ENVIRONMENT
& HEALTH

Falmouth Docks Development: Appropriate Assessment Addendum – Fal and Helford SAC

Project name **Falmouth Docks Development**
Project no. **1620015743-006**
Client **A&P Group**

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1 Introduction

This Habitats Regulations Assessment (HRA) Appropriate Assessment (AA) Addendum has been prepared by Ramboll UK Ltd (Ramboll) in response to comments received from Natural England on the HRA report[1] submitted as part of the marine licence application for the proposed redevelopment at Falmouth Docks (MLA/2025/00157).

This AA Addendum provides further information on the potential effects to the Fal and Helford Special Area of Conservation (SAC), as requested by Natural England (NE) and the Marine Management Organisation (MMO) as part of ongoing consultation. It is not intended as a standalone document and should be read alongside the HRA report.

1.1 Objective

This AA Addendum addresses the following specific points raised by Natural England regarding detailed advice (Ref: 519879, 08 September 2025) on the HRA for impacts to support a conclusion of no Adverse Effect on Integrity (AEoI) on the Fal and Helford SAC:

- Habitat and pressure mapping;
- Chronic suspended sediment concentration (SSC) impacts on benthic habitats;
- Sediment deposition depth and duration;
- Sediment deposition impacts on sensitive habitats (contamination);
- Mitigation for secondary dredge impacts; and

[1] Ramboll, 2025. Falmouth Docks Development, Habitats Regulations Assessment Report, 15743-RAM-FD-SW-RP-EV-00017

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- Coastal processes and sediment modelling limitations.

2 Supplementary Information for Appropriate Assessment

2.1 Habitat and Pressure Mapping

2.1.1 Habitat Mapping

The application includes a significant amount of both habitat and project related 'pressure' mapping, with information presented across Chapter 9 of the ES, the HRA, a number of detailed technical sediment modelling appendices as well as a specific maerl technical note as requested by NE. The level of detail supporting the assessments, including the HRA, is therefore to be found in several places within the application. The following brings together relevant information, to assist NE's AA, and to address the specific comments.

Habitat mapping used both publicly available information and the results of two project specific surveys to characterise the benthic ecological baseline for the project. Survey scopes were determined in consultation with Natural England and the classification of maerl habitats undertaken according to specific guidance from NE SMEs. To ensure no destructive sampling of maerl the surveys deployed drop down video data for the collection of images in areas with this species and grab samples were taken only in areas outside maerl habitat.

To provide a detailed understanding of the baseline conditions, the extensive survey effort and habitat characterisation was also undertaken alongside consideration of bathymetry within the survey area (Figure 1), and historic dredge activity at the site (Figure 2).

Pressure mapping involved detailed modelling of sediment transport and deposition processes undertaken by industry experts HR Wallingford.

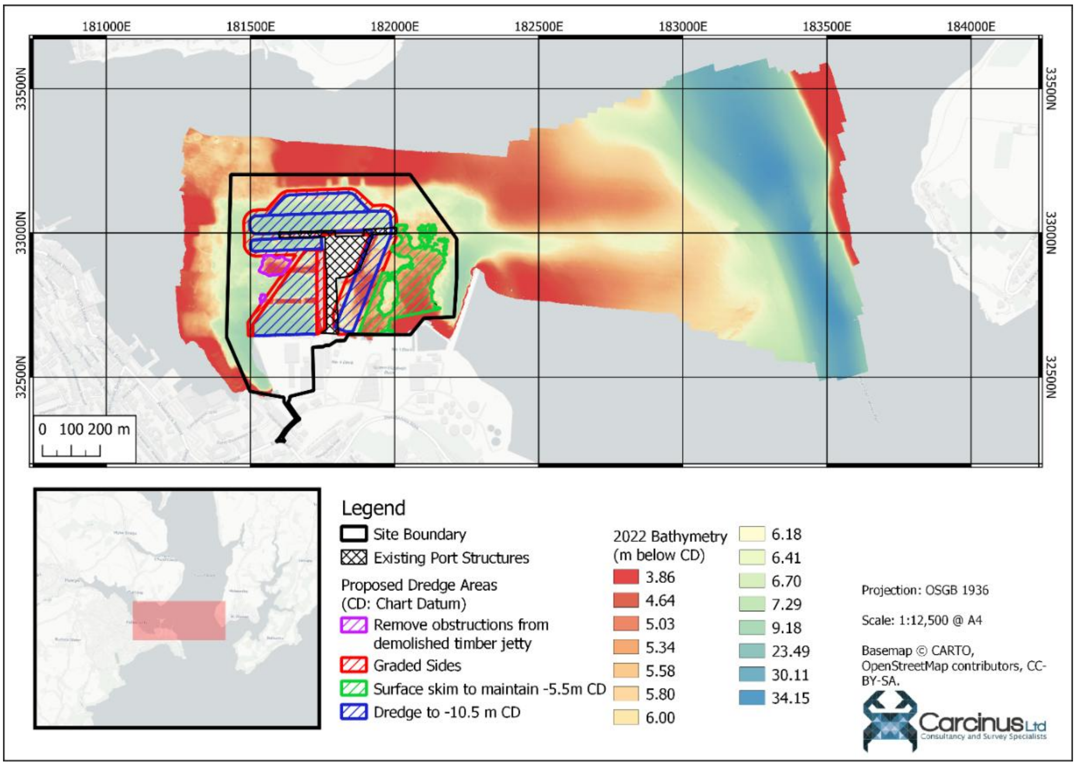


Figure 1 - Bathymetric data from waters surrounding the proposed development location, based on 2022 survey data (Carcinus Ltd, 2025)

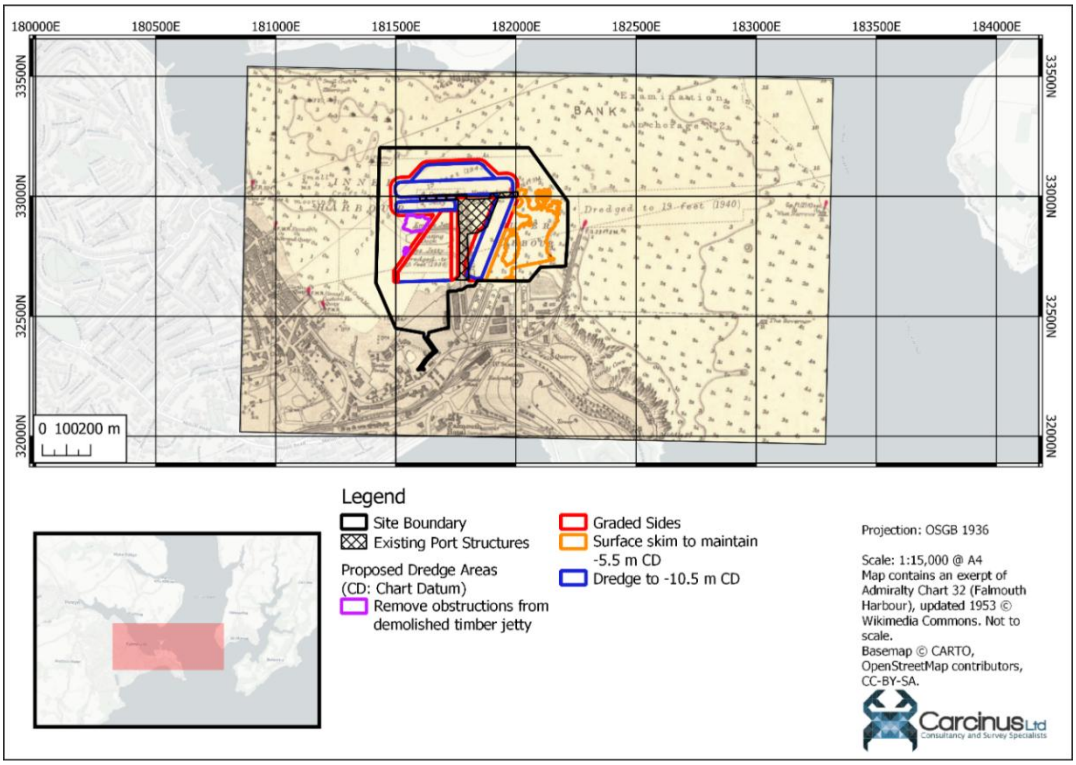


Figure 2 - Historic Dredge records (Admiralty Chart 32 excerpt), updated 1953 with proposed dredge pockets overlaid (Carcinus Ltd, 2025)

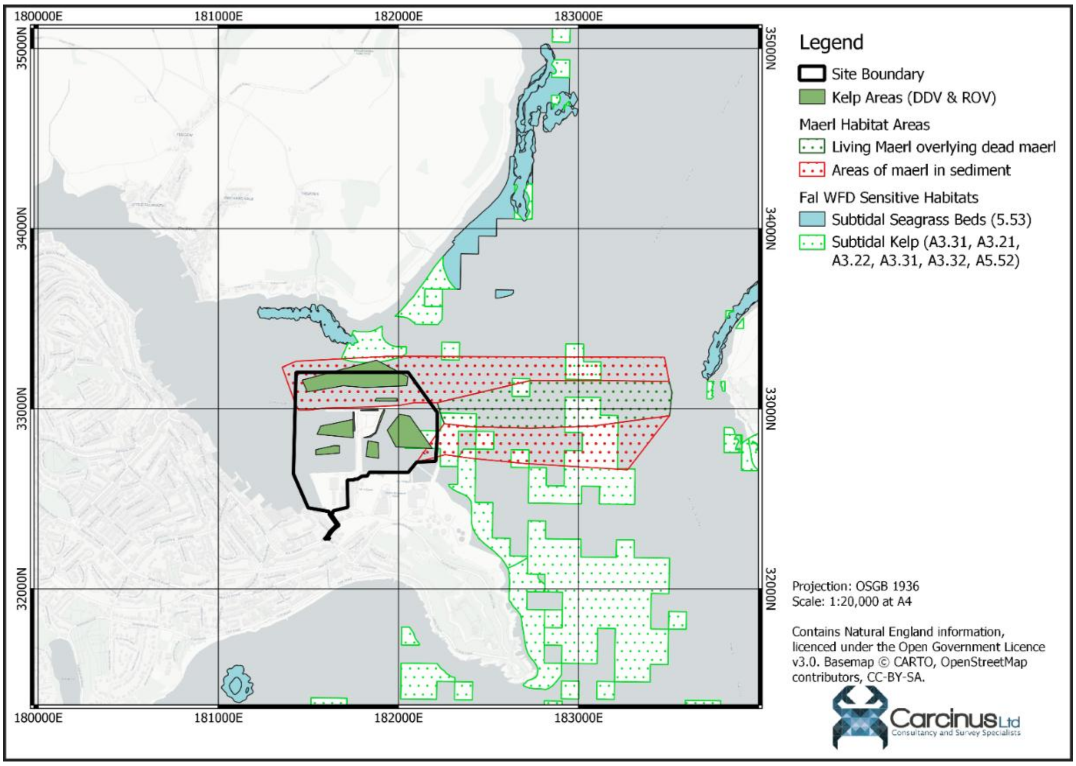


Figure 3 - Relevant sensitive habitats within the vicinity of the proposed development. WFD habitats extracted from Natural England's Marine Habitats and Species Open Data (Carcinus Ltd, 2024)

Broadscale habitat mapping, from NE online information, determined that, in addition to maerl beds, the area around the project also included Annex 1 habitats, designated by the SAC, particularly seagrass beds and kelp habitats (Figure 3).

A detailed categorisation of habitats, within and around the red line boundary, was undertaken based on survey data to plot the observed biotopes, sediment type, percentage of dead and live maerl, and maerl structure (2D or 3D) in and around the site boundary. These characteristics were mapped, as shown in the example below for biotopes, sediment type and the presence and structure of live and dead maerl in the survey area (Figures 4 – 6).

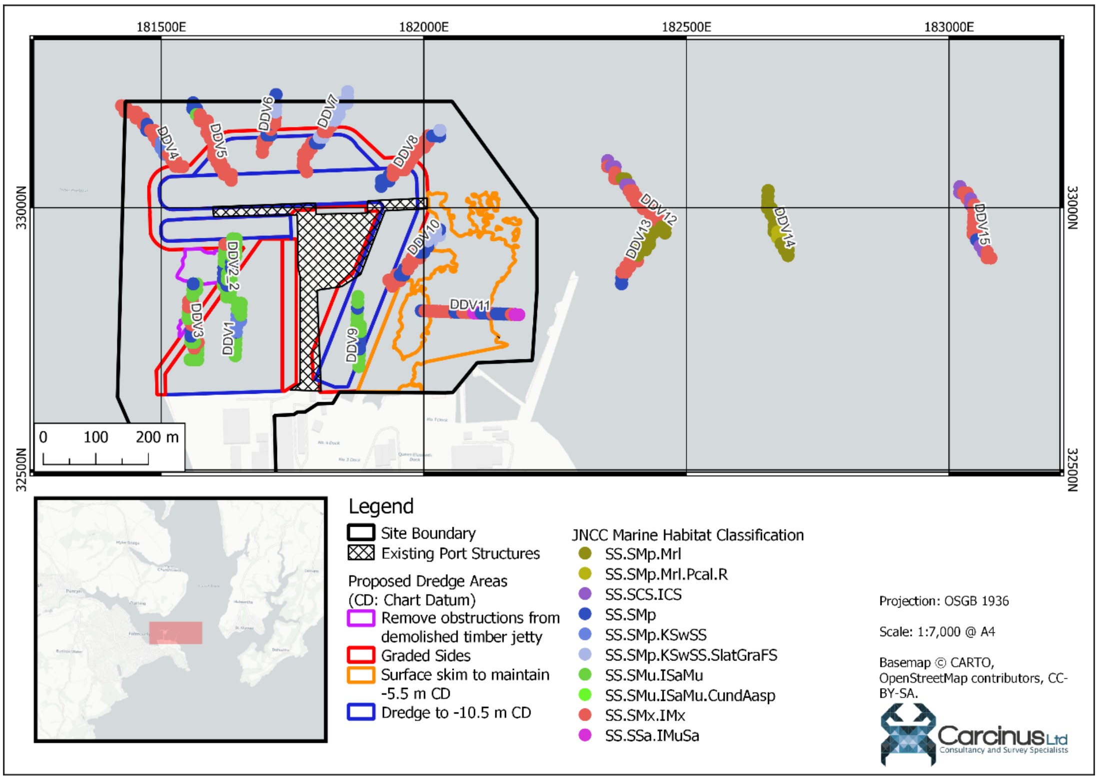


Figure 4 - Habitat biotopes along DDV transects surveyed within the study area (Carcinus Ltd, 2024)

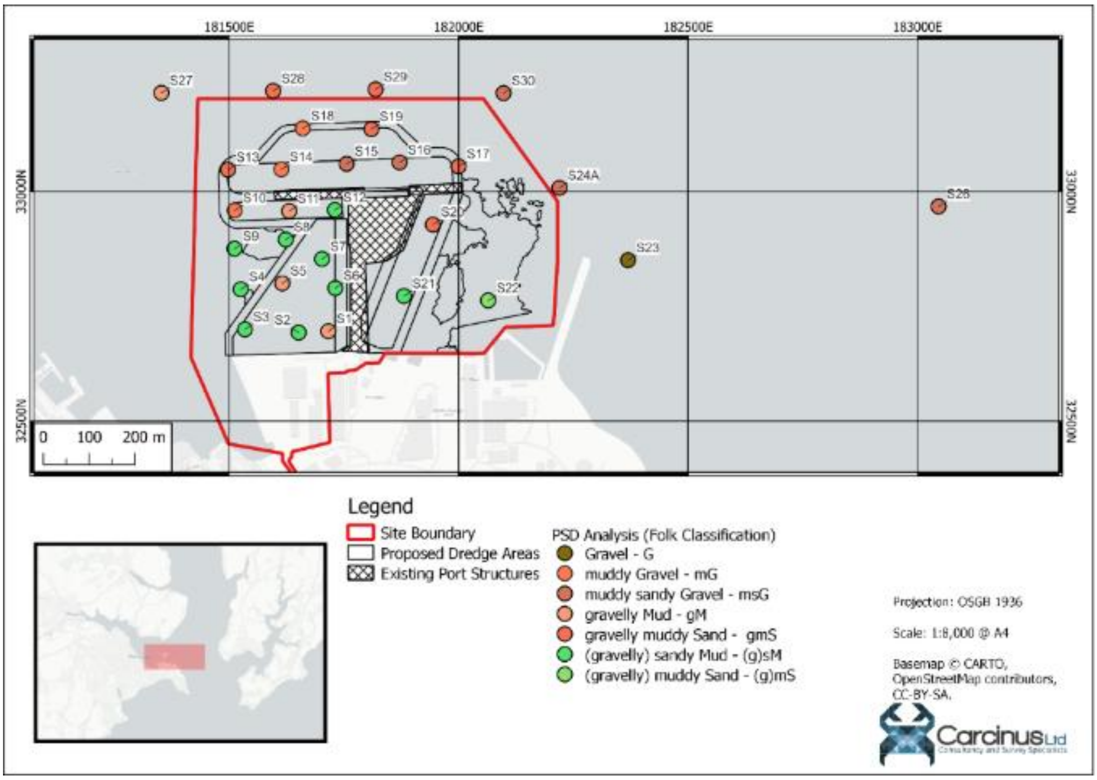


Figure 5 – Sediment type at grab stations within the study area

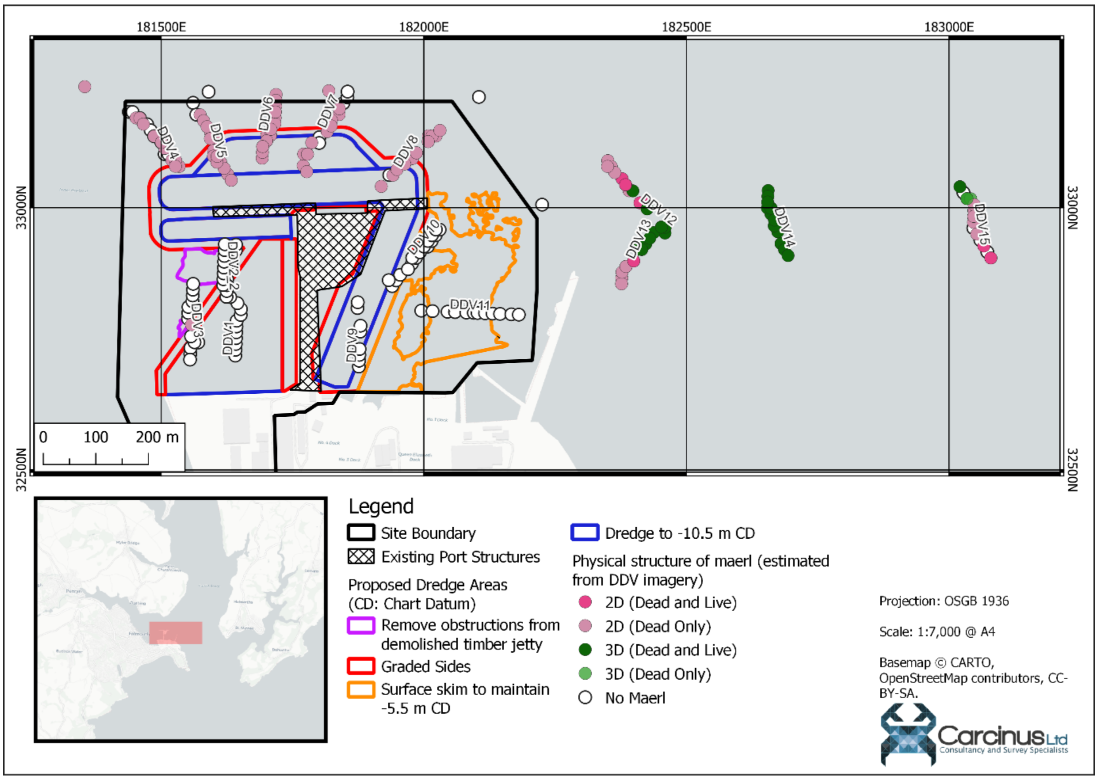


Figure 6 - Estimated 3D/2D structure of identified areas of maerl within the vicinity of the site (Carcinus Ltd, 2024)

Maerl habitat was classified according to NE guidance and consultation feedback, to show the distribution of maerl habitat as shown in Appendix 3 of the HRA Report. NE advised adopting the quoted descriptions of maerl habitat type provided in the Fal and Helford SAC's Conservation Advice Package[1]. From the description of maerl beds, as a sub-feature of *Large Shallow Inlets and Bays* and the *Sandbanks which are slightly covered by sea water all the time* qualifying features, the text descriptions shown below were extracted:

- pristine live maerl beds with up to 100% live maerl coverage;
- extensive areas of dead maerl with little to no live maerl;
- extensive areas of dead and crushed maerl;
- living maerl overlying dead maerl; and
- areas of maerl in sediment.

The survey data identified habitat types thought to be consistent with two of the descriptions above: living maerl overlying dead maerl and areas of maerl in sediment. These two habitat types are mapped and overlaid with the red line boundary (Figure 7). As there are no criteria for these descriptions there was not an opportunity to present a greater resolution within these two maerl habitat and thus some of the discrimination relies on the mapping shown in Figures 4-6 above.

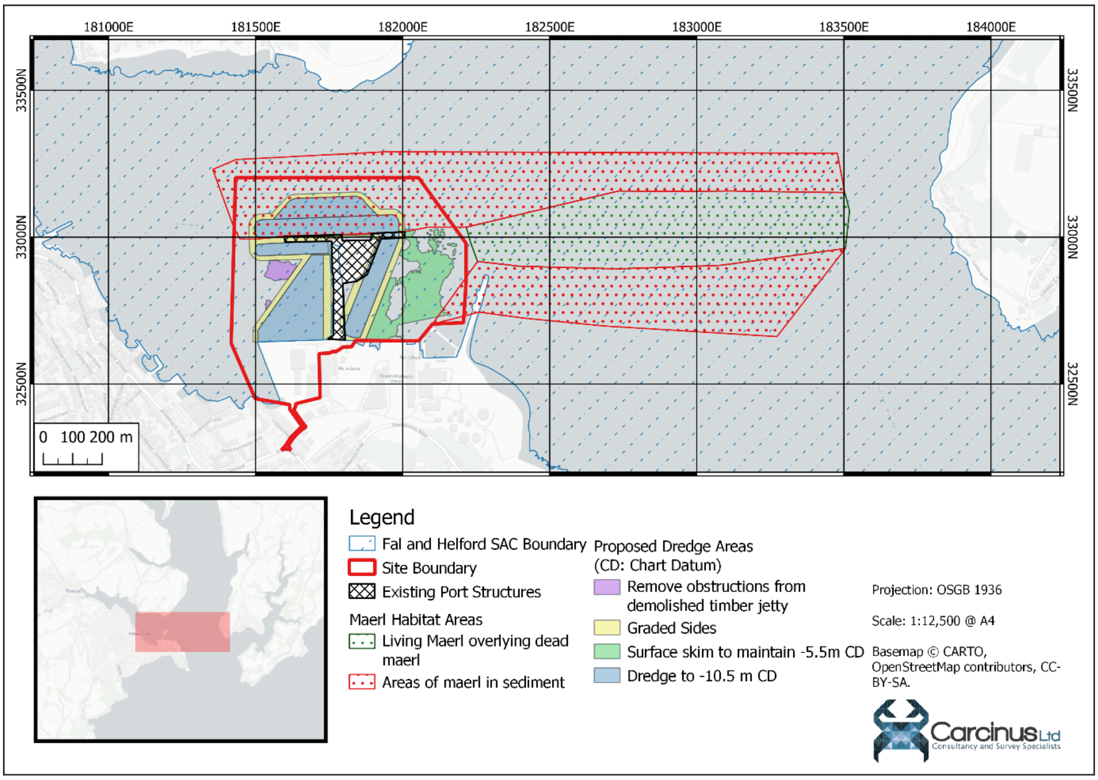


Figure 7 – Proposed Dredge Areas in Relation to Areas of Maerl Habitat, Categorised as Living Maerl overlying Dead Maerl or Areas of Maerl in Sediment

2.1.2 Pressure Mapping

For both increased SSC and deposition the area of effect is predominantly within the project red line boundary, with some small areas to the north and east outside of the boundary. Modelled impacts show very limited zones of influence – as seen in Figure 8 of predicted sediment deposition from the entire dredge campaign, assuming no break in operations between the three dredge pockets.

Considering the limited extent of the ZOI for both pathways the mapping information is considered proportionate to the potential effects of SSC and deposition. However, the following brings together the key figures and includes some additional information to demonstrate the approach and outcome of the pressure mapping that support the conclusion of no AEOSI in the HRA from the dredge campaign.

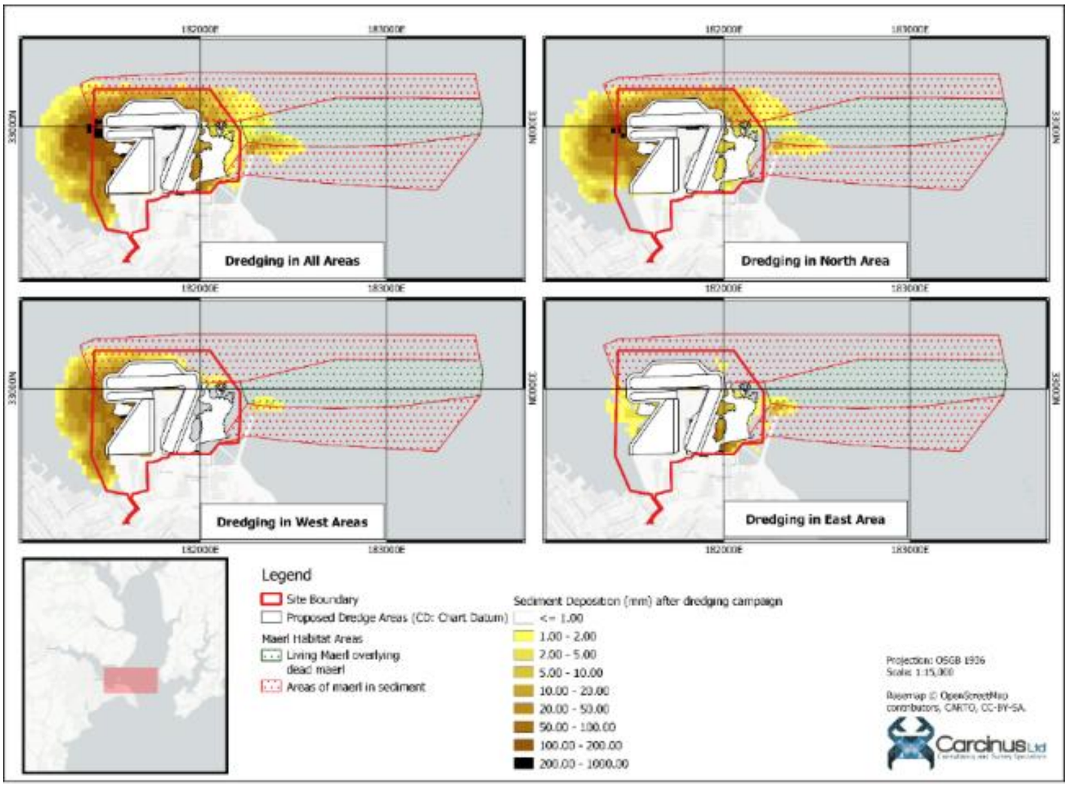


Figure 8 - Sediment deposition (mm) at the end of the entire dredging campaign as a result of proposed dredging operations

Habitat mapping also allowed the identification of nine key ecological receptor locations, shown in Figure 9 (ES Chapter 9) to investigate in more detail suspended sediment concentration and deposition values, for the key habitats in the project area. Habitats considered to be more sensitive include seagrass beds, kelp and maerl and the reasons for the selection of the sites are provide below.

- Sites 1, 2 and 8: located within the western, northern and eastern berth pockets;
- Sites 3 and 4: located in positions where maerl habitat had been identified, including in a region of live maerl cover;
- Site 5: located in proximity to seagrass and kelp habitats to the north, off Flushing Headland (see Figure 3);
- Site 6: located at the position of maerl south-east of the Eastern Breakwater, based on historical data;
- Site 7: located near the southern extent of the modelled sediment dispersion, albeit without the adopted mitigation measures; and
- Site 9: north-west of the site boundary, outside the predicted ZOI.

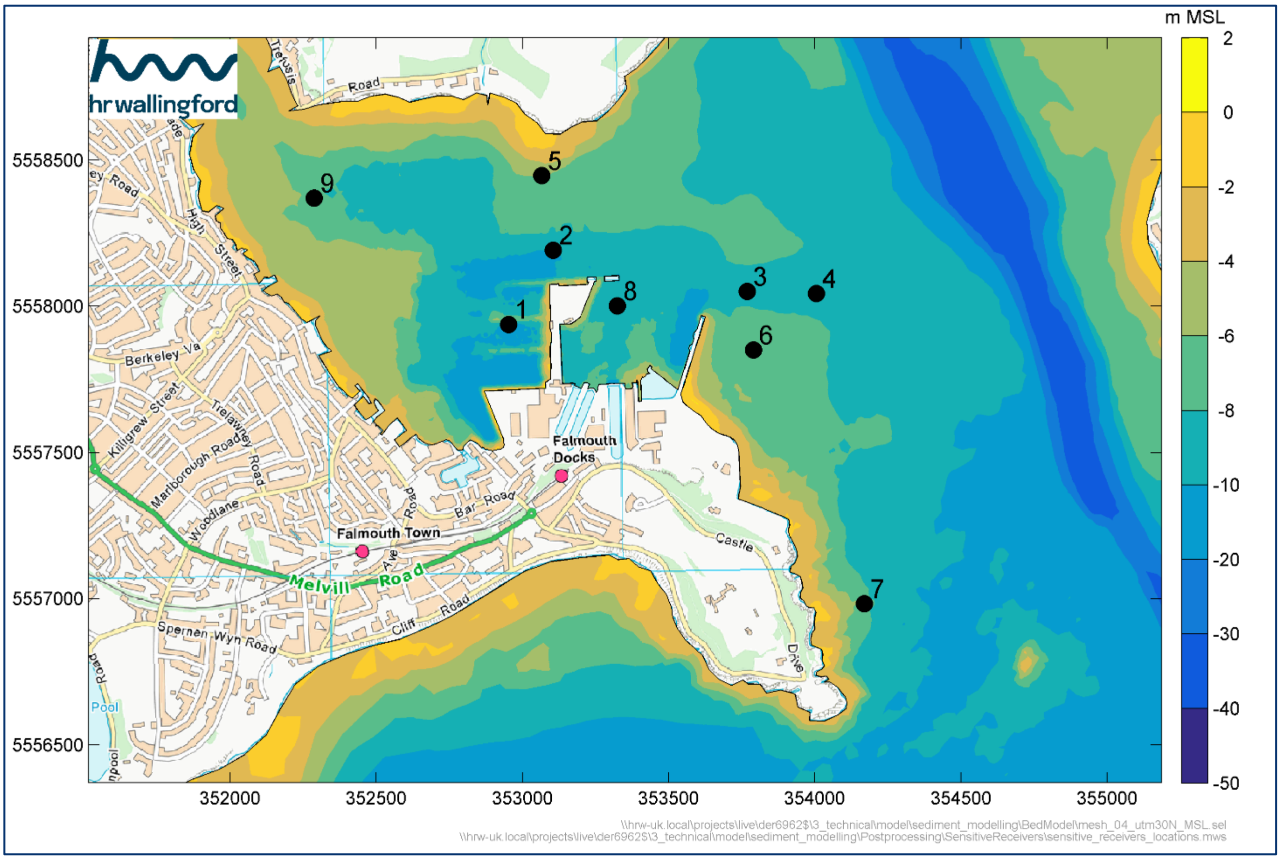


Figure 9 - Ecological Receptor Locations for detailed review of SSC and deposition from dredge campaign

2.1.3 'Chronic' Suspended Sediment Concentration Impacts on Benthic Habitats

As set out within Section 6.2 (6.2.41) of the HRA report, mitigation (Modelling Scenario 3 in Technical Appendix 6.3) will be implemented during all dredge activity to minimise suspended sediment dispersion and deposition extent. Backhoe dredge methods using a 10 m^3 or smaller lidded bucket in all areas, and to restrict the dredge window according to tidal movements, specifically restricting dredge activities to the period from 1.75 hours before low water to 1.75 hours before high water i.e. on the late ebb, early flood tide.

Dredging operations are scheduled to take approximately 20 weeks at the Western Wharf, 18 weeks at the Northern Wharf (including Queen's Wharf extension) and 20 weeks at the FLOW Deck. The modelled dredge movements, and associated increases in SSC, assumed no breaks between the dredging campaign periods set out here, which is considered a precautionary approach.

The modelling results for increases in SSC were mapped showing the maximum increase in suspended sediment concentrations resulting from proposed dredging operations in each of the three areas (Figure 10). With the exception of the dredge campaign in the north area, increases in SSC are largely contained within the docks.

Despite the fact that there would therefore be a daily spike in SSC during that time, the maximum increases in SSC at all modelled receptor locations are not higher than periodic storm events and average SSC values are within the ambient range. The restriction of dredging to certain tidal states significantly minimises the spatial extent of this plume, and SSC peak values are expected to be within natural variation. Sediment plumes are limited to within 300 m of the dredged area and are, on average, largely confined to the area within the site boundary. Where the plume extends beyond the site boundary the concentration modelled is very low (Figure 10, Dredging in North Area panel).

However, these contour plots can be misleading as they appear to represent an actual plume, when in reality the figure shows the maximum values that can occur across the whole dredge programme, not what occurs every time dredging takes place or what occurs all of the time.

In addition, maximum values generally occur only occasionally and represent the worst-case scenario for the assessment. The mean SSC values, shown in Figure 11 below, are considered to be more representative of the general increase in SSC from dredging for most of the time across the whole campaign. However, both maximum and mean SSC plots, mapped together with the site boundary and the sensitive maerl habitat show that the ZOI for SSC would be largely restricted to the site boundary.

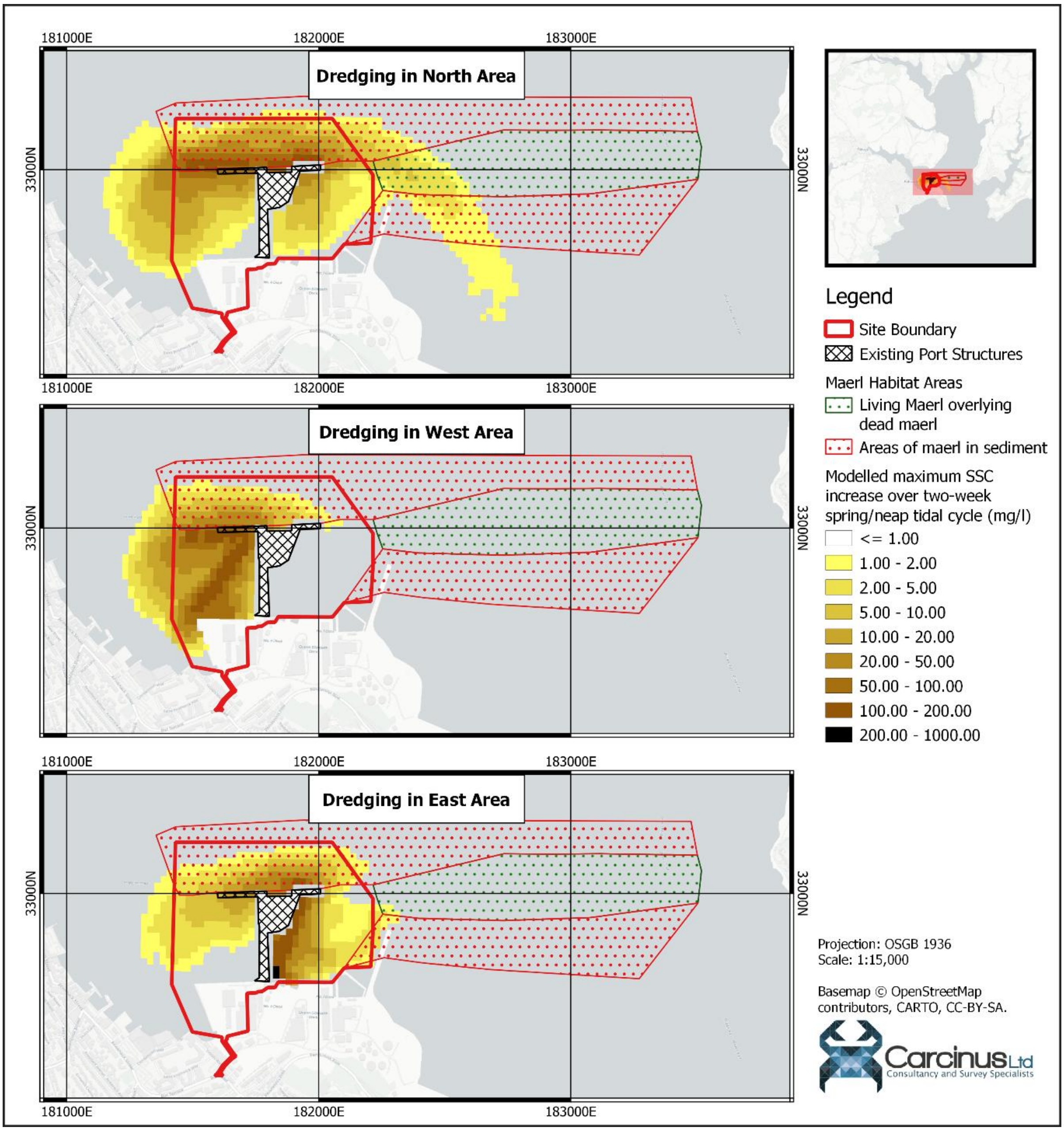


Figure 10 - Maximum increase in suspended sediment concentrations resulting from proposed dredging operations in each of the three areas

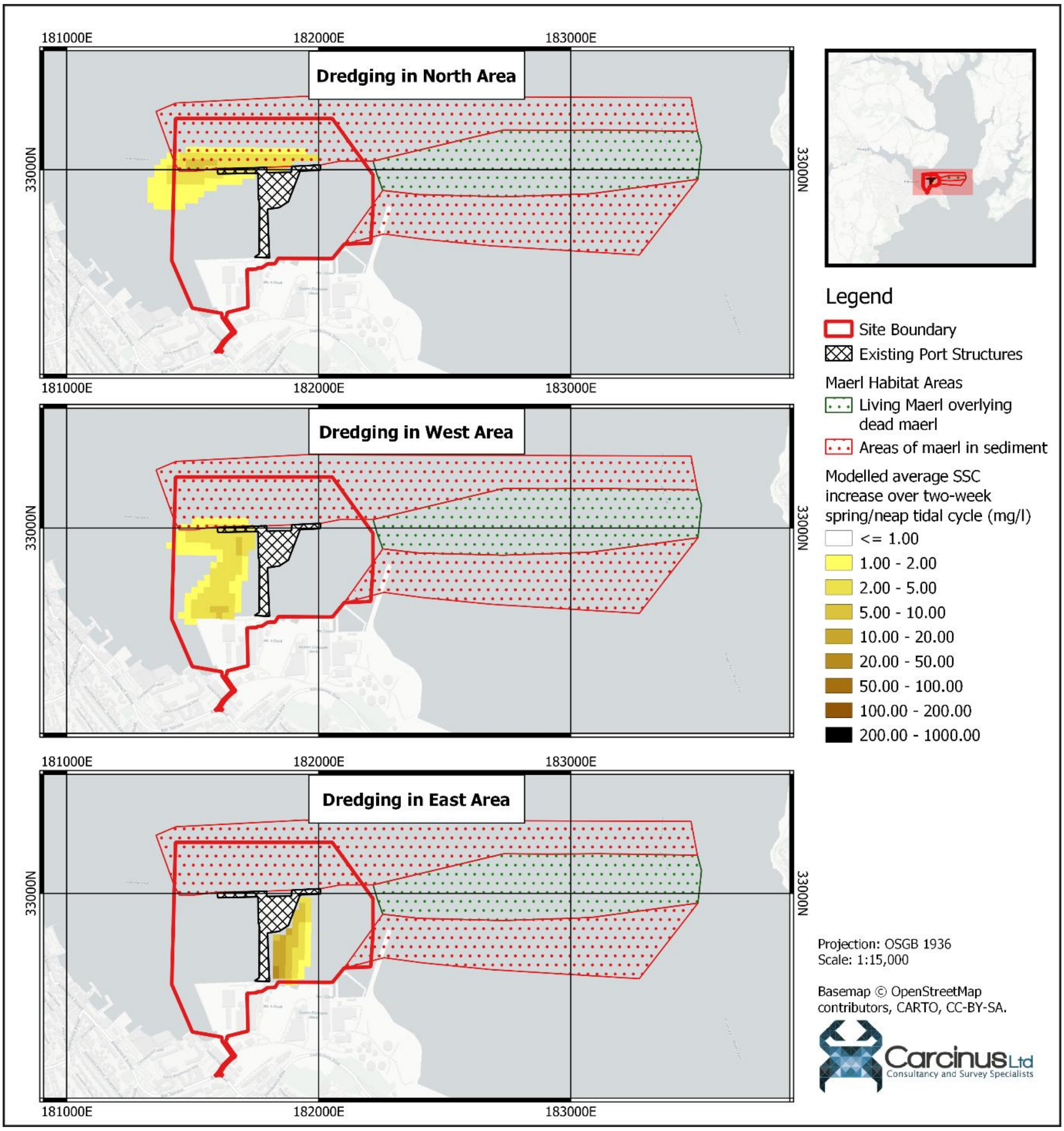


Figure 11 - Mean increase in suspended sediment concentrations resulting from proposed dredging operations in each of the three areas (Maerl Technical Note)

In addition to the SSC contour mapping shown above, SSC timeseries values were determined for each of dredge areas (north, west and east) at each of the nine habitat receptor sites (locations as shown in Figure 9), to show the significant variability in SSC values over a 15-day time simulation.

Three time-series figures, one for each of the dredge areas were provided in Technical Appendix 6.3, which was submitted with the application, but they were not specifically presented in the HRA report. As an example, the time-series for SSC from dredging in the northern area (the worst-case area) is shown in Figure 12.

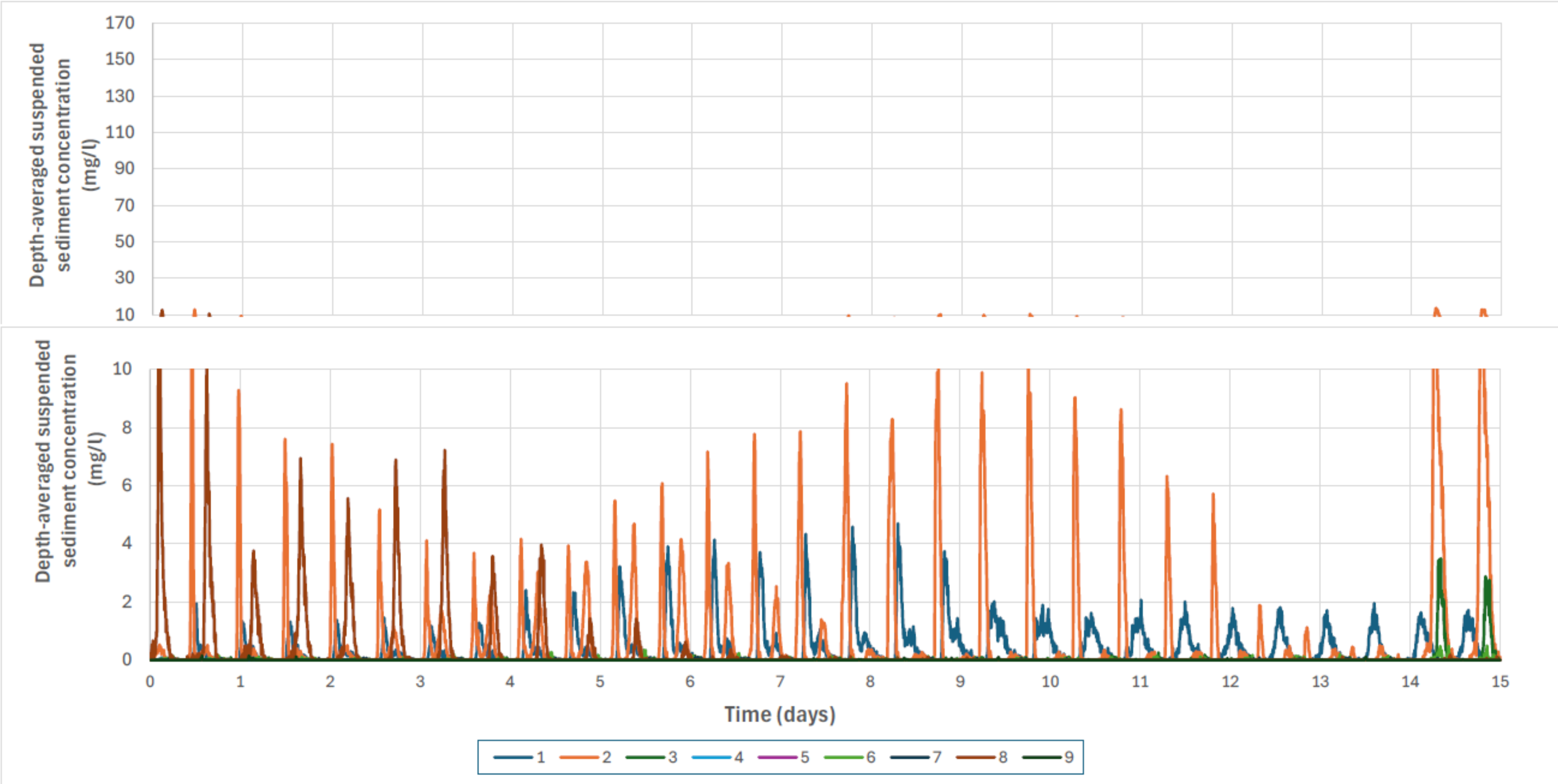


Figure 12 – Time series of predicted increase in suspended sediment concentration, for all nine receptor sites. Dredging in the north of the site

However, teasing out the information for individual locations from this plot is difficult. Therefore, to supplement the HRA timeseries plots for SSC levels, additional plots have now been produced, one for each of the nine receptor sites, to supplement the assessment of SSC effects on the SAC.

The plots for the following locations: Site 2 (immediately to the north of the northern berth pocket), Site 3 (within areas of live maerl) and Site 5 (adjacent to areas of seagrass and kelp habitats) are provided below in Figure 13 to Figure 15. The maerl beds at receptor Site 3 are considered to be the habitat of primary importance with respect to SSC. Timeseries plots for all nine receptor locations are available but not presented in order to focus on the habitats of concern in relation to the designated habitats of the SAC.

Note that in the original timeseries, right at the end of the timeseries (after 14.5 days of dredging) the model erroneously switched to being all tide, showing artificial high peaks at the end of the plot in Figure 12. The location specific plots in Figure 13 to Figure 15 have therefore been stopped at 14.2 days.

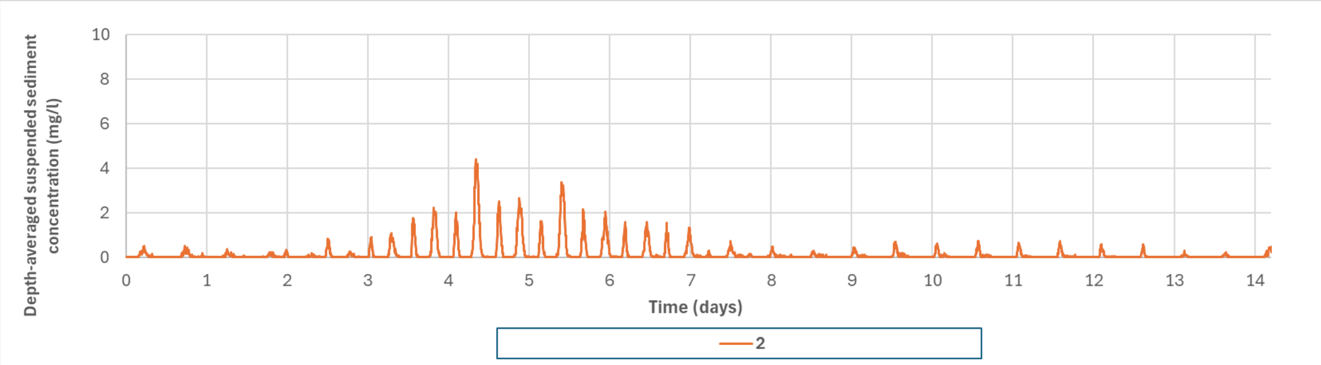
Site 2, immediately to the north of the northern berth pocket but within the site boundary has SSC values up to just over 10 mg/l (Figure 13) but only during part of the tidal cycle and the plots show the peaks are short-lived, rapidly returning to baseline.

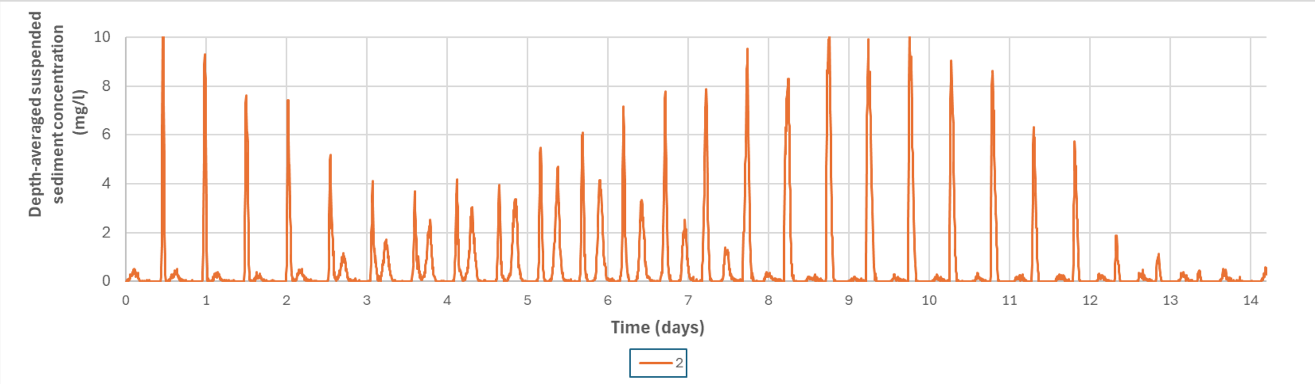
Site 3, within the area of maerl that was mapped as 'live maerl over dead maerl' also has a very low increase in SSC across the whole tidal cycle, indicative of the effectiveness of the tidal restriction mitigation measure (Figure 14).

At Site 5 the maximum SSC was <0.1 mg/l, including from dredging in the north area (Figure 15), and thus the seagrass beds at Flushing were beyond the ZOI for SSC and no further assessment of this habitat is required.

The timeseries plots demonstrate that temporary spikes in SSC will occur as the dredger moves around the site, but these spikes are temporary in duration and extremely limited in spatial extent. They also demonstrate that effects would be constrained to locations within the site red line boundary, as has been assessed, beyond which SSC levels will reduce to background levels within 24 hours and with tidal movements. The data for the individual sites shows periods in which there are dredge activities occurring that result in no increase in SSC at the receptor, as a result of the tidal state. Therefore, it is concluded that increases in SSC would not occur every day, even if dredging is being undertaken. This variability in SSC therefore supports the use of mean SSC modelled values, as the maximum values are occasional. This indicates that increased SSC is periodic, rather than chronic.

The information above supports the impact assessment for increased SSC in the HRA Report, that the effect of SSC would be temporary, non-continuous and of short-duration due to the natural downtime between the tides, during which dredging would stop and suspended sediment would decrease back to background levels. Thus, overall, with the implementation of mitigation in the form of choice of plant and dredging non-continuously according to the tidal restrictions, it is considered that increased SSC during the proposed development's demolition and construction stage would be neither of the spatial nor temporal scale to lead to adverse effects on the integrity of the SAC. Therefore, there would be **no adverse effect on site integrity**.





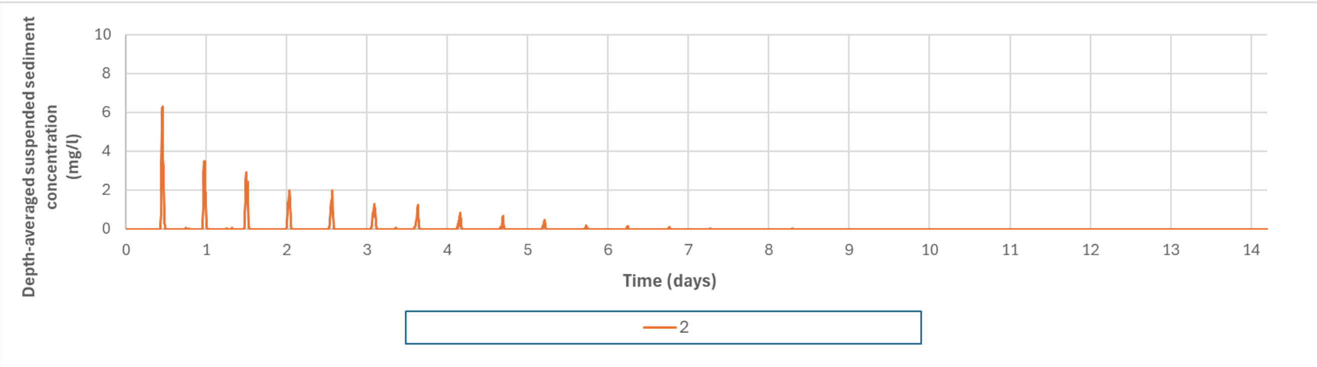


Figure 13 - Location 2 showing SSC time-series for dredging in west (top), north (middle) and east (bottom) over a 2-week spring-neaps tidal cycle

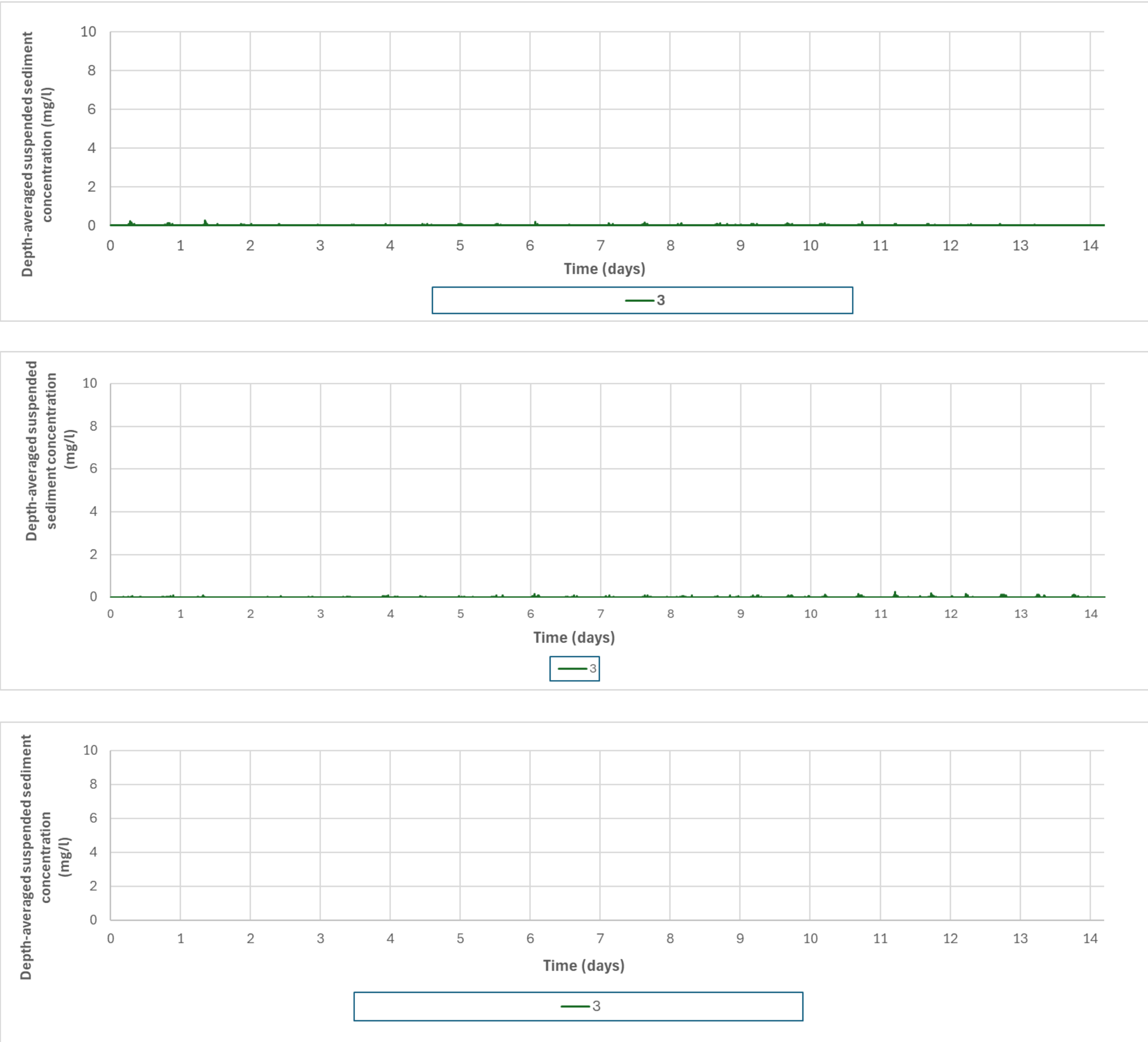
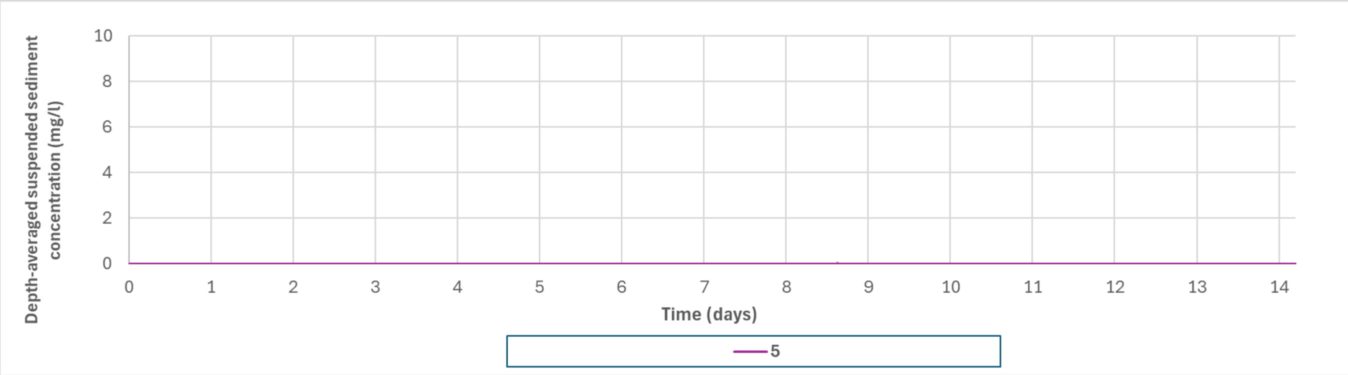
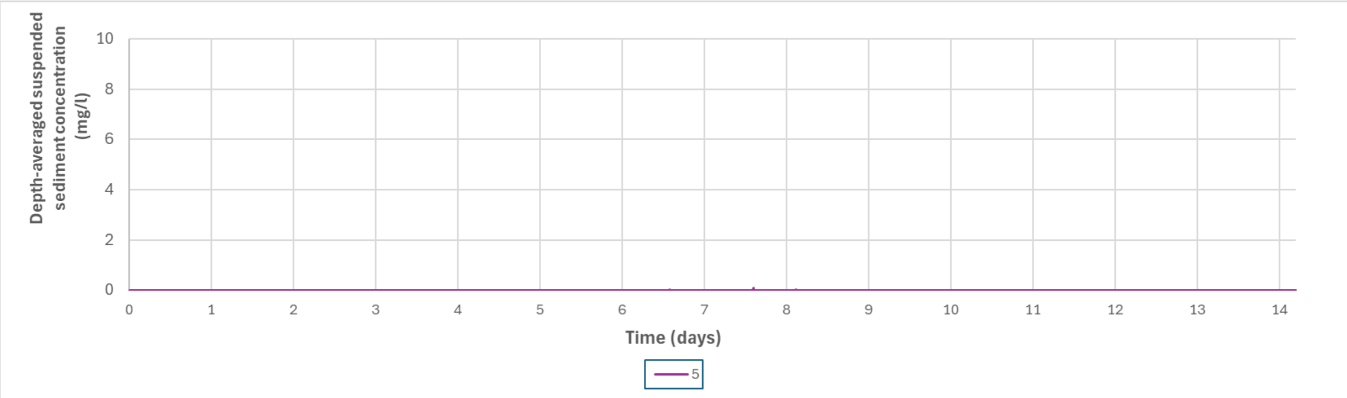


Figure 14 - Location 3 showing SSC time-series for dredging in west (top), north (middle) and east (bottom) over a 2-week spring-neaps tidal cycle





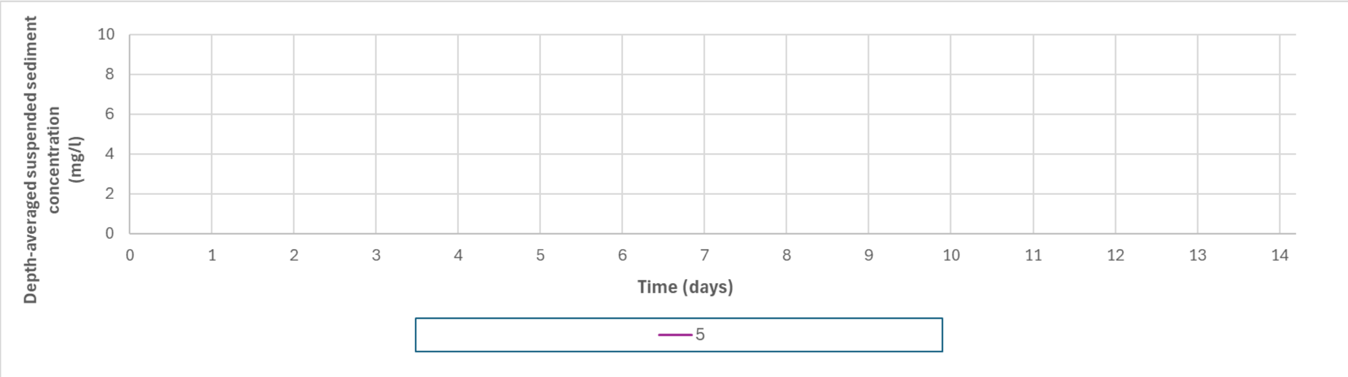


Figure 15 – Location 5 showing SSC time-series for dredging in west (top), north (middle) and east (bottom) over a 2-week spring-neaps tidal cycle

2.1.4 Sediment Deposition Depth and Duration

Deposition modelling following dredge activities, when overlaid as contour plots on maerl habitat mapping demonstrates that the area of deposition is largely constrained to the red line boundary, with a very limited spatial ZOI (Figure 16).

The contour plot shows the greatest depth of sediment deposition occurs to the west, as a result of the tidal restrictions for dredging (Figure 17). Up to 200 mm of deposition is predicted up to 150 m west of the site boundary. The plot also shows that deposition declines to less than 1 mm a short distance from the site boundary (modelled to be at distances of 370 m to the west of the site and 300 m to the east of the site). In relation to habitat sensitivities the key areas of effect are around the Eastern Breakwater and the area to the north of the north dredge area.

The area of deposition outside the eastern site boundary, extends to areas mapped as live maerl over dead maerl. The maximum deposition value within this habitat of 18.4 mm sediment depth was extracted from the contour plot. The higher values reported, of 50 mm, were also based on contour plot data, predicted for a localised area at the end of the Eastern Breakwater. This is outside the area with live maerl, instead within the habitat mapped as maerl in sediment but identified as dead maerl with a 2D structure (see Figure 6). HR Wallingford have estimated the area of total deposition predicted by the modelling within the areas mapped as live maerl overlying dead maerl. Approximately 1.38 ha of this area is modelled as having a total deposition of 1-2 mm; approximately 0.96 ha is modelled as having a total deposition of 2-5 mm; approximately 0.71 ha is modelled as having a total deposition of 5-10 mm; and approximately 0.04 ha is modelled as having a total deposition of 10-20 mm.

Deposition values were also determined for each of the nine sites (as shown in Figure 9) that were selected to represent the key habitats in the vicinity of the proposed development (Table 2-1). Sites 3, 4 and 6, all to the east of the eastern breakwater and within the region mapped to include both maerl habitats, have very low total deposition depths (up to 0.7 mm). Comparing this value with the 18.4 mm from the contour plot indicates that the depth of sediment deposition decreases rapidly with distance eastwards. No deposition is expected to occur beyond 300 m east of the site boundary. Thus, only a very small, localised area of live maerl on dead maerl is predicted to have detectable levels of deposition.

Modelled data indicates that at Site 2, at the edge of the north dredge area within the site boundary, total deposition at the end of the entire dredging campaign, assuming no break between dredge areas, is 51.8 mm. This deposition value decreases to <0.1 mm at receptor location 5, indicating that sediment deposition as a result of the proposed dredge activities decreases rapidly with distance from the dredge pocket and thus will be localised in extent and limited in area. The habitat found around Site 2 was maerl in sediment, characterised by dead maerl 2D in structure. Thus, the extent of sediment deposition on areas of maerl with live maerl and a 3D structure is predicted to be negligible.

The modelling does not account for the variation in SSC levels, such that deposition will not occur at the same rate or on every day through the dredge period – as shown in the time series plots above. Whilst the proposed development is in an area of relatively low water movement and wave action, there will be some redistribution of sediments. Grab sampling in the area around the north dredge pocket identified the sediment type to be muddy gravel, muddy sandy gravel and gravelly muddy sand and therefore, a significant change in sediment type is not expected. Where deposition is modelled to occur in areas where maerl has been identified, the thalli are dead and a covering of deposited sediment will have no effect on ecological functioning of maerl here.

In conclusion, considering the very small extent of sediment deposition, with most deposition occurring on non-maerl habitats or where maerl is present but comprised of dead maerl in a 2D structure, the deposition predicted to result from the proposed development's demolition and construction stage would be neither of the spatial scale nor depths to lead to significant habitat loss or mortality, change in spatial extent or distribution of maerl, or impacts on reproduction and longevity. Accordingly, **no adverse effects on site integrity** of the SAC are predicted.

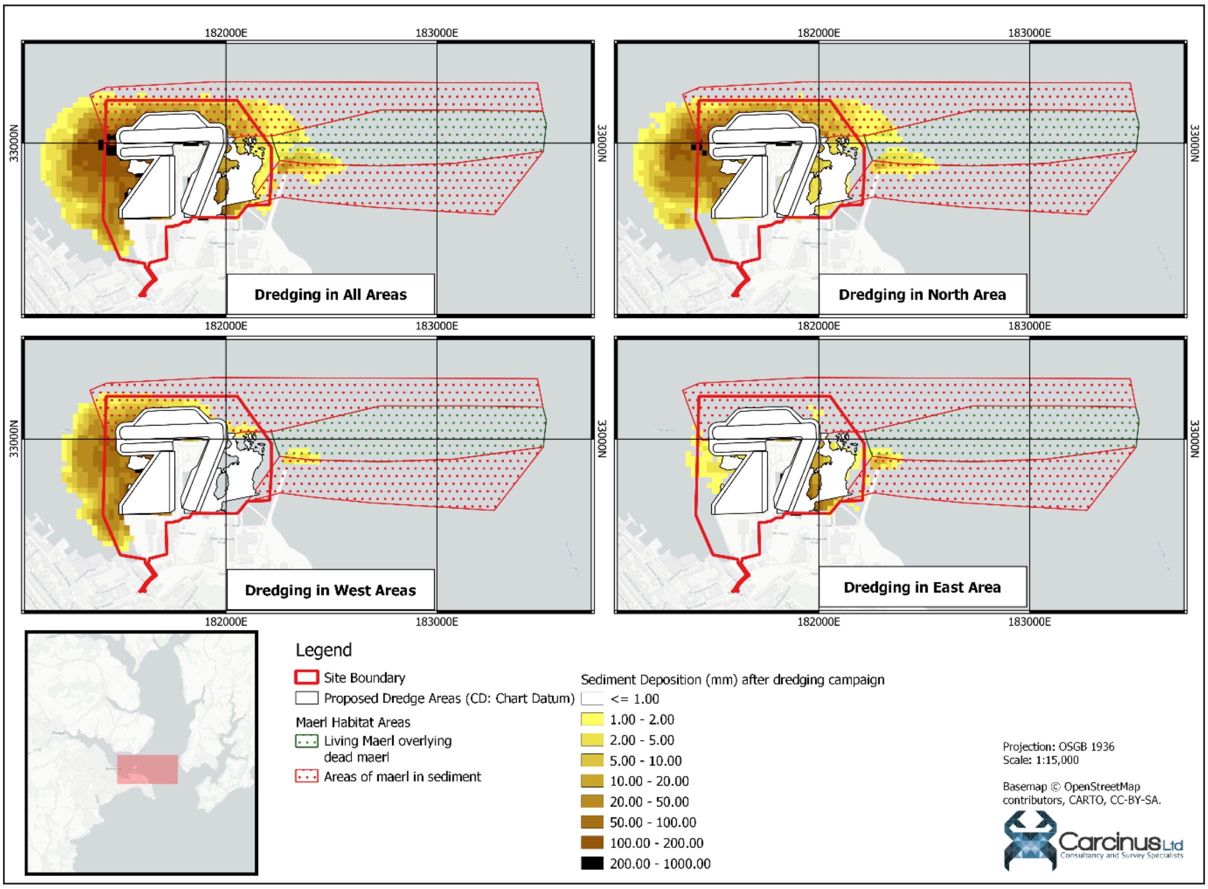


Figure 16 - Sediment deposition (mm) overlain on maerl habitat classification at the end of the entire dredging campaign as a result of proposed dredging operations (Carcinus Ltd, 2025)

Table 2-1 - Summary of predicted total fine sediment deposition resulting from dredging

Location	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9
Total Deposition (mm)	465.9	51.8	0.7	<0.1	<0.1	0.6	0.2	14.9	<0

2.1.5 Sediment Deposition Impacts on Sensitive Habitats (contaminants)

When reviewing specific contaminants that would be released as part of the proposed dredge activity, TBT is the only contaminant released into the aqueous phase that was modelled to be present in concentrations above EQS standards (Figure 17). Note, the modelling undertaken was for the unmitigated scenario only, with dredging during any tidal condition.

However, as stated in the HRA Report, the inclusion of the tidal mitigation for dredge activities is predicted to halve the concentration of TBT in aqueous phase. The concentration of the predicted 'finger' of aqueous contamination extending southeast of the site boundary would be halved and if remapped would be significantly reduced in extent.

Thus, the proposed mitigation also constrains the ZOI in relation to contamination of TBT in the water column to be largely contained within the red line boundary. Cefas have reviewed the ES and the Technical Appendices and were satisfied with the approach taken and conclusions of no significant impacts to benthic features.

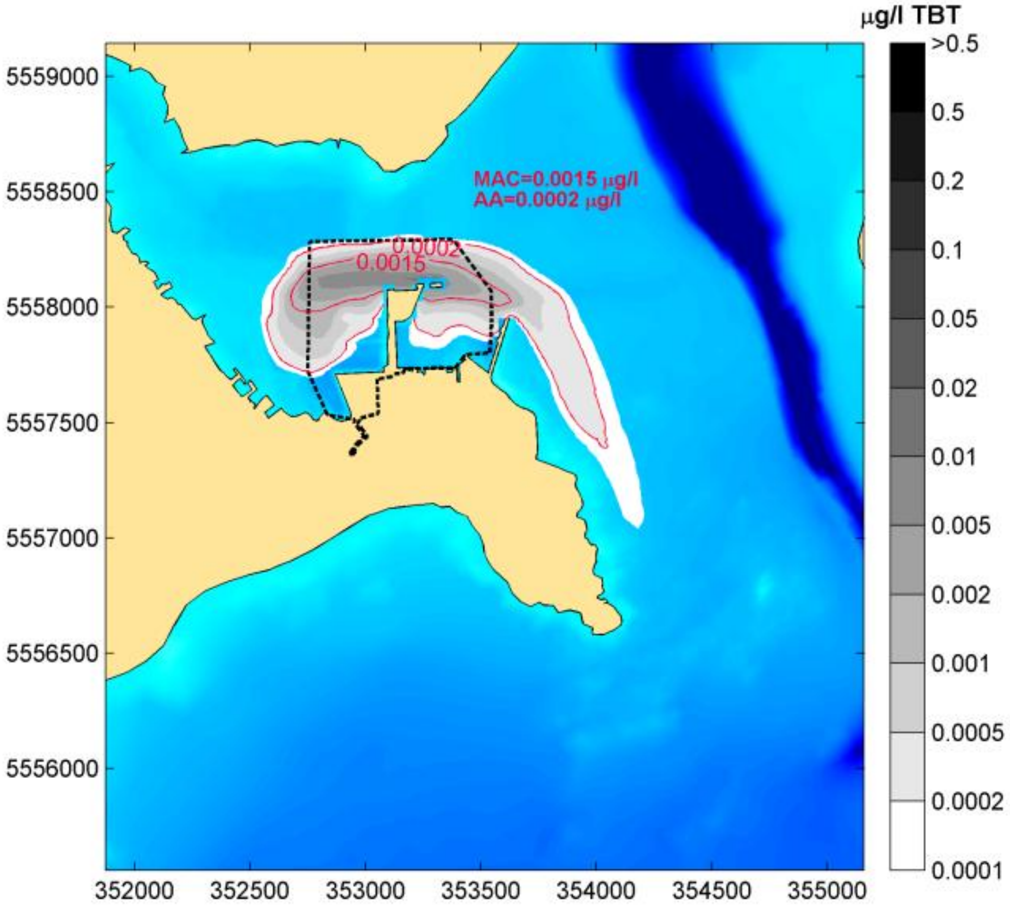


Figure 17 - Predicted time-averaged concentration of Tributyl tin (TBT) over 15 days of dredging

Considering the limited deposition of sediments on the maerl sub-feature of the Fal and Helford SAC and the contamination levels identified, given the spatial extent and intensity of deposition, and that the predicted deposition is in a small area of habitat largely comprising dead maerl thalli that do not contribute to the longevity of the feature within the SAC, nor comprise maerl beds that support high biodiversity, there is expected to be **no adverse effect on site integrity.**

2.1.6 Mitigation for Secondary Dredge Impacts

Silt curtains were considered as part of early discussions of potential mitigation solutions for the proposed development. The mitigation, as presented within the ES and HRA Report, of the 10 m³ lidded bucket and restricting dredging to the period from 1.75 hours before low water to 1.75 hours before high water i.e. on the late ebb, early flood tide, was shown to be sufficient to address the potentially significant effects associated with SSC and deposition effects and to support a conclusion of **no adverse**

effect on site integrity, as supported by the data presented in this AA Addendum, therefore no further mitigation is presented. It was also established that the use of silt curtains would not be a viable mitigation method in the site environment.

2.1.7 Coastal Processes and Sediment Modelling Limitations

Data used to inform the coastal processes assessment is set out in ES Chapter 6: Coastal Processes. It is acknowledged that the data was collected between June 1984 – June 1985, with additional data collected in June to August 2024. This later data only included one event with a significant wave height of greater than 1 m so was not added to the validation dataset but was used to provide a verification of the model.

The calibration and validation exercise was undertaken in two stages:

1) Comparison of measured waves at the offshore 45 m buoy and the Met Office NWS hindcast model at the same location and derivation of adjustment factors for the hindcast model; and
2) Comparison of measured waves and SWAN prediction at the two buoys for selected winter peaks.

Based on this comparison exercise, an adjustment for the hindcast model was derived.

The verification exercise measured waves from data collected in 2024 and was used to calibrate with SWAN model outputs for the highest observed peak. A comparison between the highest measures waves and SWAN result are shown in Table 2-2, with full detail presented in Technical Appendix 6.1: Wave Modelling.

Table 2-2: Comparison of model and measurement for the time of the highest quoted measured waves

	Hs (m)	Tp (s)	Wave direction (°N)
Highest measured wave (08/07/2024, 19:40)	1.3	7.1	249
SWAN run for this time	1.1	5.9	144

In their consultation response, Cefas advised that the modelling conducted for the proposed development is suitable. Cefas acknowledged that no new field data were collected for the establishment of the coastal processes baseline (Chapter 6, Section 6.4.1). Wave and tidal hydrodynamics field data were collected in 1984-1985 but also were characterised on the basis of the Met Office wave hindcast from 1980-near present (2024) (Chapter 6, 6.5.26) and wind data from measurements 1973-2023 (Chapter 6, Section 6.8.6) with the field data used to validate and calibrate the model.

The wave modelling and associated return periods presented in ES Chapter 6 was focussed on wave conditions common enough to have a potential effect on the sediment regime. It should be noted that the use of the 'morphological' wave integrates the whole wave climate including more extreme cases, which is considered to represent the worst-case scenario.

The conclusion drawn in the consultation response is that the method applied is standard scientific modelling assessment of magnitudes of change to physical system processes and states and is appropriate. The modelled data is therefore considered to be accurate of the conditions at the site, and no new monitoring was requested to support the conclusions drawn. No further work is required in this regard.

The dredge scenario modelled, using a single large dredge, is considered as a reasonable worst case with the largest likely dredger and largest rate of sediment release from the dredger. The use of two smaller dredgers would have a lower production rate for each and a lower rate of sediment release into the water column and would be much more likely to dredge different areas at the same time to maximise efficiency. It was considered that any other combination of smaller dredgers would be likely to have less effect than the scenario modelled on suspended sediment concentrations and a very similar effect on total deposition depth albeit depositing at a slower rate. The modelling also includes dredging throughout the area to be dredged so does reflect sensitivity to location of dredger.

To account for re-dredge activity, by integration of the total volume of dredged sediment which deposits within the area to be dredged, the model calculated a small increase (approximately 2-3%) of the total dredged volume and therefore would not significantly alter the predicted effects of the works as modelled.

In terms of sediment budget and consideration of potential impact pathways relating to estuarine dynamics, HR Wallingford has undertaken modelling including wave, sediment transport, sediment plume and tidal flow modelling. This considers both the construction and operational stages of the proposed development, taking into account new bed levels post-dredge and the structure of the proposed development. Chapter 6 of the ES summarises the modelling undertaken and the magnitude of change, and is supported by Technical Annexes 6.1-6.4. It reports on the predicted change as a result of the proposed development on: water levels, current speed and magnitude, wave height and period, suspended sediment concentration, sediment deposition and erosion, and sedimentation within operational areas requiring maintenance dredging. The outputs of Chapter 6 enabled a number of impact pathways to be scoped out of consideration in terms of ecological receptors due to a negligible to low magnitude of change. This included scoping out of the ES operational stage effects on ecological receptors relating to tidal levels, currents and wave height. In the HRA, consideration of these operational stage effects are addressed in the screening tables (see Table 5-7 of the HRA).