

Western Marinas Dredging Ltd

Aberystwyth Marine - Maintenance Dredging

Information to Inform a Water Framework Directive Compliance Assessment

July 2026

Project Nr

720

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Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Client: Western Marinas Dredging Ltd
Project: Aberystwyth Marina - Maintenance Dredging
Title: Aberystwyth Marina - Maintenance Dredging
Information to Inform a WFD Assessment

Date	Revision	Prepared by	Reviewed by
18/06/2026	Internal Draft	S Challinor	M Maloney
14/07/2026	Final	S Challinor	M Maloney

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Table of Contents

1	Introduction.....	3
1.1	Background.....	3
2	Project Definition	3
2.1	Aberystwyth Marina.....	3
2.2	Previous Maintenance Dredging Activity	4
2.3	Proposed Maintenance Dredging Activity.....	5
2.4	Other Plans and Projects	8
3	WFD Assessment.....	9
3.1	Introduction	9
3.2	Assessment Method.....	10
3.3	Assessment: Stage 1 - Screening	11
3.4	Assessment: Stage 2 - Scoping	11
3.5	Assessment: Stage 3 – Detailed Assessment of the Risk to Fish Behaviour	12
3.6	Assessment: Stage 3 – Detailed Assessment of the Risk to Water Quality	13
3.7	Assessment: Stage 3 – Detailed Assessment of Risk to WFD Protected Areas	17
3.8	Assessment: Stage 3 – Detailed Assessment of Risk of Invasive Non-Native Species.....	20
3.9	Conclusions	23
4	References	23



1 Introduction

1.1 Background

- 1.1.1 Western Marinas Dredging Ltd (WMDL) are proposing to undertake maintenance dredging at Aberystwyth Marina to restore the required water depths. Maintenance dredging will remove sediment from the marina by using water injection dredging (WID) to relocate the sediment into the downstream reaches of the estuaries of Afon Rheidol and Afon Ystwyth and, potentially, into the coastal waters of Cardigan Bay. By taking this approach to the maintenance dredging, the sediment will be retained within the same sediment cell from where it originated, which is the generally preferred dredged material management option set out in the Welsh National Marine Plan (Welsh Government, 2019).
- 1.1.2 In accordance with the provisions of the Marine & Coastal Access Act 2009, WMDL need a marine licence from Natural Resources Wales (NRW) to undertake the maintenance dredging activity. Given the nature of the maintenance dredging activity, the marine licence application will be subject to an assessment of whether it complies with the provisions of Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 as amended ('the WFD Regulations').
- 1.1.3 Accordingly, this report has been prepared by The Bates Partnership (TBP) on behalf of WMDL to present supporting information to show that, on the basis of objective information and scientific evidence, the proposed maintenance dredging of Aberystwyth Marina is not likely to cause deterioration of a water body or prevent a water body meeting the objectives of the Western Wales River Basin District - River Basin Management Plan (the '2022 Western Wales RBD RBMP') (NRW, 2022).

2 Project Definition

2.1 Aberystwyth Marina

- 2.1.1 Aberystwyth Marina is situated in the estuary to the Afon Rheidol and within the town of Aberystwyth, approximately 400m upstream of the breakwaters that form the entrance to Aberystwyth Harbour (**Figure 1**). The marina provides 154 berths largely as floating pontoon moorings and onshore facilities and services.



Figure 1 – Location of Aberystwyth Marina (map source: Google Earth; accessed 27-04-2026)



2.2 Previous Maintenance Dredging Activity

- 2.2.1 Since the capital dredging to form the basin, Aberystwyth Marina has been subject to a series of maintenance dredging campaigns to maintain a maximum bed level of -2mCD, including campaigns undertaken in accordance with marine licences DML1554 and DML1907.
- 2.2.2 The most recent maintenance dredging has been undertaken under marine licence DML1907. Under marine licence DML1907, the former operator of the marina – The Marine Group - was permitted to dredge up to 42,000 wet tonnes of dredged material (sand and silt) by WID. This activity was granted on an annual basis from 2019 to 2023, and was conditioned such that it avoided the bathing water season between 15 May and 30 September inclusive. The WFD assessment accompanying marine licence DML1907 found the proposed dredging activity would not have a significant effect on the Ystwyth & Rheidol Estuaries water body (ADBP, 2015).



2.3 Proposed Maintenance Dredging Activity

Dredging Location

- 2.3.1 Maintenance dredging will be undertaken to remove sediment that has accumulated within Aberystwyth Marina (see figure in **Appendix 1**). The vertical and horizontal extent of the proposed maintenance dredging is the same as previous maintenance dredging campaigns undertaken under previous marine licences DML1554 and DML1907. Horizontally, the proposed dredging activity will remove accumulated sediment at and around the floating pontoon berths, which covers an area of approximately 1.531 hectares. Horizontally, the proposed dredging activity will remove accumulated sediment to achieve an average bed level of -1.7mCD (i.e., 1.7m below Chart Datum). To achieve this, a dredging tolerance of 0.3m is required such that the proposed dredging activity could result in a maximum bed level of -2.0mCD.

Dredged Material Characteristics

- 2.3.2 In line with NRW sample plan SP2511, sediment samples were collected from four sampling locations within the marina (see figure in **Appendix 2**). Sediment samples were taken at the surface (i.e., 0m) and at 1m intervals down to the required dredge depth, which required sampling down to 1.5m below the existing bed level.
- 2.3.3 Particle size analysis was undertaken on the sediment samples to determine the distributions of sediment sizes and proportions of dominant sediment types (i.e., gravel, sand and silt) (see tables and figures in **Appendix 3**). The particle size distributions show the sediment samples to be dominated by particle fractions that are less than 63µm, such that silt is the dominant sediment type.
- 2.3.4 Chemical analyses were undertaken on the sediment samples to determine concentrations of a range of potentially contaminating substances; namely, metals, organotin compounds and polycyclic aromatic hydrocarbons (PAHs) (see tables in **Appendix 4**).
- 2.3.5 The concentrations of contaminants in the sediment have been compared to sediment quality criteria to indicate whether the proposed maintenance dredging activity has the potential to adversely affect the receiving environment. The principal sediment quality criteria are the UK 'action levels' (Cefas Action Level 1 (AL1) and Cefas Action Level 2 (AL2)), which are used to inform marine licence applications about the suitability of sediment for disposal at sea. Generally, sediment with contaminant concentrations below AL1 is considered suitable for disposal at sea (Mason *et al.*, 2021). UK action levels are partially available (AL1 but no AL2) for some contaminants including PAHs, so the US 'effects ranges' (effects range low (ERL) and effects range median (ERM)) can be used to inform marine licence applications about the suitability of sediment for disposal at sea; albeit on an advisory basis because the other criteria have no legal or policy standing in the UK. Generally, sediment with contaminant concentrations below the ERL is considered unlikely to cause harm to marine life (Long *et al.*, 1995; Gorham-Test, 1998) and, by implication, is considered suitable for disposal at sea.
- 2.3.6 Chemical analyses determined that the sediment samples representing the dredged material in the marina are characterised by most contaminants at concentrations below the AL1 and/or the ERL, and a few contaminants at concentrations above the AL1 and/or the ERL but well below the AL2 and/or the ERM.



- 2.3.7 Given the results of the particle size analysis and chemical analyses, the sediment in the marina should be suitable for relocating downstream: notably, it should not change the physical and chemical characteristics of the existing bed material within the downstream reaches of the estuaries of the Rivers Rheidol and Ystwyth and, potentially, the coastal waters of Cardigan Bay.

Dredging Method

- 2.3.8 The intended method for the proposed maintenance dredging activity will involve water injection dredging (WID).
- 2.3.9 WID plant consists of a small vessel or floating pontoon with a water pump and injection arm attached. The WID dredging method is described as follows. The vessel / pontoon is manoeuvred by its own propulsion system to the desired dredging location. The injection arm is lowered to the bed and passed over the dredging area as the vessel / pontoon is manoeuvred ahead at very low speeds (<1 knot). Water is pumped from the surface through the injection arm and injected into the bed sediment at low pressures (approximately 1.5 bars) through a series of nozzles positioned along the horizontal beam at the end of the injection arm. The injected water breaks down the cohesion between the sediment particles and creates a layer of water and sediment at the bed with a higher density than the overlying water column. This fluidised sediment layer acts a low viscosity fluid and flows horizontally along the bed's sediment-water interface as a density current into lower bed levels / deeper waters under the influence of gravity and currents. It is by this process that the WID method relocates sediments from a dredging area to the surrounding environment. The vertical dispersion of the fluidised sediment is limited to the lower fraction of the water column (immediately above the bed) as the low pressure of injected water avoids putting sediment into suspension in the overlying water column. The horizontal dispersion of the fluidised sediment depends on the viscosity characteristics of the fluidised sediment, the morphological characteristics of the bed, and the hydrodynamic characteristics of the water body. The flow velocity of the fluidised sediment is typically in the range 0.2m/s to 2m/s, depending on the sediment itself and the local bathymetry (e.g., slope), hydrodynamic conditions (e.g., tidal currents) and bed friction (e.g., presence of vegetation).
- 2.3.10 In the case of the proposed maintenance dredging activity, WID is expected to relocate sediment such that it flows as a density current, largely under the influence of gravity and ebb tides, from the marina, down the River Rheidol, out of the harbour and into the coastal waters of Cardigan Bay. Vertical dispersion of the fluidised sediment is expected to remain close to the bed such that there will be limited exchange with the overlying water column. Horizontal dispersion of the fluidised sediment is expected to be initially confined by the dimensions of the River Rheidol's subtidal channel through the harbour and beyond the breakwaters, and then broadened as it flows into deeper water in Cardigan Bay.

Dredging Programme

- 2.3.11 Maintenance dredging of the marina is proposed to take place over a series of annual campaigns over the next three years. The maximum volume of sediment to be dredged within each 12-month period is 30,000m³.
- 2.3.12 Each annual dredging operation is expected to take approximately 10-15 days, depending on local conditions. The proposed dredging activity will only occur during the period of 1 hour before high tide to 1 hour before low tide on falling tides (i.e., no dredging will take place on rising tides up to 1 hour before HW at which time tidal velocity is



significantly reduced). Dredging is planned for the autumn/winter months to ensure sufficient water depths are in place at the marina for the important spring/summer recreational period. As per the previous marine licence (DML1907), no dredging will take place between 15 May and 30 September to avoid the bathing water season.

Dredging Management

- 2.3.13 A number of plans will be in place to manage environmental risks during maintenance dredging of the marina. These plans are expected to include a Pollution Prevention Plan (or equivalent) for minimising the risk of pollution from spills and leaks from dredging plant, a Marine Biosecurity Risk Assessment and Management Plan (or equivalent) for minimising the risk of introducing or spreading marine invasive non-native species (INNS).

Dredging Impact Footprint: Removal of Sediment from Aberystwyth Marina

- 2.3.14 The impact footprint due to sediment removal will correspond with the dredging location within Aberystwyth Marina (see figure in **Appendix 2**), will be the same as previous maintenance dredging campaigns undertaken under previous marine licences, and covers an area of approximately 1.531 hectares.

Dredging Impact Footprint: Relocation of Fluidised Sediment to Cardigan Bay

- 2.3.15 Research on fluidised sediment propagation (e.g., Sigwald et al., 2015) combined with the local bathymetric and hydrodynamic conditions characterising the lower reach of the River Rheidol and inshore waters of Cardigan Bay (e.g., Royal Haskoning, 2011) can be considered to indicate the impact footprint of the sediment relocated by the proposed maintenance dredging activity.
- 2.3.16 The fluidised sediment is expected to propagate as a discernible density current under the influence of gravity and tidal currents and, to a lesser extent, bed friction (given the lack of vegetation).
- 2.3.17 The marina is situated in the lowermost reach of the River Rheidol immediately downstream of a weir and approximately 325m upstream of the confluence of the Rivers Rheidol and Ystwyth. This reach of the River Rheidol flows through Aberystwyth Harbour and is flanked by lengths of vertical quay wall, sloping rock revetment, intertidal shingle banks and a spending beach. Water levels within this reach are heavily influenced by tides such that water covers the entire area at high water but is constrained to a central channel at low water. Water levels typically change by approximately 3.2m between low water and high water, but can increase to approximately 5.0m on larger spring tides and decrease to approximately 0.9m on smaller neap tides. Flow velocities typically range between 0.2m/s and 0.8m/s during average tidal conditions and normal river conditions (i.e., when the flows are not affected by heavy rain events or dam releases upstream). There is a small shingle shoal at the confluence of the Rivers Rheidol and Ystwyth, and a shallow bar at the entrance to the river / harbour. These features influence flow direction at the entrance to the river / harbour and reduce wave propagation into the river / harbour. Beyond the river / harbour entrance, this part of Cardigan Bay is characterised by flow velocities that are weaker than velocities passing through the river / harbour entrance. The beaches fronting Aberystwyth comprise relatively coarse-grained sediment (i.e., gravelly sand, sandy gravel) and are gradually eroding. The harbour's southern breakwater interrupts the net northerly longshore sediment transport direction



and, therefore, the supply of material to these beaches.

- 2.3.18 Given the local bathymetric and hydrodynamic conditions, the fluidised sediment is expected to propagate (mainly under the influence of gravity and the ebb tidal current) from the marina, through the harbour (where it will be confined and directed by the river's central channel, the shingle shoal at the confluence with the River Ystwyth, and the shallow bar at the river / harbour entrance), and into Cardigan Bay. Once in Cardigan Bay, the fluidised sediment is expected to propagate (mainly under the influence of gravity and the residual effect of the ebb tidal current) in a largely offshore direction until settling on the bed on slack water. It is not possible to accurately predict the extent of the fluidised sediment's propagation, however, the timing of the maintenance dredging activity relative to tidal times and current velocities indicates that the impact footprint due to sediment relocation is expected to extend offshore into Cardigan Bay for potentially 5km, where the remnant of the fluidised sediment is expected to be no longer discernible from background conditions for bedload sediment transport.

2.4 Other Plans and Projects

Development subject to Planning Control

- 2.4.1 Reference to Ceredigion County Council's online planning information (ceredigion-online.tascomi.com; accessed 26-05-2026) identifies that no planning applications have been granted for development at and around Aberystwyth Marina, Aberystwyth Harbour and the adjacent beaches since 2020.
- 2.4.2 On the basis that development prior to and including 2020 can be considered integrated into baseline conditions, and no development since 2020 has occurred, then there is no potential for the proposed maintenance dredging activity to have in-combination effects and/or cumulative impacts with development.

Activities subject to Marine Licensing

- 2.4.3 Reference to NRW's public register (publicregister.naturalresources.wales; accessed 26-05-2026) identifies several marine licence applications have been granted for activities at and around Aberystwyth Marina, Aberystwyth Harbour and the adjacent beaches since 2020.
- 2.4.4 Under marine licence DML2473, Ceredigion County Council was permitted to dispose of 10,000 wet tonnes of dredged material (gravel, sand and silt) from the southern part of Aberystwyth Harbour to the beaches either side of the river / harbour entrance. This activity was granted on an annual basis from 2025 to 2030, and must occur during a spring tide cycle in winter / early spring (January to March inclusive). Marine licence DML2473 continues the dredged material disposal activity that took place from 2022 to 2025 under marine licence DML2160. The WFD assessments accompanying marine licences DML2473 and DML2160 both found the proposed dredged material disposal activities to pose a negligible risk to the Ystwyth & Rheidol Estuaries water body (Engineering Design Services, 2024 and Engineering Design Services, 2021).
- 2.4.5 Under marine licence CML2513 Andrew Scott Ltd was permitted to install a storm outfall through the sea wall at Old College, Aberystwyth. This activity was granted for one year from April 2025 to March 2026. A WFD assessment was not submitted to inform the application for marine licence CML2513.



- 2.4.6 On the basis that licensable activities since 2020 have no potential for significant effects, then there is no potential for the proposed maintenance dredging activity to have in-combination effects and/or cumulative impacts with these activities.

3 WFD Assessment

3.1 Introduction

Relevant River Basin Management Plan

- 3.1.1 This WFD assessment considers whether the proposed maintenance dredging activity is likely to pose the risk of significant impacts on a water body (or water bodies) that jeopardise compliance with the following objectives of the 2022 Western Wales RBD RBMP (NRW, 2022):
- Prevent deterioration in water body status.
 - Achieve the objectives for protected areas by achieving the standards set by the relevant legislation under which protected areas are designated (e.g., the conservation objectives of European sites) where achieving good status by 2027 will contribute towards meeting those objectives.
 - Aim to achieve good overall status/potential for surface waters and ground waters by implementing measures to achieve good overall status where they are technically feasible and not disproportionately costly.

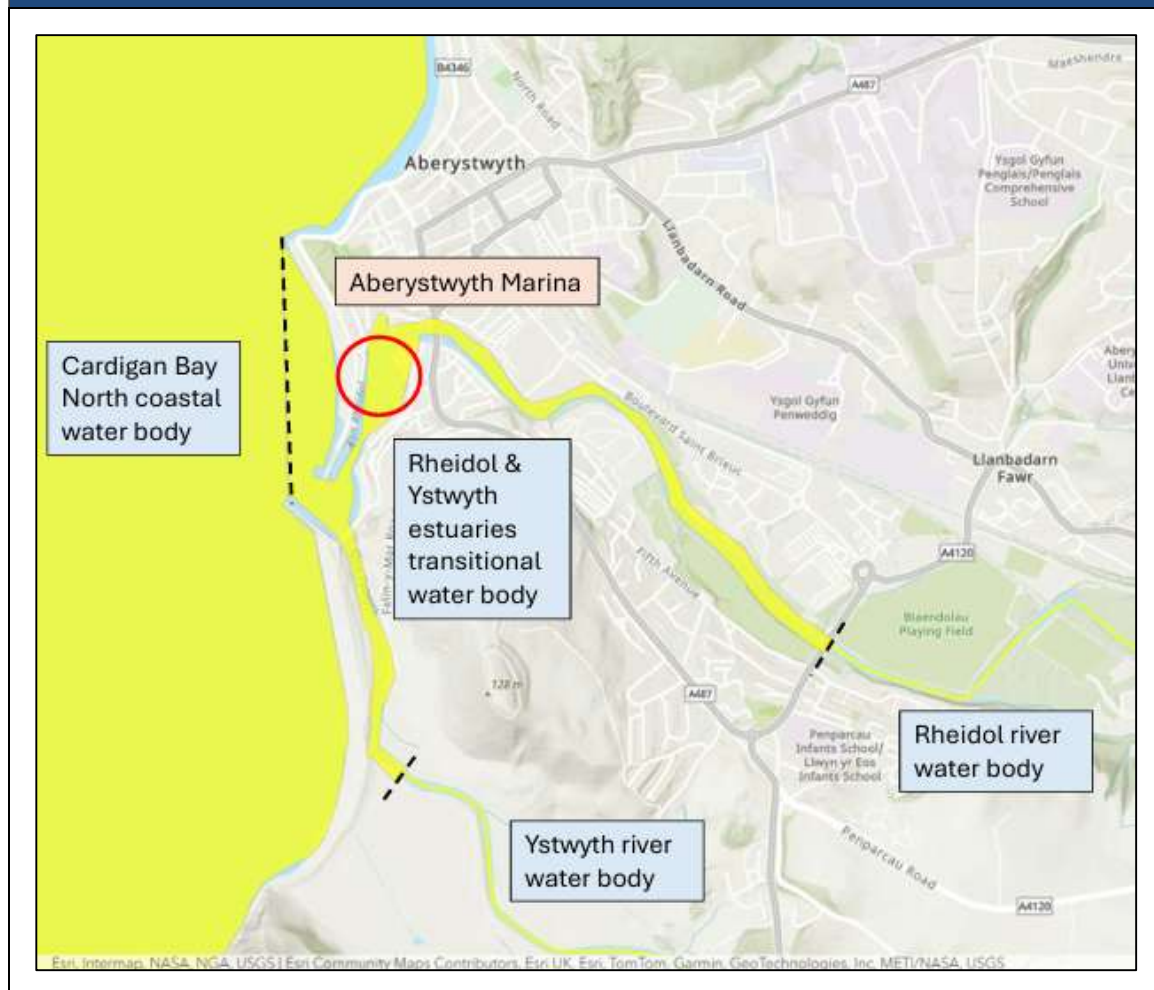
Relevant Water Bodies

- 3.1.2 The proposed maintenance dredging activity will take place within the Ystwyth & Rheidol Estuaries water body (**Figure 2**). This transitional (estuarine) water body connects the downstream reaches of the Afon Rheidol and Afon Ystwyth with the coastal waters of Cardigan Bay and covers approximately 271,697.98 hectares.
- 3.1.3 The Ystwyth & Rheidol Estuaries water body is a small estuarine water body covering 271,697.98 hectares. It is classified as heavily modified in terms of its hydromorphological features, and is currently at 'moderate' status overall. Its 'moderate' status overall is based on its 'moderate' classification for ecological status due to failing for dissolved inorganic nitrogen (DIN) and 'moderate' classification for chemical status due to failing for PAHs, cypermethrin and zinc.
- 3.1.4 The Ystwyth & Rheidol Estuaries water body is hydrologically connected to three water bodies within five kilometres of Aberystwyth Marina: the Cardigan Bay North coastal water body which is situated approximately 0.3 kilometres from Aberystwyth Marina, the Rheidol river water body which is situated approximately 1.8 kilometres from Aberystwyth Marina, and the Ystwyth river water body which is situated approximately 1.1 kilometres from Aberystwyth Marina (**Figure 2**). The proposed maintenance dredging activity will take place on falling tides to relocate sediment from the marina into the estuarine and coastal sediment systems downstream of Aberystwyth Marina; hence, the Cardigan Bay North water body is considered further in this report because it is located downstream of the marina and, therefore, has the potential to be affected by the proposed maintenance dredging activity, but the Rheidol and Ystwyth water bodies are not considered further in this report because they are located upstream of Aberystwyth Marina and, therefore, do not have the potential to be affected by the proposed maintenance dredging activity.



- 3.1.5 The Cardigan Bay North water body is a large coastal water body covering 712,175,716.4 hectares. It is not classified as heavily modified in terms of its hydromorphological features, and is currently at 'moderate' status overall. Its 'moderate' status overall is based on its 'moderate' classification for chemical status due to failing for polybrominated diphenyl ethers (BDPE) and mercury.

Figure 2 – WFD Water Bodies at and around Aberystwyth Marina (source: waterwatchwales-nrw.hub.arcgis.com; accessed 28-04-2026)



3.2 Assessment Method

- 3.2.1 The assessment method used in this report is based on Complying with the WFD Regulations 2017: Guidance Note GN 078 (NRW, 2024). This document provides guidance on how to assess the WFD compliance of activities that may cause deterioration to a water body or prevent it (or protected areas) from achieving the objectives set out in the River Basin Management Plan. It sets out the following three stages for a compliance assessment:
- Stage 1: screening. This stage is undertaken to identify and exclude projects or activities that do not need further assessment.



- Stage 2: scoping. This stage is undertaken to identify the environmental receptors that are potentially at risk from projects or activities and, therefore, need detailed assessment.
- Stage 3: detailed assessment. This stage considers the potential impacts of projects or activities on receptors identified at the scoping stage, and identifies ways to avoid, minimise impacts or mitigate impacts. It concludes with an assessment of whether projects or activities may prevent a water body and any protected areas from achieving their objectives, or cause deterioration or jeopardise the water body status.

3.2.2 The assessment has been informed by the datasets available via Water Watch Wales (waterwatchwales-nrw.hub.arcgis.com) and Defra (magic.defra.gov.uk/magicmap.aspx) map applications.

3.3 Assessment: Stage 1 - Screening

3.3.1 The proposed activity has been screened in accordance with Complying with the WFD Regulations 2017: Screening. Guidance Note GN 078 (NRW, 2024). As identified below, the responses to all three risk screening assessment questions demonstrate that the proposed activity needs to be subject to further assessment to determine compliance with the WRD Regulations.

Q1. Is the proposal in, or could it impact on, a water body at high overall status or high status for morphology (or hydromorphology for Transitional and Coastal water bodies)?

3.3.2 Reference to the data presented on Water Watch Wales (waterwatchwales-nrw.hub.arcgis.com; accessed 29-04-2026) identifies that neither the Ystwyth & Rheidol Estuaries water body nor the Cardigan Bay North water body is at high status for hydromorphology.

Q2. Are the proposed activities listed as low risk?

3.3.3 The proposed maintenance dredging activity is not listed and does not qualify as a low risk activity under provisions for marine licensing (i.e., it falls outside the scope of Band 1 activities). On this basis, the proposed maintenance dredging activity must be subject to a WFD assessment.

Q3. Are there any potential in combination and/or cumulative impacts?

3.3.4 As described above (**Section 2.4**), the proposed maintenance dredging activity does not have the potential for in combination effects and/or cumulative impacts with other plans or projects.

3.4 Assessment: Stage 2 - Scoping

3.4.1 The proposed maintenance dredging activity has been scoped in accordance with Complying with the WFD Regulations 2017: Scoping. Guidance Note GN 078 (NRW, 2024). Scoping was undertaken using the template for transitional and coastal waters and considered the following components of the proposed dredging and deposition activities individually and in-combination / cumulatively. The results of scoping are presented at **Appendix 5**.



- 3.4.2 Scoping determined that detailed assessment is required for the following risks to receptors within the Ystwyth & Rheidol Estuaries water body and/or Cardigan Bay North water body:
- The maintenance dredging activity could impact fish behaviour by creating a barrier to migration due to the presence of a sediment plume and/or noise disturbance.
 - The maintenance dredging activity could impact water quality by disturbing sediment with contaminants at concentrations above Cefas Action Level 1.
 - The maintenance dredging activity could impact protected areas by taking place within 2km of the West Wales Marine / Gorllewin Cymru Forol Special Area of Conservation (SAC), the Northern Cardigan Bay / Gogledd Bae Ceredigion Special Protection Area (SPA) and the Aberystwyth South and Aberystwyth North bathing waters.
 - The maintenance dredging activity could introduce and/or spread invasive non-native species (INNS) by using marine-based plant which will have been used in or travelled through other water bodies.

3.5 Assessment: Stage 3 – Detailed Assessment of the Risk to Fish Behaviour

Introduction

- 3.5.1 Scoping determined that the proposed maintenance dredging activity may pose a risk to fish behaviour because it may create conditions that cause a barrier to migration due to the presence of a sediment plume and/or noise disturbance.

Baseline Conditions

- 3.5.2 The estuary for the River Rheidol provides a migratory route between Cardigan Bay and the freshwater reaches of the River Rheidol. Reference to NRW's freshwater fish survey data ([NRW Freshwater Fish Surveys | DataMapWales](#); accessed 17-06-2026) identifies the River Rheidol as a freshwater location for migratory salmonids and eels. Adult sea trout / sewin (*Salmo trutta*) typically migrate upstream from spring to early autumn, peaking in late spring and summer, and adult Atlantic salmon (*Salmo salar*) typically migrate upstream from late summer to winter, peaking in late autumn. Smolts of both species typically migrate downstream in spring. European eel (*Anguilla anguilla*) typically migrates upstream as glass eels / elvers in spring and downstream as silver eels in autumn.

Impact Assessment – Suspended Sediment

- 3.5.3 Given the use of WID, the potential for suspended sediment to present a barrier to fish migration will be principally restricted to the flow of fluidised sediment that is characteristic of this dredging method. As described in **Section 2.3**, vertical dispersion of the fluidised sediment is expected to remain close to the bed such that there will be limited exchange with the overlying water column, and horizontal dispersion of the fluidised sediment is expected to propagate from the marina, through the harbour (where it will be confined and directed by the river's central channel, the shingle shoal at the confluence with the River Ystwyth, and the shallow bar at the river / harbour entrance) and into Cardigan Bay.
- 3.5.4 As noted in **Section 2.3**, the proposed maintenance dredging activity is expected to take place over autumn / winter months to ensure sufficient water depths are in place at the marina for the important spring / summer recreational period, and is expected to take



place intermittently for 6-hour periods to make use of falling tides. While the proposed maintenance dredging activity may coincide with the migration times for sea trout, Atlantic salmon and eel, the fluidised sediment passing down the estuary will be limited both in space and time such that suspended sediment is not expected to present a physical barrier that will prevent fish from entering and migrating into and/or through the estuary.

Impact Assessment – Underwater Noise

- 3.5.5 Given the use of WID, the potential for underwater noise to present a barrier to fish migration will be principally restricted to the continuous (non-impulsive) sound pressure levels that are characteristic of this dredging method. Research on WID has recorded sound pressure levels of approximately 170dB at one metre from the noise source (HR Wallingford, 2023 in Tyler and Emery, 2024). This sound pressure level is below sound exposure levels for fish where the swim bladder is not involved in hearing (i.e., trout, salmon and eel) relating to mortality or potential mortal auditory injury (>207dB; Popper et al., 2014), recoverable auditory injury (>203dB; Popper et al., 2014), and temporary, reversible decrease in auditory sensitivity (>186dB; Popper et al., 2014). This sound pressure level is likely to pose low to moderate auditory masking effects and behaviour effects for fish where the swim bladder is not involved in hearing (i.e., trout, salmon and eel) unless fish are very close to the operating WID (i.e., within tens of metres; Popper et al., 2014).
- 3.5.6 As noted in **Section 2.3**, the proposed maintenance dredging activity is expected to take place over autumn / winter months to ensure sufficient water depths are in place at the marina for the important spring / summer recreational period, and is expected to take place intermittently for 6-hour periods to make use of falling tides. While the proposed maintenance dredging activity may coincide with the migration times for sea trout, Atlantic salmon and eel, the operating WID will be limited both in space and time such that underwater noise is not expected to present a physical barrier that will prevent fish from entering and migrating into and/or through the estuary.
- 3.5.7 On the basis of the above, the proposed maintenance dredging activity is not expected to pose a significant risk to fish migration in the Ystwyth & Rheidol Estuaries water body and/or the Cardigan Bay North water body.

3.6 Assessment: Stage 3 – Detailed Assessment of the Risk to Water Quality

Introduction

- 3.6.1 Scoping determined that the proposed maintenance dredging activity may pose a risk to water quality because it may disturb sediment with contaminants at concentrations above Cefas Action Level 1 that are included as priority substances and certain other polluting chemicals under the Water Framework Directive (WFD) and Environmental Quality Standards Directive (EQSD).

Baseline Conditions

- 3.6.2 Baseline conditions for contaminants in the sediment to be removed from the marina are characterised by low concentrations of contaminants. Some contaminants are present at concentrations below AL1 and the ERL, and some contaminants are present at concentrations either below or slightly above AL1 and the ERL, but no contaminants at concentrations approaching or above AL2 or the ERM (Section 2.3 and Appendix 4). Generally, sediment with contaminant concentrations below AL1 is considered suitable



for disposal at sea (Mason et al., 2021), and sediment with contaminant concentrations below the ERL is considered unlikely to cause harm to marine life (Long et al., 1995; Gorham-Test, 1998) and, by implication, is considered suitable for relocation by WID.

Impact Assessment

- 3.6.3 Of the contaminants in the marina's sediment, the following qualify as priority substances and certain other polluting chemicals under the WFD and EQSD (source: [Environmental Quality Standards Directive \(EQSD\) list for WFD assessments - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/environmental-quality-standards-directive-eqsd-list-for-wfd-assessments); accessed 27-05-2026):
- Metals – arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.
 - Organotin compounds - tributyltin (TBT).
 - PAHs - anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, fluoranthene, indeno(1,2,3-cd)pyrene and naphthalene.
- 3.6.4 Also, of the contaminants in the marina's sediment, the following qualify as either specific pollutants for determining ecological status or priority hazardous substances and priority substances for determining chemical status under the WFD:
- Metals - cadmium, lead, mercury and nickel.
 - Organotin compounds - TBT.
 - PAHs - anthracene, benzo(a)pyrene, benzo(k)fluoranthene, fluoranthene and naphthalene.
- 3.6.5 Reference to the WFD Interim Cycle 3 Classification Data ([Water Watch Wales](https://www.waterwatch.wales.gov.uk/); accessed 27-05-2026) shows that the Ystwyth & Rheidol Estuaries and Cardigan Bay North water bodies exhibit high status for most contaminants (**Table 1**). High status means that these contaminants meet their environmental quality standards under the EQSD, and are present in the water body at concentrations that indicate no or only very minor human alterations under the WFD. However, reference to the WFD Interim Cycle 3 Classification Data ([Water Watch Wales](https://www.waterwatch.wales.gov.uk/); accessed 27-05-2026) shows that the Ystwyth & Rheidol Estuaries water body exhibits moderate status for zinc and PAHs and the Cardigan Bay North water body exhibits moderate status for mercury (**Table 1**). Moderate status means that these contaminants fail their environmental quality standards under the EQSD, and are present in the water body at concentrations that indicate a moderate deviation from natural conditions due to pollution, physical alterations, or habitat degradation, and mean action is required to improve the water body's condition.
- 3.6.6 Of the contaminants in the marina's sediment, the following are present in one or more of the 12 samples at concentrations above AL1 (**Table 1**) and, for this reason, are considered further in this impact assessment:
- Metals – cadmium, lead and zinc.
 - PAHs - benzo(b)fluoranthene, chrysene, fluoranthene, perylene, phenanthrene and pyrene.
- 3.6.7 Cadmium, lead and zinc are present in the marina's sediment at concentrations above AL1. Cadmium is present at concentrations above cAL1 in nine of the ten samples, but at concentrations that are slightly above AL1 and are not approaching AL2 (**Figure 3**). Lead and zinc are present at concentrations above AL1 in all ten samples, but at concentrations that are slightly above AL1 and are not approaching AL2 (**Figures 4 and 5** respectively).



- 3.6.8 Six PAHs in the marina's sediment are present at concentrations above AL1. In the absence of a AL2 for PAHs, scientific advice on UK marine licence applications uses the proposed sediment quality criteria published in Mason et al. (2021) as the best available evidence to interpret sediment sample data for dredged material. For the assessment of PAHs, scientific advice on UK marine licence applications calculates the sums of acutely toxic, low molecular weight (LMW) PAHs and chronically toxic, high molecular weight (HMW) PAHs and compares these sums to the US effects ranges. The sums of LMW PAHs include anthracene and naphthalene. The sums of HMW PAHs include benzo(a)pyrene and fluoranthene, but do not include benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene. LMW PAHs are present at concentrations below the ERL in all ten samples (**Figure 6**). HMW PAHs are present at concentrations below the ERL in all ten samples (**Figure 7**).
- 3.6.9 Given the limited volume of sediment to be relocated by the proposed maintenance dredging activity from the marina into the Ystwyth & Rheidol Estuaries water body and then into the Cardigan Bay North water body, and given the limited degree of sediment contamination (i.e., chemical substances generally present at concentrations either below AL1 or slightly above AL1, and below the ERL), it is unlikely that sediment relocation will sufficiently increase concentrations of chemical substances in the water body to adversely affect ecological status and chemical status, and adversely affect the achievement of WFD objectives.
- 3.6.10 On the basis of the above, the proposed maintenance dredging activity is not expected to pose a significant risk to water quality in the Ystwyth & Rheidol Estuaries water body and/or the Cardigan Bay North water body.

Table 1 WFD Classification and Sediment Quality for Priority Substances and Certain Other Polluting Chemicals under the WFD and EQSD

Priority Substances and Certain Other Polluting Chemicals under the WFD and EQSD	WFD Classification Interim Cycle 3 Classification		Baseline Sediment Quality in Aberystwyth Marina compared to Cefas Actions Levels		
	Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body	No. of samples with concentration <cAL1	No. of samples with concentration cAL1 to cAL2	No. of samples with concentration >cAL2
Anthracene	High	High	10	0	0
Arsenic	High	High	10	0	0
Cadmium	High	High	1	9	0
Chromium	No data	No data	10	0	0
Copper	High	High	10	0	0
Fluoranthene	No data	High	7	3	0
Lead	High	High	0	10	0
Mercury	No data	Moderate	10	0	0
Naphthalene	High	High	10	0	0
Nickel	High	High	10	0	0
PAHs: Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Indeno(1,2,3-cd)pyrene	Moderate	High	10 9 10 10 10	0 1 0 0 0	0 0 0 0 0
TBT	High	High	10	0	0
Zinc	Moderate	High	0	10	0



Figure 3 Cadmium in the Marina's Sediment compared to Cefas Action Levels

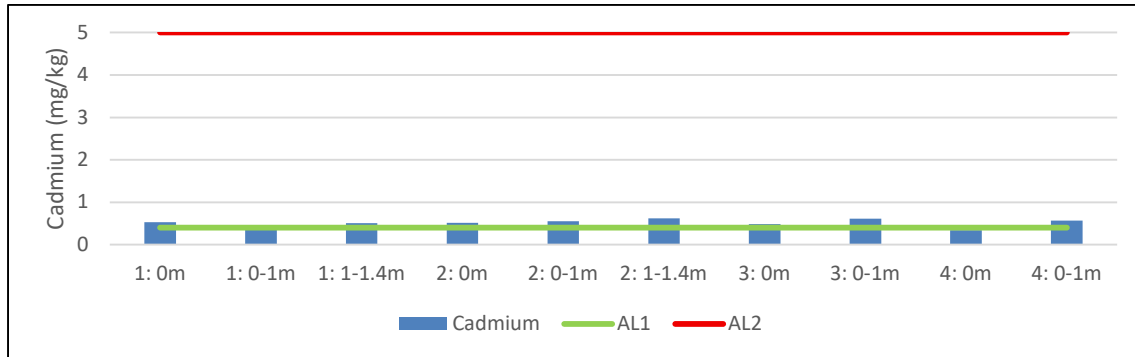


Figure 4 Lead in the Marina's Sediment compared to Cefas Action Levels

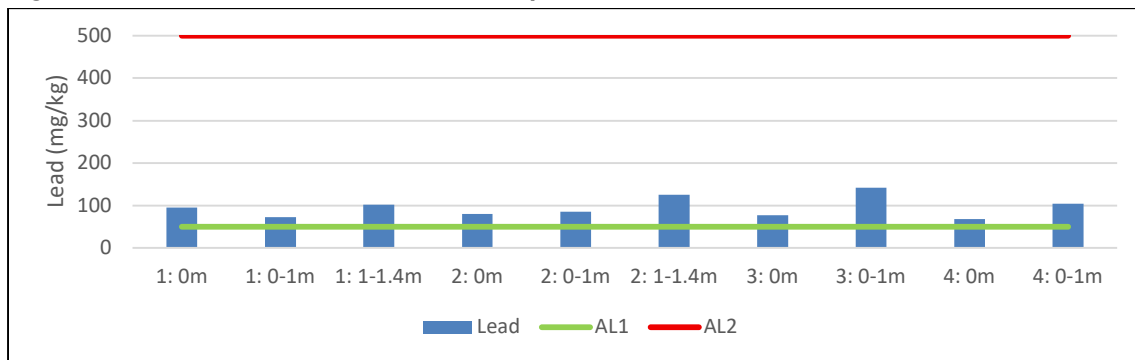


Figure 5 Zinc in the Marina's Sediment compared to Cefas Action Levels

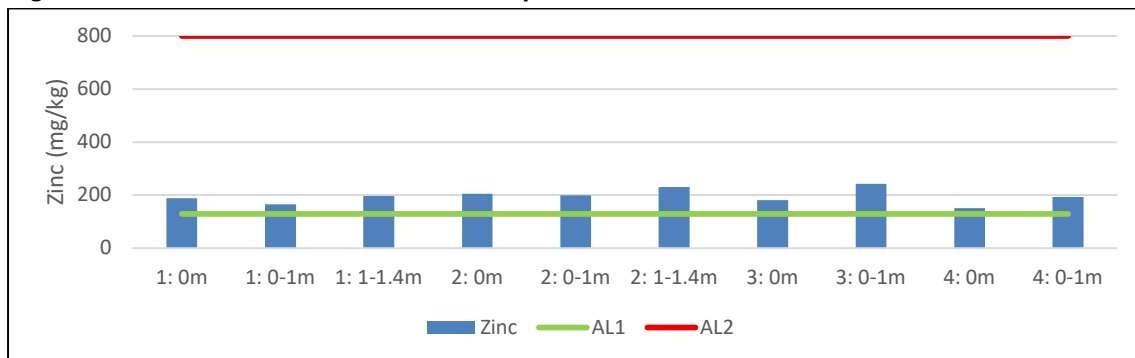


Figure 6 Sum of LMW PAHs in the Marina's Sediment compared to US Effects Ranges

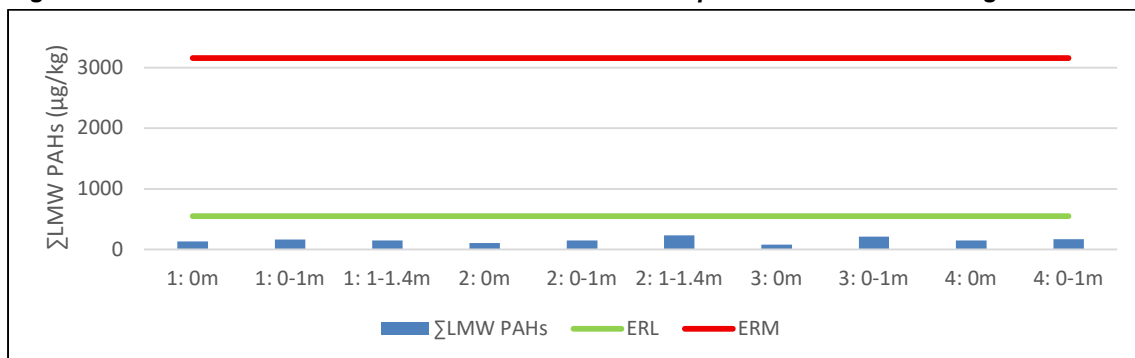
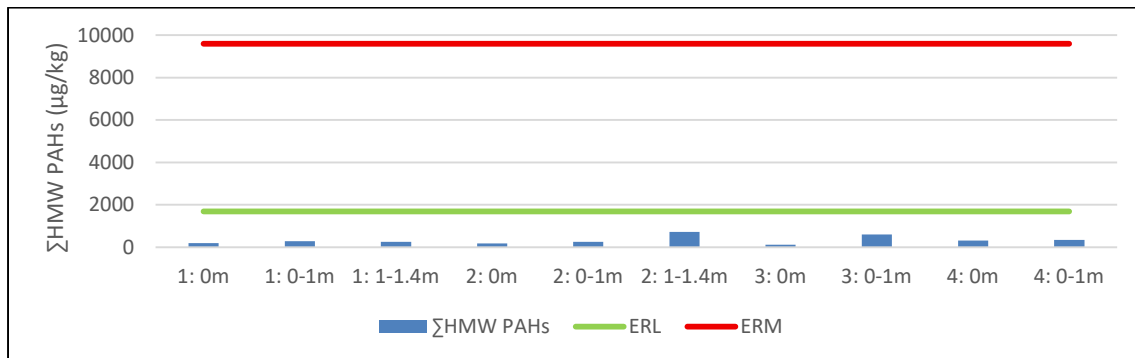




Figure 7 Sum of HMW PAHs in the Marina's Sediment compared to US Effects Ranges



3.7 Assessment: Stage 3 – Detailed Assessment of Risk to WFD Protected Areas

Introduction

- 3.7.1 Scoping determined that the proposed maintenance dredging activity may pose a risk to a WFD protected area because they will take place within 2km of the West Wales Marine / Gorllewin Cymru Forol Special Area of Conservation (SAC), the Llyn Peninsula and the Sarnau SAC / Pen Llyn a'r Sarnau SAC, the Northern Cardigan Bay / Gogledd Bae Ceredigion Special Protection Area (SPA) and the Aberystwyth South and Aberystwyth North bathing waters.

Baseline Conditions

- 3.7.2 The West Wales Marine / Gorllewin Cymru Forol SAC (**Figure 8**) is located off the coast of Wales extending from the Llŷn peninsula in the north to Pembrokeshire in the southwest, and has been identified as an area of importance for harbour porpoise (*Phocoena phocoena*). The SAC's conservation objectives are to maintain site integrity by ensuring harbour porpoise are a viable component of the site, to ensure there is no significant disturbance of the species, and to maintain the condition of supporting habitats and processes and the availability of prey.
- 3.7.3 The Llyn Peninsula and the Sarnau SAC / Pen Llyn a'r Sarnau SAC (**Figure 8**) extends from Nefyn on the north coast of Llŷn to Clarach in Ceredigion south of the Dyfi estuary, and includes nine habitat features, two of which are situated within 2km of Aberystwyth: reefs and submerged or partially submerged sea caves. The SAC's conservation objectives are to maintain site integrity by ensuring that the overall distribution and extent of the habitat features are stable or increasing, the physical, biological and chemical structure and functions are not degraded, and the presence, abundance, condition and diversity of typical species are not degraded.
- 3.7.4 The Northern Cardigan Bay / Gogledd Bae Ceredigion SPA (**Figure 9**) is located off the coast of Wales and occupies the northern half of Cardigan Bay, and has been identified as an area of importance for wintering, non-breeding population of red-throated diver (*Gavia stellata*). The SPA's conservation objectives are to maintain the wintering population of red-throated diver, to maintain access to and utilise of habitats necessary to maintain the population in favourable condition, and maintain the quality of supporting



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

habitat and the abundance of food supply.

- 3.7.5 The Aberystwyth South bathing water is situated off the beach fronting New Promenade / South Marine Terrace, while the Aberystwyth North bathing water is situated off the beach fronting Marine Terrace. Bathing water quality at both bathing waters was classified as 'good' in 2024 and 2025 (NRW, 2025).

Figure 8 - SACs at and around Aberystwyth: SACs (source: magic.defra.gov.uk; accessed 26-05-2026)

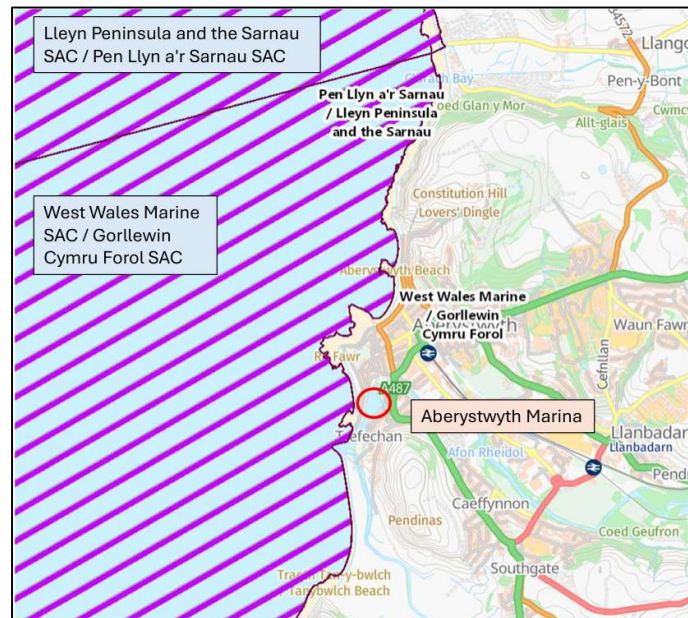
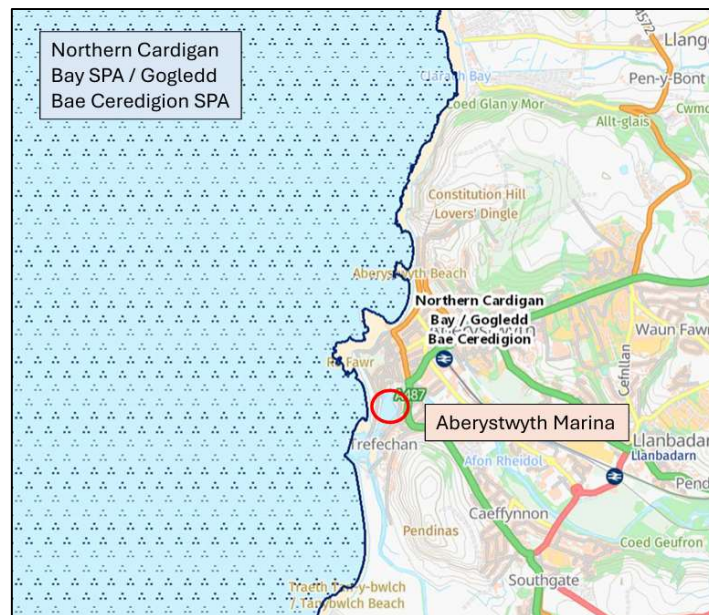


Figure 9 – SPAs at and around Aberystwyth (source: magic.defra.gov.uk; accessed 26-05-2026)





Impact Assessment - West Wales Marine / Gorllewin Cymru Forol SAC, Llyn Peninsula and the Sarnau SAC / Pen Llyn a'r Sarnau SAC and Northern Cardigan Bay / Gogledd Bae Ceredigion Special Protection Area SPA

- 3.7.6 Information to inform a Habitats Regulations Assessment (HRA) Stage 1 Screening Assessment has been compiled to consider whether the proposed maintenance dredging activity is likely to have any significant adverse effects on one or more of the SACs and SPA either alone or in combination with other plans or projects (TBP, 2026). The findings contained within this information are summarised in **Table 2**.
- 3.7.7 On the basis of the above, the proposed maintenance dredging activity is not expected to pose a significant risk to the WFD protected areas (European sites) in the Ystwyth & Rheidol Estuaries water body and/or the Cardigan Bay North water body.

Table 2 Screening for Significant Effects under the Habitats Regulations (source: TBP, 2026)

Source	Pathway	Receptor(s)	Summary of Screening Assessment for a Significant Effect
Maintenance dredging activity in Aberystwyth Marina	Dredging (sediment removal) of sediment leading to underwater noise disturbance of species features	West Wales Marine SAC: harbour porpoise	There is very limited potential for the proposed maintenance dredging activity to disturb the SAC's harbour porpoise feature due to underwater noise and, therefore, there will be no significant effect on the European site either alone or in-combination with other plans and projects.
Maintenance dredging activity in Aberystwyth Marina	Dredging (sediment removal) leading to visual and/or airborne noise disturbance of species features	Northern Cardigan Bay SPA: red-throated diver	There is very limited potential for the proposed maintenance dredging activity to disturb the SPA's red-throated diver feature due to visual and/or airborne noise and, therefore, there will be no significant effect on the European site either alone or in-combination with other plans and projects.
Maintenance dredging activity in Aberystwyth Marina	Dredging (sediment relocation) leading to the physical change of habitat / supporting habitat features	Llyn Peninsula and the Sarnau SAC: reefs and submerged or partially submerged sea caves West Wales Marine SAC: supporting habitat for harbour porpoise Northern Cardigan Bay SPA: supporting habitat for red-throated diver	There is a limited source for sediment to cause a physical change to the geomorphological and sedimentological conditions of the Llyn Peninsula and the Sarnau SAC's habitats and the West Wales Marine SAC and/or Northern Cardigan Bay SPA's supporting habitats and, therefore, there will be no significant effect on the European sites either alone or in-combination with other plans and projects.
Maintenance dredging activity in Aberystwyth Marina	Dredging (sediment relocation) leading to the chemical change of habitat / supporting habitat features	Llyn Peninsula and the Sarnau SAC: reefs and submerged or partially submerged sea caves West Wales Marine SAC: supporting habitat for harbour porpoise Northern Cardigan Bay SPA: supporting habitat for red-throated diver	There is a limited source for contaminants to cause a chemical change to the water and sediment quality conditions of the Llyn Peninsula and the Sarnau SAC's habitats and the West Wales Marine SAC and/or Northern Cardigan Bay SPA's supporting habitats and, therefore, there will be no significant effect on the European sites either alone or in-combination with other plans and projects.



Impact Assessment - Aberystwyth South and Aberystwyth North Bathing Waters

- 3.7.8 While the proposed maintenance dredging activity will take place within 2km of the bathing waters, it will not take place during the bathing water season and, therefore, will not pose a risk to bathing water quality.
- 3.7.9 On the basis of the above, the proposed maintenance dredging activity is not expected to pose a significant risk to the WFD protected areas (bathing waters) in the Ystwyth & Rheidol Estuaries water body and/or the Cardigan Bay North water body.

3.8 Assessment: Stage 3 – Detailed Assessment of Risk of Invasive Non-Native Species

Introduction

- 3.8.1 Scoping determined that the proposed maintenance dredging activity may pose a risk of introducing and/or spreading invasive non-native species because the WID plant will have been used in or travelled through other water bodies.

Baseline Conditions

- 3.8.2 A number of marine INNS have been recorded at and around Aberystwyth Marina and Aberystwyth Harbour, and in the nearshore waters at Aberystwyth.
- 3.8.3 Reference to a survey of marine INNS in Welsh marinas (Wood et al., 2015) indicates that the modest barnacle (*Austrominius modestus*) was present within Aberystwyth Marina. Reference to the NBN Atlas for Wales (wales-species-inns.nbnatlas.org; accessed 17-06-2026) indicates the presence of this species within Aberystwyth Marina and Aberystwyth Harbour (i.e., within the Ystwyth & Rheidol Estuaries water body), and along the coastline at Aberystwyth (i.e., within the Cardigan Bay North water body) (**Figure 10**). This marine INNS is typically associated with hard substrate, including hard substrate provided by artificial structures in marinas and harbours (e.g., floating pontoons, ropes, tyres).
- 3.8.4 Reference to the NBN Atlas for Wales (wales-species-inns.nbnatlas.org; accessed 17-06-2026) also indicates the presence of the brown alga Japanese wireweed (*Sargassum muticum*) in the rocky intertidal and infralittoral fringe areas of the coastline at Aberystwyth (i.e., within the Ystwyth & Rheidol Estuaries water body) (**Figure 10**), and the presence of the red alga Bonnemaisonia's hook weed (*Bonnemaisonia hamifera*) and leathery sea squirt (*Styela clava*) in the nearshore waters at Aberystwyth (i.e., within the Cardigan Bay North water body) (**Figure 11**).



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Figure 10– INNS at and around Aberystwyth: Modest Barnacle (left) and Japanese Wireweed (right) (source: wales-species-inns.nbnatlas.org; accessed 17-06-2026)

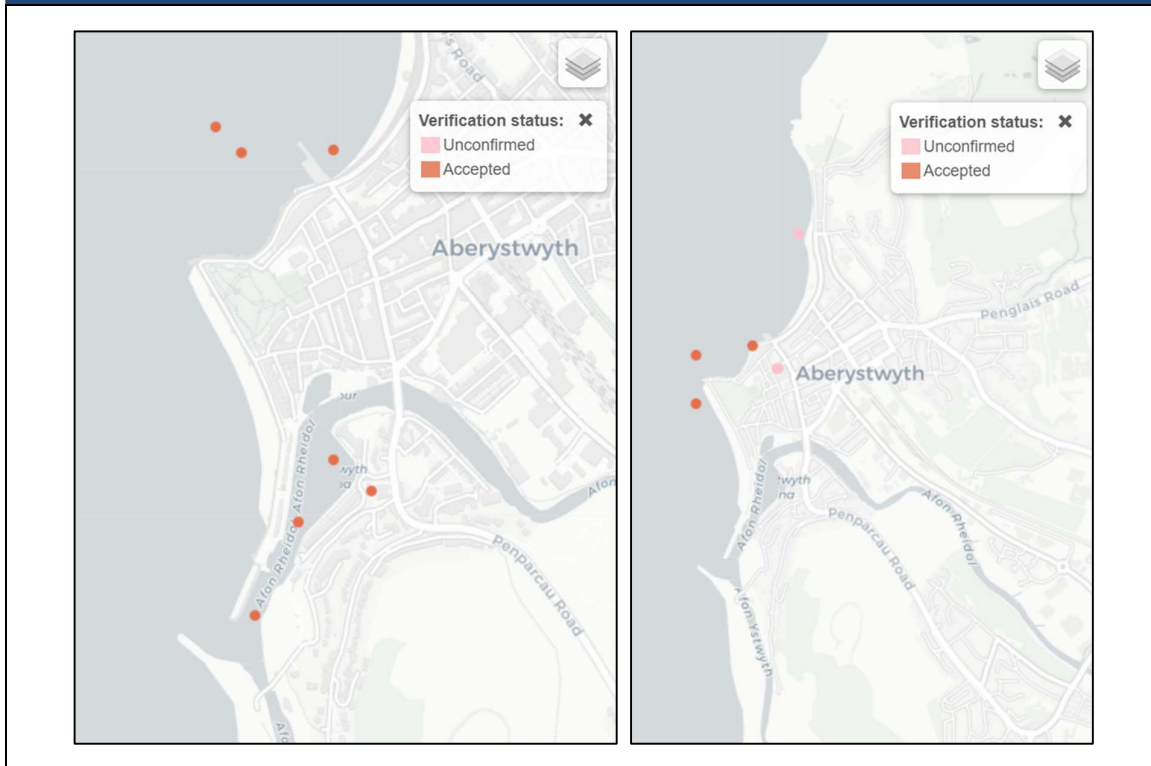
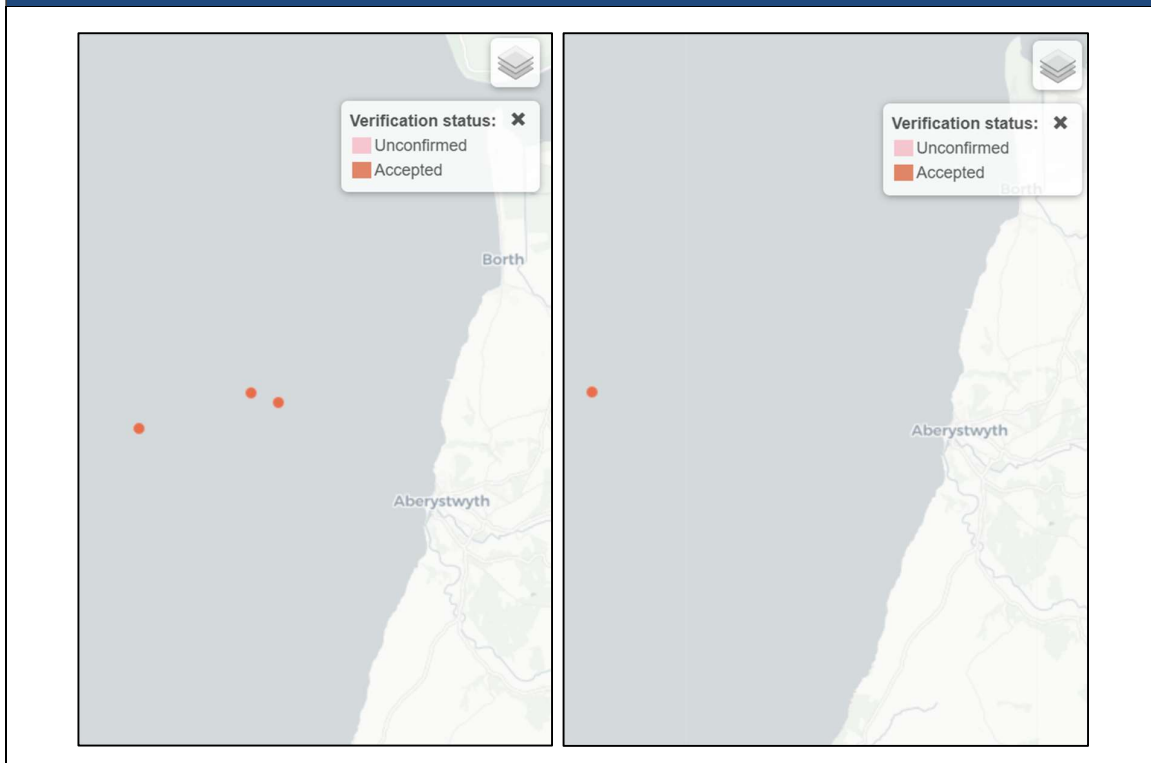


Figure 11 – INNS at and around Aberystwyth: Bonnemaisons Hook Weed (left) and Leathery Sea Squirt (right) (source: wales-species-inns.nbnatlas.org; accessed 17-06-2026)





Impact Assessment – Introduction of INNS

3.8.5 The proposed maintenance dredging activity could introduce INNS to the Ystwyth & Rheidol Estuaries water body and/or Cardigan Bay North water body by transporting and releasing INNS from other water bodies. The WID plant to be used for the proposed maintenance dredging activity will be provided by the applicant and is based in Wales. However, it will be required to ensure that the following biosecurity measures are implemented, where relevant, to the WID plant and any supporting vessels, platforms, etc:

- The antifouling regime of the WID plant shall be recorded in an up-to-date logbook, including relevant antifouling system certificates, declarations and other appropriate documentation setting out the historical applications and surveys of antifouling systems, and a valid antifouling system certificate or declaration (along with other appropriate documentation) shall be issued to the harbour master prior to the vessel entering Aberystwyth Harbour to demonstrate that the antifouling system used on the vessel complies with the provisions of The Merchant Shipping (Anti-Fouling Systems) Regulations 2024.
- Surfaces including submerged surfaces of WID plant shall be inspected for biofouling and, if necessary – shall be cleaned, before transiting to Aberystwyth Harbour. Vessel biofouling inspections shall be recorded in and demonstrated through the availability of an up-to-date logbook.
- Preferably, WID plant shall have a Biofouling Management Plan in place that accords with the provisions of the IMO's Biofouling Guidelines.
- WID plant shall be thoroughly flushed to remove dredged material before transiting to Aberystwyth Harbour including flushing of suction equipment, hoppers, buckets, grabs, screens, etc.
- Ballast water transfer, if any tanks exist, shall comply with the provisions of the Ballast Water Management Convention and undertaken in accordance with the WID plant's approved Ballast Water Management Plan.
- Ballast water exchange shall be undertaken at least once (one full cycle of at least 95% of water carried as ballast) after leaving the port of origin and before entering Aberystwyth Harbour. Exchange shall take place at sea and at the furthest point from land. This measure shall not apply for vessels already operating in the same biogeographical area.

Impact Assessment – Spread of INNS

3.8.6 In addition, the proposed maintenance dredging activity could spread INNS within the Ystwyth & Rheidol Estuaries water body and/or Cardigan Bay North water body by removing and relocating INNS present within Aberystwyth Marina. The principal marine INNS potentially present within the Outer Harbour is expected to be the modest barnacle. The modest barnacle is typically associated with hard substrata including rocks, stones, shells, other crustaceans and artificial structures, and occupies positions across all levels of the shore but is more common on the mid-shore.

3.8.7 Particle size analysis of the sediment in the marina identifies that the proposed maintenance dredging activity will remove silt material with limited potential to contain larger particles of hard substrate to which the modest barnacle may attach (e.g., rocks, stones and/or shells). Accordingly, there is a low probability – and commensurate low risk - that the proposed maintenance dredging activity will spread INNS due to removal and relocation of material to which modest barnacle is attached.



- 3.8.8 On the basis of the above, the proposed maintenance dredging activity is not expected to pose a significant risk to introducing and/or spreading INNS in the Ystwyth & Rheidol Estuaries water body and/or Cardigan Bay North water body.

3.9 Conclusions

- 3.9.1 This WFD assessment has been undertaken in accordance with NRW's Complying with the WFD Regulations 2017: Guidance Note GN 078 (NRW, 2024). The assessment has found that the proposed maintenance dredging activity is not expected to pose a significant risk to the environmental receptors within the Ystwyth & Rheidol Estuaries water body or the Cardigan Bay North water body and, therefore, it is concluded that the proposed maintenance dredging activity will not cause or contribute to deterioration of the status of these water bodies and will not jeopardise compliance WFD objectives implemented via the 2022 Western Wales RBD RBMP (NRW, 2022).

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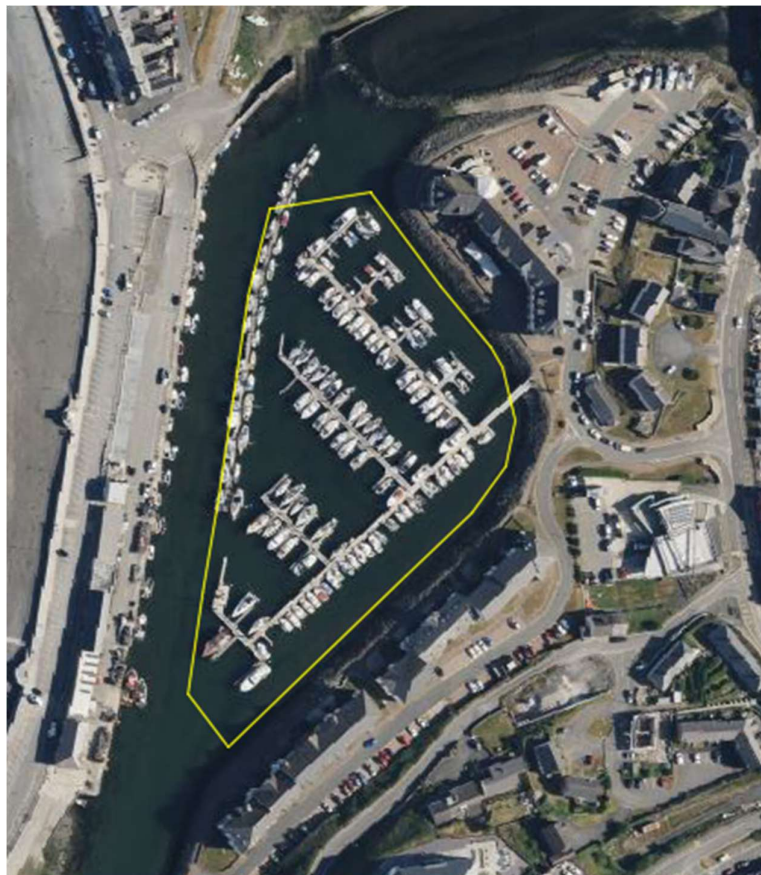
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APPENDIX 1: PROPOSED DREDGING ACTIVITY LOCATION

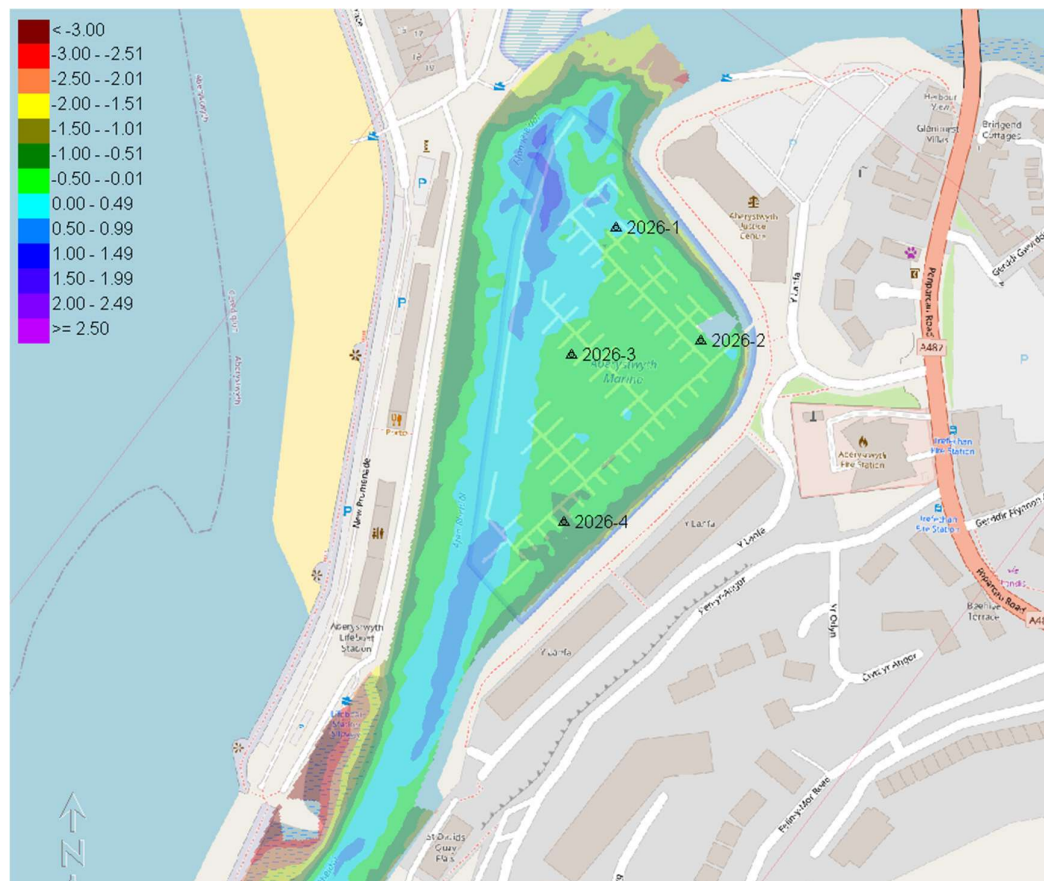
Dredging Location within Aberystwyth Marina





APPENDIX 2: SEDIMENT SAMPLING LOCATIONS (NRW SAMPLE PLAN SP2511)

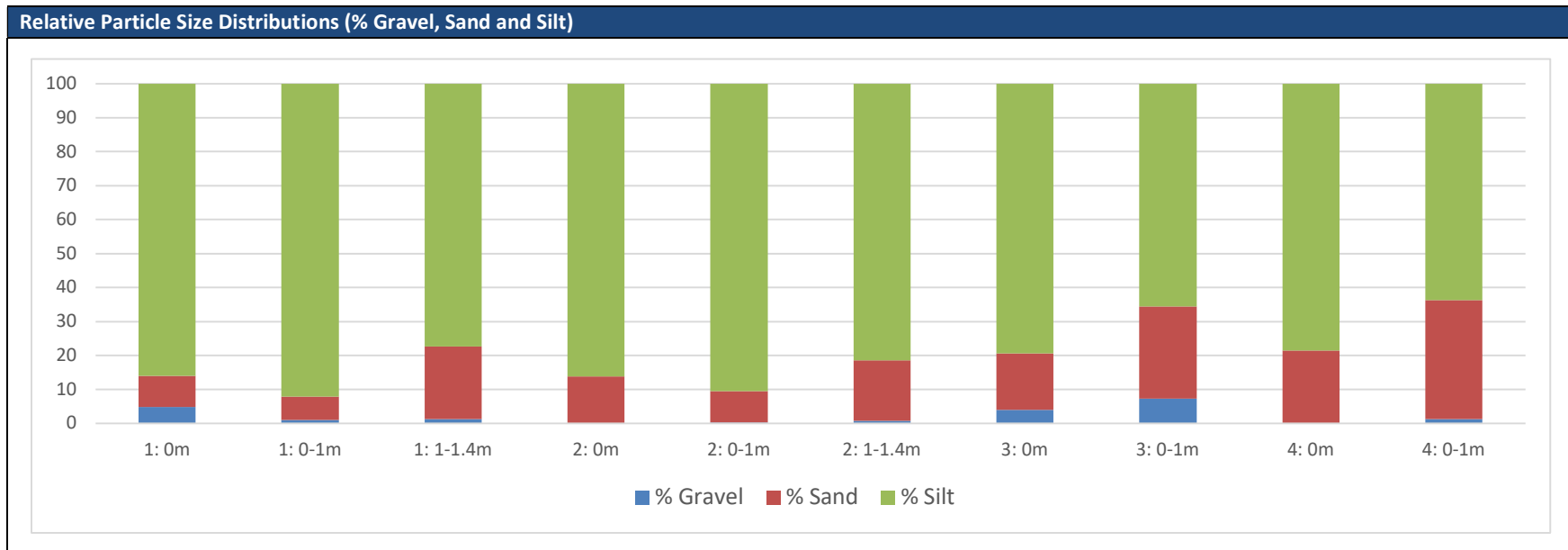
Sediment Sampling Locations in Aberystwyth Marina





APPENDIX 3: PHYSICAL CHARACTERISATION OF DREDGED MATERIAL (NRW SAMPLE PLAN SP2511)

Sample ID	Visual Appearance	% Total Solids	% Gravel (>2mm)	% Sand (0.063-2mm)	% Silt (<0.063mm)
1: 0m	Mud, plant material	38	4.82	9.18	85.97
1: 0-1m	Mud	54.1	1.01	6.84	92.12
1: 1-1.4m	Mud, cohesive	58.8	1.22	21.40	77.40
2: 0m	Mud	45.6	0.06	13.81	86.13
2: 0-1m	Mud	55.2	0.21	9.28	90.53
2: 1-1.4m	Mud, cohesive	66.9	0.82	17.75	81.42
3: 0m	Mud, plant material	65.6	3.94	16.72	79.36
3: 0-1m	Mud	58.4	7.35	27.10	65.54
4: 0m	Mud	47.8	0.00	21.45	78.55
4: 0-1m	Mud	54.8	1.29	34.98	63.72





APPENDIX 4: CHEMICAL CHARACTERISATION OF DREDGED MATERIAL (NRW SAMPLE PLAN SP2511)

Sediment Quality Criteria		Groups of Chemical Parameters		
		Metals	Organotin Compounds	Polycyclic Aromatic Hydrocarbons
UK Action Levels	Action Level 1 (AL1) and Action Level 2 (AL2)	✓	✓	✓
US Effects Ranges	Effects Range Low (ERL) and Effects Range Median (ERM)	-	-	✓

Indicator	Data Comparison to Sediment Quality Criteria
	Data is either below UK AL1 or below US ERL
	Data is either between UK AL1 and UK AL2 or between US ERL and US ERM
	Data is either above UK AL2 or above US ERM
	Not applicable as there are no UK Action Levels or US Effects Ranges

Analyte Group	Analyte Abbreviations
Metals	Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Mercury (Hg), Nickel (Ni), Lead (Pb), Zinc (Zn)
Organotin Compounds	DBT (dibutyltin), TBT (tributyltin)
Polycyclic Aromatic Hydrocarbons	Polycyclic Aromatic Hydrocarbons (PAHs), ACENAPTH (acenaphthene), ACENAPHY (acenaphthylene), ANTHRACN (anthracene), BAA (benzo[a]anthracene), BAP (benzo[a]pyrene), BBF (benzo[b]fluoranthene), BEP (benzo[e]pyrene), BENZGHIP (benzo[ghi]perylene), BKF (benzo[k]fluoranthene), C1N (C1-naphthalenes), C1PHEN (C1-phenanthrene), C2N (C2-naphthalenes), C3N (C3-naphthalenes), CHRYSENE (chrysene), DBENZA (dibenzo[a]anthracene), FLUORANT (fluoranthene), FLUORENE (fluorene), INDPYR (indeno[1,2,3-cd]pyrene), NAPTH (naphthalene), PERYLENE (perylene), PHENANT (phenanthrene), PYRENE (pyrene)
Low Molecular Weight PAHs	ΣLMW PAHs (sum of LMW PAHs comprising ACENAPTH (acenaphthene), ACENAPHY (acenaphthylene), ANTHRACN (anthracene), FLUORENE (fluorene), PHENANT (phenanthrene), NAPTH (naphthalene) and C1N (C1-naphthalenes))
High Molecular Weight PAHs	ΣHMW PAHs (sum of HMW PAHs comprising CHRYSENE (chrysene), DBENZA (dibenzo[a]anthracene), FLUORANT (fluoranthene), BAA (benzo[a]anthracene), BAP (benzo[a]pyrene) and PYRENE (pyrene))



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Sample ID	Metals (mg.kg ⁻¹)								Organotin Compounds (mg.kg ⁻¹)	
	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc	DBT	TBT
1: 0m	14.2	0.53	32.8	24	0.08	35	95.8	189	<LOD	<LOD
1: 0-1m	13.5	0.42	29.7	21.6	0.06	34.1	73	166	<LOD	<LOD
1: 1-1.4m	13.5	0.51	33	23.5	0.06	36.4	102	197	<LOD	<LOD
2: 0m	14.4	0.52	34.2	24	0.06	43	80	206	<LOD	<LOD
2: 0-1m	13.7	0.55	32.3	24.5	0.06	35.8	85.9	199	<LOD	<LOD
2: 1-1.4m	13	0.62	29.2	26.4	0.08	35.7	125	231	<LOD	<LOD
3: 0m	11.6	0.48	32.9	24.2	0.08	35.8	77.2	181	<LOD	<LOD
3: 0-1m	10.7	0.61	31.2	24.4	0.07	37.3	142	243	<LOD	<LOD
4: 0m	12.8	0.34	30.5	21.4	0.06	34.6	67.6	151	<LOD	<LOD
4: 0-1m	12.3	0.57	30.6	23.8	0.09	34.1	104	193	<LOD	<LOD
UK AL1	20	0.4	40	40	0.3	0	50	130	0.1	0.1
UK AL2	100	5	400	400	3	200	500	800	1	1

Sample ID	PAHs (µg.kg ⁻¹)										
	ACENAPTH	ACENAPTHY	ANTHRAC	BAA	BAP	BBF	BENZGHPH	BEP	BKF	C1N	C1PHEN
1: 0m	3.94	2.64	6.49	24.8	28.9	37.7	30.6	30	36.7	46.1	51
1: 0-1m	6.01	4.78	13.3	37.6	43.4	54.8	40	41.1	42.9	52.2	163
1: 1-1.4m	6.22	3.39	8.51	32.9	37.7	50	35.6	36.3	41.9	49.5	93.8
2: 0m	4.89	<LOD	5.66	22.4	26.2	35.6	26.9	26	30.2	36.4	50.1
2: 0-1m	5.78	3.06	9.89	34.6	36.4	49.2	36.7	36.2	46	46	103
2: 1-1.4m	12.8	7.77	27.3	99.1	99.2	107	67.4	70.8	95.2	38.8	156
3: 0m	2.52	<LOD	4.59	17.5	20	26.9	19.5	19.3	22.7	26.6	67.4
3: 0-1m	8.77	6.4	28.1	81.6	81.5	89.8	57.8	60.2	79.7	49.5	112
4: 0m	4.16	3.41	13.6	47.9	43.9	62.3	35.8	38.8	43.7	41.5	55.6
4: 0-1m	6.56	3.98	12.7	44.5	47.3	51.7	39.6	40	48.4	44.9	57.8
UK AL1	100	100	100	100	100	100	100	100	100	100	100
UK AL2	-	-	-	-	-	-	-	-	-	-	-



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Sample ID	PAHs ($\mu\text{g.kg}^{-1}$)										
	C2N	C3N	CHRYSENE	DBENZAH	FLUORANT	FLUORENE	INDPYR	NAPTH	PERYLENE	PHENANT	PYRENE
1: 0m	63.1	35.8	40.4	6.81	55.4	11.2	27.8	20.7	23.2	43.3	42.7
1: 0-1m	66.9	50.4	54.9	9.45	78.5	14.1	40	22.6	158	49.5	61
1: 1-1.4m	68.4	43.5	51.4	8.63	72.7	14.7	35.2	20.4	142	48.6	57.8
2: 0m	50.3	27.9	36.8	5.8	52.2	9.06	25	15	19.9	39	40.8
2: 0-1m	63.1	42.6	51.8	8.81	73.8	12.8	34.6	20.3	138	50.2	57.6
2: 1-1.4m	58.6	44.6	118	17.3	214	18.4	68.3	19.4	162	108	174
3: 0m	42	23.3	27.6	4.65	37.5	7	19.3	12.2	13.6	28.1	29.1
3: 0-1m	65.6	51.1	104	15.6	182	17.4	59	22.2	190	82.5	143
4: 0m	49.7	35.9	71.9	10.2	80.1	12.4	37.2	19.1	30.3	53.7	58.7
4: 0-1m	68.6	44.1	62.1	10.1	103	12.8	37.5	30.1	102	58	79.8
UK AL1	100	100	100	100	100	100	100	100	100	100	100
UK AL2	-	-	-	-	-	-	-	-	-	-	-

Sample ID	LMW PAHs ($\mu\text{g.kg}^{-1}$)							
	ACENAPTH	ACENAPTHY	ANTHRAC	FLUORENE	PHENANT	NAPTH	C1N	Σ LMW PAHs
1: 0m	3.94	2.64	6.49	11.2	43.3	20.7	46.1	134.37
1: 0-1m	6.01	4.78	13.3	14.1	49.5	22.6	52.2	162.49
1: 1-1.4m	6.22	3.39	8.51	14.7	48.6	20.4	49.5	151.32
2: 0m	4.89	<LOD	5.66	9.06	39	15	36.4	105.12
2: 0-1m	5.78	3.06	9.89	12.8	50.2	20.3	46	148.03
2: 1-1.4m	12.8	7.77	27.3	18.4	108	19.4	38.8	232.47
3: 0m	2.52	<LOD	4.59	7	28.1	12.2	26.6	78.49
3: 0-1m	8.77	6.4	28.1	17.4	82.5	22.2	49.5	214.87
4: 0m	4.16	3.41	13.6	12.4	53.7	19.1	41.5	147.87
4: 0-1m	6.56	3.98	12.7	12.8	58	30.1	44.9	169.04
US ERL	-	-	-	-	-	-	-	552
US ERM	-	-	-	-	-	-	-	3,160



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Sample ID	HMW PAHs ($\mu\text{g.kg}^{-1}$)						Σ HMW PAHs
	CHRYSENE	DBENZAH	FLUORANT	BAA	BAP	PYRENE	
1: 0m	40.4	6.81	55.4	24.8	28.9	42.7	199.01
1: 0-1m	54.9	9.45	78.5	37.6	43.4	61	284.85
1: 1-1.4m	51.4	8.63	72.7	32.9	37.7	57.8	261.13
2: 0m	36.8	5.8	52.2	22.4	26.2	40.8	184.2
2: 0-1m	51.8	8.81	73.8	34.6	36.4	57.6	263.01
2: 1-1.4m	118	17.3	214	99.1	99.2	174	721.6
3: 0m	27.6	4.65	37.5	17.5	20	29.1	136.35
3: 0-1m	104	15.6	182	81.6	81.5	143	607.7
4: 0m	71.9	10.2	80.1	47.9	43.9	58.7	312.7
4: 0-1m	62.1	10.1	103	44.5	47.3	79.8	346.8
US ERL	-	-	-	-	-	-	1,700
US ERM	-	-	-	-	-	-	9,600



APPENDIX 5: SCOPING THE WFD ASSESSMENT

Your activity	Description, notes or more information
Applicant name	Western Marinas Dredging Ltd.
Application reference number (where applicable)	None to date.
Name of activity	Maintenance dredging of Aberystwyth Marina.
Brief description of activity	Maintenance dredging activity by water injection dredging (WID) to relocate sediment from the marina back into the sediment cell from which it originated.
Location of activity (central point XY coordinates or national grid reference)	Approximate central point for dredging area within Aberystwyth Marina: Easting = 258104, Northing = 281159 Grid Ref = SN58108115 National Grid Field No = SN 5881 1015 Latitude = 52.409630, Longitude = -4.086345 Latitude = 52°24'34.67"N, Longitude = 4°5'10.84"W Latitude = 52°24.5778"N, Longitude = 4°5.1807"W
Footprint of activity (ha)	Maintenance dredging activity: the marina area to be dredged is approximately 1.531 hectares; accordingly, the footprint of the activity is calculated as 1.531 x 1.5 (to account for the dredging induced sediment plume) = 2.2965 hectares / 0.022965 km ² .
Timings of activity (including start and finish dates)	3 x annual campaigns comprising dredging over 10-15 days per annual campaign with dredging taking place intermittently for 6 hours on falling tides (i.e., 1 hour before high tide to 1 hour before low tide).
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	3 x annual campaigns comprising dredging of approximately 30,000m ³ of sediment per annual campaign.
Use or release of chemicals (state which ones)	The proposed activity does not include the use or release of chemicals.

¹ Water body information can be found in the Environment Agency's catchment data explorer and the water body summary table. Magic maps provide additional information on habitats and protected areas. Links to these information sources can be found in the WFD assessment guidance for estuarine and coastal waters.



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Water Body Information	Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
Water body ID	GB511006315000	GB621009600000
Water body type	Transitional	Coastal
Water body area	271,697.98 hectares	712,175,716.4 hectares
Current water body status	Moderate	Moderate
Current ecological status	Moderate	Good
Current chemical status	Moderate	Moderate
Target water body status	Good by 2027	Good by 2027
Hydromorphology: hydromorphological status	Not high	Not high
Hydromorphology: heavily modified water body?	Yes, for coastal defence	No
Biology: higher sensitivity habitats?	No	No
Biology: lower sensitivity habitats?	No	No
Biology: protected areas?	Yes, various	Yes, various
Biology: bivalve mollusc protection areas?	No	No
Water quality: phytoplankton classification	No	No
Water quality: history of harmful algae?	No	No



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Section 1: Hydromorphology

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)	
			Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status		Impact assessment not required	Not applicable, because the water body's hydromorphology is not at high status.	Not applicable, because the water body's hydromorphology is not at high status.
Could significantly impact the hydromorphology of any water body		Impact assessment not required	No, because the proposed maintenance dredging activity will restore bed levels within the marina and will retain the sediment within the retained within the same sediment cell from where it originated, thereby maintaining the water body's hydromorphology.	No, because the proposed maintenance dredging activity will restore bed levels within the marina and will retain the sediment within the retained within the same sediment cell from where it originated, thereby maintaining the water body's hydromorphology.
Is in a water body that is heavily modified for the same use as your activity		Impact assessment not required	Not applicable, because the water body is heavily modified for coastal protection.	Not applicable, because the water body is not heavily modified.

Section 2: Biology

Higher sensitivity habitats ²	Lower sensitivity habitats ³
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

² Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.

³ Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Consider if the footprint ⁴ of your activity is:	Yes	No	Biology habitats risk issue(s)	
			Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
0.5km ² or larger		Impact assessment not required	No, because the footprint of the maintenance dredging activity will be less than 0.5km ² .	No, because the footprint of the maintenance dredging activity will be less than 0.5km ² .
1% or more of the water body's area		Impact assessment not required	No, because the footprint of the maintenance dredging activity will be less than 1% of the water body's area.	No, because the footprint of the maintenance dredging activity will be less than 1% of the water body's area.
Within 500m of any higher sensitivity habitat		Impact assessment not required	No, because the footprint of the maintenance dredging activity will not be within 500m of any higher sensitivity habitat.	No, because the footprint of the maintenance dredging activity will not be within 500m of any higher sensitivity habitat.
1% or more of any lower sensitivity habitat		Impact assessment not required	No, because the footprint of the maintenance dredging activity will not be 1% or more of any lower sensitivity habitat.	No, because the footprint of the maintenance dredging activity will not be 1% or more of any lower sensitivity habitat.

⁴ Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.

Consider if your activity:	Yes	No	Biology fish risk issue(s)	
			Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	Continue with questions	Go to next section	Yes, because the proposed maintenance dredging activity will take place in an estuary and could affect fish in the estuary.	Yes, because the proposed maintenance dredging activity will take place in an estuary and could delay or prevent fish entering the estuary.
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Assessment required		Yes, because the proposed maintenance dredging activity could impact on fish behaviour by creating a barrier to migration due to the presence of a sediment plume and/or noise disturbance.	Yes, because the proposed maintenance dredging activity could impact on fish behaviour by creating a barrier to migration due to the presence of a sediment plume and/or noise disturbance.
Could cause entrainment or impingement of fish		Impact assessment not required	No, because the proposed maintenance dredging activity will use a WID method that will not entrain or impinge fish.	No, because the proposed maintenance dredging activity will use a WID method that will not entrain or impinge fish.



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Section 3: Water quality

Consider if your activity:	Yes	No	Water quality risk issue(s)	
			Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)		Impact assessment not required	No, because the proposed maintenance dredging activity will not take place continuously for longer than a spring neap tidal cycle.	No, because the proposed maintenance dredging activity will not take place continuously for longer than a spring neap tidal cycle.
Is in a water body with a phytoplankton status of moderate, poor or bad		Impact assessment not required	No, because the proposed maintenance dredging activity will not take place in a water body with a phytoplankton status of moderate, poor or bad.	No, because the proposed maintenance dredging activity will not take place in a water body with a phytoplankton status of moderate, poor or bad.
Is in a water body with a history of harmful algae		Impact assessment not required	No, because the proposed maintenance dredging activity will not take place in a water body with a history of harmful algae.	No, because the proposed maintenance dredging activity will not take place in a water body with a history of harmful algae.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)	
			Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
The chemicals are on the Environmental Quality Standards Directive (EQSD) list		Impact assessment not required	No, because the maintenance dredging activity will not use chemicals on the (EQSD) list.	No, because the maintenance dredging activity will not use chemicals on the (EQSD) list.
It disturbs sediment with contaminants above Cefas Action Level 1	Assessment required		Yes, because the maintenance dredging activity will disturb sediment with contaminants at concentrations above Cefas Action Level 1.	Yes, because the maintenance dredging activity will disturb sediment with contaminants at concentrations above Cefas Action Level 1.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes ⁵	No	Water quality risk issue(s)	
			Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list		Impact assessment not required	No, because the maintenance dredging activity will not have a mixing zone as per a permitted discharge or similar from a pipeline or outfall.	No, because the maintenance dredging activity will not have a mixing zone as per a permitted discharge or similar from a pipeline or outfall.

⁵ Carry out your impact assessment using the Environment Agency's surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.



Aberystwyth Marina - Maintenance Dredging Information to Inform a WFD Assessment

Section 4: WFD protected areas

Consider if your activity is:	Yes	No	Protected areas risk issue(s)	
			Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
Within 2km of any WFD protected area ⁶	Assessment required		Yes, because the maintenance dredging activity will take place within 2km of the West Wales Marine / Gorllewin Cymru Forol Special Area of Conservation (SAC), the Northern Cardigan Bay / Gogledd Bae Ceredigion Special Protection Area (SPA) and the Aberystwyth South and Aberystwyth North bathing waters.	Yes, because the maintenance dredging activity will take place within 2km of the West Wales Marine / Gorllewin Cymru Forol Special Area of Conservation (SAC), the Northern Cardigan Bay / Gogledd Bae Ceredigion Special Protection Area (SPA) and the Aberystwyth South and Aberystwyth North bathing waters.

⁶ Note that a regulator can extend the 2km boundary if your activity has an especially high environmental risk.

Section 5: Invasive non-native species (INNS)

Consider if your activity could:	Yes	No	INNS risk issue(s)	
			Ystwyth & Rheidol Estuaries Water Body	Cardigan Bay North Water Body
Introduce or spread INNS	Assessment required		Yes, because the maintenance dredging activity will use marine-based plant which will have been used in or travelled through other water bodies.	Yes, because the maintenance dredging activity will use marine-based plant which will have been used in or travelled through other water bodies.

Summary

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	
Biology: habitats	No	
Biology: fish	Yes	The maintenance dredging activity could impact on fish behaviour by creating a barrier to migration due to the presence of a sediment plume and/or noise disturbance.
Water quality	Yes	The maintenance dredging activity will disturb sediment with contaminants at concentrations above Cefas Action Level 1.
Protected areas	Yes	The maintenance dredging activity will take place within 2km of the West Wales Marine / Gorllewin Cymru Forol Special Area of Conservation (SAC), the Northern Cardigan Bay / Gogledd Bae Ceredigion Special Protection Area (SPA) and the Aberystwyth South and Aberystwyth North bathing waters.
Invasive non-native species	Yes	The maintenance dredging activity will use marine-based plant which will have been used in or travelled through other water bodies.

