} depending on unit size and material solids content. Other systems may be available that can process material at different rates, however, for the purposes of this assessment a rate of 150 $m^3\,hr^{-1}$ has been used. This is typically only an option for firmer sediments made up of fine sands and muds, such as those from stations N2 and N3 at Newhaven Harbour. If material can be dried at a rate of 150 $m^3\ hr^{-1}$, to dewater a total volume of approximately 15,000 m^3 would require approximately 100 hours. Other units with lower throughputs could take longer.

Filter Press

A filter press is a tool used to separate solids and liquids using the principle of pressure. The press is filled with the spoil, building up pressure before the spoil is strained through filter cloths by force. The

remaining dried spoil can then be removed from the filter press and taken away for disposal. This drying process achieves the best level of dryness of the three options, however, can take significantly longer than using a centrifuge and is considerably more expensive than either of the other two options.

3.2.4 Loading and Transport for Disposal

A loading facility would be required adjacent to the storage or dewatering area to load the material into covered HGVs for transport to treatment/disposal sites. The required infrastructure would include hard standing to allow a fleet of HGVs to be loaded by mechanical excavators. Although limited hard standing is available at the quayside at Newhaven Harbour, there are currently no storage or dewatering sites adjacent to the possible loading area and no space to build any.

Assuming the materials can be dried to a water content of 10% (by volume) at Newhaven Harbour quayside, the estimated 13,500 m^3 of dried materials would require transport for disposal, either to an incinerator, to agricultural land, to landfill or to a reclamation project. The length of journey required would depend on the location of the deposit/incineration sites.

A volume of 13,500 m^3 of dried (to 10% water content) material equates to approximately 24,300 tonnes. Assuming 20 tonne capacity sealed HGVs are used, this would equate to 1,215 return trips or 2,430 vehicle movements.

The significance of the number of movements will be dependent upon the distance to the disposal/treatment site and the existing volume of HGVs on the haulage routes. The access road to Newhaven Harbour exits onto the trunk road network where the HGV count is recorded as 86,870 per year (2016 data). The additional HGV movements as a result of the dredging operations would increase this current level by approximately 3% per year. There may also be an issue with regard to increase in HGV traffic flows if minor roads are used to reach disposal/treatment sites.

3.2.5 Disposal/Treatment Issues

Neither method of the drying process (*eg* lagoons or centrifuge) is likely to reduce the concentration of PCBs, PAHs, metals, TBT and salt present within the dredged material. This may restrict disposal and reuse options and as the material has elevated levels of some contaminants, pre-treatment may be required prior to disposal on land. In line with the Environment Agency Technical Guidance it is considered likely that the dredged material would be classed as non-hazardous, however, confirmation of this would require further analysis of the material by SEPA.

The saline nature of the sediment also restricts its application on land, as without going through a washing process it will not be able to support any form of terrestrial flora growth.

Where an option involves disposal on land there is an issue of classification of the dredged material. Once the material has been removed from the harbour for disposal on land it will be classed as waste. It then requires disposal at a licensed waste management facility and to be transported by a registered waste carrier. Alternatively, the material could be disposed of under an activity which was exempt from waste licencing (*eg* the treatment of land for agricultural benefit or ecological improvement), which would require approval from SEPA.

3.3 Beach Nourishment

3.3.1 Process Description

Beach nourishment involves the disposal of the dredged material on a beach directly from the dredging vessel or, if dewatering was required, the spoil would be brought ashore and dewatered prior to transport or placement on the beach using earth moving plant.

3.3.2 Suitable Sites for Beach Nourishment

Beach nourishment requires materials of a similar composition to the existing beach materials and usually involves clean sand or gravel. The sediment from within the proposed dredge zone comprises fine material. A recent oil contamination incident at Limekilns has resulted in the removal of circa. 500 tonnes of sand and gravel from the beach area. However, the sediment from Newhaven Harbour is not suitable for beach recharge due to the particle size distribution and the presence of contaminants such as metals, including TBT, and organics (PAHs and PCBs). SNH have also confirmed that it would only be appropriate to use material on a beach of similar substrate and provided contaminant levels were not of concern.

Given the incompatibility of the fine sediment material with sandy beach sediments at the potential receiving site, the contaminant concentrations in the material to be dredged and the conservation status of the Firth of Forth and Forth Estuary, beach nourishment is not likely to be a feasible option.

3.4 Coastal Reclamation and Construction Fill

3.4.1 Process Description

This section considers the use of the dredged material in coastal reclamation projects or as fill material inland. Depending on the potential site, reclamation or fill could involve landing, storage, dewatering, transport and possibly desalination. Coastal use directly from the dredging vessel would be preferable as this would involve pumping or spraying the material directly from the dredger or barge to the site where it was needed and would avoid handling and transporting the material on land.

3.4.2 Suitable Sites for Reclamation

Forth Ports, Marine Scotland and Edinburgh City Council are the most likely bodies to be responsible for or aware of reclamation projects in the Forth. No sites for coastal reclamation have been identified through the consultation process as requiring any of the dredged material at a time that fits with the dredging programme. In addition, the dredged material would not be suitable for many reclamation sites due to the low compressive strength properties of mud. The spoil could be pumped into bunded lagoons at the edge of the Firth of Forth to create land that could be used for development, agricultural or similar purposes. This is unlikely to be acceptable to SNH due to the potential impact on designated areas in the Firth of Forth and Forth Estuary.

3.4.3 Construction Material

Use as fill in inland construction projects would not be appropriate because of low compressive strength properties of mud and the need for landing, drying and transport of the dredged material. If landing, drying and transport were feasible then it may be that the material could be used for quarry/landfill. However, the potential presence of contaminants in the dredged material and its high salt content make this option unattractive.

3.5 Spreading on Agricultural Land

3.5.1 Process Description

It is possible to obtain an exemption from waste management licencing for treatment of land, usually by land spreading, with certain non-agricultural wastes such as paper waste, food waste or sewage sludge. The disposal of marine spoil to agricultural land would involve landing, dewatering, possibly storage, desalination and transport for disposal.

Dewatering the dredged material in lagoons or in a centrifugal drier would remove some of the salt; however it is likely that the desalination would still be required. Desalination could be achieved by placing the spoil in lagoons, layering it with sharp sand, spraying water over the material and allowing leaching of the salt back into the Firth of Forth.

The material to be dredged has concentrations of metals, but these are generally lower than the average content in sewage sludge which is presently spread on land. This is based on Scottish Agricultural College data as provided in Table 3.1( ) and concentrations of metals in Newhaven Harbour and approach channel sediments in *Table 3.1*

Table 3.1 Typical Concentrations of Metals in Sewage Sludge Applications to Land

	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Typical Sewage Sludge metal concentration ($mgkg^{-1}$)	3	55	300	2.2	30	270	630
Normal soil concentration	0.5	50	20	0.1	25	20	80
UK max allowable soil concentration ($mgkg^{-1}$)	3	400	100	1	60	300	200
Number of applications to reach limit value -(assuming 5t/ha dry weight solids)	500	3818	160	245	700	553	113

Key: Cd = Cadmium, Cr = Chromium, Cu = Copper, Hg = Mercury, Ni = Nickel, Pb = Lead, Zn = Zinc.

Source: Scottish Agricultural College, Technical Note – Use of Sewage Sludge on Agricultural Land, 1997.

Table 3.2 compares metal concentrations in the dredged material from Newhaven Harbour with levels from three other ports in the Forth Estuary and Firth of Forth.

Table 3.2 Comparison of Concentrations of Metals in Newhaven Harbour and Approach Channel Sediment with those from other Firth of Forth and Forth Estuary Ports

Metal Concentration (expressed as mg kg^{-1} on air dried sediment)								
	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Newhaven 2019								
Mean	17.6	0.5	75.2	79.5	0.7	36.2	112.1	180.7
Range	15.5-20.8	0.3-0.8	58.7-94.8	33.5-156.0	0.6-0.7	30.7-42.7	74.9-170.0	145.0-221.0
Newhaven 2014								
Mean	16.6	1.5	75.2	89.6	1.7	35.4	149.0	238.0
Range	13.1-18.4	1.3-2.2	55.1-97.5	70.8-108.0	1.1-2.7	28.0-50.8	143.0-157.0	202.0-289.0
Rosyth 2000-2012								
Mean	16.8	0.2	69.1	40.9	1.1	33.0	74.4	136.4
Range	12.4-21.9	0.0-1.0	46.3-105.0	22.5-189.9	0.4-2.6	24.6-43.4	43.1-137.5	88.4-229.7
Leith 1990-2008								
Mean	14.2	1.2	63.2	72.8	1.3	42.5	152.3	243.8
Range	4.6-21.6	0.0-3.9	14.1-84.3	12.8-144.0	0.2-4.4	13.0-59.3	29.0-787.0	62.6-687.0
Grangemouth 1988-2011								
Mean	13.9	0.1	75.5	49.4	1.2	32.5	69.3	140.7
Range	<0.1-43.6	<0.1-0.9	10.7 -211.0	3.0-94.1	<0.1-3.8	7.7-80.7	9.3-94.3	28.9-337.0

Key: As = Arsenic, Cd = Cadmium, Cr = Chromium, Cu = Copper, Hg = Mercury, Ni = Nickel, Pb = Lead, Zn = Zinc.

The data from the 2019 Newhaven Harbour survey shows all metal concentration samples to be similar to those previously collected data other docks within the Firth of Forth and Forth Estuary. Due to the historical presence of PCBs, the spoil cannot be applied to land without confirmation from SEPA that levels of these contaminants are acceptable.

Approximately 200,000 tonnes of sludge are recycled to agricultural land per annum across Scotland. Forth Ports are seeking to dispose of approximately 14,025 m^3 of dewatered material (approximately 25,245 tonnes at 1.8 tonnes m-3) of dried material equating to approximately 7% of the current volume of annually recycled sludge in Scotland.

SEPA has confirmed that the disposal or recycling of marine dredged material on agricultural land does not fall within the exemptions under Paragraph 7 of the Waste Management Licensing (Scotland) Regulations 2011, and the activity would therefore require to be licensed. Planning permission would be required from the local authority and a waste management licence would be required from SEPA. In support of the application to dispose of the dredged material to agricultural land, evidence that the material would not cause pollution of the environment or harm to human health would need to be provided.

3.6 Sacrificial Landfill

3.6.1 Process Description

The type of landfill site which can take the spoil is dependent upon the classification of the waste. As discussed above it is understood that the waste would be classified as non-hazardous and therefore a suitably licensed landfill site with sufficient capacity is required.

3.6.2 Available Landfill Sites

Subsequent to implementation of the Landfill Allowance Scheme (Scotland) Regulations 2005 and re-evaluation of landfill licences, there is currently one site within an hour's drive from Newhaven Harbour with the facilities to accept the material. This is Avondale Landfill at Polmont, approximately 35 km west of Newhaven Harbour. Previous consultation with the operators, however, confirmed that the site cannot accommodate the dredged material due to the composition, and volume not fitting with their site operations.

3.6.3 Taxes and Royalties

The material will be exempt from landfill tax under the terms of the Landfill Tax (Scotland) Act 2014 issued by the Scottish Government that specifies that dredged material from any inland waters, including harbours and their approaches, are not subject to landfill tax.

As Forth Ports own the seabed and foreshore at Newhaven, no royalties are due to The Crown Estate.

Costs are based on disposing of the maximum volume of dredged material being applied for in this Marine Licence; in this case, approximately 14,025 m^3.

3.7 Incineration

3.7.1 Process Description

Incineration would involve landing the dredged material, dewatering, possibly storing it and transporting it to either an existing incinerator or a newly constructed incinerator. The ash would then require disposal. Options for disposal of ash include landfill, reclamation and spreading on agricultural land.

The organic content of the dredged material is assumed to be around 5% and therefore there is only a small combustible component within the material. It is anticipated that incineration would result in a reduction in volume of the dried spoil by only 15% *ie,* 5% organics plus 10% water content. Incinerator operators generally require material to have an organic content above 20% to ensure efficient combustion and would most likely reject material with an organic content below this threshold (1).

A further consideration is that the material to be dredged may contain metals (including TBT), PAHs, TBT and PCBs. In a typical thermal desorption incineration process it is likely that PCBs, salt and most of the mercury (around 80%) would be removed. In addition, the leaching potential of other metals would be reduced (except for arsenic) and as a result, the ash would still be contaminated. Pre-treatment would be required for the removal of metals. Emissions to atmosphere from the incineration processes would also require to be controlled by SEPA under the *Environmental Protection Act 1990.*

3.7.2 Available Incinerator Sites

There are no appropriate waste incinerators in Scotland that could accept the dredged material. The nearest incinerator is at Ellesmere Port, Merseyside (approximately 388 km south) and transport would be costly and is unlikely to be practicable.

3.8 Other Disposal Options and Reuse

The other disposal options are re-injection into the tidal flats via a pipeline and reuse in brick making, concrete aggregate or top soil production processes.

3.8.1 Re-injection

This would involve the construction of a pipeline to take the dredged material to a high tide point on the Cramond tidal flats (the closest to Newhaven) and injecting it at velocity back into the mudflats. The advantage of this is that it effectively returns the sediment to its source. The disadvantage is that the re-injection at velocity would be likely to have an adverse impact on the protected mudflat habitat through disturbance and erosion and may affect the ornithological interest of the mudflats.

3.8.2 Brick Making/Concrete Aggregate/Topsoil Production

There are processes by which marine sediments can be made into bricks or can be used to form concrete aggregate. The advantage is that the materials can be beneficially used and metals are sealed into the bricks or aggregate. Previous consultations between Forth Ports and a brick making factory confirmed that the mineralogy of the material would not be appropriate for brick making and the contamination by salt would be unacceptable for any construction material.

Almost no agricultural species can grow in salty soils and very few in brackish soils. The salinity of the dredged sediment would require to be reduced naturally by rainwater or by a dewatering process before consideration for use as topsoil. The best topsoil is a mixture of sand, silt, clay and organic matter and must be clean for use in the production of food crops (2). This option would not be feasible at Newhaven Harbour due to lack of necessary handling facilities, storage areas and the potential contamination levels in the dredged spoil. In addition, there is no known demand for this material to be used in top soil production.

(1) Baldovie Waste to Energy Plant, pers comm, January 2014

(2) Permanent International Association of Navigation Congresses. Permanent Technical Committee II. Working Group 19. 1992. Beneficial Uses of Dredged Material, Issue 19.

3.9 Disposal to Sea

3.9.1 Process Description

Disposal at sea involves the dredge material being transported to a licensed disposal site in a dredging vessel. This approach takes place at sea and does not require the landing of any materials. Disposal to sea was the BPEO for the spoil arising from the capital dredge at Newhaven in 2015 and the maintenance dredge in 2016. Furthermore, it is also the common practice for disposal of dredged spoil from other harbours and docks in the Forth Estuary and Firth of Forth and involves the dredger sailing to a licenced disposal site and releasing the materials. It does not require landing of dredged material.

There are seven currently licenced marine disposal sites in the Firth of Forth; Bo'ness, Oxcars, Blae Rock, Kirkcaldy, Methil and two sites designated at Narrow Deep. There are several other spoil grounds in the Firth of Forth which have been used for disposal operations in the past and are now closed. For the dredging operations at Newhaven Harbour, Forth Ports would propose to use the Oxcars disposal site approximately 2.1 nautical miles northwest of Newhaven Harbour. This is the closest site to the harbour thus minimising the distance for vessel transport.

The baseline environmental conditions and potential environmental impacts at the disposal site are described in *Appendix B*.

Forth Ports proposes to use a backhoe, grab and plough to dredge the harbour and approach channel, depositing the material at the Oxcars disposal site. The time required for one cycle (dredging - travelling - discharging - travelling) is approximately two hours. Newhaven Harbour is tidal, and as such dredging operations will be restricted to the hours around high tide.

A differential global positioning system (dGPS) would be used to position the vessel in the disposal area and records of the spoil discharge locations would be retained.

3.10 Conclusion

The description of the available options allows options that are evidently impracticable to be ruled out. This is summarised in *Table 3.3.* The assessment of the short-listed options taken forward for further consideration is presented in *Section 4.*

Table 3.3 Short-listing of Options

Option	Assessment	Result
Beach Nourishment	This option does not appear to be practicable. The material is not suited to beach nourishment in the Firth of Forth and there are no beaches within the Firth of Forth or Forth estuary that require nourishment with this grade of material.	Discard
Coastal Reclamation and Construction Fill	This option may be practical. The salt content, poor load bearing properties and the potential concentration of contaminants limits the available options for reuse of the dredged material.	Short-list
Spreading on Agricultural Land	This option does not appear to be practicable. The material is not desirable for disposal on agricultural land due to potentially containing concentrations of contaminants and having a low organic content. Furthermore, desalination, storage, dewatering and transport of this material are impractical. Disposal on agricultural land would require a Waste Management Licence and evidence that there would be no harm to human health.	Discard
Sacrificial Landfill	This option is practicable and there is one local site. There are a large number of steps involved in storage, dewatering and transport. Landfill site operators may be unwilling to accept the material due to the sediment composition.	Short-list
Incineration	This option does not appear to be practicable. The material is not suited to incineration due to low organic content and large volume of spoil involved. If incinerated, volume would only slightly reduce and there are no available incinerators in Scotland that could take this amount of material.	Discard
Other Uses	This option may be practicable in the form of brick making, concrete aggregate and top soil production.	Short-list
Disposal at Sea	This option is practicable and has been the BPEO for the previous two dredging campaigns at Newhaven Harbour.	Short-list

4. ASSESSMENT OF SHORT-LISTED DISPOSAL OPTIONS

4.1 INTRODUCTION

This section presents an assessment of each option against the assessment definitions of performance listed in Table 2.1. A classification of likely performance is then provided for each of the criteria and this summarised in Table 5.1.

The environmental effects of disposal at sea are addressed in *Appendix B.*

4.2 COASTAL RECLAMATION AND CONSTRUCTION FILL

4.2.1 Strategic Considerations

Operational Feasibility

The reuse of the dredged material for reclamation will involve either direct pumping from the dredger into the disposal site or drying the material and desalination for disposal on land. This option would be achievable if disposal sites were available adjacent to the Firth of Forth. As no sites requiring this grade of material for reclamation or construction fill have been identified, the materials would require landing, drying, storing and transporting to the disposal site.

Classification: Medium

Availability of Sites

No coastal sites within the Firth of Forth have been identified at this time through consultations with The City of Edinburgh Council. No landfill sites in the vicinity of Newhaven have been identified as able to accept the material as capping material or for reinstatement purposes.

Classification: Low

Security of Option

No sites have been identified as belonging to Forth Ports, so disposal to reclamation sites is out with their control and could present practical problems, such as scheduling in sediment delivery with proposed dredging programme.

Classification: Low to Medium

Established Practice

The use of suitable dredged materials in coastal reclamation and construction fill is common practice and the technologies and techniques are well established.

Classification: High

General Public Acceptability

Use of the materials for reclamation is likely to be viewed as an acceptable option by the general public. Depending on the method of transporting the dredged material to the site requiring it will affect acceptability by the general public. Transport by sea is likely to be viewed as more favourable than transport by land, which may be viewed as unacceptable by local residents and road users.

Classification: Medium to High

Likely Agency Acceptability

Use of the dredged material for reclamation or construction fill is likely to be acceptable to public agencies. There may be some concerns regarding the proposed volume of material to be transported by HGVs for reasons relating to air quality and proximity to residential areas.

Classification: Medium to High

Legislative Implications

The disposal of dredged material from Newhaven directly from the dredger to a reclamation site requires a Marine Licence from Marine Scotland under Section 20(1) of the Marine (Scotland) Act 2010. Once landed, the dredged material would be defined as controlled waste under Schedule 3 of the Controlled Waste (Scotland) Regulations 1992. As such, Section 34(7) of the Environmental Protection Act 1990 and Section 1 of the Control of Pollution Act 1974 would apply.

The disposal of dredged material will also require a waste management licence under the Waste Management Licencing Regulations 1994 and an exemption for reclamation works. Consent will be required from the planning authority and a levy paid to The Crown Estate (see Section 3.6.3).

Classification: Medium

4.2.2 Health, Safety and Environmental Considerations

Safety

Pumping the dredged material ashore has risks associated with operational activities, all of which have mitigation measures in place. Should the dredged material be transported by HGV, there is a slight risk that other road users would be affected.

Classification: Medium

Public Health

No risks to public health are anticipated due to the short-term increase in HGV traffic.

Classification: Medium to High

Pollution / Contamination

The material is considered non-hazardous due to the levels of PCBs and metals and would therefore be suitable for disposal of in reclamation or construction fill. There may be localised and temporary deterioration in air quality as a result of HGV movements.

Classification: Medium to High

Ecological Impacts

There are unlikely to be any ecological risks resulting from the use of dredged materials for reclamation and there would be no impact on national or local priority species or habitats.

Classification: High

Interference with Other Legitimate Activities

The disposal of dredged material is unlikely to interfere with other activities unless the reclamation site is in a harbour area, in which case the dredger may interfere with other harbour users. If HGVs are used to transport the dredged material, they may affect other road users.

Classification: Medium to High

Amenity/Aesthetic

If the dredged material is disposed of directly from the dredger there is no risk to amenities/aesthetics. If disposed of by HGV, landing, storage and transport may result in an impact to both amenities and aesthetics of the area.

Classification: Medium to High

4.2.3 Cost Considerations

If the dredged material was pumped directly ashore there would be no further capital costs. If the dredged material was transported by road, the estimated costs below would apply.

- discharge berth: £2 m;
- pumping material to site – approximately £8.75 per m^3 (1) £131,250; or
- dockside centrifuge facility capable of dewatering and desalinating 15,000 m^3: £1.5 m; and
- loading and transport (sealed HGVs) – assuming the disposal site is less than one hour drive away and based on one HGV transporting 20 tonnes material at a cost of £100/hour(2): £252,600.

Total £2.13 m to £3.75 m

Classification: Low

4.3 Sacrificial Landfill

4.3.1 Strategic Considerations

Operational Feasibility

Disposal to landfill would require the landing, storage and drying of the dredged materials prior to transporting to a landfill facility. Approximately 25,245 tonnes of dried material would require transport. There are practical difficulties relating to handling the dredged material at the Newhaven site.

Classification: Low to Medium

Availability of Sites / Facilities

Under the Landfill (Scotland) Regulations 2003 the low presence of PCBs (less than 50 ppm) identified in the 2019 data would classify the material as non-hazardous rather than inert and consequently reduces the number of available landfill sites capable of accepting this material. The nearest suitable site is located at Avondale Landfill, Polmont, approximately 35 km from Newhaven Harbour, however as discussed above, due to the dredged sediment composition and volume and the time of year of dredge, Avondale would be unable to receive any of the material.

Classification: Low

Security of Option

Whilst Forth Ports have control over the dredging operations, it would have no control over the continued availability of landfill space for the material or the disposal route.

Classification: Low

Established Practice

Dredged material is sometimes disposed of to landfill for small one-off dredging operations, however it is not established practice to routinely dispose of large quantities of dredged material in this way. Landfill sites require the dredged material to be dried to 10% water content before acceptance. It is unlikely that this is a practice that would be acceptable if there are other viable alternatives.

Classification: Low to Medium

General Public Acceptability

Disposal of the material to landfill is likely to be acceptable to the general public. However, the transport of the dredged material from Newhaven Harbour to potential landfill sites may be unacceptable to residents and other road users.

Classification: Medium

(1) Based on previous consultation with contractors.

(2) Estimated cost based on consultation with HGV operator at £50/hour and estimated cost of loading at £50/hour.

Likely Agency Acceptability

The National Waste Strategy establishes the direction of the Scottish Executive's policies for sustainable waste management to 2020. One such policy is to reduce landfilling of municipal waste from 90% to 30% and as such there may be objection to dredged material routinely requiring space in landfill.

Disposal to nearby landfill sites is likely to be acceptable to SEPA provided the materials are regarded as suitable for landfill, however, the acceptability would depend on the quantities to be disposed of.

Classification: Medium

Legislative Implications

The material would be controlled waste material for the purposes of transport, storage and disposal. As such, Section 34(7) of The Environmental Protection Act 1990 and Regulation 6 of the Pollution Prevention and Control (Scotland) Regulations 2012 will apply and compliance is likely to be possible. The disposal of the material will also require a waste management licence under Waste Management Licensing (Scotland) Regulations 2011.

Classification: Medium to High

4.3.2 Health, Safety and Environmental Consideration

Safety

There may be a slight increase in safety risks associated with the movement of materials for disposal, particularly if tankers/sealed HGVs travel through populated areas and along minor roads.

Classification: Medium

Public Health

No risks to public health are anticipated due to the short-term increase in HGV traffic.

Classification: Medium to High

Pollution/Contamination

There would be little risk of contamination because of the materials being disposed of in landfill. However, there may be a small risk of leaching of contaminants that should be contained on site. EQSs are unlikely to be breached due to protection offered by the landfill when accepting contaminated waste.

Classification: High

Ecological Impacts

Although there is a small risk of contaminants leaching out from the dredged material, this would be at very low concentrations and is unlikely to cause significant harm to the local ecology.

Classification: High

Interference with Other Legitimate Activities

The increase in HGV movements may interfere with other road users. Baseline traffic data for the A901 in the vicinity of Newhaven Harbour indicates that until 2016 HGVs made up an average of 1.6% of all traffic of road traffic in and around Newhaven. As a result of the proposed disposal to landfill, the total HGV movements would increase to 3% of all traffic in the vicinity of Newhaven, however, this would be a short-term increase over four to eight weeks. Depending on the landing and storage arrangements there may be potential for interference with other harbour users.

Classification: Medium

Amenity/Aesthetic

The movement of HGVs through the area will have an impact on local amenity through noise, vibration, visual impacts and road congestion. This risk also applies to the disposal site.

Classification: Medium

4.3.3 Cost Considerations

Capital would be required to purchase new equipment. Estimates of the cost of this equipment are:

- discharge berth for the dredger with a storage facility - £2 m;
- lagoons to settle dredged material - £375,000; or
- a dockside centrifuge facility capable of dewatering 15,000 m^3 of sediment - £1.5 m;
- loading and transport (sealed HGVs) – assuming the disposal site is less than one hour drive away and based on one HGV transporting 20 tonnes material at a cost of £100/hour: £252,600; and
- a Waste Management Licence.

Total - £2.38 m - £3.75 m

Classification: Low

4.4 OTHER DISPOSAL OPTIONS AND REUSE

4.4.1 Strategic Considerations

Operational Feasibility

Reuse for brick making, concrete aggregate or top soil production would require the landing, storage and drying of the dredged materials prior to transporting to a landfill facility. Approximately 25,245 tonnes of dried material would require transport. There are practical difficulties relating to handling the dredged material at the Newhaven site. The availability of suitable factories/facilities to process the dredged material and markets for the final products are also considerations.

Classification: Low to Medium

Availability of Sites/Facilities

There are no known sites or facilities to receive the dredged material for other uses such as top soil production or brick making.

Classification: Low

Security of Option

Although Forth Ports would have control over the dredging and landing, they would not have control over the continued acceptance of the materials for making bricks or aggregate.

Classification: Low to Medium

Established Practice

Use of excavated materials for brick making or concrete aggregate is common practice but use of marine material is not and it is generally not feasible due to the level of salinity and the composition of the material. Whilst top soil has been made from dredged material in the past it is not common practice.

Classification: Low to Medium

General Public Acceptability

Making bricks, concrete or top soil is likely to be publicly acceptable depending on the end use. However, the transport of the material over a large distance may not be acceptable to residents and other road users.

Classification: Medium to High

Likely Agency Acceptability

It is likely that brick making, concrete production and top soil production would be acceptable to agencies and considered a positive activity.

Classification: High

Legislative Implications

SEPA would control emissions from brick making factories under the provisions of the Environmental Protection Act 1990. A waste management licence would also be required for their transport and storage under the Waste Management Licensing (Scotland) Regulations 2011.

Classification: Medium

4.4.2 Health, Safety and Environmental Considerations

Safety

There are unlikely to be any significant safety risks associated with making bricks, concrete or top soil with the exception that there may be a slight increase in safety risks associated with the movement of materials, particularly if HGVs travel through settlements and along minor roads.

Classification: Medium

Public Health

No risks to public health are anticipated due to the short-term increase in HGV traffic.

Classification: Medium to High

Pollution / Contamination

Pollution is not likely to be an issue provided emissions are controlled in accordance with licences.

Classification: Medium to High

Ecological Impacts

Making bricks or concrete should have no adverse ecological effects, provided the materials were decontaminated and desalinated before use.

Classification: High

Interference with Other Legitimate Activities

There is a slight risk that movement of the material would impact other road users.

Classification: Medium to High

Amenity/Aesthetic

The only impacts on amenity are likely to stem from the impact of HGVs from transporting the material.

Classification: Medium to High

4.4.3 Cost Considerations

An estimate of costs is provided below.

Capital would be required to purchase new equipment. Estimates of the cost of this equipment are:

- discharge berth for the dredger with a storage facility - £2 m;
- lagoons to settle dredged material - £375,000; or
- a dockside centrifuge facility capable of dewatering 15,000 m^3 of sediment - £1.5 m; and
- loading and transport (sealed HGVs) – assuming the disposal site is less than one hour drive away and based on one HGV transporting 20 tonnes material at a cost of £100/hour: £252,600.

Total - £2.38 m to £3.75 m

Classification: Low

4.5 SEA DISPOSAL

4.5.1 Strategic Considerations

Operational Feasibility

Operationally disposal at the Oxcars site is comparatively simple as it does not require the landing, storage and drying of the spoil and all the necessary procedures are understood. This option has proven practicable during the spoil disposal from the Newhaven Harbour capital dredge in 2015, the Newhaven maintenance dredge in 2016 and for other dredging activities within the Firth of Forth.

Classification: High

Availability of Sites / Facilities

The sites / facilities that are required for the sea disposal option include Oxcars disposal site. No other disposal sites east of the bridges have been indicated by Forth Ports as available at this time for the Newhaven dredged material.

Classification: High

Security of Option

Forth Ports will have full control over all stages in the dredging and disposal process assuming they receive a disposal licence.

Classification: Medium to High

Established Practice

Disposal at sea at Oxcars disposal site is the current established practice for the disposal of dredged spoil from Newhaven Harbour.

Classification: High

General Public Acceptability

Forth Ports has confirmed that similar disposal operations from other docks and harbours in the Firth of Forth and Forth Estuary have not attracted any appreciable comment. Dredging operations are unlikely to affect members of the general public, with the possible exception of some recreational users when the vessel is transiting to and from the disposal site.

Classification: High

Likely Agency Acceptability

Consultations with the regulatory bodies to date indicate that there is no objection to Sea Disposal at Oxcars. SEPA has no objection should there be no other suitable reuse options. Marine Scotland has not expressed an objection to the continued use of Oxcars disposal site. The Crown Estate did not raise an objection and have no knowledge of any sites that could make any beneficial use of the material. Scottish Natural Heritage and the National Lighthouse Board did not highlight any objections to spoil disposal at sea. The Forth District Salmon Fishery Board (FDSFB) highlighted

concerns surrounding time of year of disposal clashing with migrating smolts and requested that disposal was avoided during June and July. This concern is addressed in *Appendix B*.

Classification: Medium to High

Legislative Implications

A Marine Licence will be required from Marine Scotland and provided that the BPEO is satisfactory, and the statutory consultees do not object, it is established practice that a Marine Licence will be issued. Compliance should not therefore demand significant management control. Permission will be required from The Crown Estate for disposal of spoil to The Crown Estate owned sea bed, and under the provisions of the Marine (Scotland) Act 2010 it has the right to veto any consent for works in tidal waters which may constitute a hazard to navigation.

Classification: Medium to High

4.5.2 Health, Safety and Environmental Considerations

Safety

The operations are undertaken at sea, therefore members of the public are not likely to be exposed to risk from the disposal activities. The contractor appointed to undertake the dredging and disposal may be subject to a health, safety and environmental audit by Forth Ports.

Classification: High

Public Health

The risk of members of the general public being exposed to contamination from the dredged material is regarded as low. Commercial species of demersal fish are not taken from the area and no food chain links between sediment contamination or contamination liberated into the water column, and human consumers leading to impacts on public health are considered likely.

Classification: Medium to High

Pollution/Contamination

The effects on water quality of the disposal operations and the potential for impacts on sediment contamination may cause the occasional exceedance of Environmental Quality Standards and failure to meet Water Framework Directive (WFD) objectives although based on current evidence this would be localised and short-term.

Classification: Medium

Ecological Impacts

The disposal operations may affect the benthic fauna in proximity to the disposal site due to sediment drifting from the disposal area itself. It is anticipated that there will not be any significant impact on the Forth marine ecosystem as a whole given the scale and duration of effects. There may be some localised and short-term effects such as displacement on migrating fish due to increased turbidity caused by the discharge of dredged material into the water column but these impacts are not predicted to prevent migration, cause mortalities or affect the viability of fish populations. Under the proposed disposal proposals, cumulative impacts with other operations are not predicted to create a significant impact to the Firth of Forth SPA, Forth Islands SPA, Firth of Forth SSSI, SACs farther afield or marine ecosystems.

Classification: Medium to High.

Interference with Other Legitimate Activities

There are currently approximately 38 boats moored in Newhaven Harbour during the summer months, taking it almost to capacity. During the winter this number drops to approximately 20 as some boats are taken out of the water to dry dock. There is a commercial fishing vessel operating out of the

harbour most days of the week, with a number of smaller vessels taking out weekend anglers. The disposal activities may cause some disruption to other users of the Firth of Forth, however as the operations will only be occurring for a limited period of time it is not anticipated that there will be any significant interference. In addition, historic operations at Oxcars have not resulted in any reported disruption to other Firth of Forth users.

Classification: High

Amenity/Aesthetic

The disposal activities may cause some short-term disruption to other users of the Firth of Forth but the proposals will contribute to the normal functioning of Newhaven Harbour and maintain its capacity to accommodate larger vessels.

Classification: Medium to High

4.5.3 Cost Considerations

There would be no capital required to purchase new equipment. Operational costs for the operation of the dredger are approximately £250,000.

Classification: High

5. SUMMARY OF THE BPEO

5.1 INTRODUCTION

This section summarises the assessment of options against the criteria described in Chapter 2: Table 2.1 and identifies the BPEO.

5.2 COMPARISON OF OPTIONS

Seven options were initially considered for the disposal of the dredged spoil from Newhaven Harbour. These were reduced to a short-list of four options based on practicality. A summary of the key considerations with regard to each of the four short-listed options is provided below and illustrated in Table 5.1.

5.2.1 Sacrificial Landfill

Operationally, disposal to landfill will be achievable but problematic. The dredged materials would require landing and drying in specially constructed facilities and would then require transport in sealed HGVs to an appropriate landfill site. There are limited sites available to take the material, and a full analysis of the contaminants in the material would be required by the operators before final acceptance.

Whilst small amounts of dredged material are sometimes disposed of to landfill, it is not common practice and Forth Ports would not have the security of controlling the disposal route. The public and agencies are likely to find this disposal acceptable, but there may be concerns relating to transport and the National Waste Strategy Scotland (1999) favours a reduction in the volume of material disposed by landfill.

The requirement for transport will result in some safety and public health risks and interference with legitimate activities and there is low risk of ecological disturbance. There would be an increase in traffic volume due to HGV movements, along with elevated carbon dioxide emissions. The costs of this option outweigh the other short-listed options, due to the requirement for construction of a landing and storage facility, a drying facility and high transport costs.

5.2.2 Coastal Reclamation and Construction Fill

Operationally coastal reclamation and construction fill would be possible; however it would likely be costly and involve a number of contractors to undertake the transition from vessel to bunded lagoons and drying and fixing of the material in the lagoons. The sediment is primarily sandy mud, with some gravel fractions close to the harbour wall (as per sample N1), with low compressive strength properties, making it unsuitable for most types of construction. In addition, the presence of some heavy metals and PCBs classes it as non-hazardous, which restricts its suitability for application on land.

Currently there are no significant areas of coastal reclamation planned in the Firth of Forth. Furthermore, if the dredged material (where owned by The Crown Estate) is beneficially used for fill or construction purposes this will attract a royalty rate per cubic metre. The specific royalty rates for material beneficially used are dependent on the quality and specific end use, and this is set during commercial negotiations between the developer and The Crown Estate.

5.2.3 Other Disposal Options and Reuse

Operationally this option would be achievable but there would be difficulties associated with the requirement to land, store, dry and transport the material. Forth Ports would have limited control over the option and it is not common practice to use marine dredged material for these purposes. It is likely to be viewed as an attractive option by the public and agencies and no legislative issues are anticipated. There would be potential for benefit through substitution of recycled material for primary minerals.

Environmental and public health and safety concerns associated with this option are linked to transport of the materials, and are anticipated to be minimal. There will be no significant impact on amenity and little interference with other legitimate users. As with Sacrificial Landfill, Coastal Reclamation and Construction Fill, capital costs would be high because of the need for landing, storage and drying facilities and transport costs.

The mineralogical composition and salinity of the material limit its suitability for use for brick making, as concrete aggregate or in top soil production as it would require treatment to desalinate and decontaminate the material.

5.2.4 Sea Disposal

Operationally few problems are anticipated with disposal at Oxcars and this site is has been historically used for disposal of dredged materials from Newhaven and other harbours and docks within the Firth of Forth and Forth Estuary. It is anticipated that this option will be acceptable to both public and agencies. Forth Ports would have full control over the dredging process through the appointment of contractors and risks to safety and public health are anticipated to be low.

There will be some short-term effects on water quality during disposal, such as raised turbidity and suspended sediment levels, which may have short-term and localised ecological effects but these are considered to be not significant. There is unlikely to be interference with other legitimate activities and there is not anticipated to be any impact on local amenity.

5.3 IDENTIFICATION OF THE BPEO

The assessment of options highlights the major operational difficulties associated with the landfill and other use options that primarily relate to lack of available sites and facilities and the nature of the material. There are also major costs associated with the need to construct landing, storage and drying facilities at Newhaven Harbour. Disposal at sea will keep the dredged material within the ecosystem, maintaining the sediment budget for the area. In line with guidance from Marine Scotland, the Best Practicable Environmental Option is identified as the disposal at a licensed sea disposal site. The preferred site for this is the Oxcars disposal site.

Table 5.1 Summary of Assessment of Options

Consideration	Sacrificial Landfill	Coastal Reclamation and Construction Fill	Other Disposal Options and Reuse	Sea Disposal
Operational feasibility				
Availability of sites/facilities				
Security of option				
Established practice				
General public acceptability				
Likely agency acceptability				
Legislative implications				
Safety				
Public health				
Pollution / contamination				
Ecological impact				
Interference with other activities				
Amenity / aesthetic				
Capital and maintenance costs				

Key: Performance of Options	
Low	
Low to Medium	
Medium	
Medium to High	
High	

APPENDIX A SEDIMENT SAMPLE CHEMICAL ANALYSIS

CONTENTS

List of Tables

List of Figures

A1 NEWHAVEN SEDIMENT SAMPLE DATA

A1.1 Introduction

Samples of the seabed sediments to be dredged were collected from the harbour and approach channel seabed by ERM and Forth Ports on 26th February 2019 and were analysed by the National Laboratory Service (NLS), part of the Environment Agency.

The survey plan followed the Marine Scotland guidance and was agreed with Marine Scotland on 8th January 2019. Based on the dredging depths of up to 1 m and estimated dredge volumes, surface samples from three sample stations were required. Sample station locations are presented in Figure A1.1.

Samples were taken using a van Veen grab and the sample retrieved from each survey station was subsampled on deck and stored in pre-cleaned sample containers provided by the NLS.

Each sample was labelled with a unique sample ID and a field log was kept to record the sample location, date and time sample was taken and a photograph and description of the sediment taken. Sediment photographs are presented in Figure A1.2.

Samples were kept chilled and sent by overnight courier in coolboxes to the analytical laboratory on the same day as sampling.

For each of the samples the following chemical analysis was undertaken:

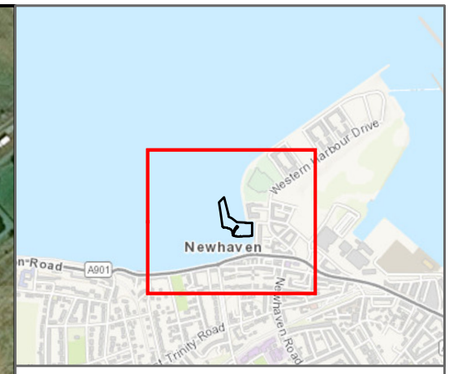
- metals (As, Cd, Cr, Cu, Hg, Ni, PB, Zn);
- TBT;
- PAHs;
- PCBs;
- presence of asbestos;
- sediment solids/water content; and
- sediment particle size distribution.

Marine Scotland Action Levels are discussed in Section A1.2 and the sediment sample data are presented in Section A1.3 to Section A1.8.

3°12'0"W

3°11'30"W

55°59'0"N



Newhaven Dredge Area

Sediment Sampling Points (2019)

Reference	Longitude (UTM30N)	Latitude (UTM30N)
A	3° 11' 51.324"W	55° 59' 0.096"N
B	3° 11' 52.692"W	55° 58' 59.304"N
C	3° 11' 51.504"W	55° 58' 55.344"N
D	3° 11' 48.84"W	55° 58' 54.336"N
E	3° 11' 47.616"W	55° 58' 55.56"N
F	3° 11' 47.292"W	55° 58' 55.452"N
G	3° 11' 47.616"W	55° 58' 55.2"N
H	3° 11' 48.696"W	55° 58' 54.12"N
I	3° 11' 43.404"W	55° 58' 54.012"N
J	3° 11' 43.404"W	55° 58' 56.064"N
K	3° 11' 45.204"W	55° 58' 56.028"N
M	3° 11' 47.688"W	55° 58' 56.136"N
N	3° 11' 49.956"W	55° 58' 57"N
L	3° 11' 45.204"W	55° 58' 56.1"N

0 20 40 60 80 100

Metres

N

SCALE: 1:2,500

SIZE: A3

PROJECT: 0496046

DATE: 11/02/2019

VERSION: A02

DRAWN: GB

CHECKED: CM

APPROVED: MI

Figure A1.1

Newhaven Sediment Sampling Sites (2019)

ERM

CLIENT:

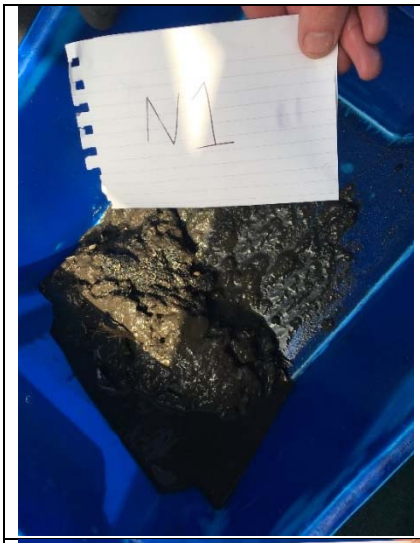
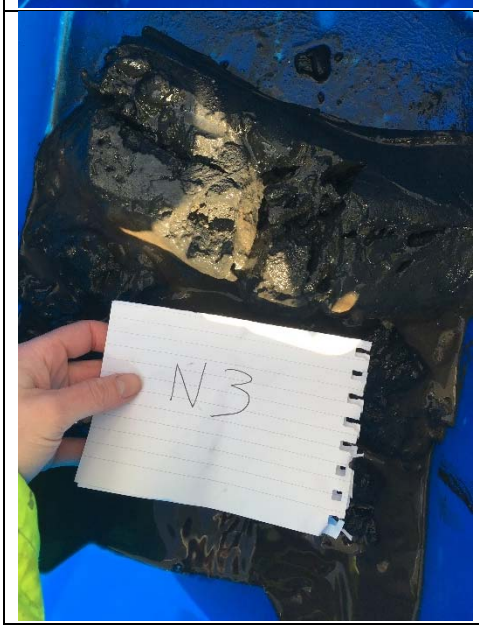
Forth Ports Ltd.

PROJECTION: WGS 1984 UTM Zone 30N

SOURCE: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community;
Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Path: P:\Projects\0496046 Forth Ports PLC Forth Ports BPEO 2019.MI\GIS\MAPS\0496046_NewhavenApproach_A02.mxd

Figure A1.2 Photographs of Sediment Samples

	Station N1
	Station N2
	Station N3

A1.2 Marine Scotland Action Levels

Table A1.1 and *Table A1.2* set out the Action Levels for metals, PCBs, TBT and PAHs used by Marine Scotland to assess the suitability for disposal of sediments at sea.

In general, contaminant levels in dredged material below Action Level 1 are of no concern and are unlikely to influence the licensing decision. A breach of Action Level 1 does not automatically preclude disposal at sea but usually requires further consideration before a decision can be made. Dredged material with contaminant levels above Action Level 2 is generally considered unsuitable for normal sea disposal, but may be suitable for other management options such as treatment or seabed burial/capping, unless a compelling case can be made for normal sea disposal.

Table A1.1 Marine Scotland Action Levels: Metals

Metal	AL1 (mgkg-1 dry weight)	AL2 (mgkg-1 dry weight)
Arsenic	20	70
Cadmium	0.4	4
Chromium	50	370
Copper	30	300
Mercury	0.25	1.5
Nickel	30	150
Lead	50	400
Zinc	130	600

Table A1.2 Marine Scotland Action Levels: PCBs, TBT and PAHs

Determinand	AL1 (mgkg-1 dry weight)	AL2 (mgkg-1 dry weight)
ICES 7 PCBs	0.02	0.18
TBT	0.10	0.50
PAHs		
Naphthalene	0.10	
Phenanthrene	0.10	
Anthracene	0.10	
Fluoranthene	0.10	
Pyrene	0.10	
Benz[a]anthracene	0.10	
Chrysene/Triphenylene	0.10	
Benzofluoranthenes	0.10	
Benzo[a]pyrene	0.10	
Indenopyrene	0.10	
Benzoperylene	0.10	
Acenaphthylene	0.10	
Acenaphthene	0.10	
Fluorene	0.10	
Dibenz[a,h]anthracene	0.01	
Total PAHs	100	

A1.3 Metal Results

Concentrations of metals are presented in *Table A1.3*. Levels above Marine Scotland Action Level 1 are highlighted in yellow. No concentrations above Action Level 2 were recorded (see Table A1.1 for Action Levels for metals).

Table A1.3 Analysis of Metal Contaminants from Newhaven (mg kg-1) 2019

Station	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
N1	16.5	0.8	58.7	156.0	0.7	30.7	170.0	221.0
N2	20.8	0.3	94.8	49.1	0.7	42.7	91.5	176.0
N3	15.5	0.4	72.0	33.5	0.6	35.1	74.9	145.0
Mean	17.6	0.5	75.2	79.5	0.7	36.2	112.1	180.7

As = Arsenic, Cd = Cadmium, Cr = Chromium, Cu = Copper, Hg = Mercury, Ni = Nickel, Pb = Lead and Zn = Zinc.

Error! Reference source not found. provides a comparison of metal data from samples analysed from 2014 and 2019. In most cases in both years, the mean concentrations of metals in the sediments are above Action Level 1 but below Action Level 2. In the current survey, all concentrations of Cd, Cr, Hg, Ni and Zn were within the range observed in the previous survey with the range in concentrations of As, Cu and Pb being slightly higher in 2019 than 2014.

Table A1.4 Comparison of Metal Contaminants from Newhaven (mg kg-1) 2014 to 2019

Year		As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
2014	Mean	16.6	1.5	75.2	89.6	1.7	35.4	149.0	238.0
	Range	13.1-18.4	1.3-2.2	55.1-97.5	70.8-108.0	1.1-2.7	28.0-50.8	143.0-157.0	202.0-289.0
2019	Mean	17.6	0.5	75.2	79.5	0.7	36.2	112.1	180.7
	Range	15.5-20.8	0.3-0.8	58.7-94.8	33.5-156.0	0.6-0.7	30.7-42.7	74.9-170.0	145.0-221.0
2014-2019	**Mean**	**17.1**	**1.0**	**75.2**	**84.6**	**1.2**	**35.8**	**130.6**	**209.4**
	Range	**13.1-20.8**	**0.3-2.2**	**55.1-97.5**	**33.5-156.0**	**0.6-2.7**	**28.0-50.8**	**74.9-170.0**	**145.0-289.0**

A.14 Polychlorinated Biphenyls Results

Polychlorinated biphenyls (PCBs) are organic compounds comprising a biphenyl group (composed of two benzene rings) with between one and ten bonded chlorine atoms. PCBs are highly toxic, persistent pollutants and are readily bioaccumulated in animals.

Although production in the UK ceased in the 1970s, PCBs still enter the marine ecosystem through the disposal of industrial plant, emissions from old electrical equipment and from landfill sites ( ).

Dry weight concentrations of ICES 7 PCBs from samples collected in 2019 are presented in Table A1.5. Station N1 exceeded Action Level 1 (0.02 mg kg-1) for the sum of the ICES 7 PCBs. It is noted that this station is the innermost within the harbour. No ICES 7 PCB levels exceed Action Level 2 (0.18 mg kg-1) in any of the samples.

Table A1.5 Analysis of PCBs (mg kg-1) from Newhaven in 2019

Station	Sum of ICES 7 PCB Concentrations
N1	0.059
N2	0.014
N3	0.011
Mean	**0.028**

ICES 7 PCB congeners (with IUPAC numbers): 28 - 2,4,4' - Trichlorobiphenyl, 52 - 2,2',5,5' - Tetrachlorobiphenyl, 101 - 2, 2', 4, 5, 5' - Pentachlorobiphenyl, 118 - 2, 3', 4, 4', 5 - Pentachlorobiphenyl, 138 - 2, 2', 3, 4, 4', 5' - Hexachlorobiphenyl, 153 - 2, 2', 4, 4', 5, 5' - Hexachlorobiphenyl, 180 - 2, 2', 3, 4, 4', 5, 5' - Heptachlorobiphenyl.

Table A1.6 presents a comparison of mean dry weight concentrations of ICES 7 PCBs from samples collected in 2014 and 2019. Results show that there was a lower mean concentration of PCBs from samples taken in 2019 than 2014.

Table A1.6 Analysis of PCBs from Newhaven (mg kg-1) 2014 - 2019

Year		Sum of ICES 7 PCB Concentrations
2014	Mean	0.053*
	Range	0.039-0.071*
2019	Mean	0.028
	Range	0.011-0.059
2014-2019	**Mean**	**0.041**
	Range	**0.011-0.071**

ICES 7 PCB congeners (with IUPAC numbers): 28 - 2,4,4' - Trichlorobiphenyl, 52 - 2,2',5,5' - Tetrachlorobiphenyl, 101 - 2, 2', 4, 5, 5' - Pentachlorobiphenyl, 118 - 2, 3', 4, 4', 5 - Pentachlorobiphenyl, 138 - 2, 2', 3, 4, 4', 5' - Hexachlorobiphenyl, 153 - 2, 2', 4, 4', 5, 5' - Hexachlorobiphenyl, 180 - 2, 2', 3, 4, 4', 5, 5' - Heptachlorobiphenyl.
*surface samples only

A1.5 Polycyclic Aromatic Hydrocarbons

Levels of PAHs are presented in **Error! Reference source not found.** Levels above Marine Scotland Action Level 1 for individual PAHs are highlighted in yellow. Marine Scotland Action Level 1 for Total PAHs is 100 mg kg^{-1}, and all the samples are below that level.

A comparison of mean dry weight concentrations of PAHs from samples collected in 2014 and 2019 are presented in Table A1.8, which shows that PAH concentrations of the majority of individual PAHs are above Action Level 1 in both years, with concentrations generally higher in 2014.

Table A1.7 Analysis of PAHs from Newhaven Harbour (mg kg 1 Dry Weight)

	Sample Station		
PAH	**N1**	**N2**	**N3**
Acenaphthene	0.38	0.06	0.06
Acenaphthylene	0.08	0.02	0.02
Anthracene	0.76	0.17	0.17
Benzo(a)anthracene	1.57	0.43	0.41
Benzo(a)pyrene	1.57	0.48	0.45
Benzo(b)fluoranthene	1.42	0.50	0.44
Benzo(e) pyrene	1.23	0.41	0.37
Benzo(ghi)perylene	1.06	0.41	0.36
Benzo(j)fluoranthene	0.80	0.26	0.23
Benzo(k)fluoranthene	0.78	0.25	0.23
Chrysene + Triphenylene	1.63	0.46	0.43
Chrysene	1.31	0.33	0.31
Dibenzo(ah)anthracene	0.21	0.08	0.07
Dibenzothiophene	0.10	0.03	0.03
Fluoranthene	2.93	0.69	0.64
Fluorene	0.38	0.10	0.09
Indeno(1,2,3-c,d)pyrene	0.98	0.37	0.32
Naphthalene	0.64	0.20	0.19
Perylene	0.38	0.16	0.14
Phenanthrene	2.22	0.42	0.40
Pyrene	2.82	0.82	0.78
Triphenylene	0.31	0.12	0.11
Total PAH	**23.54**	**6.78**	**6.25**

Table A1.8 Comparison of PAHs from Newhaven Harbour 2014 and 2019 (mg kg 1dry Weight)

Year	**2014***		**2019**	
PAH	**Mean**	**Range**	**Mean**	**Range**
Acenaphthene	0.16	0.15-0.17	0.17	0.06-0.38
Acenaphthylene	0.01	0.01-0.02	0.04	0.04-0.08
Anthracene	0.41	0.37-0.44	0.36	0.17-0.76
Benzo(*a*)anthracene	1.16	1.08-1.24	0.80	0.41-1.57
Benzo fluoranthenes	0.79	0.55-1.28	0.83	0.44-1.42
Benzo(*a*)pyrene	1.13	1.04-1.28	0.79	0.45-1.57
Benzoperylene	-	-	0.67	0.36-1.06
Chrysene/Triphenylene	0.84	0.80-0.88	0.61	0.46-1.63
Dibenz[*a*,*h*]anthracene	0.20	0.19-0.23	0.43	0.07-0.21
Fluoranthene	2.05	1.82-2.23	1.42	0.64-2.93
Fluorene	0.21	0.20-0.23	0.84	0.09-0.38
Indenopyrene	0.66	0.58-0.72	0.65	0.32-0.98
Naphthalene	0.30	0.22-0.41	0.12	0.19-0.64
Phenanthrene	1.04	0.98-1.14	0.06	0.40-2.22
Pyrene	2.22	2.07-2.46	1.42	0.78-2.82

*surface samples only

A1.6 Tributyltin

Tributyltin (TBT) is a highly toxic compound historically used as an anti-biofouling agent in paint used to coat the hulls of vessels. It is also toxic to non-target organisms and is linked to immune-suppression and imposex [16] in snails and bivalves. TBT was also used in various industrial processes as a biocide and can enter the marine environmental through effluent discharges. In some cases, TBT can also be persistent in the marine environment.

Mean dry weight concentrations of TBT from the samples collected are presented in *Table A1.9.* Station N1 has TBT concentrations above Marine Scotland Action Level 1 (0.1 mg kg^{-1}). It is noted that this is the innermost station within the harbour.

Table A1.9 Analysis of TBT from Newhaven Harbour (mg kg 1Dry Weight)

Station	TBT Concentration
N1	0.276
N2	0.041
N3	0.014
Mean	0.110

A comparison of TBT concentrations from samples collected in 2014 and 2019 are presented in *Table A1.10,* which shows that TBT concentrations are above Action Level 1 in both years, with average surface sample concentrations higher in 2014.

Table A1.10 Comparison of TBT from Newhaven Harbour in 2014 and 2019 (mg kg 1 Dry Weight)

Year		TBT Concentration
2014*	**Mean**	**0.140**
	Range	<0.007-0.196
2019	**Mean**	**0.110**
	Range	0.014-0.276
2014-2019	**Mean**	**0.125**
	Range	**<0.007-0.276**

A1.7 Sediment Particle Size Analysis

Sediment Particle Size Analysis (PSA) was undertaken on the three sediment samples taken from Newhaven Harbour and approach channel in 2019. Sediments were predominantly muddy, with fractions of gravel and sand. The muddy-sandy material is typical of a relatively low energy harbour environment. Table A1.11, Table A1.12 and Figure A1.3 present the 2019 data.

Sediment contamination is typically higher in sediments less than 63 µm diameter *eg* silts and clays due to the increased surface area providing more adhesion sites for contaminants than the same volume of sand or gravel. The sediment particle sizes in sample stations N2 and N3 comprised more than 50% of silts and clays whilst sample station N1 comprised more sand than clay.

(16) The development of male characteristics in females

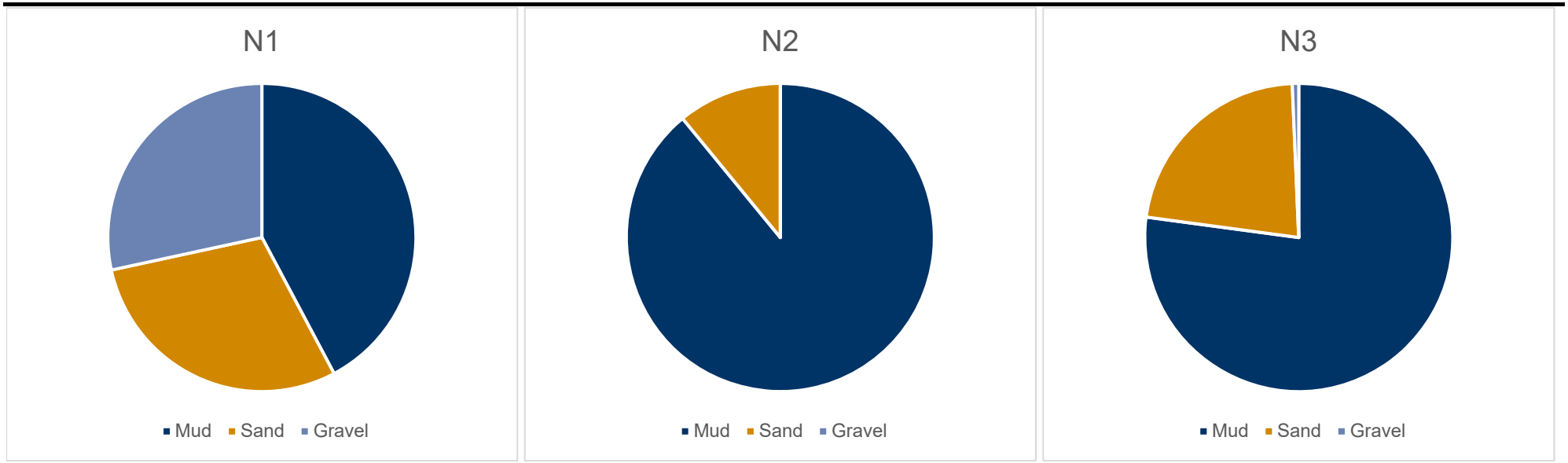
A1.8 Asbestos

Asbestos in the form of chryostile fibres were found all samples. The source of the asbestos is not known as accumulated sediments in the harbour and the approach channel are transported in from the wider Firth of Forth. There are no Marine Scotland Action Levels for asbestos, however, asbestos in seabed sediments does not provide an exposure pathway to human receptors unless the material is dried and fibres can become airborne.

Table A1.11 Newhaven Harbour and Approach Channel Sediment PSA Data

Grain Size Fraction	Station Number		
	N1	N2	N3
	%		
< 0.98 microns : {>10 phi}	0.56	1.71	1.03
0.98 to 1.38 microns: {10 to 9.5 phi}	0.45	1.18	0.78
1.38 to 1.95 microns: {9.5 to 9 phi}	0.57	1.50	0.97
1.95 to 2.76 microns: {9 to 8.5 phi}	1.10	2.86	1.85
2.76 to 3.91 microns: {8.5 to 8 phi}	2.18	5.46	3.66
3.91 to 5.52 microns: {8 to 7.5 phi}	3.24	7.77	5.59
5.52 to 7.81 microns: {7.5 to 7 phi}	4.45	10.20	7.97
7.81 to 11.1 microns: {7 to 6.5 phi}	5.36	11.80	10.00
11.1 to 15.6 microns: {6.5 to 6 phi}	5.55	11.80	10.7
15.6 to 22.1 microns: {6 to 5.5 phi}	5.67	11.50	10.9
22.1 to 31.3 microns: {5.5 to 5 phi}	5.21	10.00	9.75
31.3 to 44.2 microns: {5 to 4.5 phi}	4.33	7.63	7.75
44.2 to 62.5 microns: {4.5 to 4 phi}	3.57	5.56	6.21
62.5 to 88.4 microns: {4 to 3.5 phi}	3.20	4.05	5.49
88.4 to 125 microns: {3.5 to 3 phi}	3.24	2.72	5.16
125 to 177 microns: {3 to 2.5 phi}	3.56	1.54	4.68
177 to 250 microns: {2.5 to 2 phi}	3.67	0.89	3.74
250 to 354 microns: {2 to 1.5 phi}	3.32	0.70	2.27
354 to 500 microns: {1.5 to 1 phi}	2.53	0.55	0.57
500 to 707 microns: {1 to 0.5 phi}	1.74	0.33	0.01
707 to 1000 microns: {0.5 to 0 phi}	0.84	0.16	0.00
1000 to 1400 microns: {0 to -0.5 phi}	3.19	0.00	0.15
1400 to 2000 microns: {-0.5 to -1.0 phi}	4.09	0.00	0.14
2000 to 2800 microns: {-1.0 to -1.5 phi}	4.01	0.00	0.14
2800 to 4000 microns: {-1.5 to -2.0 phi}	4.01	0.00	0.08
4000 to 5600 microns: {-2.0 to -2.5 phi}	2.76	0.00	0.10
5600 to 8000 microns {-2.5 to -3.0 phi}	2.82	0.00	0.36
8000 to 11200 microns: {-3.0 to -3.5 phi}	1.98	0.00	0.00
11200 to 16000 microns: {-3.5 to -4.0 phi}	0.40	0.00	0.00
11200 to 16000 microns : {-3.5 to -4.0phi}	2.62	0.00	0.00
16000 to 22400 microns: {-4.0 to -4.5phi}	9.79	0.00	0.00
22400 to 31500 microns: {-4.5 to -5.0phi}	0.00	0.00	0.00
31500 to 45000 microns: {-5.0 to -5.5phi}	0.00	0.00	0.00

Figure A1.3 Newhaven Harbour and Approach Channel Sediment PSA



A2 SPOIL GROUND SEDIMENT SAMPLE DATA

Table A2.1 presents metal and PCB concentration data from sediment sampled from within Oxcars spoil ground and from five other spoil ground sites within the Firth of Forth and Forth Estuary for comparison. Levels above Marine Scotland Action Level 1 for metals and PCBs are highlighted in yellow.

Table A1.12 Concentration of Metals and PCBs (mg kg-1) from Oxcars Spoil Ground with five other Firth of Forth and Forth Estuary Spoil Grounds

Site Name	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	Sum ICES 7 PCBs
Oxcars 2015	15.7	0.3	79.6	41.6	1.0	35.8	78.1	141.7	0.008
(*n=3*)									
Narrow Deep 2015	11.7	0.2	63.8	24.6	0.6	30.0	58.4	105.9	0.003
(*n=5*)									
Methil 2015	8.7	0.1	18.0	9.6	BDL	11.2	14.5	72.8	0.000
(*n=1*)									
Kirkcaldy 2015	8.9	0.1	43.1	17.0	0.2	22.0	30.6	62.9	0.000
(*n=3*)									
Blae Rock 2011	17.2	0.1	39.6	21.9	0.5	21.4	52.1	80.3	0.001
(*n=6*)									
Bo'ness 2015	18.6	0.1	59.6	26.5	0.7	27.5	54.2	114.0	0.000
(*n=5*)									

* Data provided by Marine Scotland (2019)

Key: n = the number of samples analysed (where known)

The metal data in *Table A2.1* indicate that concentrations of metals and PCBs within sediment samples from the Oxcars spoil ground are all slightly higher than other spoil grounds sampled. Both metals and PCBs are lower than the original material dredged as part of the capital dredge from Newhaven (refer to *Table A1.3, Table A1.4* and *Table A1.5*), which would be expected from a dispersive spoil ground such as Oxcars.

Note that monitoring of spoil grounds is not mandatory therefore, the data presented in *Table A2.*1 are the most recent data available.

APPENDIX B ENVIRONMENTAL IMPACTS OF DISPOSAL OPERATIONS

CONTENTS

List of Tables

B1 DISPOSAL IMPACTS

B1.1 Introduction

This appendix addresses the environmental impacts of the disposal of dredged material from the maintenance dredging at Newhaven Harbour at the licenced Oxcars disposal site. Impacts on water quality, sediment quality, and habitats and species are considered. Table B1.1 presents the impact summary.

The identification and assessment of environmental impacts of dredged material in this appendix follows recent guidance from the Environment Agency, Clearing the Waters for All ( ).

As the Marine Licence application is for disposal of the dredged material, impacts of the dredging activities are not addressed, other than in the context of Bathing Waters and cumulative impacts from existing and proposed dredging and disposal activities, and other activities and developments.

B1.2 Impacts of Disposal

B1.2.1 Introduction

As described in *Section 1.3* it is proposed that approximately 15,000 m^3 (wet weight comprising approximately 3,000 m^3 water and 12,000 m^3 solids) of material would be disposed at Oxcars spoil ground over a period of approximately four to eight weeks annually, subject to siltation rates and commercial requirements.

The material to be dredged and disposed consists primarily of sandy mud, with some gravelly fractions, and the concentrations of contaminants in the material sampled in 2014 and 2019 are presented in *Appendix A*. In 2019, samples were taken at three stations (N1-N3) and the results are summarised here.

- The mean concentrations of metals were all above Action Level 1 but below Action Level 2 with the exception of arsenic that was below Action Level 1.
- The concentration of total PCBs were below Action Level 1 in two of the three stations sampled. Total PCBs were above Action Level 1 at station N1 but below Action Level 2.
- The total PAH concentrations at all survey stations were below Action Level 1. For individual PAHs most were above Action Level 1 but all were below Action Level 2. This pattern was observed in the previous data from samples analysed in 2014.
- TBT concentrations were below above Action Level 1 at stations N2 and N3 with the sample from station N1 being above Action Level 1.

Metal and PCB concentration data from sediment sampled in the Oxcars spoil ground are presented in *Appendix A* and indicate that levels are slightly higher those from other spoil grounds within the Firth of Forth.

B1.2.2 Impacts on Water and Sediment Quality

Coastal water quality in the Firth of Forth is currently Good in the outer Firth, with the exception of the area around Portobello and Musselburgh, which is classified as Poor. It is classified as Good in the lower estuary to Muirhouses and Moderate upstream in the estuary to Kincardine bridge [(1)].

(1) Water Framework Directive (WFD) Waterbody Classification 2007-2017 (SEPA)
https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=1110

The salinity in the Firth of Forth averages 33‰, decreasing into the Forth Estuary under the influence of freshwater inputs. Suspended solids levels are also usually low, and average 3 mg l^{-1} (1). In the Firth of Forth, dissolved oxygen concentrations show little variation with depth and are approximately 90-95%, but may be lower during periods of high summer water temperatures (2).

There are no designated bathing waters with 5 km of the dredging or disposal sites. The nearest is Portobello West which is approximately 7 km from the dredging site and approximately 10 km from the disposal site.

The material disposed at Oxcars will fall to the sea bed by gravity and consist of cohesive lumps of dredged material. Fine sediment will be liberated as it sloughs off the descending material and when the clumps reach the seabed. There are no data available that indicate the concentration or dispersion of suspended solids from the disposal operations at Oxcars. Field measurements of suspended solids in surface waters following similar disposal operations indicate that less than 5% of the discharged material escapes the descending density jet (3). Data available from Middle Bank, located approximately 2.3 nm from Oxcars during dredging operations in 2008 (4) recorded the baseline mean suspended solids concentrations between 8.87 mg l^{-1} and 10.3 mg l^{-1} (mean 9.1 mgl^{-1}). Comparison of these mean baseline suspended solids concentrations with those recorded during dredging activities at Middle Bank indicated peak increases were approximately two and half times above background levels (1). Significant increases in turbidity associated with the disposal operations are therefore likely to be confined to the immediate area of the disposal site.

The oxidation of anoxic sediments released into the water column has been shown to reduce oxygen concentrations by up to 58% (5). Based on the background levels this may reduce the oxygen saturation to between 40 and 50% (equating to approximately 4 to 5 mg l^{-1}). Therefore, if the disposal operations occurred during a period of 'naturally' low dissolved oxygen it is possible that the Water Quality standards for EC Freshwater Fisheries Directive of oxygen concentration greater than 6 mg l^{-1} would not be met (6). It is predicted that this would be short-lived, due to the limited period over which disposal is intended to occur, and localised based on previous dredge plume studies. The impacts are not considered to be significant given the generally high dissolved oxygen levels anticipated at the disposal site and the extent of the area potentially affected.

Increased nutrient levels may stimulate local algal production, although the effects are predicted to be short-term and confined to the immediate area of the disposal operations. Nitrogen is generally regarded to be the limiting nutrient in estuarine and marine systems and in its reduced form (ammoniacal nitrogen) is also toxic to fish. As a consequence of the reduced (oxygen demanding) nature of the seabed sediments, nitrogenous nutrients are likely to be in this form.

Sediment bound metals liberated during the disposal operations will rapidly become complexed with the settling sediments and re-deposited on the sea bed. Previous studies have shown that metal concentrations in the water column remained consistent following sediment disposal (1). However, the continual re-suspension of sediment containing absorbed metals might cause desorption of pollutants to the water column (7).

Studies of the behaviour of sediment bound organic micro-pollutants (*eg* PCBs) suggest that they will reach equilibrium with the water during disposal. As the dispersed sediment falls through the water

(1) SEPA monitoring buoy data from Gunnet Ledge, Firth of Forth, available online from http://www.sepa.org.uk/environment/environmental-data/monitoring-buoys-network/gunnet-ledge/
(2) SEPA (1998). Winter Nutrient Distribution in the Firth of Forth, 1987 - 1997. Report TW 01/98, January 1998.
(3) Kennish M.J. 1992. Ecology of Estuaries Anthropogenic Effects Dredging and Dredged Spoil Disposal p357-397
(4) ERM, 2008. Middle Bank Aggregate Production Licence: Monitoring Report. A report for Westminster Gravels Ltd.
(5) Brown C. 1968. Observations on Dredging and Dissolved Oxygen in a Tidal Waterway. Water Resources Research Vol 4, No 6, p1381.
(6) UKTAG 2010. Water Framework Directive: An approach to the Revoked Directives:- the Freshwater Fish Directive, the Shellfish Directive and the Dangerous Substances Directive. Available online from: http://www.wfduk.org/resources%20/approach-revoked-directives-%E2%80%93-freshwater-fish-directive-shellfish-directive-and-dangerous
(7) Goossend, H. and Zwolsman, J. 1996. An Evaluation of the Behaviour of Pollutants during Dredging Activities. Terra Et Aqua Mar 6, No 62 p20 (9).

column it will be continually exposed to uncontaminated water. Consequently, the concentration of organics in the water will not reach equilibrium, and desorption will occur.

The natural levels of suspended sediments in the Firth of Forth vary with seasonal weather conditions and this contributes to the natural sedimentation in the Firth of Forth that aids the removal of contaminants from the water column and incorporates them in the seabed sediments.

Although there may be some release of contaminants such as metals and PAHs into the water column during disposal operations the majority of the dredged material will descend to the seabed rapidly. Sediment bound contaminants liberated during the disposal operations will rapidly become complexed with particulate matter in the water column and be re-deposited on the sea bed. It is therefore not anticipated that the disposal operation at Oxcars will introduce significant amounts of contamination into the water column. Disposal of the dredged material may result in a localised and short-term increase in the levels of some contaminants; however, the deposited sediment will disperse over time. Considering the short-term, localised and intermittent increase in the levels of some contaminants in the water column will not affect the overall water body quality status of the Forth Estuary and the inner and outer Firth of Forth with respect to the Water Framework Directive.

The PAHs in the sediment comprise both low molecular weight (LMW) (two and three benzene rings) and high molecular weight (HMW) (more than 3 benzene rings) compounds. PAHs tend not to be volatile and poorly soluble and therefore readily absorb onto particulate matter in the water column and are incorporated into marine sediments. The HMW PAHs are generally the less water soluble, less acutely toxic and slower to biodegrade.

The ratios of individual PAHs have been used to determine the likely anthropogenic source of PAHs in the environment: *eg* from combustion sources (pyrolytic) or petroleum hydrocarbons (petrogenic). Petrogenic PAHs are often characterised by phenanthrene to anthracene (Ph/An) values >10, whereas pyrolytic PAH from combustion processes are characterised by Ph/An ratios <10. The ratio of and fluoranthene to pyrene (Fl/Py) greater than 1 generally come from pyrolytic sources while ratios of less than 1 generally indicate petrogenic sources [(1)].

For all the sediment samples analysed from Newhaven the Ph/An ratios were between 2.38 and 2.94 and the Fl/Py ratios were between 1.32 and 1.64. This suggests that these contaminants are from both combustion and petroleum hydrocarbon sources. This supports the view that recorded contamination in the sediments has been transported into the port with the accumulated sediments from the wider Firth of Forth sediment circulation system.

There was a large reduction in point source discharges of hydrocarbons and metals within the Forth Estuary and the Firth of Forth between the mid-1980s and 1990s [(2)]. With efforts focussed on improving the water quality of the Firth of Forth in more recent years, point source discharges have continued to decrease and the water quality of the Firth of Forth has continued to improve as a result [(3)].

Although there may be some release of contaminants such as metals, PCBs, TBT and PAHs into the water column during disposal operations the majority of the dredged material will descend to the seabed rapidly. Sediment bound contaminants liberated during the disposal operations will rapidly become complexed with particulate matter in the water column and be re-deposited on the sea bed. It is therefore not anticipated that the disposal operation at Oxcars will introduce significant amounts of contamination into the water column. Disposal of the dredged material may result in a localised and short-term increase in the levels of some contaminants within the seabed sediments at the disposal site; however, the deposited sediment will disperse over time.

(1)Y.W. Qiu, G. Zhang, G.Q. Liu, L.L. Guo, X.D. Li, O. Wai. Polycyclic aromatic hydrocarbons (PAHs) in the water column and sediment core of Deep Bay, South China. Estuar. Coast. Shelf Sci., 83 (1) (2009), pp. 60-66.
(2) SEPA, 1998. Trace Metals in the Forth 1986 - 1996. Available online from http://www.sepa.org.uk/science_and_research/data_and_reports/water/forth_estuary_trace_metals.aspx
(3) SEPA, 2014. Scottish bathing waters 2013-2014. Available online http://www.sepa.org.uk/media/39125/scottish-bathing-waters-report-2013-2014.pdf

B1.2.3 Impacts on Benthic Ecology

The benthic macrofaunal communities recorded in proximity to Oxcars disposal site are expected to be typical for estuarine conditions and not considered to be of high conservation significance due to the wide distribution, low diversity and lack of any rare or notable species (1).

The impact on benthic communities will depend on the comparative rates of natural deposition (currently unknown) and the deposition due to the dredging disposal operations. It is anticipated that the deposition of dredged material at the Oxcars disposal site may result in the loss (burial) of the benthos within and in the immediate vicinity of the 'deposition zone' within the disposal site. Localised impoverishment of the fauna (in terms of abundance and diversity) is likely along the axis of tidal flow as a result of secondary impacts comprising sediment deposition subsequent to the disposal activities.

Given the relatively homogenous nature of benthic communities (2) and their exposure to the naturally high levels of suspended levels during periods of low river flow and availability of similar habitat within the Firth of Forth, the spatial extent of predicted sediment related impacts to benthos (and resultant impact on prey availability for foraging seabirds) are unlikely to be significant. Dredge spoil from ports and harbours within the Firth of Forth has been deposited within the Oxcars spoil ground for over 30 years and significant impacts on benthic ecology outside of the disposal ground are not predicted.

B1.2.4 Impacts on Seabirds

The Firth of Forth Special Protection Area (SPA), Forth Islands SPA and the Outer Firth of Forth and St Andrews Bay Complex proposed SPA are designated under the Birds Directive (3) for rare, vulnerable and regularly occurring migratory bird species.

There are three potential effects of the disposal of dredge material at sea on seabirds; increased suspended solids, release of contaminated particulates and physical disturbance of birds by the dredging vessel. These effects could potentially have a significant effect on the qualifying interests of the SPAs by reducing prey availability and disturbing bird behaviour and breeding patterns. The vessel used for disposal of the material will be travelling to and from Newhaven Harbour and the disposal site during the four to eight week period of dredging campaigns, a round trip of approximately 4.2 nautical miles.

The main passage population of sandwich tern occurs during the autumn and the proposals are not likely to have significant effects on open water habitats that might support foraging terns during this period.

The Forth Islands SPA supports breeding seabirds that forage over a wide area. The disposal of the dredged material will result in localised increases in suspended sediment that may reduce the ability of fish eating birds to forage around the disposal site due to impaired visibility. However the area affected is a small percentage of the total available foraging habitat, with alternative sources of prey available close by.

The results of sediment dispersion studies undertaken by HR Wallingford (4) for aggregate extraction activities on Middle Bank (approximately 2.3 nm east of Oxcars) involving the disposal of 68,000 m^3 sediment overburden (estimated 40% silt, 60% sand content) at the Narrow Deep spoil ground (approximately 3.5 nm southeast of Oxcars) indicated that the maximum levels of dispersion were achieved with disposal during spring tides. The study showed that at peak tidal velocity the plume would extend 7 km west and 5 km northeast of the disposal site, *ie* along the axis of tidal flow with

(1) Elliot M & Kingston P F (1987). The Sublittoral Benthic Fauna of the Estuary and Firth of Forth, Scotland. Proceedings of the Royal Society of Edinburgh, 93B, pp 449-465
(2) Elliot M & Kingston P F (1987). The Sublittoral Benthic Fauna of the Estuary and Firth of Forth, Scotland. Proceedings of the Royal Society of Edinburgh, 93B, pp 449-465
(3) European Communities (1979) Council Directive 79/409/EEC on the conservation of wild birds.
(4) HR Wallingford Ltd, 1998. Middle Bank Aggregate Dredging - Dispersion Studies. Report EX 3874.

very little movement to the north or south and therefore not impacting coastal or intertidal areas within the SPA(1).

It is noted that Oxcars is an established and long term spoil ground with disposal activities being ongoing at the time that the area was designated as an SPA. Given that disposal was an existing activity and ongoing disposal is at a similar scale to previous disposal activities it is considered that the proposals will not have significant effects on the qualifying interest of the SPA.

B1.2.5 Impacts on Fish and Marine Mammals

The River Teith Special Area of Conservation (SAC), the Isle of May SAC and the Moray Firth SAC are designated under the Habitats Directive (2) for their habitats and fish and mammals species of European importance.

Atlantic salmon, river lamprey and sea lamprey inhabit and migrate up and down the Firth of Forth and Forth Estuary to reach spawning grounds in the River Teith SAC and may therefore pass the Oxcars disposal site. The river lamprey grows to maturity in estuarine environments and between October and December moves into fresh water to spawn in clean rivers and streams. The sea lamprey spends most of its life at sea, only returning to freshwater to spawn around April and May.

A potential effect of disposal at sea is for increased levels of suspended solids to disturb fish migration routes and areas they occupy. The concentration of suspended sediment at which the passage of salmonid fish is affected has been observed to be 500 mg l^{-1} (3). The works are intended to take place during the spring/summer and are not likely to have a significant effect on the main spawning period of salmon (usually between November and December (4)). The Forth District Salmon Fishery Board has advised that smolts are likely to be passing through the Firth of Forth during June and July. Even if any salmon were in the area of the disposal activities, exceedance of the effects concentration for suspended sediment levels relating to the passage of salmonid fish is not anticipated (see *Section B1.2.2*).

The disposal activities will take place within a very small area of the Firth of Forth where river and sea lamprey may be present or may pass through. The species are highly mobile and will be able to move to abundant suitable habitat nearby if they are initially present within the footprint of the proposed disposal activities. The species will also be able to avoid the area during periods of raised suspended sediment during disposal and migrate using an alternative route through the Firth of Forth. For context, at the Oxcars site the Firth of Forth is approximately 8,735 m wide and the spoil ground is approximately 530 m in width, representing approximately 6% the width of the Firth of Forth at that point. As discussed in Section 1.2.2, significant increases in turbidity associated with the disposal operations are likely to be confined to the immediate area of the disposal site, which at Oxcars represents a small part of the cross section of the Firth of Forth.

It is not anticipated that the disposal operation at Oxcars will introduce significant amounts of contamination into the water column although the dispersive nature of disposal operation and resuspension of contaminated surface sediment may increase the partitioning of metals and organics into the aqueous phase.

Due to the scale of the proposed operations and the likely impacts on water quality and seabed habitat it is predicted that the proposals are not likely to have a significant effect on migratory fish species.

The Isle of May SAC, in the outer Firth of Forth, is designated for its populations of grey seal. Grey seals forage widely and may forage at the Narrow Deep spoil ground, approximately 4 nm east of

(1) ERM, 1998. Aggregate Production Licence Application, Middle Bank, Firth of Forth: Environmental Statement. Report to Westminster Gravels Ltd.
(2) European Communities (1992) Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna.
(3) Redding M.J. and Schreck C.B. 1987, Physiological effects on coho salmon and steelhead of exposure to suspended solids, Transactions of the American Fisheries Society, Vol116 pp737-747
(4) https://www.nature.scot/plants-animals-and-fungi/fish/freshwater-fish/atlantic-salmon

Oxcars. Potential effects on grey seals resulting from the disposal activities are disturbance and noise due to vessel movements and disposal activities and displacement of prey species as a result of increased levels of suspended sediment at the disposal site.

The proposals are not likely to have a significant effect on grey seals for the following reasons.

- The small area of potential foraging affected by disposal activities at the Oxcars disposal site.
- The short duration of disposal activities (up to eight weeks per annum).
- The small increase in total vessel movements (one per tide) associated with the disposal activities in relation to total vessel movements within the Firth of Forth.
- The long term existing disposal operations in the area which pre-date the site designation.

Bottlenose dolphins are a Habitats Directive Annex II species and are resident in the Moray Firth SAC. They are infrequent summer visitors to the Firth of Forth, mainly between June and September (1).

Potential effects on bottlenose dolphins resulting from the disposal activities include disturbance and noise due to vessel movements and displacement of prey species as a result of increased levels of suspended sediment at the disposal site.

The proposals are not likely to have a significant effect on bottlenose dolphins for the following reasons.

- The distance between the disposal site and the SAC is large and the proportion of the bottlenose dolphin population anticipated to pass through the area affected by disposal activities is anticipated to be low.
- The extent of vessel movements (one per tide) associated with the disposal activities relative to total vessel movements within the Firth of Forth.
- The short duration of disposal activities (although the dredging is expected to occur over a period of four to eight weeks, Newhaven is tidally restricted so there would only be one trip made by the dredger per tide).
- The long term existing disposal operations in the area.

B1.2.6 Summary of Impacts

Table B1.1 presents a summary of the impacts and an assessment of significance of the impacts in relation to the sensitivity/importance of the receiving site.

(1) Evans P. G. H. Chapter 5.15 Whales, Dolphins and Porpoises. In Coasts and Areas of the United Kingdom. Region 4 South- east Scotland: Montrose to Eyemouth, ed by J H Barne, C F Robson, S S Kaznowska, J P Doody, N C Davidson and A L Buck, pp 129-132. JNCC (Coastal Directories Series).

Table B1.1 Summary of Significance of Impacts

Receptor	Impact Significance Justification	Impact Significance
Water quality at disposal site	Disposal will be periodic and sediment will descend to the seabed rapidly. Any impacts will be localised and short-lived.	Not Significant
Sediment quality at disposal site	Increase in the levels of some contaminants will be localised and short-term and the deposited sediment will disperse within the open water system over time.	Not Significant
Benthic ecology at disposal site	Oxcars is designated as a disposal site. Disposal will occur over a relatively short period and similar habitat is available in close proximity to the site.	Not Significant
Seabirds	Proposed disposal operations are over a relatively short period each month and the area affected is a small percentage of the total available foraging habitat, with alternative sources of prey available close by. Both SPAs were designated after the Oxcars spoil site was designated, and have not been impacted by historic and ongoing disposal operations.	Not Significant
Marine mammals and fish	Proposed disposal operations are over a short period of time and the area affected is a small percentage of the total available foraging habitat, with alternative sources of prey available close by. Due to the scale of the proposed operations and the likely impacts on water quality and seabed habitat it is predicted that the proposals are not likely to have a significant effect on migratory fish species. The volume of dredger vessel traffic will not be significant in relation to the existing traffic in the Firth of Forth.	Not Significant

B1.3 Cumulative Effects within the Firth of Forth and Forth Estuary

B1.3.1 Introduction

The potential impacts of the sea disposal option have been assessed within *Section* ***Error! Reference source not found.*** in isolation from other activities within the Firth of Forth and Forth Estuary. The impacts associated with the sea disposal option are not predicted to result in adverse effects on the integrity of the SPAs and SACs, however, it is possible that cumulative impacts with other projects could result in significant impacts.

For the purposes of this report a working definition of cumulative impacts as 'impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions, together with the project' (1) has been adopted. The assessment of potential cumulative impacts has been restricted to activities and proposed activities with the potential to directly impact the water and / or sediment quality within the SPAs and SACs.

The limitations of assessing the cumulative impact of disposal activities with other operations, for example, commercial fishing activities, is recognised given the lack of historical and current environmental data and a detailed understanding of sediment transport regimes within the Firth of Forth and Forth Estuary.

(1) European Union. Guidelines for the Assessment of Indirect and Cumulative Impacts, as well as Impact Interactions, DG XI Brussels Downloaded from http://ec.europa.eu/environment/eia/eia-support.htm

B1.3.2 Past and Current Activities within the Firth of Forth and Forth Estuary

Introduction

The Firth of Forth and Forth Estuary has previously experienced pollution from a number of industrial sources and sewage discharges, such as the petro-chemical operations at Grangemouth and the sewage works at Seafield. Over the past 35 years, however, most of these pollution sources have been controlled or eliminated altogether.

Additional improvements to sewage works and other effluent treatment plants upstream have improved the condition of the water coming down the estuary.

Petro-Chemicals and Power Generation

The INEOS refinery and petro-chemical complex at Grangemouth are historically a dominant source of oil related PAHs in the Forth Estuary and the Firth of Forth. In 2016, INEOS constructed Europe's largest ethane storage tank, with the capacity to store up to 33,000 tonnes of liquid ethane, together with the associated pipework and jetty modifications.

The Longannet coal-fired power station on the north bank of the estuary closed in March 2016. The historic release of combustion related PAHs from this source will have contributed to the PAH loading within the Forth Estuary and Firth of Forth (1). Water from the Firth of Forth was abstracted and used as cooling water by the power station before being discharged back into the Firth of Forth.

Cockenzie power station was a coal-fired power station located on the southern shore of the Firth of Forth near to Cockenzie and Port Seaton. It generated electricity between 1967 and 2013, with demolition of the station completed in 2015. Water was abstracted from the Firth of Forth in the same way it was for Longannet.

Methil power station was a small base load coal slurry-fired power station, located on the south side of the mouth of the River Leven, where the river enters the Firth of Forth at Methil. The power station started operations in 1965 and was decommissioned in 2000, finally being demolished in 2011. As with Cockenzie power station, Methil abstracted water from and discharged water to the Firth of Forth for use as cooling water.

Commercial Fishing Activity

The sandeel fishery on the Wee Bankie, at the mouth of the Firth of Forth, has been closed since 2000 on seabird conservation grounds. The initial five year period was reviewed and extended following the reduction in numbers of some seabird species observed during a 2004 count (reduced sandeel numbers may be linked) within the Firth of Forth (2).

Improved water quality in the Firth of Forth has led to a resumption of cockle fishing, particularly on the Fife coast. Uncontrolled cockling could impact upon wintering bird populations by causing loss of prey species, directly (removal of cockles) and indirectly (damage to non-target species). A Special Nature Conservation Order (SNCO) was implemented under the *Conservation (Natural Habitats) Regulations 1994* to the outer Firth of Forth, including Forth Bridge to Granton Harbour and from Leith Docks to Joppa. This Order, implemented in March 2003, was revoked and reissued in 2006, and still stands (3).

(1) Richardson D.M., Davies I.M., Moffat C.F., Pollard P. and Stagg R.M. 2001. Biliary PAH metabolites and EROD activity in flounder (*Platichthys flesus)* from a contaminated estuarine environment. J. Environ. Monit., **3**, 610-615.
(2) Marine Scotland (2012). The Distribution of Zooplankton Prey of Forage Fish in the Firth of Forth Area, East Coast of Scotland. Available online http://www.scotland.gov.uk/Publications/2012/08/2345/1 .
(3)http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8499

B1.3.3 Other Dredging Disposal Activities

In addition to the intended maintenance dredging activities at Newhaven Harbour with proposed disposal at Oxcars, Forth Ports manages five other dredging operations within the Forth Estuary and Firth of Forth. The operations comprise the following.

- Trailer suction dredging in Grangemouth with disposal at Boness spoil ground: maximum capacity for maintenance dredging is 1,700,000 m^3 per annum, undertaken over four days every month.
- Trailer suction dredging in Leith with disposal at Narrow Deep spoil ground: maximum capacity for maintenance dredging is 90,000 m^3 per annum, undertaken over one to two days per month, six months of the year.
- Trailer suction dredging in Rosyth with disposal at Oxcars spoil ground: maximum capacity for maintenance dredging is 400,000 m^3 per annum, undertaken over three days per month, every other month.
- Trailer suction or grab dredger Methil approach channel with disposal at Methil spoil ground: maximum quantity of disposed material is 12,500 m^3. This is undertaken annually.
- Grab dredger and plough at Kirkcaldy with disposal at Kirkcaldy spoil ground: maintenance dredging of approximately 5,000 m^3 undertaken annually.

Other dredging activities in the Firth of Forth include the following.

- Maintenance dredge of 100,000 tonnes at Rosyth for Babcock Marine between March 2019 and March 2020 with disposal at Oxcars B.
- Maintenance dredge of 3,300 tonnes per year using a plough dredger at Port Edgar within the confines of the marina between 2018 and 2021 with disposal to an area immediately adjacent to the mairna breakwater on the north east boundary of the marina.
- Trailer suction and backhoe dredging with self-propelled barge at Defence Munitions (DM) Crombie, maximum quantity of disposed material is 22,000 m^3 per annum for maintenance (1).
- Capital dredge of 86,980 m^3 at Granton Harbour with disposal at Bo'ness or Narrow Deep spoil disposal sites between August 2019 and July 2022.
- Maintenance dredging at Pittenweem Harbour, with disposal of 16,500 tonnes at Anstruther Deposit Area.
- Maintenance dredging of 3,600 tonnes over three years at Dysart Harbour, with disposal on the adjacent foreshore where it is dispersed on the incoming tide.

All the above maintenance spoil disposal operations require licence renewals every three years by Marine Scotland. Potential impacts are therefore assessed and reviewed every three years prior to granting a Marine Licence. The historical disposal route for spoil from all listed dredging operations has been deposition at sea, and to date, no environmental impacts, other than direct impacts within the spoil ground, have been reported.

Work began on the Forth Replacement Crossing at the end of 2011, and capital dredging works for the bridge support foundations started at the beginning of 2012. The purpose of the dredging was to create access for the construction of the foundations for the structures which will support the new bridge. In total 180,000 m^3 silt and sand was dredged from the seabed to form access channels for bridge foundation works between 2011 and 2016 (2). This spoil was disposed of at Oxcars.

(1) Rosyth International Container Terminal. Operational In-combination Assessment of Maintenance Dredging and Implications for the River Teith SAC. Jacobs, 2011.
(2) Hochtief (UK) Construction (2016). Forth Road Bridge Replacement - Queensferry Crossing. Available online http://www.hochtief-construction.co.uk/bridges_Forth_Road.shtml

B1.3.4 Foreseeable Future Activities within the Forth Estuary and Firth of Forth

Methil Offshore Wind Farm

The Offshore Renewable Energy (ORE) Catapult's seven megawatt wind turbine was completed in 2013 and is located 50 m from the coast. The tower stands at 110 m and is 195 m to the top of the blade. Samsung had previously owned the wind turbine demonstrator, before selling to ORE Catapult in December 2015.

In March 2014 2-B Energy secured investment to fund the establishment of two full-scale test units at the site (two six megawatt turbines to be located approximately 1.5 km offshore standing at 109 m above the lowest tide, 186 m to top of blade). A marine Licence was granted in January 2017 and planning permission has been granted. A scoping Report has now been submitted to Marine Scotland to erect a further seven turbines. This extension would be subject to separate consenting and if approved the developer expects that the turbines would be in place by 2020.

Inch Cape Offshore Wind Farm

Consent was granted for the proposed Inch Cape Offshore Wind Farm in October 2014. Consent was delayed following an objection lodged by the Royal Society for the Protection of Birds and final approval was given in 2017. Up to 213 turbines are planned which will be occupy an area of 150 km^2. Construction is expected to begin in 2020. Once fully operational the wind farm will have an export capacity of approximately 1,000 megawatts.

Seagreen Offshore Wind Farm

Scottish and Southern Electric (SSE) and Fluor joint venture partnership Seagreen Wind Energy has been awarded the exclusive development rights for the Firth of Forth Zone by The Crown Estate. The zone covers an area of 2,852 km^2 in the outer Firth of Forth. Seagreen was awarded consent by the Scottish Government in October 2014 to develop the northern part pf the Firth of Forth Zone to generate up to 1,050 megawatts of power from up to 150 turbines. The design was updated and approved in 2018 to comprise fewer, larger wind turbines. Construction is expected to start in 2020.

Neart na Gaoithe Offshore Wind Farm

Mainstream Renewable Power was granted consent by the Scottish Government in 2018 to build a 450 megawatt offshore wind farm in the Outer Firth of Forth comprising up to 54 wind turbines up to 208 m high occupying an area of approximately 105 km^2. The wind farm is expected to be operational by 2023.

B1.3.5 Conclusions

None of the projects listed in *Section B1.3.4* have yet been constructed, so there are no predicted cumulative impacts from these operations associated with the disposal of dredged material from Newhaven at Oxcars disposal site. Any significant future developments are likely to be subject to their own Environmental Impact Assessment and Habitats Regulations Assessment to demonstrate that no significant impacts will arise as a result.

However, Oxcars spoil disposal site does receive material from of other ports and harbours and various projects as discussed, and as a result there will be some cumulative impacts at this site. Should Forth Ports dispose of the spoil arising from the Newhaven Harbour maintenance dredge at the same time as the maintenance dredge spoil disposal from Port Edgar there will be elevated levels of suspended solids than those assessed in this BPEO. There will be no disposal of dredged spoil from Rosyth at Oxcars at the same time as spoil disposal from Newhaven as Forth Ports has control over both of these operations.

At the levels of dredging/disposal and point source discharge related impacts, available data do not indicate any significant detrimental impacts to SAC or SPA integrity.

APPENDIX C CONSULTEE RESPONSES

Catriona Munro

From: Peter Galloway [redacted]
Sent: 20 February 2019 15:04
To: Catriona Munro
Cc: Bancks, Paul
Subject: RE: Newhaven Harbour

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Catriona,

Following on from Paul's email, I am not aware of any current projects that could make practical use of the dredged material.

I will let you know if anything come to light in the near future. In the meantime, if you have any other queries then please get in touch.

Best Regards,

Peter

BIDWELLS

Peter Galloway BEng (Joint Hons) PhD
Associate

5 Atholl Place, Perth, Scotland. PH1 5NE
[redacted] | bidwells.co.uk

A CLEAR VIEW
A WELL INFORMED APPROACH

From: Bancks, Paul [redacted]
Sent: 20 February, 2019 10:20
To: [redacted]
Cc: Peter Galloway [redacted]
Subject: Newhaven Harbour

Dear Catriona,

I refer to your letter of 18th February (attached).

The bed of Newhaven harbour is not within our management and so I've comments on the dredging itself, and I'm not aware of projects for which the material could be beneficially used.

You could send the request to the Forth Estuary Forum (https://www.forthestuaryforum.co.uk/) which has a firth-wide remit and may know of projects for which the material could be beneficially used.

I've copied this email to Peter Galloway at Bidwells, Peter looks after all our property dealings in the area and may have some additional ideas or comments.

Regards

Paul

Paul Bancks
Asset Manager
Crown Estate Scotland (Interim Management)
[redacted]
6 Bells Brae, Edinburgh, EH4 3BJ
www.crownestatescotland.com
@crownestatescot

FORTH
DISTRICT SALMON FISHERY BOARD

The Clubhouse, 106 Biggar Road,
Edinburgh, EH10 7DU

Tel: [redacted]
Email: [redacted]

Catriona Munro
ERM
102 West Port
Edinburgh
EH3 9DN

25th February 2019

Dear Catriona

Forth Ports Limited: Newhaven Harbour Maintenance Dredge and Spoil Disposal

Thank you for contacting the Forth District Salmon Fishery Board (FDSFB). We have reviewed your communication and would make the following comments.

Whilst the FDSFB acknowledges that the management of sediment is required in the Forth Estuary, this process could have a negative impact on migratory fish species such as Atlantic salmon and sea trout. The FDSFB remit is for the protection and enhancement of these migratory salmonids and this duty extends to the Estuary and the Firth. Currently salmon are in decline and the majority of the Forth District is deemed by Marine Scotland to have un-sustainable harvestable stocks. The vast majority of Forth salmon stocks have been rated as Category 3 which means that those fish caught must be returned unharmed to the water and this includes the Estuary and Firth areas as well as the rivers. The conditions in the estuary and firth, as the route of migration of these fish from the freshwater to marine environment, are key to the survival and protection of these fish. We remain concerned that there is limited information on the impacts of disposal at sea (including any cumulative effect) and that this does not appear to assessed as part of the usual application process.

The impact that sediment disposal at sea has on migratory salmonids in the Firth of Forth is not clear and therefore it is difficult for the FDSFB to make informed comments on this application. A degradation of water quality and clarity accompanies sediment disposal. Research has shown that contaminants and toxins can be released from sediment plumes into the surrounding water column and prolonged exposure to suspended sediments causes damage to gill structure in fish. BPEO reports, if they give any consideration to migratory fish, tend to rely on the untested assumption that fish are able to avoid areas during periods of suspended sediments and that they will find alternative routes through the area, but there is no evidence provided to support this theory.

For information, when salmonids make their seaward migration through the Firth of Forth, they are very fragile, physiologically stressed and can be as small as 10cms in length. Therefore they may not physically be able to avoid sediment plumes. In any case it is not known how large an area the plumes might cover. These smolts are likely to be passing through the Firth of Forth during the summer months. **Until data is made available to support the assumption that there is no impact of sediment plumes on migrating smolts, a sensible precautionary approach would be to avoid sea disposal taking place in the Firth during June and July.** We have raised these points with Marine Scotland as well and are awaiting a response.

Should you wish to discuss or require any further information please do not hesitate to contact me.

Kind regards

Alison
[Redacted]

Alison Baker
Clerk to the Forth District Salmon Fishery Board

Northern Lighthouse Board

84 George Street
Edinburgh EH2 3DA
Switchboard: 0131 473 3100
Fax: 0131 220 2093
Website: www.nlb.org.uk
Email: enquiries@nlb.org.uk

Your Ref: 0496046
Our Ref: GB/D002_19

Ms Catriona Munro
Consultant
Environmental Resources Management
6th Floor
102 Westport
EDINBURGH
EH3 9DN

25 February 2019

Dear Catriona

PRE-APPLICATION CONSULTATION FOR MAINTENANCE DREDGING AND SPOIL DISPOSAL – NEWHAVEN HARBOUR, FIRTH OF FORTH

Thank you for your correspondence dated 18 February 2019 regarding the proposal by **Forth Ports Limited** for consent to undertake maintenance dredging and disposal operations at Newhaven Harbour, Firth of Forth.

We note that the works are for a 3 year period, focusing on the harbour and approach channel to ensure a safe navigable water depth is maintained for vessels to berth alongside and allow passenger embarkation and disembarkation.

Northern Lighthouse Board has no objections to the proposed dredging and/or disposal of dredged spoil to the charted and approved spoil grounds at Oxcars.

However, we would advise that on completion of the maintenance dredging operations, that Forth Ports Limited advise the UK Hydrographic Office (sdr@ukho.gov.uk) of the revised water depths in order that Admiralty Chart BA735 can be revised accordingly.

Yours sincerely
[Redacted]

Peter Douglas
Navigation Manager

Catriona Munro

From: Smith, Michael [redacted]
Sent: 01 March 2019 11:13
To: Catriona Munro
Subject: Newhaven Harbour Dredging

Follow Up Flag: Follow up
Flag Status: Flagged

Catriona,

Thanks for contacting us in relation to this proposal – please note that Andrew Gilbert-Straw no longer works for SEPA.

I can only really comment in general terms at this stage and give you an indication of what the licensing requirements may be for your various options.

In relation to the disposal at Oxcars, this is not an activity that SEPA would regulate so I have no comment to make.

The deposit of dredgings (from inland waters) on land can be covered by an exemption to Waste Management Licensing under paragraph 25 (see link below), although I'm not sure that the harbour area would classify as being an inland water so may not be applicable in this instance.

The application of dredging spoil onto agricultural land can be carried out under a paragraph 7 exemption if agricultural benefit can be demonstrated. Guidance on this and other exemptions that may be applicable can be found at the link below –

https://www.sepa.org.uk/regulations/waste/activities-exempt-from-waste-management-licensing/

Obviously incineration and or landfill at appropriately licensed facilities would also be an acceptable disposal option.

I hope this helps but please feel free to contact me should you have any queries or wish to discuss this further.

Regards

Mike

Mike Smith
Specialist II
Edinburgh and Lothians Team

SEPA Edinburgh Office,Silvan House, 3rd Floor, 231 Corstorphine Road, Edinburgh, EH12 7AT
T: [redacted]
email: [redacted]
Web: www.sepa.org.uk

Oifis chlàraichte: Taigh Srath Alain, Pàirc Gnothachais a’ Chaisteil, Sruighlea FK9 4TZ. Fo Achd Riaghladh nan Cumhachdan Rannsachaidh 2000, dh’fhaodadh gun tèid an siostam puist-d aig SEPA a sgrùdadh bho àm gu àm.

Catriona Munro

From: Malcolm Fraser [redacted]
Sent: 07 March 2019 11:27
To: Catriona Munro
Subject: Newhaven Harbour - maintenance dredge and spoil disposal

Catriona –

Thank you for your letter dated 18 February 2019.

We have previously responded to BPEO consultations for Newhaven Harbour in 2014 and 2016. In our view the current proposal for continued dredging and disposal raises no new issues.

Regarding the disposal of dredge spoil, we are aware of two sites which may potentially be suitable for receiving sand:

1. Dunbar East Beach – which we have discussed previously; and
2. Limekilns, Fife – please contact me if you would like to know more about the circumstances at this location.

I hope this short email is adequate for your records.

All the best.

--
Malcolm Fraser | Operations Officer - Forth
Scottish Natural Heritage | Silvan House | 3rd Floor East | 231 Corstorphine Road | Edinburgh | EH12 7AT | t: [redacted]
Dualchas Nàdair na h-Alba | Taigh Silvan | 3mh Làr an Ear | 231 Rathad Chros Thoirphin | Dùn Èideann | EH12 7AT
nature.scot – Connecting People and Nature in Scotland – @nature_scot

--

ERM has over 160 offices across the following countries and territories worldwide

Argentina
Australia
Belgium
Brazil
Canada
Chile
China
Colombia
France
Germany
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
The Netherlands
New Zealand
Norway
Panama
Peru
Poland
Portugal
Puerto Rico
Romania
Russia
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
Taiwan
Thailand
UAE
UK
US
Vietnam

ERM's Edinburgh Office

6th Floor
102 West Port
Edinburgh
EH3 9DN

T: 0131 221 6750

www.erm.com

The business of sustainability

ERM