Dover Western Docks Revival Environmental Report

Port of Dover

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1. Introduction

Background

In 2012 Dover Harbour Board (DHB) gained consent for the Terminal 2 (T2) ferry terminal and new marina development at the Western Docks, Port of Dover via the Dover Harbour Revision Order 2012 (the HRO). The HRO allows a period of 10 years for the work to be completed; if the works are not sustainably started in this time an extension would have to be sought.

Since the T2 Environmental Impact Assessment (EIA) and HRO work was carried out, Europe has undergone a period of recession and consequently there has been a short term reduction in freight traffic levels. DHB has implemented a substantial amount of renovation work within the Eastern Docks, including several berth refurbishments and the introduction of a Traffic Management Improvement Scheme. The short term reduction in freight traffic in combination with increased ferry sizes and improvement works at the Eastern Docks has delayed the capacity breach which would trigger the requirement to commence construction of T2.

In order to protect the consented development under the HRO, DHB is proposing to commence the construction of the Dover Western Docks Revival (DWDR). The DWDR scheme will bring forward the majority of the marine works required for T2 thereby securing port operational land for the future, whilst creating a 23 hectare site which can be made available in the interim for cargo handling facilities and the potential subsequent delivery of a Port Centric Logistics Centre. The proposed layout is shown in **Figure 1-1.**

In early 2014 DHB submitted an EIA screening request under the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 to Dover District Council (DDC) for the DWDR scheme. In their Screening Response DDC confirmed that the DWDR scheme will not differ in environmental impacts and confirmed that a new EIA is not required In January 2015 DHB submitted an EIA Screening Request under the Marine Works (Environmental Impact Assessment) Regulations 2007 to the Marine Management Organisation (MMO) for the same scheme. In their Screening Response the MMO confirmed that whilst a Marine Licence is required for the marine construction and reclamation works as well as the proposed disposal of capital dredged material at an offshore disposal site, a new EIA is not required to support this application.

This report is submitted in support of the Marine Licence Application (MLA) DWDR scheme necessary to consent the relevant activities that are proposed to take place below the Mean High Water Springs (MHWS) mark. Although an EIA is not required, there are a number of supporting documents and information that is necessary to inform this MLA, including: a WFD assessment, MCZ assessment, waste framework directive assessment and a disposal site assessment. It is therefore the purpose of this report to bring this information together in a comprehensive package for ease of reference.

Figure 1-1 Proposals to be included in the DWDR works

Overview of DWDR

The proposed development will create a 2 berth cargo handling facility. It will bring forward the majority of the marine works required for T2, thereby securing port operational land for the future whilst creating a 23 hectare site which can be made available in the interim for cargo handling facilities (the Cargo Facilities) and any subsequent delivery of a Port Centric Logistics Centre.

The Cargo Facilities will consist of temperature controlled storage chambers, ripening rooms and a pack house. These will be situated close to Cargo Berth A for the storage and handling of palletised fresh produce. These facilities will not only replace the existing cargo sheds in the Eastern Docks but improve the range of services available in port from a simple storage facility to one that will ready the cargo for distribution. By extending the range of 'in port' services available the efficiency of the supply chain for fresh produce to the UK and European markets is improved.

It is anticipated that the Cargo Facilities will be developed through a joint venture relationship with an operator with whom DHB would have a landlord-tenant relationship. The Cargo Facilities are expected to be operational 24 hours a day and capable of handling up to 600,000 tonnes of trade per annum; providing the ability to grow the Dover cargo business significantly.

Existing and Required Consents (including the requirement or otherwise for EIA)

Capital dredging will be undertaken in exercise of DHB's powers to dredge as set out in Section 46(1) of the Dover Harbour Consolidation Act 1954. Other than a Marine Licence for the disposal of dredged material (subject to the submission of a supporting Water Framework Directive (WFD) Assessment), no further consent is anticipated to be required in respect of the dredging activities. Sediment sampling and analysis has been

carried out to inform the Marine Licence Application (MLA) together with detail on the character of the dredged material to assist the regulators in their decision regarding its suitability to be disposed of offshore. The approach to sampling and analysis was developed in consultation with the MMO and CEFAS and drew on historic geotechnical information as appropriate.

DHB will undertake the majority of the marine works (most of the land reclamation and construction of the marina) in exercise of its powers under the HRO. A Marine Licence, Listed Building Consents and land owner consent from The Crown Estate will also be required in order for DHB to carry out these works. In order to minimise delays to the construction programme DHB is progressing the consenting process for those activities planned for early 2016 through this MLA. Activities planned for later in the construction programme will be the subject of a separate MLA once the associated design and methodologies have been further developed.

DHB has Permitted Development Rights (PD Rights) under Part 8 of Schedule 2 to the Town and Country Planning (General Permitted Development) Order 2015 (the 2015 Order). The PD Rights apply to operational land and Article 8 of the HRO confirms that the land created in exercising of the HRO powers shall be classed as operational land for planning purposes.

However, by virtue of Article 3(10) of the 2015 Order, PD Rights do not apply to Schedule 2 Development as defined by the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 (the EIA Regulations 2011) unless a screening opinion is adopted by the Local Planning Authority that the development is not "EIA Development". Schedule 2 Development is defined under the EIA Regulations 2011 as development "likely to have significant effects on the environment by virtue of factors such as its nature, size or location" (see Regulation 2.1).

DHB will undertake the reclamation of the 4,875m^2 site between the T2 development footprint and the Dunkirk Jetty in exercise of its PD Rights as this work does not fall within either Schedule 1 or Schedule 2 of the EIA Regulations 2011 (see **Figure 1.2**).

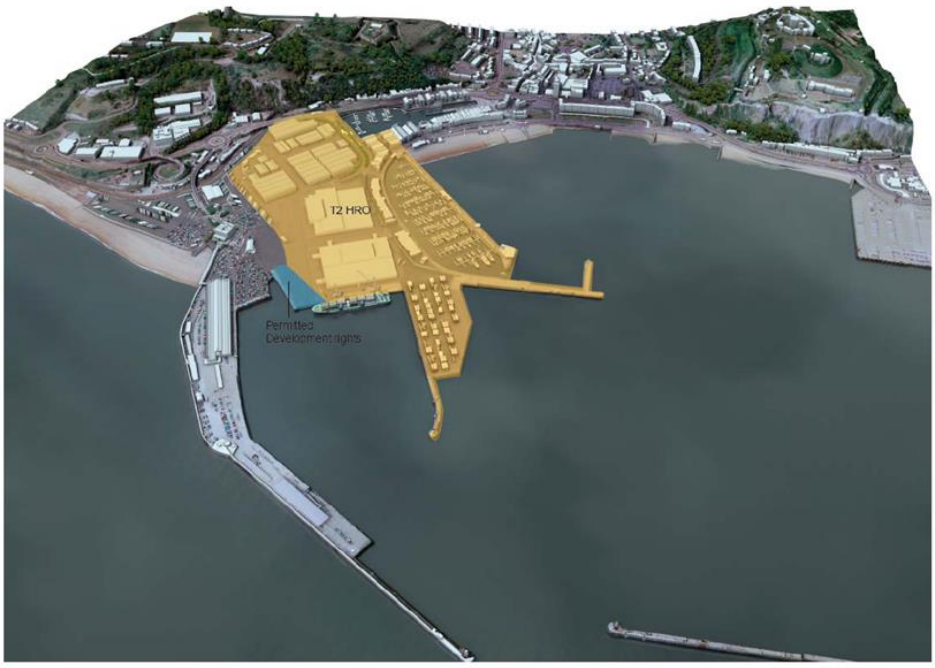

Figure 1-2 Layout of DWDR scheme with the consents route for the marine works (T2 HRO & PD)

A Marine Licence will however be required for the reclamation works and has been subject to screening under the Marine Works (Environmental Impact Assessment) Regulations 2007 (EIA Regulations 2007, see below). A further Marine Licence (also subject to screening under the EIA Regulations 2007) will be required for obtaining marine dredged aggregate for use as the reclamation infill material.

DHB is progressing the Marine Licence application and EIA for the proposed dredging of aggregates from Goodwin Sands separately to the reclamation and disposal activities, and it is not covered further in this report.

In early 2014 DHB submitted an EIA Screening Request under the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 to Dover District Council (DDC) as the Local Planning Authority. In their Screening Response DDC confirmed that a new EIA is not required – i.e. the environmental impacts from DWDR will be within the envelope of impacts consented via the T2 HRO. The DDC Screening Response is provided in Appendix 1.

In 2015 the MMO confirmed that whilst a Marine Licence is required for the marine construction and reclamation works as well as the proposed disposal of capital dredged material at an offshore disposal site, a new EIA is not required to support this application.

Purpose

This report has been prepared to provide the supporting information for construction in the marine environment, land reclaim and for disposal of the dredged sediment at sea (which all require a Marine Licence). It outlines the DWDR scheme and a summary of the relevant baseline information, assessments and mitigation measures within the T2 ES and the MMO Screening Request Report (January 2015). It also includes a detailed WFD assessment and Marine Conservation Zone (MCZ) assessment as required to inform the MLA. Consideration is also given to the waste hierarchy in relation to the disposal of dredged material and an assessment is made of the proposed offshore disposal site to be used in this scheme.

Approach

The baseline considered for this review is existing conditions. However, the majority of the works required for the DWDR scheme have been assessed within the T2 EIA and it was concluded that the T2 scheme as a whole did not lead to any unacceptably adverse impacts (as stated in the HRO decision letter from the Secretary of State dated 28th November 2011, see Appendix 2).

The conclusions of the T2 EIA were accepted by the Secretary of State. In light of this, it can be concluded that it is only where (i) there is a material difference in the impact arising as a result of the DWDR scheme that could lead to a significant impact, (ii) an additive effect from the new works that were not part of T2 or (iii) significant change in the status of the baseline environment that an EIA would be triggered.

The envelope of impacts accepted for T2 was used as a benchmark to determine whether an EIA was necessary for the DWDR scheme and the Screening Opinion Request report sent to the MMO in January 2015 provided an appraisal of the impacts to environmental receptors assessed in the T2 EIA. It also then assessed the impact of the DWDR scheme to determine whether the environmental impacts of DWDR fell within the envelope of impacts accepted for T2. The outcome was that it was concluded that the impacts of DWDR fall within the envelope of impacts of the T2 scheme and do not lead to an increase in the significance of any adverse impact caused by the development of the full scheme for which consent has been granted via the HRO. Nor do they create any significant additional impact to those expected for T2.

A range of additional studies have been undertaken to inform the DWDR scheme which are of relevance to this MLA. In particular, HR Wallingford has carried out an assessment of the scheme on the hydrodynamic and sedimentary regime as well as a focussed study modelling the disposal plume dispersion in relation to nearby MCZs. Sediment sampling has also been carried out in the areas to be dredged and these samples have been analysed to inform the WFD assessment as well as the assessment of the suitability of the disposal site.

A teleconference attended by the MMO, DHB and Royal HaskoningDHV was held in June 2015 to discuss the DWDR scheme and the information required to support the MLA. The MMO advised that the following information should be provided:

- Information on the proposed construction methodology as available together with the anticipated programme (with the understanding that this will be supplemented as further detail is developed);
- A summary of the potential impacts on the relevant environmental receptors and the identified mitigation measures (through signposting to previous documentation);

- WFD assessment;
- MCZ assessment;
- Consideration of disposal options, and
- Disposal site assessment.

This report will take a similar approach to that taken for the MMO Screening Opinion Request (Royal HaskoningDHV, January 2015) report with signposting to existing documents as appropriate for those aspects for which no further assessment is required. The additional assessments required to inform the MLA process as identified in the list above will be covered in full in Sections 4, 5, 6 and 7 with supporting studies being included as appendices for ease of reference.

2. Scheme Description and Proposed Construction Methodology

The DWDR scheme comprises of:

- 250m long Berth A which will accommodate a RCT building
- 300m long Berth C with a dolphin jetty at the seaward end, to be utilised in the future for offloading containers and for berthing cruise ships
- The development of a new Marina curve and pier and other associated structures to form a new marina and new entrance to the existing marina
- Reclamation works for the existing Wick Channel, Granville Dock and Tidal Basin to create new land in the port for future development opportunities.

Dredging is required to support various elements of the scheme and this MLA is required to consent the disposal of around 150,000m^3 materials offshore. For Berth C, the approach to Berth C and the proposed new marina an additional 450,000 m^3 of material is also anticipated to need to be dredged however the disposal of this material will be the subject of a separate MLA process. **Figures 2.1 and 2.2** illustrate the proposed scheme and the areas of dredging required.

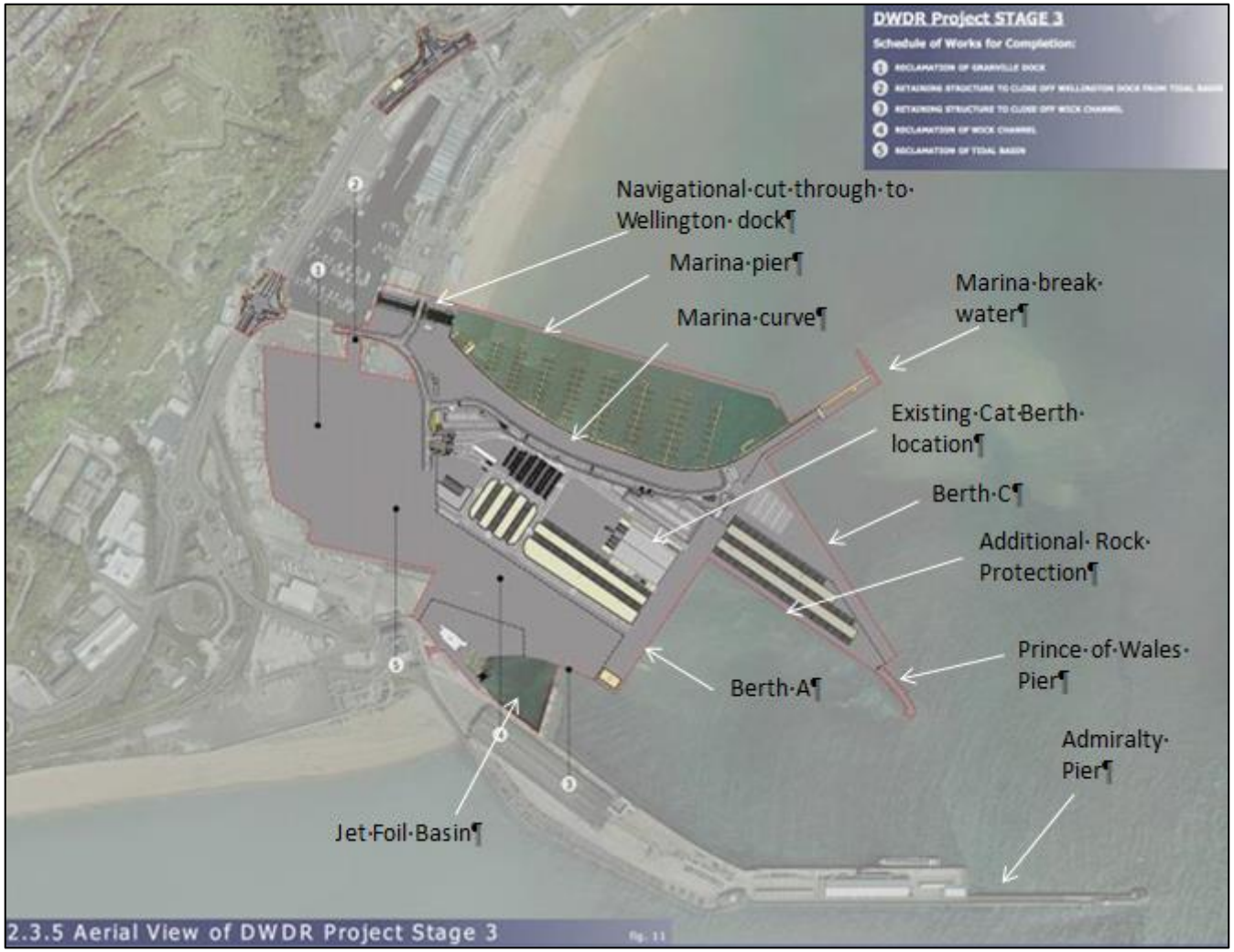

Figure 2-1Illustration of the elements proposed in the DWDR scheme

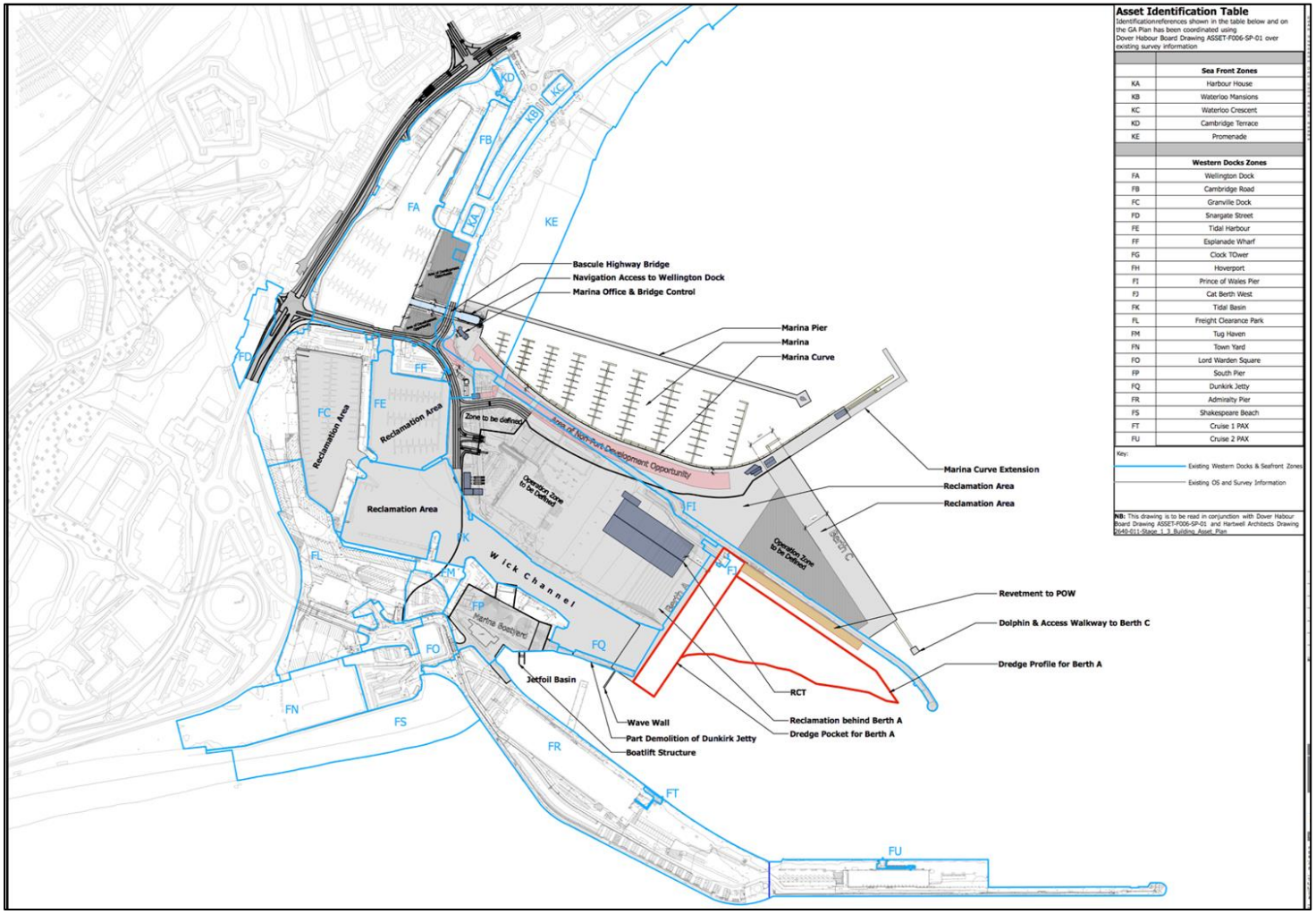

Figure 2-2 DWDR Layout Plan

Construction Methodology

GRAHAM Construction has been appointed by DHB to undertake the marine based construction activities for DWDR. This section provides a summary of the methodology that GRAHAM Construction are intending to use and the four stages of construction (**Table 2.1**). A set of construction drawings can be found in **Appendix 3.**

Table 2.1 Construction stages and commencement dates

Construction activity	Commencement date
Stage 1	
Construction of Berth A Quay Wall	Due to commence March 2016
Silt removal behind Berth A	Due to commence February 2016
Reclamation behind Berth A	Due to commence July 2016
Berth Pocket Dredging for Berth A	Due to commence February 2017
Construction of Berth C Quay Wall	Due to commence June 2016
Reclamation behind Berth C	Due to commence October 2016
Construction of Marina Curve	Due to commence October 2016
Construction of Marine Pier and Promenade	Due to Commence December 2016
Land Reclamation between Marine Curve and existing POW Pier	Due to commence May 2017
Stage 1A	
Demolition of the Dunkirk Jetty	Due to commence January 2017
Formation of new Wick Channel Navigation Access	Due to commence March 2017
Stage 2	
Construction of Marina Curve Extension	Due to commence May 2017
New Wellington Dock navigation access	Due to commence May 2017
Construction of Breakwater with promenade on top	Due to commence July 2017
Restraint Piling to new marina, RNLI Berth, Workboat Berth and Fuel Berth	Due to commence September 2017
Attendance on installation of lock gates	Due to commence July 2018
Stage 3	
Construction of retaining structure to close the Wellington Dock from the tidal basin	Due to commence February 2019
Retaining structure to close the Wick Channel from the Inner Harbour	Due to commence February 2019
Land Reclamation to Wick Channel, Tidal Basin and Granville Dock	Due to commence April 2019
Removal of existing marina equipment from Tidal Basin and Granville Dock	Due to commence March 2019
Installation of the permanent Southern Water outfall	Due to commence May 2019

Construction of Berth A and C

Berths A and C will be constructed using a Combi wall (with large diameter tubular piles and sheet pile infills) which will be installed using plant on floating pontoons. For Berth A, barges will commence piling adjacent to the existing Prince of Wales Pier (POWP) and work south; for Berth C the barges will commence piling at the easternmost point of the POWP and work north. Double height free-standing or barge mounted piling gates will also aid the installation process. Prior to the piling operation commencing the existing silt in the line of the combi wall will be removed by a back hoe dredger to minimise the risk of UXO discovery during piling; arisings will be transported to DV010 for disposal. The piles will be delivered in bulk by ship to the project. Temporary ship mooring facilities will be provided adjacent to the Prince of Wales Pier.

Vibratory piling techniques will be used to drive the piles to refusal after which an impact hammer will be used to drive the piles to the final level. All piling activities will follow the 2010 JNCC guidance as agreed through the Client Construction Environmental Management Plan (CCEMP) (see Section 3 and Appendix 4 for more detail). For both the tubular piles and the sheet pile infills, a standard frequency vibro hammer will be employed initially with an impact hammer with a drop weight utilised to achieve design toe level.

Sheet pile anchor walls and tie bars will be installed 40m behind the main walls using land based plant. These will be installed using a vibro hammer piling unit attached to a tracked excavator. This will be completed after the quay wall has been installed and the sand reclamation fill has been brought up to the tie bar level. Piles will be delivered to the required areas via the sand infill.

Installation of the tie bars will be done as work on the anchor walls progresses. The tie bars are approximately 40m in length; a crawler crane will be used to install these from the sand infill. Tie bars, waling beams and associated connections will be delivered in bulk by ship to the project.

Once reclamation is complete a capping beam will be installed along the top of each berth. The pre-cast capping beam shell elements will be lifted into position on top of the sheet piled wall by a lattice Jib crawler crane. Once secured in position, the precast hollow capping beam will have steel reinforcement installed inside and concrete will be placed using a concrete skip or concrete pump. Suitable measures will be in place to ensure that no concrete enters the marine environment.

Once the berths have been constructed, material from the berthing pocket and approaches will be dredged using a backhoe dredger and loaded into split hopper barges. This will then be transported to DV010 for disposal.

Marine Curve and Marina Curve Extension

Construction of these elements will take a slightly different approach to that used in Berth A and C. This is because tie bars cannot be installed through part of the marina curve to ensure the front wall is not tied to the anchor wall and thus future development of the area is not restricted.

Prior to the piling operation commencing the existing silt in the line of the combi wall will be removed by a back hoe dredger to minimise the risk of UXO discovery during piling. Arisings will be transported to DV010 for disposal.

For Area 1 and 2 in **Figure 2.3** the wall will be constructed of medium diameter tubular piles and sheet piles, and is designed to stand as a cantilever. Area 3 will be constructed of large diameter tubular piles and sheet piles supported with ground anchors and Area 4 will be constructed of similar diameter tubular piles and sheet piles to area 3 that are cross tied to a further tubular and sheet pile wall.

Area 1 will be constructed from a temporary causeway installed on the beach, piles will be driven using both vibro and impact pile driving techniques. Consideration is also being given to using temporary sheet pile cells adjacent to the permanent new Marina quay wall as potential alternative.

Area 2 will be constructed using floating crane barges similar to berth A and C. The tubular piles will be installed initially using a vibro hammer and will be driven to their final designed level using a large impact hammer. For the sheet pile infills, the same vibro hammer will be employed however final drive to design toe level will be carried out using an impact hammer.

Area 3 piles will be installed from floating crane barge using the same piling plant as for Berth A and C. Ground anchors will also be required on this section of the wall and installation of these will be completed from a Jack-up Barge or from a land side platform using specialist plant capable of drilling beneath itself from

the new quay wall piles. Area 4 will be installed from floating plant and will follow on from the construction of Berth A and C and also utilise the same plant.

It is possible that the piles on Marina Curve may be coated for aesthetic purposes however only coatings suitable for use in the marine environment will be employed.

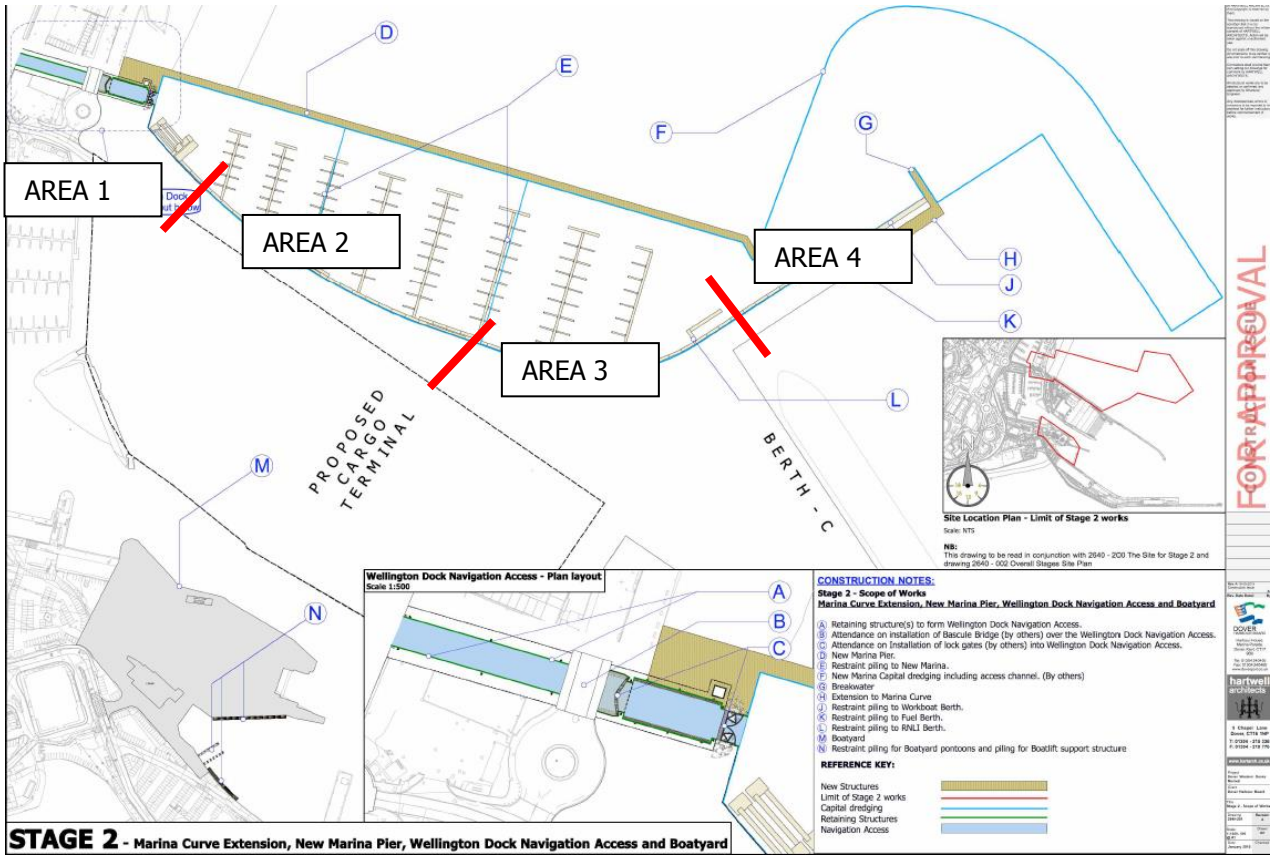

Figure 2-3 Marina curve and marina curve extension layout

New Marina Pier and Breakwater Construction

The marina pier will be constructed from the shore from a causeway or using a cell construction technique utilising sheet piles and the permanent piles until the water depth becomes such that it is more suitable to install the piles from using marine plant. **Figure 2.4** shows the outline proposal for the construction of the marina pier. It is anticipated that the piling plant required to install the marina pier will be the same as that used in the construction of Marina Curve, as the tubular piles will be of similar diameter.

The Breakwater will be constructed from floating crane barge and is formed of a continuous tubular wall. Driving the wall will be a similar technique to Berth A and C.

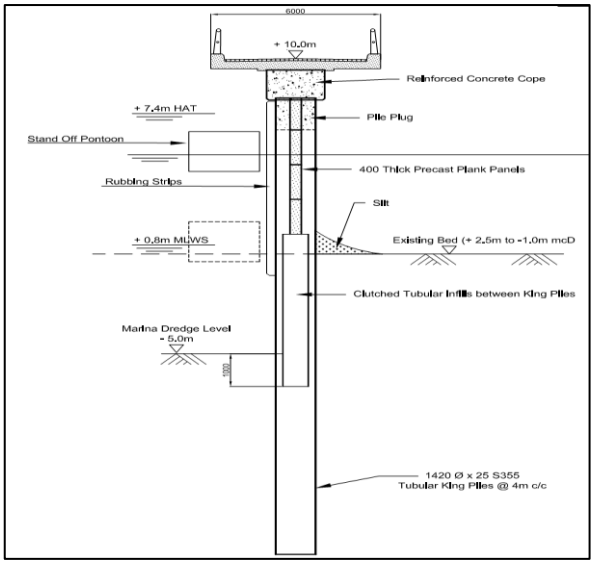

Figure 2-4 Outline proposed construction methodology for the marina pier

Restraining piling to new marina, RNLI berth, workboat berth, fuel berth and boatyard pontoons
Small diameter tubular piles are required for the construction of these elements and will be installed from a floating pontoon, once the dredging of the new marina has been completed. Piles will be driven initially using a vibrating hammer and driven to design toe level using a small impact hammer.

Construction of the retaining structure to close the Wellington Dock from the tidal basin

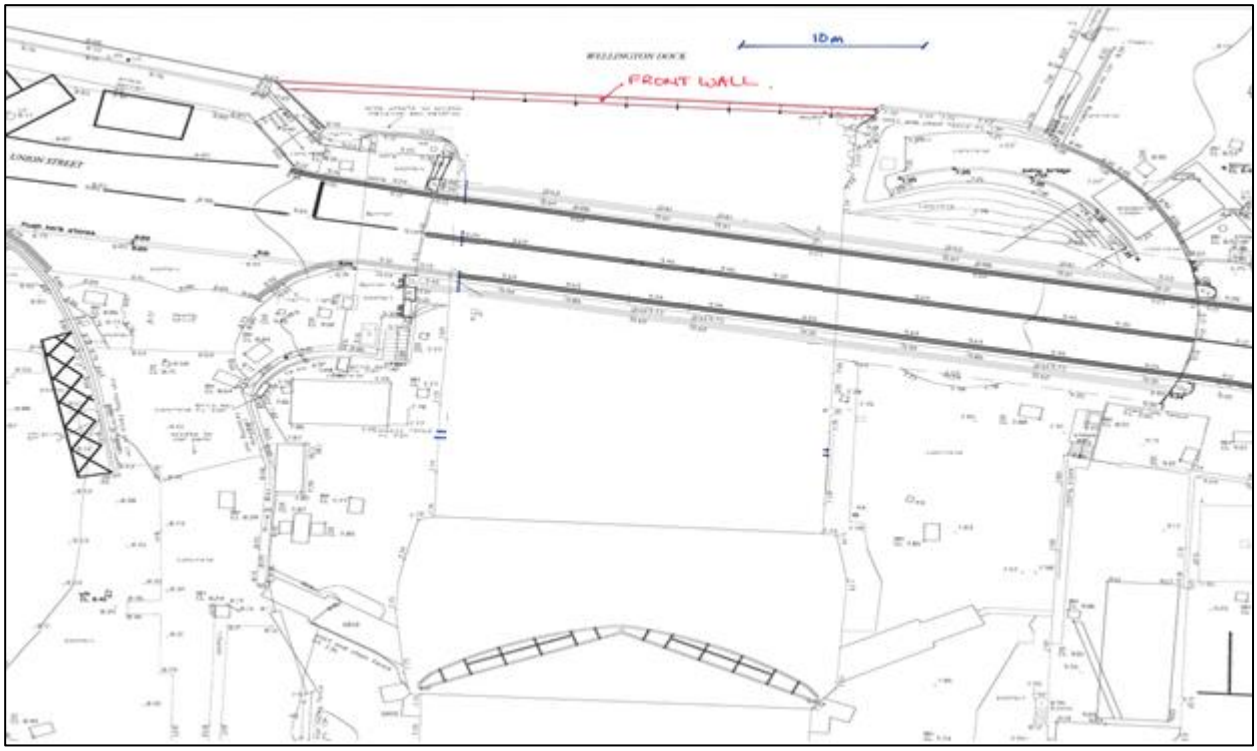

Figure 2-5 Location of retaining structure to close Wellington Dock

The River Dour's primary route to sea will be via the newly completed Wellington navigational channel ahead of this element of work commencing.

The construction sequence for this stage of the works is anticipated to be as follows:

- Install sheet piles inclusive of ground anchors and sheet pile anchor wall
- Seal at the ends (welding/grout bags)
- Place a berm behind the wall up to a suitable level to maintain stability once the water within the cut is tidal
- Remove existing mitre gates
- Continue filling within the cut to the underside of the bridge
- Fill up to surrounding ground level to the south of the bridge
- Construct temporary access road over the newly placed or compacted fill to the south of the swing bridge
- Remove swing bridge
- Complete filling
- Construct permanent road access where the bridge stood.

The retaining structure to close the Wellington Dock from the Tidal Basin will take the form of a sheet piled wall running from the land on the north east side of the swing bridge car park at the Wellington Dock in a south west direction. Piles will be driven using a vibro hammer suspended from a lattice jib crawler crane.

Retaining structure to close the Wick Channel from the Inner Harbour

Following the opening of the new Marina the Wick Channel will be closed off from the Inner Harbour through the construction of a combi wall comprising of large diameter tubular piles and sheet pile infills. Similar floating plant to that used in the construction of Berths A and C or land based cranes will be used for this wall.

The intention is to use a free standing pile gate supported on temporary driven tubular piles which are independent of floating plant. Initially this will be connected to Berth A's existing permanent combi wall. The piles will be driven at each end of the frame using a vibro hammer. This process will be repeated for each piling frame set up and each set up will allow six piles to be driven. Temporary piles will be fully removed after each set up.

Reclamation Works

Prior to reclamation of the existing marina causeway all existing mooring pontoons and tubular piles will be removed. Pontoons will be reused in the new Marina wherever possible. It is intended that all material required for the reclamation elements of the DWDR scheme will be sourced from the Goodwin Sands and this dredging operation is the subject of a separate MLA. Approximate volumes of sand required for the infill are:

- Berth A = 100,000m^3
- Berth C and Marina Curve = 400,000m^3
- Infilling of Granville Dock, Tidal Basin and Wick Channel – 2,000,000m^3

The material will be brought to the relevant area by the Trailer Suction Hopper Dredger (TSHD) used to remove the material from Goodwin Sands and once at site the vessel will berth along the temporary berthing piles to position for discharge. The temporary berthing arrangement will comprise two tubular piles driven into the seabed with attached navigational lighting and warning beacons as agreed with the Harbour Master. Once safely berthed, the floating pipeline will be brought towards the vessel with the assistance of a multicat support vessel and connected to the TSHD. Seawater will be mixed with the sand within the hopper and this will be discharged to the reclaim area via a floating pipeline. The saturated sand will then be manoeuvred into position by excavators and bulldozers (see photos below).

In order to efficiently drain the reclamation area to Berth C fabric wick drains will be installed using a floating pontoon. This will be done after an initial 2m depth of sand infill has been completed. The vertical wick drains

will be installed by pressing a hollow steel mandrel, which houses the drain, into the sand or silt. Once at the required depth, the mandrel is removed leaving the vertical drain anchored by the steel anchor plate to hold the drain securely in place. **Figure 2.6** illustrates the band drain installation process.

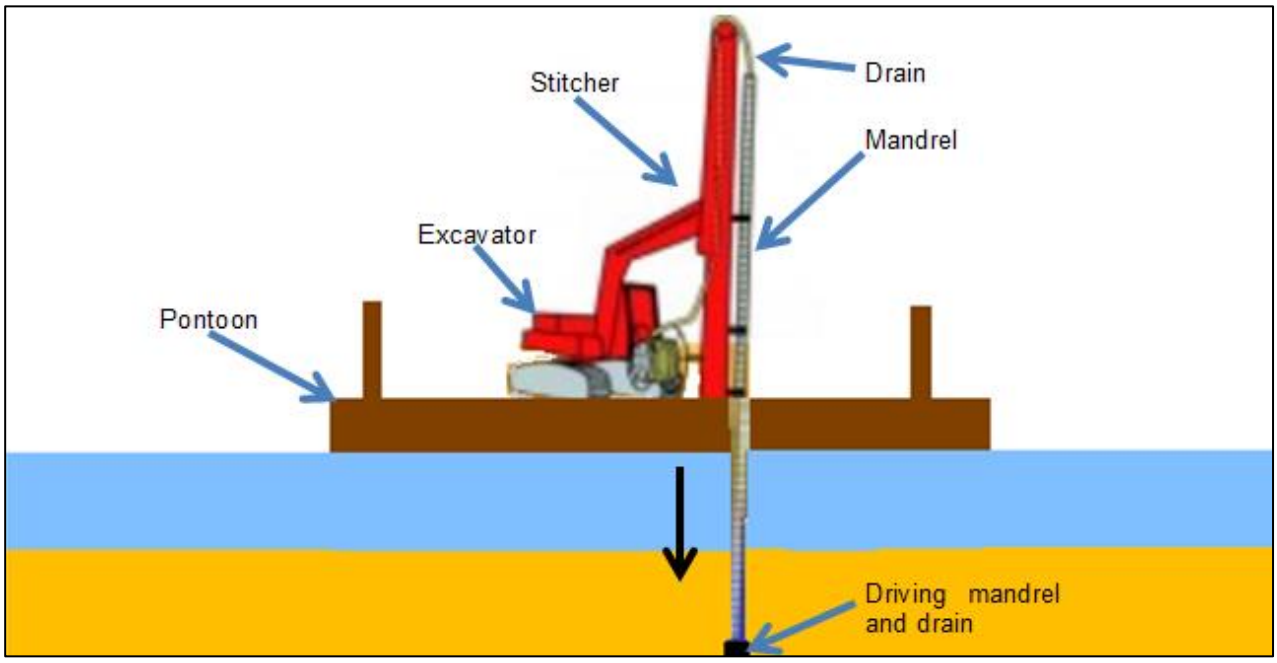

Figure 2-6 Band drain installation process

As infilling progresses separation methods will be employed to control the sediment levels in the discharged water thus allowing the suspended solids to settle out prior to discharge and thus minimise release of sediment to the marine environment. The excess water will be channelled back towards the sea via an opening in the sheet pile cut off wall.

For areas with tidal restrictions such as Granville Dock, Wick Channel and the Tidal Basin these areas will be sealed off prior to reclaim. No dewatering or dredging is proposed prior to the commencement of reclaim of these areas and excess water will be discharged as described above. All discharges to the marine environment will be subject to a Discharge Consent which will be sought from the Environment Agency.

Upon completion of the infill works and prior to the dredging of the berthing pocket the temporary mooring piles will be removed; using a vibro hammer suspended from a camber crane.

Construction of the berm to stabilise the POWP

The strengthening works to the POWP will commence at the edge of the berth pocket for Berth A and proceed south east along the POWP and extend for approximately 300m.

Silt will be removed from next to the pier by a long reach excavator situated on a pontoon; the silt will be loaded into a barge and removed to DV010. Suitable rock will then be used to replace the excavated silt along the toe of the POWP. This will be loaded onto a hopper barge which will then be docked in position before discharging the rock into position. The excavator will be used to level out the rock material and ensure accurate positioning. **Figure 2.7** provides an illustration of this process.

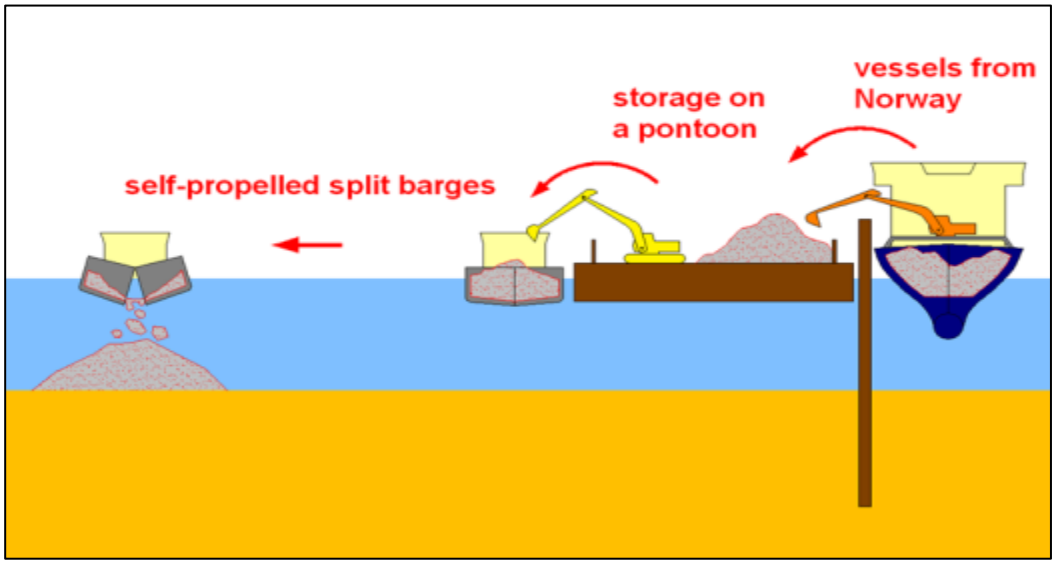

Figure 2-7 Illustration of stabilising work for the POWP

Construction of the Wellington Dock Navigation Cut

The new Wellington Dock navigation access will be created by constructing an *in situ* reinforced concrete wall within a sheet pile cofferdam. The works area has been divided into two (see **Figure 2.8**) and a causeway or a celled cofferdam will be constructed on the beach to provide adequate access to Area 2 and to provide a working platform for sheet piling operations.

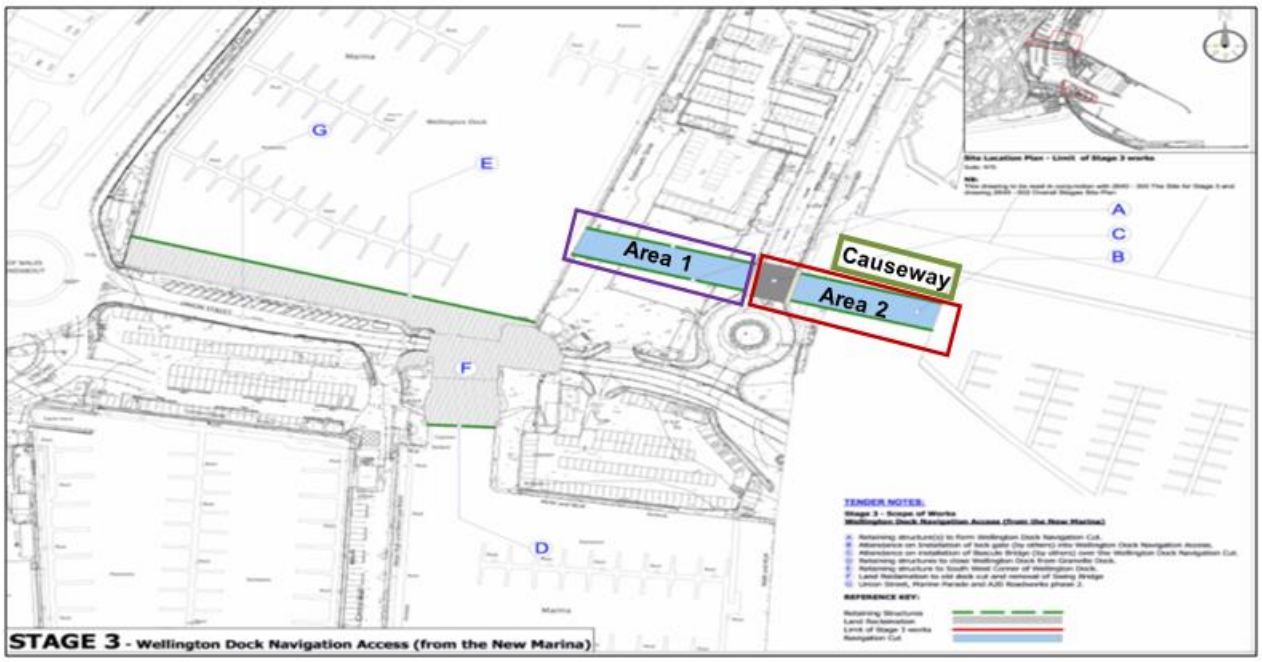

Figure 2-8 Work areas for the Wellington Dock navigation cut

This element of the construction activities will take place in various stages:

1. The sheet pile cofferdam will be installed using a vibro hammer suspended from a crawler crane or a leader rig. Piles will be driven to refusal using the vibro hammer and then driven to design level using an impact hammer. The sheet piles for Area 1 will be installed from the existing ground level, those for Area 2 will be installed from the causeway or infilled temporary cofferdam described above. During

the installation of the permanent sheet piles, piles will also be installed at the end of the walls to complete the cofferdam so that works can be completed in the dry.

2. Following installation of the sheet piles, excavation will be carried out to install the first waling beam. Excavation will be carried out using a traditional excavator with material being drawn away from the work area to a suitable stock pile area. This material will be sorted for reuse and/or disposal in accordance with the waste management plan for the DWDR scheme. This process will then be repeated to the second waling beam and the final waling beam. Dewatering works will be implemented as and when required.
3. Following the installation of the lower waling beam, excavation works can continue to the formation level after which the mass concrete will be placed via a concrete pump and the blinding poured on top.
4. Once the capping slab is complete steel reinforcing will be tied *in situ*. Once cast or cured the temporary props at can then be removed. The steel reinforcing will then be extended to allow the concrete to be poured to form the walls of the navigation cut in stages, with each prop being removed as appropriate. On reaching the top of the navigation cut, reinforcement will be placed and the casting of the walls and cope will be completed, **Figure 2.9** illustrates the end of this process.
5. Upon completion of the full length of the navigation cut, the temporary sheet pile wall at each end of the cofferdam will be removed. This will be achieved using a vibro hammer suspended from a crawler crane.

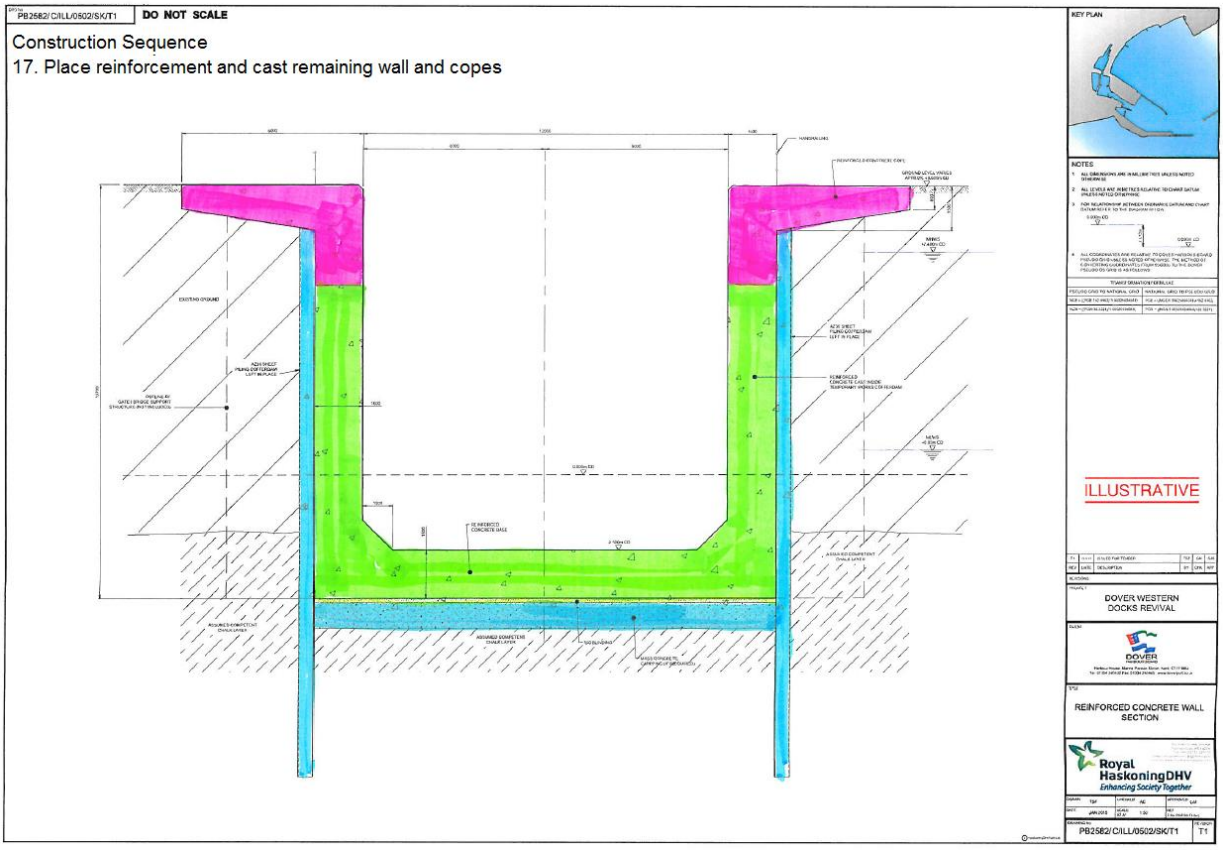

Figure 2-9 Final stages of the construction of the Wellington Dock navigation cut

Demolition of Dunkirk Jetty

The demolition of the jetty and the concrete roadway on top of the jetty will be broken out and removed by excavators equipped with demolition tools, concrete hammers and scissors with care being taken to ensure large debris does not enter the water in the Wick Channel.

The concrete upper part of the caissons which make up the main structure of the jetty will be wire cut into manageable pieces and removed as far as practicably possible. The lower part of the caissons will be broken up using long reach demolition plant similar to the upper road section.

Once all materials have been removed the sea bed will be 'cleaned' using a barge mounted long reach excavator to dredge any remaining concrete spoil and leave the bed free of obstructions to the required depth. This will be verified using side scan sonar and potentially also diver/drop video survey.

Piling controls and best practice

A number of controls will be in place across the piling activities necessary to deliver the DWDR scheme. These are detailed fully in the CCEMP (see Appendix 4) however in summary these are:

- Compliance with piling window restrictions as identified during the T2 EIA and agreed through subsequent discussions with consultees (e.g. Environment Agency, Kent Wildlife Trust);
- Compliance with daytime piling hours as set out in the Section 61 agreement (unless it would constitute a health and safety risk to leave a pile in a partly driven position);
- Continuous marine mammal observation during piling activities;
- 30 minute pre-piling marine mammal search;
- 20 minute soft-start piling, to commence only after 30 minute search period;
- If there is a pause in piling operations of more than 10 minutes then the pre-piling search and soft-start procedures will be repeated before piling recommences.
- Continuous noise monitoring.

In addition to the above all plant involved in the construction of the DWDR will be suitably marked and lit in line with Marine and Coastguard Agency Regulations and Notices to Mariners will be issued as necessary.

Operational phase

During the operational phase, periodic maintenance dredging will be required. The footprint of maintenance dredging required is anticipated to be comparable to the current regime, with disposal of material at the DV010 offshore disposal site.

There will be a permanent surface water drainage system installed as part of the scheme with associated oil interceptors.

The permanent outfall will be constructed into the Berth A wall and will be part of the permanent surface water outfall system. A discharge consent application will be submitted to the Environment Agency for the proposed out fall.

There would also be no changes to water quality due to new discharges from foul drainage as all foul drainage would be directed into the mains foul sewer and not discharged directly into Dover Harbour.

In terms of the new navigational channel, it is proposed that the river will still flow into the Wellington Dock and then through a newly created channel into the new marina. The channel will have a single pair of gates to impound the dock, which will generally be opened 1.5 hours before high water to 2 hours afterwards, following the same regime that is currently operated at the gates between the Wellington Dock and the Tidal Basin.

3. Environmental Appraisal

In the request for a Screening Opinion submitted to the MMO in January 2015, an appraisal was undertaken of the environmental effects of the DWDR scheme and a comparison made against the envelope of impacts consented for T2. For each receptor the following element were presented:

- A review of the baseline conditions, i.e. the current scenario or environment 'without' the developments in place at a given moment in time depending on which is most applicable to provide a comparison;
- A review of the impacts assessed in the T2 EIA;
- An assessment of the environmental impacts associated with the DWDR scheme during construction and operation;
- Suggested mitigation measures where a potentially significant adverse impact has been identified; and
- A comparison of the impact of the DWDR scheme with that determined in the T2 ES.

The overall conclusion of the environmental appraisal carried out in 2014/2015 was that the impacts of DWDR fall within the envelope of the impacts of the T2 scheme and do not lead to an increase in the significance of any adverse impact caused by the development of the full scheme for which consent has been granted via the HRO. Nor do they create any significant impact additional to those expected for T2. The DWDR is not considered to be a material change when compared to the T2 scheme, rather a partial implementation of the T2 development.

As this MLA relates almost directly to the DWDR scheme as presented in the request for a Screening Opinion (Royal HaskoningDHV, January 2015) it is not intended to reproduce the assessment here. **Table 3.1** provides a summary of the appraisal carried out in 2014/2015 and the full report is appended for more detailed reference as appropriate (see Appendix 5).

As the detail of the construction methodology is still in development this MLA is not intended to encompass every element of the DWDR scheme and as such the level of impact for some environmental receptors are considered to be reduced. For example, as this MLA is only seeking to consent the disposal of 150,000m^3 of dredged material (instead of 600,000m^3) the impacts associated with this disposal are likely to be lower than for the full DWDR scheme. However, as the differences in potential impact are not significant and given that the reduced impacts will be within the envelope of impacts of both the T2 and full DWDR scheme, the comparison as presented in **Table 3.1** is considered to be suitably valid and sufficient to support this MLA.

Notwithstanding the above, there are a number of additional assessments that are required to inform this MLA and these are presented in the Sections 4, 5, 6 and 7. Where these are of relevance to particular environmental receptors listed in **Table 3.1** this is identified clearly in the pertinent section for ease of cross reference.

Additional Mitigation and Enhancement

During recent months there have been ongoing discussions with key regulators to develop mitigation and enhancement opportunities identified through side agreements to the T2 EIA process. The details of these are captured within the CCEMP which is a live document to be used throughout the detailed design and construction phases of the DWDR scheme (see Appendix 4). For completeness the main mitigation and enhancement opportunities are summarised below and referred to throughout the assessments contained within this report as appropriate.

Marine Mammals

Given the presence of cetaceans and pinnipeds in and around the vicinity of Dover Harbour all piling activities will be carried out in line with the most recent guidance from the Joint Nature Conservation Committee (JNCC, August 2010). These require a 500m 'mitigation zone' to be implemented around the area of piling activity that will be visually monitored for the presence of marine mammals by a qualified Marine Mammal Observer. Prior to the commencement of piling a 30 minute observation period will take place; vibro-piling will be used wherever possible and where impact piling is required, 'soft-start' procedures will be employed for 20 minutes. If marine

mammals are sighted after 20 minutes then piling can continue; if a marine mammal transits the mitigation zone during piling then it is deemed to have done so voluntarily. If there is a pause in marine piling operations for a period of greater than 10 minutes, then the pre-piling search and soft-start procedures will be repeated before piling recommences.

Migratory Fish

The River Dour (which discharges into Dover Harbour) is known to support a small migratory population of brown trout and the European Eel is also common in this catchment. Migration of sea trout is however impeded and the data held by the Environment Agency (EA) is fragmented and incomplete. Discussion with the EA at a meeting in August 2015 confirmed that migration is not known to occur from the Harbour upstream. Potential impacts on migratory fish species will therefore largely be managed through the construction programme thereby ensuring that the new marina cut will be open and complete prior to any infilling of Granville Dock and the Tidal Basin. This will ensure that a clear migratory route is maintained throughout the DWDR construction phase allowing trout and eels to migrate out to sea. In addition, soft-start piling techniques (as required for the marine mammal mitigation) together with observational monitoring should ensure that the potential impacts on migratory fish species are suitably mitigated.

Following construction DHB will ensure that the new lock gates in the Wellington Dock Navigation Cut are kept open for not less than 1.5 hours either side of high water to provide access for migratory fish species.

Marine Ecology

In order to compensate for the macroalgal habitat that will be lost due to the infilling of the Granville Dock, Tidal Basin and Wick Channel, DHB are planning to create 1875m of new habitat within the proposed new marina using artificial structures. These include:

- 1134 m tidal concrete featured surface (see **Figure 3.1**) on the Marina Pier;
- 700m tidal painted steel surface on Marina Curve
- 24m of isolated timer fenders at 10m centres;
- 1600m non tidal featured concrete surface on the Wellington Navigation Cut walls;
- 100m tidal featured surface on Marina Breakwater;
- 100m of recycled rock protection used from the existing SeaCat berth.

Figure 3-1 Featured concrete surface similar to that which will be used to create macroalgal habitat.

In addition, in constructing the new marina DHB will seek to re-use the pontoons from the existing marina where viable to assist with colonisation of the new structures. Any re-location will be overseen by a qualified marine ecologist.

Since the HRO was granted in 2012 DHB have also constructed four new granite rock groynes and created 356m of new macroalgal habitat within the Harbour on the beach.

Navigation

Dover Harbour is a very busy port and will remain operational throughout the construction of the DWDR scheme. Considerable efforts will therefore be made to minimise the disturbance to commercial and recreational navigation with the following mitigation measures being employed:

- 'Notices to Mariners' will be issued informing sea users of the construction activities and timings so the area can be avoided. A 'Notice to Mariners' should be issued at least 10 days prior to works commencing warning of the start day for construction works and the expected supply/construction vessel routes from the local service ports. Notices will be updated and re-issued at appropriate intervals.
- Safety zones will be set up around construction vessels which will be appropriately marked and lit to minimise the risk of collision.
- An Emergency Response Plan will be developed to ensure the lines of responsibility and reporting are clear and predefined; this will feed into the Port of Dover Emergency Response Plan and Marine Pollution Response Plan.
- During the construction works, adequate provisions must be made to follow the standard tidal works requirements. Lighting must be implemented from sunset to sunrise under Article 11 of the Harbour Revisions Order (HRO) 2007. In addition, buoys and lights must be implemented to prevent danger to navigation under Article 12, HRO 2007.
- A Water Safety Strategy will be developed for recreational users; this will be updated once the DWDR scheme becomes operational.
- Once the scheme becomes operational, new navigation lights will be implemented as required in consultation with DHB marine staff and Trinity House. Navigational lighting will be active from sunrise to sunset to prevent danger to navigation under Article 15 of the 2007 HRO.

More detail on these is available through the CCEMP and the 2009 T2 ES.

Noise and vibration

Dover Harbour is part of the town of Dover and residential as well as commercial properties are in close proximity to the proposed works. The principal contractor will be required to apply to the local authority for a Section 61 'Prior Consent' as described in Control of Pollution Act, 1974 (COPA). This will ensure that details of the required construction noise mitigation are agreed with the local authority Environmental Health Officer before construction works commence. Generic mitigation in the application of the principles of Best Practicable Means (BPM), as defined in COPA and BS 5228:2009, will be applied to all on-site construction activities. For the marine based elements of the DWDR scheme mitigation of noise impacts will focus on piling techniques as discussed further in Section 2 of this report. Further details are also available in the CCEMP.

Table 3.1Summary of T2/DWDR Environmental Impact Comparison (Royal HaskoningDHV, 2015)

Receptor Type	T2 Residual Change/Impacts	DWDR Residual Impacts
Hydrodynamics and Sedimentary Regime	Construction: minor changes Operational: negligible to moderate changes	Construction: minor changes, less than T2. Operational: negligible to minor changes. Changes less than or consistent with T2.
Water and Sediment Quality	Construction: minor to moderate adverse Operational: minor beneficial to minor adverse	Construction: minor to moderate adverse Operational: minor beneficial to minor adverse
Soil Quality and Geology	The T2 ES provides a detailed summary of the construction phase and operational phase risks associated with contamination (see Table 8.35 on page 269 and Table 8.36 on page 273)	No change to the risk types or levels
Marine Ecology	Construction: negligible to moderate adverse Operational: negligible to minor adverse	Construction: negligible to moderate adverse. Impacts less than or consistent with T2 Operational: negligible to minor adverse. Impacts less than or consistent with T2.
Marine Mammals	Construction and Operational: negligible to minor adverse	Construction and Operational: negligible to minor adverse. Impacts less than T2.
Marine and Coastal Ornithology	Construction and Operational: negligible to minor adverse	Construction and Operational: negligible to minor adverse. Impacts less than or consistent with T2 impacts.
Fisheries	Construction: negligible to minor adverse Operational: negligible to minor adverse	Construction: negligible to minor adverse. Impacts less than or consistent with T2 impacts. Operational: negligible to minor adverse: Impacts less than or consistent with T2.
Terrestrial and Coastal Ecology	Construction: no impact to minor adverse Operational: negligible to minor beneficial	Construction: no impact to minor adverse. Impacts less than, or consistent with T2. Operational: no impact to negligible. Minor beneficial impact predicted for T2 has already been realised through lighting improvements at the Western Docks.
Navigation	Construction: negligible to minor adverse Operational: minor adverse to moderate beneficial	Construction: negligible to minor adverse. Impacts less than or consistent with T2. Operational: minor adverse to minor beneficial. Moderate beneficial impact of T2 on cruise vessel berthing at Admiralty Pier has been partially delivered already as the height of the blockship has been reduced. However, the Prince of Wales Pier will not be shortened as part of the DWDR scheme. Therefore the full extent of this moderate beneficial impact will not be realised for the DWDR scheme. However, a new minor beneficial impact is predicted, as the DWDR scheme will remove the requirement to berth cargo vessels within the Eastern Docks and therefore reduce the potential for cargo manoeuvring to delay access and egress from the ro-ro ferry berths and improve conditions for cargo vessels (through the move to the Western Docks).
Historic Environment	Construction: moderate beneficial to moderate adverse Operational: no impact to moderate adverse	Construction: moderate beneficial to moderate adverse. Impacts less than or consistent with T2. Operational: no impact to moderate adverse. Impacts consistent with T2.
Tourism and Recreation	Construction: minor adverse Operational: major beneficial to minor adverse	Construction: minor adverse. Impacts consistent with T2. Operational: major beneficial to minor adverse. Impacts less than or consistent with T2.
Traffic and Transport	Construction and operational: negligible	Construction and operational: negligible
Noise and Vibration	Construction: negligible to minor adverse Operational: negligible to minor adverse	Construction: negligible to minor adverse. Impacts consistent with, or marginally less than T2.

		Operational: negligible. Impacts less than T2.
Air Quality	Construction: minor adverse Operational: negligible to moderate adverse	Construction: minor adverse. Impact the same as T2. Operational: negligible to moderate adverse. Impacts less than or consistent with T2.
Landscape and Visual Impact	Construction: no impact to moderate adverse Operational: moderate beneficial to substantial adverse	Construction: no impact to moderate. Impacts consistent with T2. Operational: Moderate beneficial to substantial adverse. Impacts consistent with T2.
Socio-economics	Construction: moderate beneficial Operational: major beneficial	Construction: moderate beneficial. Impacts consistent with T2. Operational: moderate to major beneficial. Beneficial impacts less than or consistent with T2. It should be noted that the impacts associated with the DWDR scheme do not preclude or detract from the impacts of the full T2 scheme. Instead they contribute to them in the shorter term and will be entirely additional to those in the fully consented scheme.
Offshore Disposal of Dredged Material	Construction: negligible to minor adverse Operational: negligible	Construction: negligible to minor adverse. Impacts less than or consistent with T2. Operational: negligible. Impacts less than T2.
Impact on Protected Areas	Construction and operation: negligible	Construction and operation: negligible

4. Options for use of disposal of dredge material (including beneficial use)

Introduction

This section presents the consideration of the options for use and disposal of the dredged material arising from the DWDR scheme as part of the marine licensing application process. In accordance with the MMO guidance document number 3 on 'Dredging, Disposal and Aggregate Dredging', alternatives to the disposal of dredged material must be considered (MMO, 2011). The MMO states in this guidance that it will endeavour, where possible, to work with applicants, nature conservation bodies, coast protection authorities, the Environment Agency, the local planning authority and others to identify potential schemes to utilise dredged material (MMO, 2011).

This section also examines the implications of the Waste Framework Directive with regard to this project. It provides discussion on the route taken through the waste hierarchy, including the reduction of the volume of dredged material in relation to the T2 scheme, options for beneficial use (re-use) and concludes with a discussion on the preferred licensed disposal site.

Implementation of the Waste Framework Directive (2008)

Once dredged material has been produced it is classed as waste material. Waste policy is governed by the waste hierarchy which comprises of:

- Prevention – most preferred;
- Re-use;
- Recycle;
- Other recovery, and
- Disposal – least favoured option.

The processing and final destination of the dredged material determines its status within the waste hierarchy. This is central to the management options for dealing with dredge material, especially if contaminated material is involved. These strategies are summarised below and discussed in more detail where they are applicable for this project.

Prevention

A strong emphasis is placed on the minimisation or prevention of waste. In considering an application to dispose of dredged material at sea, the MMO would seek to minimise the waste by, for example, a reduction in the amount of material to be dredged. The MMO does however recognise that prevention or minimisation may not always be possible if, for instance, the dredging is required to ensure navigational safety.

Re-use

Where complete prevention is not possible, then the next step is to identify any re-use opportunities for the dredged arisings. In its guidance, the MMO offers to work with the applicant in identifying any potential and current schemes that may be able to utilise the dredged material in a practical and appropriate manner. However, it states that re-use may be limited by the contamination status of the material or by regulatory issues.

Recycle

Recycling of material is where the resultant material takes a different form to that of the original material, for example the production of bricks or aggregate material. The MMO acknowledges that these are generally land-based solutions and the materials produced are used in land construction projects.

Data available from the British Geological Survey (BGS) Sheet 290 (Dover) of the 1:50,000 Series

Geological Map, Solid and Drift Edition, indicates that the site is underlain by superficial deposits

overlying chalk.as follows:

- Soft clay / silt;
- Sands and gravels;
- Chalk.

Soft clays and silts are not suitable for reclamation / fill material due to their high compressibility i.e. volume decrease, which ultimately results in large vertical deformations. This means that if the soft clays / silts were used for reclamation then it would take several years for the silt to decompress and result in negligible settlement and thus be an unsuitable reclamation material.

Sands and gravels are generally used for reclamation / fill material however the amount available within the DWDR dredge areas is very small and in thin layers between the soft clays / silt and the chalk which makes it very difficult to retrieve from its in-situ state.

Chalk by its very nature is a highly variable material in strength and consistency. It is generally not suitable for reclamation / fill material because when it is dredged it is put into suspension and would take a very long time (several years) to dewater it to a state such that it would be suitable as a reclamation material.

There is, therefore, limited potential for applying the recycling element of the waste hierarchy in this project and it is not considered further in this assessment.

Other recovery

It is recognised that there are currently very few examples of recovery from dredged material (such as biomass or energy recovery). Given the extremely limited potential for 'other recovery' this option is not considered further within this assessment.

Disposal

In terms of the waste hierarchy, disposal is seen as the least favoured option. The MMO guidance notes that waste should be disposed at sea only as a last resort. Every effort to prevent or minimise, re-use, recycle, or recover material should be made before considering disposal.

In the event that disposal is necessary, the applicant is expected to identify the site(s) which they propose to use in the application and the MMO and its consultees would decide whether this is suitable or if another site should be used. Another option open to applicants is to identify and characterise a new site for disposal at sea.

Minimising the volume of material to be dredged

As described above, the first stage in the Waste Hierarchy is 'Prevention'; in practical terms the MMO interprets this stage to include minimisation where possible, and also acknowledges the need for navigational safety.

The need for the increased capacity at Dover is described in some detail in the 2009 ES written to support the T2 HRO application. The capital dredging and associated production of dredged material is therefore required to support this expansion. The DWDR scheme seeks to protect the development consented through the T2 HRO as well as ensuring DHB's commitment to the regeneration of Dover seafront. As such the dredging is an essential component in safeguarding the planned renovation of the Harbour.

The T2 scheme included an 84 week dredging programme to remove 2,100,000m^3 of silts and 175,000m^3 of chalk resulting in a total volume of dredged material of 2,275,000m^3 potentially to be disposed of at sea. The initial DWDR scheme involved a dredging programme of approximately 36 weeks to remove approximately 900,000m^3 of material comprising 630,000m^3 of silt and mud and 270,000m^3 of chalk. The total volume of material to be dredged was therefore considerably reduced in comparison to the original scheme. The scheme was then revised again to further reduce the volume of material to be dredged with the final anticipated dredging programme to be approximately 26 weeks to remove approximately 650,000m^3 of material comprising around 462,100m^3 of silt and mud, 121,300m^3 of sand/gravel and 16,600m^3 of chalk.

As described in the introduction, this MLA is limited to the disposal of the material to be removed from the approaches to as well as around Berth A (see **Figure 2.2**) only. Dredging of this area will remove approximately 150,000m^3 of material, comprising around 60% chalk (90,000m^3), 20% sand and gravel

(30,000m^3), and 20% silt (30,000m^3). This element of the dredging programme is anticipated to take approximately 9 weeks.

Despite this reduction the amount of dredging still required is determined by the demands of the project to ensure safe navigation and efficient ship manoeuvring into and out of the Harbour. This dredging is an integral aspect of the project and therefore cannot be entirely prevented.

Re-use of dredge material

The re-use of material generally seeks to examine whether there are any projects already planned or that could be organised to make use of the dredged material, by placing it beneficially, for example, to build up mudflats or saltmarsh that are experiencing loss due to sea level rise. Such projects may need to utilise softer, clay or silt sediments. Another option may be to use the larger granular material, such as sand and gravel, for beach nourishment or to create habitat such as tern islands. Stiff clay has been used in the past to help with habitat creation on the east coast of the United Kingdom.

The overall suitability of the material in terms of volume, particle size and levels of any potential contamination must be considered, as well as its compatibility with the receiving environment.

Material type and volumes

In order to assess any potential opportunities for the re-use of dredged materials the volumes, particle size and contaminant levels of the material need to be established. In this case, sediment samples were taken from the areas to be dredged as part of the DWDR scheme and analysed by CEFAS.

As explained above this MLA is limited to the disposal of the material to be removed from the approaches to as well as around Berth A (see **Figure 2.2**) only. Dredging of this area will remove approximately 150,000m^3 of material, comprising around 60% chalk (90,000m^3), 20% sand and gravel (30,000m^3), and 20% silt (30,000m^3). A summary of the sediment quality is provided in the section entitled 'Suitability of the material for disposal at sea'.

Consultation on options for re-use

In order to investigate the potential options for re-use of the dredged material contact was made with the South East Coastal Group. The South East Coastal Group is the Regional Coastal Group for South East England. The Group brings together local authorities, the Environment Agency and other maritime operating organisations to achieve coordinated strategic management of the shoreline between the Isle of Grain and Selsey Bill. This Group is routinely contacted by DHB in relation to their maintenance dredging regime and has extensive knowledge of the coastal processes and sediment cells around the Kent coastline. At the time of writing the Group was not aware of any potential opportunities for which the dredge material arising from the DWDR scheme could be put to beneficial use.

DHB will continue to explore the options for re-use throughout the MLA process and, if appropriate, post consent. Should any appropriate scheme be developed the volume of dredged material to be disposed of at the disposal site would be reduced. At present, however, this volume cannot be quantified.

It is important to note that DHB will have no responsibility for consenting any potential beneficial use scheme which will instead lie with the proposer of any viable scheme.

Disposal to a Licenced Disposal Site at Sea

As discussed earlier, Stage Four – Other Recovery has been scoped out of any further assessment as the possibilities are extremely limited.

The final stage of the waste hierarchy is therefore 'Disposal' and it is the least favoured option. However, once all the other options have been explored and exhausted, it is the only practical option remaining. In light of the outcome of the previous stages of the assessment it is concluded that all of the capital material will be disposed of at sea using the Dover site (designation code DV010). Material removed during future maintenance dredging activity will also be disposed of at DV010.

In order for the material to be considered for disposal there are two elements to be examined and progressed:

- The selection of an existing disposal site (or the characterisation of a new disposal site); and

- The assessment of the material with regard to its suitability for disposal at sea (in terms of volume, particle size and levels of chemical contaminants present within that material).

Selection of a disposal ground

There are two open designated disposal sites situated near to Dover Harbour; DV010 Dover and DV011 Dover Emergency.

DV010 is currently used for the disposal of maintenance dredging and DHB is licensed to deposit up to 499,000 tonnes of silt per annum. The DWDR proposals are anticipated to lead to an increase in mud deposition of 5% and an increase in sand deposition of 10%, creating a combined increase in deposition of 6% (see Section 2.10 in Appendix 3 of the 2015 Screening Report (Appendix 5 to this MLA). It is anticipated therefore that the maintenance dredging regime when DWDR is operational will be similar to the existing regime in terms of volume, location and ratio of particle sizes and will present no concerns in terms of disposal site capacity. The consenting for the disposal of maintenance dredged material will be addressed through a separate licensing process and is not considered further in this assessment.

Site DV011 is used as an emergency alternative disposal site in the event that bad weather prevents use of DV010. DHB's current maintenance dredging licence allows the disposal of up to 1,000 tonnes of silt per annum at DV011. As there is no intention to utilise DV011 for the disposal of the capital dredged material it is not considered further in this assessment.

Description of DV010

The DV010 disposal ground is located approximately 2.5km to the south-east of Dover Harbour and is described as 'segment of a circle centred 51° 06.300'N 01° 20.900'E of a radius of 1 nautical mile from 107 degrees clockwise to 157 degrees'. Its most shallow extent is approximately -16mCD, deepening to around -33mCD at most, in the further offshore portion. This site has been consistently used for dredged material reception for many years, for both maintenance dredged material as well as for capital projects.

The T2 ES (Section 22, 2009 ES) describes site DV010 as being strongly dispersive and no alterations to the hydrodynamic regime were anticipated as a result of the proposed disposal of the dredged material.

Suitability of the material for disposal at sea (contaminant analysis)

In order to inform the MLA, sediment samples were collected and sent to CEFAS for analysis. The main survey was carried out over four days on the 15th to the 18th April, 2015 by Fugro Seacore Limited. In total, 27 cores were collected across the proposed study area to reflect the different areas. The cores collected during this survey are determined by 'VC' and then a number. These cores were also supplemented by samples taken from borehole investigations carried out on a separate occasion during the same survey for geotechnical information requirements. This survey entailed the collection of samples at locations 104 (marina berth area dredge), 109 (reclamation dredge area), 113 (vessel manoeuvring area) and 116 (edge of marina approach dredge channel).

In order to ensure adequate coverage of potential sediment changes at depth, samples were taken at 1m depths until the depth of the core was reached whereby a final sample was collected during the Fugro survey and every 2m during the geotechnical investigation survey. Where chalk was identified, samples were not collected as the risk of contamination was considered to be unlikely within this geological layer.

In total, 94 samples were sent to the Cefas laboratory for analysis.

Figure 4.1 shows the locations of the vibrocores within the areas to be dredged as part of this application. In total, 5 cores were collected in the areas to be dredged and at each of the locations, analysis for metals and tins, polycyclic aromatic hydrocarbons (PAHs) and particle size analysis was undertaken as requested by CEFAS.

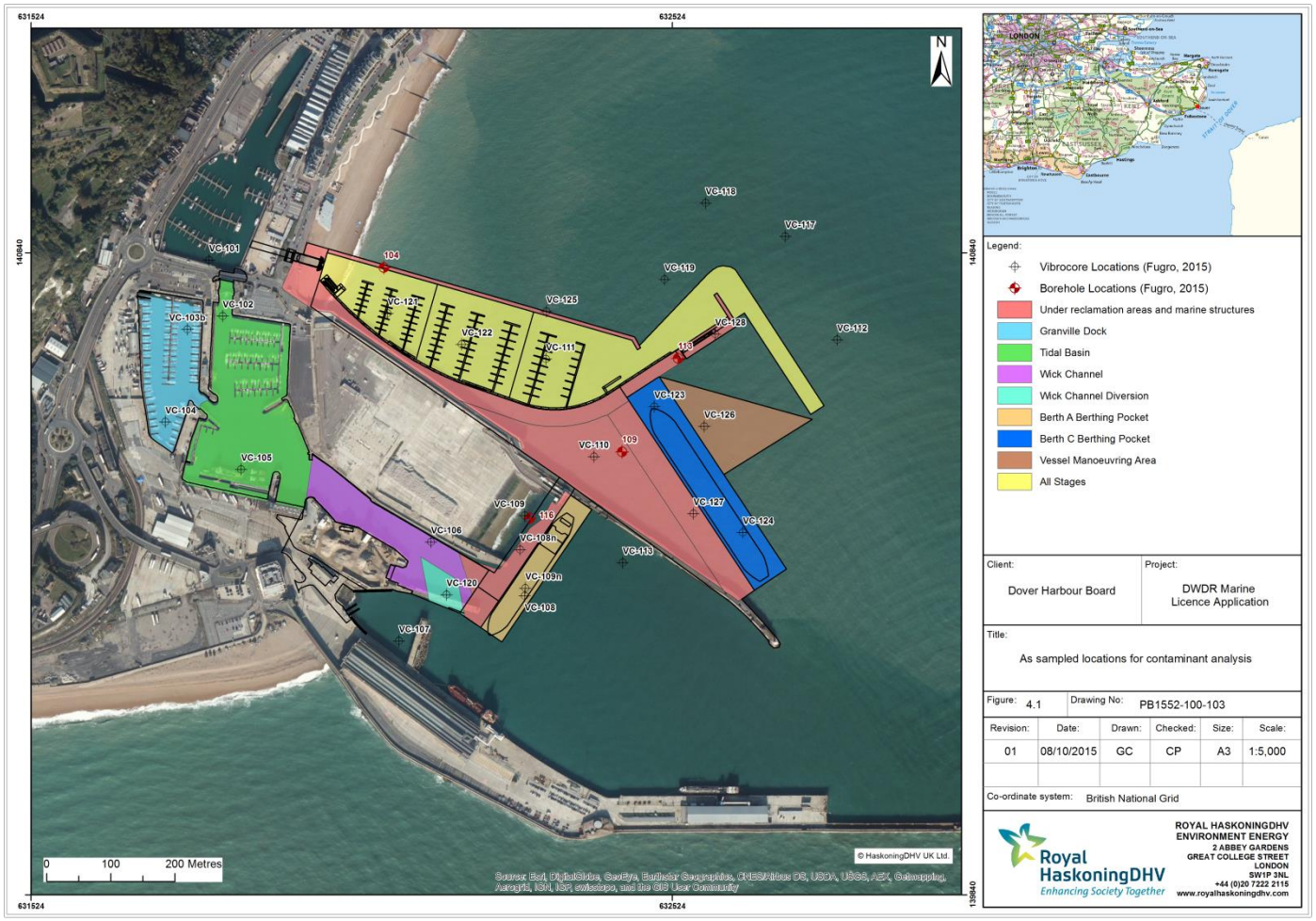

Figure 4-1 Vibrocore locations from DWDR Ground Investigations

In order to provide an initial high level assessment as to the suitability for the material for disposal at sea, the sample results have been compared to the Cefas Action Levels (see **Table 4.1**).

Table 4.1 Cefas Action Levels

Cefas Action Levels		
Contaminant/Compound	**AL1**	**AL2**
	mg/kg dry weight (ppm)	
Arsenic	20	100
Cadmium	0.4	5
Chromium	40	400
Copper	40	400
DBT (dibutyltin)	0.1	1
DDT (dichlorodiphenyltrichloroethane)	0.001	-
Dieldrin	0.005	-
Lead	50	500
MBT (mono-butyltin)	0.1	1
Mercury	0.3	3
Nickel	20	200
PAHs (individual compounds, except Dibenz[ah]anthracene)	0.1	-
PCBs, sum of 25 congeners	0.02	0.2
PCBs, sum of ICES 7	0.01	-
Total hydrocarbons	100	-
TBT (tributyltin)	0.1	1
Zinc	130	800

Tables 4.2 and **4.3** provide the results from the contaminant analyses of the vibrocores from the areas to be dredged around Berth A and the approaches. Those figures highlighted in yellow indicate an exceedance of Cefas Action Level 1.

Table 4.2 Vibrocore data compared against Cefas Action Levels – metals and organotins

Sample ID	Depth (m)	Total Solids*	Cadmium	Copper	Mercury	Lead	Zinc	Arsenic	Chromium	Nickel	DBT	TBT
VC 108	0.0	41.7	0.13	13.13	0.08	26.27	69.54	19.46	46.93	22.27	<0.002	<0.002
VC 108	1.0	59.8	0.15	14.23	0.1	28.37	69.22	17.34	47.93	20.43	<0.001	<0.001
VC 113	0.0	48.2	0.14	13.23	0.07	27.68	70.3	18.57	48.08	22.51	<0.001	<0.001
VC 113	1.0	55.8	0.1	14.45	0.08	27.42	73.96	19.13	45.54	22.73	<0.001	<0.001
VC 113	2.0	62.1	0.22	17.14	0.17	38.53	86.85	21.18	53.16	24.21	<0.001	<0.001
VC 113	3.0	63	0.45	15.8	0.21	38.1	82.06	18.1	43.75	21.58	<0.001	<0.001
VC 113	4.0	70	0.07	9.11	0.23	27.93	48.63	17.03	35.36	16.9	<0.001	<0.001
VC 113	5.2	69.4	0.07	8.12	0.11	22.98	41.46	14.62	32.03	15.56	<0.001	<0.001
VC 109n	0.0	54.8	0.11	11.82	0.06	22.32	65.78	16.88	43.88	19.28	<0.001	<0.001
VC 109n	1.0	50.9	0.12	17.2	0.1	32.41	90.61	20.95	61.13	28.6	<0.001	<0.001
VC 109n	2.0	59.1	0.16	13.55	0.12	27.25	75.16	17.01	43.67	19.72	<0.001	<0.001
VC 108n	0.0	86.2	0.04	1.83	<0.032	5.65	21.12	11.71	9.45	3.94	<0.001	<0.001
VC 108n	1.0	63.9	0.55	13.81	0.2	35.93	80.76	17.35	42.46	17.87	<0.001	<0.001
VC 108n	2.0	66.4	0.58	12.6	0.2	34.49	73.57	16.99	39.46	16.8	<0.001	<0.001

Table 4.3 Vibrocore data compared against Cefas Action Levels – PAHs and THCs (rounded to 3 decimal places)

Sample ID	Depth (m)	Acenaphthylene	Acenapthene	Anthracene	Benz[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[e]pyrene	Benzo[k]fluoranthene	methyl naphthalenes	methyl phenanthrene	dimethyl naphthalenes	trimethyl naphthalenes	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Perylene	Phenanthrene	Pyrene	THC (Total Hydrocarbon Content)
VC 108	0.0	0.004	0.003	0.010	0.048	0.054	0.060	0.049	0.039	0.029	0.048	0.061	0.071	0.096	0.036	0.010	0.087	0.006	0.058	0.019	0.032	0.044	0.068	102
VC 108	1.0	0.006	0.006	0.021	0.093	0.104	0.093	0.082	0.070	0.048	0.054	0.111	0.083	0.145	0.063	0.018	0.178	0.011	0.096	0.021	0.049	0.067	0.160	152
VC 113	0.0	0.004	0.005	0.015	0.056	0.058	0.051	0.047	0.040	0.028	0.044	0.074	0.063	0.093	0.039	0.010	0.097	0.008	0.057	0.01	0.030	0.056	0.077	83.0
VC 113	1.0	0.005	0.006	0.018	0.070	0.078	0.082	0.068	0.059	0.038	0.098	0.111	0.145	0.206	0.048	0.014	0.125	0.012	0.077	0.030	0.039	0.066	0.101	121
VC 113	2.0	0.011	0.013	0.049	0.166	0.184	0.181	0.134	0.122	0.093	0.081	0.173	0.126	0.214	0.130	0.031	0.289	0.022	0.161	0.031	0.069	0.130	0.264	216
VC 113	3.0	0.015	0.014	0.049	0.189	0.222	0.226	0.192	0.165	0.106	0.124	0.218	0.203	0.347	0.134	0.040	0.357	0.024	0.221	0.047	0.079	0.152	0.353	347
VC 113	4.0	0.004	0.008	0.040	0.117	0.098	0.091	0.061	0.065	0.046	0.047	0.118	0.084	0.128	0.073	0.016	0.222	0.016	0.074	0.016	0.049	0.085	0.189	89.0
VC 113	5.2	0.003	0.003	0.026	0.081	0.065	0.055	0.041	0.042	0.031	0.025	0.061	0.049	0.077	0.046	0.011	0.132	0.011	0.049	0.010	0.044	0.038	0.130	61.0
VC 109n	0.0	0.003	0.004	0.010	0.051	0.058	0.059	0.052	0.045	0.031	0.041	0.057	0.061	0.078	0.038	0.011	0.086	0.006	0.062	0.016	0.029	0.039	0.074	136
VC 109n	1.0	0.004	0.008	0.019	0.067	0.078	0.080	0.082	0.072	0.038	0.192	0.166	0.260	0.335	0.059	0.016	0.121	0.016	0.083	0.056	0.043	0.089	0.109	174
VC 109n	2.0	0.006	0.011	0.028	0.100	0.104	0.102	0.086	0.080	0.055	0.066	0.120	0.106	0.156	0.080	0.018	0.194	0.015	0.100	0.026	0.048	0.095	0.175	142
VC 108n	0.0	0.0002	0.0001	0.001	<0.001	0.002	0.002	0.002	0.001	0.001	0.002	0.004	0.003	0.005	0.001	0.0003	0.003	0.000	0.003	0.001	0.001	0.001	0.003	3.00
VC 108n	1.0	0.016	0.019	0.061	0.225	0.250	0.240	0.197	0.177	0.119	0.115	0.263	0.213	0.451	0.184	0.042	0.419	0.030	0.226	0.044	0.078	0.173	0.402	280
VC 108n	2.0	0.017	0.015	0.060	0.221	0.243	0.222	0.195	0.178	0.113	0.095	0.231	0.174	0.400	0.165	0.042	0.408	0.030	0.233	0.041	0.075	0.163	0.379	293

As can be seen from the Tables above, there are no Action Level 2 exceedances and the majority of Action Level 1 exceedances for both metals and PAHs in the data provided to date show relatively minor exceedances (i.e. are only just above the Action Level concentration). Indications regarding the potential contaminant levels of sediments within the areas to be dredged are considered therefore to be positive.

As discussed above, the alternative options for use of the dredged material have been considered and rejected for the reasons explained in this report. The only remaining option is therefore for the disposal of the material to sea. The DV010 disposal site has received large volumes of material in the past and is well suited as the chosen site for disposal of material arising from this capital dredge project. Additionally, there do not appear to be any reasons why the material itself would not be considered suitable for disposal at sea. A more detailed assessment of the suitability of the disposal site and its capacity to receive the material from the proposed capital dredge is provided in Section 5 of this report.

Conclusion

This section has examined the Waste Framework Directive's Waste Hierarchy in terms of its use and disposal options for the capital dredged material that would arise from the DWDR scheme, taking account of relevant MMO guidance. It has identified positive elements in the following stages:

- Stage One – minimisation of the amount of material arising through the altered scheme;
- Stage Five – identification of a suitable marine disposal site at DV010 and assessment of the suitability of the material for disposal to that site.

Further work will be carried on in parallel with the application and licencing process to further explore the options for re-use which would, where practicable, reduce the volume of material to be disposed of at sea.

5. Disposal Site Assessment

As discussed in Section 4, the alternative options for use of the dredged material have been considered and rejected; this section will consider the potential for this material to be disposed of at DV010, the licensed disposal site close to Dover Harbour.

Baseline Environmental Conditions at DV010

The DV010 disposal ground is located approximately 2.5km to the south-east of Dover Harbour and has been used for many years to receive both capital and maintenance dredge arisings. **Table 5.1** shows the returns (in metric tonnes) from previous dredging campaigns in Dover Harbour over the last 20 years (CEFAS, 2015).

Table 5.1 Returns to DV010 from previous dredging campaigns in Dover Harbour (metric tonnes)

Year	Capital	Maintenance	Total (tonnes)
1994	1340	948914	950254
1995	696111	118144	814255
1996	0	218214	218214
1997	2586	215170	217756
1998	146689	393037	539726
1999	7840	215885	223725
2000	2730	321658	324388
2001	0	383604	383604
2002	0	756210	756210
2003	0	501002	501002
2004	0	432846	432846
2005	0	535183	535183
2006	7000	287894	294894
2007	0	480814	480814
2008	0	390442	390442
2009	0	344229	344229
2010	0	869102	869102
2011	0	489063	489063
2012	0	181359	181359
2013	0	296085	296085

Hydrodynamic conditions

The DV010 disposal ground is located approximately 2.5km to the south-east of Dover Harbour and is described as 'segment of a circle centred 51° 06.300'N 01° 20.900'E of a radius of 1 nautical mile from 107 degrees clockwise to 157 degrees'. Its most shallow extent is approximately -16mCD, deepening to around -33mCD at most, in the further offshore portion. **Figure 5.1** illustrates the bathymetry of the disposal site as recorded during 2011.

The predominant tides in the area of DV010 run in a south-west to north-east direction, with stronger flows towards the north-east. Due to the position of the Dover Straits, between the influence of the tides of the North Sea and those of the English Channel, the tidal structure is unusual, with high currents running at high water and low water and slacker periods observed at one hour before high tide and five hours after high tide.

The disposal site is in a region of high current velocity due to the constriction of the English Channel in this area; modelling carried out by HR Wallingford to inform the plume dispersion studies predicted that current speeds would be greater on the northeast/flood tide (maximum 1.7 m/s at the disposal site) than on the southwest/ ebb tide (1.4 m/s).

Average wave conditions at the disposal site, based on two years of measurements at Dover (1985-1986) in 17m water depth as provided by the Cefas WaveNet site, are considered to be H_s = 0.85m, T_z = 3.4s).

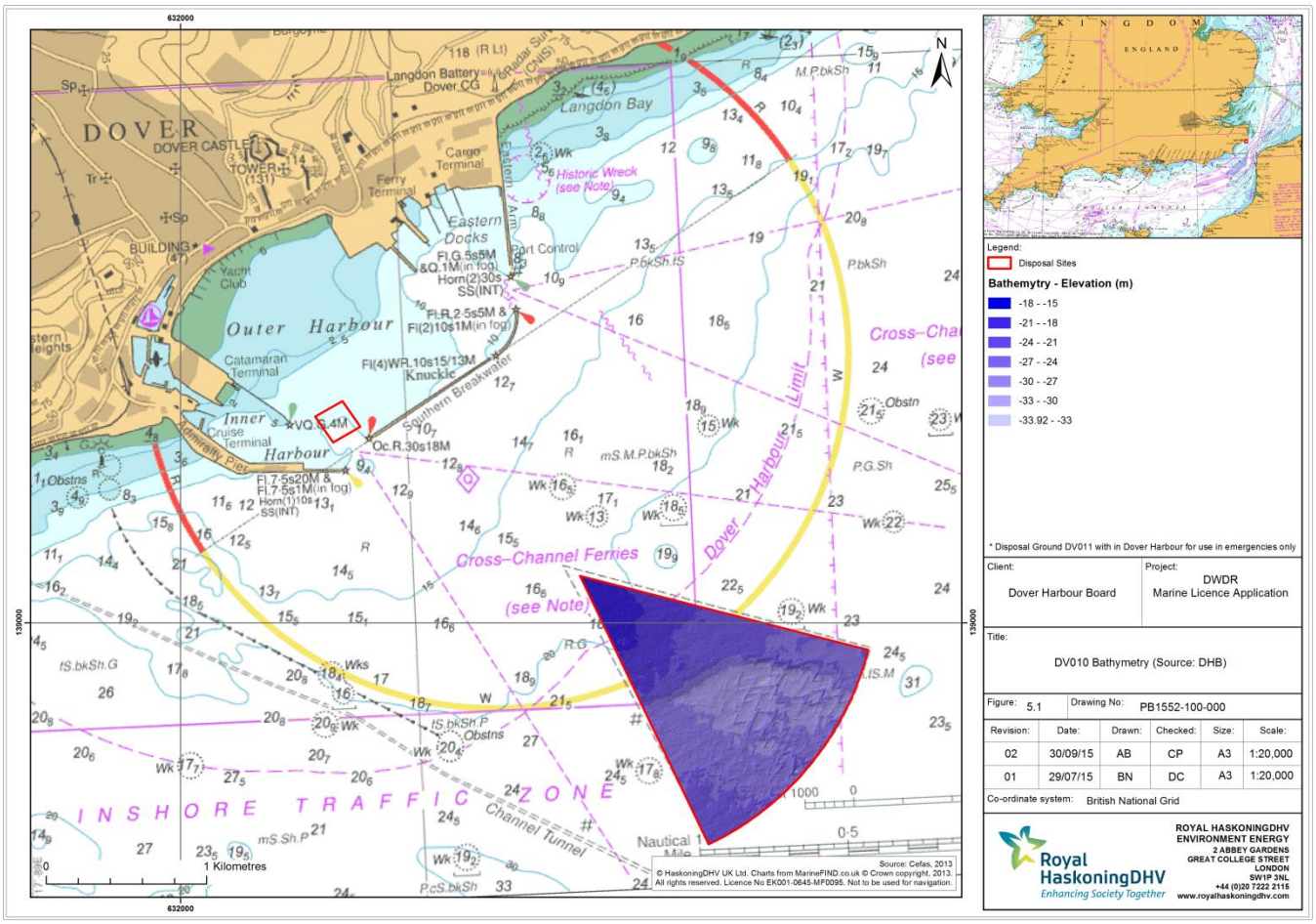

Figure 5-1 Bathymetry at DV010

Approach to Dredging

As described in Section 4 the 150,000m^3 of material to be dredged comprises chalk (around 60%) overlain by sand/gravel (around 20%) and silt (20%). All dredging activities associated with this MLA will be undertaken using a backhoe dredger; the material will then be transported to the disposal site by barge and deposited at DV010. No water will be added to the material once in the barge and it is anticipated therefore that the dredge arisings will not break down significantly during transport to the disposal site.

Backhoe dredging is considered to introduce a relatively low level of additional water to the dredge arisings (when compared to other dredging techniques) and thus dredged material should retain much of its *in situ* qualities.

Physical characteristics of the material to be dredged

As mentioned in Section 5, in March/April 2015 geotechnical site investigations at Dover Harbour were carried out to inform the DWDR scheme and Appendix 6 contains the factual report from Fugro Sea Core Ltd (FSCL).

Of the vibrocores taken in the areas to be dredged, VC-108, VC-108n and VC-109n were taken from within the footprint of Berth A and VC-113 was taken from within the approaches to Berth A These locations are marked as numbers on **Figure 4.1**.

In order to ensure adequate coverage of potential sediment changes at depth, samples were taken at 1m depths until the depth of the core was reached whereby a final sample was collected during the Fugro survey

and every 2m during the geotechnical investigation survey. Where chalk was identified, samples were not collected as the risk of contamination was considered to be unlikely.

From VC-108, VC-108n and VC-109n it can be seen that the top 1m of Berth A comprises clay/ gravelly sand overlaying softer clay to depths of up to 1m – 3m. These finer materials are underlain by medium strong moderately weathered chalk overlain by a mixture of silty clay, clay or gravelly sand.

VC-113 indicate that the first 1m of the approach to Berth A comprises silty clay underlain by 1m-4m of soft clay with the bottom 4-5.2m of the core yielding clayey fine sand.

Sampling chalk with core techniques can often destroy much of the texture and structure of the material yielding 'disturbed' samples (Fugro Sea Core Limited, 2015). The fact that the chalk recorded under Berth A is sampled as moderately weathered despite the disturbance from the coring action suggests that the chalk layer is likely to be quite strongly cohesive and that backhoe dredging should therefore lead to much of the chalk being removed in cobble/boulder sized chunks rather than the 'toothpaste' consistency that can arise through other forms of dredging.

The finer silts, clays and gravelly sands overlaying the chalk are likely to be dredged with higher amounts of water and thus be more 'fluid' at the point of disposal. This finer material however is more similar to the material regularly disposed of through maintenance dredging of the Harbour.

In order to inform this MLA, 94 samples were sent to the Cefas laboratory for analysis and no bulking of samples was undertaken in order to ensure a good cross section of samples in the various locations. Results from the various analyses were compared against the Cefas guideline Action Levels in assessing the suitability of the dredged sediment for disposal at sea (see **Table 4.1** for Cefas Action Levels). These guideline Action Levels do not represent pass/fail criteria, but are used in a weight-of-evidence approach during the licence application process.

At each of the locations, analysis for metals and tins, polycyclic aromatic hydrocarbons and particle size analysis was undertaken as requested. The results from the metals analysis confirmed that there are no Action Level 2 exceedances within the data set within the areas to be dredged. There was an exceedance of Action level 2 however, in the 0.6m sample in Granville Dock which showed elevated levels of tributyl tin (TBT) at 1. 194mg/l. However, since dredging is no longer proposed within this dock, no further investigation has been undertaken in this location.

In terms of all other metal parameters, there are exceedances of Action Level 1, particularly of chromium, nickel and arsenic. However the majority of exceedances are just above the Action Level and therefore are not significantly greater than the considered background.

The PAH results also indicate some exceedances of Action Level 1, particularly in VC-113 and VC-108n, however the majority of these are just above the Action Level and therefore are not significantly greater than the considered background.

Indications regarding the potential contaminant levels of sediments within the areas to be dredged are considered therefore to be positive in that there are no Action Level 2 exceedances and the majority of Action Level 1 exceedances in the data provided to date show relatively minor exceedances (i.e. are only just above the Action Level concentration).

Biology of the disposal site DV010

The proposed disposal site is not located within or adjacent to any European sites designated or being considered for designation for their nature conservation importance. Full details on each of these, and a comprehensive assessment on the potential for the proposed disposal of dredged arisings from the DWDR scheme to impact on these MCZs is provided in Section 6.

The Channel Habitat Atlas for Marine Resource Management (CHARM) describes the Dover Straits as 'Seabeds essentially pebbly in the Strait, being borded to the north-east and south-west by sandy sediments' and the seabed sediment represented in the mapping is characterised as predominantly gravels (Carpentier *et al.*, 2005).

No direct sampling of the benthic ecology or the fish assemblages of the disposal site has been undertaken, as the strong tides and extremely busy shipping traffic through the Straits constrain such activities. The benthic fauna and fish assemblages are therefore inferred from those found in association with similar substrate types in the wider Eastern English Channel. It is likely that the benthic fauna are adapted to a high energy environment, given the coarse nature of the sediments and the relatively high tidal current speeds and consist of species such as the crab *Pisidia longicornis*, the sea urchin *Psammechinus miliaris* and the polychaete work *Ophelia borealis*. Fish species considered likely to be present in abundance are red gurnard *Aspitrigla cuculus*, cod *Gadus morhua*, whiting *Merlangius merlangius*, thornback ray *Raja clavata* and Dover sole *Solea solea*.

Fishing Activity

The 2009 ES describes Dover as having very few fishing boats working from the harbour, with potting known to take place on the nearshore chalk reefs and drift and fixed nets used to catch cod, Pollack, bass, herring and flatfish. It is unlikely that a high fishing effort exists in the vicinity of the disposal site as the high levels of shipping traffic can render it impractical.

Potential impacts from disposal of dredged material

Drawing on both the 2009 T2 ES and more recent studies to inform the MLA an assessment has been made of the potential impacts arising from the disposal of dredged material at DV010. Of particular relevance is the plume dispersion modelling carried out by HR Wallingford in 2015 (see Appendix 7); understanding the behaviour of the dredge plume following disposal helps to inform the assessment of impacts at and within the vicinity of DV010.

Visual impact as a result of disposal

The disposal of any dredged material results in the creation of a plume. The disposed material discharged from the hull of a dredging vessel will have significant initial momentum and results in a body of water, denser than the surrounding water, which descends towards the seabed (HR Wallingford, 2015). This initial rapid descent is known as the 'dynamic phase' of plume dispersion and the plume at this stage is referred to as the 'dynamic plume'.

As the dynamic plume descends the ambient water is mixed with the plume diluting it and slowing it down until it reaches the seabed as a dense pancake-like plume which spreads out radially from the point of impact. Initially the mixing between the plume and ambient water is limited however if the density of material in the plume is sufficiently low and/or the ambient currents/wave action are sufficiently high then significant mixing occurs and sediment is released back into the water column to form a passive plume. It is this element of the plume that has the potential to result in a visual impact in the vicinity of DV010.

Of the materials to be dredged in relation to this MLA (gravelly sand, silt, clay and chalk) it is the muddier sediments (silt and clay) which give rise to the most extensive sediment plumes upon disposal as gravelly sand particles are likely to rapidly settle to the bed at the disposal location itself (HR Wallingford, 2015). Modelling of the plume dispersion indicated that the concentrations of depth-averaged increase in suspended sediment above background was likely to peak as flood tides carry sediment into an area and return to background levels on the ebb tide. Whilst the plume of muddy sediments was anticipated to extend several 10s of kilometres from the release site, mean suspended sediment concentrations are relatively low (up to 10 mg/l).

Although contemporary observations of background suspended sediment concentrations in the region of the plume are not available, Lafite *et al* (2000) found that concentrations a few kilometres offshore at Folkestone varied seasonally between 1 and 16 mg/l; HR Wallingford (2002) report average suspended sediment concentrations in the southern North Sea of approximately 2-64mg/l depending on the season. This suggests that the concentrations predicted in the HR Wallingford plume modelling (2015) are much less than the natural background variability that has been measured in the area. The visual impact from the dispersion of the muddier sediments is therefore likely to be negligible in comparison to the natural conditions.

The disposal of chalk at sea can present different challenges in terms of aesthetic impact; very fine particles of chalk when combined with water have the potential to disperse widely from the point of disposal, often in the upper levels of the water column. For the DWDR scheme the chalk will be dredged with a backhoe dredger which should mean that much of the chalk will be in cobble and boulder sized chunks, rather than

highly fluidised as can arise through other types of dredging. The vibrocores indicate that the chalk to be dredged is likely to be of a completely weathered almost clay like consistency (also known as 'putty' chalk) and as such the amount of fines released during the disposal of the chalk is anticipated to be negligible. It is likely that a small amount of suspended chalk particles will be released but given the high levels of mixing and existing background levels of suspended sediment, it is anticipated that any visual impact will be short-term and negligible. Disposing of the chalk at the slackest point of the tide will also minimise the potential for mixing between the dredged material and the ambient water and thus reduce the amount of fine chalk particles that contribute to the passive plume.

Disturbance to fish at the disposal site

Disposal of 150,000m^3 of dredged sediment at the Dover disposal site could be expected to impact on any fish resources present in the area through increased levels of suspended sediments in the water column or smothering, and may potentially affect fisheries in the area. However, given that the site is already used for dredge disposal and that the fish species are mobile and would show avoidance reactions to short-term localised areas of increased sedimentation, the potential is considered to be of negligible impact.

Disturbance to benthic fauna at the disposal site

The proposed scheme involves disposing of the dredged material over a period of 9 weeks. The majority of the material would be expected to disperse naturally away from the site due to the fine nature of the sediments and the dynamic dispersive nature of the site. However, a significant proportion of the dredged material would be expected to initially settle in the immediate area of disposal, resulting in smothering of the benthos. For fine sediments, the impact is expected to be relatively short-term, as more material disperses from the site. The chalk, however, is anticipated to take longer to disperse as the process of eroding the cobbles and boulders of material is likely to be more long-term. To prevent excessive build up in any one location it is anticipated that the site will be divided into quadrants and the material will be deposited equally within those quadrants; this should also aid dispersion as multiple surfaces of the material will be exposed to erosion at all times.

It is likely that there may be a loss of species within the disposal footprint however this is an already present impact resulting from long-term use of DV010 as a disposal site. Species in the surrounding areas may suffer from increased turbidity during the disposal operations however it would be expected that the surrounding area will be rapidly re-colonised upon cessation of the disposal activity. Due to the short-term nature of the impact, the existing resistant communities and the likelihood of rapid recovery, it is not considered that this operation will result in more than a potential minor adverse impact.

Once the DWDR scheme is completed it is anticipated that maintenance dredging within the harbour will continue regularly incorporating any dredging requirement of the new development. HR Wallingford has predicted that the amount of silt deposited of within the harbour will increase by 6% as a result of the DWDR scheme and this material will be disposed of at DV010. Any impacts on benthic fauna associated with the disposal of maintenance dredged material are likely to be similar to those associated with the previous disposal activities at the site. Any impacts are therefore considered to be comparable to those already experienced at the site and of negligible significance.

Resuspension of potentially contaminated sediments

As explained above analysis of the material to be dredged has indicated that the potential contaminant levels of sediments within the areas to be dredged are considered therefore to be positive in that there are no Action Level 2 exceedances and the majority of Action Level 1 exceedances in the data provided to date show relatively minor exceedances (i.e. are only just above the Action Level concentration). No impact is therefore considered likely to arise from the resuspension of this material.

Obstruction to navigation during disposal

The disposal site lies in an area subject to high levels of shipping traffic and as such increases in vessel movements (i.e. barges travelling to and from the disposal site) have the potential to cause a temporary moderate adverse impact. As indicated in the 2009 T2 ES, the Port of Dover, together with the Maritime and Coastguard Agency and HM Coastguard, has a range of technologies that they utilise to control the movement of vessels in and around the port. Arrangements for movements of vessels associated with the dredging will

therefore be communicated as necessary and Notices to Mariners will be issued as appropriate supported by VHF radio broadcasts as necessary.

Potential impacts on water depths

The disposal of 150,000m^3 of material has the potential to create a navigation hazard should there be a risk of accumulation and subsequent reduction in 'clear water' above DV010. As described above it is anticipated that the majority of the fine sediments (clay and silt) will be quickly dispersed away from the site, along with much of the gravelly sand; these elements comprise approximately 40% of the dredged material. Approximately 90,000m^3 of the material to be dredged is anticipated to be chalk, the majority of which is likely to be disposed of as cobbles/boulders.

Water depths at DV010 are in the region of 15 – 33m with an increase in depth over the disposal site. DV010 has an area of approximately 1.5km^2 and material will be deposited targeting the deeper areas where possible. The disposal site will also be divided into quadrants to facilitate even deposition of the material across the available area. Whilst in the initial days following disposal there may be discrete piles of chalk these will subsequently slump and settle out and then be subject to weathering and dispersal as a result of the strong tidal currents in this location.

Assuming the deposition of material is evenly distributed across the disposal site (using the quadrant approach) and based on the available area of DV010 it is anticipated that the settlement of 90,000m^3 of chalk is unlikely to raise the bed level by more than 60 mm before dispersion occurs. Furthermore, as the disposal is anticipated to be spread across a 9 week period, the influx of material will be staggered. There is considered therefore to be sufficient capacity within the disposal site to accept the chalk without causing shallowing that could result in impacts on other sea users. No impacts are therefore predicted on water depths and the future use of the site for both capital and maintenance material is not considered to be compromised.

Potential impacts on tidal currents

The initial disposal of the chalk will temporarily protrude above the surrounding seabed with the potential for minor localised changes to tidal currents. Such changes would be restricted to the immediate vicinity of each barge load, potentially resulting in a scour hole (assuming the adjacent bed material was erodible). As the deposited material is not anticipated to raise the bed level more than 60 mm and as this is considered to be a temporary impact, the disposal is not expected to have an effect on the hydrodynamics beyond any minor scour that may occur initially around each area of disposal.

Conclusions

This section has considered the potential implications of disposing of 150,000m^3 of material at DV010. The conclusion of this disposal site assessment is that, subject to appropriate management, the deposition of the material is not likely to have any adverse impacts at the disposal site or its environs. This conclusion is based on the following points:

- Following analysis of the vibrocore samples it has been confirmed that no contamination has been identified within the material to be disposed of at DV010.
- The use of backhoe dredging techniques will minimise the addition of extra water to the dredged material. This will help ensure that the chalk is removed in relatively cohesive cobble/boulder sized chunks which should minimise the potential visual impact at the point of disposal.
- DV010 is a highly dispersive site characterised by strong tidal currents and as such accumulation is not anticipated to be an issue. The finer material being disposed of (silts, clays and gravelly sands, around 40% of the total) are considered likely to be rapidly dispersed from the site after initial disposal. The larger cobbles/boulders of chalk will initially be deposited on the seabed temporarily raising the bed level however it is anticipated that these too will be weathered and dispersed over time.
- The disposal site will be divided up into quadrants to ensure that deposition is evenly distributed across DV010.
- The ecology at the site is adapted to a disturbed environment, including the regular disposal of maintenance material

A post dredge high resolution multibeam bathymetric survey will be carried out on completion of the disposal of material at DV010 to demonstrate that the material has been evenly distributed and is being dispersed as anticipated.

6. Marine Conservation Zone Assessment

Introduction

This section contains the information required to undertake a Marine Conservation Zone (MCZ) assessment for proposed scheme for the purposes of marine licensing.

The proposed scheme

As described previously this MLA is limited to the disposal of the material to be removed from the approaches to as well as around Berth A of the DWDR scheme (see **Figure 2.2**) only. Dredging of this area will remove approximately 150,000m^3 of material, comprising around 60% chalk (90,000m^3), 20% sand and gravel (30,000m^3), and 20% silt (30,000m^3). This material will be disposed of at licenced disposal site DV010.

Marine Protected Area Designations

The proposed disposal site is not located within or adjacent to any European sites designated or being considered for designation for their nature conservation importance (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA), candidate SAC, proposed SPA, Ramsar site), the closest being 'Dover to Kingsdown Cliffs SAC', designated entirely for terrestrial features. The only Marine Protected Areas of relevance to the current proposals are therefore those designated or proposed for designation as MCZs under the Marine and Coastal Access Act 2009 (as amended).

Due to a number of gaps and limitations in the scientific evidence base for MCZs, Defra took the approach to designate MCZs in 'tranches', with the best evidenced sites being designated first, and additional studies undertaken on those for later tranches. Defra designated the first tranche of 27 MCZs in November 2013, and aim to designate the second tranche by January 2016. This will then be followed by a third tranche to complete the network of MCZs in English waters.

The MCZs of relevance to this assessment and considered in the following sections of this report are outlined in **Table 6.1** below. Their locations in relation to the proposed scheme are shown in **Figure 6.1**.

Table 6.1 MCZs relevant to the proposed scheme

Name	Status	Distance from DV010
Folkstone Pomerania	Fully designated MCZ (i.e. designated in First Tranche)	1km
Dover to Folkstone	'Proposed' MCZ (pMCZ) (i.e. included in Second Tranche public consultation)	1.3km
Dover to Deal	'Proposed' MCZ (pMCZ)	2km
Goodwin Sands	'Recommended' MCZ (rMCZ) (i.e. not included in Second Tranche public consultation)	9km
Offshore Foreland	'Recommended' MCZ (rMCZ)	6km

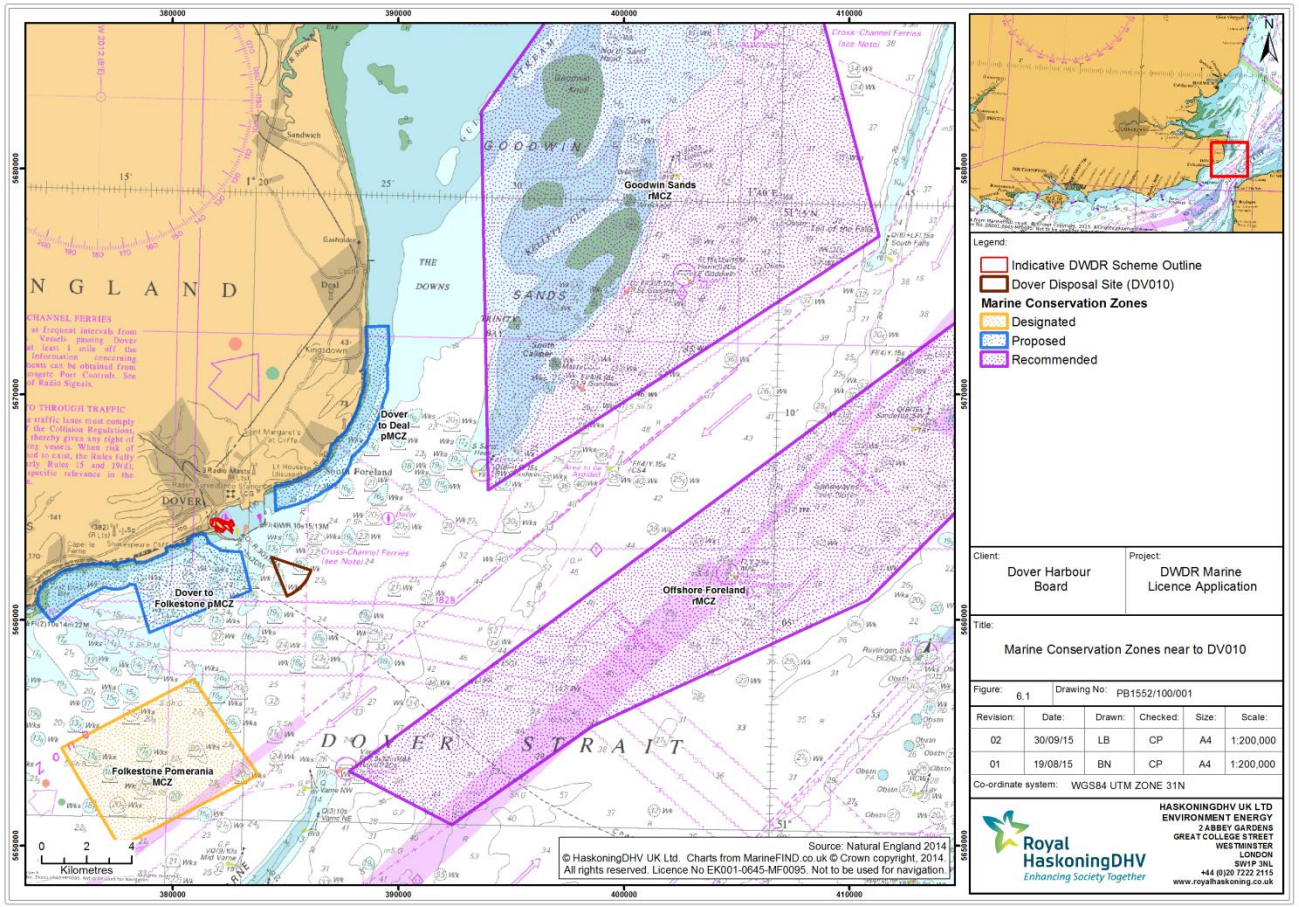

Figure 6-1 MCZs within the vicinity of DV010

MCZ Assessment Process

For MCZs a new process has been developed by the MMO to assess the potential impacts of operations or activities occurring within, or in close proximity to, an MCZ. This is to enable the MMO to meet its duties under the Marine and Coastal Access Act (MCAA) 2009 (as amended), the legislative framework that provides for the designation and management of MCZs in England and Wales.

Under Section 126 of the MCAA, duties are placed on the MMO in relation to marine licence decision making and the consideration of MCZs. This applies where:

a) A public authority has the function of determining an application (whenever made) for authorisation of the doing of any act, and

b) The act is capable of affecting (other than insignificantly) –

i. The protected features of an MCZ;

ii. Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent alone or in-combination with other plans or projects.

The MMO guidance 'Marine conservation zones and marine licensing' (Marine Management Organisation, 2013) provides information on the two staged approach for undertaking a MCZ assessment. The MMO initially screen all licence applications for potential to impact on an MCZ. Screening considers proximity to a proposed or designated MCZ along with the likelihood that the plan or project could impact on the features within the site. If an application is screened in it is then considered under the following two-staged assessment process.

Stage 1 MCZ Assessment

The Stage 1 MCA Assessment considers the extent of the potential impact of the plan or project on the MCZ in more detail. At this stage the conservation objectives for the MCZ need to be considered. The conservation objectives for MCZs are high level criteria describing the desired condition of the MCZ features. There are two objectives for features within an MCZ, namely whether the features are in the desired favourable condition and need to be maintained in this condition, or, whether the features are not in the desired favourable condition and need to be recovered to that condition.

The Stage 1 MCZ Assessment looks at whether the plan or project could potentially affect these objectives, that is, impact the site so that the features are no longer in favourable condition, or prevent the features from recovering to a favourable condition. The MMO also needs to be satisfied that they can meet their requirements under the MCAA to further the conservation objectives for the site. This requirement sits with the MMO as the licensing authority to ensure that the condition of the site is improved and enhanced wherever possible.

The MMO will use information supplied by the applicant with the licence application, advice from the Statutory Nature Conservation Bodies (SNCBs) and any other relevant information to determine whether (as set out in MMO guidance):

- *There is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ.*
- *The MMO can exercise its functions to further the conservation objectives stated for the MCZ.*

If neither of the criteria above can be met, the Stage 1 assessment then considers whether:

- *There is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of the conservation objectives stated for the MCZ. This should include proceeding with it (a) in another manner, or (b) at another location.*

If mitigation to reduce the impacts to an acceptable level cannot be secured, and there are no other alternative locations, then the project will proceed to be considered under Stage 2 of the assessment process.

Stage 2 MCZ Assessment

The Stage 2 MCZ Assessment considers the socio-economic impact of the plan or project together with the risk of environmental damage. There are two parts to the Stage 2 assessment process:

- *Does the public benefit in proceeding with the project clearly outweigh the risk of damage to the environment that will be created by proceeding with it? If so,*
- *Can the applicant satisfy that they can secure, or undertake arrangements to secure, measures of equivalent environmental benefit for the damage the project will have on the MCZ features?*

Guidance from the MMO on what constitutes measures of equivalent environmental benefit states that measures can be based on those considered appropriate when securing compensatory habitat for projects deemed to have an adverse effect on internationally designated sites under the Habitats Directive.

Royal HaskoningDHV has recently produced guidance for developers on the steps needed to provide sufficient information for each stage of the MCZ Assessment process (published September 2015). This guidance will be used to set out the required information for the MMO to undertake an MCZ Assessment for the proposed disposal operations to licenced disposal site DV010.

MCZ Features

For each designated feature of a site, a conservation objective is assigned. The conservation objectives for MCZs are high level criteria describing the desired condition of the MCZ features. There are two objectives for features within an MCZ, namely whether the features are in the desired favourable condition and need to be maintained in this condition, or, whether the features are not in the desired favourable condition and need to be recovered to that condition.

As discussed above, one fully designated MCZ, two MCZs proposed for designation and two recommended MCZs which will be subject to further consultation are located within the vicinity of the proposed scheme. These sites, their designated features and their conservation objectives (if available) are outlined in greater detail in the following section.

Folkstone Pomerania MCZ

The site is located approximately 5.4km southwest of disposal site DV010 at its closest point.

The following information is taken from Natural England's draft formal advice for Folkestone Pomerania MCZ provided under the MCAA to give advice on how to further the conservation objectives for the MCZ, and the activities that are capable of affecting the designated features and the processes which they are dependent upon (Natural England, 2015a).

Folkestone Pomerania MCZ was designated on 21 November 2013 and covers 33.71km^2 of the subtidal marine environment. It is composed of high energy circalittoral rock with extensive areas of subtidal sand and coarse sediment. The site also supports two types of biogenic reefs, ross worm reef (*Sabellaria spinulosa*) and the honeycomb worm reef (*Sabellaria alveolata*) as well as fragile sponge and anthozoan communities. Within the site, water depth and seabed composition varies, creating a range of habitats capable of supporting a diverse range of species.

Subtidal coarse sediment and sand are dominant, covering approximately 93% of the site. Smaller areas of high energy circalittoral rock are also found, however, given the highly mobile state of the sand and coarse sediment, their exposure is susceptible to change.

The site is characterised by its distinctive large depressions in the seabed, where the relatively flat topography drops from 22m down to 30m through a progression of boulder-strewn slopes.

Exposed rock ledges are found at the top edges of these depressions. These support attached fauna including sponges, hydroids and anemones, and providing holes and crevices for mobile species such as crabs and fish. This rocky habitat also supports the fragile sponge and anthozoan communities. Both the ross and the honeycomb worm exhibit unusual occurrences, the ross worm has an uncommon combination of animals associated with it and the subtidal location of the honeycomb reef makes it exceptional. Commercially important fish species including sole, cod, mackerel and herring are known to use this area as a nursery and spawning ground.

At the time of writing the designated features of the Folkestone Pomerania MCZ had not yet undergone a formal condition assessment, therefore 'Supplementary Advice Tables' (SAT) for the MCZ have been used, with the 'target' for each feature referred to for the purposes of this assessment. The designated features, their attributes and targets are summarised from the SAT and outlined in **Table 6.2**.

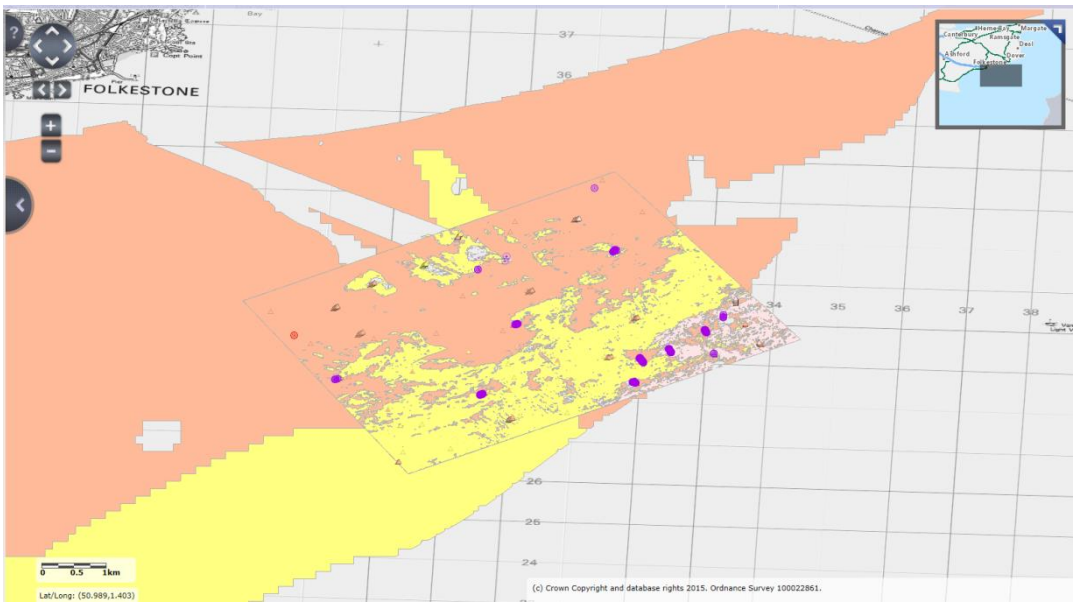

Figure 6-2 Folkstone Pomenaria MCZ Broad Scale Habitats and Features (from magic.gov.uk)

Table 6.2 Folkestone Pomerania MCZ - Designated features, attributes and targets

Designated feature	Fragile sponge and anthozoan communities on subtidal rocky habitats	High energy circalittoral rock	Honeycomb worm (*Sabellaria alveolata*) reef	Ross worm (*Sabellaria spinulosa*) reef	Subtidal coarse sediment	Subtidal sand
Attribute and Target for each Designated Feature						
Extent and distribution						
Recover the total extent and spatial distribution of fragile sponge and anthozoan communities on subtidal rocky habitat.	R	-	-	-	-	-
Maintain the total extent and spatial distribution of circalittoral rock, subject to natural variation in sediment veneer.	-	M	-	-	-	-
Maintain the total extent and spatial distribution of subtidal coarse sediment.	-	-	-	-	M	-
Maintain the total extent and spatial distribution of subtidal sand.	-	-	-	-	-	M
Extent of subtidal biogenic reef						
When *Sabellaria* reef develops within the site, its extent and persistence should not be compromised by anthropogenic activities, accepting that due to the naturally dynamic nature of the feature its extent will fluctuate over time.	-	-	X	X	-	-
Distribution: presence and spatial distribution of circalittoral rock communities						
Recover the presence and spatial distribution of circalittoral rock communities.	-	R	-	-	-	-
Distribution: presence and spatial distribution of subtidal coarse sediment communities						
Maintain the presence and spatial distribution of subtidal coarse sediment communities.	-	-	-	-	M	-
Distribution: presence and spatial distribution of subtidal sand communities						
Maintain the presence and spatial distribution of subtidal sand communities.	-	-	-	-	-	M
Structure: Non-native species and pathogens						
Restrict the introduction of non-native species and pathogens and their impacts.	Rest	Rest	Rest	Rest	Rest	Rest
Structure: physical structure of rocky substrate						
Maintain the surface and structural complexity, and the stability of the subtidal rock structure.	M	-	-	-	-	-
Structure: physical structure of rocky substrate						
Maintain the surface and structural complexity, and the stability of the reef structure.	-	M	-	-	-	-
Structure: population density						

Maintain the existing density of *Sabellaria* species across the feature.	-	-	M	M	-	-
Structure: presence and abundance of typical species						
Maintain the abundance of listed typical species, to enable each of them to be a viable component of the habitat.	M	M	M	M	M	M
Structure: sediment composition and distribution						
Maintain the existing distribution of sediment composition types across the feature.	-	-	-	-	M	M
Structure: species composition of component communities						
Recover the Species composition of component communities.	R	R	-	-	-	-
Structure: Species composition of the community						
Recover the species composition of the *Sabellaria* reef community.	-	-	R	R	-	-
Supporting processes: areas with conditions suitable for reef formation						
Recover the environmental conditions in those locations that are known, or which become known, to be important for *Sabellaria* reef formation.	-	-	R	R	-	-
Supporting processes: energy / exposure						
Maintain the natural physical energy resulting from waves, tides and other water flows, so that the exposure (high, medium, low) does not cause alteration to the biotopes, natural disturbance levels and stability, across the habitat.	M	M	-	-	M	M
Supporting processes: physico-chemical properties						
Maintain the natural physcio-chemical properties of the water.	M	M	M	M	M	M
Supporting processes: sediment contaminants						
Restrict surface sediment contaminant levels to concentrations where they are not adversely impacting the infauna of the feature.	-	-	-	-	Rest	Rest
Supporting processes: sediment movement and hydrodynamic regime						
Maintain all hydrodynamic and physical conditions such that natural water flow and sediment movement is not significantly altered or prevented from responding to changes in environmental conditions.	-	-	-	-	M	M
Supporting processes: sedimentation rate						
Maintain the natural rate of sediment deposition.	M	M	M	M	-	-
Supporting processes: water movement and energy						
Maintain the natural water flow velocity to the subtidal *Sabellaria* reefs, to provide high levels of oxygen, sediment supply and food.	-	-	M	M	-	-
Supporting processes: water quality – contaminants						
Restrict aqueous contaminants to levels equating to High Status (according to Annex VIII and X of the Water Framework Directive), avoiding deterioration from existing levels.	Rest	Rest	Rest	Rest	Rest	Rest
Supporting processes: water quality - dissolved oxygen						
Maintain the dissolved oxygen (DO) concentration to levels equating to high Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	M	M	M	M	M	M
Supporting processes: water quality – nutrients						
Maintain the natural water quality and specifically winter dissolved inorganic nitrogen (DIN) at a concentration equating to Good Ecological Status avoiding deterioration for existing site levels.	M	M	M	M	M	M

Supporting processes: water quality – turbidity						
Maintain natural levels of turbidity (e.g. suspended concentrations of sediment, plankton and other material) across the habitat.	M	M	M	M	M	M

M	MAINTAIN	R	RECOVER	Rest.	RESTRICT

As can be determined from **Table 6.2**, the vast majority of interest feature attributes of the Folkestone Pomerania MCZ have a target to 'maintain' the existing conservation status of the feature concerned. Four of the six interest features do however have certain attributes with a target of 'recover' as a conservation objective.

- (1) Fragile sponge and anthozoan communities on subtidal rocky habitats:
  - Recover the total extent and spatial distribution of fragile sponge and anthozoan communities on subtidal rocky habitat.
  - Recover the Species composition of component communities.
- (2) High energy circalittoral rock:
  - Recover the presence and spatial distribution of circalittoral rock communities.
  - Recover the Species composition of component communities
- (3) Honeycomb worm (*Sabellaria alveolata*) reef / (4) Ross worm (*Sabellaria spinulosa*) reef:
  - Recover the species composition of the *Sabellaria* reef community.
  - Recover the environmental conditions in those locations that are known, or which become known, to be important for *Sabellaria* reef formation.

Should subtidal rock be lost (e.g. due to smothering by sediment), it would no longer be able to support the fragile sponge and anthozoan communities which are an interest feature of this site, thus potentially impacting upon species composition (and biodiversity) within the MCZ. *Sabellaria* reefs are reliant on the physical and biological process that allow reef to form. Areas where there is evidence for the ability of reef to persist over time, forming more elevated structures or consistently recolonising, will be especially important for the conservation of the feature (Natural England, 2015a).

A draft 'Advice on Operations' document has been published by Natural England as part of the conservation advice package for Folkestone Pomerania MCZ. This identifies pressures associated with the most commonly occurring marine activities in the MCZ, and provides a broad scale assessment of the sensitivity of the designated habitat and species features of the site to these pressures (Natural England, 2015c).

For the activity of 'capital dredging disposal', there are 24 potential 'pressures' identified. Of these, six are not categorised and a further five pressures are deemed to be 'not sensitive'.

The remaining 13 pressures of most of most relevance to the interest features of the MCZ from capital dredging disposal (not including the feature 'fragile sponge and anthozoan communities on subtidal rocky habitat') are identified as a mixture of either 'sensitive' or having 'insufficient evidence to assess'. These are:

- Abrasion/disturbance of the substrate on the surface of the seabed.
- Changes in suspended solids (water clarity) (not Honeycomb worm or Ross worm reefs).
- Introduction of other substances (solid, liquid or gas).
- Introduction or spread of non-indigenous species.
- Organic enrichment.
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.
- Physical change (to another seabed type).

- Physical loss (to land or freshwater habitat).
- Radionuclide contamination.
- Siltation rate changes (High), including smothering (depth of vertical sediment overburden).
- Siltation rate changes (Low), including smothering (depth of vertical sediment overburden) (not Ross worm reefs).
- Water flow (tidal current) changes – local, including sediment transport considerations (not Ross worm reefs).
- Wave exposure changes - local.

These pressures should therefore be taken forward in any necessary assessment. Pressures deemed 'not sensitive' should also be considered in the assessment, with regards to the potential for indirect or in-combination effects to occur on interest features.

Dover to Folkstone pMCZ

The site is located approximately 1.3km west of disposal site DV010 at its closest point.

The Dover to Folkestone pMCZ is an inshore site with an area of 20 km², encompassing the wave-cut intertidal platforms that form an almost continuous reef between Kingsdown, Deal in the northeast and Folkstone Warren in the southwest (Defra, 2015d). The site protects a wide range of features and fills a gap for moderate energy intertidal rock and peat and clay exposures. Both littoral chalk and intertidal boulder communities are considered to be the best regional examples of these features (Defra, 2015a). The site boundary has been moved 500 metres away from the harbour wall of the Port of Dover to reduce impacts on the functioning of the port. As a result of this change, the features of moderate energy circalittoral rock sediments and subtidal sand are reduced by a quarter across the site. The locations where short snouted seahorses have been sighted are no longer within the boundary and the feature will not therefore be designated (Defra, 2015d).

Designation would protect the interest features as outlined in **Table 6.3**, all of which are currently within favourable condition and have a 'maintain' conservation status.

Table 6.3 Interest features of the Dover to Folkstone pMCZ

Feature	General management approach
Low energy intertidal rock	Maintain at favourable condition
Moderate energy intertidal rock	
High energy intertidal rock	
Intertidal under boulder communities	
Intertidal coarse sediment	
Intertidal sand and muddy sand	
Littoral chalk communities	
Subtidal chalk	
Peat and clay exposures	
Ross worm reefs (*Sabellaria spinulosa*)	
Moderate energy infralittoral rock	
High energy infralittoral rock	
Moderate energy circalittoral rock	
High energy circalittoral rock	
Subtidal coarse sediment	
Subtidal mixed sediments	
Subtidal sand	
Subtidal mud	
Native Oyster *(Ostrea edulis)*	
Folkestone Warren (geological feature)	

According to Defra's site summary document (Defra, 2015d), the following features are not currently proposed for designation as there is insufficient supporting evidence. Inclusion of these features may however be considered if scientific evidence becomes available:

- subtidal sands and gravels;
- intertidal mud;
- intertidal mixed sediments;
- blue mussel beds; and
- low energy infralittoral rock.

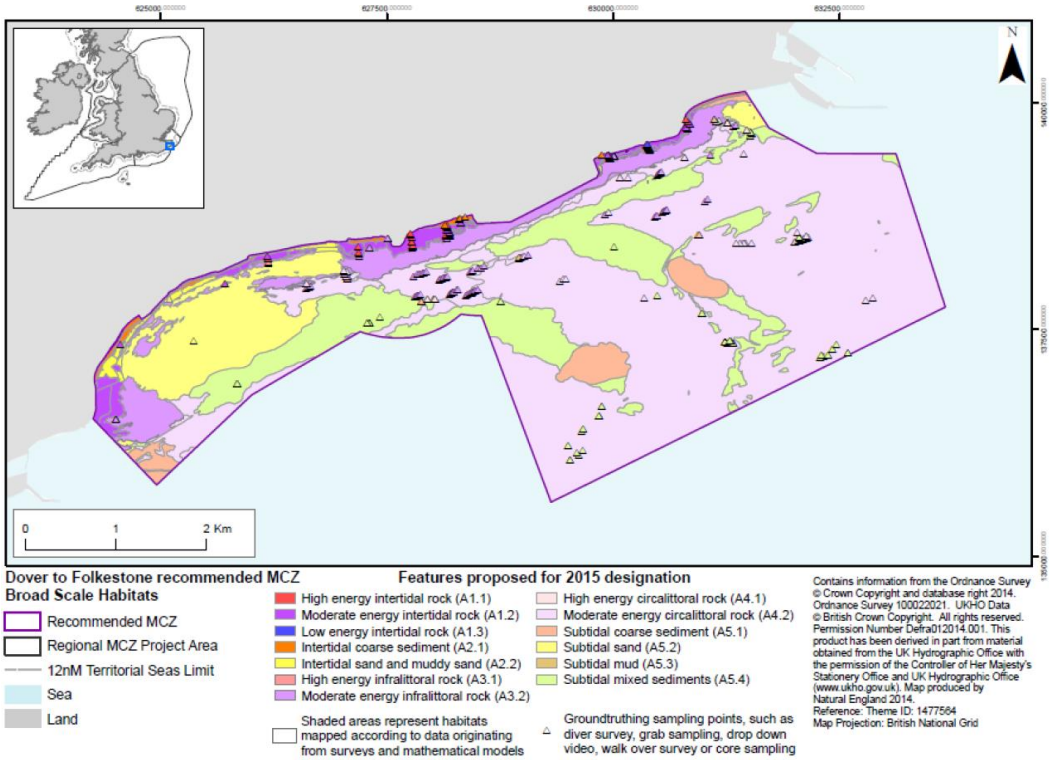

Figure 6-3 Dover to Folkstone pMCZ Broad Scale Habitats

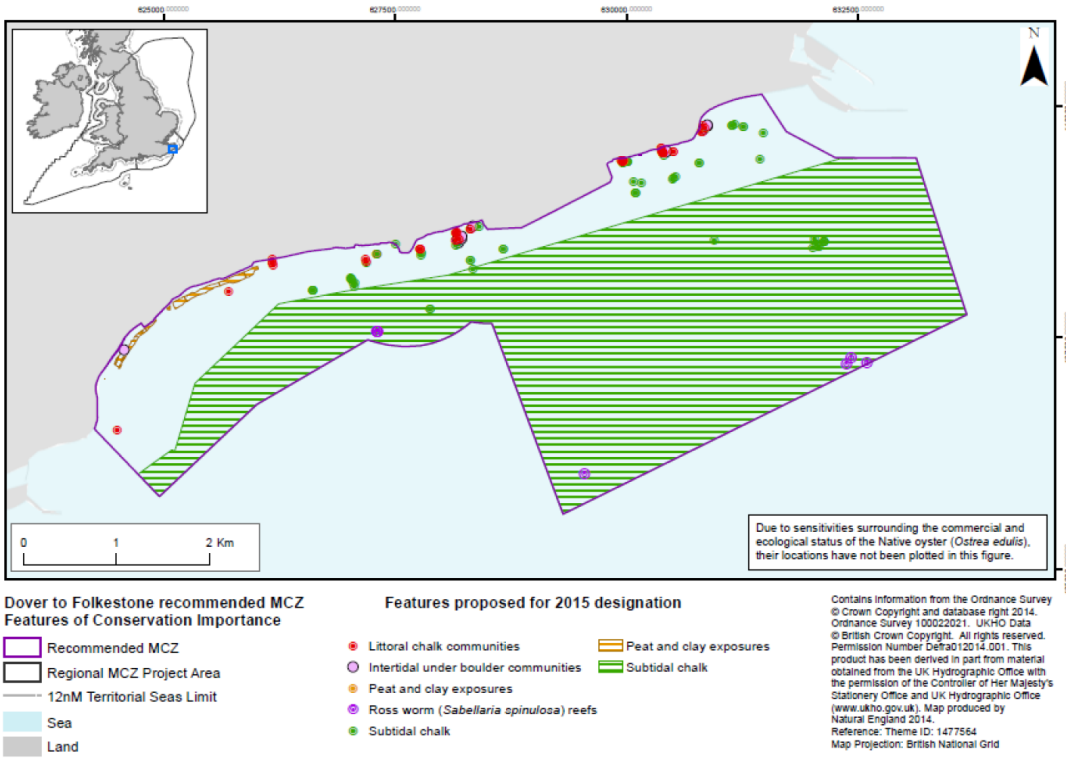

Figure 6-4 Dover to Folkstone pMCZ Features

Dover to Deal pMCZ

The site is located approximately 2km north of disposal site DV010 at its closest point.

The Dover to Deal pMCZ is located in the Dover Straits, between Deal in the north and Dover Harbour in the south and has an area of 10 km². The site protects a wide range of features in intertidal and subtidal habitats and will help to address gaps in the network for Rossworm reefs and intertidal underboulder communities and will contribute to the percentage protection of subtidal course sediment (Defra, 2015a). The site boundary has been moved 500 metres away from the harbour wall of the Port of Dover. This change will allow port operations such as dredging and disposal to continue unaffected while the sites remain ecologically viable although with some impacts on features included. The new boundaries retain the ecological value of the site though half of the subtidal sand would be lost and there would also be reductions in subtidal chalk and subtidal coarse sediment features (Defra, 2015c).

Designation would protect the interest features as outlined in **Table 6.4**, all of which are currently within favourable condition and have a 'maintain' conservation status.

Table 6.4 Interest features of the Dover to Deal pMCZ

Feature	General management approach
Low energy intertidal rock	Maintain at favourable condition
Moderate energy intertidal rock	
High energy intertidal rock	
Intertidal underboulder communities	
Littoral chalk communities	
Subtidal chalk	
Rossworm (*Sabellaria spinulosa*) reef	
Blue mussel beds	
Moderate energy infralittoral rock	
High energy circalittoral rock	
Moderate energy circalittoral rock	
Subtidal mixed sediments	
Native Oyster *(Ostrea edulis*	

According to Defra's site summary document (Defra, 2015a), the following features are not currently proposed for designation as there is insufficient supporting evidence. Inclusion of these features may however be considered if scientific evidence becomes available:

- intertidal coarse sediment;
- intertidal mud;
- intertidal sand and muddy sand;
- high energy infralittoral rock;
- subtidal coarse sediment; and
- subtidal sand.

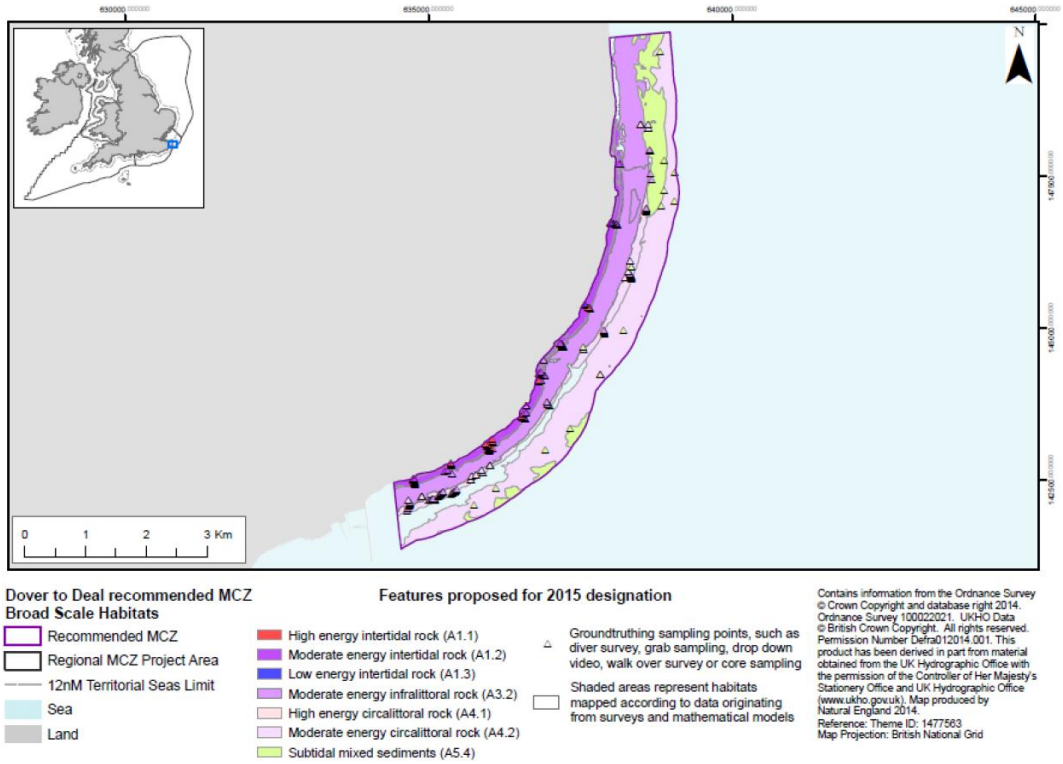

Figure 6-5 Dover to Deal pMCZ Broad Scale Habitats

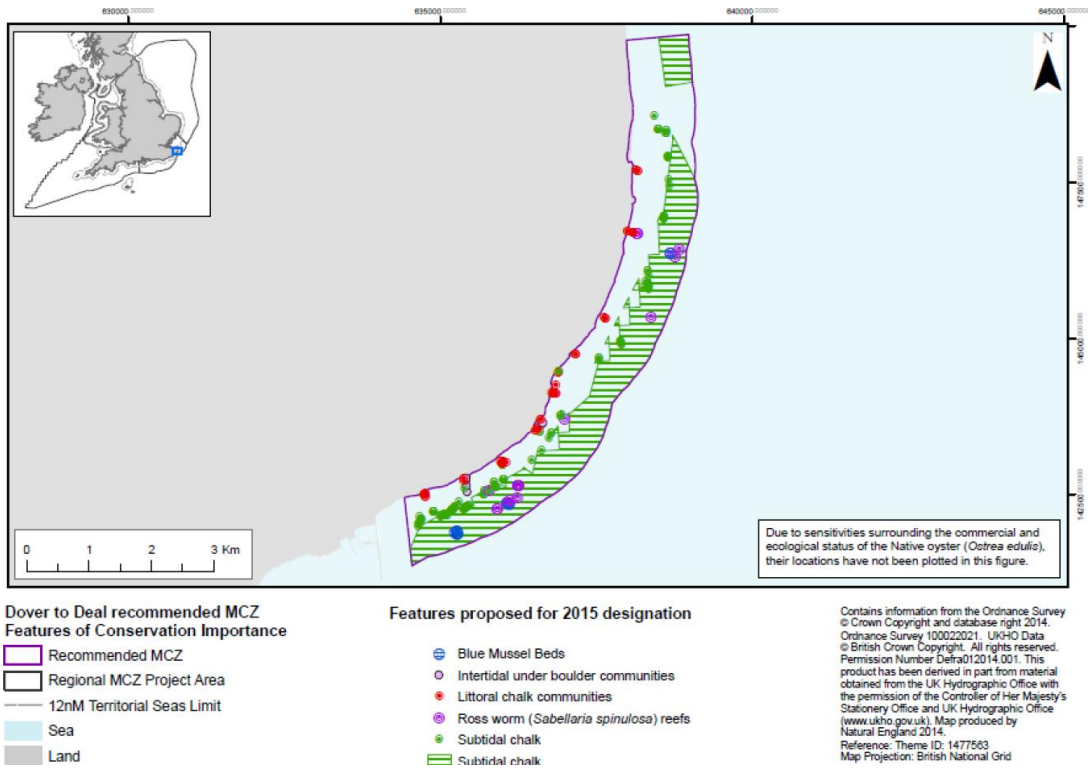

Figure 6-6 Dover to Deal pMCZ Features

Goodwin Sands rMCZ

The site is located approximately 9km northeast of disposal site DV010 at its closest point. No further information is currently available regarding if or when this site may be put forward for designation.

Goodwin Sands rMCZ is an inshore site measuring 277 km² and was recommended for four Broad Scale Habitats, two FOCI Habitats and one geological feature of interest within the 'Balanced Seas' 'Site Assessment Document (Balanced Seas, 2011). Due to uncertainty as to the presence of these features of interest, further survey work was commissioned by Defra and has recently been reported (Defra, 2015b). Analysis of this data has revealed that one broad scale habitat was not present (moderate energy infralittoral rock), with the others present but in sometimes significantly greater (e.g. moderate energy circalittoral rock), or lesser (e.g. subtidal sand) extents than predicted. 'Blue mussel beds' and 'Ross worm (*Sabellaria*) reefs' were observed in ground-truth data, but could not be confidently spatially mapped from the hydrographic data obtained.

Features which were found to be present, but which had not been identified in the SAD, included the Broadscale Habitat 'subtidal mixed sediments', and Habitat Foci 'subtidal sands and gravels' and 'subtidal chalk'. With regards to mobile species foci, survey observations agreed with evidence presented in the SAD, with no low or limited mobility species or highly mobile species recorded. This information is summarised in **Table 6.5**.

Table 6.5 Interest features of the Goodwin Sands rMCZ

Interest Features	Balanced Seas' 'Site Assessment Document' (Balanced Seas, 2011)	Goodwin Sands rMCZ Post-survey Site Report (Defra, 2015d)
Broad Scale Habitats	A3.2 Moderate energy infralittoral rock (0.65km^2)	Not present
	A4.2 Moderate energy circalittoral rock (0.58km^2)	Greater (11.19km^2)
	A5.1 Subtidal coarse sediment (115.55km^2)	Greater (133.19km^2)
	A5.2 Subtidal sand (159.97km^2)	Lesser (89.48km^2)
	Not listed	A5.4 Subtidal mixed sediments (24.09km^2)
FOCI habitats	Blue mussel beds (312.57m^2)	Present
	Rossworm (*Sabellaria spinulosa*) reef (625.29m^2)	Present
	Not listed	Subtidal sands and gravels (222.68km^2)
	Not listed	Subtidal chalk (11.19km^2)
Geological feature of interest	Geology Eastern English Channel outburst flood features	Within feature: A5.1 Subtidal coarse sediment

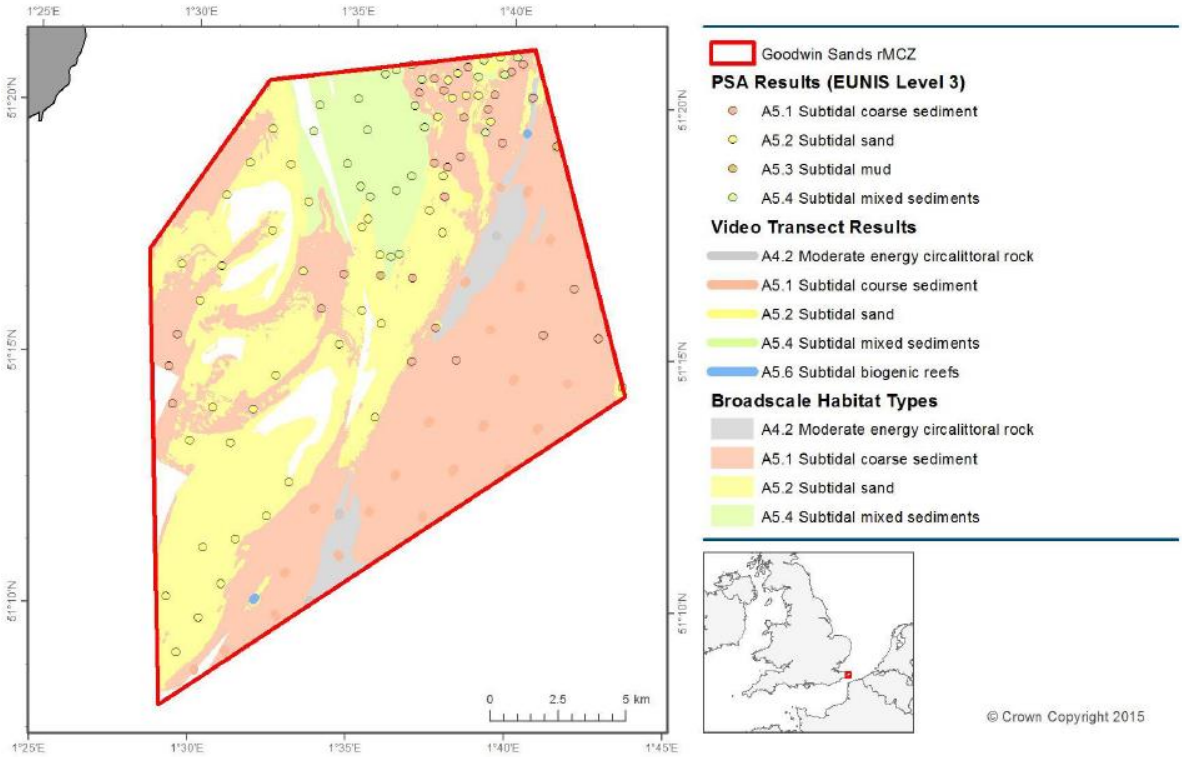

Figure 6-7 Goodwin Sands rMCZ – Updated map of Broad Scale Habitats and Features based on survey data (Defra 2015d).

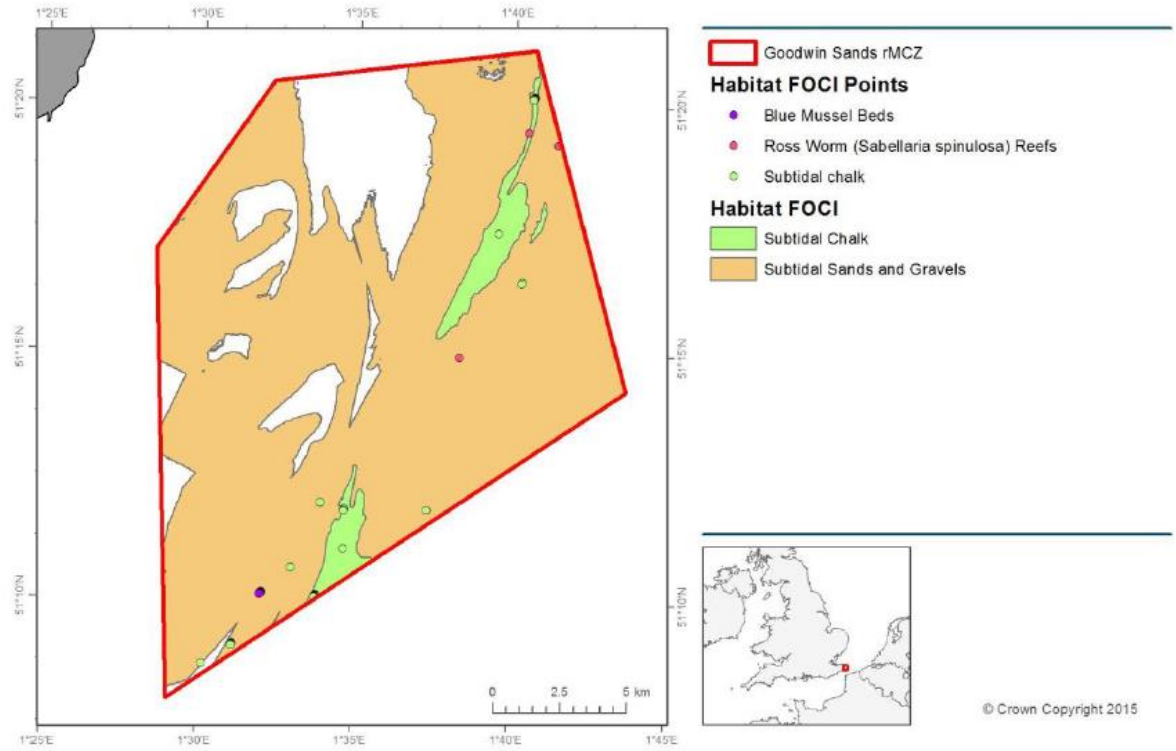

Figure 6-8 Goodwin Sands rMCZ – Updated Habitats FOCI map based on survey data (Defra 2015d).

Offshore Foreland rMCZ

The site is located approximately 8km south of disposal site DV010 at its closest point.

The Offshore Foreland rMCZ covers an area of 252 km² and lies between the 6nm and median lines off the South East coast of Kent. Five Broad Scale Habitats and one feature of geological interest were predicted in the Balanced Seas SAD (Balanced Seas, 2011):

- A3.1 high energy infralittoral rock (3.10 km^2).
- A4.1 high energy circalittoral rock (72.86 km^2).
- A4.2 mod energy circalittoral rock (12.68 km^2).
- A5.1 subtidal coarse sediment (93.65 km^2).
- A5.2 subtidal sand (68.61 km^2).
- Geology Eastern English Channel outburst flood features.

Designation has not been possible due to potentially significant unquantified socio-economic implications of designation associated with the non-UK commercial fishing sector (i.e. benthic trawling), with Defra committing to undertake further work to improve the data certainty prior to this site being considered for designation (Defra, 2013). No further information is currently available regarding if or when this site may be put forward for designation.

Screening

This MCZ assessment is being undertaken in support of a marine licence application to the MMO for the disposal of capital dredged material to offshore disposal site DV010. The sites discussed in the previous section of this report are deemed relevant to the current proposals and as such the following sections will follow the MMO's requirements with regards to the MCZ assessment process. The MMO will screen all marine licence applications to determine whether Section 126 of the MCAA should apply to the application (MMO, 2013). For the benefit of the MMO **Table 6.6** outlines this process for the current proposals and relevant sites.

Table 6.6 Outline screening for the DWDR scheme and relevant MCZs

MMO Screening Criteria	Folkstone Pomerania MCZ	Dover to Folkestone pMCZ	Dover to Deal pMCZ	Goodwin Sands rMCZ	Offshore Foreland rMCZ
Is the licensable activity taking place within or near an area being put forward for or already designated as an MCZ?	Yes – approx. 5.5km northeast (nearest point).	Yes – approx. 1.1km west (nearest point).	Yes – approx. 2.0km north (nearest point).	Yes – approx. 9.5km northeast (nearest point) and may be put forward for designation in third tranche.	Yes - approx. 8km southeast (nearest point) and may be put forward for designation in third tranche.
And					
Is the activity capable of affecting (other than insignificantly) either:					
i. The protected features of an MCZ?; ***or*** ii. Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent?	Yes – the proposed dredge disposal operations will be undertaken using Trailing Suction Hopper Dredger (TSHD) to dredge material including: chalk; gravel; sand; clay and silt. Backhoe dredger may be used to remove chalk or stiffer clays. Disposal of finer grained material (e.g. silt) has the potential to affect interest features through the release of dredged material causing increased Suspended Sediment Concentrations (SSC) and an increased risk of fine sediment deposition (and smothering) outwith the boundaries of the licenced disposal site.				
Result of screening exercise	Screened **in** to further assessment.	Screened **in** to further assessment.	Screened **in** to further assessment.	Screened **in** to further assessment (though as rMCZ this is as a precautionary measure only).	Screened **in** to further assessment (though as rMCZ this is as a precautionary measure only).

Stage 1 Assessment

Following consultation with Cefas (Cefas, 2015), disposal plume dispersion modelling was commissioned to help assess the predicted impacts of dredged material disposal at site DV010 on MCZs within the vicinity. The modelling addressed the Folkstone Pomerania MCZ, Dover to Folkstone pMCZ and Dover to Deal pMCZ (HR Wallingford, 2015). Though not explicitly considered by the modelling, the results have also been used to assess the likelihood of impacts upon the two recommended MCZ's within the vicinity of the disposal site, namely Goodwin Sands rMCZ and Foreland Offshore rMCZ.

Plume Dispersion Modelling

Muddy sediment was identified as the worst case in terms of potential for impacts, therefore modelling of the predicted dispersion of the fine sediment plume and its potential deposition was undertaken using average wave conditions for a 14 day (spring-neap cycle) period, representative of the proposed disposal operations which may continue over several months. The release point selected for modelling was close to the centre of the disposal site (HR Wallingford, 2015). **Figure 6.9** below shows the mean predicted increase in depth-averaged SSC above background levels.

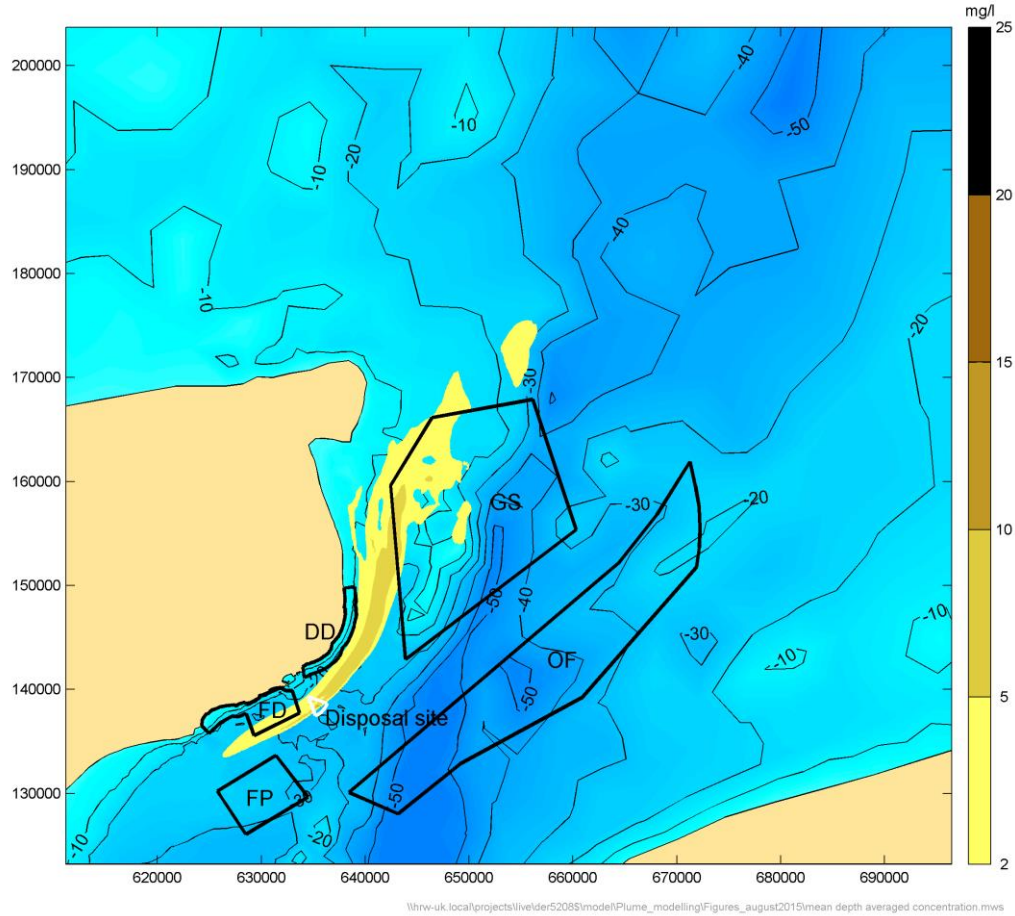

Figure 6-9 Mean predicted increase in depth-averaged SSC above background (mg/l) (HR Wallingford, 2015).

Note: FP = Folkstone Pomerania MCZ; FD = Dover to Folkstone pMCZ; DD = Dover to Deal pMCZ., GS = Goodwin Sands rMCZ, OF = Offshore Foreland rMCZ

Deposition of Fine Material

Figure 6.10 shows the predicted peak deposition of fine sediment, which shows three main areas where this may occur: at the disposal site, just inside the Dover to Deal pMCZ boundary, and at a location approximately 30km northeast of disposal site DV010 (HR Wallingford, 2015). No deposition was predicted in the Folkstone Pomerania MCZ or Dover to Folkstone pMCZ. Away from the disposal site, the maximum predicted deposition over the 15 day simulation was less then 5mm (**Figure 6.11**).

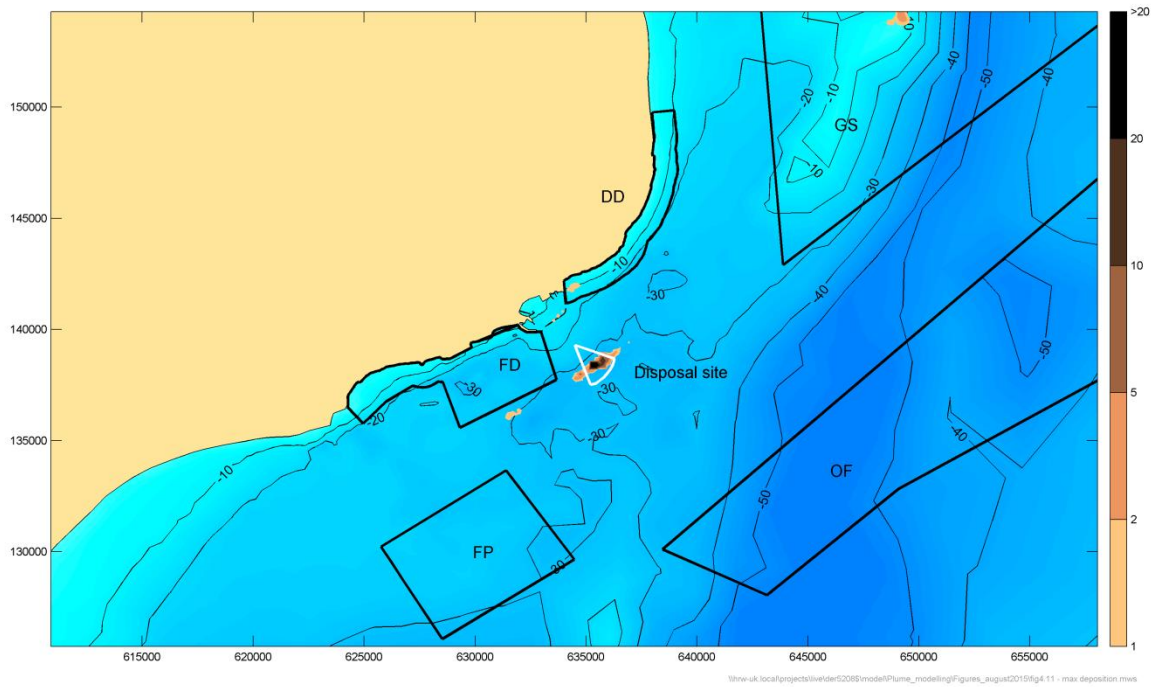

Figure 6-10 Maximum bed deposition predicted during simulation (mm) (HR Wallingford, 2015).

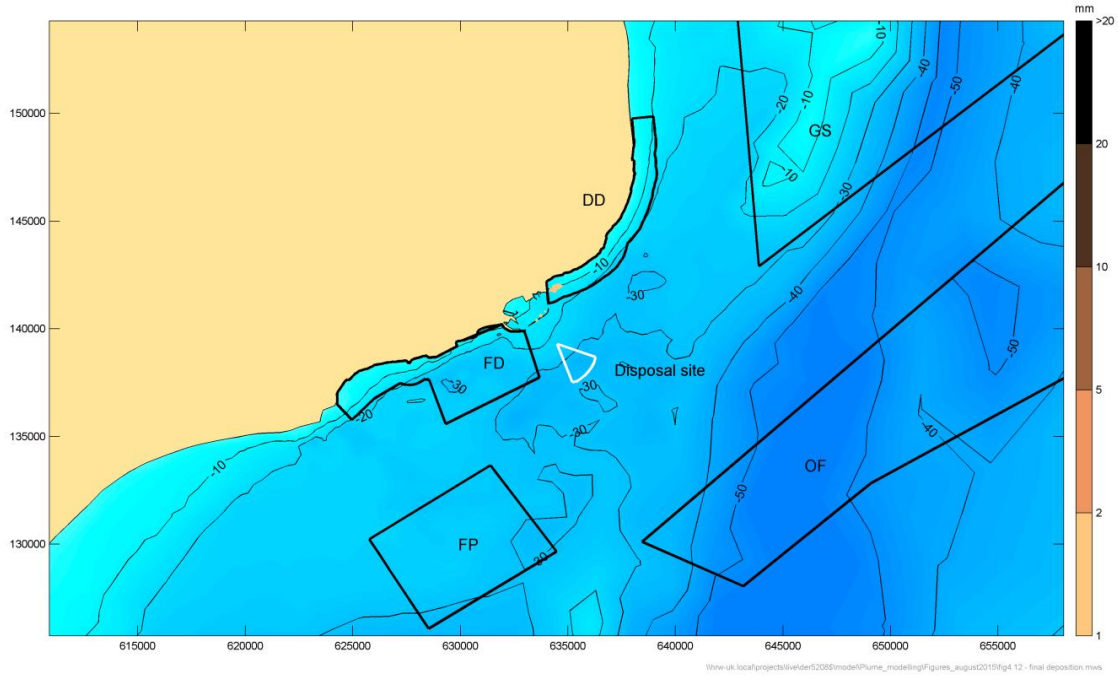

Figure 6-11 Final predicted deposition (15 days, 18 hours) (mm) (HR Wallingford, 2015).

Assessment of Impacts on the Folkstone Pomerania MCZ

Feature	Attribute and Target	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
Fragile sponge and anthozoan communities on subtidal rocky habitats	All 'Maintain', except: Recover • the total extent and spatial distribution of fragile sponge and anthozoan communities on subtidal rocky habitat. • the Species composition of component communities.	Fragile sponge and anthozoan communities on subtidal rocky habitats are present in the north-western sector of the MCZ, particularly around the rim of large trough features (Natural England, 2015a). This very rare habitat supports a number of species including a variety of sponges, soft corals (dead mans fingers *Alcyonium digitatum*) and anemones (e.g. plumose anemone *Metridium senile*, white striped anemone *Actinothoe sphyrodeta* and dahlia anemone *Urticina feline*). Mean SSCs caused by the release of dredged material were predicted to be highest at the disposal site and in a northeast/north-north-easterly direction, with some SSC levels above background levels predicted to the southwest of the disposal site. The Folkstone Pomerania MCZ is located outwith the predicted flow path of this material on either flood or ebb tides, with limited sediment transport in the direction of the MCZ from the disposal site. Based on modelling results, mean SSCs within the MCZ were therefore predicted to increase by less than 2mg/l as a result of the disposal operation for the modelled wave and tide conditions, with no deposition of fine materials predicted within the MCZ. This result would also be predicted should material be disposed of further offshore in the disposal site.	No adverse impact is predicted.

Feature	Attribute and Target	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
High energy circalittoral rock	All 'Maintain', except: Recover • the presence and spatial distribution of circalittoral rock communities. • the Species composition of component communities.	Areas of high energy circalittoral rock (composed of 'Greensand', a hard sandstone unique to SE England) were found to be exposed at the south-east corner of the site, though it is believed they underpin much of the site, though may be covered by subtidal coarse sediments and subtidal sands (Natural England, 2015a). This feature supports a wide variety of species, including the fragile sponge and anthozoan community feature. Modelling has indicated that the disposal of dredged material at site DV010 would have no impact upon the Folkstone Pomenaria MCZ. The predicted SSCs plume generated by the disposal activity is unlikely to reach the MCZ, nor is any sediment deposition from the disposal plume predicted.	No adverse impact is predicted.
Honeycomb worm (*Sabellaria alveolata*)	All 'Maintain', except: Recover • the species composition of the Sabellaria reef community. • the environmental conditions in those locations that are known, or which become known, to be important for *Sabellaria* reef formation.	The highly ephemeral reefs of the honeycomb worm have been found in two discrete areas in the western sector of the site. The occurrence of subtidal honeycomb reefs (particularly in south-east England) is very unusual as they are normally found in the intertidal zone (Natural England, 2015a). Modelling has indicated that the disposal of dredged material at site DV010 would have no impact upon the Folkstone Pomenaria MCZ. The predicted SSCs plume generated by the disposal activity is unlikely to reach the MCZ, nor is any sediment deposition from the disposal plume predicted.	No adverse impact is predicted.
Ross Worm (*Sabellaria spinulosa*) reefs	All 'Maintain', except: Recover • the species composition of the Sabellaria reef community. the environmental conditions in those locations that are known, or which become known, to be important for *Sabellaria* reef formation.	This ephemeral species occurs throughout the site. It is found both where underlying muddy sediment is present, and also forms part of the subtidal coarse sediment feature, building its tubes and also biogenic reefs where sufficient anchorage is available. A diverse community of infauna and epifauna can develop associated with the reefs. Within the MCZ, the honeycomb worm *Sabellaria alveolata* has also been found to be present alongside Ross worm on occasion (Natural England, 2015a). Modelling has indicated that the disposal of dredged material at site DV010 would have no impact upon the Folkstone Pomenaria MCZ. The predicted SSCs plume generated by the disposal activity is unlikely to reach the MCZ, nor is any sediment deposition from the disposal plume predicted.	No adverse impact is predicted.
Subtidal coarse sediment	All 'Maintain at favourable condition'	Subtidal coarse sediment is a highly mobile feature and is distributed throughout much of the site, comprising mixes of cobbles, pebbles, gravel and sands in varying proportions. Species found amongst these sediments within the MCZ include soft coral (*Alcyonium digitatum*) and partially buried dahlia anemones. Ross worm is also likely to be present as the larger stones prove a suitable anchorage substrate. This MCZ habitat is also used as a nursery and spawning ground by a number of commercially important fish species including Dover sole *Solea solea*, cod *Gadhus morhua*, mackerel *Scomber scombrus* and herring *Clupea harengus.* Modelling has indicated that the disposal of dredged material	No adverse impact is predicted.

Feature	Attribute and Target	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
		at site DV010 would have no impact upon the Folkstone Pomenaria MCZ. The predicted SSCs plume generated by the disposal activity is unlikely to reach the MCZ, nor is any sediment deposition from the disposal plume predicted.	
Subtidal sand	All 'Maintain at favourable condition'	Subtidal sand is a highly mobile feature predominantly found in the south west corner, with a small presence in the north-east of the site (Natural England, 2015a). A range of subtidal sand communities have been found, including both sessile (e.g. bryozoans, sponges, *Sabellaria spinulosa*) and mobile (e.g. *Asterias rubens*) species. Modelling has indicated that the disposal of dredged material at site DV010 would have no impact upon the Folkstone Pomenaria MCZ. The predicted SSCs plume generated by the disposal activity is unlikely to reach the MCZ, nor is any sediment deposition from the disposal plume predicted.	No adverse impact is predicted.

Conclusions of assessment for the Folkstone Pomerania MCZ

Based upon the results of the modelling exercise and assessment undertaken it is concluded that the proposed disposal activities meet the required 'tests' of the MCZ assessment process: that being, that there is no significant risk of the activity becoming a 'pressure' on any of the designated interest features, and thus 'hindering' the conservation objective targets to either 'Maintain' or 'Recover' the specific attributes of each interest feature within the MCZ. It is also concluded that the MMO will therefore be able to exercise its functions to 'further' the conservation objectives stated for the MCZ in accordance with Section 125(2) (a) of the MCAA 2009. No Stage 2 assessment is therefore considered necessary for Folkstone Pomerania MCZ.

Assessment of Impacts on the Dover to Folkstone pMCZ

Feature	General management approach	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
Intertidal rock: • Low energy; • Moderate energy; • High energy.	Maintain at favourable condition	Intertidal rocky habitats are located along much of the shore of the pMCZ. Modelling has indicated that the plume of SSCs would occur within offshore areas of the Dover to Folkstone pMCZ, with the predicted sediment plume extending approximately 10km to the southwest of the disposal site. Depth-averaged SSCs within offshore areas of the pMCZ could be increased by up to 34mg/l above background concentrations on a spring tide, when material is released at the centre of the disposal site. Greater SSCs were predicted seaward of the MCZ boundary. The predicted increase in SSCs is however considered to be within the range of natural variability in SSCs experienced in coastal zone areas of the English Channel, between 10mg/l and 200mg/l having been reported depending upon wave conditions (HR Wallingford, 2015). No sediment deposition from the disposal plume was predicted within the Dover to Folkstone pMCZ.	No adverse impact is predicted.
Intertidal underboulder communities	Maintain at favourable condition	The habitats provide refuge to important organisms which encrust the under-surfaces of the boulder (e.g. sea mats, sponges, pink coralline seaweed), which in turn provide a habitat for feeding and cryptic animals (e.g. sea slugs, crustaceans, juvenile fish). Given the low level and temporary predicted increases in SSCs, and that modelling has predicted no sediment deposition within the pMCZ, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Intertidal coarse sediment	Maintain at favourable condition	Coarse sediment shores are composed of small rocks, pebbles, and gravel, sometimes mixed with coarse sand (JNCC, 2015). Given the low level and temporary predicted increases in SSCs, and that modelling has predicted no sediment deposition within the pMCZ, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Intertidal sand and muddy sand	Maintain at favourable condition	Sandy shores are made up of clean or muddy sand and may have shells and stones on the surface. Their surface may be a mass of ripples, as a result of wave action or tidal currents (JNCC, 2015). Given the low level and temporary predicted increases in SSCs, and that modelling has predicted no sediment deposition within the pMCZ, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Littoral chalk communities	Maintain at favourable condition	Littoral chalk communities are unique communities of seaweeds and the animals that associate with them. The pMCZ is regionally important for its excellent examples of littoral chalk communities on intertidal and subtidal chalk reefs, with littoral chalk communities found intermittently along the length of the pMCZ coastline. Given the location of the littoral chalk communities along the shoreline, the low level and temporary predicted increases in SSCs, and that modelling has predicted no	No adverse impact is predicted.

Feature	General management approach	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
		sediment deposition within the pMCZ, no significant impacts are predicted on the interest feature from disposal activities.	
Rossworm (*Sabellaria spinulosa*) reef	Maintain at favourable condition	Rossworm reef occurs in the intertidal area of East Wear Bay (Balanced Seas, 2011). Subtidally chalk grades into chalk marl clay, and impressive *Sabellaria spinulosa* reefs. Blue mussel beds are also believed to occur with *Sabellaria* in both intertidal and subtidal areas, though this feature has not been taken forward due to lack of evidence (Defra, 2015d). Given the low level and temporary predicted increases in SSCs, and that modelling has predicted no sediment deposition within the pMCZ, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Subtidal rock: • Moderate energy infralittoral rock; • High energy circalittoral rock; • Moderate energy circalittoral rock.	Maintain at favourable condition	Hard rock habitats are found in the vicinity of Shakespeare Cliff (in the northern section of the pMCZ), and support a range of species including kelp, red algae and worm tubes. This particular habitat is unusual for the region, which is mostly softer sediments (Defra, 2015d). Given no sediment deposition within the pMCZ has been predicted by modelling, no significant impacts are predicted on these interest features from disposal activities.	No adverse impact is predicted.
Subtidal chalk	Maintain at favourable condition	The chalk platform extends across the intertidal and out into the subtidal to varying distances. Subtidal chalk (moderate energy circalittoral rock) is the predominant habitat feature in the offshore zone of the MCZ. The vertical structure of the subtidal chalk reefs varies from relatively flat exposures partially overlain and scoured with sediment, through areas of large boulders, to outcropping chalk reefs with gullies up to around 2m high, supporting a rich cover of animal life (Balanced Seas, 2011). Given no sediment deposition within the pMCZ has been predicted by modelling, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Peat and clay exposures	Maintain at favourable condition	Seabed formed of exposed peat or clay, or in some cases both, are uncommon. Where they do occur, they have been found between the tides as well as fully underwater. They can be buried by sand or other sediments and then exposed again on a regular basis. 'Peat and clay exposures' habitat foci are found in far southwest of the pMCZ, approximately 3km north of the predicted sediment plume from disposal activities. Given no sediment deposition within the pMCZ has been predicted by modelling, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Subtidal coarse sediment	Maintain at favourable condition	Coarse sand, gravel and shingle seabeds are found on the open coast or in tide-swept marine inlets. These areas are disturbed by waves and tides, which prevent finer sands and mud from settling (JNCC. 2015). Subtidal coarse sediment is found within the pMCZ between littoral and subtidal chalk reefs and harder rock types further offshore	

Feature	General management approach	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
		(Balanced Seas, 2011), in similar areas to occurrences of the subtidal mixed sediment feature. Given no sediment deposition within the pMCZ has been predicted by modelling, no significant impacts are predicted on the interest feature from disposal activities.	
Subtidal mixed sediments	Maintain at favourable condition	Subtidal mixed sediments are found in inshore and offshore areas of the pMCZ, between areas of moderate energy circalittoral rock (most likely subtidal chalk). The mixed sediment within the site is rich in mobile animals including brittlestars, squat lobsters, crabs, fish and molluscs, and wild native oysters are found scattered across the site (Defra, 2015d). Given no sediment deposition within the pMCZ has been predicted by modelling, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Subtidal sand	Maintain at favourable condition	Sandy seabeds usually occur on open coasts, and close inshore they are often disturbed by waves and tides (JNCC, 2015). Subtidal sand habitat occurs only in inshore areas of the pMCZ. Given no sediment deposition within the pMCZ has been predicted by modelling, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Subtidal mud	Maintain at favourable condition	Muds and sandy muds occurring in areas too deep to be exposed to the tide are mainly found in extremely sheltered areas with very weak tidal currents, such as sea lochs and some estuaries and harbours (JNCC, 2015). Given no sediment deposition within the pMCZ has been predicted by modelling, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Native Oyster *(Ostrea edulis)*	Maintain at favourable condition	Native oyster has high sensitivity to activities associated with substratum loss or abrasion and is moderately sensitive to smothering (Jackson and Wilding, 2009). Wild native oysters are found scattered across the site (Defra, 2015d), though only four records were reported by Balanced Seas (2011). Given the low level and temporary predicted increases in SSCs, and that modelling has predicted no sediment deposition within the pMCZ, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Folkestone Warren (geological feature)	Maintain at favourable condition	The very soft clay in Folkestone Warren supports different communities of algae with larger fucoids and laminarian kelps replaced with faster-growing *Palmaria palmata*, and the less robust, lighter kelp, *Saccharina latissimi*. It is also the only known foreshore occurrence in Kent of the brown alga *Desmerestia ligulata* (Balanced Seas, 2011). Folkstone Warren is located in the far southwest of the pMCZ, approximately 3km north of the predicted sediment plume from disposal activities. Given no sediment deposition within the pMCZ has been predicted by modelling, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.

Conclusions of assessment for the Dover to Folkstone pMCZ

Based on the outcome of the above MCZ Assessment, it has been identified that the proposed disposal of capital dredged material at DV010 would not result in a significant risk to the proposed management approach for the Dover to Folkstone pMCZ. A Stage 2 MCZ Assessment is therefore not considered necessary.

Assessment of Impacts on the Dover to Deal pMCZ

Modelling has indicated that SSCs within the Dover to Deal pMCZ could be increased by up to 8mg/l above background concentrations, though this is considered to be within the range of natural variability in SSCs experienced in coastal zone areas of the English Channel, with between 10mg/l and 200mg/l having been reported depending upon wave conditions (HR Wallingford, 2015).

A maximum of 2mm of sediment deposition was predicted at what appears to be a natural 'sink' for deposition within the Dover to Deal pMCZ. Any predicted fine sediment deposition form the disposal plume would therefore be in addition to deposition from natural processes, tough this may be reworked by storm events. The predicted area of deposition is located in the southwestern part of the pMCZ. This corresponds with the likely location of the following interest features:

- A1.2 Moderate energy intertidal rock;
- A3.2 Moderate energy infralittoral rock;
- A4.2 Moderate energy circalittoral rock; and
- Subtidal chalk.

It is likely that the location of the predicted deposition is already a natural 'sink' for marine-derived sediments, though it is unclear whether this is temporary or otherwise.

Feature	General management approach	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
Intertidal rock: • Low energy; • Moderate energy; • High energy.	Maintain at favourable condition	Intertidal rocky habitats are located along the entire length of the pMCZ. Modelling has indicated that SSCs within the Dover to Deal pMCZ could be increased by up to 8mg/l above background concentrations, though this is considered to be within the range of natural variability in SSCs experienced in coastal zone areas of the English Channel, with between 10mg/l and 200mg/l having been reported depending upon wave conditions (HR Wallingford, 2015). A maximum of 2mm of sediment deposition is predicted at what appears to be a natural 'sink' for deposition within the Dover to Deal pMCZ. Any predicted fine sediment deposition form the disposal plume would therefore be in addition to deposition from natural processes, though this may be reworked by storm events.	No adverse impact is predicted.
Intertidal underboulder communities	Maintain at favourable condition	The habitats provide refuge to important organisms which encrust the under-surfaces of the boulder (e.g. sea mats, sponges, pink coralline seaweed), which in turn provide a habitat for feeding and cryptic animals (e.g. sea slugs, crustaceans, juvenile fish). Given the low level and temporary predicted increases in SSCs, and predictions of sediment dispersal as outlined by the modelling results, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Littoral chalk communities	Maintain at favourable condition	Littoral chalk communities are unique communities of seaweeds and the animals that associate with them. The chalk foreshore at St Margaret's Bay in this site represents the richest algal community in southeast England (Natural England, 2014). Given the low level and temporary predicted increases in SSCs, and predictions of sediment dispersal as outlined by the modelling results, no significant impacts are predicted	No adverse impact is predicted.

Feature	General management approach	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
		on the interest feature from disposal activities.	
Rossworm (*Sabellaria spinulosa*) reef	Maintain at favourable condition	Well-developed ross worm reefs are present on the lower shore, where sand fringes the edge of the chalk foreshore reef; these habitats recorded together are particularly rare in Kent and in fact are unrecorded in the rest of the UK (Natural England, 2014). The habitat is also well developed subtidally off Kingsdown. Given the low level and temporary predicted increases in SSCs, and predictions of sediment dispersal as outlined by the modelling results, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Blue mussel beds	Maintain at favourable condition	Areas of biogenic reef have a high sensitivity to activities associated with substratum loss or abrasion and a moderate sensitivity to smothering (Tyler-Walters, 2008). Intertidal blue mussel beds are mixed together with *Sabellaria* reefs and are some of the best in the Kent and Essex area (Balanced Seas, 2011). Given the low level and temporary predicted increases in SSCs, and predictions of sediment dispersal as outlined by the modelling results, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.
Subtidal rock: • Moderate energy infralittoral rock; • High energy circalittoral rock; • Moderate energy circalittoral rock; • Subtidal chalk (habitat foci).	Maintain at favourable condition	The chalk platform extends across the intertidal and out into the subtidal to varying distances. The vertical structure of the subtidal chalk reefs varies from relatively flat exposures partially overlain and scoured with sediment, through areas of large boulders, to outcropping chalk reefs with gullies up to around 2m high, supporting a rich cover of animal life (Balanced Seas, 2011). A maximum of 2mm of sediment deposition was predicted at what appears to be a natural 'sink' for deposition within the Dover to Deal pMCZ. Any predicted fine sediment deposition form the disposal plume would therefore be in addition to deposition from natural processes, though this may be reworked by storm events.	No adverse impact is predicted.
Subtidal mixed sediments	Maintain at favourable condition	Subtidal mixed sediments are found in the northern extent of the pMCZ and also in areas further offshore in the south. The deposition predicted from modelling is not located in areas associated with this interest feature.	No adverse impact is predicted.
Native Oyster *(Ostrea edulis)*	Maintain at favourable condition	Native oyster has high sensitivity to activities associated with substratum loss or abrasion and is moderately sensitive to smothering (Jackson and Wilding, 2009). Native oyster records are not currently published for this site. Given the low level and temporary predicted increases in SSCs, and predictions of sediment dispersal as outlined by the modelling results, no significant impacts are predicted on the interest feature from disposal activities.	No adverse impact is predicted.

Conclusions of assessment for the Dover to Deal pMCZ

Based on the outcome of the above MCZ Assessment, it has been identified that the proposed disposal of capital dredged material at DV010 would not result in a significant risk to the proposed management approach for the Dover to Deal pMCZ. A Stage 2 MCZ Assessment is therefore not considered necessary.

Assessment of Impacts on the Goodwin Sands rMCZ

Feature	Conservation objective (Defra,2013)	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
Subtidal rock • Moderate energy circalittoral rock; • Subtidal chalk (habitat FOCI)	Maintain at favourable condition	Moderate energy circalittoral rock (subtidal chalk) occupies 4% of the rMCZ by area (Defra, 2015c). This interest feature is found predominantly in two areas, though coarse sediment is also regularly encountered in these areas. The habitat FOCI 'Subtidal chalk' was not listed in the SAD (Defra, 2015c). Modelling suggests that mean predicted increases in depth-averaged SSCs of a maximum of 5-10mg/l above background levels may be experienced in western areas of the rMCZ due to disposal activities. These rock interest features are however only found in two discrete areas towards the centre and east of the site, therefore no impacts are predicted.	No adverse impact is predicted.
Subtidal coarse sediment	Maintain at favourable condition	Coarse sand, gravel and shingle seabeds are found on the open coast or in tide-swept marine inlets. These areas are disturbed by waves and tides, which prevent finer sands and mud from settling (JNCC. 2015). Subtidal coarse sediment is the most widespread habitat type in the rMCZ, occupying 52% by area (Defra, 2015c). Although the sediment plume may extend over areas of this interest feature in the west and north of the rMCZ, the elevated levels are short term and transient, and well within the range of natural variability in SSCs experienced in coastal zone areas of the English Channel, with between 10mg/l and 200mg/l having been reported depending upon wave conditions (HR Wallingford, 2015).	No adverse impact is predicted.
Subtidal sand	Maintain at favourable condition	Sandy seabeds usually occur on open coasts, and close inshore they are often disturbed by waves and tides (JNCC, 2015). Subtidal sand habitat occupies 35% of the rMCZ by area (Defra, 2015c). Although the sediment plume may extend over areas of this interest feature in the north and west of the rMCZ, the elevated levels are short term and transient, and well within the range of natural variability in SSCs experienced in coastal zone areas of the English Channel, with between 10mg/l and 200mg/l having been reported depending upon wave conditions (HR Wallingford, 2015). The model indicates that the plume of SSC may travel up the western edge of the raised bathymetry of Goodwin Sands and then turn south-eastwards, becoming deposited in levels of up to 5mm within more central areas of the rMCZ. Though the permanence of such potential deposition is not known, given the existing nature of mixed sediments in the predicted deposition location it is considered that this would minor in comparison to natural processes, with reworking by storms possible.	No adverse impact is predicted.
Subtidal mixed sediments	Maintain at favourable condition	Subtidal mixed sediments occupy 9% of the rMCZ by area and are located exclusively within the northern part of the rMCZ (Defra, 2015c). Results from recent surveys reveal that these sediments are made up of a combination of gravels, sands and silts/clays of varying composition, with PSA for one sample (Station 197) showing a maximum of	No adverse impact is predicted.

Feature	Conservation objective (Defra,2013)	Description of disposal impacts on proposed management approach	Adverse impact as a result of the disposal activity
		23% of the silts/clay fraction (Defra, 2015c) The predicted sediment plume may extend over areas of this interest feature in the north of the rMCZ, though the elevated levels are expected to be short term and transient, and well within the range of natural variability in SSCs experienced in coastal zone areas of the English Channel. The model indicates that the plume of SSC may travel up the western edge of the raised bathymetry of Goodwin Sands and then turn south-eastwards, becoming deposited in levels of up to 5mm within more central areas of the rMCZ. Though the permanence of such potential deposition is not known, given the existing nature of mixed sediments in the predicted deposition location it is considered that this would minor in comparison to natural processes, with reworking by storms possible.	
Subtidal sands and gravels		The habitat FOCI 'Subtidal sands and gravels' occupies approximately 86% of the surveyed area (Defra, 2015c). Predictions are as those for subtidal coarse sediment, subtidal sand, and subtidal sands and gravels habitats.	No adverse impact is predicted.
Blue mussel beds	Maintain at favourable condition	Areas of biogenic reef have a high sensitivity to activities associated with substratum loss or abrasion and a moderate sensitivity to smothering (Tyler-Walters, 2008). Blue mussel were observed in ground-truth data, but could not be confidently spatially mapped from the hydrographic data obtained. Blue mussel beds were not observed in those locations where either increased SSCs or potential deposition are predicted to occur.	No adverse impact is predicted.
Rossworm (*Sabellaria spinulosa*) reef	Maintain at favourable condition	*Sabellaria* reefs were observed in ground-truth data, but could not be confidently spatially mapped from the hydrographic data obtained. *Sabellaria* reefs were not observed in those locations where either increased SSCs or potential deposition are predicted to occur.	No adverse impact is predicted.

Conclusions of assessment for the Goodwin Sands rMCZ

Based on the outcome of the above MCZ Assessment, it has been identified that the proposed disposal of capital dredged material at DV010 would not result in a significant risk to the proposed management approach for the Dover to Deal pMCZ. A Stage 2 MCZ Assessment is therefore not considered necessary.

Assessment of Impacts on the Offshore Foreland rMCZ

Although the Offshore Foreland rMCZ was not explicitly considered in the modelling exercise (HR Wallingford, 2015), this has demonstrated that any increase in SSC caused by the release of dredged material would not travel in the direction of the Offshore Foreland rMCZ at any tidal state. In addition no sediment deposition would be expected to occur within the rMCZ site boundary.

Conclusions of assessment for the Offshore Foreland rMCZ

Given the distance of the rMCZ from the disposal location, and the results of the modelling exercise showing that materials would not reach the Offshore Foreland rMCZ, it can be concluded that the proposed capital dredge disposal will not be capable of affecting the proposed interest features of the Offshore Foreland rMCZ, or any ecological or geomorphological process on which their conservation is dependant. No further assessment is therefore deemed necessary.

7. Water Framework Directive Compliance Assessment

Introduction

In their objection to the HRO the Environment Agency stated that within the Terminal 2 Environmental Statement 'the requirements of the Water Framework Directive (WFD)' have not been considered in sufficient detail to satisfy the Environment Agency that the proposals will not affect the water quality in surrounding water bodies.' The Environment Agency objection was withdrawn following a formal agreement being reached with DHB to resolve their concerns. The agreement includes the commitment by DHB to undertake a WFD assessment to be submitted in support of any Marine Licence application related to the development.

This section assesses the DWDR proposals against the requirements of the WFD. The method used to make this assessment and the baseline data used to assess potential impacts on water body status resulting from the scheme is also presented. A preliminary assessment of compliance is then made in order to identify potential risks to each water body screened into the assessment. This is then followed by a detailed assessment for those activities which could potentially lead to deterioration.

The Water Framework Directive

The Water Framework Directive (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) (WFD) was adopted by the European Commission in December 2000. The WFD requires that all EU Member States must prevent deterioration and protect and enhance the status of aquatic ecosystems. This means that Member States must ensure that new schemes do not adversely impact upon the status of aquatic ecosystems, and that historical modifications that are already impacting it need to be addressed.

The Directive was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, which mean that the requirements of the WFD need to be considered at all stages of the planning and development process.

Unlike the EU Birds and Habitats Directives (EC Directive on the Conservation of Wild Birds (2009/147/EC) and EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC), respectively), which apply only to designated sites, the WFD applies to all water bodies, including those that are man-made. The consideration of the proposals under the WFD will, therefore, apply to all surface and groundwater bodies that have the potential to be impacted by DHB's proposals.

Method for assessment

The way in which WFD impacts are assessed is quite different to the approach conventionally used within the EIA process. The standard EIA approach assesses whether an impact is minor, moderate or major, and whether it is beneficial or adverse. This is not compatible with the requirements of the WFD, which requires an assessment of whether a scheme (or element of a scheme) is compliant or non-compliant with the environmental objectives outlined in **Table 7.1**.

Table 7.1 Environmental Objectives in the WFD

Objectives (taken from Article 4 of the Directive)	Reference Article
Surface water	
Member States shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water	4.1(a)(i)
Member States shall protect, enhance and restore all bodies of surface water, subject	4.1(a)(ii)

Objectives (taken from Article 4 of the Directive)	Reference Article
to the application of subparagraph (iii) for artificial and heavily modified bodies of water, with the aim of achieving good surface water status by 2015.	
Heavily Modified and Artificial Water Bodies	
Member States shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status by 2015.	4.1(a)(iii)
Progressively reduce pollution from priority substances and cease or phase out emissions, discharges and losses of priority hazardous substances.	4.1(a)(iv)
Ground water	
Prevent deterioration in status and prevent or limit input of pollutants to ground water (Daughter Directive)	Ground Water 4.1(b)(i)

Following the recommendations made by the Environment Agency's National Environment Assessment Service (Murphy et al., 2012), which has become recognised as national standard practice, the approach adopted in this assessment is to determine whether the scheme has:

- Potential to cause deterioration in surface water body status by adversely affecting biological, hydromorphological and/or physico-chemical quality elements.
- Potential to cause deterioration in groundwater body status by adversely affecting quantitative and chemical quality elements.
- Potential to prevent achieving WFD status objectives by impacting upon proposed mitigation measures already identified for water bodies in the area that are heavily modified.
- Potential to incorporate mitigation measures included in the appropriate River Basin Management Plan(s).

This guidance will be supplemented by the use of the Clearing the Waters: A user guide for marine dredging activities produced by the Environment Agency (2012) in order to undertake WFD compliance assessments on projects requiring dredging and disposal. Where the assessment suggests that deterioration in a water body could occur as a result of the scheme, measures to mitigate the risk and therefore avoid deterioration are recommended where appropriate.

The WFD compliance assessment is undertaken in four stages which are outlined below.

Stage 1: Collation of baseline information

Identification of water bodies: Selection rationale

Water bodies that could potentially be affected by the scheme were identified using the Environment Agency's water body shapefiles and online WFD mapping system (part of the "What's in your backyard?" tool). Additionally, updates included in the draft River Basin Management Planning Round 2 consultation exercise (including the Catchment Data Explorer, http://environment.data.gov.uk/catchment-planning/) have also been consulted in order to ensure the latest water body outlines and status objectives have been considered. Water bodies were selected for inclusion in the initial stages of the compliance assessment using the following criteria:

- All surface water bodies that could potentially be directly impacted by the scheme (i.e. those within the scheme footprint).
- Any surface water bodies further upstream that have direct connectivity and could potentially be affected by the proposed works.
- Any surface water bodies downstream that have direct connectivity and could potentially be affected by the proposed works.

- Any groundwater bodies that underlie the proposed scheme.

Baseline data

To collate the baseline data that are required to inform the WFD compliance assessment, the following tasks were undertaken:

- Collection of water body baseline data, including on the type and status of each quality element and, if appropriate, reasons for failure and mitigation measures identified by the Environment Agency. These data have been collated from the South East River Basin Management Plans (RBMP) (Environment Agency, 2009 and 2014).
- Collection of scheme baseline data, broken down in sufficient detail so that the compliance of each main scheme component has been considered in the assessment.
- Identification of new or planned activities in the area that could also affect water body status.

Stage 2: Preliminary compliance assessment

A preliminary assessment determines whether there is the potential for the scheme to cause deterioration in any of the water bodies identified during Stage 1, and whether there is the potential to cause deterioration or a failure to meet Good Ecological Status (GES) or Good Ecological Potential (GEP) targets for these water bodies (cf. **Table 7.1**). The preliminary assessment considers:

- The potential of the scheme to adversely impact on any of the quality elements sufficient to cause deterioration in the water body. It is broken down into the potential impact of the various scheme components on each quality element so that any areas of potential impact can be clearly identified.
- The potential for the scheme to impact upon proposed WFD mitigation measures and improvements, and therefore prevent GES or GEP being achieved.
- The potential for cumulative impacts as a result of existing pressures, new or recent schemes in the area, and any planned schemes.
- The potential for impacts on critical and sensitive habitats, including designated sites and habitats with particular ecological importance.
- At the end of the preliminary assessment, water bodies, quality elements and activities to be assessed in more detail in the subsequent stages of the compliance assessment are then identified.

In the absence of any identifiable impact pathway, some water bodies can be screened out at the end of Stage 2. Where there is uncertainty over the potential for a water body to be impacted by an activity, a precautionary approach is taken and both the water body and activity is screened in for further assessment.

Stage 3: Detailed compliance assessment

The end result of Stage 2 is a list of water bodies and quality elements to be carried forward for further assessment. Stage 3 then considers the potential for non-temporary impacts associated with each relevant scheme component (and the scheme as a whole) on the relevant quality elements of each relevant water body.

The assessment therefore establishes whether the scheme will:

- Cause deterioration in water body status.
- Prevent WFD status objectives being achieved.
- Prevent status objectives being achieved in any other water bodies.

Following the broad principles of the WFD, the scheme is considered to be non-compliant if any of the scheme components will cause WFD failure for any of the quality elements, individually or cumulatively.

Impacts of the scheme on other European legislation, including the Habitats Directive and Birds Directive are also considered in line with Articles 4.8 and 4.9 of the WFD.

If the assessment process identifies any impacts that are sufficient to cause WFD non-compliance, suitable mitigation measures must be identified, with reference to appropriate guidance (such as the online "Healthy Catchments" guidance (EU RESTORE, 2013) and "Estuary Edges: Ecological Design Guidance" (Thames Estuary Partnership and Environment Agency, undated)).

Stage 4: Summary of assessment and further recommendations

This stage summarises the results of the assessment and any mitigation measures that are required to ensure compliance with the WFD.

Stage 1 Baseline Information

Purpose of this section

The purpose of this section is to describe the baseline characteristics of the water bodies within the proposed development site, against which potential impacts on WFD compliance can be assessed. The section includes a description of the proposed activities and provides a summary of the main characteristics of the water bodies that could be impacted by development activities at the site.

Defining scheme activities

Construction stage activities

The construction phase is likely to include the following key activities with potential effects on water body receptors:

- Capital dredging of the various areas and berthing pockets.
- Disposal of material at disposal site.
- Construction and demolition in the marine environment.
- Run-off/discharge of surface water during construction of landside elements (surface water/reclamation water/wastewater).
- Requirement for a new navigational cut from Wellington Dock into the new marina.
- Groundworks to prepare the site including stockpiling of construction materials.

Operational stage activities

The operational phase is likely to include the following key activities with potential effects on water body receptors:

- Maintenance dredging and disposal of the berthing pocket.
- Discharge of surface water from the newly reclaimed area.

Decommissioning stage activities
Since there are no plans to decommission the activities, these are not considered further.

Water bodies screened in for assessment

Figure 7.1 shows the extent of works boundary at the harbour site and the WFD groundwater water bodies that could potentially be impacted by the proposals; **Figure 7.2** illustrates the WFD waterbodies that are also of relevance. The water bodies that are considered in this assessment have been selected on the basis of the criteria set out above.

The following water bodies have been identified as relevant in geographical and hydrological terms to take through the WFD compliance assessment process. WFD classification details are provided in **Tables 7.2, 7.3** and **7.4**. Note that the information presented below is based on the revised South East RBMP (Environment Agency, 2014) which is out for consultation, and therefore may be subject to change when the final version of

the second RBMP is published in December 2015. Where information was not available, data from the published RBMPs (Environment Agency, 2009) have been used instead, and this is indicated by a *.

- Dour from Kearsney to Dover GB107040073310 (river water body). This freshwater water body is designated as heavily modified as a result of urbanisation and drains into the Wellington Dock, which leads to the Granville Dock. Both docks have dock gates which open into Tidal Basin. There is also a sluice gate which can be used when the dock gates are shut. This water body will be impacted by the proposed construction activities and will require diversion via a new navigational cut. As a result this water body is screened into the assessment.

- Kent South GB640704540001 (coastal water body). This water body is also designated as Heavily Modified as a result of modifications for coastal protection. It is currently at Moderate Ecological Potential due to pressures on supporting surface water elements. Both the dredging and marine construction (including reclamation) will be undertaken within this water body and therefore it is screened in to the assessment. It should also be noted that the tip of the disposal site is also within this water body.

- East Kent Chalk Stour GB40701G501500 (groundwater body). The water body underlies the entire landside area of the proposed development. It is at poor status for both chemical and quantitative supporting quality elements which are attributed to natural conditions.

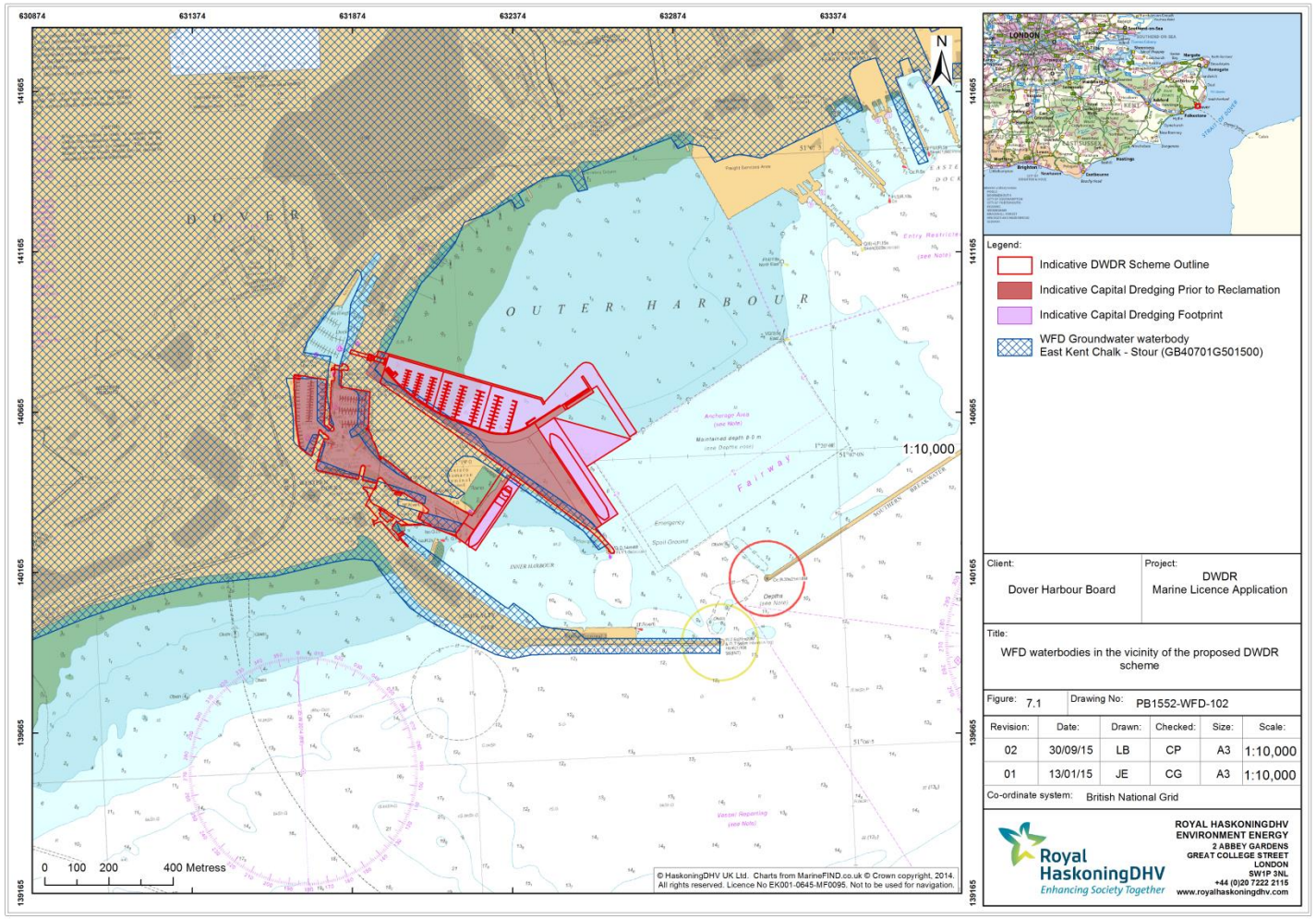

Figure 7-1 WFD Groundwater waterbodies within the vicinity of the proposed DWDR scheme

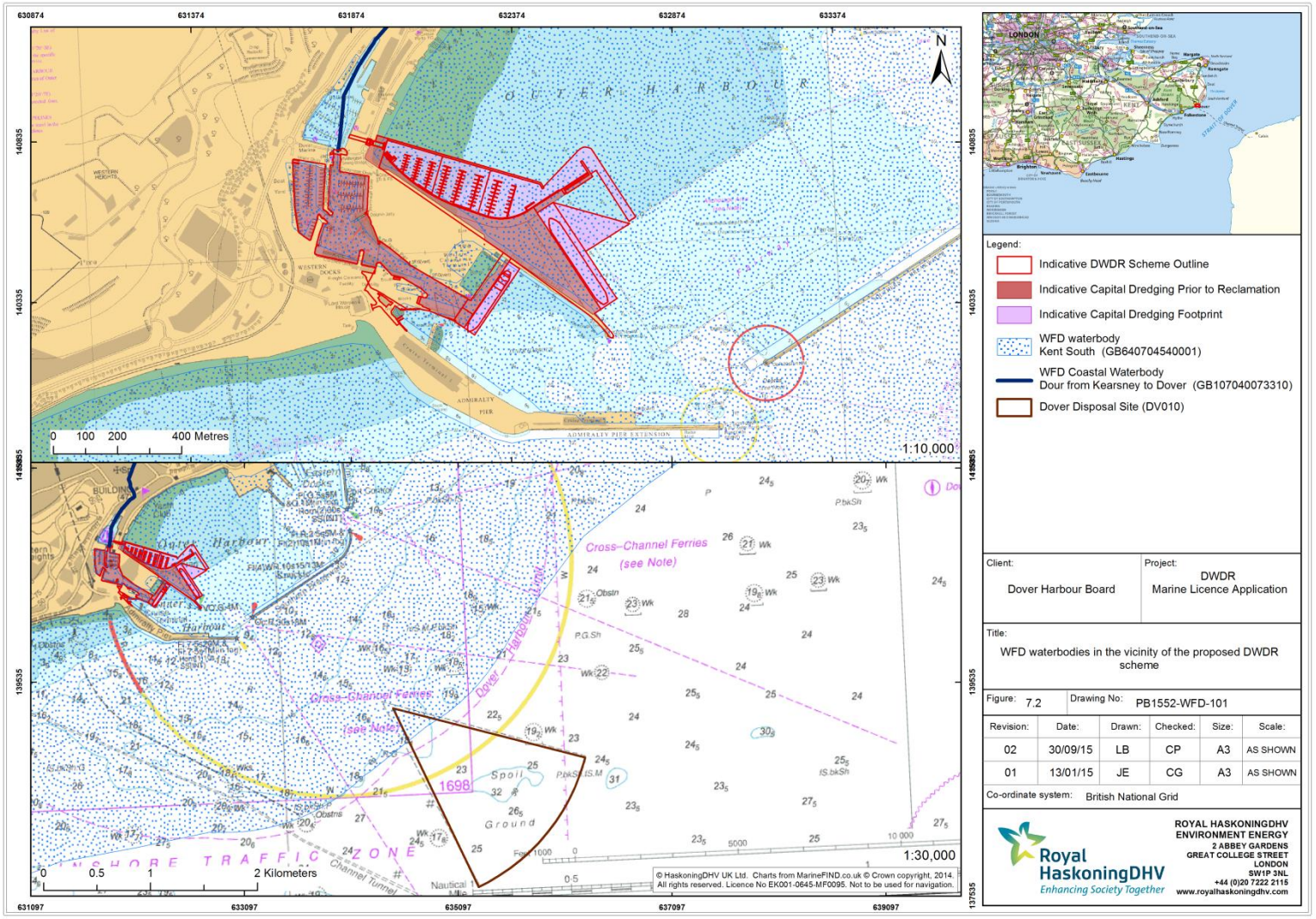

Figure 7.2 WFD waterbodies within the vicinity of the proposed DWDR scheme

Table 7.2 Water body information for the Kent South water body (GB640704540001)

Kent South (GB640704540001)	
Type	Coastal
Size of water body	248,375,840 m^2
Current Status	Moderate Ecological Potential
Objective	Good by 2021
Current chemical status	Good
If not at good status record all WFD parameters at moderate status or below*	The following mitigation measures are deemed not to be in place hence moderate potential classification: Operational and structural changes to locks sluices, weirs, beach control, etc; Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone; Preserve and, where possible, restore historic aquatic habitats.
Is the water body designated as heavily modified or artificial? If so record reason	Heavily modified (coastal protection)
Mitigation measures in place*	Manage disturbance, site selection (dredged material disposal) (e.g. avoid sensitive sites), sediment management
Protected Areas*	Bathing Water Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive

Table 7.3 Water body information for the Dour from Kearsney to Dover (GB107040073310)

Dour from Kearsney to Dover (GB107040073310)	
Type	River
Length	4.85km
Current Status	Moderate Ecological Potential
Objective	Good by 2021
Current chemical status	Good
If not at good status record all WFD parameters at moderate status or below*	Specific pollutants (Triclosan); biological quality elements (fish), Supporting element (surface water); mitigation measures not in place (all); Priority Hazardous Substances (Nonylphenol).
Is the water body designated as heavily modified or artificial? If so record reason	Heavily modified (urbanisation)
Mitigation measures in place*	No mitigation measures are in place.
Protected Areas*	Freshwater Fish Directive, Nitrates Directive

Table 7.4 Water body information for the East Kent Chalk Stour (GB107040073310)

East Kent Chalk Stour (GB 40701G501500)	
Type	Groundwater
Size of water body	593,844,713m^2
Current Status	Poor
Objective	Good by 2021
Current chemical status	Poor
If not at good status record all WFD parameters at moderate status or below*	Chemical drinking water protected area; Quantitative status element.
Is the water body designated as heavily modified or artificial? If so record reason	Not applicable
Pressures and Risk*	Nutrients (nitrates, phosphates, trends in nitrates); hazardous substances and other pollutants (mines); Abstraction and other artificial flow pressures (saline intrusion).
Protected Areas*	Drinking Water Protected Area and nitrates directive

Stage 2: Preliminary Compliance Assessment

Purpose of this section

The aim of this section is to consider the water bodies that could potentially be impacted upon by the activities and highlight the quality elements within each water body that could be impacted. This assessment therefore determines the scope for the detailed compliance assessment.

Initial assessment of water bodies

This assessment considers the construction and operational phases of the scheme and highlights potential impact mechanisms based on water body type. The potential mechanisms for impact are described in **Table 7.5** and these have been used to undertake a preliminary assessment of the potential impacts of the scheme on the quality elements of each water body (biological, hydromorphological and physico-chemical quality elements for surface waters, and quantitative and chemical quality elements for groundwater). The results of the preliminary assessment are shown in **Tables 7.6 to 7.13** for construction and **7.14** to 7.**16** for operation.

Table 7.5 Mechanisms for potential impact on water body status

Water body	Phase of development	Potential impact mechanisms
Kent South Coastal Water Body (GB640704540001)	Construction	• Surface water run off associated with reclamation. • Direct disturbance to bed associated with works on the seabed (construction and demolition). • Increase of contaminants in surface runoff associated with the presence of storage of fuels and oils for construction vehicles, accidental spillage during refuelling for example. • Potential for runoff from stockpiling to impact on water quality.

		• Changes to water quality (including physico-chemical changes) associated with dredging and disposal. • Temporary loss of subtidal habitats associated with dredging/disposal and any works on the foreshore (for access for example). • Potential impacts on mitigation measures currently in place. • Note the potential for the proposals to impact on fish is not considered here as fish are not a quality element for coastal water bodies (transitional only).
	Operation	• Impacts on coastal water body associated with discharge from the site drainage system. • Changes to hydromorphology associated with the presence of new structures and increase in dredge depth. • Increase in sediment supply to surface water bodies associated with maintenance dredging. • Permanent loss of intertidal/subtidal habitat under new structures.
Dour from Kearsney to Dover river water body (GB107040073310)	Construction	• Increase in sediment supply to surface water bodies associated with ground preparation as well as changes in surface water run off.
	Operation	• Permanent changes to hydromorphological supporting elements associated with new navigation cut.
East Kent Chalk Stour groundwater body (GB107040073310)	Construction	• Potential for changes to groundwater quality associated with ground preparation works, piling activities and stockpiling.
	Operation	• As the site is anticipated to be mainly covered by hard standing or drained to a surface water drainage system, operational impacts on groundwater are not anticipated.

Table 7.6 Preliminary Assessment (screening and scoping stages of Clearing the Waters Guidance) trigger table for effects on WFD parameters for Kent South GB640704540001 water body associated with capital dredging

WFD water body (Kent South)	Classification	Dredging triggers for potential effects on WFD parameters at water body level	
		Screening/scoping trigger	Detailed assessment required
Biological elements			
Phytoplankton	Composition, abundance and biomass	In EA guidance this element is screened out as dredging is generally considered to only have very transient effects on this parameter	No
Other aquatic flora		In the Clearing the Waters guidance triggers are	Yes

WFD water body (Kent South)	Classification	Dredging triggers for potential effects on WFD parameters at water body level	
		Screening/scoping trigger	Detailed assessment required
(angiosperms, saltmarsh, seagrass, macroalgae, seaweed) Benthic invertebrate fauna Fish fauna (only for transitional waters so not considered further here)		split into three categories: a. Trigger in guidance: Will the dredging directly remove intertidal area or is it within 10m of MLWS (if yes, scoping is triggered)? **Response: The dredging will be located within 10m of the intertidal.** b. Trigger in guidance: proportion of water body impacted by dredging activity will be >5% (formula to be applied 1.5 x dredge footprint) – if yes, scoping is triggered. **Response: Not required as screened in via a.** c. High level assessment (made up of a number of elements, need to score 2 or more to trigger scoping) - Is the dredging dispersive or non-dispersive? The dredge is non-dispersive technique (Score 0). - When will the dredge occur (score 1 if March to October, score 0 if November to February). **Response: Not required as screened in via a.**	
Hydromorphological elements			
Depth variation		The triggers in the Clearing the Waters guidance refer to the proportion of water body impacted. If greater than 5% then scoping required. **Response: The dredge is less than 5% of the water body (0.25%).**	No
Bed	Quantity (transitional only), structure and substrate		
Intertidal zone structure		Will the dredging directly remove intertidal or is it within 10m of MLWS? **Response: Yes**	Yes
Dominant currents	Direction	Is the dredge a significant change to a maintenance dredge? **Response: Yes this is a capital project and the area of the dredge will be deepened beyond normal maintenance activity**	Yes
Freshwater flow (transitional only)		Not applicable as coastal water body	No
Wave exposure		Will the dredge take place in shallow water? **Response: Yes**	Yes
Chemical and physical-chemical elements			

WFD water body (Kent South)	Classification	Dredging triggers for potential effects on WFD parameters at water body level	
		Screening/scoping trigger	Detailed assessment required
Transparency		Triggers relate to the percentage of water body to be impacted (i.e. is it >5%), whether dredging is dispersive and timing and duration of dredging. **Response: Duration of the activity will be less than 25% of the year but will be carried out between March and August and, therefore, a Score of 1 is allocated for this trigger.** **TOTAL SCORE: 1** (scoping is required if score is over 1.5).	No
Thermal conditions		Screened out by EA guidance	No
Oxygenation conditions		Triggers relate to the percentage of water body to be impacted (i.e. is it >5%), whether dredging is dispersive and timing and duration of dredging. **Response: As above, score would be 1 in relation to the potential time of year in which the dredging would be undertaken. TOTAL SCORE: 1** Additional points should be allocated where sediment chemical oxygen demand is an issue, if dredging is near to raw sewage inputs and where oxygen issues have been identified within the water body. Scoping is required where 4 points or more are scored. **In relation to these additional issues, dredging will not occur in the vicinity of raw sewage discharges and there are no known reports of oxygenation issues within the Harbour. Significant impacts on the dissolved oxygen concentrations on the coastal water body associated with dredging are therefore not anticipated. TOTAL SCORE remains at 1.**	No
Salinity		Screened out by EA guidance	No
Nutrient conditions		Is the dredge a capital or new dredge? **Response: Yes the dredge is a capital dredge.**	Yes
Specific pollutants			
Sediment quality	Cefas Action Levels	**Consideration of sample information available does show exceedances of Action Level 1 but only very minor exceedances (i.e. within 10mg/kg). As a result, sediment quality is not considered a significant risk to the**	No

WFD water body (Kent South)	Classification	Dredging triggers for potential effects on WFD parameters at water body level	
		Screening/scoping trigger	Detailed assessment required
		water body.	
Protected Areas			
Bathing Water Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive	Relevant legislation associated with each protected area	**The proposed capital dredge will not take place within any designated nature conservation sites.** **The closest Natura 2000 site is the Dover to Kingsdown Cliffs Special Area of Conservation (SAC), which is designated for terrestrial sea cliff and grassland habitats (JNCC, 2013). Impacts are unlikely to occur since all development will be located within the harbour and will not impact on the cliffs.** **There are no designated bathing waters located within the Harbour although Dover beach is monitored. The nearest bathing waters are located at St Margaret's Bay and at Folkstone which are several km away either side of the harbour. Impacts on these protected areas are therefore not anticipated. See 2009 T2 ES.** **Regarding the nitrates directive, this designation is managed via landuse practices and therefore will not be considered further within the assessment, apart from the requirement to consider the introduction of nutrients as identified above.**	No
Mitigation Measures			
Manage disturbance, site selection (dredged material disposal) (e.g. avoid sensitive sites), sediment management		**It is understood that these mitigation measures are in place as a result of ongoing maintenance activity within the water body. Since the capital dredge will be a one off activity, it will not impact on the long term implementation of these mitigation measures.**	No

Table 7.7 Preliminary Assessment (screening and scoping stages of Clearing the Waters Guidance) trigger table for disposal effects on WFD parameters for Kent South GB640704540001 water body

WFD water body (Kent South)	Classification	Disposal triggers for potential effects on WFD parameters at water body level	
		Screening/scoping trigger	Detailed assessment required
Biological elements			
Phytoplankton	Composition, abundance and biomass	In EA guidance this element is screened out as dredging is generally considered to only have very transient effects on this parameter	No
Other aquatic flora (angiosperms, saltmarsh, seagrass, macroalgae, seaweed)		a. Will the dredging directly remove inter-tidal area or is it within 10m of MLWS? **Yes it will but impact of this is considered under dredging. Disposal will not occur within 10m of MLWS** or b. Proportion of water body impacted by disposal activity. **There is only a very small area of the disposal site within the water body and therefore, the proportion of water body impacted by the disposal will be less than 5% (see Figures 7.1 and 7.2)**	No
Benthic invertebrate fauna			
Fish fauna (only for transitional waters so not considered further here)			
Hydromorphological elements			
Depth variation		Proportion of water body impacted by disposal activity. Scope in if X is > 5% of Y. **Response: No, the disposal area is not greater than 5% of the water body**	No
Bed	Quantity (transitional only), structure and substrate		
Intertidal zone structure		Is the disposal site within 10m of MLWS? **Response: No**	No
Dominant currents	Direction	Is this a new disposal site in a coastal water body or a significant change to existing disposal operations at a site in a coastal water body? **Response: No, this is not a significant change to the disposal operations at the disposal site.**	No
Freshwater flow (transitional only)		Screened out in guidance	No
Wave Exposure		Is the activity a capital dredge that will take place in a shallow water body? **Response: No**	No
Chemical and physical-chemical elements			
Transparency		Screened out in guidance	No
Thermal conditions			
Oxygenation conditions			

WFD water body (Kent South)	Classification	Disposal triggers for potential effects on WFD parameters at water body level	
		Screening/scoping trigger	Detailed assessment required
Salinity			
Nutrient conditions			
Specific pollutants			
Sediment quality	Cefas Action Levels	**Consideration of sample information available does show exceedances of Action Level 1 but only very minor exceedances (i.e. within 10mg/kg). As a result, sediment quality is not considered a significant risk to water quality.**	No
Protected Areas			
Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive	Relevant legislation associated with each protected area	**Disposal will not impact on protected areas as located offshore.**	No
Mitigation Measures			
Manage disturbance, site selection (dredged material disposal) (e.g. avoid sensitive sites), sediment management		**It is understood that these mitigation measures are in place as a result of ongoing maintenance activity within the water body. Since the disposal will be a one off activity, it will not impact on the long term implementation of these mitigation measures.**	No

Table 7.8 Preliminary Assessment table effects of construction/demolition/reclamation on WFD parameters for Kent South GB640704540001 coastal water body

Quality Element	Potential for impacts on status (grouped according to quality element)	Included in detailed assessment
Biological	*Phytoplankton; Other aquatic flora; Benthic invertebrate fauna* There will be a discharge to the coastal water body associated with the reclamation however this discharge will be managed in order to reduce the suspended solids concentration as far as practicable. Additionally, this will only be temporary whilst the reclamation works are ongoing. As a result, any deterioration in water quality is only likely to be small scale and will return to baseline conditions following cessation of the activities. In terms of any contaminants within the reclamation material, this will be won from Goodwin Sands and therefore the material will predominantly consist of clean sand. As a result, there will be no risk of contamination within the reclamation discharge.	No

	Other activities associated with construction such as installation of new quay walls and demolition of existing structures etc. will cause disturbance to the seabed but this is likely to be very short lived and baseline conditions will return to normal following cessation of the works. Permanent effects associated with habitat loss within the footprint of the new structures are considered under operational effects.	
Hydromorphological	*Quantity, structure and substrate of the river bed, depth variation; structure of the intertidal zone* The permanent presence of the structures is considered within the operational assessment of this report.	No
Physico-chemical/Priority substances	See biological quality elements for explanation.	No
Mitigation measures	Since the mitigation measures relate to sediment management/reduction in sediment disturbance associated with dredging etc, no impacts are anticipated as a result of the reclamation or construction process.	No
Protected Areas	Since the potential effects are likely to be localised and short lived, impacts on protected areas are not anticipated.	No

Table 7.9 Preliminary Assessment table for construction surface water runoff effects on WFD parameters for Kent South GB640704540001 water body

Quality Element	Potential for impacts on status (grouped according to quality element)	Included in detailed assessment
Biological	*Phytoplankton; Other aquatic flora; Benthic invertebrate fauna* The risk of accidental spills to the environment will also be managed using best practise guidance (such as Pollution Prevention Guidance documents issued by the Environment Agency). A Construction Environmental Management Plan will be prepared on this basis to reduce the risk and potential outcome of any spills.	No
Hydromorphological	*Quantity, structure and substrate of the river bed, depth variation; structure of the intertidal zone* No impacts on these parameters are anticipated.	No
Physico-chemical/Priority substances	See biological quality elements for explanation	No
Mitigation measures	Since the mitigation measures relate to sediment management, no impacts are anticipated as a result of the reclamation process.	No
Protected Areas	Since very small or negligible effects are anticipated, impacts on protected areas are not anticipated.	No

Table 7.10 Preliminary Assessment table for construction effects on WFD parameters for Dour from Kearsney to Dover GB107040073310

Quality Element	Potential for impacts on status (grouped according to quality element)	Included in detailed assessment
Biological	*Phytoplankton; Macrophytes; Fish fauna and phytobenthos; Benthic invertebrate fauna.* It is proposed that the river will still flow into the Wellington Dock and then through a newly created channel into the new marina. The channel will have a single pair of gates to impound the dock, which will generally be opened 1.5 hours before high water to 2 hours afterwards, following the same regime that is currently operated at the gates between the Wellington Dock and the Tidal Basin. As a result, no change is anticipated to the current flow characteristics of the River Dour and therefore changes to biology quality elements are not predicted.	No
Hydromorphological	*Quantity and dynamics of flow; River continuity; River depth and width variation; Structure and substrate of the river bed* See biological quality elements – since no change will occur to the existing flow characteristics, no changes to the existing heavily modified hydromorphology are anticipated.	No
Physico-chemical/Priority substances	*Thermal conditions; Oxygenation conditions; Salinity; Acidification status; Nutrient conditions* Since there will be no changes to the way in which the river flows or any current pollutant loadings, no changes to water quality are anticipated.	No
Mitigation measures	There are no mitigation measures in place and therefore the proposals will not impact on mitigation measures.	No
Protected Areas	Whilst there is a designation under Freshwater fish, this directive has now been subsumed and it is considered by UKTAG that the WFD standards make sufficient provision to ensure they are protected. As a result, no further consideration is given here.	No

Table 7.11 Preliminary Assessment table for construction effects on WFD parameters for East Kent Chalk Stour groundwater body GB40701G501500

Quality Element	Potential for impacts on status (grouped according to quality element)	Included in detailed assessment
Chemical	*Supporting elements; chemical status elements* The mobility of some contaminants within soils may be temporarily increased by disturbance of the ground during construction of landside buildings. However, construction will be phased so that the length of time that the ground is left disturbed and exposed is minimised. The excavation of deep holes for foundations or stabilisation measures (such as the installation of piling) will be appropriately designed and protected to prevent the direct migration of contaminants through the	No

	temporary excavations to lower strata. As a result, no long term changes to groundwater are anticipated.	
Quantitative	*Quantitative status element* The proposed works are unlikely to be of a nature to cause significant changes to groundwater conditions in terms of quantitative supporting elements.	No
Protected Areas	*Drinking water; Nitrates Directive* See quality elements above.	No

Table 7.12 Preliminary Assessment table for operational effects on WFD parameters for Kent South– surface water discharge

Quality Element	Potential for impacts on status (grouped according to quality element)	Included in detailed assessment
Biological	*Phytoplankton; Other aquatic flora; Benthic invertebrate fauna* There will be a permanent surface water drainage system installed as part of the scheme with associated oil interceptors. As a result, there will be changes to water quality associated with road contaminants. There would also be no changes to water quality due to new discharges from foul drainage as all foul drainage would be directed into the mains foul sewer and not discharged directly into Dover Harbour. As a result, impacts on water quality that could directly affect biological are not anticipated.	No
Hydromorphological	*Wave exposure; Depth variation ; Dominant currents* No impacts on hydromorphology are anticipated.	No
Physico-chemical/Priority substances	As per biology	No
Mitigation measures	No impact on mitigation measures that are in place is anticipated	No
Protected Areas	No impacts on protected areas are anticipated.	No

Table 7.13 Preliminary Assessment table for operational effects on WFD parameters for Kent South GB640704540001 due to presence of new structures

Quality Element	Potential for impacts on status (grouped according to quality element)	Included in detailed assessment
Biological	*Phytoplankton; Other aquatic flora; Benthic invertebrate fauna* The habitats in the location of the new structures are considered to be of low sensitivity, comprising disturbed invertebrate communities with high abundances of few opportunistic species that are common throughout the harbour and the WFD water	No

	body. As a result, the direct loss of this habitat is unlikely to change the existing structure of invertebrate communities within the water body (EIA Screening Report, 2015). The creation of the new marina would change the habitat of 69,150m^2 of the Outer Harbour by making it more brackish, more enclosed and lower energy. However, the area is considered relatively small in the context of the Outer Harbour and water body and therefore the impact is likely to be very small on a water body scale. Large changes to hydromorphological parameters are not anticipated and therefore no impacts on biological quality elements are anticipated.	
Hydromorphological	*Wave exposure; Depth variation* The completed T2 development was anticipated to lead to an increase in wave energy from the north north-east but a significant reduction in wave energy from the prevailing wind direction of south south-west (see Section 6.5.1 and 6.5.2 of the ES, 2009). Overall the T2 ES predicted a minor change to wave activity due to the localised nature of increased wave energy and the predominance of a highly dynamic hydrodynamic regime within the harbour. The DWDR scheme leads to an increase in wave height in the Eastern Docks at a similar level to the change created by the full T2 scheme and an increase in wave height at the Western Docks to a height greater than the full scheme. However, it is anticipated that this can be mitigated with wave absorption to a level that would be similar to the T2 scheme. It is therefore considered that the change in wave activity will be minor and consistent with the change predicted to result from the full consented scheme (see Appendix 5, EIA Screening Report, 2015). *Dominant currents* The completed T2 scheme was predicted to create minor changes in tidal current speed, generally in the order of less than 0.1m/s (see Section 6.5.3 of the ES, 2009). There are also minor changes in current direction at the entrances of the harbour due to the jet stream at the Western Entrance being deflected to the west by the Admiralty Pier extension. The DWDR scheme leads to a change in current speed also in the order of less than 0.1m/s. The jet stream is no longer deflected by the Admiralty Pier extension (as this is not included in the DWDR scheme) but is slightly impeded by the new pier to the south east of the new marina. It is therefore considered that the change in tidal current speed will also be minor (see Appendix 5, EIA Screening Report, 2015).	No
Physico-chemical/Priority substances	The completed T2 development diverted the River Dour from its present course through the new marina and into the Outer Harbour and therefore there could potentially be an effect on the salinity gradient within the coastal water body. Modelling undertaken by HR Wallingford for the T2 ES demonstrated that the salinity profile would be very similar to that currently	No

	experienced through the existing marina basins but in a different location. The dilution gradient was slightly steeper and therefore the impact was judged to be minor. There are no changes to the layout of the new marina in the DWDR and therefore the impact is expected to be minor (see Appendix 5, EIA Screening Report, 2015)	
Mitigation measures	*Sediment management* The change in the maintenance dredging required to meet the changes in harbour layout for the full T2 scheme was assessed against a background of ongoing maintenance dredging and was assessed to be a minor change (see Section 6.5.7 of the ES, 2009). The maintenance dredging regime however for the current proposals will be more similar to the existing regime in terms of volume, location and the ratio of particle sizes and therefore is expected to be a minor change and significantly less than that required for the full T2 development. As a result, it is not anticipated that the mitigation measure currently in place is not at risk.	No
Protected Areas	No impacts on protected areas are anticipated.	No

Table 7.14 Preliminary Assessment table for operational effects on WFD parameters for Kent South GB640704540001 due to maintenance dredging

Quality Element	Potential for impacts on status (grouped according to quality element)	Included in detailed assessment
Biological	*Phytoplankton; Other aquatic flora; Benthic invertebrate fauna* The maintenance dredging regime for the current proposals will be more similar to the existing regime in terms of volume, location and the ratio of particle sizes and therefore is expected to be a minor change and significantly less than that required for the full T2 development. As a result, changes to biological elements are not anticipated.	No
Hydromorphological	*Wave exposure; Depth variation; Dominant Currents; Intertidal zone structure.* The maintenance dredging regime for the current proposals will be more similar to the existing regime in terms of volume, location and the ratio of particle sizes and therefore is expected to be a minor change and significantly less than that required for the full T2 development. As a result, changes to hydromorphological supporting elements are not anticipated.	No
Physico-chemical/Priority substances	As per biology	No
Mitigation measures	*Sediment management* The maintenance dredging regime for the current proposals will be more similar to the existing regime in terms of volume, location and the ratio of particle	No

	sizes and therefore is expected to be a minor change and significantly less than that required for the full T2 development. As a result, it is not anticipated that the mitigation measure currently in place is not at risk.	
Protected Areas	Considered within the 2009 T2 ES and 2015 EIA Screening Report.	No

Table 7.15 Preliminary Assessment table for operational effects on WFD parameters for Dour from Kearsney to Dover GB107040073310

Quality Element	Potential for impacts on status (grouped according to quality element)	Included in detailed assessment
Biological	*Phytoplankton; Macrophytes; Fish fauna and phytobenthos; Benthic invertebrate fauna.* There will be no changes to water quality or existing parameters supporting biological elements and therefore no changes are anticipated for these quality elements.	No
Hydromorphological	*Quantity and dynamics of flow; River continuity; River depth and width variation; Structure and substrate of the river bed* Whilst the final section of the River will be diverted, the nature of the diversion is similar to that that exists now (i.e. heavily modified).	No
Physico-chemical/Priority substances	*Thermal conditions; Oxygenation conditions; Salinity; Acidification status; Nutrient conditions* There are no changes to discharges to this water body and therefore there are no changes anticipated in relation to these parameters.	No
Mitigation measures	There are no mitigation measures in place and therefore the proposals will not impact on mitigation measures that are in place.	No
Protected Areas	Whilst there is a designation under Freshwater fish, this directive has now been subsumed and it is considered by UKTAG that the WFD standards make sufficient provision to ensure they are protected. As a result, no further consideration is given here.	No

Additional assessment requirements

Tables 7.6 to **7.15** have considered all activities associated with the construction and operational phases of the project that could potentially impact on the quality elements of the WFD water bodies screened in to the assessment. These are summarised in **Table 7.16.**

Table 7.16 Summary of the potential effects on quality elements for the construction and operational phase for surface waters. (Note that no risks to groundwater or the riverine water bodies were identified).

Water body	Activity	Biological	Hydromorhpological	Physico-chemical	Mitigation measures	Protected Areas
Construction Phase						
Kent South (GB640704540001)	Disposal	×	×	×	×	×
	Dredging	✓ (other aquatic flora, invertebrates)	✓ (intertidal zone structure, dominant currents, wave exposure)	✓ (nutrients)	×	×
	Reclamation	×	×	×	×	×
	Surface Water management	×	×	×	×	×
Operational Phase						
Kent South (GB640704540001)	Maintenance dredging	×	×	×	×	×
	Presence of new structures	×	×	×	×	×
	Surface water management	×	×	×	×	×

These issues will therefore be carried forward for further assessment in Stage 3. It should be noted that this assessment has screened out the Dour from Kearsney to Dover (GB107040073310) river water body and the East Kent Chalk Stour groundwater (GB40701G501500) from requiring any further assessment.

Stage 3: Detailed Assessment

Purpose of this section

This section presents the results of the detailed compliance assessment that has been undertaken for the surface water body that has been scoped in for further assessment at the end of the previous stage. It considers potential impacts on water body status in more detail, recommends measures to mitigate any predicted impacts, and makes a clear statement about whether deterioration in water body status would occur.

Kent South Water Body (GB640704540001)

Impacts on quality elements

For the purposes of this assessment, the quality element classification included in the South East RBMP (2014) has been used.

The main risks to the WFD water body during the construction and operational phases for this water body have been identified as:

- Potential changes to hydromorphological supporting parameters associated with dredging (dominant currents, intertidal zone structure, wave exposure).
- Potential changes to biological quality elements (benthic invertebrates and other aquatic flora).
- Potential changes to nutrient concentrations.

Barriers to achieving good status/potential

In terms of the hydromorphological parameters, the T2 assessment considered there to be a minor change to wave activity due to the localised nature of increased wave energy and the predominance of a highly dynamic hydrodynamic regime within the harbour and therefore significant permanent changes to hydrodynamic parameters on a water body scale are not anticipated. There will also be a temporary loss in invertebrate communities as a result of the dredging but since the communities are of low sensitivity and already experience disturbance, it is anticipated that these communities will recover relatively quickly. As a result, only temporary impacts on benthic communities associated with dredging are anticipated.

For nutrient concentrations, risks to water bodies are usually only identified where large amounts of organic material are located within the seabed sediments, and in those areas where historical organic material has been discharged (via a sewage treatment works outfall for example). Since this material is predominantly chalk (considered to be geological material) with lesser amounts of sand/gravel and silt, changes to nutrient levels within the water body are not anticipated.

Impacts on other water bodies

Because the risks to the water body are relatively small in scale and entirely within the coastal water body, no impacts to other water bodies are anticipated.

Impacts on critical or sensitive habitats

There are no critical or sensitive habitats within the area over which the impacts are predicted to occur and therefore no impacts on critical or sensitive habitats are anticipated.

Proposed mitigation measures

There are already a number of mitigation measures that will be put in place in order to ensure permanent impacts on this water body do not occur – for example the installation of the drainage systems and protective measures associated with the reclamation discharge. These are summarised below.

- During construction, ensure that the working methodology adheres to the Environment Agency's Pollution Prevention Guidance notes (including PPG01, PPG05, PPG08 and PPG21) and construction industry good practice guidance recommended in CIRIA (2001).
- Adhere to requirements of CCEMP which has been developed and is a live document (see Appendix 4).
- All marine vessels should be checked for presence of invasive species before commencing operations.
- Concrete and cement mixing and washing areas should be situated at least 10 m away from the nearest watercourse. These should incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment should be undertaken in a contained area, and all water should be collected for off-site disposal.
- All fuels, oils, lubricants and other chemicals should be stored in an impermeable bund with at least 110% of the stored capacity. Spill kits should be available at all times, and damaged containers should be removed from site.
- All refuelling for landside vehicles should take place in a dedicated impermeable area, using a bunded bowser.
- Biodegradable oils should be used where possible.
- During operation ensure that the final designs for the site drainage system minimise any increase in surface water flows and reduce the potential for surface run off to contain sediments or contaminants.
- During operation, seek to minimise dredging requirements as far as possible via appropriate use of technical information (such as bathymetry surveys).
- Utilise appropriate infill material for reclamation with acceptably low contamination levels and low silt content.

- Ensure effective containment of the land reclamation area and monitor the quality of the dewatering discharge in order to ensure meeting permit requirements.
- Construction will be phased so that the length of time that the ground is left disturbed and exposed is minimised.
- The excavation of deep holes for foundations or stabilisation measures (such as the installation of piling) should be appropriately designed and protected to prevent the direct migration of contaminants through the temporary excavations to lower strata.

Likelihood of deterioration in water body status

With the above mitigation measures in place, deterioration in the status of the Kent South water body is not anticipated to occur as a result of the proposed development.

Stage 4: Summary of Assessment

Purpose of this section

This section provides a concise summary of the main findings of the WFD compliance assessment presented in the previous sections. The main impacts are identified and the potential for deterioration in water body status is clearly stated. Mitigation measures to prevent deterioration in water body status are also summarised.

Impacts of the scheme on WFD compliance

The previous sections have demonstrated that the proposed scheme has the potential to impact upon one surface water body in the area. Both the Dour from Kearsney to Dover river water body (GB107040073310) and the East Kent Chalk Stour groundwater body (GB40701G501500) have been scoped out of requiring further assessment. The main impacts of the development proposals are therefore described below:

- The presence of the new structures could give rise to permanent changes in a number of hydromorphological supporting parameters in the Kent South (GB640704540001) water body but these changes are considered to be very small in scale.
- The presence of the new structures (including the reclaimed area) in the Kent South (GB640704540001) water body will lead to a loss in invertebrate communities however these are considered to be of low sensitivity and the loss is only a very small area compared to the water body size. As a result the deterioration is considered to be small scale and will not alter the status of the water body for this parameter.

Mitigation measures

In order to prevent deterioration in the status of the surface and groundwater bodies, and ensure that the proposals are compliant with the WFD, the following mitigation measures are recommended:

- During construction, ensure that the working methodology adheres to the Environment Agency's Pollution Prevention Guidance notes (including PPG01, PPG05, PPG08 and PPG21) and construction industry good practice guidance recommended in CIRIA (2001).
- Adhere to requirements of CCEMP, which is a live document (see Appendix 4).
- All marine vessels should be checked for presence of invasive species before commencing operations.
- Concrete and cement mixing and washing areas should be situated at least 10 m away from the nearest watercourse. These should incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment should be undertaken in a contained area, and all water should be collected for off-site disposal.
- All fuels, oils, lubricants and other chemicals should be stored in an impermeable bund with at least 110% of the stored capacity. Spill kits should be available at all times, and damaged containers should be removed from site.
- All refuelling for landside vehicles should take place in a dedicated impermeable area, using a bunded bowser.
- Biodegradable oils should be used where possible.

- During operation ensure that the final designs for the site drainage system minimise any increase in surface water flows and reduce the potential for surface run off to contain sediments or contaminants.
- During operation, seek to minimise dredging requirements as far as possible via appropriate use of technical information (such as bathymetry surveys).
- Utilise appropriate infill material for reclamation with acceptably low contamination levels and low silt content.
- Ensure effective containment of the land reclamation area and monitor the quality of the dewatering discharge in order to ensure meeting permit requirements.
- Construction will be phased so that the length of time that the ground is left disturbed and exposed is minimised.
- The excavation of deep holes for foundations or stabilisation measures (such as the installation of piling) should be appropriately designed and protected to prevent the direct migration of contaminants through the temporary excavations to lower strata.

WFD compliance

In summary, the proposed works will not cause deterioration in the status of any waterbody or prevent good status being achieved in these water bodies in the future.

8. Summary

This report has been written to support the marine licence application for the proposed DWDR scheme. There are not anticipated to be any significant impacts to any environmental features or designated sites as supported by the information gathered above. In order to ensure that all agreed mitigation and enhancement obligations are adhered to, a CCEMP has been developed and will continue to be a live document throughout the duration of the DWDR project.

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10. Appendix 1 DDC Screening Response
11. Appendix 2 T2 HRO Decision Letter
12. Appendix 3 Outline Design Drawings
13. Appendix 4 Client Construction Environmental Management Plan (CCEMP)
14. Appendix 5 Request for Screening Opinion DWDR Cargo Handling Facilities (RHDHV, 2015)
15. Appendix 6 Fugro Seacore Limited Dover Draft Factual Report (September 2015)
16. Appendix 7 DWDR Disposal Plume Dispersion modelling (HR Wallingford, 2015)