

Carmarthenshire County Council

Burry Port Harbour - Disposal of Dredged Material

Application Ref: DML2562

Monitoring & Adaptive Management Plan

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Burry Port Harbour - Disposal of Dredged Material
Application Ref DML2562 – Monitoring & Adaptive Management Plan

Client: Carmarthenshire County Council
Project: Burry Port Harbour – Maintenance Dredging and Disposal of Dredged Material
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1 Introduction

This Monitoring & Adaptive Management Plan has been developed to support and inform the planned maintenance dredge disposal activities to be carried out under disposal licence application DML2562 for Burry Port Approach Channel and Outer Harbour.

2 Pertinent Conservation Objectives

Listed below are the conservation objectives that are considered applicable to inform the monitoring plan, and associated adaptive management strategy, for the maintenance dredging disposal on the East Beach at Burry Port Harbour.

2.1 Carmarthen Bay and Estuaries SAC

2.1.1 Feature 1: Estuaries:

- Objective 1: The overall distribution and extent of the estuaries feature within the SAC and each of its main component habitats are stable or increasing, subject to natural change.
- Objective 2: The hydro-morphological and chemical elements necessary for the structure and function of the estuaries feature are stable or improving, subject to natural change.
- Objective 3: The abundance, distribution and diversity of species within component habitats and communities necessary for the structure and function of the estuaries feature are stable or improving, subject to natural variability.

2.1.2 Feature 2: Mudflats and sandflats not covered by seawater at low tide:

- Objective 1: The overall distribution and extent of the mudflats and sandflats feature within the SAC and each of its main component habitats are stable or increasing, subject to natural change.
- Objective 2: The hydro-morphological and chemical elements necessary for the structure and function of the mudflats and sandflats feature are stable or improving, subject to natural change.
- Objective 3: The abundance, distribution and diversity of species within component habitats and communities necessary for the structure and function of the mudflats and sandflats feature are stable or improving, subject to natural variability.

2.2 Burry Inlet SPA

2.2.1 Feature 5: Oystercatcher *Haematopus ostralegus*:

- Objective 1: The population of wintering oystercatcher is stable or increasing relative to the SPA target population.
- Objective 2: Wintering oystercatcher that use the SPA continue to have access to, and can utilise, habitats necessary to maintain the population in favourable condition.
- Objective 3: The quality of habitat and abundance of food supply is sufficient to maintain the population of wintering oystercatcher that use the SPA in favourable condition.



3 Monitoring Plan

3.1 Summary

This monitoring plan has been informed by advice received from NRW(A) during the application process and associated consultations. There are four main elements to the disposal monitoring. The first is the Phase 1 Habitat Survey (Cooke 2026). The second is the monitoring of ground levels and beach profile. The third is the pre-commencement base-line benthic and Particle Size Distribution (PSD) of the placement area, located on the upper East Beach. The fourth is the longer-term monitoring of the benthic and PSD condition of the placement site following the placement of dredged material.

3.2 Phase 1 Habitat Survey

The Phase 1 habitat survey (Cooke 2026) provides a Phase 1 baseline of the dredge areas, disposal area and the wider vicinity, as shown in Figure 1 below. Each of the green dots indicates the location of sample assessments.



Figure 1. Sample locations to inform Phase 1 Habitat survey carried out in March 2026

The Phase 1 Habitat survey provides the baseline conditions that were present in all areas prior to any dredging activity taking place.

It is not presently intended to repeat the Phase 1 Habitat survey, however, as it provides a reliable baseline it can be referenced to, as and when required, in association with the planned monitoring and adaptive management strategy. It is possible that as part of the adaptive management it may be considered appropriate to repeat the Phase 1 Habitat Survey, but this will be dependent on the findings of the planned monitoring activities.

The Phase 1 Habitat survey was issued to NRW in April 2026 as part of the licence application process.

3.3 Physical Process - Beach Level Monitoring

As dredged material is being placed within the defined disposal area on the upper portion of the East Beach, it is considered appropriate to monitor the levels of the beach, by conducting topographic survey, in order to, 1) Establish the pre-disposal levels/profile of the East Beach Disposal Area, and 2) to monitor any changes in beach levels/profile



subsequent to disposal activities. These topographic surveys will be carried out to inform the physical processes to monitor effects on the SAC's estuaries and mudflats and sandflats features.

The topographic surveys of the East Beach disposal area will include a 100m extension on either side (west & east), and extend from the MHWS line to, as close as possible, the low water line on the day of the survey. The survey will be carried out by recognised topographic survey methods i.e. spot levels, beach transects, laser scan, or by drone LiDAR. The surveys will be referenced to Ordnance Datum and will be suitably ground truthed. The beach levels will be observed at a suitable density to provide a reliable representation of the morphology of the beach, including any significant changes in gradient.

The topographic monitoring surveys will be carried out:

- Before sediment placement for each sand dredge campaign.
- Within 8 weeks of the completion of deposit activities following each sand dredge campaign. (To allow for at least two spring tide cycles for the reworking of the deposited sand by natural processes).
- If not covered by the timing of dredge related surveys, additional topographic surveys will be conducted after winter period (April) and after summer period (September) or at the same time as the benthic sampling.

The reporting will include comparisons of beach profile, volumes of material deposited, duration of any related disposal campaign, and variations in beach profile within the survey area between surveys. The results of the topographic surveys will also be used to inform the benthic monitoring.

As there will be no comparative information available for the initial pre-placement survey it is not proposed to provide an official comparative report to NRW for review/approval until 9-12 months following the initial placement of dredged material. However, the results of the survey can be provided to NRW as proof that the topographic monitoring has taken place, but would not be subject to NRW approval before disposal activities take place. As set out above, should additional disposal be necessary before the 9–12-month reporting, then the pre and post placement Topographic surveys will be repeated, and the information will be incorporated into the 9-12 month report. It is envisaged that any disposal activity carried out following the initial dredging operation, in summer 2026, will be of significantly lower quantities as they will not include the backlog of material.

3.4 Benthic Monitoring Plan

The benthic monitoring plan will be referred to herein as Phase II monitoring, to separate it from the Phase I Habitat Survey referenced above.

Figure 2 below shows the intended sampling locations, marked by blue, red and orange dots. The green dots being the locations of the Phase 1 Habitat sample sites as observed by Cooke 2026, and as shown in Figure 1 above.

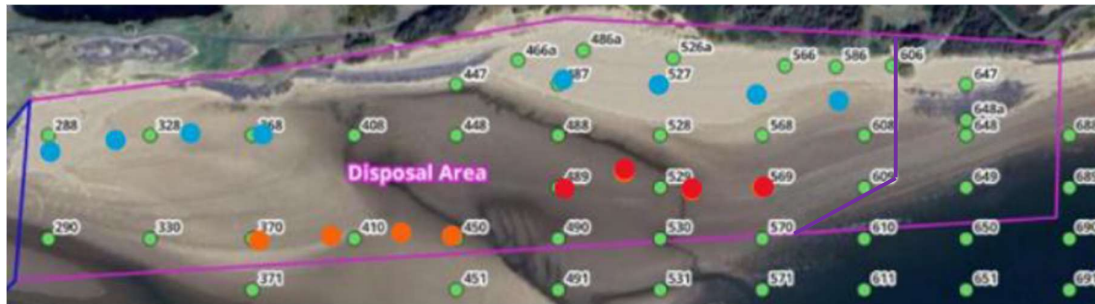


Figure 2. Proposed sample locations with reduced disposal site area shown at eastern end

The sampling locations are in line with those proposed by NRW(A). The sample locations are intended to provide temporal multivariate analysis by ensuring geographical spread. The sampling will also include 4 replicate stations within the mid-upper, mid and mid-lower shore height communities within the disposal area (each of which are reported to be dominated by amphipod communities (blue), amphipod and polychaete communities (red) and polychaete communities (orange)). The location of these stations is intended to avoid, as far as possible, environmental (and therefore community) variability that exists across the site, which undermines the effectiveness of temporal analysis. The suitability of these locations will be verified prior to samples being taken to ensure variables such as standing water, particle size, shore height etc are consistent across the 4 stations in each shore height.

All sampling will be undertaken in accordance with the relevant guidelines (e.g. ISO 16665: (2014). Water quality – Guidelines for quantitative sampling and sample processing of marine soft bottom macrofauna; JNCC (2004). Common Standards Monitoring Guidance for Littoral Sediment Habitats. 2004; Worsfold, T.M., Hall, D.J. & O'Reilly, M. (Ed.). 2010. Guidelines for processing marine macrobenthic invertebrate samples: a Processing Requirements Protocol: Version 1.0, June 2010. Unicomarine Report NMBAQCMbPRP to the NMBAQC Committee. 33pp. etc).

At each Phase II sampling station 0.01m² cores will be taken for full macrofaunal analysis and enumeration. At one station at each of the 4 shore heights a further two cores will be taken (triplicate) for full macrofauna analysis to inform sampling variability. At the triplicate sites an additional core will be taken for particle size distribution analysis (PSD). This equates to 24 macrofaunal cores and 4 PSD cores. Post deposition surveys will also determine any change in extent of the Talitrid communities on the upper shore.

The first survey will be carried out before disposal activities take place. The post deposit survey will be carried out a minimum of 9 months, but no longer than 12 months, following the completions of deposit activities. The reason for this temporal separation is to allow time for the benthic communities to recover following the placement of material in the disposal area.

To interpret the data, both univariate statistics (such as the number of taxa, number of individuals, Shannon Wiener diversity and Margalef's species richness) and multivariate statistics (i.e. ANOSIM or similar) will be carried out to determine spatial and temporal variability in the communities present before and after sediment disposal operations (multivariate methods of data analysis are considered to provide a more sensitive measure of community change than univariate methods, since all the data are analysed collectively with no loss of information such as that which occurs when reducing the data to a single number or univariate statistic). The PSD of the sediment is anticipated to have an effect on the structure of benthic communities, and therefore, multivariate analysis will also be used to determine changes in sediment character and any associated



changes in the benthic communities present (e.g. by using analysis such as BIOENV, PCA etc).

3.5 Reporting

The first set of monitoring will be carried out in advance of any dredged material being deposited in the disposal area. This survey will provide the pre-placement baseline for physical processes and/or benthic habitat conditions within the SAC and SPA. As this will be the initial survey there will be nothing comparable to compare the results against. The first comparative report will be developed following the recovery period following the initial deposition activity in 2026 (i.e. 9-12 months following the initial placement activity). This first comparative report will include the monitoring results of the pre and post placement investigations for the physical processes and/or benthic habitat conditions within the SAC and SPA and will assess whether there are discernible changes to these conditions (outside of natural variation). Should a survey demonstrate discernible changes to conditions that pose a risk to or show non-compliance with the SAC and/or SPA conservation objectives, then the report will include an assessment of the need for, and implementation of the adaptive management measures contained within this document. This report will be submitted to NRW for review/approval. Any subsequent monitoring reports, should they be considered necessary, will include comparisons against all previous monitoring results.

For the purposes of reporting, discernible changes to physical processes and/or benthic habitat conditions for the SAC and SPA features will be considered in the context of the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC Conservation Objectives (as they are set out within the relevant Regulation 37(3) advice dated June 2025: [conservation-advice-for-carmarthen-bay-and-estuaries-sac.pdf](#)) and with reference to specific monitoring methods, and where relevant, associated benchmarks as listed below:

- Topographic surveys (using topographic differencing methods) to detect changes in beach levels and/or profile due to disposal activities that may be ecologically significant due to a significant change in the extent / distribution of main component benthic communities as a result of altered inundation periods, etc.
- Particle size analysis (a component of the benthic monitoring plan and reporting commitments) to detect changes to sediment type in accordance with the Wentworth Scale (i.e., coarse, medium, fine and very fine sand, silt and clay).
- Benthic fauna analysis to detect changes to the abundance, distribution and diversity of species within component habitats and communities to be monitored and reported in accordance with the benthic monitoring and reporting plan outlined in Section 3 above.

The field results of the pre-placement baseline monitoring can be provided to NRW if so required, however there will be no detailed analysis carried out until the first post placement monitoring survey is carried out, which will be 9-12 months following the initial placement. The analysis reports will be provided to NRW for their review and comment prior to the next dredge campaign taking place, unless an emergency campaign is triggered by the Harbour Master for navigational safety reasons.

4 Trigger Levels

Trigger levels will be considered by comparing the results of pre- and post-placement monitoring surveys to detect discernible changes to physical processes and/or benthic habitat conditions in the context of Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC Conservation Objectives (as they are set out within the relevant Regulation 37(3) advice dated June 2025: [conservation-advice-for-carmarthen-bay-and-estuaries-sac.pdf](#)) as follows:



4.1 Green (Normal Condition):

- Status: Monitoring detects no discernible changes to physical processes and/or benthic habitat conditions outside of natural change as defined by the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC Regulation 37(3) advice.
- Action: No management intervention is needed. Continue monitoring or agree reduced monitoring frequency with the licensing authority.

4.2 Amber (Caution / Warning Trigger):

- Status: Monitoring detects discernible changes to physical processes and/or benthic habitat conditions outside of natural change as defined by the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC Regulation 37(3) advice.
- Action: Implement one or more of the adaptive management measures listed within Section 5 of this document in agreement with the licensing authority. Agree a monitoring plan with the licensing authority until physical processes and/or benthic habitat conditions return to green status.

4.3 Red (Action / Limit Trigger):

- Status: Following the implementation of adaptive management measures, monitoring continues to detect discernible changes to physical processes and/or benthic habitat conditions outside of natural change as defined by the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC Regulation 37(3) advice
- Action: Implement further adaptive management measures which may, or may not, be listed within Section 5 of this document in agreement with the licensing authority. Agree a monitoring plan with the licensing authority until physical processes and/or benthic habitat conditions have been demonstrated to return to green status.

5 Adaptive Management Strategy

5.1 Introduction

It is recognised that the marine environment is complex and dynamic, particularly in the Loughor Estuary, meaning there are often unknowns about the impacts from a project, such as the placement of dredged material on the upper beach area. Adaptive management is a tool that can allow disposal activities to be consented when the environmental effects are not well understood.

The application of adaptive management can enable deployments by helping reduce risks associated with scientific uncertainty. It can also increase the understanding of effects of the project on the environment. The aim of adaptive management is to avoid unacceptable effects. It is a systematic and iterative approach of “learning by doing and adapting as you learn”. Adaptive management is a process where decisions are made on available information. It is intended to be a structured, iterative approach to environmental assessment, allowing the management of a project to be adapted based on learning once the project has commenced. The outcomes of project-related decisions should be monitored and analysed.

The adaptive management will be informed by targeted and effective monitoring and analysis that provides a measure of an effect, or change in effect, and how the receptor could be impacted. Action can then be taken before an unacceptable impact occurs or threshold has been reached.



For adaptive management to be successful it must rely on robust monitoring data, information and, where appropriate, expert scientific judgement to deliver and enforce it. This includes making decisions on monitoring, management and remedial action. All must be technically possible and realistic to avoid unacceptable impacts.

5.2 Dredge Disposal Adaptive Management

The monitoring procedure, provided above, sets out the monitoring CCC are planning to implement to monitor the behaviour of the deposited dredge material within the designated disposal area, and the impacts against the baseline condition. The level of monitoring being carried out will be adaptive. Should the monitoring, associated with the first dredge campaign, demonstrate that the deposited sand material disperses quickly and the rate of benthos recovery is good, then the level of monitoring will be reviewed and reduced if considered appropriate. However, if the monitoring suggests that the changes in the beach profile and benthic recovery are of concern, the monitoring programme will continue until such time as sufficient evidence is collated to inform on any possible changes to the dredging and associated disposition programme. The results of the survey comparisons will be discussed with NRW and appropriate measures adopted based on the findings of the initial and subsequent investigations.

Following the initial dredging campaign, in summer 2026, it is anticipated that the volume of material being deposited, during each subsequent dredge campaign will reduce, as only the Approach Channel should require regular maintenance dredging, if the sand can be prevented from migrating into the Outer Harbour.

If impacts of concern are identified, then the approach to the disposal activity will be reviewed. It will not be possible to establish what the most appropriate adaptive management approach might be until the results of the monitoring surveys have been analysed. However, some of the options that might be considered may include the following.

5.3 Disposal Site Zoning

One of the adaptive managements that could be considered going forward might be to create deposition zones within the disposal area, with the material dredged from each campaign being deposited in different zones each time. This would provide longer periods of time between disposal acts in the other zones, which may aid in the recovery rates. The zones may be structured in blocks along the beach (e.g., 4 blocks running from West to East), or as strips running the full length of the disposal site in sections running down the beach (e.g., 3 strips running from North to South).

5.4 Minimising Layer Thickness

Alternatively, it may prove to be more appropriate to deposit each subsequent campaign as thinly as possible over the whole defined deposition area so that the thickness of the deposit is minimised and hence reduce the potential impacts of smothering.

5.5 Frequency of Dredging

The time period between dredge campaigns may be reviewed to minimise the risk of impacts. This may result in increasing the frequency of campaigns to reduce the volume of material being deposited at any one time. Or if navigational safety permits, the period between dredging campaigns may be extended as long as possible to maximise the recovery period. However, this will result in a larger volume being deposited when dredging is carried out, which may be counterproductive.

5.6 Continued Optioneering

CCC are committed to finding the right balance between the maintenance of Burry Port Harbour and the potential impacts on the pertinent conservation objectives. As such, all



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options will be considered as the evidence base expands, and the adaptive management regime will be modified in the most appropriate way.