Shell Island Maintenance Dredge

Shell Island Maintenance Dredging and Disposal Works - Environmental Review

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Executive Summary

This document considers potential environmental impacts arising from the proposed maintenance dredging works, with particular reference to the features of the Morfa Harlech a Morfa Dyffryn SAC, Pen Llyn a'r Sarnau SAC and Morfa Dyffryn SSSI, in addition to the Gogledd Bae Ceredigion SPA, which is immediately adjacent to the dredge disposal site.

The impacts of the proposed maintenance dredging operation at Shell Island are considered to be negligible, non-existent or potentially beneficial for individual ecological features and resources in and around the site, particularly those features relevant to the designation of the SPA, the two SACs and SSSI in the area. Dredging and disposal of sandy materials will be conducted so as to potentially enhance eroding dune habitats to the north of the site. All transport of materials will be conducted over existing roads to avoid damage to adjacent habitats, such as saltmarsh. As dredging of the tidal basin is not predicted to occur in 2020, loss of intertidal habitats will not occur. The dynamic nature of the site, with seasonal variations in wave action combined with freshwater inputs leading to strong natural variations in suspended sediment levels, means that the relative impact of this small maintenance dredging operation will be **negligible** overall.

1. Background

The SACs are designated for the presence of the following Annex I Habitats:

- Embryonic shifting dunes;
- Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes');
- Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*);
- Humid dune slacks;
- Estuaries;
- Coastal lagoons;
- Large shallow inlets and bays;
- Reefs;
- Mudflats and sandflats not covered by seawater at low tide;
- Salicornia and other annuals colonising mud and sand;
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); and
- Submerged or partially submerged sea caves.

These features, along with the features listed below, are also the basis for the site's designation as a Site of Special Scientific Interest (SSSI), and they support a number of nationally notable flora. In addition, the following ecological features may be of conservation concern:

- Saltmarsh habitats;
- Breeding birds (redshank, ringed plover, curlew);
- Over wintering and migratory birds (primarily wildfowl);
- Migratory fish;
- Marine mammals (bottlenose dolphin, grey seal); and
- Otter.

The SPA contains an Article 4.1 Qualification (79/409/EEC), for regularly supporting and overwintering in the area, the following:

- Red-throated diver (*Gavia stellata*) - 1,186 individuals representing 7% of the wintering population in Great Britain (2001/02-2003/04).

There is also a range of intertidal habitats, based on common littoral biotopes such as algal shrubs and films (e.g. *Fucus vesiculosus* and *Verrucaria maura*). One relatively rare biotope is *Sabellaria alveolata* reef. The dredging will lead to removal of benthic habitats for burrowing infauna such as amphipods and polychaetes, which are food sources for fish and for birds at low tides.

2. Impacts from dredge and disposal operations for main channel dredge (sandy materials)

Removal of approximately 4,000 tonnes of sand will deepen the channel and mooring areas to their original depth, moving an average depth of 0.29 metres of material. The deposition of material at Dinghy Beach and Bar Newydd will re-introduce material to the northerly littoral drift system, which has led to the formation of Morfa Dyffryn and Morfa Harlech. The dunes at Llandanwg Beach immediately north of Shell Island (and in the SACs/SSSI) are subject to erosion, so that re-introduction of dredged material from deposition at Bar Newydd or Dinghy Beach will have an overall beneficial impact on the system. Additionally, there will be a relatively small amount of material deposited in each tide, which will be rapidly dispersed and thus have only temporary effects on the area's morphology. The deposition of material containing invertebrates that were collected with the dredged arisings will also provide good foraging opportunities for the red-throated divers that overwinter within the adjacent SPA. Disposal of material will occur at low water onto sub-aerial sand, thus minimising the potential for local increases in suspended sediment levels at disposal sites.

3. Assessment of potential impacts and mitigation options

An impact assessment with mitigation options for each of the ecological resources and features listed above is given in the table below:

Ecological Features	Potential impact	Mitigation	Residual impacts
Embryonic shifting dunes	No impact, but materials can be transported northwards in the littoral drift system and may deposit on eroding dunes	No mitigation required	Potentially Beneficial: Depositing sandy materials on Bar Newydd and Dinghy beach to ensure transport into natural littoral drift system could add material to eroding dunes north of the dredge site using the littoral drift system responsible for formation of the SACs/SSSI habitats
Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')	No impact, but materials can be transported northwards in littoral drift system and may deposit on eroding dunes	No mitigation required	Potentially Beneficial: Depositing sandy materials on Bar Newydd and Dinghy beach to ensure transport into natural littoral drift system could add material to eroding dunes north of the dredge site using the littoral drift system responsible for formation of the SACs/SSSI habitats
Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)	No impact, but materials can be transported northwards in littoral drift system and may deposit on eroding dunes	No mitigation required	Potentially Beneficial: Depositing sandy materials on Bar Newydd and Dinghy beach to ensure transport into natural littoral drift system could add material to eroding dunes north of the dredge site using the littoral drift system responsible for formation of the SACs/SSSI habitats
Humid dune slacks	No impact, but materials can be transported northwards in littoral drift system and may deposit on eroding dunes	No mitigation required	Potentially Beneficial: Depositing sandy materials on Bar Newydd and Dinghy beach to ensure transport into natural littoral drift system could add material to eroding dunes north of the dredge site using the

Ecological Features	Potential impact	Mitigation	Residual impacts
			littoral drift system responsible for formation of the SACs/SSSI habitats
Intertidal habitats (including shallow inlets and bays, exposed mud- and sand flats)	Temporary smothering of habitats from deposition; loss of habitats	None possible for habitat loss as required to return levels to previous navigable depths. However, leaving intervals between depositions of sandy material at disposal sites will minimise the build-up of materials on existing habitats; work is proposed only to occur at low tide. Disposed material is likely to be a similar grade to the same as the *in situ* material. The dredge area is likely to be recolonised very rapidly, within 3-4 months, and represents less than 1% of the total area of available feeding habitat for birds and fish.	Negligible
Saltmarsh and Atlantic salt meadows (these form the upper reaches of salt marshes)	None: routes of transport between dredge and disposal sites are over existing roads.	None required	None
Sea caves	None: disposal and dispersal of sediment into littoral drift system highly unlikely to affect any sea caves in the area	None required	None
Breeding and wintering birds	Temporary disturbance to birds, temporary loss of feeding habitats.	Works conducted outside breeding season and noise will be limited to excavator any tipper trucks. Works will be conducted on only a	Negligible

Ecological Features	Potential impact	Mitigation	Residual impacts
		temporary basis during the winter period; wintering birds are also not a primary or secondary feature for SAC selection. Works conducted so as to ensure negligible losses to feeding habitats (see Intertidal habitats above). Access routes between dredging and disposal sites will also use existing roads to minimise disturbance to birds.	
Migratory fish	Temporary disturbance to fish, temporary loss of feeding habitats, increased suspended sediments.	Works conducted outside main upstream migration period for fish such as salmonids and eel, materials disposed so as to be dispersed in natural littoral drift system as quickly as possible. Works conducted so as to ensure negligible losses to feeding habitats (see Intertidal habitats above).	Negligible
Benthic fauna	Disturbance, loss of habitats, smothering of habitats	Mitigation as for intertidal habitats; rapid recolonisation of dredged area by fauna within 3-4 months.	Negligible
Sabellaria alveolata	Potential smothering of reefs. The disposal site is situated to the north of many reefs in the area and nearest reefs north of disposal sites are more than 400 metres away. A northerly littoral drift system means that smothering of southern reefs is highly unlikely.	Dispose of sand so that it re-enters the northerly littoral drift system and further avoids smothering southern reefs, potentially travelling in suspension to feed northern reefs. *Sabellaria* requires some sand in suspension to build its honeycomb	Negligible (potentially minor beneficial but not proven)

Ecological Features	Potential impact	Mitigation	Residual impacts
	For northern reefs, distance from disposal site will mean that sandy material will be dispersed and in suspension if it reaches them.	reefs, and has a relatively high tolerance to sedimentation.	
Mammals (marine)	None: activities not within/adjacent to haul out sites for grey seal, e.g. as identified by Stringell *et al*. (2014).	None required	None
Over wintering red-throated divers in the adjacent SPA	Temporary disturbance to birds	Dredging and deposition works are required to be undertaken in the winter months, but noise will be limited to an excavator and small tipper trucks. These works will also only be conducted on a temporary basis during the winter period. Works will be conducted so as to ensure negligible losses to feeding habitats (see Intertidal habitats, above) and the disposal of material containing invertebrates that were taken along with the dredged arisings will potentially add a small and temporary food source for birds. Routes of travel between dredging and disposal sites will also use existing roads, to minimise disturbance to birds.	Negligible

4. Impacts from Dredge and Disposal Operations for Tidal Basin Dredge (Muddy Materials)

There will be no removal of silt within the tidal basin in 2020. No impacts on circulation, water quality and intertidal habitats are therefore predicted.

5. References

Stringell, T., Millar, C., Sanderson, W., Westcott, S., McMath, A. (2014). When aerial surveys won't do: Grey seal pup production in cryptic habitats of Wales. Journal of the Marine Biological Association of the United Kingdom 94(6): 1155–1159.