Technical Note

To:	Marine Directorate Licensing and Operations Team	Ref:	R/5630/TN02/egm
From:	E Mungo, ABPmer	Date:	10 October 2025

Subject: Loch Ryan Assessment of the Best Practicable Environmental Option (BPEO)

1 Introduction

1.1 Background

Stena Line Ports Ltd is applying for a Marine Licence under the Marine (Scotland) Act 2010 to carry out maintenance dredging at Loch Ryan and deposit the dredge arisings at the sea disposal site MA010 (North Channel, Scotland). The new licence would replace the current Marine Licence (Licence Number: MS-00009930) which expires on 14 December 2025.

The Marine Directorate Licensing and Operations Team (MD-LOT) has an obligation to consider the availability of practical alternatives when considering applications involving disposal of material at sea. This is a requirement under Part 4, Section 27(2) of the Marine (Scotland) Act 2010. This report provides an assessment of the alternative options to sea disposal in order to present the Best Practicable Environmental Option (BPEO).

1.2 Location and dredging information

Loch Ryan is located on the south-west coast of Scotland, at the mouth of the Firth of Clyde. The area that is proposed to be dredged to maintained depths is shown in Figure 1.

Scotland's National Marine Plan [Page 102, Paragraph 13.13] states that "*Dredging is an essential activity to maintain existing shipping channels, establish safe approaches to new ports or open up routes to old ports*." The current Marine Licence (Licence Number: MS-00009930) was issued 15 December 2022 and at that time dredging had not been required in the preceding three years (i.e. the returns from 2019-2022 were nil). Since then, the port and approach channel have been subject to dredging with the last dredge in October 2023 with a return submitted of 31,152 wet tonnes. The returns for 2024 were nil.

Stena Line does not wish to make any changes to the dredge areas, dredge quantities or disposal site for the new Marine Licence and therefore these details will remain the same as for the existing licence. The current licence authorises the dredging and deposit of material up to a maximum quantity of 100,000 wet tonnes per annum.

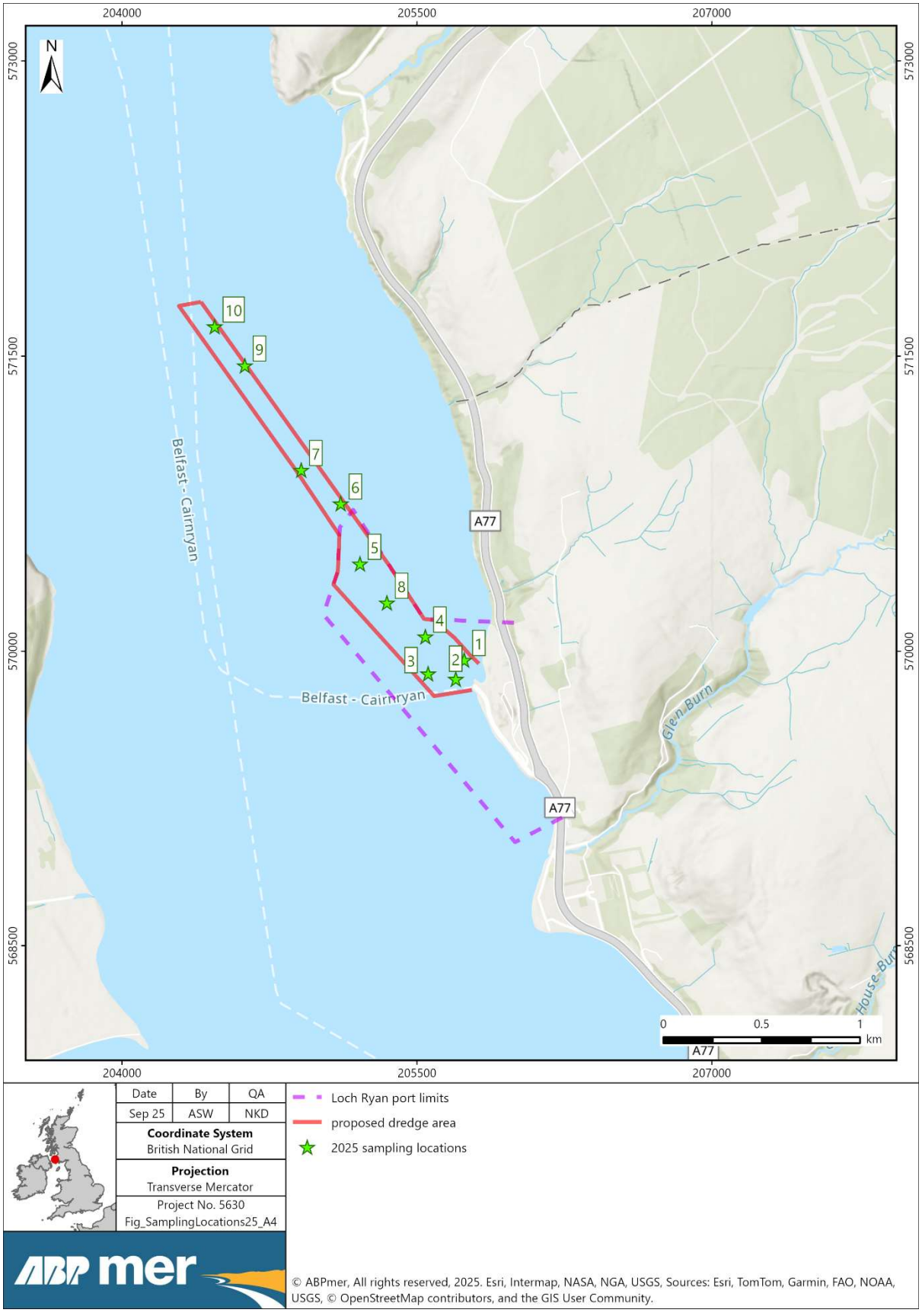

Figure 1: Location of proposed dredge area and sediment sample locations.

2 Dredge Material Characterisation

Sediment sampling was carried out in support of this Marine Licence application on 15 August 2025. Samples were obtained from ten locations throughout the proposed dredge area as shown in Figure 1. Eight of these locations were also sampled in 2022 in support of the previous Marine Licence application at that time.

In the 2025 survey it was noted that the nature of the seabed at stations in previously dredged areas was predominantly hard substrate with very little surficial sediment. At station 9 this meant that an insufficient quantity of material was obtained for the full suite of analysis, despite several attempts at sampling. This resulted in the laboratory not being able to complete all tests for this one site. Sufficient material was obtained for analysis at all other sites. Table 1 details the percentage of each material type for the different samples obtained. The full certified sediment sample results obtained are provided separately as part of the Marine Licence application[1].

Table 1. Sample material physical characteristics

Sampling station	Date and time sampled (GMT)	Locations of sampling stations (WGS84, decimal degrees)		Gravel (>2 mm) (%)	Sand (63-2000 µm) (%)	Silt (<63 µm) (%)
		Latitude	Longitude			
1	15/08/25 09:15	54.98621	-5.03766	0.2	65.4	34.5
2	15/08/25 08:47	54.98533	-5.03827	50.5	26.4	23.1
3	15/08/25 13:17	54.98552	-5.04048	87.8	12.2	0.0
4	15/08/25 13:01	54.9872	-5.04083	91.3	8.7	0.0
5	15/08/25 12:11	54.99039	-5.04627	24.4	72.4	3.3
6	15/08/25 12:01	54.9931	-5.048	70.0	28.5	1.5
7	15/08/25 10:40	54.99455	-5.05125	58.8	38.2	3.0
8	15/08/25 12:20	54.98867	-5.04399	75.2	23.9	0.8
9	15/08/25 10:03	54.9992	-5.05609	Insufficient	Insufficient	Insufficient
10	15/08/25 09:49	55.00092	-5.05862	14.7	83.7	1.6

Sediment at the berth pocket (Samples 1 and 2) comprised predominantly silt and sand. Sediment at the turning circle areas (Samples 3, 4 and 8) was dominated by gravel and sand. These areas remain deeper as a result of the scour caused by the vessel manoeuvres and propellers and are therefore less likely to require dredging.

Sediment at the south-eastern end of the approach channel (Sample 6) also comprised mainly sand and gravel. Located further out within the approach channel, Samples 7 and 10 comprised a high proportion of sand and gravel. Recent hydrographic surveys carried out in 2025 show that these areas also remain deeper and will likely not require dredging in the short term.

Chemical analysis of sediment from samples in 2025 indicated that only chromium (Cr) and nickel (Ni) have consistent exceedances above AL1, with both of these metals exceeding AL1 in all samples with

[1] Results are provided in the accompanying worksheet (ref: MAR02766) and station numbers use the prefix 'LR'.

only two exceptions (chromium at 5 and 10). Figure 2 and Figure 3 show the levels of chromium and nickel identified in the sediment samples against AL1 and AL2 in 2018, 2022 and 2025.

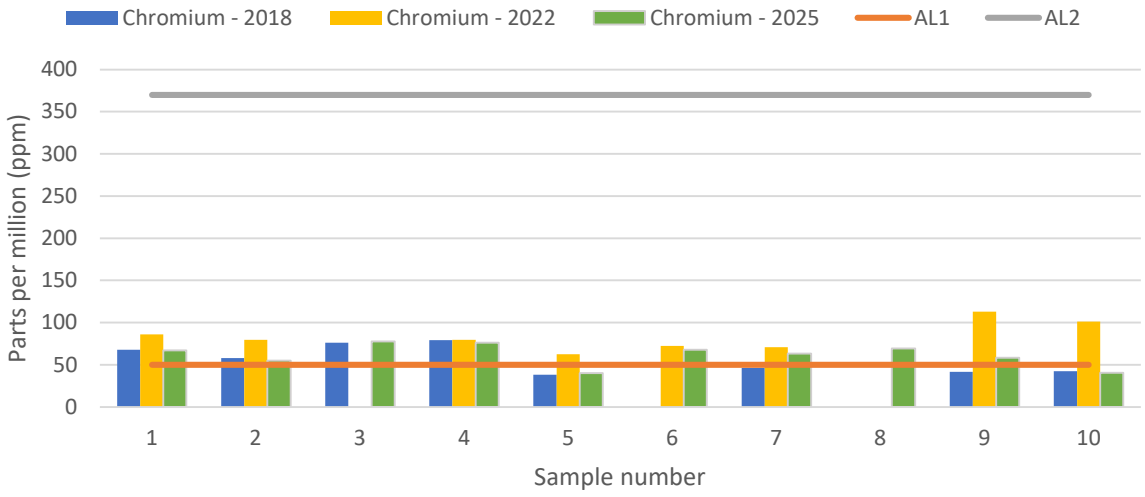

Figure 2: Concentrations of chromium in samples 2018, 2022 and 2025.

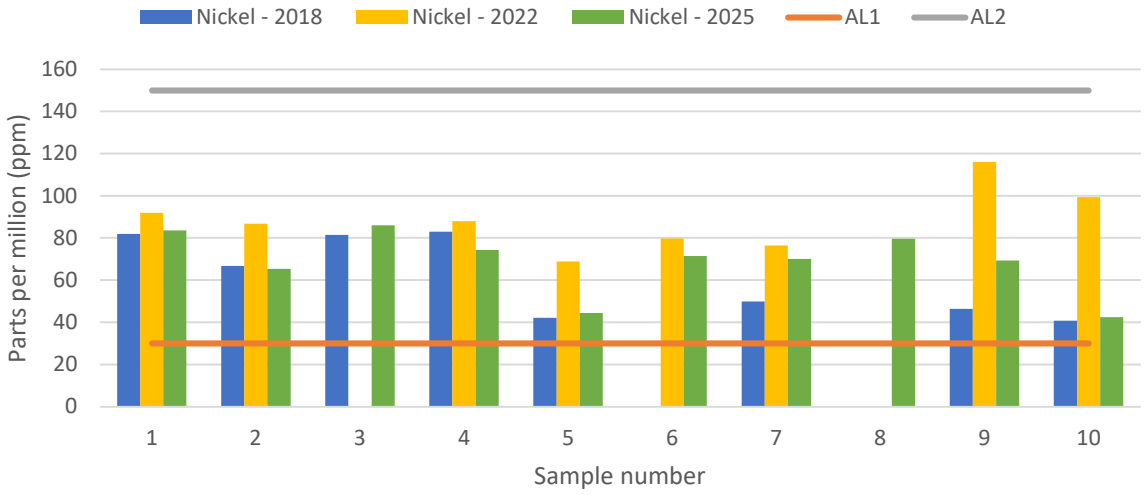

Figure 3: Concentrations of nickel in samples 2018, 2022 and 2025.

The concentrations of chromium and nickel in 2025 were slightly lower at all stations compared with 2022 data. The highest level of chromium in any sample was 77.5 ppm at station 3 which is only slightly above AL1 (50 ppm). The highest nickel concentration recorded was 86.0 ppm at station 3, which is above AL1 (30 ppm), but well below AL2 (150 ppm).

There were no exceedances above AL1 for Polycyclic Aromatic Hydrocarbons (PAH), Total Hydrocarbons (THC), Polychlorinated Biphenyls (PCBs) or asbestos. The results for organotins are inconclusive due to

interference with sample matrix during laboratory analysis. However, it is noted that previous sampling results from 2018 and 2022 showed Tributyltin (TBT) and Dibutyltin (DBT) to be below AL1 in all sampling stations.

3 Best Practicable Environmental Option Assessment

3.1 Prevention

There are three main alternatives for the prevention of generating waste material, including:

- Do Nothing (i.e. do not undertake maintenance dredging);
- Reduce the dredging requirement; and
- Reduce the disposal requirement.

The main approach to avoiding the generation of waste would be to not undertake the proposed maintenance dredging. Lack of maintenance dredging would mean that the accretion in the navigation channel, approaches and berths would continue and would affect the ability for vessels to safely navigate to and from the Port. Maintenance dredging is therefore concluded to be essential for the ongoing safe and commercial ferry operations of the Port. The 'do nothing' scenario is therefore not appropriate.

Dredging will be carried out in response to planned and timely hydrographic surveys, determined by recorded accretion rates. The requirement to dredge is a direct cost to the operation of port facilities and is not undertaken without sufficient business need. As described in the previous paragraph, the requirement to keep navigation channels, approaches and berths at a safe navigable depth is the overriding priority. This is linked to the size of vessels and careful consideration of available water depths. Stena Line Ports use proactive monitoring in the form of hydrographic surveys, with scientific evaluation of deposition rates to predict future short-term, and long-term dredging trends. The objective is to reduce the dredge burden which is a financial cost whilst maintaining safe navigational access and allowing the ferry to continue to operate commercially. In this way, the dredge requirement is reduced where possible through optimisation of campaigns.

The port and channel were last dredged in October 2023 and a return was submitted of 31,152 wet tonnes. The returns for 2019 - 2022 and 2024 were nil.

In summary, all measures to prevent and/or reduce the volume of waste generated by the maintenance dredging activities have been fully considered.

3.2 Re-use, recycling and other recovery

Few cost-effective re-use and/or recycling options have been identified due to the nature of much of the material arising from maintenance dredging in Loch Ryan. The dredge area locations which have experienced the largest levels of accretion and so would be the most likely to require maintenance dredging are areas around the berthing pockets (Stations 1 and 2) which have a relatively high proportion of sand and silts (Table 1). Sand presents the most advantageous material for beneficial use from the material types that will be extracted by the maintenance dredging. It is considered that when

dredging of this material is required, this could represent a resource for general fill material that could be used as backfill in the local area. In general, the material does not meet the standards for beach nourishment purposes or good quality aggregate.

A search was carried out for planned developments in the local area which would be able to use the material from the Port. This identified two potential opportunities: Stranraer Marina and the Loch Ryan Habitat Restoration project.

There are proposals forthcoming for expansion at Stranraer Marina on the southern shore of Loch Ryan, located approximately five miles south of Loch Ryan Port. Works for this development will include extended breakwaters and land reclamation using dredged material. However, it has been proposed that material from the project's own dredging operations will be used as infill (RPS, 2021). A public consultation event was held recently[2] but the timescales for the application and the works themselves are still unclear. Whilst it is very unlikely that the project would to be in a position to receive dredge material from Loch Ryan Port in the short term, Stena Line are in discussion with the developer to ascertain if there is any potential for reuse in the future.

The Loch Ryan Habitat Restoration project is located on the western shore of Loch Ryan. It aims to create a 1.55 ha inland pool containing up to four islands as part of a package of seabird habitat creation measures which will deliver compensation as part of a Habitats Regulations Assessment (HRA) derogation case for proposed offshore windfarm projects (Stantec, 2023). The excavation required for this project will generate excess material which will need to be managed and therefore it is not considered likely that there would be any potential for re-use of dredged material from Loch Ryan Port.

No other opportunities for re-use of the material have been identified at this time, given to the type of material and the known developments in the area.

3.3 Beach Nourishment/Recharge

Scotland's Dynamic Coast project has assessed the changing state of its coastline, revealing significant erosion and accretion patterns driven by climate change. This shows that in the vicinity of the Port there are areas currently experiencing erosion (Cairnryan Old Pier (Site 88)) (Hansom *et al.*, 2017).

Detailed sediment mapping data for this location has not been found; however, the available evidence (including aerial photographs) suggests that the frontage comprises predominantly coarse-grained material.

Beach nourishment requires materials of a similar composition to the existing beach materials and usually involves clean sand or gravel. This material may be present in the approach channel and turning circle areas. However, the main target areas for maintenance dredging would be focused on the berths where silt accumulates (stations 1 and 2). There is therefore unlikely to be suitable material available for beach recharge.

In addition, dredge arisings comprising gravel and larger material will fall from suspension once entering the dredge hopper and resuspension for pumping would not be possible. This means that to discharge this material ashore, a grab or conveyor would be required at a quay. The dredge material would then

[2] https://www.dumfriesandgalloway.gov.uk/news/2025/views-sought-stranraer-marina-expansion-plans

need to be transported to a beach location for discharge. This would require the quay to be out of use during the dredge campaigns causing significant disruption to the ferry service.

For dredge arisings comprising sand and mud, pumping ashore direct from the dredge location is not practical as the dredger would have to be connected to a pipe, either from a quay or a mooring point which would need to be maintained during discharge. This would mean that the navigation channel would not be accessible to the regular ferry service operating at the Port. If the dredger were to take material to a beach for recharge, a pipe would be required to run along the foreshore and be deployed and removed each time the replenishment was required. Intervention of this kind has the potential to disturb or damage the existing beach and restrict recreational use near the area of replenishment. The infrastructure required for the deployment would also be significant and costly to implement.

3.4 Disposal

The above assessment has considered the options available for management of the maintenance dredged arisings from Loch Ryan Port. No beneficial use options have been identified and therefore the BPEO for the material is considered to be disposal. However, the context in which disposal is achieved has been further considered in the following sections.

3.4.1 Disposal ashore

The nature of the dredged material (a mixture of sand, silt and gravel) is unsuitable for sacrificial landfill without involving an extensive transport and treatment process. Disposal to landfill would involve a complicated material handling operation involving sea to land transfer, de-watering, loading to trucks and transport to site. In addition, there would need to be a change in dredger type, for example from a vessel designed for maintenance dredging to one designed for aggregate recovery or a change to a mechanical form of dredger, unless a settling lagoon could be constructed.

Each existing dredger load would produce *circa* 1,000 m^3 of 'semi- wet' material after water has been 'weired-off' from the dredger or de-watered in a settling lagoon on land. This volume equates to *circa* 50-60 lorry loads of material produced at the quayside in a time of 1 – 2 hours to several hours depending on the method of de-watering the dredge arisings. This transport requirement is impractical and very costly as a significant fleet of lorries would be required to prevent significant delays in dredging operations. This option has therefore been discounted.

3.4.2 Disposal at sea

The identified marine spoil deposit ground MA010 (North Channel Scotland) is located 25 km away and is the closest open deposit ground to the area where dredging will take place; thus, relocation in terms of distance is minimised. This keeps transport time low and reduces the carbon footprint whilst minimising costs. The main effects of the disposal are all short term and transient in nature (ERM, 2008). Continuing the current disposal practice will not change the current minimal impacts on other uses and users, marine habitats and ecology of the deposit ground.

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 the present time, 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 MA010 (North Channel Scotland) deposit ground 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 is characterised for the material present at the proposed dredge location.

Stena Line Ports will continue to seek opportunities to minimise the dredging requirement and to re-use the maintenance dredge material where feasible and cost-effective.

5 References

ERM (Environmental Resources Management) (2008). Loch Ryan Port: Environmental Statement. December 2008.

Hansom, J.D., Fitton, J.M., and Rennie, A.F. (2017). Dynamic Coast - National Coastal Change Assessment: Vulnerability Assessment, CRW2014/2. Available at: https://www.dynamiccoast.com/files/reports/NCCA%20-%20Vulnerability%20Assessment.pdf [Accessed July 2025].

RPS (2021). Environmental Impact Assessment Scoping Report Stranraer Marina. Available at: https://marine.gov.scot/sites/default/files/stranraer_scoping.pdf. [Accessed July 2025].

Stantec (2023). Loch Ryan Habitat Restoration EIA Screening Request. Available at: https://marine.gov.scot/sites/default/files/loch_ryan_screening_report_18.10.2023_redacted.pdf [Accessed July 2025].