# Peterhead Bay Marina & Port Henry Dredging

## Best Practicable Environmental Option Report

Peterhead Port Authority

Date: 26 January 2026

| Rev.no. | Date | Description | Prepared by | Verified by | Approved by |
|---|---|---|---|---|---|
| 00 | 26/01/2026 | First Release | AATH/MERO | IGP | ACW |

# Contents

## Table of Figures



## Table of Tables

# 1. Introduction

## 1.1. Background

This report has been prepared by NIRAS Group (UK) Ltd (hereafter NIRAS), on behalf of Peterhead Port Authority (PPA), and presents an assessment of the Best Practicable Environmental Option (BPEO) for the disposal of dredged material arising from the proposed capital dredging of Peterhead Bay Marina (the Marina) and Port Henry. Figure 1.1 illustrates the location of both sites within Peterhead Harbour.

This BPEO is submitted together with an application for disposal of dredged material to the Marine Directorate Licensing and Operations Team (MD-LOT), as required by the Marine (Scotland) 2010 Act.

Under the Marine (Scotland) Act 2010, Section 21(1), a Marine Licence issued by MD-LOT is necessary for dredging and depositing substances or objects within the Scottish inshore region, which extends out to 12 nautical miles from the coast. When considering applications for disposing of dredged spoil at sea, MD-LOT must assess practical alternatives and ensure that disposal does not pose an unacceptable risk to the marine environment and other users. Marine Licences for capital works are valid for the specified duration agreed upon with MD-LOT. This BPEO provides information to support that assessment.

## 1.2. The Need for Dredging and Spoil Disposal

The Marina is situated in the south-west of the bay and is protected by two rubble mound breakwaters. The Marina provides sheltered pontoon berthing for up to 150 locally based and visiting leisure craft of up 20 m in length. The entrance depth is 2.3 m below chart datum (CD), with the deepest berths accommodating vessels with up to 2.8 m draft.

Port Henry is accessed via North Harbour. It has 740 m of quayside with depths varying from 2 m to 3 m below CD, and a slipway capable of handling four vessels up to 30 m length, 7.2 m beam and 300 tonnes. It serves as a working port for the inshore fishing fleet and provides 48 berthing spaces for small commercial fishing vessels, a temperature-controlled fish market, a ship-lift that can handle two vessels, a drydock, and a maintenance workshop.

Following the completion of a bathymetric survey on 18 April 2023, shallow depths were highlighted in the Marina and Port Henry. The requirement for dredging to -1.5 m CD for the Marina and -2.5 m CD for Port Henry was recognised to ensure the safe passage of vessels in accordance with regular operations. Maintenance (i.e. dredging) is in line with Section 13 of Scotland's National Marine Plan (Marine Planning Policy Transport 4) which states: '*Maintenance, repair and sustainable development of port and harbour facilities in support of other sectors should be supported in marine planning and decision making*'.

## 1.3. Proposed Dredging and Disposal Operations

### 1.3.1. Location of Dredging

The estimated dredging volume is 8,500 $m^3$ (10,795 wet tonnes) at the Marina and 500 $m^3$ at Port Henry (635 wet tonnes). The wet tonne amount was calculated using a factor of 1.27 wet tonnes per $m^3$. Dredging will not exceed 1.5 m below CD for the Marina and 2.5 m below CD for Port Henry. The dredging schedule will be dependent on the licence award date and dredger availability. It is currently intended that the dredging works will be completed within 2 years of the licence issue and carried out in phases to avoid disruption of summer season leisure activities such as bathing season and recreational water sports.

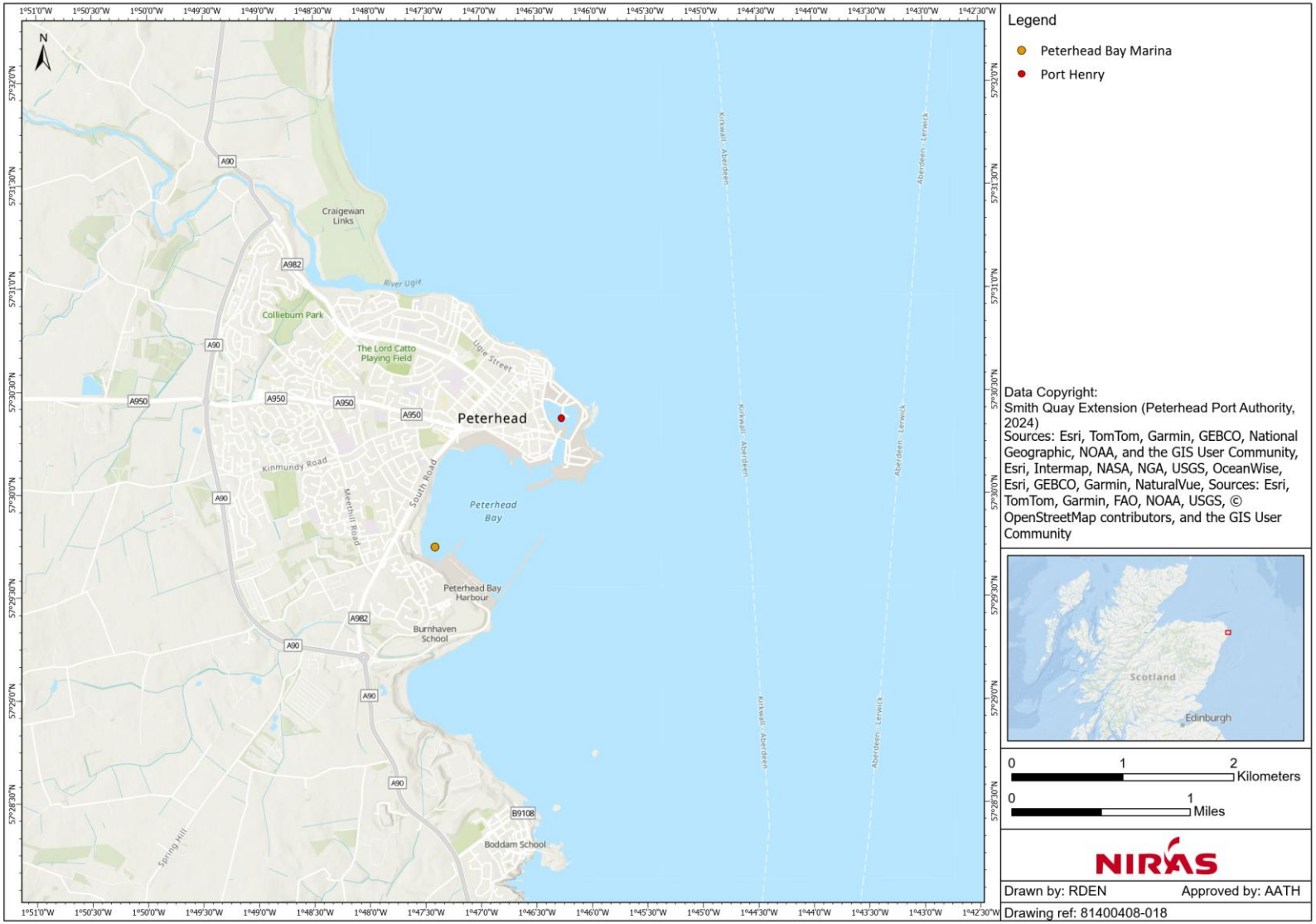


*Figure 1.1 Location of the Marina and Port Henry in Peterhead Harbour.*

The boundary coordinates of the proposed dredge area in the Marina are presented in Table 1.1 and illustrated in Figure 1.2.

The boundary coordinates of the proposed dredge area in Port Henry are presented in Table 1.2 and illustrated in Figure 1.3.

*Table 1.1 Dredge area coordinates for the Marina in WGS84 (UTM Zone 30N, degrees decimal minutes).*

| Node | Latitude | Longitude |
|---|---|---|
| **SP-S1** | 57° 29.799' N | 001° 47.441' W |
| **SP-S2** | 57° 29.791' N | 001° 47.421' W |
| **SP-S3** | 57° 29.741' N | 001° 47.401' W |
| **SP-S4** | 57° 29.710' N | 001° 47.405' W |
| **SP-S5** | 57° 29.699' N | 001° 47.478' W |
| **SP-S6** | 57° 29.769' N | 001° 47.519 W |
| **SP-S7** | 57° 29.785' N | 001° 47.495' W |

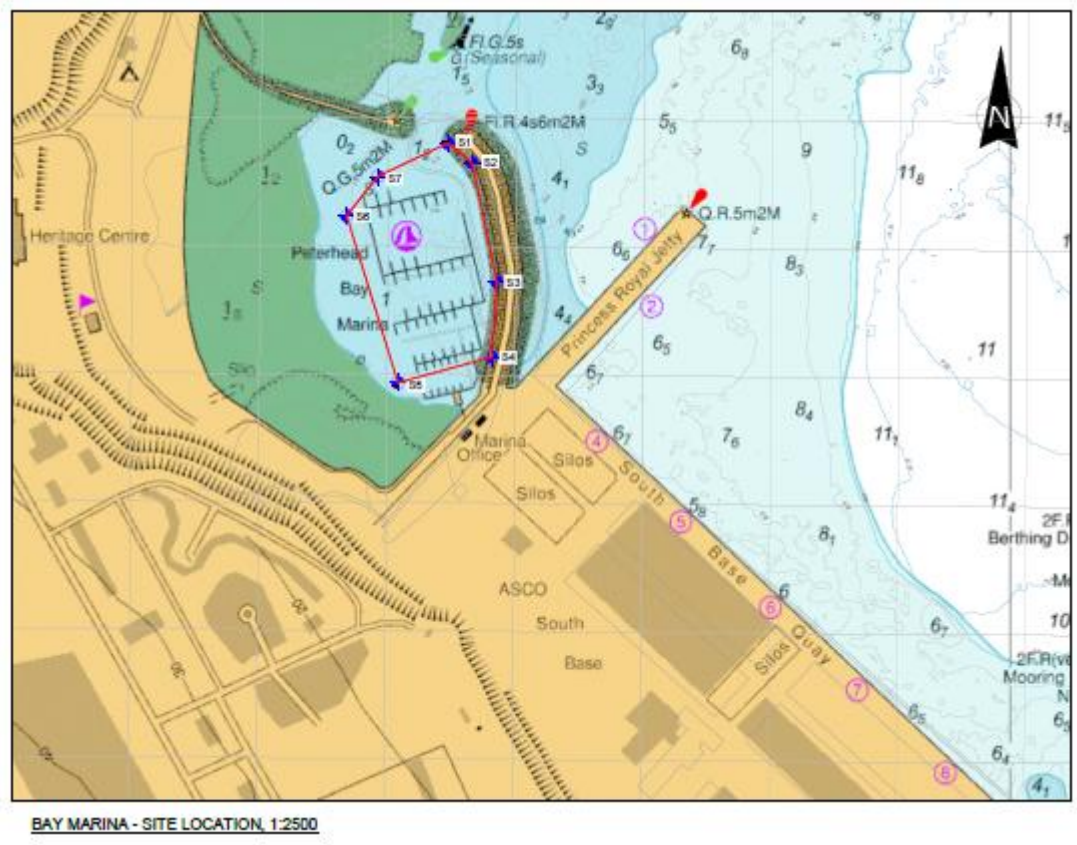


*Figure 1.2 Proposed dredging area for the Marina.*

*Table 1.2 Dredge area coordinates for Port Henry in WGS84 (UTM Zone 30N, degrees decimal minutes).*

| Node | Latitude | Longitude |
|---|---|---|
| **SP-N1** | 57° 30.4100' N | 001° 46.3647' W |
| **SP-N2** | 57° 30.398' N | 001° 46.375' W |
| **SP-N3** | 57° 30.4000' N | 001° 46.387' W |
| **SP-N4** | 57° 30.409' N | 001° 46.392' W |
| **SP-N5** | 57° 30.416' N | 001° 46.386' W |

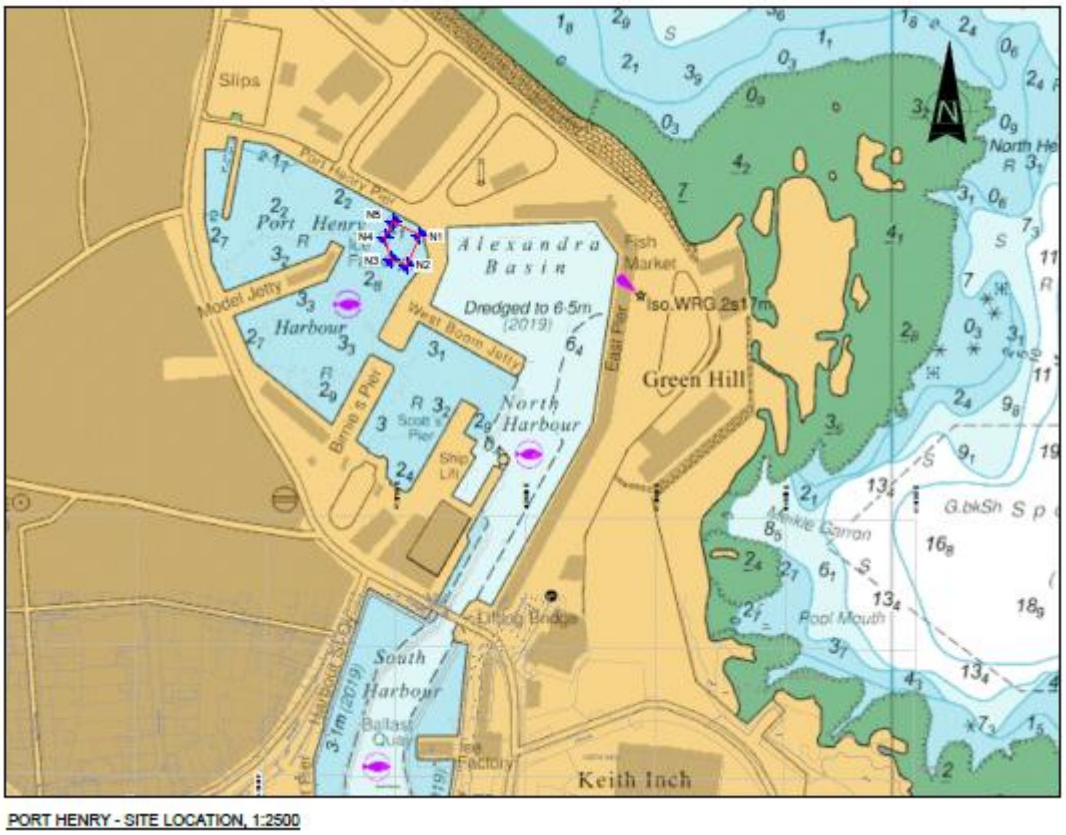


*Figure 1.3 Proposed dredging area for Port Henry.*

### 1.3.2. Method of Dredging

The dredging works will be undertaken using either a small excavator or a suction dredge pump, selected based on site conditions and contractor assignment. When using an excavator, the machine would be positioned on a stable platform or barge to remove sediment from the seabed and transfer it directly into a barge. The excavator will operate within safe working limits, ensuring controlled lifting and placement of material.

Alternatively, a suction dredge pump will be deployed to extract material hydraulically and discharge it into the barge. Once loaded, the barge will transport the dredged material to the designated disposal site. Upon reaching the disposal site, the vessel aligns with the tidal stream and sails slowly in reverse. The vessel is positioned

over the disposal location and material released via the barge's bottom doors or, if necessary, by excavator to ensure complete discharge.

### 1.3.3. Disposal operations

Historically, material dredged from the harbour to maintain navigable depths has been disposed of at sea locations offshore from the harbour, specifically disposal sites CR070 (Peterhead) and CR080 (North Buchan Ness). The primary location of disposal at the offshore locations has been the CR080 disposal site as confirmed by Bidwells on behalf of Crown Estate Scotland on 14/07/2025 (see Appendix D). It is anticipated that this method would be used again, should offshore disposal be the selected option.

This BPEO report considers this disposal option alongside alternatives.

## 1.4. Scope of the Report

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 Waste (Scotland) Regulations 2012. The options on the short-list are then reviewed against environmental and cost considerations. The options are then compared and the BPEO identified through an options appraisal process.

Further supporting information is provided in the four appendices:

- Appendix A: Dredging Sampling Plans
- Appendix B: Sediment Sampling Results
- Appendix C: Marine Directorate Action Levels
- Appendix D: Communications with consultees.

# 2. Sediment Sampling

## 2.1. Introduction

In line with Marine Directorate's guidelines on pre-dredge sampling protocol[1], sediment grab samples were taken using a Van Veen grab on the 20th May 2025 from six locations within the proposed dredge zones – three in the Marina and three in Port Henry. The locations from which samples were taken are presented in Table 2.1 and illustrated in Figure 2.1 and Figure 2.2. The full sampling plan is detailed in Appendix A: Dredging Sampling Plan. The number of sample locations were agreed in advance with Marine Directorate. For each of the samples the following chemical analysis was undertaken:

- Sediment water content.
- Total Organic Carbon (TOC).
- Sediment particle distribution (PSD).
- Metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), and zinc (Zn).
- Tributyl Tin (TBT).
- Polycyclic Aromatic Hydrocarbons (PAHs): US EPA 16.
- Poly Chlorinated Biphenyls (PCB): ICES 7.

[1] Marine Scotland Pre-disposal Sampling Guidance Version 2 – November 2017

*Table 2.1 Sampling location points for the Marina and Port Henry in WGS84 (UTM Zone 30N, degrees decimal minutes).*

| Sample | Latitude | Longitude |
|---|---|---|
| **Bay Marina A (1428671)** | 57° 29.79102' N | 001° 47.45074' W |
| **Bay Marina B (1428672)** | 57° 29.76552' N | 001° 47.4394' W |
| **Bay Marina C (1428673)** | 57° 29.7315' N | 001° 47.47881' W |
| **Port Henry Pier A (1428674)** | 57° 30.41016' N | 001° 46.38227' W |
| **Port Henry Pier B (1428675)** | 57° 30.40614' N | 001° 46.37566' W |
| **Port Henry Pier C (1428676)** | 57° 30.4023' N | 001° 46.38302' W |

All analysis was completed by a laboratory accredited to the ISO17025 standard for marine sediment analysis, and also engages in inter-comparison analysis exercises such as QUASIMEME. The limits of detection (LoD) and sensitivity requirements were met as per those set out in the Clean Seas Environmental Monitoring Programme (CSEMP) Green Book.

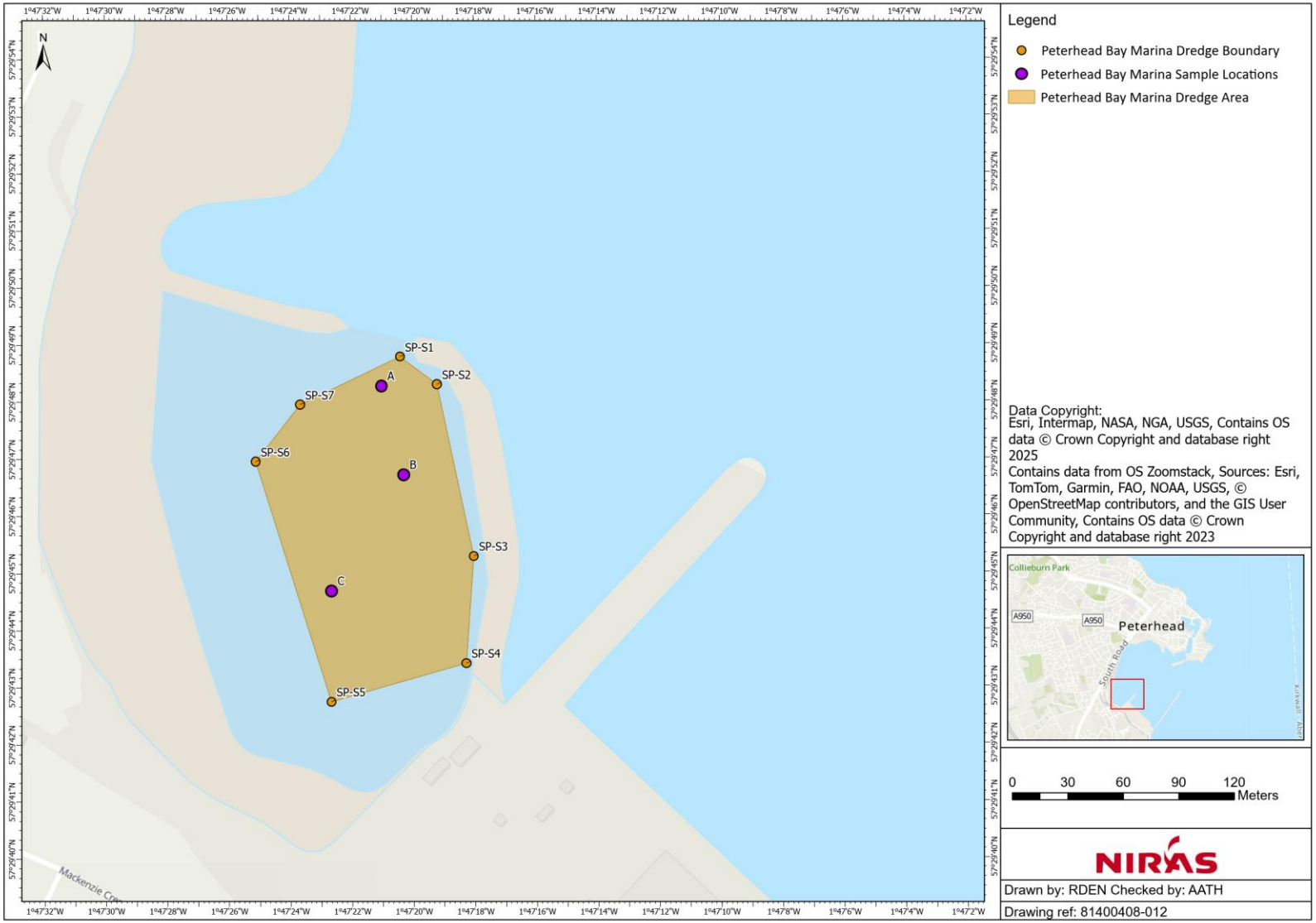


*Figure 2.1 Sampling locations in the Marina.*

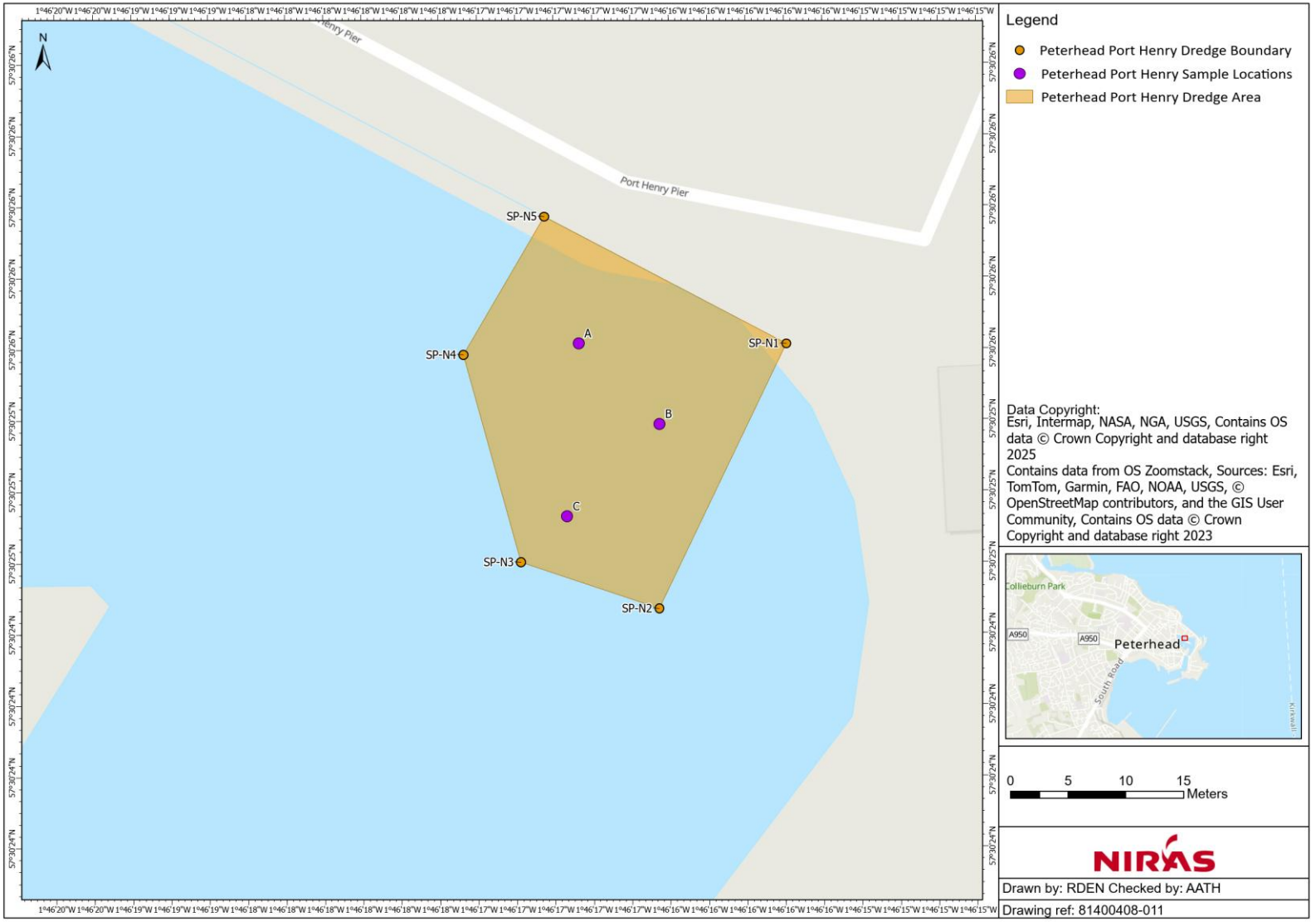


*Figure 2.2 Sampling locations in Port Henry.*

## 2.2. Results of Sediment Sampling

Sediment samples were collected at the locations detailed in Table 2.1. The full analyses of all samples are presented in Appendix B.

The physical characteristics result of sediment samples indicate that the sediment in the Marina area is predominantly comprised of sand (86.73% to 97.6%). There are smaller quantities silt present (1.99% to 12.89%), followed by gravel (0% to 0.41%). Table 2.2 details the physical characteristics results.

The physical characteristics results of sediment samples indicate that the sediment in the Port Henry area is predominantly sand (88.01% to 93.60%) or silty sand. There are smaller quantities silt present (5.85% to 11.02%), followed by gravel (0.54 % to 1.72%). Table 2.2 details the physical characteristics results.

*Table 2.2 Classification of sediment samples taken for dredging works.*

| Sample ID | Folk and Ward (1954) Classification | Major Sediment Fractions | | |
|---|---|---|---|---|
| | | % Gravel | % Sand | % Silt |
| **Bay Marina A (1428671)** | Sand | 0.41 | 97.6 | 1.99 |
| **Bay Marina B (1428672)** | Silty sand | 0 | 89.56 | 10.44 |
| **Bay Marina C (1428673)** | Silty sand | 0.38 | 86.73 | 12.89 |
| **Port Henry Pier A (1428674)** | Sand | 1.72 | 90.52 | 7.76 |
| **Port Henry Pier B (1428675)** | Silty sand | 0.97 | 88.01 | 11.02 |
| **Port Henry Pier C (1428676)** | Sand | 0.54 | 93.60 | 5.85 |

In terms of contaminants, sampling results from Port Henry did not exceed Marine Directorate Action Level 1 for organohalogens (PCBs). In some samples Action Level 1 was exceeded for PAHs, or copper and/or organotins. These instances are presented in Table 2.3 and

Table 2.4, respectively. All other results for trace metals, organotins, and PAHs were below Action Level 1 and no results exceeded Action Level 2. All results are provided in Appendix B and details of Action Levels can be found in Appendix C.

*Table 2.3 The Port Henry results which exceeded Action Level 1 for PAHs (blue text).*

| Sample ID | Benz(a)anthra-cene µg/kg | Di-ben(ah)anth-racene µg/kg | Fluoranthene µg/kg | Phenanthrene µg/kg | Pyrene µg/kg |
|---|---|---|---|---|---|
| **Port Henry Pier A (1435724)** | 110.22 | 9.08 | 57.99 | 26.04 | 48.59 |
| **Port Henry Pier B (1435725)** | 40.47 | 5.11 | 168.45 | 112.33 | 156.73 |
| **Port Henry Pier C (1435726)** | 78.81 | 10.25 | 40 | 24.2 | 32.32 |

*Table 2.4 The Port Henry results which exceeded Action Level 1 for trace metals and organotins (blue text).*

| Node | Copper (Cu) mg/kg | Tributylin (TBT) mg/kg |
|---|---|---|
| **Port Henry Pier A (1428674)** | 67.75 | 0.17 |
| **Port Henry Pier B (1428675)** | 56.37 | 0.04 |
| **Port Henry Pier C (1428676)** | 48.23 | 0.03 |

During the initial round of sediment sampling, the physical characteristics section of the results template was not processed and reported by the laboratory. Upon enquiry, the laboratory advised that all sediment from the first set of samples had been fully utilised during the chemical analysis, leaving no remaining material for particle size or physical characteristics testing, although information on other physical parameters such as moisture content was collected during the Waste Acceptance Criteria (WAC) analysis. Following correspondence with MD-LOT, it was agreed that a second round of sampling and laboratory analysis should be undertaken. During this second round, the laboratory reported specific gravity and sample volume for only one of the submitted sample volumes. As this reported specific gravity is consistent with values documented in historic EIA references for the site, it has been applied across all samples. In addition, because the second-round laboratory report did not include moisture content results for the samples, the moisture content values used in this report are taken from the measurements obtained during the first round of sampling.

# 3. BPEO Assessment Method

The BPEO study was undertaken using the following method:

- Identification of potential disposal options;
- Scoping and short-listing of options based on practicability;

- Assessment of the short-listed options based on:
  - strategic considerations;
  - health, safety and environment considerations i.e., what the impacts would be; and
  - cost, in terms of capital and operational costs.
- Comparison of the relative merits and performance of the options and identification of the BPEO.

The BPEO determination takes into account the Waste Hierarchy set out in Article 4(1) of the EU Waste Framework Directive (2008/98/EC) (European Parliament and of the Council, 2008). The Waste (Scotland) Regulations 2012 implement the Waste Framework Directive obligations in Scotland. Furthermore, the Environmental Protection Act 1990 section 34 makes it the duty of everyone who produces, keeps or manages controlled waste, or as a broker or dealer has control of such waste, to take all such measures available to that person as are reasonable in the circumstances to apply the waste hierarchy set out in Article 4(1) of the Waste Directive. The waste Hierarchy places emphasis on minimisation and re-use of dredged material, with sea deposit only being used if no alternative options are available (Figure 3.1).

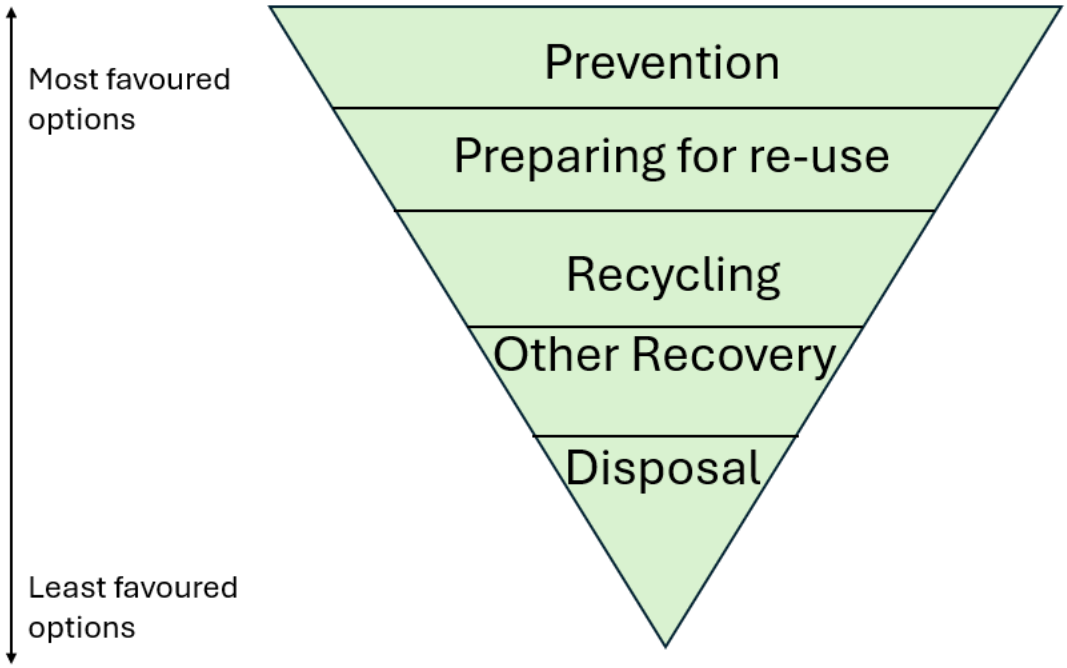


*Figure 3.1 Waste hierarchy for dredged material.*

## 3.1. Identification of Options

An evaluation of dredge material disposal methods was conducted through a desk-based analysis of standard disposal practices. Relevant regulators and statutory bodies were asked for any relevant information that they hold or any comment on the options for disposal of the dredged material. Table 3.1 summarises the responses received, with full responses provided in Appendix D.

*Table 3.1 Summary of consultee responses.*

| Consultee | Response |
|---|---|
| Aberdeenshire Council | Council advised that SEPA and MD-LOT should be consulted. Council confirmed that there are no plans for beach nourishment in the next 12-18 months. |
| SEPA | Dredged material might not be suitable for beach nourishment. It needs to be of similar composition to existing beach materials. Because dredged material is from a working harbour, there may be contaminants present. Marine Directorate should be consulted on disposal method. NatureScot should be consulted to determine if there is any anticipated impact to nearby conservation areas. |
| NatureScot | No further advice received. |
| Crown Estate Scotland | Confirmed that previous dredging operations in Peterhead have used the CR080 disposal site and Crown Estate Scotland will be content for that site to be used again. Number of samples confirmed to be in order. |
| Northern Lighthouse Board (NLB) | Advised the NLB would formally respond to MD-LOT's request upon receipt. Advised that PPA should issue marine safety advice ahead of dredging and inform the UK Hydrographic Office of the changing depths so that charts can be updated. |
| Maritime and Coastguard Agency (MCA) | MCA confirmed that works fall under the jurisdiction of the Statutory Harbour Authority, PPA. MCA confirmed no objection to dredging on the understanding that all maritime safety legislation is followed. |
| Marine Directorate | General information given on how to apply for a dredging marine licence and selecting a disposal site. |

Eight treatment/disposal options have been identified:

- Option 1: Do Nothing
- Option 2: Coastal Reclamation
- Option 3: Construction Material
- Option 4: Landfill
- Option 5: Agricultural Use
- Option 6: Beach Nourishment
- Option 7: Incineration
- Option 8: Disposal to Sea.

### 3.1.1. Summary

Beach nourishment was assessed as an option for dredged material from the Marina. Low levels of contamination were found in the Port Henry samples which make them unsuitable for use in beach nourishment. This option was deemed unsuitable as there are no sites nearby planned for beach nourishment, according to communications with Aberdeenshire Council.

Option 8: Disposal to Sea

## 3.2. Method of Assessment

An initial assessment is conducted on each option detailed in Section 3.1 exploring the suitability of each option with regards the amount of dredge material to be disposed, its composition, and the presence of any contaminants. At this stage, options may be ruled out and only those short-listed will be brought to the next stage of assessment.

The parameters which were used to assess the short-listed disposal options are discussed below.

### 3.2.1. Strategic Considerations

Strategic Considerations include:

- Operational Feasibility: Assessing if the option is technically and operationally viable.
- Availability of Sites/Facilities: Evaluating the presence of sites or facilities capable of handling the dredge spoil.
- Security of Option: Ensuring Peterhead Harbours can oversee all disposal stages.
- Established Practice: Considering if the technologies and techniques are proven, allowing for predictable performance and challenges.
- Public Acceptability: Determining the likelihood of public support or opposition to the proposals.
- Agency Acceptability: Anticipating any significant concerns from public agencies during the FEPA application consultation.
- Legislative Implications: Ensuring compliance with relevant laws and assessing the required management controls.

### 3.2.2. Health, Safety and Environmental Considerations

The factors used to assess the health, safety and environmental performance of the options are:

- Safety: Identifying potential hazards and the likelihood of risks to the public or workers.
- Public Health: Evaluating the risk of adverse effects on public health based on predicted exposure pathways and receptors.
- Pollution/Contamination: Determining the potential for pollution or contamination that could lead to exceeding Action Level thresholds.
- Ecological Impact: Assessing the potential impact on significant habitats or species.
- Interference: Considering the potential impacts on other activities, such as estuary, dock, or road users.
- Amenity/Aesthetic: Evaluating the potential visual impact and effects on local amenities.

### 3.2.3. Cost Considerations

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

- Capital costs; and
- Operational costs (i.e., transport and disposal costs).

Costs in relation to each option are categorised into the following bands:

• Low – broadly within the range of some tens of thousands of pounds sterling.
• Medium – within the range of low hundreds of thousands of pounds sterling.
• High – potentially exceeding several hundreds of thousands of pounds sterling.

# 4. Scoping of Potential Options

This section describes potential options for the dredged material. Where an option is not considered feasible, the reason is given, and it is not taken forward to the assessment stage. Options that are considered practicable are considered in Section 5.

## 4.1. Option 1: Do Nothing

In the baseline scenario, the proposed capital dredging would not occur at the Marina and Port Henry. In such a do-nothing scenario, both sites would not be able to service existing and new customers because the vessels would ground without dredging as sediment would continue to build up, reducing water depth and ability for vessels to sail. This progressive reduction in navigable depth would also create an unacceptable risk to navigation, as vessels attempting to access or manoeuvre within the Marina or Port Henry could experience grounding, restricted movement, or loss of safe under-keel clearance. While avoiding dredging would prevent waste generation, this option is deemed impractical as it would not provide the necessary depth for vessels and operation of the sites will eventually cease.

This option has been discounted.

## 4.2. Option 2: Coastal Reclamation

Coastal reclamation involves converting coastal wetlands or shallow seas into dry land or enclosed shallow water bodies. The dredged material, which can include sand, silt, clay, and gravel, is excavated from the seabed using dredgers and transported to the reclamation site, where it undergoes processes such as landing, storage, dewatering, and possibly desalination to make it suitable for use. Once prepared, the material is placed at the reclamation site to create new land or restore eroded areas. This can involve spreading the material in thin layers to build up the land gradually. In this occasion, coastal use involving pumping or spraying the material directly from the dredger or barge to the site where it was needed is not feasible given the nature of the material to be dredged.

The material grade and quality are critical: material suitable for reclamation is generally medium to coarse sands and gravel fractions, typically in large volumes. The results of sediment sampling at the Marina and Port Henry indicate a high sand content, followed by lower silt and gravel content. As such, coastal reclamation could be possible with minimal sorting required of the dredged material. In determining the need for coastal reclamation, local sites should be investigated and dredged material contamination levels explored.

This option is considered further in Section 5.1.

## 4.3. Option 3: Construction Material

Reusing dredged material as construction material in onshore construction projects would involve landing, drying, and transporting the material. Any material that is re-used will need to be assessed to ensure it is geotechnically suitable. On occasions, additional material might need to be added to ensure the dredge material is compliant with specifications for infill and/or treatment for contamination then relocated to be deposited in the reclaim.

While the dredged material could potentially be used for quarry or landfill capping, the presence of PAHs in the Port Henry sampling results makes this option unattractive. The saline content of both sites' dredged material

also makes it unsuitable as a construction material. The grading and washing required coupled with the drying and storage challenges previously identified makes this option uneconomical and unpractical.

This option has been discounted.

## 4.4. Option 4: Landfill

A common use of dredged material within landfill sites is as capping or restoration material. Material would need to be brought ashore, e.g. at Peterhead harbour, and dewatered before being transported to trucks and taken to the landfill site by road. It is assumed that the waste would need to be transported to either Stonyhill Environ Park or Savoch Quarry for disposal as these are the nearest suitably licenced sites to Peterhead Port.

Existing landfill sites must cope with large volumes of domestic and industrial requirements, and marine dredgings on the present scale would place an intolerable burden on such sites. Dredged material is relatively inert by landfill standards, so disposal at a landfill site is not usually necessary or recommended unless it is significantly contaminated, which it is not in this case (see Section 2.2).

Dredged material would have to be dried in lagoons before being transported by road to the landfill site. Suitable land for drying lagoons is not available within the port estate due to the location of the construction site and the port subletting land. Transportation of material from the port to the landfill would generate significant vehicle movements on local roads, contributing to congestion and air and noise pollution, as well as road safety concerns.

Landfill is one of the least favoured disposal methods based on the waste hierarchy (Figure 3.1) and should only be considered when all other options have been discounted.

Based on the significant operational and financial cost of landfill disposal, this option has been discounted.

## 4.5. Option 5: Agricultural Use

The Northeast of Scotland is a rural farming area with an abundance of good arable land and there is no known requirement for a supplement of imported material. The dredged material would have to be de-watered and desalinated to make it suitable for soil conditioning or spreading, and no land is available to locate a drying lagoon. Transportation of material from the harbour to agricultural land would generate significant vehicle movements on local roads, contributing to traffic congestion and air and noise pollution with associated carbon emissions.

This option has been discounted.

## 4.6. Option 6: Beach Nourishment

The use of dredged material for beach nourishment or recharge is a sustainable beneficial use: it generates a purpose for the material that benefits a local amenity. Material is typically deposited direct from the dredging vessel via a pipeline or by 'rainbowing' onto the beach, where it is reprofiled using land-based plant.

The results of sediment sampling at the Marina and Port Henry indicated that the sediment is predominantly sand with low levels of silt and gravel. Beach nourishment requires sediment with high quantities of sand, which makes the dredged material at both sites suitable for this re-use. In determining the need for beach nourishment, local sites should be investigated and dredged material contamination levels explored.

This option is considered further in Section 5.2.

## 4.7. Option 7: Incineration

Incineration of dredged material would involve landing, dewatering, possibly storing, and transporting it to an incinerator. The nearest incinerator to Peterhead Harbour is in Aberdeen[2]. The resulting ash would need to be disposed of, with options including landfill, reclamation, or spreading on agricultural land. However, the dredged material has a low organic content (around 1%) with up to 93.6% and 97.6% of the material volume being sand at the Port Henry and the Marina, respectively, making it unsuitable for efficient combustion, as incinerators typically require an organic content above 20%.

This option has been discounted.

## 4.8. Option 8: Disposal at Sea

Disposal at sea involves transporting dredged material to a licensed marine spoil disposal site using a dredging vessel. This method does not require landing the material onshore. Instead, the dredger travels to the designated disposal site and releases the material, e.g. through bottom doors or a split hull.

MD-LOT designates these marine deposit sites. Although the dredged material meets the chemical requirements for sea disposal (below AL2), the exceedances of AL1 and T50 at the Port Henry necessitate engagement with the Marine Directorate to agree on disposal strategies.

There are two licenced marine spoil disposal grounds in close proximity to Peterhead: Peterhead (Site ID: CR070) and North Buchan Ness (Site ID: CR080) as shown in Figure 4.1. It is understood that CR070 has been closed since 2018 and therefore CR080 would be considered for use in this project. CR080 is also the closer of these two sites to Port Henry and the Marina, as evident in Figure 4.1.

The nature of the dredged material and the proximity of a suitable licensed deposit site make deposition at sea a viable option, which will be considered in detail in Section 5.3 .

[2] UK Incinerators – United Kingdom Without Incineration Network (ukwin.org.uk) [Accessed 10/03/2025]

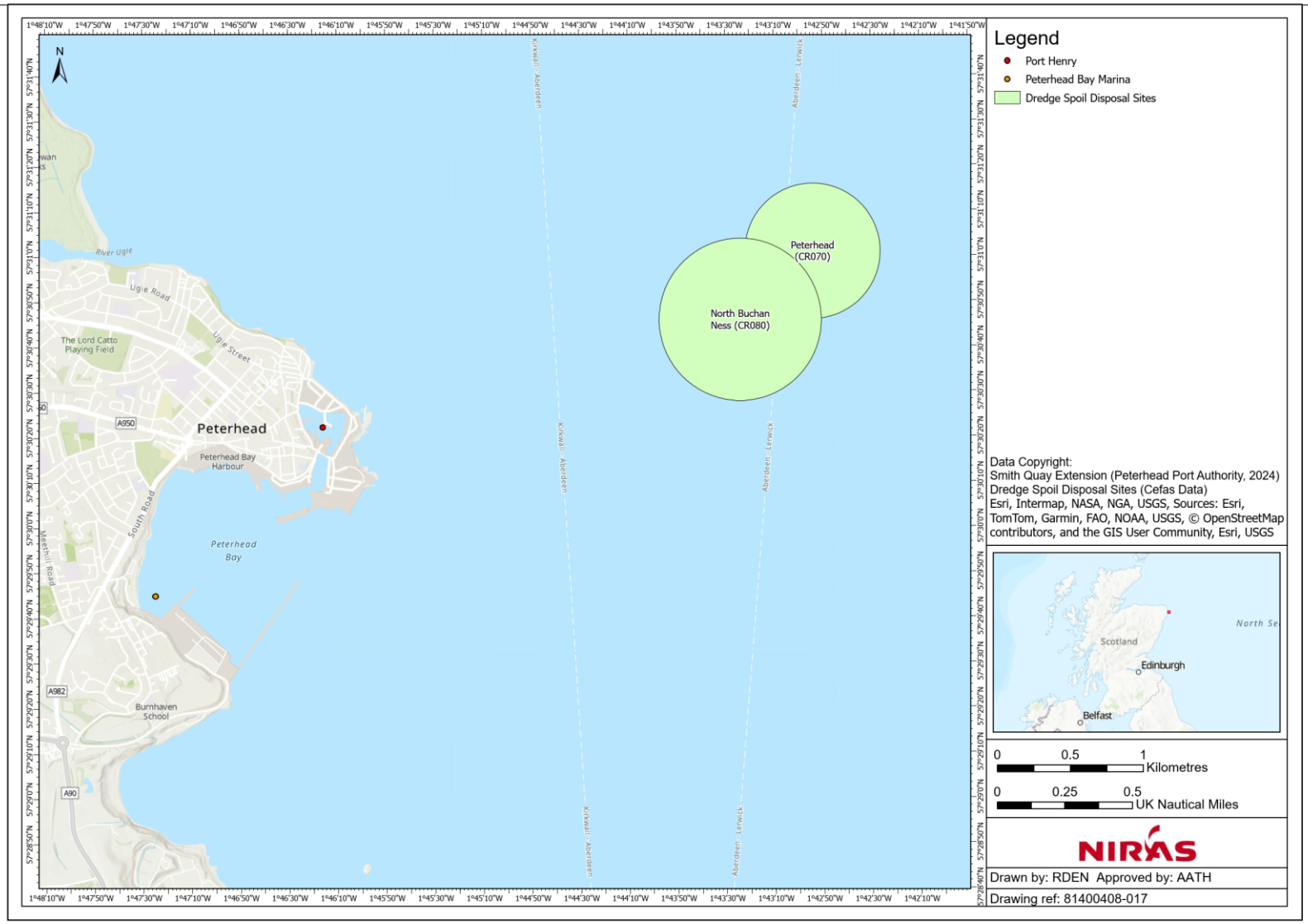


*Figure 4.1 Dredge spoil disposal sites within range of Peterhead Harbour.*

## 4.9. Short-list Conclusion

Table 4.1 details the options that have been initially investigated for this dredging work and whether they have been discounted or progressed to the assessment stage (short-listed). Of the eight options, three have been further progressed: coastal reclamation, beach nourishment, and disposal at sea.

*Table 4.1 Summary of options and the outcome of scoping.*

| Option | Outcome |
|---|---|
| **Option 1: Do Nothing** | Discounted |
| **Option 2: Coastal Reclamation** | Short-listed |
| **Option 3: Construction Material** | Discounted |
| **Option 4: Landfill** | Discounted |
| **Landfill is one of the least favoured disposal methods based on the waste hierarchy (Figure 3.1) and should only be considered when all other options have been discounted.**<br><br>**Based on the significant operational and financial cost of landfill disposal, this option has been discounted.**<br><br>**Option 5: Agricultural Use** | Discounted |
| **Option 6: Beach Nourishment** | Short-listed |
| **Option 7: Incineration** | Discounted |
| **Option 8: Disposal at Sea** | Short-listed |

# 5. Assessment of Available Disposal Options

In this section, Options 2, 6 and 8 are considered in greater detail. The BPEO assessment comprises three aspects: strategic, environmental, and cost considerations.

## 5.1. Option 2: Coastal Reclamation

### 5.1.1. Strategic Considerations

*Operational Aspects*

The reuse of the dredged material for reclamation will involve either direct pumping from the dredger into the disposal site or landing and drying the material and desalination prior to transporting the material for disposal on land. This option would be feasible if disposal sites were available adjacent to Peterhead Harbour.

*Availability of Sites*
PPA and the local authority are the most likely bodies to be responsible for or aware of reclamation projects in the Aberdeenshire area. No sites for coastal reclamation have been identified through the consultation process as requiring any of the dredged material.

*Legislative Implications*
The use of suitable dredged materials in coastal reclamation is common practice, and the technologies and techniques are well established, however, this is for dredged primary aggregate materials such as sands and gravels.

The use of dredged material in land reclamation rates is mid-level in the waste hierarchy (Figure 3.1). Guidance and permission would be required from the Aberdeenshire Council, SEPA, and the CES to determine appropriate sites to ensure no contamination and the availability of sites.

Once the material has been removed from Peterhead Harbour it would be classed as waste under the Waste Management Licensing (Scotland) Regulations, 2011 and the disposal would therefore require a waste management licence and an exemption for any reclamation works. As well as a Marine Licence for the construction works, consent would be required from the planning authority, and a levy may be due to the CES.

*Third Party Considerations*
There would be minimal impact to third parties assuming that material would be brought onshore at an operation port and used within a wider reclamation project.

### 5.1.2. Environmental Considerations

*Public Safety Implications*
Transferring the dredged material ashore has risks associated with operational activities, all of which have standard mitigation measures in place. Should the dredged material be transported by HGV, there may be an 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.

*Public Health Implications*
There may be localised and temporary deterioration in air quality, e.g. as a result of intermittent increase in HGV movements if such are used to transport material.

*Pollution/Contamination Implications*
The material may be classified as hazardous or non-hazardous (i.e. not inert) due to the concentration of contaminants with respect to land-based disposal; however, further analysis would be required to confirm this, and run-off and leaching would need to be controlled.

*Ecological Impact*
There are unlikely to be significant ecological risks resulting from the use of dredged materials for reclamation, beyond those associated with any such scheme in the first instance assuming any contaminants are contained within the site. If the site was to be used for terrestrial habitat creation, then the salt levels could limit plant growth.

*Amenity/Aesthetic Implications*
No specific risks for amenity or aesthetics (visual impact) are identified, beyond those associated with any coastal reclamation project..

### 5.1.3. Cost Considerations

To support comparison between options, costs are expressed using qualitative cost bands rather than specific monetary values. These reflect the typical scale of capital and operational expenditure associated with dredging, transport, and material management:

- Low – broadly within the range of some tens of thousands of pounds sterling.
- Medium – within the range of low hundreds of thousands of pounds sterling.
- High – potentially exceeding several hundreds of thousands of pounds sterling.

These bands reflect typical Scottish dredging market conditions and avoid reliance on project-specific contractor pricing.

Coastal reclamation requires the controlled placement of dredged material to create or raise land levels within a defined reclamation footprint. This option typically involves higher capital expenditure due to the need for engineered containment structures, preparation of the reclamation area, and mobilisation of specialised placement equipment. Operational costs are influenced by transport distance, material handling requirements, and the need for ongoing monitoring during placement.

Given the engineering complexity and the scale of material management involved, the overall cost profile for coastal reclamation is assessed as **High**. Expenditure is generally expected to fall within the upper hundreds of thousands, with potential for higher costs depending on the extent of containment works and the duration of the dredging campaign once a location is identified.

### 5.1.4. Summary

This option was deemed unsuitable as there are no sites for coastal reclamation have been identified, according to communications with Aberdeenshire Council. The operational and financial cost of coastal reclamation is also considered to be significant.

## 5.2. Option 6: Beach Nourishment

### 5.2.1. Strategic Considerations

*Operational Aspects*

Beach nourishment would require either a pipeline connected to the dredger to pump material ashore onto the beach, or a dredger capable of accessing the nearshore area to discharge the material directly using a 'rainbowing' technique. Both the pipeline and rainbowing methods take significantly longer to discharge than the open water bottom-dumping method.

For the pipeline method, the loaded dredger would moor at a suitable point offshore and a floating pipeline would pump material onto the beach, where it would then be reprofiled using land-based mechanical plant.

For the rainbowing method, the dredging vessel must have sufficiently shallow draft to access the shallow nearshore area.

The exact dredging equipment is not known at this time. It will be determined once the dredging contractor is commissioned.

*Availability of Sites*
Aberdeenshire Council were contacted and requested to supply information on sites needing beach nourishment over the next 12-18 months in the area surrounding Peterhead that could be used as a disposal site for the Marina dredge material. Their response if summaries in Table 3.1 and in full in Appendix D. They have stated that they have no plans within the next 12-18 months for beach nourishment in the area surrounding Peterhead.

*Legislative Implications*
Standing advice from the Scottish Environment Protection Agency (SEPA) states that waste material, which includes dredged material, deposited above the low water mark is subject to Waste Management Licensing controls regulated by SEPA unless it is subject to a licence issued under Part 4 of the Marine (Scotland) Act 2010, in which case it is excluded from such controls (SEPA, 2016), provided that it does not constitute a landfill (which is not applicable to this project). As beach nourishment would require a marine licence, it is assumed that a separate Waste Management Licence would not be required.

Section 34 of the Environmental Protection Act 1990 (as amended) makes it a duty to take all measures available as are reasonable in the circumstances to apply the waste hierarchy set out in Article 4(1) of the Waste Directive. The waste hierarchy ranks waste management options according to the best environmental outcome taking into consideration the lifecycle of the material. In its simplest form, the waste hierarchy gives top priority to preventing waste. When waste is created, it gives priority to reuse, then recycling, then other recovery, and last of all disposal. The option to reuse the material for beach nourishment ranks highly on the waste hierarchy; it negates the need to otherwise dispose of the material.

Marine Directorate's approval would be necessary for this approach, which is only suitable for small volumes of material (less than 5,000 $m^3$). The process would involve sampling the proposed recharge area to ensure the receiving material is appropriate, followed by monitoring the disposal site and adjacent areas for sediment movement for at least two years before and after the recharge. A detailed methodology has not been developed at this stage due to the time and costs associated with the required assessment and monitoring, which do not align with the project timeline.

*Third Party Considerations*
The pipework and bunds required to pump the dredged material ashore would create a temporary barrier along the beach. This would prevent the public from accessing parts of the beach when the dredging and beach recharge would take place. This is likely to be manageable through a communications plan and planning works outside the main recreational season (May-September).

### 5.2.2. Environmental Considerations

*Public Safety Implications*
A pipeline over a beach could pose a tripping hazard or falling from height hazard and would have to be cordoned off. The construction plant required to spread the material would present a small risk to users of the beach.

*Public Health Implications*
There is no public health risk given that the dredged material is naturally occurring sediment that is suitable for beach nourishment. Low levels of contamination were found in the Port Henry samples which make them unsuitable for use in beach nourishment.

*Pollution/Contamination Implications*
The Port Henry dredge material poses a low risk of pollution or contamination resulting from the material. The Marina dredge material does not pose a risk of pollution or contamination resulting from the material.

*Ecological Impact*
There are unlikely to be any ecological risks resulting from the use of dredged materials from the Marina for beach nourishment, due to the lack of contaminants in the material. There would be no significant impact on national or local priority species or habitats.

*Amenity/Aesthetic Implications*
The temporary stockpiling of the dredged material would not be aesthetically pleasing, but otherwise of little implication. There would be temporary access restrictions on the beach whilst the recharge activity was on-going.

#### 5.2.3. Cost Considerations
Beach nourishment requires transporting dredged material to a suitable nearshore or foreshore location and placing it in a controlled manner to supplement existing beach levels. This option typically involves additional handling and mobilisation of specialised equipment for nearshore placement. Operational costs are influenced by transport distance, placement method, and the need for environmental supervision during works.

Overall, the cost profile for beach nourishment is assessed as **Medium to High**, depending on the proximity of the nourishment site and the scale of material placement required.

#### 5.2.4. Summary
Beach nourishment was assessed as an option for dredged material from the Marina. Low levels of contamination were found in the Port Henry samples which make them unsuitable for use in beach nourishment. This option was deemed unsuitable as there are no sites nearby planned for beach nourishment, according to communications with Aberdeenshire Council.

### 5.3. Option 8: Disposal to Sea
The use of North Buchan Ness (CR080) is proposed as it has historically been used (with no known adverse effects) for the disposal of dredged material from Peterhead Harbour and is the closest site to the port, thus minimising the distance for vessel transport and the carbon footprint.

#### 5.3.1. Strategic Considerations

*Established Practice*
Dredging and deposition at sea is an established practice at Peterhead Harbour throughout its history. Dredged material has been disposed of offshore in the North Buchan Ness (CR080) spoil ground, shown in Figure 4.1.

*Operational Aspects*
The practicalities of depositing dredged material at the designated North Buchan Ness (CR080) site are straightforward: it is likely that an excavator onboard a barge will be used, which would discharge directly at the deposit site. No preparation of the material is required prior to deposition.

*Availability of Sites*
The licensed deposit site is available for the acceptance of dredged material and has been used for many years by the harbour.

*Legislative Implications*
Under the provisions of Marine Directorate, a dredging license is required. This requires the acceptance of the BPEO by the statutory consultees.

The option to deposit the material at an offshore site ranks poorly on the waste hierarchy (see Section 0 for details). To minimise waste generation and to manage the high costs and logistical challenges of accommodating a dredger in the harbour, PPA dredges only the volume of material required to maintain the navigation channel and berths at the published depths.

*Third Party Considerations*
The North Buchan Ness (CR080) spoil ground is a licenced disposal ground and given that the dredge material has shown relatively low levels of contamination it is unlikely that there will be objections to disposal.

### 5.3.2. Environmental Considerations

*Public Safety Implications*
Deposition at sea would have negligible implications for safety providing that normal navigational and maritime procedures are observed.

*Public Health Implications*
There are no known threats to public health associated with deposition at sea.

*Pollution/Contamination Implications*
As presented in Section 2.2, the material to be dredged contains isolated elevations above Marine Directorate Revised Action Level 1 for PAHs, but not to an extent that would prevent deposition of the material in the marine environment. The risk of pollution/contamination is very low.

*Ecological Impacts*
The disposal operations may affect the benthic fauna in proximity to the disposal site due to suspended sediments depositing on the seabed outside the disposal site. It is anticipated that there will not be any significant impact on the surrounding marine ecosystem given the scale and duration of effects. There may be some short-term effects such as displacement of migrating fish due to increased turbidity caused by the discharge of dredged material into the water column, but these impacts are not predicted to cause mortality, significantly affect migration routes or affect the viability of populations.

*Interference with Other Activities*
There is the potential for interference between the dredging vessel and other users of the sea (e.g. fishing vessels and recreational vessels). This is managed through compliance with harbour byelaws and standard communications between the dredging crew, PPA, and other users. The works are planned outside the main recreational season to minimise disruption where possible.

*Amenity/Aesthetic Implications*
There are no amenity or aesthetic implications of depositing material at a designated offshore site.

#### *5.3.2.1. Ecological Implications*
Deposition at sea can smother marine life on the seabed within the site. As the site has been in use for many years and is subject to annual deposition of material, it is likely that any benthic species in or around the site can tolerate the periodic disturbance caused by deposition and temporary increased turbidity.

### 5.3.3. Cost Considerations

Sea disposal at the designated deposit site is considered a direct and operationally efficient solution. Capital expenditures are confined to standard dredging mobilisation activities, while operating costs are primarily associated with vessel transit time between the dredging location and the disposal site. Given the proximity of the deposit site to the dredging area, transportation distances—and consequently, fuel expenses—are minimised.

Accordingly, this option is assessed as **Low to Medium** cost.

### 5.3.4. Summary

Sea disposal was assessed for both the Port Henry and the Marina. It was determined to be the most suitable option based on cost and operational timescales. The North Buchan Ness (CR080) disposal site has been identified as the most appropriate site.

# 6. Additional Assessment

Due to the exceedances of Action Level 1 at the Port Henry, it is necessary to conduct an additional assessment to determine if the dredged material is suitable for sea disposal. This assessment will compare the laboratory sample results with other recognised sediment assessment criteria.

## 6.1. Assessment criteria

The Background Assessment Concentration (BAC) was developed by the OSPAR Commission as a statistical tool to assess contaminant concentrations in the marine environment. BACs are used to test whether observed concentrations are near background levels for naturally occurring substances or close to zero for man-made substances (OSPAR, 2005-6). The BACs have been developed for various substances, including polybrominated diphenyl ethers (PBDEs) in fish and shellfish, and are part of the OSPAR Commission's Comprehensive Environmental Monitoring Programme (CEMP), which includes methods for data screening, quality assurance, temporal trend assessment, and assessment against criteria. BACs were calculated by OSPAR using samples taken from four regions: south North Sea, north North Sea, Barents Sea, and Arctic to Iceland.

The aforementioned background approach had raised concerns in the past as it did not consider the types of biological resources in aquatic environments or the concentration levels at which these organisms would experience adverse effects. To address these limitations, sediment quality guidelines were developed to assess sediment quality by identifying contaminant concentrations that cause harmful effects (Wenning and Ingersoll, 2002).

The Effects Range Low (ERL) was adopted by the United States Environmental Protection Agency (USEPA) as a measure of toxicity in marine sediment. ERLs are used to assess the ecological significance of sediment concentrations and to formulate guidelines for assessing toxicity hazards, particularly from trace metals or organic contaminants. ERLs identify threshold concentrations that, if exceeded, are expected to produce ecological or biological effects based on the literature evaluated (US EPA, n.d.). Concentrations below the ERL rarely cause adverse effects in marine organisms, while concentrations above the ERL often cause adverse effects in some marine organisms. Sediment condition is determined by comparing the observed concentrations to ERL and Effects Range Median (ERM) values developed by the National Oceanic and Atmospheric Administration. Sediment contamination is rated moderate if five or more ERLs are exceeded and high if one or more ERMs are exceeded. Additionally, sediment toxicity depends not only on the concentrations of toxic materials but also on their biological availability, which is controlled by factors such as acid volatile sulphides, pH, particle size and type, organic content, resuspension potential, and the specific form of contaminant. Biological availability is determined

in practice by bioassays that expose test organisms to sediments and evaluate their effects on the organisms' survival.

The Probable Effects Level (PEL) for marine environments is a sediment quality guideline adopted from the Canadian Environmental Quality Guidelines. PELs are used to evaluate the degree to which adverse biological effects are likely to occur as a result of exposure to contaminants in sediments. The Canadian Council of Ministers of the Environment (CCME) developed these guidelines to ensure the protection of aquatic life by setting benchmarks for sediment quality[3]. PEL values represent concentrations above which adverse biological effects are frequently found. These guidelines help in assessing the ecological significance of sediment contamination and are part of the broader framework for protecting aquatic life. The guidelines provide threshold effects levels (TELs) and PELs for various contaminants, including polycyclic aromatic hydrocarbons (PAHs), trace metals, and other organic compounds.

## 6.2. Assessment

The Assessment of the results where Action Level 1 was exceeded for PAHs and trace metals are presented in Table 6.1. Specifically, the table includes the concentrations of Benz(a)anthracene, Diben(ah)anthracene, Fluoranthene, Phenanthrene, Pyrene, Copper, and Tributyltin in the three sample locations at Port Henry and their average value, along with the values of Action Level 1, Action level 2, BAC, ERL, ERM and PEL where one is available. Historical data from sampling that took place in 2010 have also been reported to assist with the assessment.

[3] CCME: https://ccme.ca/en/summary-table#void [Accessed July 2025]

*Table 6.1 Results at Port Henry exceeding Action Level 1 (blue text are values exceeding Action Level 1, red text are values exceeding Action Level 2).*

| | | Benz(a)anthracene (µg/kg) | Di-ben(ah)anthracene (µg/kg) | Fluoranthene (µg/kg) | Phenanthrene (µg/kg) | Pyrene (µg/kg) | Copper (Cu) mg/kg | Tributyltin mg/kg |
|---|---|---|---|---|---|---|---|---|
| **Samples** | Port Henry Pier A (1435724) | 110.22 | 9.08 | 57.99 | 26.04 | 48.59 | 67.75 | 0.17 |
| | Port Henry Pier B (1435725) | 40.47 | 5.11 | 168.45 | 112.33 | 156.73 | 56.37 | 0.04 |
| | Port Henry Pier C (1435726) | 78.81 | 10.25 | 40.00 | 24.20 | 32.32 | 48.23 | 0.03 |
| | **Average** | **76.5** | **8.2** | **88.8** | **54.2** | **79.2** | **57.5** | **0.08** |
| **Historical sampling 2013** | Port Henry S19 | 70 | <40 | 200 | 210 | 360 | 461 | <0.01 |
| **Action Levels** | Action Level 1 | 100 | 10 | 100 | 100 | 100 | 30 | 0.1 |
| | Action Level 2 | | - | - | - | - | 300 | 0.5 |
| **Assessment Criteria** | BAC | 16 | - | 39 | 32 | 24 | 27 | - |
| | ERL | 261 | 63.4 | 600 | - | 665 | 34 | - |
| | ERM | 1600 | 260 | 5100 | 1500 | 2600 | 270 | - |
| | PEL | 693 | 135 | 1494 | 544 | 1398 | 108 | - |

### 6.2.1. Benz(a)anthracene

The average concentration of Benz(a)anthracene across the three sample locations is exceeds the BAC. However, the concentration is significantly below Action level 1 and the ERL, ERM and PEL thresholds, indicating that the sediment quality is within acceptable limits for this PAH.

### 6.2.2. Diben(ah)anthracene

The average concentration of Diben(ah)anthracene across the three sample locations does not exceed Action Level 1, ERL, ERM and PEL thresholds, indicating that the sediment quality is within acceptable limits for this PAH.

### 6.2.3. Fluoranthene

The average concentration of Fluoranthene across the three sample locations is exceeds the BAC. However, the concentration is significantly below Action Level 1, ERL, ERM and PEL thresholds, indicating that the sediment quality is within acceptable limits for this PAH.

### 6.2.4. Phenanthrene

The average concentration of Phenanthrene across the three sample locations exceeds the BAC threshold. However, the concentration does not exceed Action Level 1, ERM, and PEL thresholds, indicating that the sediment quality is within acceptable limits for this PAH.

### 6.2.5. Pyrene

The average concentration of Pyrene across the three sample locations is exceeds the BAC and Action level 1. However, the concentration is significantly below the ERL, ERM and PEL thresholds, indicating that the sediment quality is within acceptable limits for this PAH.

### 6.2.6. Copper

The Copper concentration in all three samples is above the ERL value of 34 mg/kg but below the PEL value of 108 mg/kg1. This indicates that while there is some potential for ecological effects, the sediment quality is within acceptable limits for copper. Additionally, the copper concentration has decreased significantly since the 2013 sampling.

### 6.2.7. Tributyltin

The average concentration of Tributyltin across the three sample locations does not exceeds the Action level 1 threshold indicating the sediment quality is acceptable for organotin limits.

# 7. Conclusion

The dredge spoil is predominantly sand. The material to be dredged from the Marina is suitable for beach recharge due to the high level of sand. Although the sediment samples at Port Henry also indicate high levels of sand, the material is not suitable for beach nourishment due to the presence of contaminants such as trace metals and PAHs. However, no sites requiring beach nourishment in the Peterhead/Aberdeenshire area have been identified.

Option 8: Sea Disposal was determined to be the best option in terms of operational, environmental, and cost considerations for dredged material at both the Marina and the Port Henry. The disposal site identified is North Buchan Ness (CR080), located approximately 3.4 km northeast of Peterhead Port.

# 8. References


European Parliament and Council (2008). Directive 2008/98/EC of 19 November 2008 on waste and repealing certain Directives. Official Journal of the European Union L 312/3, 22.11.2008.

Folk RL, Ward WC (1957). A Study in the Significance of Grain Size Parameters. Journal of Sedimentary Petrology, 27(1), 3–26. Available at: https://doi.org/10.1306/74D70646-2B21-11D7-8648000102C1865D

Marine Scotland. (2017) Pre-disposal Sampling Guidance. Version 2, November 2017. Available at: https://www.gov.scot/publications/pre-disposal-sampling-guidance-version-2/ (Accessed: 10 March 2025).

Marine Scotland (n.d.). National Marine Plan Interactive. Atkins Geospatial. Available at: https://marinescotland.atkinsgeospatial.com/nmpi/ (Accessed: 10 March 2025).

OSPAR (2005-6). Agreement on Background Concentrations for Contaminants in Seawater, Biota and Sediment, OSPAR Agreement 2005-6, Replaces OSPAR Agreement 1997-14.

Scottish Environment Protection Agency (SEPA) (2016). Land Use Planning System SEPA Guidance Note 13: SEPA Standing Advice for Marine Scotland on Marine Consultations. Issue 5.0, 29 September 2016. Available at: SEPA Guidance Note 13 PDF

United Kingdom Without Incineration Network (UKWIN) (n.d.). UK Incinerators. Available at: https://ukwin.org.uk (Accessed: 10 March 2025).

USACE (n.d.). Beneficial Uses of Dredged Material. Washington, DC: United States Army Corps of Engineers New York District. https://www.nan.usace.army.mil/Missions/Navigation/Dredged-Material-Management-Plan/Beneficial-Uses-of-Dredged-Material/

U.S. Environmental Protection Agency (n.d.). Indicator: Coastal Sediment Quality Index (333). https://cfpub.epa.gov/roe/indicator_pdf.cfm?i=40 [Accessed July 2025].

VIMS (2023). Beach Nourishment & Dune Restoration. Gloucester Point, VA: Virginia Institute of Marine Science Center for Coastal Resources Management. https:// www.vims.edu/ccrm/outreach/living_shorelines/design/non_structural/beach_dune/index.php

Wenning RJ, Ingersoll CG (2002). Summary of the SETAC Pellston Workshop on Use of Sediment Quality Guidelines and Related Tools for the Assessment of Contaminated Sediments; 17-22 August 2002; Fairmont, Montana, USA. Society of Environmental Toxicology and Chemistry (SETAC). Pensacola FL, USA.

# Appendix A: Dredging Sampling Plans

# Appendix B: Sediment Sampling Results

## Appendix C: Marine Directorate Action Levels

| Contaminant | Action Level 1<br>mg/kg dry weight (ppm) | Action Level 2<br>mg/kg dry weight (ppm) |
|---|---|---|
| **Arsenic (As)** | 20 | 70 |
| **Cadmium (Cd)** | 0.4 | 4 |
| **Chromium (Cr)** | 50 | 370 |
| **Mercury (Hg)** | 30 | 300 |
| **Nickel (Ni)** | 0.25 | 1.5 |
| **Lead (Pb)** | 50 | 400 |
| **Zinc (Zn)** | 130 | 600 |
| **Tributyltin (TBT)** | 0.1 | 0.5 |
| **Polychlorinated Biphenyls** | 0.02 | 0.18 |
| **Polyaromatic Hydrocarbons** | | |
| **Acenaphthene** | 0.1 | - |
| **Acenaphthylene** | 0.1 | - |
| **Anthracene** | 0.1 | - |
| **Fluorene** | 0.1 | - |
| **Naphthalene** | 0.1 | - |
| **Phenanthrene** | 0.1 | - |
| **Benzo[a]anthracene** | 0.1 | - |
| **Benzo[b]fluoranthene** | 0.1 | - |
| **Benzo[k]fluoranthene** | 0.1 | - |
| **Benzo[a]pyrene** | 0.1 | - |
| **Benzo[g,h,i]perylene** | 0.1 | - |
| **Dibenzo[a,h]anthracene** | 0.01 | - |

| | | |
|---|---|---|
| **Chrysene** | 0.1 | - |
| **Fluoranthene** | 0.1 | - |
| **Pyrene** | 0.1 | - |
| **Indeno(1,2,3cd)pyrene** | 0.1 | - |
| **Total hydrocarbons** | 100 | - |

# Appendix D: Consultation Responses