REPORT

CMAL SVRP

Portavadie Best Practicable Environmental Option (BPEO)

Client:	CMAL
Reference:	PC5424-HAS-DR-PE-RP-EV-1010
Status:	S2/P01
Date:	15 December 2025

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Document title:	CMAL SVRP
Subtitle:	Portavadie Best Practicable Environmental Option (BPEO)
Reference:	PC5424-HAS-DR-PE-RP-EV-1010
Your reference	N/A
Status:	S2/P01
Date:	15 December 2025
Project name:	CMAL SVRP
Project number:	PC5424
Author(s):	RG
Drafted by:	RG/EB
Checked by:	E. Maxwell
Date:	15/12/2025
Approved by:	E. Maxwell
Date:	15/12/2025
Classification:	Project related

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1 Introduction

1.1 Background information

Caledonian Maritime Assets Ltd's (CMAL) Small Vessel Replacement Programme (SVRP) aims to renew a number of the aging small vessels fleet with new low emissions vessels. As part of the SVRP it is proposed to undertake upgrades to the existing Portavadie ferry terminal to facilitate the new vessels. These upgrades will include an increased marshalling area, widening of the existing slipway, dredging of the toe and approach to allow safe navigation onto the slipway and manoeuvring on the overnight berth.

1.2 Purpose of this document

Under the Marine (Scotland) Act 2010, Section 21(1), a Marine Licence issued by the Marine Directorate Licensing Operations Team (MD-LOT) is required for the dredging and the deposit of substances or objects within waters adjacent to Scotland. Under Part 4, Section 27(2), the Marine Directorate has an obligation to consider the availability of practical alternatives when considering applications involving disposal of material at sea, in order to identify the best practicable environmental option. Applications for a Marine Licence to dispose of dredged material at sea therefore require a Best Practicable Environmental Option (BPEO) assessment, demonstrating that alternatives to sea disposal have been investigated in accordance with Scotland's Waste Hierarchy (**Figure 1-1**), as outlined in Scotland's circular economy and waste route map to 2030[1]. Marine Licences for capital works are valid for the duration of the activities, to be specified in the Marine Licence application and agreed with the Marine Directorate.

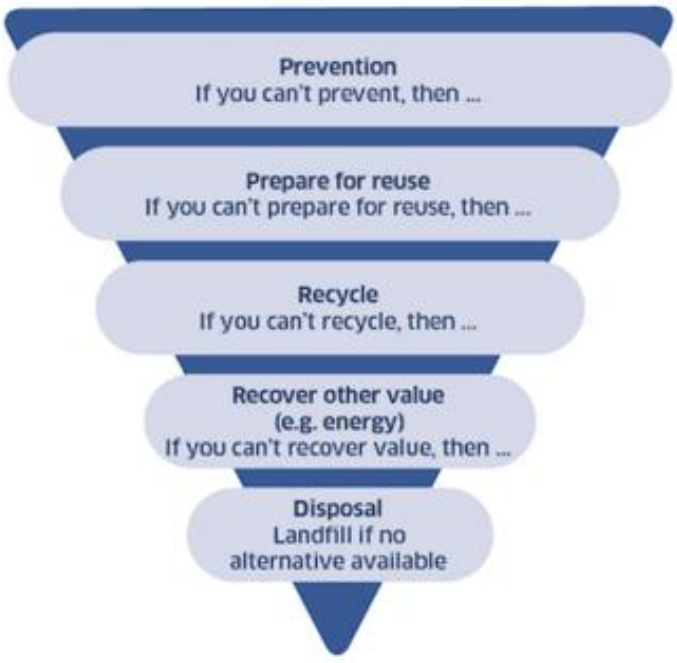


Figure 1-1 Scotland's waste hierarchy[2]

[2] *Scottish Government (2024) Scotland's Circular Economy and Waste Route Map to 2030.*

This report has been produced in support of a Marine Licence application for the disposal of capital dredge material at sea as a result of the proposed deepening of the approach to the Portavadie ferry terminal. It compares various options for the disposal of dredge material and identifies the BPEO.

2 Proposed Dredging Activity

2.1 Dredge volume

It is proposed to dredge a small section of the toe and the approach of the slipway, which allows for under-keel clearances for the new low emissions vessels, without restrictions from tidal regimes. A 500mm tolerance has been applied to allow for sedimentation. The proposed work includes the dredging of shallower areas on the approach slipway. The dredge levels are based on vessels being on the slipway at the lowest astronomical tide and a design draught of 2.14m.

The dredge area is anticipated to be in the region of 25m x 20m to a maximum depth of 0.5m. Resulting in a maximum dredge volume of 250m³. The total required dredge area is shown in **Figure 2-1**.

2.2 Dredge material characteristics

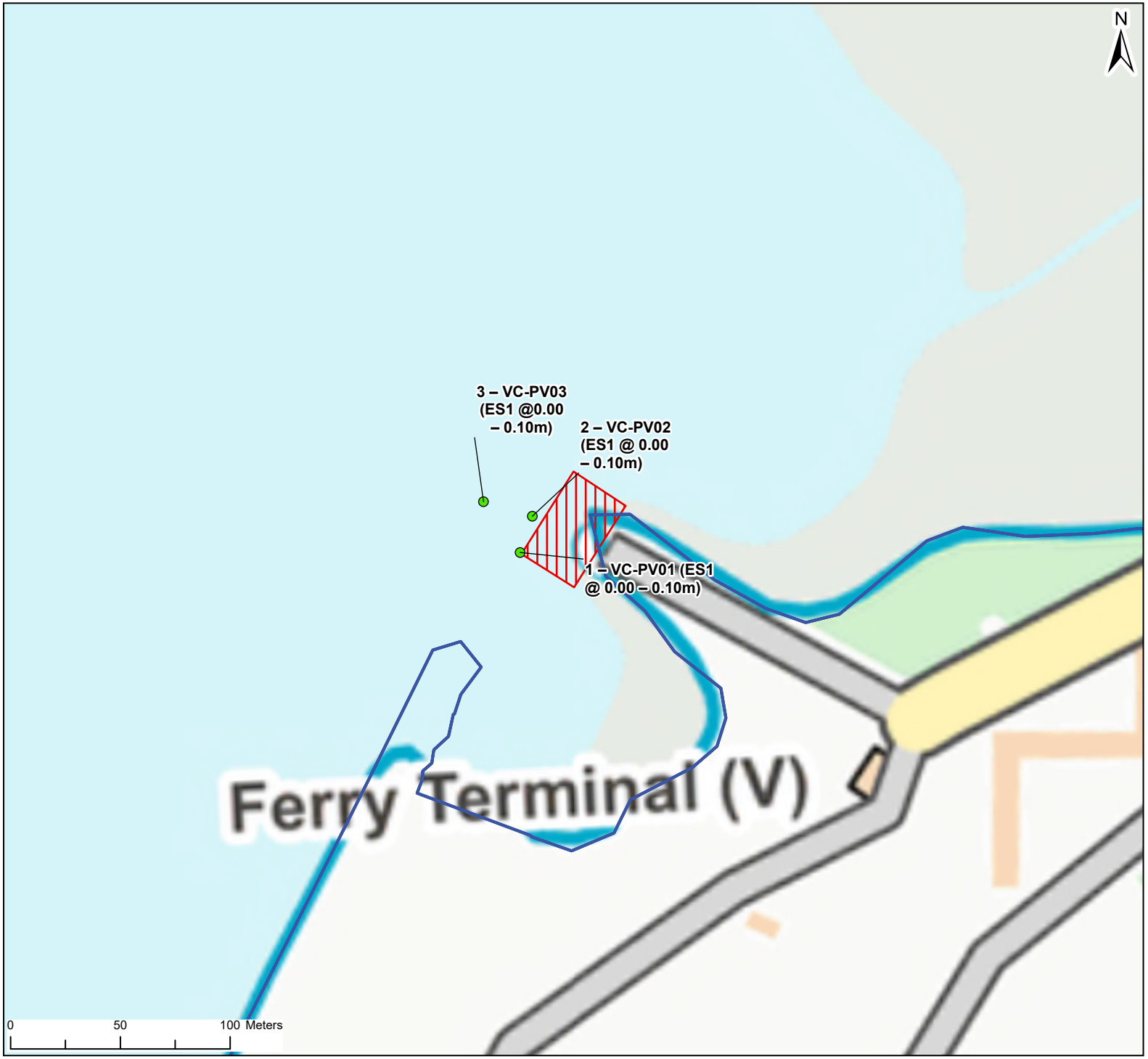
In support of this study, sediment samples were collected and analysed for their physical characteristics (Particle Size Analysis – PSA), metals, organotins, organohalogens and polycyclic aromatic hydrocarbons (PAH's). The pre-dredge sampling plan (submitted on 19th September 2024) was agreed with the MD-LOT prior to the surveys and subsequent sample analysis.

The sample locations are listed in **Table 2-1** and marked on **Figure 2-1**.

A site-specific sampling survey was undertaken on the 4th of September 2025. The proximity of the dredge area to the slipway and the shallow depth of water resulted in the Contractor adjusting the grab locations on site and therefore two of the sediment samples were taken from slightly (1-14m) outside the proposed dredge area. However, the samples are still considered to be representative of the sediment within the dredge area.

Table 2-1 Sample locations

Point	Lat	Long
1 – VC-PV01 (ES1 @ 0.00 – 0.10m)	55 º 52.605'N	5 º 19.053'W
2 – VC-PV02 (ES1 @ 0.00 – 0.10m)	55 º 52.610'N	5 º 19.050'W
3 – VC-PV03 (ES1 @0.00 – 0.10m)	55 º 52.612'N	5 º 19.062'W



Legend:

- Sediment Sample Locations
- Mean High Water Mark
- Dredge Area

Source: © Haskoning UK Ltd, 2025
Base map: Contains OS data © Crown Copyright and database right 2024

Project:	CMAL SVRP
Title:	Portavadie Sediment Samples

Figure:	2-1	Drawing No:	PC5424-HAS-DR-PE-D-EV-xxxx			
Revision:	Date:	Drawn:	Checked:	Size:	Scale:	
01	28/11/2025	OB	EB	A4	1:2,500	

Co-ordinate system: WGS 1984

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2.3 Characteristics of the material to be dredged

Sediment within the dredge area comprised primarily of sand, with further details in **Table 2-2**.

Table 2-2 Physical properties of the sampled sediment.

Sample ID	Type of sample	Sample depth (m)	Gravel (>2 mm) (%)	Sand (63-2000 µm) (%)	Silt (<63 µm) (%)
VC-PV01 (ES1 @ 0.00 – 0.10m)	Grab	0.00 – 0.10	21.58	62.29	16.14
VC-PV02 (ES1 @ 0.00 -0.10m)	Grab	0.00 – 0.10	17.96	59.05	22.98
VC-PV03 (ES1 @ 0.00 – 0.10m)	Grab	0.00 – 0.10	19.46	58.78	21.76

2.4 Contaminants

Analysis of sediment collected during sampling in September 2025 indicated an exceedance of Action Level 1 in two samples. These samples showed elevated levels of PAHs slightly above AL1, results detailed in **Table 2-3**.

Table 2-3 Sediment sample elevated results ("-" indicated results not above AL1)

Sample ID	BAA	BAP	BBF	BENZGHIP	BKF	CHRYSENE	DBENZAH	FLUORANT	INDPYR	PHENANT	PYRENE
VC-PV02	-	108	-	-	-	115	15	183	-	127	147
VC-PV03	175	182	151	111	157	178	34.9	318	124	224	250

Upon averaging the results, the contaminants in Table 2-4 remained slightly above AL1.

Table 2-4 Averaged results, elevated above AL1

Contaminants	BAP	CHRYSENE	DBENZAH	FLUORANT	PHENANT	PYRENE
Results (µg/kg)	100	101	17.5	173	120	138

All other contaminants analysed were below their respective ALs (Marine Scotland, 2017).

3 Assessment of Disposal Options

3.1 Do nothing

As described in **Section 1.1**, the proposed dredge is required to enable safe operation of the new low-emissions vessels proposed under the SVRP. Therefore, the Do Nothing option would compromise CMAL's ability to implement the SVRP.

This option has been discounted.

3.2 Construction fill / material

Dredged sediments could be reused for construction fill on site. To achieve this, however, dredged materials will need to be assessed to ensure they are geotechnically suitable. The presence of very coarse rounded particles (and shells) within the dredged material may limit the possibility for beneficial use as engineered fill. The dredged material would need to be processed for use as an engineered fill (e.g. by screening and crushing), the saline content of the dredge material reduces the suitability of the material as engineered fill, the grading and washing required as well as the drying and storage challenges makes this option impractical and uneconomic.

This option has been discounted.

3.3 Beneficial re-use

This includes the use of dredged sediments for beach restoration or habitat creation. Ideally, using dredged materials for beach recharge or habitat restoration would generate a purpose for the material that benefits a local amenity. The dredged sediments are expected to consist broadly of sand although some coarser material is present.

Whilst NatureScot was consulted and identified the potential to beneficially re-use the dredged sediment as part of a pilot study within the Inner Clyde SPA/SSSI. The timeline for the projects did not line up and the slightly elevated results for the PAH analysis means that beneficial re-use of this sediment would not be a preferred option.

There are no known sites available within close proximity to the Proposed Development that require beach recharge.

This option has been discounted.

3.4 Disposal on land

This option involves transporting dredged materials from the dredge site to an appropriate onshore commercial waste facility. Three processes would need to be undertaken to make the dredged materials suitable for landfill disposal.

- Materials would need to be transported onshore for treatment/dewatering prior to disposal.
- Sediments would need to be dewatered prior to disposal or treatment. The water removed from the sediment would require containment and further sampling to avoid land contamination from the effluent. There is no area at Colintraive to undertake this process and therefore an alternative location would have to be found.
- Dewatered/treated material would need to be transported by road using HGVs to a landfill site. Transportation of material from the dewatering/treatment site to a landfill site would generate significant vehicle movements on local roads, contributing to traffic congestion and air and noise pollution with associated carbon emissions.

Suitable land for drying/treating the dredge material is not available within the vicinity of the proposed development and thus, would be impractical. Additionally, there are no suitable landfill sites in the immediate vicinity of the proposed development that could cope with a relatively large volume of material. The closest landfill site is Lingerton Landfill, Lochgilphead located 114.26 km by road.

The Scottish government has released several targets across different legislation aiming to reduce waste destined for disposal to landfills significantly by 2025. Scotland's Zero Waste Plan (2010) set a long-term

target of reducing waste sent to landfill to no more than 5%. This is mirrored within the Climate Change Plan update 2018 -2032 and Circular Economy (Scotland) Act 2024.

This option has been discounted.

3.5 Incineration

This process would involve landing the dredged material, dewatering, storing and transportation to an incinerator. The residual incineration ash would then require disposal. Options for disposal of ash include landfill, reclamation and spreading on agricultural land. The dredged sediments are expected to consist broadly of sand. 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. The average total organic content of the sediment samples was found to be 0.35% and therefore, incineration of the sediment would be an inefficient option.

This option has been discounted.

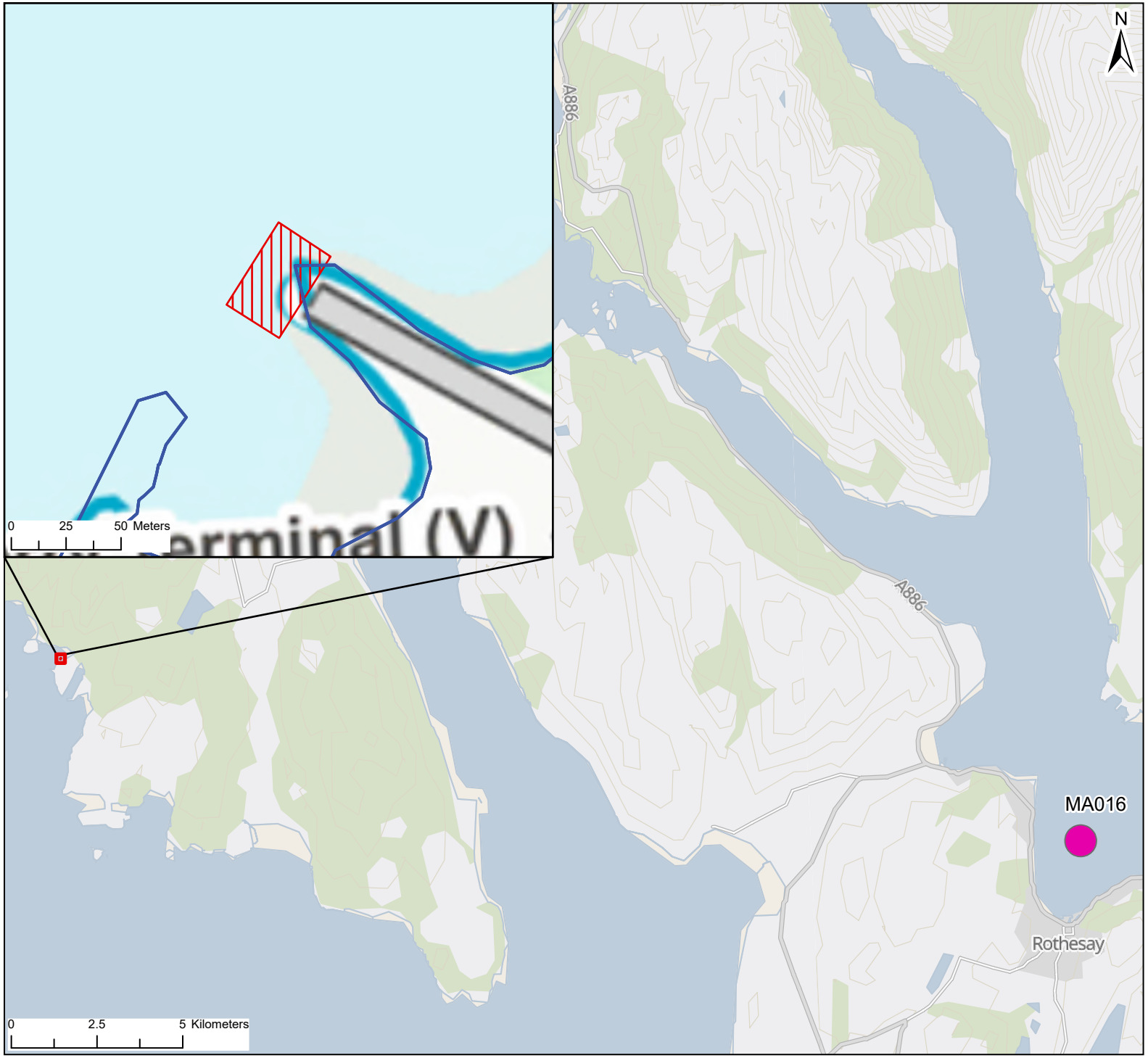
3.6 Disposal to sea

This option involves the transportation and disposal of dredge materials to a licensed disposal site in a dredging vessel. It takes place at sea and does not require the landing of any materials. The dredger or barge transits to a licensed spoil disposal ground and releases the materials, generally through bottom doors or a split hull. To ensure even distribution of material across the disposal site and at the correct depths, a grid pattern will be applied across the disposal site, and will be tracked using a global positioning system (GPS) to record the spoil discharge locations.

The closest dredge and disposal site to the Proposed Development is Rothesay Bay (MA016) located 17 km away (**Figure 3-1**). This disposal site is within an accessible distance from the Proposed Development and, given the extremely small volume of material to be dredged, is likely to have the capacity to store the dredge material from Portavadie.

In addition to the practicalities of disposal at sea, this option has the added benefit of retaining marine sediment within the Firth of Clyde, preventing loss of sediment from the system, which is generally considered to be good practice (Manning *et al*., 2021).

This option has been chosen.



Legend:

- Mean High Water Mark
- Disposal Site
- Dredge Area

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Base map: Contains OS data © Crown Copyright and database right 2025
Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2024

Project: CMAL SVRP

Title: Portavadie Disposal Site

Figure: 3-1

Drawing No: PC5424-HAS-DR-PE-D-EV-xxxx

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	28/11/2025	OB	EB	A4	1:160,000

Co-ordinate system: WGS 1984

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4 Summary

The BPEO assessment has not identified any immediate opportunities for the re-use of the dredge material. Without any suitable uses available at present, disposal in the marine environment at a licenced disposal ground is considered the BPEO. The optimum disposal location is determined through consideration of practical, environmental and economic parameters. The disposal site has been selected to be as close as practical to the dredge site. This minimises transport time to each site and reduces the carbon footprint whilst minimising transportation cost. The disposal site has no current exclusions that would preclude the deposition of the dredge material.

5 References

Manning, W.D., Scott, C.R and Leegwater. E. (eds) (2021). Restoring Estuarine and Coastal Habitats with Dredged Sediment: A Handbook. Environment Agency, Bristol, UK.

Marine Scotland, 2017. Pre-disposal Sampling Guidance. Version 2 – November 2017.