BEST PRACTICABLE ENVIRONMENTAL OPTION (BPEO) ASSESSMENT

MAINTENANCE DREDGING AT CUSHENDUN VILLAGE

JANUARY 2026

National Trust

Contents

1. Introduction

1.1 Background

Cushendun is a small village located on the east coast of Co. Antrim and consists of 2 main parts which lie on the north and south sides of the River Dun estuary, now linked by a stone bridge. It has a long history of human settlement, with artefacts from the Mesolithic and Neolithic such as flints, as well as megalithic monuments in the area such as standing stones and iron age monuments such as Altagore Cashel. One of the oldest 'roads' in Ireland is what was probably a drove road, running from Clough in central Antrim via Glendun to Cushendun – likely used as Cushendun Bay provides the closest sheltered location for sea crossings to Scotland, and indeed a ferry between Cushendun and Dunaverty in Kintyre operated until the early 19th century. Castle Carra was built in the northern end of the bay during the 13th – 14th centuries as part of a coastal network of fortifications associated with the Dalradian kingdom. Agriculture became a driving force for Cushendun, after woodland clearance took place in the late 17th and early 18th centuries, with flax and cattle trade being a significant part of the trade goods crossing the sea to Scotland. Eventually some of the prominent 'big houses' in the area, such as Glenmona Lodge and Rockport Lodge were built by local landowner McNeill using the architect Clough Williams-Ellis in the "Cornish village style". During the early 20th century, in parallel with the commercial marine traffic in the bay declining due to various economic and strategic reasons, land-based tourism boomed and a variety of hotels were built in response to the increased availability of the motorcar and post World War II the number of summer and weekend visitors increased. In 1980 Cushendun was designated as a Conservation Area by the Department of the Environment for Northern Ireland (DAERA) on the basis of its' architectural and cultural heritage and its environmental setting.

1.2 Source of materials

The river Dun (also known as the Glendun river and Glendun burn) runs down from Slievanorra/Slievanee along the Glendun valley to discharge out to sea. The whole of the Dun catchment, including Cushendun bay sits within the Antrim Coast and Glens Area of Outstanding Natural Beauty (AONB), and the northern part of the catchment lies within the Antrim Hills Special Protection Area (SPA). The Glendun valley is steep-sided, but at the point that it crosses under the vehicle bridge on the B92 the channel widens and shallows out, while also meeting the force of the sea coming inland, so a combination of sand, river borne silts and muds, leaf litter and seaweed are dumped in the mouth of the river as it meets the sea bringing materials onshore. The deposits in this area, if left to accumulate, create a barrier to the recreational users of the small harbour in

Cushendun village that either prevents them launching their boats from the slipway installed in the small carpark, or can make navigation difficult/dangerous.

National Trust | Cushendun - proposed dredging area

Legend

Notes

Area to be dredged outlined in red

0 50 100 m

Scale 1: 1250 (when printed at 100% on A4 landscape)

2. Description of Dredging Material

2.1. Dredging methodology

National Trust have a record of dredging in this harbour area going back 35+ years, originally to maintain open channels for commercial fishermen after the installation of a rubble breakwater, but in latter years it has been done to enable village residents and members of the Cushendun Boat Club to launch their vessels down the slipway, and on occasion safety boats concerned with watersports like rowing in the bay.

Dredging has in the past been done using a 13 T digger, filling into tractor-towed trailers, which then dump nearby (see Figure 2. on next page) as part of a beach renourishment option and to enable the material to remain within the same sediment cell – it is proposed that we follow the same methodology with this upcoming dredging, although we are happy to work with changes in location of renourishment area, etc. Work is carried out by the National Trust Countyside Management team, with appropriate operator certificates for the activity.

Dredging happens annually in the Springtime, approximately early-mid April, and depth dredged is approximately 1-1.5m. The volume of material dredged annually is approximately 2,500 tonnes but can vary from year to year.

2.2 Sampling Methodology

On 16th April 2025, dredging material was sampled to support the previous dredging application as the sampling done by RPS (Report No: 22-19228-1) had expired on 18th April 2025 before the end of the licensing period on 28th July 2025. This analysis was done by Socotec UK Ltd., and an interim report was produced on 11th June 2025(Test Report ID: MAR02641 Test Result Analysis – see Appendix). This report was submitted in support of the previous application and permission was granted to dredge, which was carried out between 24th & 27th June 2025 last year. Socotec's laboratory participates in the QUASIMEME Scheme (Quality Assurance in Marine Environmental Monitoring in Europe).

Sampling was done in 3 locations at 2 depths (surface level and 1.5m) by hand sampling – sampling locations within the dredging area were proposed to and accepted by DAERA prior to sampling taking place. Each sample required 5 jars of sampling material and a total of 30 jars were sent to Socotec. They were sampled for the full DAERA suite (Tier I & II chemical suite), as well as particle size analysis, which is as follows:

- Moisture Content
- Particle Density
- Total Organic Carbon (TOC)
- Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Aluminium
- Organotins – Tributyl Tin & Dibutyl Tin (TBT/DBT)
- Polycyclic Aromatic Hydrocarbons (PAH USEPA 16); and
- Polychlorinated Biphyenyls (PCB ICES 7).

Surface sampling for Particle Size & Density was also done of the historic dredging disposal location (as agreed in most recent Marine License) and compared to the samples within the dredging area, as well as to sediment structure analysis done by Ken Pye Associates Limited on a variety of locations within Cushendun Bay, in a report looking at coastal change within the area (Pye & Blott, *Cushendun Coastal Scoping Report and Monitoring Coastal Change to Inform Future Management*. 28th February 2025. KPAL Report No: 110255 – see Appendix).

3. Discussion of Chemical Analysis Results

Results of the analysis report produced by Socotec on 11th June 2025 are discussed below.

3.1. Chemical Analysis Criteria

Chemical analysis results were assessed against Existing Action Levels (EAL) criteria as adopted by the DAERA Marine & Fisheries Division and were presented in approved template format for consideration.

3.2 Chemical Analysis Results

A summary is presented in Table 3-1 – for full laboratory results, see Appendices.

Contaminant	No. of Exceedances (of 6 samples)	
	EAL 1	**EAL 2**
Arsenic	0	0
Cadmium	0	0
Chromium	2	0
Copper	0	0
Mercury	0	0
Nickel	2	0
Lead	0	0
Zinc	0	0
PCBs	0	0
TBT	0	0

Taking guidance from the 'Northern Ireland Guidance on Marine Licensing; Dredging, Disposal and Aggregate Dredging, under Part 4 of the Marine and Coastal Access Act 2009 (Produced May 2016) – this advises that samples with contaminant values below EAL 1 are generally to be considered to of no concern and are unlikely to impact licensing decisions. Contaminant values above EAL 2 is considered unsuitable for sea disposal due to pollutant levels. Values between EAL 1 and EAL 2 may require further consideration and/or testing. For Chromium the EAL 1 is 40, with EAL 2 of 400 mg/kg. The 2 samples that exceeded EAL 1 were respectively 46.1 & 49.4 mg/kg so quite far below the threshold for EAL 2. For Nickel the EAL 1 is 20, with EAL 2 of 200 mg/kg. The same 2 samples that exceed the EAL 1 for Chromium also showed values slightly

higher than the EAL 1, of 21.4 & 25 mg/kg respectively. These values are however broadly similar to that for sampling carried out by Socotec in October 2022 of the dredging area, with values of 45.6 mg/kg for Chromium and 23.5 mg/kg for Nickel. Upon consideration of the chemical analysis results a marine license was granted in 2022 to the National Trust for a disposal option of beach nourishment within the same sediment cell.

4 Scoping of Potential Options for Disposal of Dredged Materials

The BPEO process is designed to identify a preferred strategy from the perspective of the environment as a whole, as opposed to a detailed analysis of any one selected disposal option. It follows a simple, structured process to detail, compare and eliminate options in a transparent manner. Discussion of the available options has been carried out informed by the OSPAR Guidelines for the Management of Dredged Material at Sea (2014), which were adopted by contracting parties to the 1992 OSPAR Convention, to prevent and eliminate pollution and protect marine species and habitats in the OSPAR maritime area. These guidelines emphasise that dredged sediments are part of the natural sediment cycle, and if it is environmentally, technically, socially & economically feasible to do so retention of dredged materials within the same aquatic system from whence it originated is a valid management option, as it maintains aquatic habitats. The OSPAR guidelines also outline steps to be considered in assessing preapplications for disposal at sea (Figure x). The Waste Hierarchy detailed in the 2016 Northern Ireland Guidance on Marine Licensing; Dredging, Disposal and Aggregate Dredging, under Part 4 of the Marine and Coastal Access Act 2009 is also taken into consideration when evaluatin these options. The Waste Hierarchy is as follows: Prevention > Re-use > Recycle > Other recovery > Disposal – placing a strong emphasis on waste prevention and minimisation of waste.

The stages of a BPEO are:

Identification of options

- Screening of options
- Selection of assessment criteria
- Analysis and evaluation of criteria; and
- Evaluation of BPEO

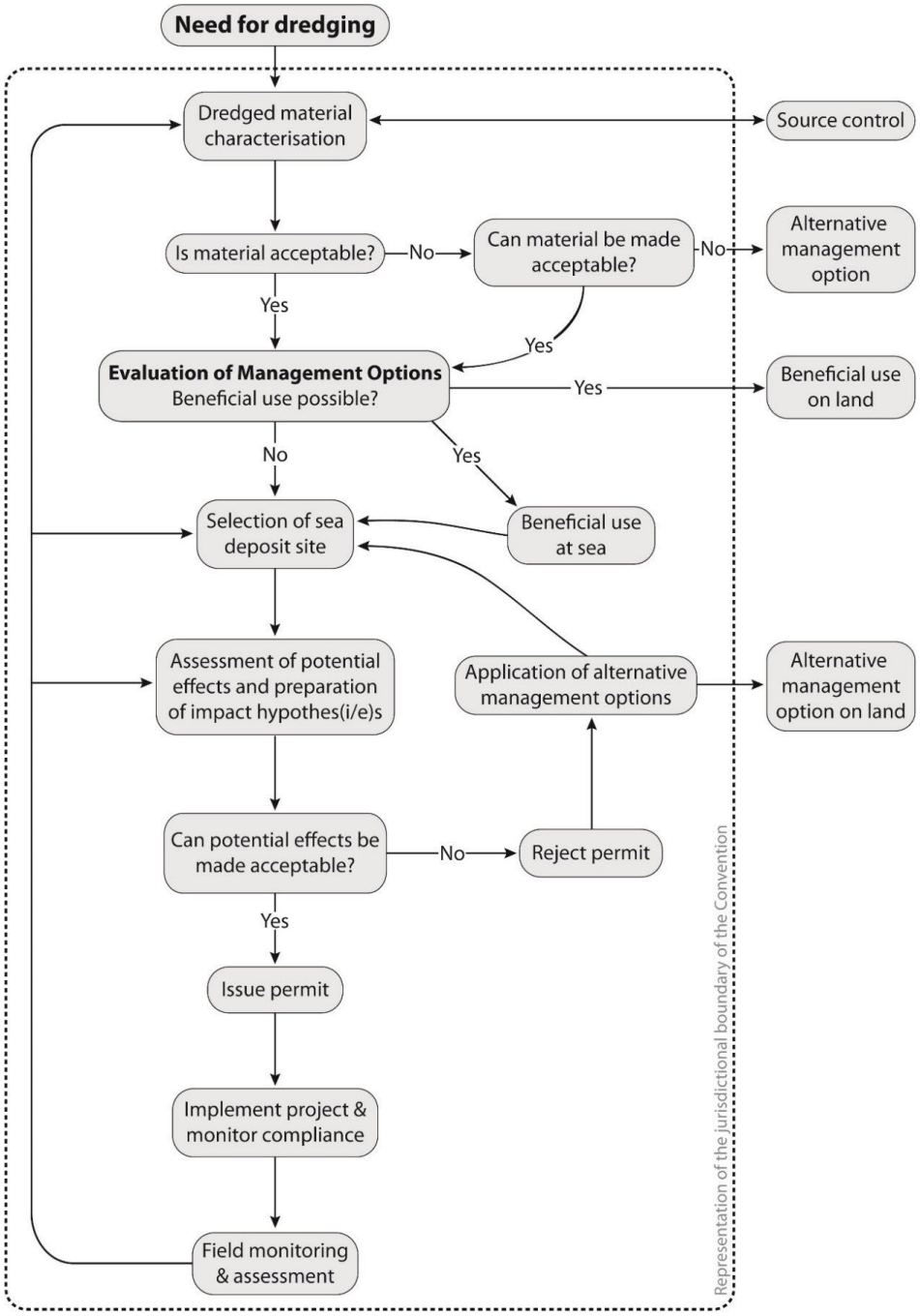

Figure 4: Steps to be considered when assessing permit applications for disposal at sea

4.1 Identification & screening of available disposal options

A variety of options are available for disposal of dredged sediments – these are presented in Table 4-1, along with justification for screening out options which have not been taken forward for further consideration.

Table 4.1. Primary Best Practicable Available Options

Location	Options	Screening Assessment	Carry forward?
Coastline	Leave In-Situ	Not an option due to the need to maintain depth in the channel between rock armour and harbour wall to allow boats to access the harbour.	No
	Re-use: e.g. for infill for an existing dry dock/harbour facility	No current or proposed infilling projects known within a reasonable distance of Cushendun village – the amount of material proposed to be generated is also relatively small (circa 2,500 m^3) so this would likely not be a sufficient amount for an infill project.	No
	Beach nourishment	This has been the option utilised under previous marine licenses, with material being used for beach nourishment on Cushendun Bay itself, therefore keeping the material within the sediment cell from which it originated. The material to be dredged is comprised predominantly of a mixture of sand and gravel, which is consistent with the findings of Pye & Blott during their sediment structure analysis across the whole of the bay, so is likely to be considered suitable for beach nourishment. The bay is close to the dredging site, so transport of materials and vehicle movements would be minimised as well.	Yes
Land	Landfill disposal	This is a potential option but it is unlikely to provide a long-term solution, and also removes the material from the sediment cell and removes it from the established cycling process of sediments within the bay. Dredged material would also likely have to be treated to remove salt from it before entering a landfill, which would incur additional cost and generate dissolved salt which would need to be removed from the water system via filtering. Landfill space is also at a premium so this would be a relatively costly option. It is typically regarded as the last option in waste disposal methods and reserved for sediment with contaminant levels above EAL 2, which none of our samples are.	Yes

	Land Incineration	This would be difficult to achieve as the sediments are primarily composed of sand and gravel so therefore would not be particularly combustible.	No
	Application to Agricultural Lands	As explored in the landfill disposal option, prior to application to agricultural land the dredged material would need to be treated to reduce salinity to acceptable levels – this would incur a significant level of cost and may require further permissions in forms such as a Waste Management authorisation, due to the potential for odours, and watercourse contamination. Disposal in this method would be detrimental to terrestrial habitats and is not a preferred option.	No
	Recycling	While the material to be dredged is composed of sand and gravel, both good materials for recycling, they are composed of a mixture of the 2 components, and the salinity presents an additional complication. Grading and treatment would need to be carried out on the dredged material, in a suitable processing plant, to obtain usable products for the recycled materials market. National Trust does not know of a suitable processing plant within reasonable distance from the dredging site - combine this with the relatively small amount of material overall and this would be a cost prohibitive option.	No
Sea	Aquatic disposal to seabed	Sea disposal is generally considered to be an option with low environmental risk due to appropriate sediment quality screening measures, and chemical analysis suggests it *may* be suitable for sea disposal, with the caveat that further advice from DAERA might need to be sought in relation to the 2 samples exceeding EAL 1 for Chromium & Nickel. A receiving site would need to be identified by DAERA but there have been disposal sites used in previous years for dredging operations in other harbour areas (e.g. Ballycastle, Ballintoy). However the proposed dredging work is planned to be undertaken by terrestrial based plant machinery and the shallow, rocky nature of the shoreline and access routes to the dredging area from the sea makes it very difficult, if not impossible to move a larger vessel like a barge close enough to transfer material from an excavator for onward transport. Sea disposal is also generally the least preferable in the context of the waste hierarchy as detailed in the Northern Ireland Guidance on Marine Licensing	No

		(Re-use > Recycle > Other Recovery > Disposal (last resort).	

4.2. Summary of identified BPEO options

Following review of the available options detailed in Table 4.1, these two options are taken forward for consideration:

- Beach nourishment
- Landfill disposal

A brief summary of the methodology required for both these disposal options is detailed below:

4.2.1 Beach nourishment

This method would involve the following methodology:

- Dredging;
- Movement of materials via dumper/tractor with trailer to beach nourishment location;
- Placement of sediment (using machinery such as an excavator); and
- Profiling of sediment and any making right of access routes using excavator

Dredging would follow the methodology adopted during previous years dredging and materials would be placed into tractor towed trailers for dumping on identified beach nourishment site (the precise location of which can be agreed with DAERA MFD). The National Trust has identified Cushendun Bay as a whole, as being suitable for beach nourishment due to the physical characteristics of proposed dredging materials aligning with that already observed on the beach and the erosion status of Cushendun Bay, which is eroding at a rate of c10cm/year. The Bay is easily accessible via either the harbour car park or via Bay Rd, and will not require any additional road closures as the harbour carpark will be closed during dredging operations anyway.

The proposed potential area and historic area for beach nourishment is shown on GIS Map (see Appendices). The historic area is very close to the dredging area (circa 25m away), but the access to the beach as a whole is about 50-100m away, and would also retain the dredged material within the same sediment cell.

4.2.2 Landfill disposal

This method would involve the following methodology:

- Application to and consent received from the appropriate local council and the relevant landfill owner for disposal at landfill, with arrangements made in advance due to the amount of material needing to be transported, including payment of fees
- Dredging of material into tractor-towed trailers;
- Transport to a suitable area for desalination treatment (as salty materials put into a landfill site without proper pre-treatment can cause a highly saline leachate, which could damage the environment)
- Desalination and treatment of liquid obtained from this process

- Transport to suitable landfill option identified via council consent (with the closure of Craigahulliar in 2025, the closest landfill site is Craigmore Landfill site owned by RiverRidge Recycling Ltd., approximately 34 miles away).

This option would be prohibitively costly, as payment would need to be made to both the landfill operator and also an application to NIEA with proper waste characterisation. The National Trust is a registered Waste Carrier for Waste Transfer Purposes only. NT would either have to source a company/business with a desalination plant and transport materials there along with payment of fees. Or embark themselves upon setting up a desalination area. This could be a complex multi-layered process, requiring NT to register as a waste treatment facility, apply for appropriate consents, take on staff with relevant experience in waste management, choose an area for the desalination plant, and also purchase equipment for the desalination and post-treatment processing of saline liquid. That process (whether done by NT or another company with a desalination plant) would then need to be followed with transport of desalinated material to landfill.

5. Additional Consideration of Remaining Identified Disposal Options

Both of the remaining options (beach nourishment and at-sea disposal) will be considered against additional criteria, which take into account environmental impact, strategic and financial impact.

Primary Criteria	Description and attributes
Environmental	- Health & Safety Implications - Public Health implications - Pollution/Contamination Implications - General Ecological Implications - Amenity/Aesthetic Implications - Interference with other activities, such as fishing
Strategic	- Operational aspects (handling, transport etc.) - General public/community Implications - Availability of suitable sites/locations - Legislative Implications
Financial	- Operating costs (labour, site operations, environmental monitoring) - Capital (transport, equipment hire)

5.1 Environmental Implication Comparison

Criteria	Beach nourishment	Landfill disposal
Health & Safety Implications	Vehicle movements between harbour & beach – potential for accidents to occur. Harbour area will be closed	Extended amount of travel time with heavy loads would be required to transport materials to landfill and/or a

	during dredging operation and access to the beach will be limited during this time. Work would be undertaken in accordance with H&S legislation.	desalination plant – increasing the potential for accidents to occur. Work would be undertaken in accordance with H&S legislation.
Public Health Implications	Limited potential for human contact during nourishment activities, unless sediment dries out in good weather which might increase potential of dust incidents – relatively unlikely during proposed time period for dredging. The majority of contaminants in are below EAL 1.	If a suitable already operating desalination plant could not be found (there appears to be no large-scale facilities in NI and nearest are in Isles of Scilly/London), then NT setting up a desalination facility of its own would carry with it all the incumbent risks associated with that process.
Pollution/Contamination Implications	Vehicles transporting dredged material to the nourishment sites could be the source of pollution incidents and carry a carbon footprint implication.	Without desalination taking place, transport of dredged materials straight to landfill carries with it the risk of highly saline leachate causing harm to the environment. The distances required for transportation of heavy loads to the nearest would have the consequence of increased amounts of carbon discharged into the atmosphere. Desalination plants themselves carry contamination risks, with production of highly saline, chemical-laden discharges that would then need treatment to make safe. The high energy use of a desalination plant would also contribute to increased carbon discharged into the atmosphere.
General Ecological Implications	Lesser environmental impact as material would be retained within the same sediment cell, and beach nourishment (re-use) is at the beginning of the waste hierarchy. Unlikely to be ecological implications of adding sand to the beach	Approval for a desalination plant may prove difficult to obtain ecologically due to its potential impacts, and disposal of dredged materials is the least preferred in the Waste Hierarchy. This would also remove material from within

	considering the similarity of sediment structure profiles between dredging material and the wider in-situ beach material. Cushendun Bay has been recorded as an eroding coastline so addition of even a modest amount of material may be a welcome mitigation for more erosion.	the sediment cell in which it arose, which is not a preferable option. Transport of material to the nearest desalination plant (Isles of Scilly or London) would contribute to GHG emissions.
Amentity/Aesthetic Implications	The local community is used to beach nourishment being used as a way to dispose of dredged material.	This approach would be a net loss of material from the sediment cell.

5.2 Strategic Implication Consideration

Criteria	Beach nourishment	Landfill disposal
Operational	Would require movement of materials by HGV to identified/approved site – a required distance of up to 250m. Possibility of needing additional environmental assessments, although work has been done on sediment structure analysis between proposed nourishment site and dredged material.	This would be a very complex approach and require double/triple handling to reach an eventual end point with dredged material in a landfill.
General public/community implications	The local community is already familiar with beach nourishment having been used as an option with previous dredging works so it is likely to be generally welcomed by the public.	The requirement for multiple handling procedures, as well as the optics of dumping material in landfill, removing it from its sediment cell and the requirements for desalination is likely to not be welcomed by the public and see some criticism from the local community. It would also be seen as running contrary to NT's own approach to shoreline change, as outlined in its 'Shifting Shores' policy.
Availability of suitable site/locations	Cushendun Bay has been identified by NT, and they are the owners of the access to it. It is also close to the dredging area (within 250m)	No known desalination plant in NI, so therefore material would either have to travel to one in GB/Isles of Scilly, or NT would have to set up its own, which would be a complex process that would

		severely hamper the timeline of the project.
Legislative Implications	Approval and suitable location would need to be agreed with DAERA MFD for this re-use approach. NT being the landowner of the identified beach nourishment location reduces a potential legislative barrier to this approach.	Approval would be required during many of the stages of this potentially multi-stage process, such as waste transfer notes and approval to transport dredged material, approval for landfill disposal (DAERA and landfill owner), etc. Disposal at landfill is also generally reserved for materials with above the EAL 2 threshold, which this is not.

5.3 Financial Implication Considerations

Criteria	Beach nourishment	Landfill disposal
Financial implications	Lowest cost of the options which involve removing the dredged material, as transport distances required are relatively low, skill set is present within current employed staff and as NT is the owner of the land/access route identified for the potential nourishment site this would reduce costs too. Hire of Diggger - £1k/week Staff Time - c. £3k c.£500 for Fuel and additional costs = c. £4.5k a year (Not including the Sediment analysis and additional work analysing the beach or the additional licencing costs)	This is the most costly option and most complex, requiring multiple processes, double/triple handling of material, transport of material and could involve large fees, as well as costly start-up costs for a modest desalination plants, on top of timeline need for approvals and set-up costs. It would be prohibitively costly for NT to choose this approach, particularly considering it is the least preferred in the waste hierarchy and the contaminant levels as shown in sediment sampling are nowhere near the threshold above which landfill disposal would be required.

5.4 BPEO Assessment Discussion

Landfill disposal for the dredged material would likely prove to be a complicated and multi-layered process, with added cost, logistics and strategic implications associated with it. It is also the least preferred option when considering the Waste Hierarchy approach within NIEA's guidance on Marine Dredging Disposal activities, and would not be a required approach as the

sediment sampling results do not return values above the EAL 2 threshold for the Tier I and II Chemical Suite analysis that was performed.

Beach nourishment would be an effective re-use option for the dredged materials and could be carried out in-house by NT core staff, who have the skills and experience required to carry out beach nourishment via the methodology outlined above – and is therefore practicable and sustainable for the period a maintenance dredge license would operate over. This has also been an accepted route for disposal of dredging material in previous maintenance dredging applications granted for the proposed dredging area – and NT is fully prepared to work with DAERA upon the precise locations for beach nourishment to occur within Cushendun Bay.

5.5 Conclusion

The Best Practicable Environmental Option has therefore been assessed as beach nourishment.

As identified in the chemical results discussion, further analysis may be required as 2 samples had values of Chromium and Nickel over the EAL1, but well below the threshold of EAL 2 – NT is happy to take guidance from DAERA's MFD as to how to proceed in this respect, or if further chemical analysis is required at all. However, there are no significant sources of pollution in this area as it is used for light seasonal recreational boat use only.

References

Northern Ireland Guidance on Marine Licensing; Dredging, Disposal and Aggregate Dredging, under Part 4 of the Marine and Coastal Access Act 2009 (May 2016, Department of Agriculture, Environment and Rural Affairs).

Pye, K. & Blott, S. Cushendun Coastal Scoping Report and Monitoring Coastal Change to Inform Future Management. KPAL Report No: 110255 (February 2025)

OSPAR Commission; OSPAR Guidelines for the Management of Dredged Material at Sea

National Trust. Shifting Shores Policy: Playing our part at the coast (2022).

Appendices

National Trust | Area to be dredged & disposal area Cushendun

Legend

NT Land Interest

NT Ownership

NT Leasehold

Notes

Blue: area proposed for dredging Red: area proposed for disposal

0 100 200 m

Scale 1: 1994 (when printed at 100% on A4 landscape)