



Exmouth Marina Licence Variation 2: PO050 Desk-based Site Scoping and Characterisation – August 2019



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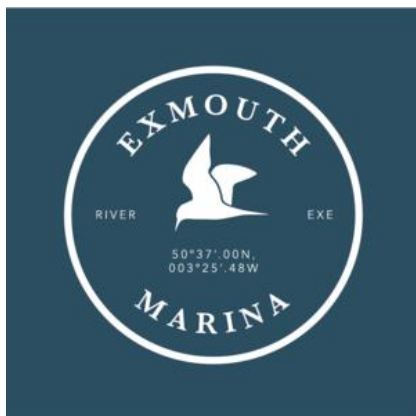
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Executive Summary

This report has been produced to support a marine licence variation request made by MarineSpace Ltd on behalf of Exmouth Marina Ltd. The objective of the variation request is to change the disposal location of dredged material taken from within the marina from PO070 at Sprey Point, to PO050, located approximately 7.7 km further offshore. In addition to varying the disposal location, Exmouth Marina would also like to reduce its overall dredge and disposal volumes by half, giving it a total of 50,000 wet tonnes (or 35,000 dry tonnes, equating to 40,000 m³) over a 10 year Licence period.

Exmouth Marina has an existing licence for maintenance dredging of its marina, and for disposal at site PO070 of up to 10,000 wet tonnes per annum for 10 years. This licence was suspended following the appearance of black sediment on Teignmouth beach, pending an investigation by the MMO which included sediment sampling undertaken by Cefas.

This Site Scoping and Characterisation Report aims to provide the information necessary to inform the MMO's assessment of the suitability of re-opening PO050 to receive future dredged material from Exmouth Marina.

On instruction from Exmouth Marina, Cefas undertook plume modelling of PO050, and results showed the trajectory of the particles was to the southwest / northeast on each tide, with a slight northerly movement on the residual current. Material placed at PO050 is likely to move in a northwesterly direction and migrate out of the disposal site over the course of several days. After 72 hours the particles are shown to have left the boundary of the disposal site, at which point the majority of particles are still approximately 6 km offshore. While there are uncertainties in the model (see Appendix A), there is reasonable confidence in the trajectory of material and high confidence that no material will come ashore at Teignmouth.

Within this document an assessment of all relevant receptors has been undertaken. The following receptors have been scoped out:

- Ornithology;
- Underwater noise;
- Marine mammals; and
- Shipping and navigation.

The following conclusions have been drawn for the receptors scoped into this assessment:

- Physical processes – Negligible;
- Water Framework Directive – Negligible;
- Marine Ecology – Negligible;
- Nature Conservation – Negligible;
- Commercial Fisheries – Negligible and minor;
- Marine Archaeology – Negligible;
- Other Users – Negligible; and
- Cumulative Impacts – Negligible.

At the request of the MMO, MarineSpace has undertaken a consultation process on behalf of Exmouth Marina on this document and proposed licence variation. The following consultees were included¹:

- Maritime Coastal Agency;
- Environment Agency (Devon and Cornwall);
- The Crown Estate;
- Historic England;
- Royal Yachting Association;
- Trinity House;
- Devon and Severn IFCA;
- ABP Teignmouth Harbour Authority;
- Exe Harbour Authority (Exeter County Council);
- Land planning authority;
- Teignbridge District Council (planning);
- Teignmouth Town Council; and
- Dawlish Council.

¹ It was agreed with the MMO that Natural England would be consulted during the Habitats Regulation Assessment (HRA) process and therefore did not need to be consulted at this time.

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1. Introduction

1.1. Marine Licence variation – Supporting Information

This document has been produced following a request by Alec Carter of the Greendale Group, which owns Exmouth Marina, to Claire Griffiths of MarineSpace to apply for a licence variation to their existing maintenance dredge and disposal licence. As part of this variation request process, the Marine Management Organisation (MMO) has requested that supporting information, in the form of a Site Scoping and Characterisation document, be provided to accompany the variation. This document represents that supporting information and is intended to be read alongside the request for variation 2 on the Marine Licence.

1.2. Project Background

Exmouth Marina was granted a licence in August 2017, for a 10 year period, that permitted it to dispose of a maximum of 10,000 wet tonnes (or 7,000 dry tonnes which equates to 8,000 m³) of dredged material per annum at licensed disposal site PO070. Following the last disposal event in February 2018, the MMO received reports of ‘black sand’ on amenity beaches adjacent to licensed disposal site PO070. It was suspected that material from the disposal site may be migrating to the beaches and the Licence was subsequently suspended while an investigation was undertaken by the MMO and their advisors at the Centre for Environment Fisheries and Aquaculture Science (Cefas).

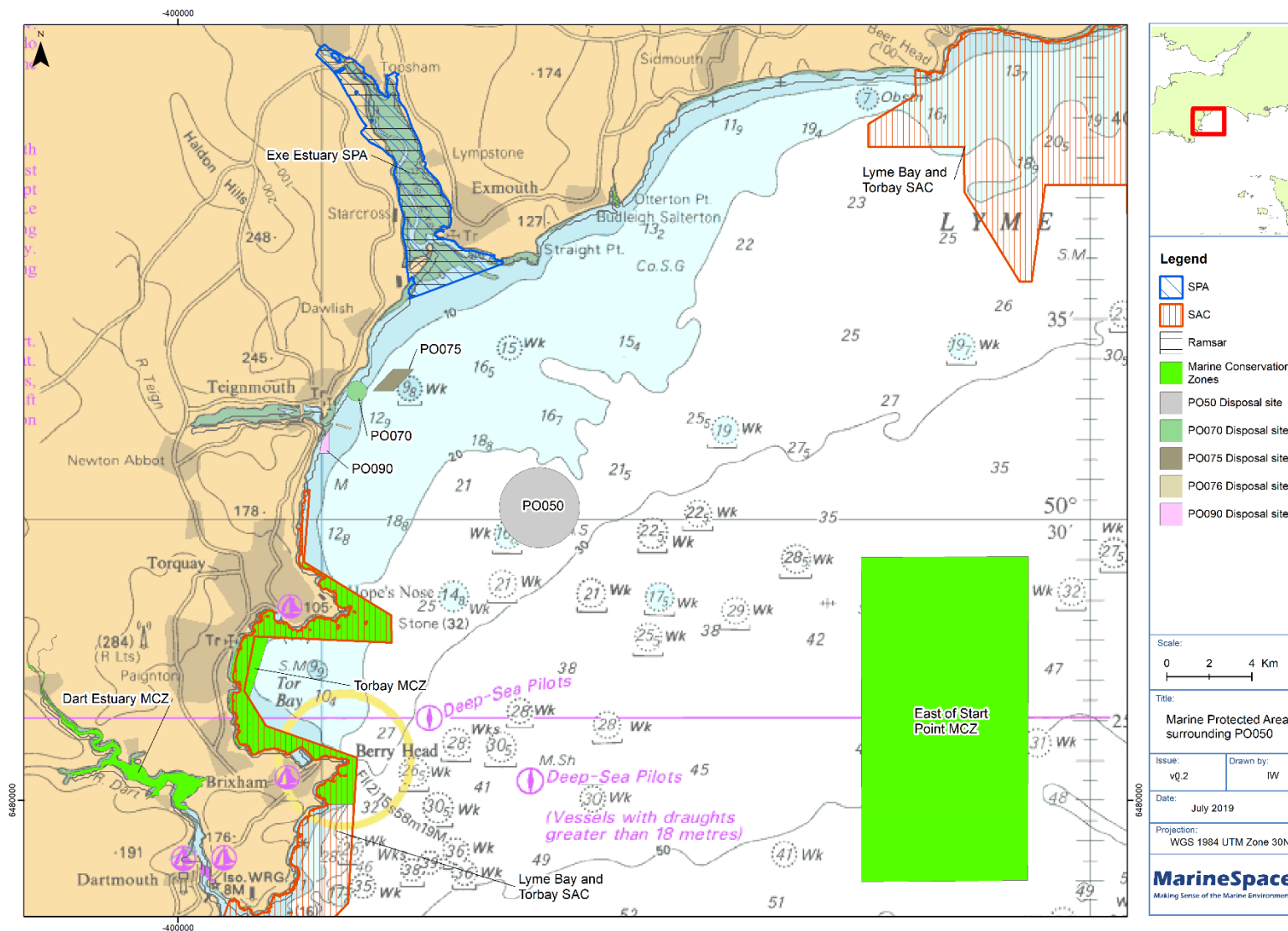
The MMO issued Exmouth Marina with a Suspension Notice on 26 February 2018, following which Cefas undertook investigations following a scope agreed with the MMO, as follows:

- Review of all licences, conditions and associated chemistry and particle size analysis results to disposal site PO070;
- Modelling of sediment from disposal activities to determine if the ‘black sand’ was from disposal site PO070;
- Modelling disposal of sand material in the intertidal, and silt material in the subtidal areas of disposal site PO070 to determine if waves/currents/tides may have moved material to the beach;
- Modelling disposal quantities to a maximum of 10,000 wet tonnes per annum; and
- Consideration of alternative disposal sites if PO070 is not appropriate for future disposal activities.

Following the conclusion of investigations undertaken by Cefas, Exmouth Marina applied for a variation (variation 1) to their suspended licence which reduced the overall volumes to be disposed of at PO070. A consultation was undertaken by the MMO on this variation request and received significant responses from both statutory consultees and public representatives. Further to this, Exmouth Marina has chosen to consider alternative options for the disposal of its maintenance dredged material.

This Marine Licence variation request (variation 2) for disposal to occur at PO050 instead of at PO070, represents the outcome of an assessment of alternative options available to Exmouth Marina.

Figure 1.1: Location of proposed alternative disposal site PO050, along with other disposal sites in the region and nature conservation Designated Sites



1.3. Need for Disposal Site

Dredge operations within the marina are a necessity in order to maintain navigable depths. The removal and disposal of the material is fundamental to the continued successful operation of the marina and to ensure safety of all its users. However, there exists a number of options for disposal of this dredged material which are discussed in more detail in the following section.

The total amount currently approved on the suspended licence for disposal by Exmouth Marina at PO070 Sprey Point is 100,000 wet tonnes, which is capped at 10,000 wet tonnes per annum over a 10 year licence period. As these disposal volumes represented a maximum volume required, Exmouth Marina has chosen to seek a variation which reduces its total dredge and disposal volume by half. This would give it a total allowable disposal to the proposed alternative site PO050 of 50,000 wet tonnes over 10 years, with a maximum of 7,000 dry tonnes/10,000 wet tonnes in any one year.

1.4. Existing Disposal Sites

Whilst suspended at this time, Exmouth Marina's existing disposal site for dredged material has been PO070, just off Sprey Point. Figure 1.1 shows the location of existing disposal sites in the vicinity of Exmouth Marina.

Other disposal sites in the region include PO075, PO090 and PO076. All of these sites also lie fairly close inshore and following a number of modelling scenarios undertaken by Cefas, and consultation responses to a previous variation request (variation 1) to the MMO, it does not seem that any of these sites represent a long-term viable option for Exmouth Marina.

Other disposal sites exist along the south coast of Devon, including the newly licensed Plymouth Deep. However, gaining access into the Exe river for the size of the barge required to dispose to this site, and the cost of getting the necessary equipment to dredge into Exmouth Marina, would be prohibitively costly for a small marina like Exmouth.

1.5. Consideration of Alternatives

There exist three possible alternatives to disposal of maintenance dredged material from within Exmouth Marina. Each of which is detailed and considered below:

Cease dredging (and therefore cease the need for disposal)

As discussed above, this is not a viable option for Exmouth Marina and would significantly impact the operational functionality of the marina facility itself, which could create a health and safety risk. A worst-case scenario would see the marina being unable to continue operations due to insufficient water depth, resulting in closure. This would, in turn, have a knock-on effect to marina users and employees, residents, and tourism within the area.

Terrestrial disposal and other potential alternative disposal options

The sediment dredged from Exmouth Marina would not be appropriate for other disposal options such as beach nourishment / land reclamation due to its nature and the volumes proposed.

In terms of terrestrial disposal, another option was explored whereby a cutter suction dredger would suck material out of the marina and pump it through pipes to a lagoon area where it could be stored. Water would then be removed enabling the dredged material to be transported by lorry to a land based disposal site. This option was not deemed feasible for Exmouth Marina as, firstly, there is no suitable area of land to set-up a 'storage lagoon'; secondly, uncertainty over the feasibility of this option over a 10 year period; and, thirdly, due to prohibitive costs.

Alternative marine disposal site

PO050 lies some 7.7 km from the original disposal site at Sprey Point (PO070) and 11 km from Exmouth Marina itself. This site is considered to offer the best long-term disposal at sea option to Exmouth Marina.

Following sampling undertaken by Cefas on material from within Exmouth Marina, results showed that levels of determinands were slightly elevated above Cefas Action Level 1 but not so elevated as to cause concern and were considered therefore unlikely to cause harm to marine life. From these results it is determined that this material is acceptable for disposal at sea.

2. Proposed Works

2.1. Existing Licence (Suspended)

Exmouth Marina was granted Marine Licence L/2017/00034/1 on 18 August 2017 by the MMO. This licence permitted Exmouth Marina to undertake the following activities:

Activity 1.1 – Exmouth Marina maintenance dredging

Navigational (maintenance) dredging within the marina up to a maximum quantity of 8,000 m³ per annum between 2017 and 2027. Methods include use of a silt curtain across the marina entrance during dredge operations.

Activity 2.1 – Dumping of Exmouth Marina material

Disposal of dredged material up to a maximum quantity of 10,000 wet tonnes per annum between 2017 and 2027 at PO070 Sprey Point.

2.2. Requested Licence Variations

Taking into account the consideration of alternatives; advice from the MMO; plume modelling and sediment analysis results from Cefas (discussed below); and consultation responses to the variation 1 request, Exmouth Marina proposes the variations detailed in Table 2.1 to its existing Marine Licence:

Table 2.1: Variation request to marine licence

Existing Licence Wording	Requested Variation	Reason
<p>Licence Start Date: 18 August 2017</p> <p>Licence End Date: 18 August 2027</p>	<p>Licence Start Date: Jan 2020</p> <p>Licence End Date: Jan 2030</p>	To allow Exmouth Marina a 10 year period of dredge and disposal activities
<p>Site 1 – Dredge Quantities - 8,000 m³ per annum</p>	<p>Site 1 – Dredge Quantities – 40,000 m³ total quantity over 10 years with a maximum of 8,000 m³ in any one year.</p>	To reduce the overall dredge quantity by half but allow Exmouth Marina flexibility on when they may take this over the licence lifetime.
<p>Site 2 – Sprey Point (PO070).</p>	<p>Site 2 – Lyme Bay 2 (PO050).</p>	Request for variation to dispose at alternative site PO050.
<p>Schedule 2 (remove reference to Sprey Point (PO070) and location).</p>	<p>Schedule 2 (update disposal site and location to Lyme Bay 2 (PO050)).</p>	Request for variation to dispose at alternative site PO050.

<p>Site 2 – Disposal Quantities – 7,000 dry tonnes / 10,000 wet tonnes per annum</p>	<p>Site 2 – Disposal Quantities – 35,000 dry tonnes / 50,000 wet tonnes total quantity over 10 years with a maximum of 7,000 dry tonnes/10,000 wet tonnes in any one year.</p>	<p>To reduce the overall disposal quantity by half but allow Exmouth Marina flexibility on when they may dispose of this over the licence lifetime.</p>
<p>Activity 2.1 Description – “The dredged material will be loaded into a hopper barge, taken to Sprey Point and disposed of.”</p>	<p>Activity 2.1 Description – “The dredged material will be loaded into a hopper barge, taken to Lyme Bay 2 (PO050) and disposed of.”</p>	<p>Request for variation to dispose at alternative site PO050.</p>
<p>Condition 5.2.2 – “Between 15 May and 31 May and 1 September to 30 December inclusive of any year, dredging must take place immediately prior to an ebb tide”</p>	<p>Removal of condition</p>	<p>This condition was put in place to mitigate any impact to local amenity beaches and users within Lyme Bay during bathing season. This mitigation will no longer be required as PO050 is significantly further offshore.</p>
<p>Condition 5.2.3 – “The marina entrance must be sealed with a silt curtain before the dredging starts and removed no less than 2 hours after the dredging has finished.”</p>	<p>Condition 5.2.3 – “The marina entrance must be sealed with a silt curtain before the dredging starts and removed no less than 30 minutes after the dredging has finished.”</p>	<p>Request for reduction in the required operational time of the silt curtain after dredging.</p>
<p>Condition 5.2.4 – “Disposal at Sprey Point site must not be on the fastest / strongest 2 hours of the ebb tide flowing east to west”</p>	<p>Removal of condition</p>	<p>Proposed alternative disposal site PO050 is 8.4 km (at its closest point) from the wreck at Church Rocks.</p>
<p>Condition 5.2.5 – “During the course of each disposal, material must be distributed as evenly as possible over the disposal site PO070.”</p>	<p>Condition 5.2.5 – “During the course of each disposal, material must be distributed as evenly as possible over the disposal site PO050.”</p>	<p>Request for variation to dispose at alternative site PO050.</p>
<p>Condition 5.2.8 “No more than 10,000 tonnes wet weight is disposed of at PO070 (Sprey Point) per annum.”</p>	<p>Condition 5.2.8 “No more than 50,000 tonnes wet weight (up to a maximum of 10,000 tonnes wet weight in any one year) is disposed of at PO050 (Lyme Bay 2)”</p>	<p>Request for variation to amount of material disposed and disposal to alternative site PO050.</p>

Exmouth Marina understands that, whilst it is proposing a change to the start and end dates of the Licence, that according to conditions 5.2.9 and 5.2.11 it will be required to provide an assessment of alternative uses for the sediment in Year 5, and must request a sediment sampling plan at least 6 months prior to the end of Year 5 from the date of issue, which will still refer to the original issue date of 18 August 2017. Therefore, sampling will still be required by May 2021.

3. Plume Modelling

Cefas undertook plume modelling of proposed alternative disposal site PO050, at the request of Exmouth Marina, to indicate the fate of material disposed of here. Information provided by Cefas following this modelling has been used to support this environmental assessment.

3.1. Modelling Objectives and Methods

The objective of the modelling exercise was to mimic the potential movement of suspended sediment following disposal at the, currently closed, site PO050. A particle size of 64 microns was used within the model, a typical size of material that will be dredged from within Exmouth Marina.

Rees (2019) states that “the ellipses at the potential PO050 disposal site are orientated south-west / north-east and are relatively open and of moderate currents.”

Virtual particles were released into the modelled flow regime at the centre of disposal site PO050 during a slack spring period and then tracked for 72 hours. The position of the particles after 4, 24, 48 and 72 hours are shown in different colours (Figure 4.2).

3.2. Modelling Results

The dispersion from a proposed new (currently closed) disposal site at PO050 was undertaken using a particle size mimicking that from Exmouth Marina. The Cefas plume model shows the trajectory of the particles to be southwest / northeast on each tide with a slight northerly movement on the residual current. Material placed at PO050 is likely to move in a northwesterly direction (see Figure 4.2) and migrate out of the disposal site over the course of several days. After 72 hours the particles are shown to have left the boundary of the disposal site, at which point the majority of particles are still approximately 6 km offshore and merge with naturally occurring muddy sediments observed within the region (see Figure 5.1).

While there are uncertainties in the model (see Appendix A), there is reasonable confidence in the trajectory of material and high confidence that no material will come ashore at Teignmouth (Rees, 2019).

3.3. Model Limitations

Cefas undertook desk-based modelling, using their plume model, to explore dispersion of fines from PO050 and give first order approximations of any resultant plume. The limitations of this modelling are indicated in Appendix A.

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3.4. Cefas Advice (Griffith, 2019)

Set out below is advice from Cefas (Griffith, 2019) which was used to inform this scoping and characterisation report. This response was provided following the recent licence of the much larger disposal site at Plymouth Deep which Cefas suggested should be used as a template here, hence the reference to Plymouth Deep below:

“In the previous advice on this application (dated 5th March 2019) I note the following:

“Initially the applicant would need to provide a desk-based site scoping and preliminary characterisation of the site (I would expect this to include some dispersion modelling which Cefas could support with if requested). This should follow the OSPAR guidance. Should this initial assessment deem the use of a proposed new site to have a negligible or low impact on surrounding receptors this may be sufficient to open the disposal site without further work. It should be noted that the site would be limited to the use levels assessed and that the assessment should be precautionary in the absence of ground-truthed evidence or validated models.”

To expand on the above statement, the work carried out to characterise the Plymouth Deep site was comprehensive as the site was intended for substantial use and is located in a sensitive area with many receptors of concern. Disposal of up to 10,000 tonnes per year from Exmouth Marina is considerably smaller and carries a smaller risk to the marine environment. It is not possible to conclusively exclude the need for site specific surveys of PO050 at this stage, however I would expect surveys would only be required if an initial desk-based assessment identified considerable uncertainty or potential significant impacts.

Please note that, in the UK, a disposal site itself is not licensed, use of the site is licensed. I would therefore expect the processes to be that the applicant seeks a variation to disposal of dredged material in a new area. To support this variation, they should prepare a disposal site characterisation report. Within this report they should outline the proposal (i.e. assessed disposal volumes and type of material) and identify receptors which may be influenced. There should also be an assessment (following standard EIA methods) of the potential impacts to the identified receptors. The existing (SAM/2015/00023) sediment chemical testing of the dredge material and modelling work carried out by Cefas will inform these assessments. The report should follow the OSPAR guidance² (see section 8). For points a and b under section 8.2 of the OSPAR guidelines which detail seabed surveys, I would anticipate desk-based assessments would suffice (for example data from EMODnet habitat maps) although the requirement for more detailed data would depend on the findings of the assessment.

The applicant may wish to review two recent characterisation reports (links provided at the end of this advice), however note that both represented sites with sensitive receptors and considerable disposal volumes in excess of that required for the Exmouth licence.

Based on the scale and location of the disposals proposed, I anticipate that many receptors will be able to be scoped out or assessed as negligible risk. I would however urge the applicant to identify any local fisheries concerns early and encourage public consultation on the characterisation report before any disposal site is opened.”

² OSPAR Guidelines for the Management of Dredged Material at Sea. (Agreement 2014-06). 39 pp.

4. MMO Coastal Inspection

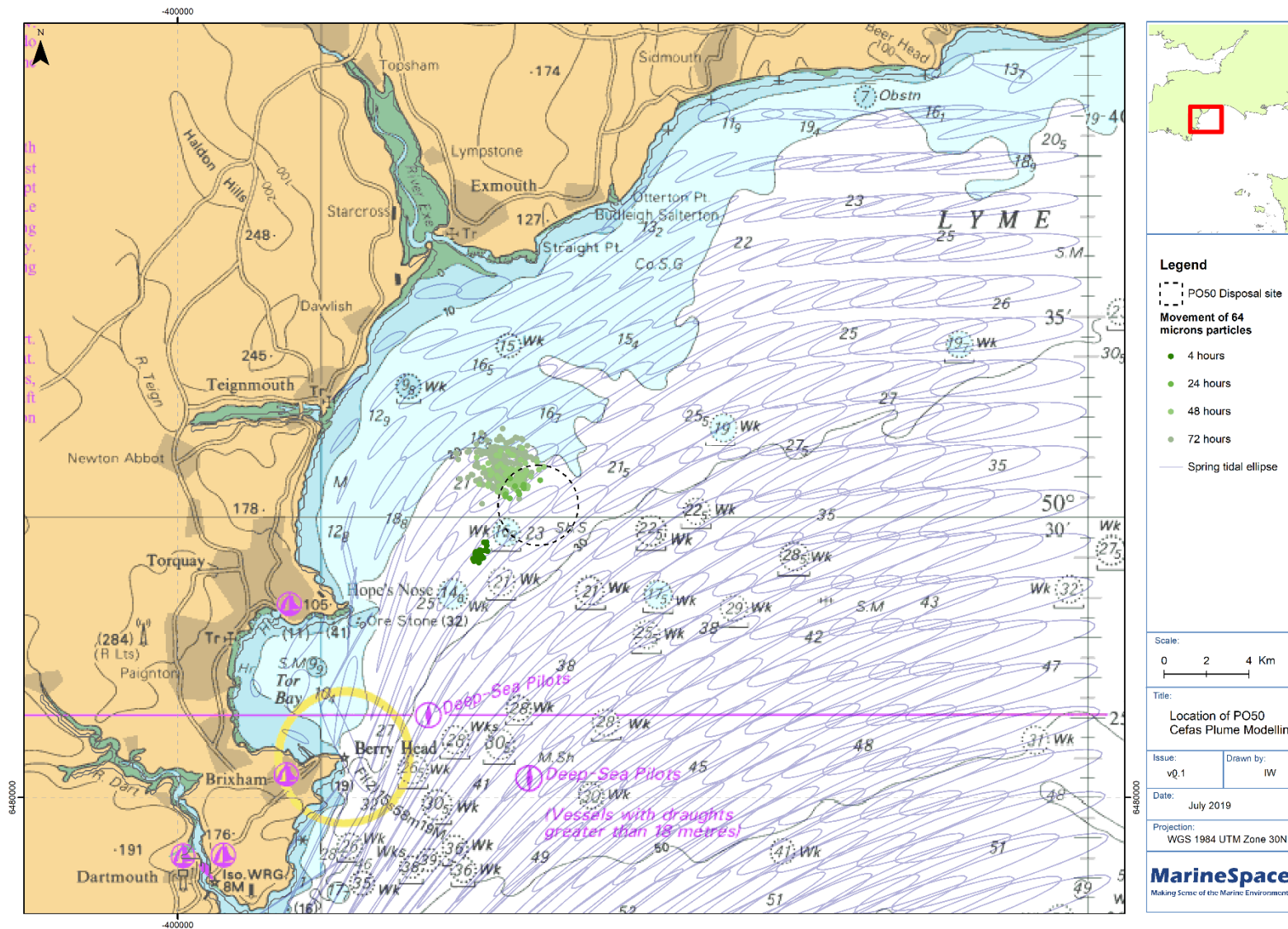
During February 2018, the MMO undertook a coastal inspection of Exmouth Marina (Lewington and Irwin, 2018) during dredging operations under the existing (suspended) Marine Licence for maintenance dredging. The purpose of this visit was to ensure compliance with the Marine Licence. During this inspection photographs were taken of the silt curtain in place across the entrance to Exmouth Marina (**Error! Reference source not found.**) which clearly show that the estuarine side of the curtain contains significantly more suspended sediment than the Marina side and no plume or suspended sediment can be observed at the marina entrance from dredge operations on the marina side.

Figure 4.1: Photos demonstrating silt curtain at Exmouth Marina entrance during dredge operations (Source: Lewington and Irwin, 2018)



The purpose of the existing 2 hour restriction of lowering of the silt curtain is to protect the Exe Estuary SPA and Ramsar site, however, this period of time has a significant effect on the operation of the marina and its users, including commercial fishing vessels, restricting access to and from the facility. The MMO's local officer commented during the consultation on variation 1, that the 2 hour restriction may be excessive given the observations undertaken during the MMO's previous coastal inspection. It is, therefore, proposed that a 30 minute restriction would be more fit for purpose whilst still fulfilling the objective of mitigating any impact on the SPA and Ramsar site. The rationale behind this is that during dredging operations no sediment was observed near the silt curtain, suggesting that it may not be required at all, but taking a precautionary approach 30 minutes seems appropriate for both a mitigation measure and from an operational point of view.

Figure 4.2: Results from Cefas plume modelling of PO050 (Source: Rees, 2019)



5. Alternative Disposal Site (PO050) Regional Characteristics

5.1. Overview

Exmouth Marina and the proposed alternative disposal site (PO050) are both located within Lyme Bay on the south coast of Devon. PO050 is a closed disposal site which lies approximately 9 km offshore from Exmouth Marina.

Table 5.1: Central coordinates of proposed alternative disposal site (PO050)

Latitude	Longitude	Radius
50°30.2996 N	3°21.4984W	1,850 m

5.2. Marine Physical Environment

5.2.1. Bathymetry

Exmouth Marina and PO050 lie within Lyme Bay where depths are typically less than 60 m and the seabed slope is relatively gentle. Inshore, near to the River Exe, there are large areas where water depths are less than 10 m. Water depths within PO050 typically range from 21-23 m, with a greatest depth of 30 m on the southern edge. Bathymetry data (Figure 5.3) show a number of 2-3 m wide anchor scar marks running north/south extending for approximately 500 m.

5.2.2. Tidal/Wave Regime

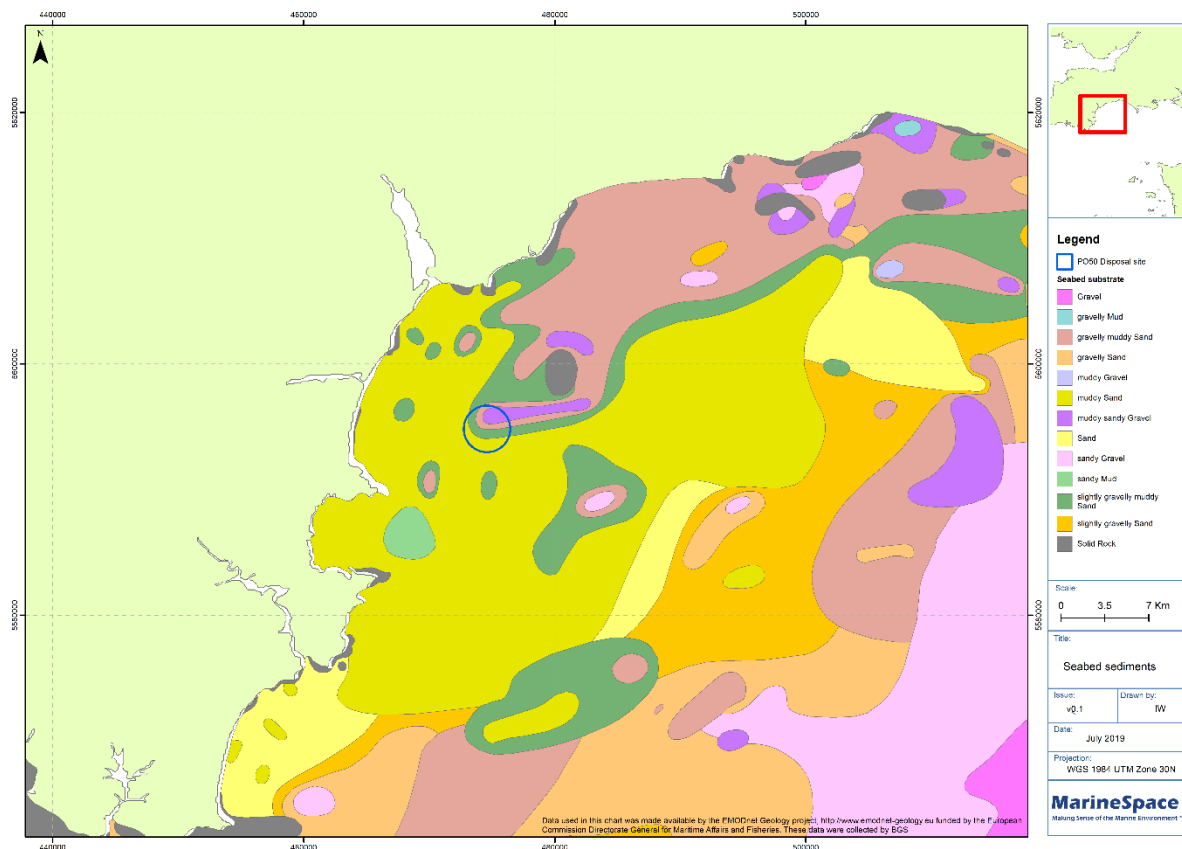
Tides within Lyme Bay, and in the vicinity of PO050, have a mean spring range of 4 m or less and maximum tidal streams are generally less than 0.5 m/s.

The prevailing winds within Lyme Bay are from the southwest and can be particularly strong during winter. This generates large waves due to a long fetch, which affect the westerly facing coastlines of the south Devon region, leaving the lee sides of exposed headlands more sheltered. Winds from the southeast are less frequent, less persistent, and are most common during spring (Barne *et al.*, 1996).

5.2.3. Seabed Sediment and Transport Regime

The seabed of Lyme Bay is relatively shallow and consists predominantly of sand and gravel. According to British Geological Survey (BGS) data gained from EMODnet (Figure 5.1), seabed sediments vary across the disposal site (PO050) from predominantly muddy sandy gravel in the northeast, to gravelly muddy sand and slightly gravelly muddy sand within the centre, before becoming predominantly muddy sand in the south and southwest of the site.

Figure 5.1: Seabed sediments in the region of PO050 (Source: EMODnet, 2019a)



5.3. Biological Environment

5.3.1. Subtidal and Intertidal Benthic Ecology

It can be determined from EMODnet broadscale seabed habitat classification (EMODnet, 2019b) that site PO050 lies within a region of moderate energy, predominantly shallow circalittoral mixed sediment, with some regions of high energy circalittoral sandy mud. Both habitats are widespread throughout Lyme Bay; within more nearshore central regions and throughout the majority of the western bay, respectively.

5.3.2. Fish and Shellfish Ecology

Figure 5.2 shows fish spawning and nursery ground in the vicinity of the proposed alternative disposal site. PO050 lies within nursery ground for anglerfish, whiting, spotted ray and thornback ray and partially within the nursery grounds for plaice. PO050 lies within spawning grounds for mackerel and spurdog.

The majority of these nursery and spawning grounds are widespread throughout Lyme Bay, the exception being the nursery ground for plaice which seems more closely related to the coastal and estuarine region of the Exe and which only partially overlaps with PO050.

Figure 5.2: Fish spawning and nursery grounds located within Lyme Bay and in the vicinity of PO050 (Source: Coull *et al.*, 1998)



5.3.3. Marine Nature Conservation

Proposed alternative disposal site PO050 lies in the vicinity of a number of designated nature conservation sites, the closest of which is the Torbay MCZ, which is approximately 6.7 km away. Details of each site can be found below in Table 5.2. It should be noted that PO050 does not lie within the boundaries of any designated nature conservation site.

Table 5.2: Designated sites and qualifying feature in the vicinity of proposed alternative disposal site PO050

Designated Site	Qualifying features for designation	Distance from PO050 (km)
Torbay MCZ	Intertidal coarse sediment, intertidal mixed sediments, intertidal mud, intertidal sand and muddy sand, intertidal under boulder communities, long snouted seahorse (<i>Hippocampus guttulatus</i>), low energy intertidal rock, moderate energy intertidal rock, native oyster (<i>Ostrea edulis</i>), peat and clay exposures, seagrass beds and subtidal mud	6.7 km
Exe Estuary SPA & Ramsar	Supporting populations of European importance of overwintering avocet and Slavonian grebe. Assemblage qualification: wetland of international importance – overwinter the area regularly supports at least 20,000 waterfowl.	9.3 km
East of Start Point MCZ	Subtidal sands	13.4 km
Dart Estuary MCZ	Coastal saltmarshes and saline reedbeds, tentacled lagoon-worm, estuarine rocky habitats, intertidal mud and low energy intertidal rock	³ 18 km
Lyme Bay and Torbay SAC	Annex I habitats: Reefs and submerged or partially submerged sea caves.	20.8 km

³ This distance is a direct measurement between PO050 and the MCZ.

5.4. Human Environment

5.4.1. Commercial Fisheries

The proposed disposal site lies within inshore waters (inside the 6-mile limit), which are largely utilised by the under 10 m fishing fleet. Inshore fishing activities are managed under the authority of Devon and Severn IFCA. The key ports and harbours in the vicinity of the proposed site are Brixham, Paignton, Torquay, Teignmouth, Dawlish, Dartmouth and Exmouth.

Target commercial species in the wider region surrounding PO050 include crab, lobster, cuttlefish, mussels and oyster from static methods; and flatfish such as sole from mobile gears.

From preliminary consultation with fishermen from Exmouth⁴ we know there to be commercial fishing grounds in the vicinity of PO050 (particularly rocky regions to the north and west). Despite Figure 5.1 showing this region to be sandy seabed, anecdotal evidence from an Exmouth fisherman suggests that there are some rocky regions here where crabbing using static gear is undertaken.

5.4.2. Shipping and Navigation

According to the MMO's Marine Information System (MMO, 2019), proposed disposal site PO050 does not lie within any high density or important navigation routes, anchoring areas or navigational approaches. The closest anchorage area is that off the coast of Torbay but there is no spatial overlap with PO050.

5.4.3. Archaeology

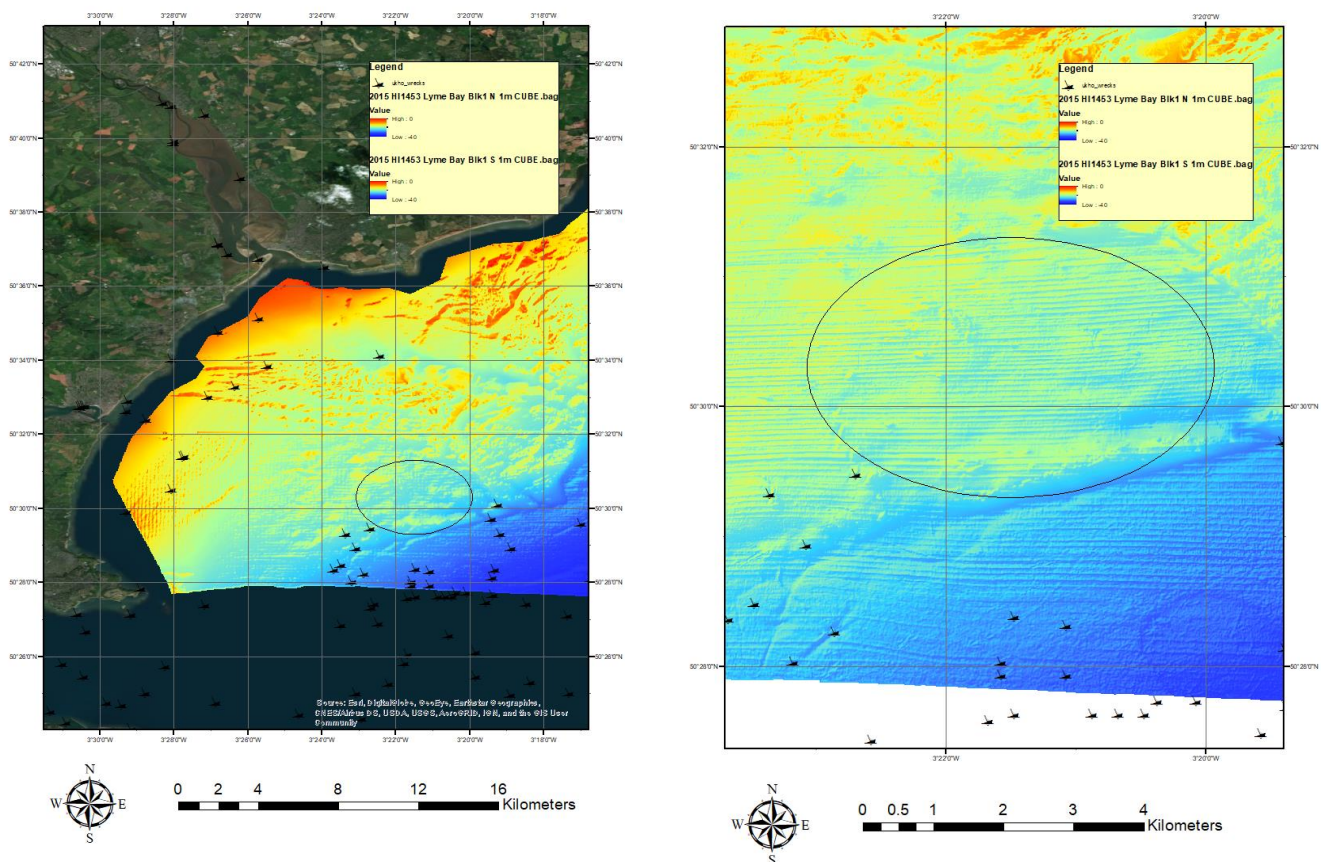
There are no protected wreck sites in close proximity to the proposed disposal site, PO050. The closest protected site is at Church Rocks which lies just offshore of Teignmouth, but approximately 8.4 km from the proposed disposal site.

There are no military remains within the proposed disposal site. The closest record is the battleship *HMS Formidable* which is some 36 km offshore from PO050.

Figure 5.3 shows potential wrecks located within Lyme Bay in the vicinity of the proposed disposal site, from UKHO records of wrecks and obstructions. No potential wrecks lie within the disposal site. The closest wreck to PO050 is the *SS Bretagne* which is to the southwest.

⁴At the time of writing we were still awaiting information from Devon and Severn IFCA. We will contact them formally during the consultation process for comment.

Figure 5.3: Chart showing UKHO bathymetry along with potential wrecks in the region of PO050 (Rees, 2019)



5.4.4. Other Users

The south Devon coast and Lyme Bay region is a popular destination for tourists and other beach and sea users and there are 9 bathing water areas in the vicinity of the proposed disposal site. There are a number of ports and harbours located within the region of the proposed disposal site which means that recreational fishing, sailing and charter vessels are common. There is also year-round swimming, triathlon training, and kayaking, as well as a thriving surf lifesaving and diving community in the region.

Diving is a popular recreational activity in the region and the closest potential wreck site to the disposal site PO050 is the *SS Bretagne*, a wreck owned by Bristol Aerospace Sub-Aqua Club and dived by a number of clubs in the region.

In terms of commercial use, as well as being important for fisheries, the FabLink interconnector cable is also being developed and will pass through Lyme Bay.

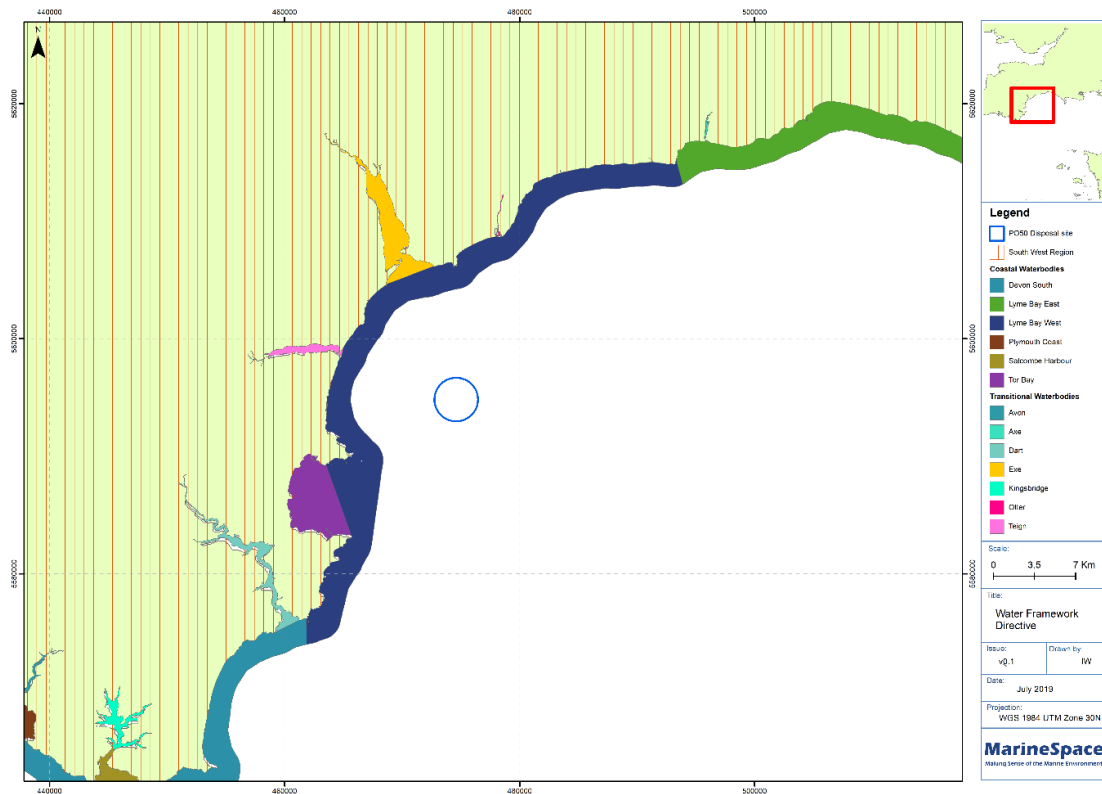
5.4.5. Water Framework Directive

Figure 5.4 shows the location of the proposed disposal site in relation to WFD water bodies. PO050 lies approximately 5 km from the nearest water body, Lyme Bay West, within the South West River

Basin District (RBD). The Lyme Bay West water body currently has good chemical and ecological status.

Exmouth Marina itself lies within the Exe Transitional water body. The Exe Transitional water body currently has moderate chemical and ecological status.

Figure 5.4: WFD water bodies in the vicinity of proposed alternative disposal site PO050



6. Environmental Assessment

6.1. OSPAR Guidelines – Sea Deposit Site Selection

According to OSPAR Guidelines (OSPAR, 2014) the site selection for seabed deposit should consider both the environment, economic and operational feasibility. In doing so it should try to ensure that the deposit of dredged material does not interfere with, or devalue, legitimate commercial and economic uses of the marine environment nor produce undesirable effects on the vulnerable marine ecosystems or species and habitats on the OSPAR List of Threatened and/or Declining Species and Habitats.

This section details receptors scoped out of this characterisation report and assesses the potential environmental impacts of the proposed licence variations discussed in Section 2.2 on those receptors scoped in, whilst taking into account the OSPAR Guidelines.

6.2. Site Characterisation Scoping

6.2.1. Receptors Scoped Out

The following environmental receptors are ‘scoped out’ of this site characterisation and environmental assessment:

- Ornithology - The proposed site is not within or adjacent to any known areas of sensitivity (e.g. SPAs). The closest site of sensitivity is the Exe Estuary SPA and Ramsar site which lies approximately 9.3 km away at its closest point;
- Underwater noise - With the exception of vessel noise, disposal activities are not considered to create any additional underwater noise. Vessels (small commercial/recreational vessels) are common in the local area and therefore the vessel noise is considered insignificant;
- Marine mammals - The only impact pathway between the proposed disposal at PO050 and marine mammal species would be via underwater noise. As detailed above, the only noise will be that from the vessel and as this area is subject to significant vessel traffic, from both commercial and recreational, this is again considered insignificant; and
- Shipping and navigation – There is no overlap with major shipping lanes or navigational routes. The dredging vessel would exhibit the correct lights and signals and comply with Collision Regulations.

6.2.2. Receptors Scoped In

The following topic areas are considered relevant to this characterisation and assessment and have been ‘scoped in’:

- Physical processes;
- Water Framework Directive assessment;
- Marine ecology;
- Nature conservation;
- Commercial fishing;
- Marine archaeology;
- Other users; and
- Cumulative effects.

6.3. Overview

The proposed Marine Licence variation outlined in Section 2 has the potential to create environmental impacts on a number of receptors. These potential environmental impacts are assessed using the criteria shown in Table 6.1.

Table 6.1: Definition of significance of environmental impacts presented in this assessment

Significance	Description
Major adverse impact	Impacts of sufficient importance to call for serious consideration of changes to the project
Moderate adverse impact	Impacts of sufficient importance to call for consideration of changes to the project
Minor adverse impact	Impacts that are unlikely to be sufficiently important to call for mitigation measures
Negligible / No adverse impact	Impacts that are assessed to be of such low significance that they are not considered relevant for the decision-making process

6.4. Marine Physical Processes

As demonstrated from Cefas modelling results, it is expected that within 72 hours of a disposal activity dredged material will have dispersed outside of the disposal site and merged with the natural sediment of the region, suggesting that no permanent build-up of disposed sediment is expected. Any increase in suspended sediment within the proposed site during disposal activities is expected to be localised, temporary and short-term and any impact upon the tidal, wave or sediment transport regime is determined to be **negligible**.

6.4.1. Sediment and Water Quality

Under Exmouth Marina's existing licence, further sediment sampling is to be undertaken by May 2021 to ensure the suitability of the material for disposal at the proposed site. Further to additional sampling undertaken by Cefas during 2018, it is assessed here that the levels of determinands (slightly elevated above Action Level 1 but not cause for concern) recorded within the sediment samples means **negligible** effects are predicted on the chemical parameters of sediment or water quality as a result of the disposal of dredged material.

6.5. WFD

Neither the proposed disposal site or modelled sediment plume (Rees, 2019) overlaps with any WFD waterbody, therefore a **negligible** effect is predicted on WFD waterbodies and the proposed disposal should not prevent the waterbodies from achieving their WFD objectives.

The proposed change to silt curtain operational times during dredge activities within the marina has the potential to impact upon the Exe Transitional water body due to the spatial overlap. However, due to observations made during an inspection by the MMO (Section 0) it was concluded that no suspended sediment exits the marina during dredge operations and, therefore, even considering the proposed reduced operational time of the silt curtain, along with the fact that the overall amount of sediment to be dredged is half that of the original Licence, the impact upon the Exe Transitional waterbody is negligible and it will not be prevented from achieving its WFD objectives.

6.5.1. Water Quality (Bathing Waters)

The modelled sediment plume does not extend into the 9 surrounding bathing waters areas or beaches and therefore no impact pathway exists. The model limitations are noted however and even when taking into account that wind and waves are not considered within the modelling it is likely that sediment plumes would have significantly dispersed before reaching any bathing water region. The impact is assessed here as **negligible**.

6.6. Marine Ecology

The assessment of marine ecology receptors takes into account both direct (smothering and increased suspended sediment from disposal) and indirect (resuspension and eventual deposition of material) impacts.

6.6.1. Fish

Increased suspended sediment from disposal activities has the potential to impact upon fish receptors, however given that the seabed around the disposal site contains muddy sediments with sand and gravel, it is likely that fish species in this region would be used to elevated suspended sediment concentrations as a result of regular storm events. With this in mind, and considering the relatively low volumes (half that of the existing marine licence) and short-term nature of disposal activities being discussed here, the impact upon fish receptors due to smothering and increased suspended sediment is assessed as **negligible**.

This region of western Lyme Bay is thought to be a spawning ground for mackerel and spurdog and a nursery ground for anglerfish, whiting, spotted and thornback ray and plaice. However, given that these spawning and nursery grounds are widespread within the region and are not exclusive to the proposed disposal site, and that disposal activities would be temporary in nature, and deposited sediments would merge with naturally occurring sediments in the region already containing mud, a **negligible** impact is predicted upon species that utilise these spawning and nursery grounds.

6.6.2. Shellfish

A number of shellfish species are present within the western region of Lyme Bay, some of which are targeted commercially; however it is not thought that the proposed disposal site is an especially important habitat for any of these species within the wider Lyme Bay region. Crustacean and bivalve shellfish are generally considered to have low sensitivity to smothering and changes in suspended sediment, particularly given that sediment in the region is naturally muddy, although sessile bivalves such as mussels may be more affected as they are unable to move away. Given the relatively low volumes (now sought to be half of that originally licensed) proposed to be disposed, the short-term

nature of disposal activities and the low sensitivity of this receptor, the impact upon shellfish is assessed as **negligible**.

6.6.3. Benthic Habitats

Disposal activities within PO050 have the potential to impact upon benthic communities due to an increased load of suspended sediment being added to the environment. According to habitats data gained from EMODnet (2019b) habitats within and surrounding the proposed disposal site are all sedimentary, consisting predominantly of moderate energy circalittoral mixed sediment and high energy circalittoral sandy mud.

The habitats identified are expected to be widely occurring throughout the region and more sensitive species are generally associated with coarser materials, whereas much of this region is naturally muddy. Recolonisation in smothered regions is expected to occur in the short-term. Given that benthic species have the ability to recolonise and respond to increased suspended sediment and smothering (both direct and indirect impacts), that the disposal site does not lie within any region of benthic habitat of designatory importance, and that the sediment volumes proposed to be disposed of here are relatively low and now half of the total deemed acceptable within the original Licence, it is concluded the impact upon benthic habitats will be **negligible**.

According to habitats data gained from EMODnet (2019b), just outside the southwestern edge of the proposed disposal site lies a Habitat of Conservation Importance (HOCl) in the form of *Eunicella verrucosa* or pink sea fan. According to a report by JNCC (Maher *et al.*, 2016) this species has a high sensitivity to smothering but not to changes in suspended sediments and so likely sensitivities here are to direct but not indirect impacts from disposal. It is, however, stated that the pink sea fan can grow up to 50 cm and given that disposal will only occur within the site, not outside and that the volumes applied for are relatively low, the sea fan would likely sit well above any depositional level. Modelling also shows deposited sediment is likely to migrate in a northerly direction after disposal (i.e. away from the location of the pink sea fan), it is concluded here that there would be a **negligible** impact upon this species.

6.7. Nature Conservation

According to the results of sediment plume modelling undertaken by Cefas, no sediment is predicted to be deposited within any of the designated sites of nature conservation.

6.7.1. Assessment of Likely Significant Effect (Exe Estuary SPA and Ramsar; and Lyme Bay and Torbay SAC)

According to modelling results it is likely that sediment from disposal activities would have sufficiently dispersed before a chance of interaction with either the SPA, Ramsar, or SAC. No sediment is predicted to be deposited within these sites as a result of disposal activities at PO050.

The proposed variation to reduce the operational time of the silt curtain to 30 minutes after dredging operations within Exmouth Marina has the potential to have a direct impact upon a designated site, as Exmouth Marina lies within the Exe Estuary SPA and Ramsar site. Mitigation was originally put in place to prevent any impact upon the site and its features by stipulating that a silt curtain must be in place during dredging operations and cannot be removed until 2 hours after

dredging has ceased to prevent suspended sediment from being released into the estuary. During February 2018 an inspection was undertaken by the MMO which monitored dredge and disposal operations (See Section 0) and it was observed that no sediment went near to the marina entrance during dredge operations, prompting the MMO officer to suggest that the 2 hour mitigation may be excessive. It is not predicted that by reducing the silt curtain restriction to 30 minutes that there would be any further impact upon the designated sites of the Exe estuary.

It is concluded here that there will be a **negligible** effect on the interest features of the SAC and SPA and supporting habitats when considering the site's conservation objectives either alone or in combination with other known projects or plans. The proposed disposal activities and reduction in silt curtain operational time during dredging will have **no likely significant effect** on these European sites.

6.7.2. MCZ Evaluation – Torbay, East of Start Point and Dart Estuary MCZ

As above, no sediment is predicted to be deposited within these sites as a result of disposal activities at PO050, with the closest MCZ being 6.7 km away. An impact assessment of **negligible** is therefore concluded and the proposed activity will not significantly affect the protected features of the MCZ; or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependent.

6.8. Commercial Fisheries

The majority of fishing activity likely to be occurring within the proposed disposal site PO050 will be undertaken by the inshore fishing fleet (<10 m) and therefore underrepresented by any official MMO landings and AIS data. Whilst there is a lack of data to detail the inshore fishing fleet in this region, from communication with local fisherman it has been determined that commercial fishing activities do take place in the region of PO050 and therefore disposal here has the potential to impact upon this receptor.

The presence of the dredger during disposal activities will displace fishermen and their vessels from undertaking normal fishing activities within the region of PO050. However, disposal activities will be short-term (hours), temporary and infrequent (likely only 6 time throughout the 10 year licence period). Due to the wider region being popular with numerous commercial and recreational activities, vessels are commonplace and so it is not expected that the addition of a dredging vessel at the intervals detailed would pose any significant displacement effect to commercial fishing vessels. Mitigation measures would be implemented such as issue of Notice to Mariners (NtM) at least a week in advance of works and the dredger would adhere to standard practice in terms of lighting/signals and ColRegs, therefore any effects arising from displacement are assessed as **negligible**.

It is possible that an increase in suspended sediment and sediment deposition could impact upon commercial target species by affecting their ability to target prey or resulting in species moving to more favourable grounds. From Cefas modelling results (Figure 4.2), it is determined here that suspended sediment from disposal into PO050 will migrate in a northwest direction, suggesting that it is possible that very low volumes of fine sediment could be deposited upon rocky grounds known to be fished by the local Exmouth fleet. It has been suggested that disposal to the southeast of the

central point of PO050 (50°30.1287N, 003°21.2455W) may be more favourable and reduce the impact upon the fishing grounds. As detailed above, however, these proposed disposal activities at PO050 will be short-term, infrequent and any increase in suspended sediment will be short-term and limited spatially. In addition, the total disposal volume applied for under this licence variation, is reduced by half compared with the original Licence for disposal at PO070. Therefore, a minor effect is concluded upon commercially targeted fish species.

In addition, a **positive** impact is expected upon commercial fishing receptors (along with all other marine users) as a result of the proposed reduction in the operational time of the silt curtain as this would significantly reduce any disruption to those fishermen working out of Exmouth Marina.

6.9. Historic Environment

No features of archaeological interest are located within the proposed disposal site according to Figure 5.3 and therefore no direct impacts from disposal activities are predicted.

There are identified wrecks outside the proposed site that have the potential to be impacted by the sediment plume during disposal activities. Results from Cefas plume modelling indicates that sediment is likely to migrate and disperse in a northwesterly direction which would take sediment away from the closest wrecks in the region. In the event that sediment is deposited on surrounding identified wrecks this would comprise fine material, of relatively low volumes, over a short time period and of a temporary nature and therefore any impact is considered **negligible**. The deposit of fine sediment upon wreck sites may actually pose a **positive** impact as the sediment plume may “aid the preservation of archaeological sites and materials by covering or burying them, thereby reducing the effects of erosion and biological and chemical agents on the archaeology” (EMU, 2012).

6.10. Other Users

As discussed in Section 0, there are a number of other users in the vicinity of the proposed disposal site, including the FabLink cable route and recreational activities. There is no spatial overlap with the FabLink development and so this is only discussed in the next section (Section 6.11 Cumulative Assessment).

One of the main objectives of assessing and characterising an alternative disposal site for Exmouth Marina is to mitigate/manage any impacts upon tourism and recreational receptors. As the proposed site is now much further offshore it is not predicted that there should be any spatial overlap between disposal activities and local tourism and recreation. From modelling undertaken by Cefas it is deemed unlikely that any sediment from disposal activities from Exmouth Marina would find its way ashore to any amenity beaches and that significant dispersion would have happened over the 72 hours following disposal. Therefore, a **negligible** impact is predicted upon the majority of other users in the region.

The two exceptions to this are recreational fishing and scuba diving activities where an overlap is expected and could result in a potential impact upon these receptors. Recreational fishing activities may be impacted as a result of disposal of material by displacement of fish species from the area of increased suspended sediment to the surrounding region, leading to displacement of recreational activities. However, given that this impact is will be limited spatially and short-term, along with the

fact that recreational vessels can easily transit to a nearby location not impacted by the sediment plume this effect is assessed as **negligible**.

Diving activities have the potential to be more impacted due to the fixed nature of a dive site. The wreck site, *SS Bretagne*, is located in closest proximity to the disposal site and sits in around 30 m water depth. Potential impacts include reduction in visibility due to increased suspended sediment and siltation of the wreck itself, however, given the relatively low volumes of material proposed to be disposed of, the fact that modelling undertaken by Cefas shows the general sediment movement to be in a northwesterly direction, as well as the likelihood that the majority of disposal events will occur outside of the peak diving season the impact is assessed here as **negligible**.

6.11. Cumulative Assessment

In the vicinity of the proposed disposal site there are other activities such as commercial/recreational fishing and the FabLink interconnector which could also give rise to an increase in suspended sediments. In the case of the FabLink development it is concluded here that there is sufficient distance from PO050 as installation of FabLink is predicted to cast sediment up to 25 m either side of the trench during installation (Intertek, 2016) and so would not result in a cumulative impact as the proposed disposal site is approximately 8 km away at its closest point.

Other activities may occur much closer spatially, however any increases in suspended sediment as a result of commercial/recreational activities are assessed here as of a limited extent, both spatially and temporally. Therefore, any adverse effects resulting from the cumulative increase in suspended sediment is concluded to be **negligible**.

7. Summary

Table 7.1: Summary of impact assessment

Receptor	Impact Pathway	Impact Assessment
Marine Physical Processes	Accumulation of deposited materials	Negligible
	Increase in suspended sediment from disposal	Negligible
	Sediment and water quality	Negligible
Water Framework Directive	Suspended sediment from dredging (silt curtain)	Negligible
	Increase in suspended sediment from disposal	Negligible
	Bathing waters	Negligible
Marine Ecology	Fish: Smothering and increased suspended sediment	Negligible
	Shellfish: Smothering and increased suspended sediment	Negligible
	Benthic Habitats: Smothering and increased suspended sediment	Negligible
Nature Conservation	Suspended sediment from dredging (silt curtain)	Negligible – No Likely Significant Effect
	Increase in suspended sediment from disposal	Negligible – No Likely Significant Effect
Commercial Fisheries	Displacement from fishing grounds	Negligible
	Increase in suspended sediment from disposal	Minor
Marine Archaeology	Increase in suspended sediment from disposal	Negligible
Other Users	Majority: Sediment plume from disposal	Negligible
	Fishing and diving: Restricted access to fishing grounds/dive sites and increased suspended sediment from disposal	Negligible
Cumulative Impact	Increase in suspended sediment from disposal	Negligible

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Appendix A. Cefas Modelling Results



MARINE AND COASTAL ACCESS ACT (2009). APPLICATION BY EXMOUTH MARINE FOR DISPOSAL SITE MODELLING AT PO050

Reference Number: MLA/2016/00372/1 – L/2017/00034/1

From: Jon Rees

Cefas, Lowestoft Laboratory

Date: 16th April 2019

Tel: 01502 524383

E-mail: Jon.Rees@cefas.co.uk

To: Luella Williamson - MMO (by MCMS)
Cc: Andrew Griffith (Cefas)

1. With reference to the above application for dredge disposal from Exmouth Marine and your request for modelled data dated 04th April 2019 please find my assessment and model results below.
2. Please note that I have attached the GIS (shapefile) data generated from the model to this submission.

Description of the proposed works

3. Following the recent suspension of the disposal licence for disposal of dredge material from Exmouth Marine to Sprey Point (PO070) Exmouth Marina are exploring options to re-open nearby closed disposal sites as an alternative option to PO070. For further background please refer to the previous advice under this case submitted on the 14th March 2018 from Jemma-Anne Lonsdale and Jon Rees, and advice dated 5th March 2019 from Andrew Griffith.
4. Exmouth Marina have requested Cefas provide modelling results to indicate the fate of material if it were placed at the currently closed site PO050. This information is intended to support any assessment of impacts for future use of the site. Note that the current advice pertains only to the modelled fate of the material and does not assess or imply the impact of any disposal at PO050.
5. The aim of the new modelling is to mimic the potential movement of suspended sediment post placement from dredging activities within Exmouth harbour at the currently closed site PO050. Typically, the particle size of these sediment is around 64 microns. The modelling output shows directions of movement and potential sinks of sediment. It does not show anything about rates of transport or thicknesses of any superficial sediment post a disposal.

Results

6. The tidal ellipse used within the model are shown in Figure 1 (note every 10th ellipse is shown for the sake of clarity). This shows the ellipses at the potential PO050 disposal site are orientated south-west / north-east and are relatively open and of moderate currents.
7. Virtual particles were released in the flow regime in the model at a position of 50.505, -3.358 (centre of the polygon of PO050) during a slack spring time and then tracked for 72 hours. The position of the particles after 4, 24, 48 and 72 hours are shown in different colours (see figure 2).
8. The trajectory of the particles is south west / north east on each tide with a slight north movement on the residual current. After 72 hours the particles have just left the boundary of the licence area.
9. The bathymetry from the UKHO Inspire portal (<https://data.admiralty.co.uk/portal/apps/sites/#/marine-data-portal>) for the region around the potential PO050 site is shown in Figure 3. Note this is from 2015 and is processed to show the bathymetric data at 1m grid cells. Also shown is the position as recorded in the UKHO database of wrecks. The closest wreck on the SW quadrant is that of the SS Bretagne sunk in 1918 at 50.492N, 3.378W. The position of nearby wrecks will be pertinent to charactering the impacts of disposal and should be considered in the characterisation assessment.
10. Zooming in further (as shown in Figure 4), shows the bathymetry within PO050. This shows that is relatively flat with a range depths of 21 to 23m. Only on the southern edge are depths of 30m encountered. A number of anchor scar marks are observable, generally running north/south which are approximately 2-3m wide and extending typically 500m.

Caveats

11. In order to undertake this modelling, the Cefas Plume model has been used to explore dispersion of fines from a potential new (reopened) disposal site. It should be noted that this is a desk-based tool and designed to give a first order approximation of the plumes. In this instant, only 1 day was allocated to gathering the relevant dredging disposal records, parameterising in the model and interpreting the results. The limitations to this model include:
 - It is assumed that historic dredging record represents the material currently planned to be disposed (i.e. silt with an average particle of 64 microns)
 - The Cefas Plume Model is a tidal current model – no inclusion of wave dynamics has been included.
 - No wind driven circulation is included in the model.
 - The resolution of the model is relatively coarse at 2.1 km and some features such as headlands and estuaries will not be resolved. In this instant, the Teign estuary is not resolved.
 - The PO050 disposal site lies within the potential ROFI (Region of Freshwater influence) zone of the River Exe. This process has not been accounted for.
 - All the scenarios assume that there is no wind. In reality, wind strength and direction can be an important driver of the suspended sediment plume especially in areas of weak residual circulation or where topographic features can steer and

- moderate the wind regime.
- Due to time limitations, a thorough calibration and validation procedure has not been undertaken.

Summary

The dispersion from a proposed new disposal site at PO050 has been undertaken using a particle size mimicing that from Exmouth Docks. The Cefas plume model shows material placed at PO050 is likely to move in a north west direction and migrate out of the disposal site over the course of several days. While there are uncertainties in the model (see caveats above), there is reasonable confidence in the trajectory of material and high confidence that no material will come ashore at Teignmouth.

Jon Rees
Principal Physical Oceanographer

<i>Quality Check</i>	<i>Date</i>
Andrew Griffith	16/04/2019

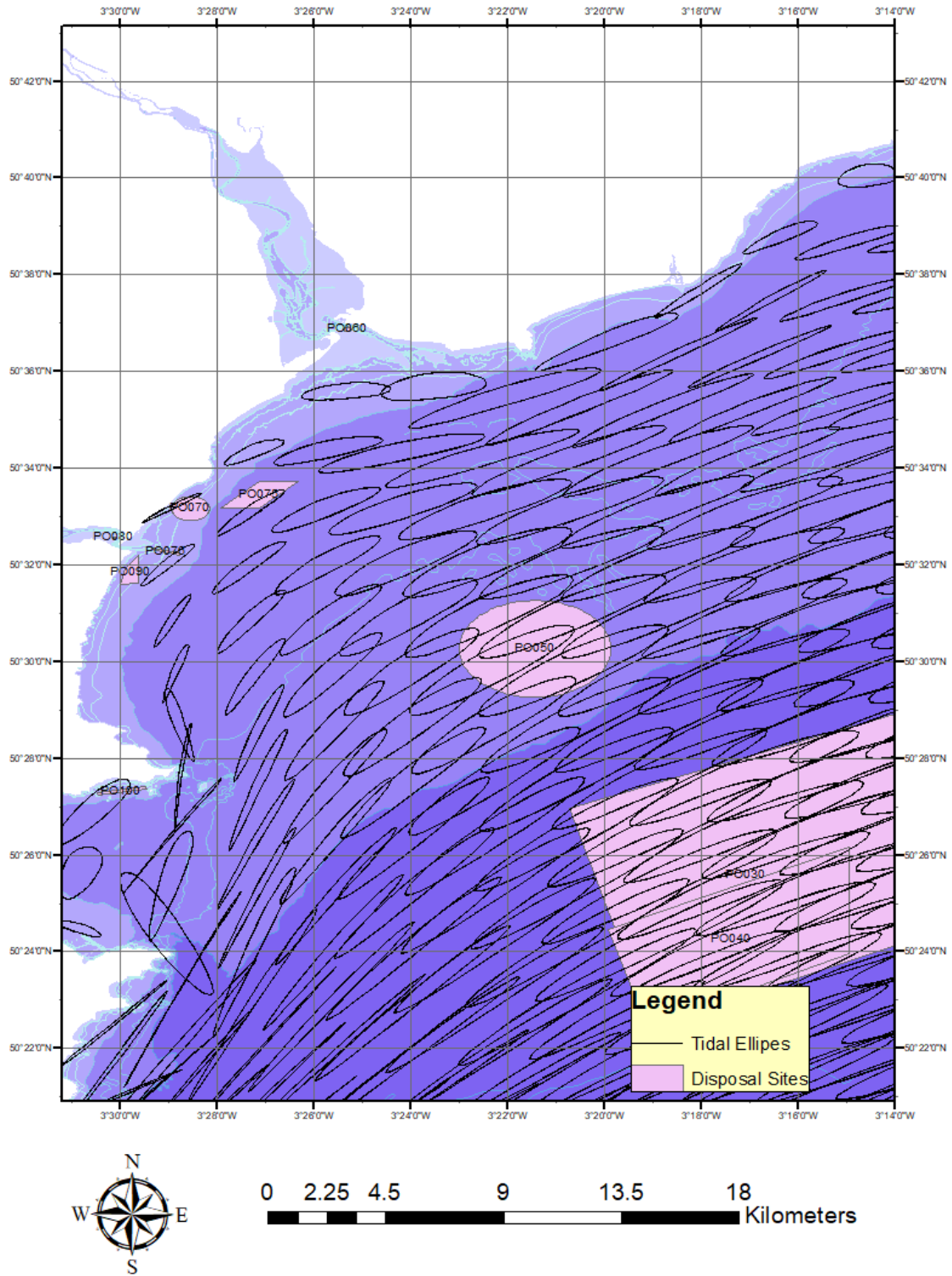


Figure 1: Map showing the position of PO050 off Exmouth along with the spring tidal excursion ellipses from the Cefas Plume model (note every 10th ellipse shown for clarity).

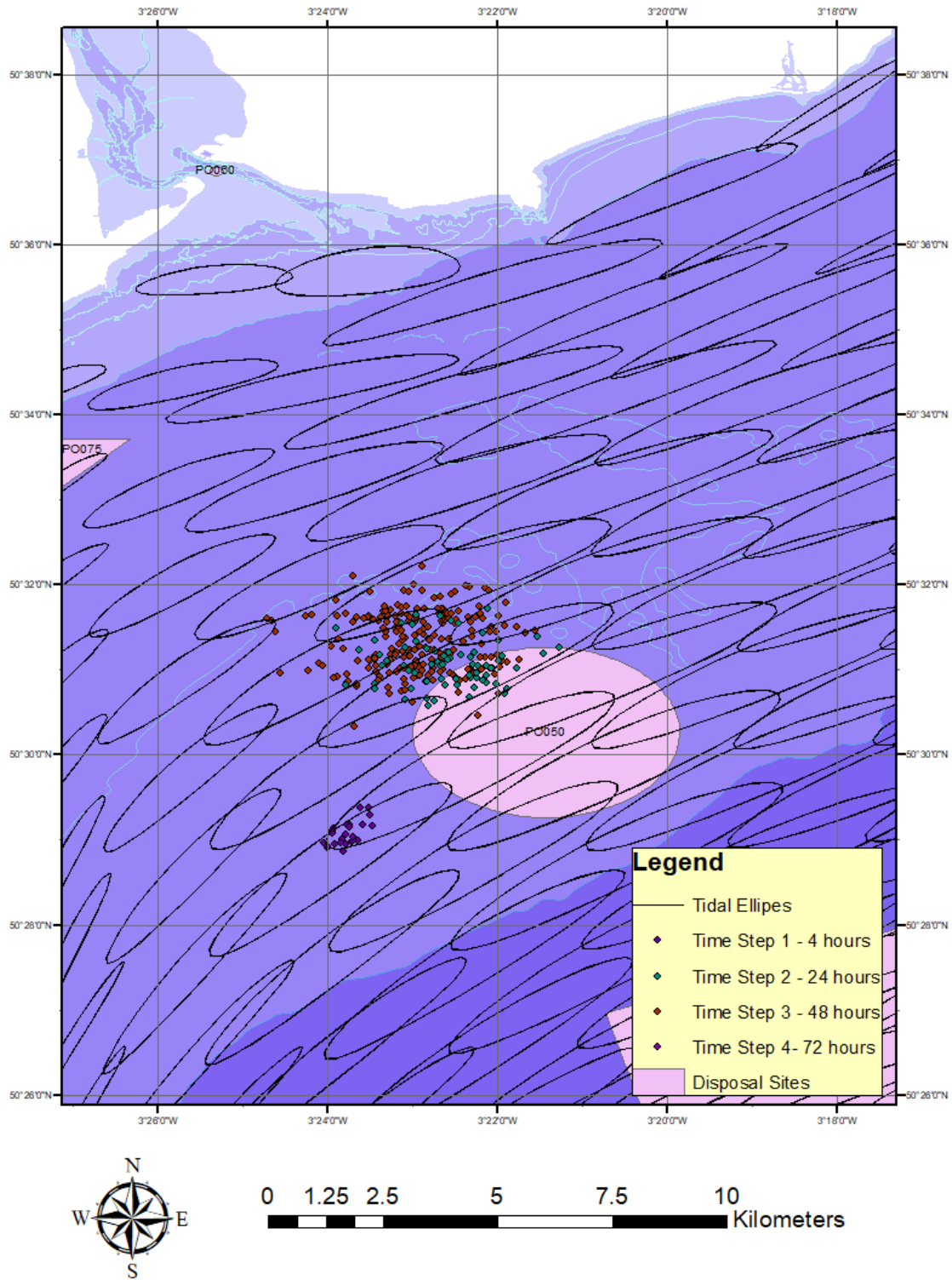


Figure 2: Cefas plume model results show the position of virtual sediment particles after 4, 24, 48 and 72 hours after release. Note the particles are represent the dredging from Exmouth Harbour (typically 64 microns) and are released over a typical dredge release operation of 1 hour.

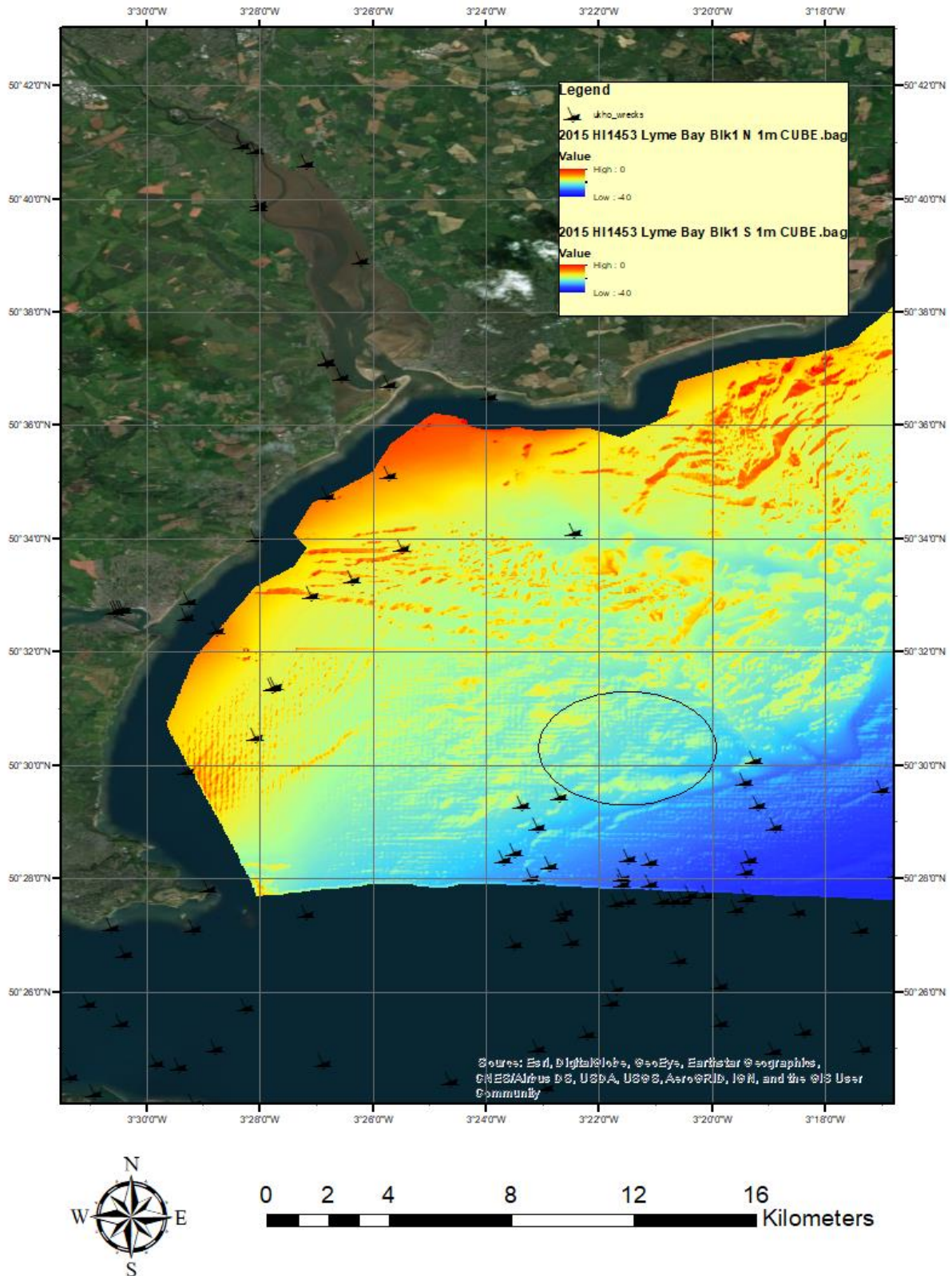


Figure 3: Map showing the UKHO bathymetry from the INSPIRE portal along with potential shipwrecks from the UKHO database.

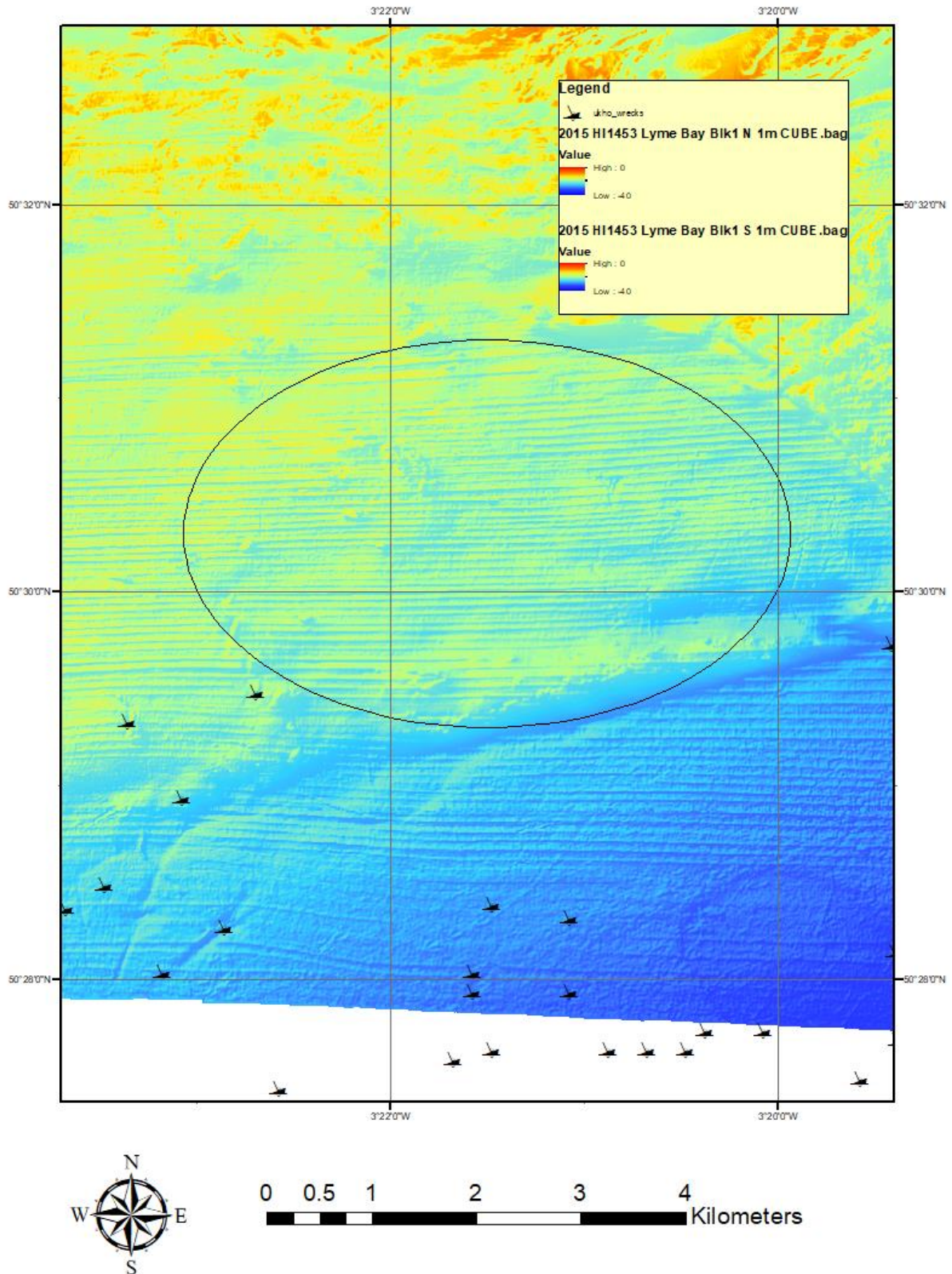


Figure 4: As per Figure 3 but zoomed in on the old PO050 disposal area. Note some artefacts of the survey can be seen in the data – the individual East-west lanes are visible probably due to an incorrect gyro setup.

Appendix B. Consultation Responses

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