Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Environmental Statement Volume 4

Annex 5-3: Marine Conservation Zone Assessment

June 2018, Revision A

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Volume 4

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June 2018

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Table of Contents

5 MCZ Assessment

5.1 Introduction

5.1.1 VWPL is seeking a Development Consent Order (DCO) for Thanet Extension Offshore Wind Farm (Thanet Extension). The proposal is for a wind farm with a total generating capacity of up to 340 MW.

5.1.2 Specific consideration of Marine Conservation Zones (MCZs) is required for any Marine Licence or DCO applications containing Deemed Marine Licences. The Marine Management Organisation (MMO) has specific duties for MCZs and Marine Licence decision making under Section 126 of the Marine and Coastal Access Act (MCAA) 2009. Section 126 applies where:

- (a) A public authority has the function of determining an application (whenever made) for authorisation of the doing of an act; and
- (b) The act is capable of affecting (other than insignificantly):
    - (i) The protected features of an MCZ; and/ or
    - (ii) Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

5.1.3 This report has been produced as an annex to the Environmental Statement (ES) to provide the necessary evidence on the impacts of Thanet Extension on identified MCZs. It follows guidance published by the MMO (2013) on how these assessments should be undertaken. The MCZ assessment has been undertaken on the basis of Thanet Extension project information as detailed within Volume 2, Chapter 1: Project Description (Offshore) (Document Ref: 6.3.1) and Volume 3, Chapter 1: Project Description (Onshore) (Document Ref: 6.3.1).

5.1.4 This MCZ assessment should be read alongside the following chapters of the ES, which are referred to and drawn upon throughout this document:

- Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5);
- Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2);
- Volume 2, Chapter 3: Marine Water and Sediment Quality (Document Ref: 6.2.3); and
- Volume 2, Chapter 14: Offshore Designated Sites (Document Ref: 6.2.8).

5.1.5 In line with the structure proposed in the guidance the report is structured as outlined in Table 5.1:

Table 5.1: Structure of the MCZ assessment

No.	Section	Description
5.1	Introduction	Provides an introduction to Thanet Extension project and the purpose of this MCZ assessment.
5.2	Consultation	Details the feedback received on the MCZ Assessment to date, and how those comments have been addressed.
5.3	Methodology	Includes information on the approach to the MCZ assessment following relevant published guidance, and how information presented in other parts of the ES have been used to support the assessments presented in this MCZ assessment.
5.4	Screening	Presents details of the screening exercise followed to assess which MCZs have the potential to be affected by Thanet Extension.
5.5	Background information MCZs	Provides details on the background of the identified MCZs, such as location and designated features.
5.6	Stage one assessment	Details the stage one assessment exercise, in which potential impacts of Thanet Extension are assessed for effects on the features of the MCZs identified in the screening stage. Potential effects on the habitats and features of the Goodwin Sands recommended MCZ (rMCZ) are also assessed.

Project description

5.1.6 The following paragraphs provide a brief overview of the key components of Thanet Extension. Volume 2, Chapter 1: Project Description (Offshore) (Document Ref: 6.2.1) and Volume 3, Chapter 1: Project Description (Onshore) (Document Ref: 6.3.1) of the ES, which present the project description for the offshore and onshore components of Thanet Extension.

5.1.7 Thanet Extension will have a total capacity of up to 340 Megawatts (MW) and up to 34 Wind Turbine Generators (WTGs). The array area will be approximately 70 km^2 and will be approximately 8 km north-east of the Isle of Thanet, around the existing Thanet Offshore Wind Farm (TOWF).

5.1.8 The Offshore Export Cable Corridor (OECC) will extend from the south-western boundary of the array area in a south-westerly direction to Pegwell Bay on the Kent coast. The OECC will be approximately 20 km in length. As a result of Section 42 consultation, the project has adopted a 'cable exclusion area' within the OECC. This area encompasses the dredged approach channel to Ramsgate Harbour, and a 100 m buffer around the harbour limits. No infrastructure will be installed in this area, however it may be used for anchoring during construction, maintenance and decommissioning activities.

5.1.9 The electricity generated will be transmitted via buried High Voltage Alternating Current (HVAC) cables. From the landfall at Pegwell Bay, onshore cables will connect the wind farm to an onshore substation at Richborough Port, which will in turn connect to an existing National Grid Substation at Richborough Energy Park. The onshore cable corridor will be approximately 2.5 km in length.

5.1.10 The key offshore components of Thanet Extension include:

- Up to 34 WTGs and associated foundations;
- Offshore Substation (OSS) (if required) and its associated foundations;
- Subsea inter-array cables between WTGs;
- Subsea export cables between the wind farm and the shore; and
- Scour protection, concrete mattresses of other protective substrate associated with foundations, cables and cable crossings;

5.1.11 The key onshore components of Thanet Extension include:

- Landfall site with associated Transition Joint Bays (TJBs);
- Onshore undergrounds cables;
- Temporary construction areas; and
- Onshore Substation in proximity to the National Grid connection at Richborough Energy Park.

5.1.12 The Thanet Extension boundaries (referred to as 'Order Limits'), including both onshore and offshore components, were selected following both engineering and environmental considerations. Further details regarding the site selection of Thanet Extension are provided in Volume 1, Chapter 4: Site Selection and Considerations of Alternatives (Document Ref: 6.1.4).

5.2 Consultation

5.2.1 A formal scoping opinion was requested from PINS following the submission of the Scoping Report (VWPL, 2016). Ongoing consultation post-scoping has been important in the evolution of the project and the parameters for assessment. As part of the Environmental Impact Assessment (EIA) process, ongoing consultation has been undertaken with various statutory and non-statutory authorities, under the auspices of the Thanet Extension Evidence Plan (Marine Ecology Technical Review Panel) (Evidence Plan Report (Document Ref: 6.8.5).

5.2.2 In response to the Thanet Extension Scoping Report, PINS issued a Scoping Opinion (PINS, 2017). The Secretary of State (SoS) identified a number of issues that could not be scoped out of the assessment at this stage, based on a review of the Scoping Report. The draft MCZ Assessment was submitted as an annex to the Preliminary Environmental Information Report (PEIR) for statutory consultation under Section 42 of the Planning Act 2008.

5.2.3 The consultation responses relating to the MCZ Assessment which are addressed in this report are presented in Table 5.2.

Table 5.2: Summary of consultation relating to the MCZ Assessment

Consultation phase/ type	Consultation and key issues raised	Section where comment addressed
Scoping Opinion	The SoS notes that at present Section 2.5 of the Scoping Report makes no reference to the Thanet Coast MCZ or the Goodwin Sands rMCZ, any effects to these sites will need to be assessed and presented in the ES.	Effects on the Thanet Coast MCZ are assessed in this report.

Consultation phase/ type	Consultation and key issues raised	Section where comment addressed
		As the Goodwin Sands rMCZ* has not been brought forward for consultation, and the site has no conservation objectives, the site was not included as part of the formal MCZ Assessment at the PEIR stage. However, an assessment of the potential impacts to the habitats and features of conservation importance has now been added to this MCZ Assessment.
Section 42 Consultation: MMO	The MMO notes that the Goodwin Sands rMCZ has been scoped out of the PEIR as it has not been taken forward for consultation, and that consideration has been made with regards to the habitats and features inside the proposed boundary of the Goodwin Sands rMCZ in the benthic ecology chapter. The MMO recommends that an assessment of the rMCZ is undertaken in order to future proof the project as the status may change if it us put forward prior to the proposed project construction. The MMO reiterates that it is the applicant's risk not to include an assessment of the rMCZ.	As the proposed site has not been brought forward for consultation, and in the absence of conservation objectives for the site, a formal MCZ assessment was not undertaken at the PEIR stage. However, a 'proxy' assessment of the potential impacts to the habitats and features of conservation importance of the rMCZ* has been carried out, which makes reference to ES chapters which have already included these within their assessments. Background information on the Goodwin Sands rMCZ* is described in Section 5.5, with potential impacts assessed in Section 5.6.
	The MMO defers to Natural England on the suitability of the assessment of the Thanet Coast MCZ.	Noted. This table (Table 5.2) includes comments received by Natural England, and how they have been addressed.
	Annex 8.2: Marine Conservation Assessment contains incorrect references to Annex 5.3, which does not appear to exist.	Typographic errors have been corrected. Document reference numbers have been updated, so that Annex 5.3 now refers to this document.
Section 42 Consultation: Natural England	Natural England advises Vattenfall to consider Goodwin Sands rMCZ within their assessment in order to future proof their project/ application, in line with other developments in the area.	As the rMCZ* has not been brought forward for consultation* and therefore there is some uncertainty as regards conservation objectives, an assessment 'by proxy' has been included, which assesses the potential impacts to the habitats and features of the rMCZ*, but not to the rMCZ* itself. Background information on the Goodwin Sands rMCZ* is described in Section 5.5, with details of this 'proxy' assessment contained in Section 5.6. It is noted that it is the Applicant's risk not to consider the site.
	NE acknowledge and agree that due to the proximity of the proposed project to the Thanet Coast MCZ, a MCZ assessment will be undertaken to assess any likely significant impacts to the MCZ.	
	NE wish to highlight that the decision to designate the Goodwin Sands rMCZ is still under discussion and therefore the impacts to this site may need revisiting in the future if designation is progressed. Vattenfall should consider it within their assessment in order to future proof their project/ application and should follow the route taken by other developers recently, who have considered the site.	
Section 42 Consultation: Kent Wildlife Trust	We have concerns regarding the impact of the cabling route on Thanet Coast MCZ, particularly on the subtidal chalk feature. After reviewing Benthic Characterisation Report Volume 4, Annex 5-2, we do not believe enough sampling has been undertaken within the MCZ to give sufficient	The OECC boundary has been partially amended to avoid cable installation within Thanet Coast MCZ and Ramsgate Harbour limits. This 'cable exclusion

Consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	confidence on the presence or absence of subtidal chalk. Once the removal of a subtidal chalk habitat has taken place, there is no option for the recovery of this habitat; it will be lost in perpetuity, and therefore the conservation objectives of the site would not be met. We suggest that the cabling route avoids Thanet Coast MCZ to reduce any risks to the conservation status of this site. This would also reduce any consenting risks to this development.	area', shown in Figure 5.2, will permit works such as anchor placements, but will not permit cable installation. The exact offshore cable route will be submitted to the MMO for approval following detailed design and pre-construction surveys. As is described in paragraph 5.6.2 *et seq.*, the cables could be installed anywhere within the Red Line Boundary except within the cable exclusion zone, eliminating long-term effects within the area of overlap. This will be shown on the Works Plans as within the Order Limits. Background information on the Goodwin Sands rMCZ* is described in Section 5.5, with details of this 'proxy' assessment contained in Section 5.6.
	KWT cannot support the approach to the MCZ Assessment and therefore the conclusions. The assessment should be against the conservation advice for the site, in this case Thanet Coast MCZ conservation advice. This would reflect the approach being undertaken by Ørsted for Hornsea 3 offshore wind farm and also numerous Inshore Fisheries and Conservation Authorities (IFCAs) undertaking assessments of fishing activities on MCZs. It is of great concern that Vattenfall are at present giving no consideration to the Goodwin Sands rMCZ, and we strongly agree with the advice from Natural England and the SoS's Scoping Opinion in January 2017 that an assessment should be undertaken for Goodwin Sands rMCZ. This would follow best practice undertaken by other offshore wind farm developers. The designation of the Goodwin Sands rMCZ should be considered when assessing cumulative effects of reduction of fishing space and therefore more competition/fishing in areas outside of the Thanet Extension area and the Goodwin Sands area. We also suggest that the section on habitats of nature conservation importance should include consideration of the impact on beds of blue mussels (*Mytilus edulis*), which are a key feature of the Goodwin Sands rMCZ.	
Marine Ecology - Evidence Plan teleconference (26/01/18)	Following several stakeholder comments requesting the inclusion of the Goodwin Sands rMCZ in the MCZ Assessment, this was discussed with the Evidence Plan post-Section 42. After highlighting the lack of certainty as to whether the site will be brought forward for consultation as a fully designated MCZ, an approach was proposed to consider the habitats and features of conservation interest of the rMCZ, but not to fully assess the site in the MCZ Assessment. This approach has been taken as it would be difficult a meaningful assessment in view of the lack of conservation objectives and management measures for the site.	An assessment of the habitats and features of conservation importance of the Goodwin Sands rMCZ* is described in Section 5.6 of this report.

*Note: On 08/06/2018, consultation opened on the third tranche of MCZ designations, bringing 41 proposed sites, including the Goodwin Sands rMCZ. In light of this, the assessment and it's conclusions remain valid. It should be noted that the Goodwin Sands rMCZ Consultation Factsheet (Defra, 2018) identified that cable installation and renewable energy activities are not likely to be damaging to the features of the site.

5.3 Methodology

5.3.1 The 2013 MMO guidance provides the best available guidance on how MCZ assessments should be undertaken. These guidelines recommend a staged approach to the assessment, with three sequential stages: Screening, Stage One Assessment, and Stage Two Assessment (Figure 5.1). Full detail of these stages of the approach have been provided in the following sections.

5.3.2 If certain activities, sites or impacts are screened into the MCZ assessment process, these are then considered within the Stage One Assessment, followed by Stage Two Assessment if significant risks to the achievement of the MCZ conservation objectives have been identified in the Stage One Assessment.

5.3.3 This assessment has considered MCZs that have been designated during the first two tranches of MCZ designations (Tranche One in 2013 and Tranche Two in 2016). MCZs not designated or brought forward for consultation are not required to be considered however the Applicant has undertaken a proxy MCZ assessment for the Goodwin Sand rMCZ which has not been brought forward for consultation at the time of writing (June 2018).

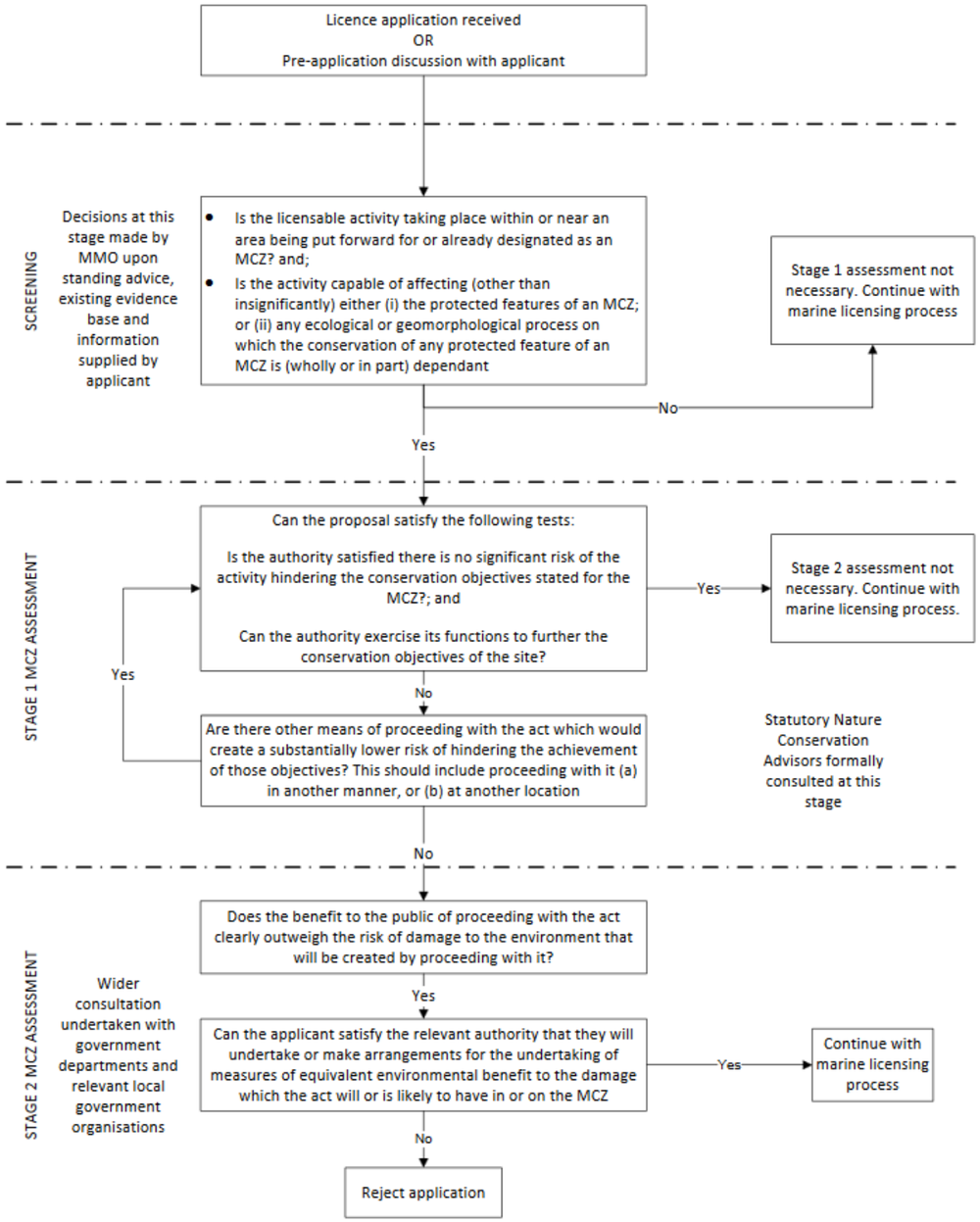

Figure 5.1: Summary of the MCZ assessment process used by the MMO (MMO, 2013).

Screening

5.3.4 According to the MMO (2013) guidelines, all Marine Licence applications need to be screened to determine whether Section 126 should apply to the application. It would apply if it is determined through the course of screening that:

- The licensable activity is taking place within or near an area being put forward or already designated as an MCZ; and
- The activity is capable of affecting (othering 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) dependant.

5.3.5 The MMO recommends the use of a risk-based approach when determining the 'nearness' of an activity to MCZs, including applying an appropriate buffer zone to the MCZ features under consideration as well as a consideration of risks for activities at greater distances from features of the MCZ(s).

5.3.6 In determining 'insignificance', the MMO considers the likelihood of an activity causing an effect, the magnitude of the effect (should it occur), and the potential risk any such effect may cause on either the protected features of an MCZ or any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant.

5.3.7 For the purposes of Thanet Extension MCZ screening, MCZs considered within the assessment were identified through the Scoping Report (VWPL, 2016) and Scoping Opinion (the Planning Inspectorate (PINS), 2017). The method of defining 'significance' is provided in section 5.3.18 *et seq*.

Stage One Assessment

5.3.8 The Stage One Assessment (if/ as required) would then consider whether the condition in Section 126(6) can be met. In doing so, the MMO would use the 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:

- There is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ (in accordance with Section 126(6)); and
- The MMO can exercise its functions to further the conservation objectives stated for the MCZ (in accordance with Section 125(2)(a)).

5.3.9 If the condition in Section 126(6) cannot be met, the Stage One assessment would consider whether the condition in Section 127(7)(a) can be met. In doing so the MMO would determine whether there are 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.

5.3.10 In undertaking a Stage One assessment the MMO would formally consult with SNCBs for a period of 28 days unless the SNCB notifies the MMO that it need not wait or the MMO determine that there is an urgent need to grant authorisation (in accordance with Section 126(2).

5.3.11 Within this stage of assessment, 'hinder' would be any act that could, either alone or in-combination:

- In the case of a conservation objective of 'maintain', increase the likelihood that the current status of a feature would go downwards (e.g. from favourable to degraded) either immediately or in the future (i.e. these features would be placed on a downward trend); or
- In the case of a conservation objective of 'recover', decrease the likelihood that the current status of a feature could move upwards (e.g. from degraded to favourable) either immediately or in the future (i.e. these features would be placed on a flat or downward trend).

5.3.12 Similarly, 'further' would be any act that could:

- In the case of a conservation objective of 'maintain', increase the likelihood that the current status of a feature would be maintained either immediately or in the future; or
- In the case of a conservation objective of 'recover', increase the likelihood that the current status of a feature could move upwards (e.g. from degraded to favourable) either immediately or in the future.

5.3.13 When considering whether an activity can hinder the conservation objectives of a site, the MMO would consider the direct impact of an activity upon a feature as well as any applicable indirect impacts. Such an indirect impact could include changing the effectiveness of a management measure put in place to further the conservation objectives.

5.3.14 The applicant should be able to demonstrate that 'other means' reduces the risk such that the act no longer has a significant risk of hindering the conservation objectives of the site.

5.3.15 In determining 'significant', the MMO (2013) guidance states that 'this should take into account the likelihood of an activity causing an effect, the magnitude of the effect should it occur, and the potential risk any such effect may cause on either the protected feature of an MCZ or any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant'.

Stage Two Assessment

5.3.16 If mitigation to reduce the impacts to an acceptable level cannot be secured, and there are no other alternative locations, then a stage two assessment would be required. Should a stage two assessment be required, this would follow the MMO guidance (MMO, 2013) on the two-staged approach for undertaking an MCZ assessment.

5.3.17 The stage two assessment involves the MMO using information supplied by the applicant with the Marine Licence application, advice from the SNCBs and any other relevant information to determine whether the benefit to the public of proceeding with the act clearly outweighs the risk of damage to the environment that will be created by proceeding with it and if so, whether the applicant can satisfy the MMO that they will undertake or make arrangements for the undertaking of measures of equivalent environmental benefit to the damage the activity will, or is likely to have, in or on the MCZ.

Significance of effects

5.3.18 Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2) and Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) of the ES have presented assessments of the impacts of Thanet Extension on the physical and ecological marine environment respectively, with definitions of the magnitude of impacts, sensitivity of receptors, and the significance of effects on those receptors. These definitions have also been adopted for the purposes of this MCZ assessment, with the term 'effect' used to express the consequence of an impact. This is expressed as the 'significance of effect' and is determined by considering the magnitude of the impact alongside the sensitivity of the receptor or resource, in accordance with defined significance criteria (Volume 1, Chapter 3: EIA Methodology (Document Ref: 6.1.3)).

Magnitude of impact

5.3.19 For each impact, a magnitude has been assigned, providing a definition of the spatial extent, duration, frequency and reversibility of the impact considered (where applicable).

5.3.20 The magnitude of impact has been categorised according to the following scale, with definitions of these provided in the maximum design scenario tables of Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2) and Volume 2, Chapter 5: Benthic, Subtidal and Intertidal Ecology (Document Ref: 6.2.5) of the ES:

- Negligible;
- Low;
- Medium; or
- High.

Sensitivity of receptor

5.3.21 For the purposes of the MCZ assessment, receptors have been defined as the features of MCZs that would be affected. The features of MCZs with the potential to be affected by Thanet Extension, and therefore considered within this assessment, correspond to the benthic ecological receptors (i.e. habitats and associated species and assemblages) identified within Volume 4, Annex 5.1: Benthic Ecology Technical Report (Intertidal) (Document Ref: 6.4.5.1) and Volume 4, Annex 5.2: Benthic Ecology Technical Report (Subtidal) (Document Ref: 6.4.5.2) and assessed in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5). MCZs themselves are considered in Volume 2, Chapter 8: Offshore Designated Sites (Document Ref: 6.2.8).

5.3.22 In defining the sensitivity for each receptor, the value or importance is usually a key consideration, with all MCZ features considered to be of national importance. When considering sensitivity, it is also important to consider the combined vulnerability of the receptor to a given impact and the likely rate of recoverability to pre-impact conditions. Vulnerability is defined as the susceptibility of a species or assemblage to disturbance, damage or death, from a specific external factor. Recoverability is the ability of the same receptor (species or assemblage) to return to a state close to that which existed before the activity or event which caused the change. For benthic ecological receptors, it is dependent on the ability of these benthic species and assemblages to recover or recruit subject to the extent of disturbance or damage incurred. These definitions have been further discussed in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5).

5.3.23 Similar to the magnitude of impact, the sensitivity of a receptor has been categorised according to the following scale:

- Negligible;
- Low;

- Medium: or
- High

Significance of effect

5.3.24 The overall significance of an effect has been determined by correlating the magnitude of the impact alongside the sensitivity of the receptor. In order to ensure a transparent and consistent approach, a matrix approach has been adopted (Table 5.3).

5.3.25 For the purposes of the MCZ assessment, any effects with a significance level of 'minor' or 'negligible' are considered 'not significant' in terms of the MCAA. In line with the MMO (2013) guidance, the conclusion with respect to the significance of the effect has considered the risk of an activity causing an effect, the magnitude of the effect should this occur, and the potential risks to either the protected features of the MCZ or any ecological or geomorphological process on which these features are dependent.

Table 5.3: Significance of potential effects

		Sensitivity			
		High	**Medium**	**Low**	**Negligible**
Negative Magnitude	**High**	*Major*	*Major*	*Moderate*	*Minor*
	Medium	*Major*	*Moderate*	*Minor*	*Negligible*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*
	Negligible	*Minor*	*Minor*	*Negligible*	*Negligible*
Beneficial Magnitude	**Negligible**	*Minor*	*Minor*	*Negligible*	*Negligible*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*
	Medium	*Major*	*Moderate*	*Minor*	*Negligible*
	High	*Major*	*Major*	*Moderate*	*Minor*

5.3.26 These criteria have been used to inform the MCZ assessment, drawing on findings of the impact assessments presented in the ES. However, in contrast to the approach taken in the EIA process, this assessment has considered the risks that Thanet Extension might pose to the current conservation status of each of the individual MCZ features.

5.3.27 Based on the information presented within this assessment and consideration of the conservation objectives and management approach for the sites and features, conclusions have been made with respect to whether the conditions in Section 126(6) of the MCAA can be met, i.e.:

- There is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ; and
- The MMO can exercise its functions to further the conservation objectives stated for the MCZ (in accordance with Section 125(2)(a)).

5.3.28 If it cannot be concluded that there is no significant risk of the activity hindering the achievement of the conservation objectives or the management approach for an MCZ, and that mitigation or consideration of the alternative means of proceeding would not create a substantially lower risk of hindering achievement of the conservation objectives, a stage two assessment would be required. Should this be required for Thanet Extension, the relevant parts of the MMO (2013) guidance would again be followed (Figure 5.1).

5.4 Screening

Is the licensable activity taking place within or near an area being put forward or already designated as an MCZ?

5.4.1 The MCZs identified in Section 2.15 (Offshore Designated Sites) of the Scoping Report (VWPL, 2016) as having the potential to be affected by Thanet Extension were the Thanet Coast MCZ, and the Goodwin Sands recommended MCZ (rMCZ). The Thanet Coast MCZ, shown in Figure 5.2 overlaps with Thanet Extension OECC and is approximately 7 km from the array area at its closest point (within one ~ 13 km tidal excursion as identified in Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2)).

5.4.2 As outlined in Section 5.2, it was recommended that the Goodwin Sands rMCZ should also be included in the MCZ Assessment in order to future proof the project. Since the rMCZ has not been brought forward for consultation, there is no obligation for formal consideration of the site within the MCZ Assessment. In addition to this, the lack of certainty with regards to conservation objectives makes any assessment of the impacts to those objectives impractical. As such, an assessment of the impacts to features of conservation importance has been undertaken, with reference to assessments already carried out within Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2) and Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5). More information on the potential effects on the features of the rMCZ are presented below, with background information on the rMCZ being presented in Section 5.5.

Is this 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?

Thanet Coast MCZ

5.4.3 The Thanet Coast MCZ was identified as having the potential to be affected by Thanet Extension in Section 2.15 (Offshore Designated Sites) of Thanet Extension Scoping Report (VWPL, 2017), and has been included due to the site's proximity to Thanet Extension OECC (0 km at its closest point), and array area (7 km at its closest point).

5.4.4 Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2) concluded that increases in Suspended Sediment Concentration (SSC) and associated sediment deposition during cable installation would occur in close proximity to the cable installation activity, with the majority of sediments settling on the seabed within metres of the cable. Fine sediments would be transported over greater distances, but these would be expected to be near background levels within hundreds to a few thousand metres. Sediment deposition due to cable installation would not be likely to settle to a measurable thickness beyond tens to hundreds of metres from the cable, with the majority of disturbed sediments deposited within a few metres of the cable. Sediments released from the drilling and dredging of piles, being released at a greater height in the water column, can be expected to remain in suspension for a longer time and therefore be advected over a greater distance. In the order of hundreds to thousands of metres away from these locations, elevations of SSC above background levels are expected to be very low, and within the range of natural variability (see paragraph 5.6.10 *et seq.*).

5.4.5 Due to the distance between Thanet Extension OECC and the Thanet Coast MCZ (overlapping at the southern end of the MCZ (see Figure 5.2), it can be concluded that there is the potential for a receptor-impact pathway that could result in an effect on the Thanet Coast MCZ. Any potential impacts from the array area and areas of the OECC further away from the Thanet Coast MCZ will more limited and will be confined to the construction phase (effects in the Operations and Maintenance (O&M) and decommissioning phases will be much more limited in extent.

5.4.6 It should be noted that although the Thanet Extension OECC overlaps with the Thanet Coast MCZ, the area of overlap relative to the MCZ is small (0.7 km^2 compared with the total MCZ area of approximately 64 km^2 (1.1%). It is also worth noting that as a result of Section 42 consultation, a 'cable exclusion area' has been introduced to the OECC boundary. This area, encompassing a 100 m buffer around the Ramsgate harbour limits, and the dredged approach channel to the harbour, will not have cables installed within it, however the area may however still be used for anchor placement (see Figure 5.2). The 100 m buffer was deemed to be a sufficient distance in order to ensure a limited effect on the harbour from anchor spreads. In practice, this will mean that long-term effects during the O&M phase are limited to impacts from cable maintenance within the MCZ.

5.4.7 Furthermore, impacts from cable installation within or near the Thanet Coast MCZ are likely to be a series of discrete operations (up to four cable installations but potentially as low as two), and there may well be recovery of affected habitats and species between operations.

5.4.8 Following the MMO guidelines (MMO, 2013), any impacts that are concluded to have a negligible impact (non-significant impact) on benthic ecology receptors (including features of an MCZ) can be screened out and not taken through to the stage one assessment. Impacts which were concluded to have a negligible impact on features of an MCZ are considered to present a sufficiently low risk to its protected features or the ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent, so as to allow these to be screened out at this stage. The following impacts (all of which were concluded to be non-significant within Volume 2, Chapter 5: Benthic Intertidal and Subtidal Ecology (Document Ref: 6.2.5) have therefore been screened out and are not considered in the stage one assessment:

- Direct impacts on benthic ecology from noise arising from foundation installation;
- Colonisation of subsea infrastructure affecting benthic ecology and biodiversity;
- Long-term loss of seabed habitat as a result of the use of cable protection;
- Indirect disturbance to benthic habitats from electromagnetic fields generated by inter-array and export cables; and
- Long-term changes to the seabed habitats from scour effects and changes in sediment regime.

Goodwin Sands rMCZ

5.4.9 The habitats and features within the boundary of the Goodwin Sands rMCZ have the potential to be affected by Thanet Extension. The OECC overlaps with the north-western corner of the rMCZ, covering an area of overlap of approximately 1.13 km^2. The Thanet Extension array boundary is approximately 3.08 km from the rMCZ at its closest point.

5.4.10 Since the Goodwin Sands rMCZ has not yet been brought forward for consultation, and there are no formal conservation objectives of which to assess potential impacts against, a formal MCZ assessment is not proposed to be undertaken for the Goodwin Sands rMCZ. However, in response to consultation (outlined in Table 5.2), an assessment of the potential impacts to the habitats and features of conservation importance is described in Section 5.6 of this MCZ Assessment.

5.4.11 Due to the overlap between the OECC and the Goodwin Sands rMCZ, it can be concluded that there is the potential for a receptor-impact pathway that could result in effects on the habitats and features of conservation importance of the proposed site. As with the Thanet Coast MCZ, any effects from the Array and areas further away in the OECC will be more limited and confined to the construction phase.

5.4.12 Similar to the Thanet Coast MCZ, it should be noted that although there is an area of overlap between the rMCZ and the OECC, which is small in extent compared to the total area of the site (approximately 1.13 km^2 compared to the total 279.28 km^2 of the Goodwin Sands rMCZ, a percentage overlap of 0.4%). The overlap is also partial, and whilst cable installation could take place anywhere within the proposed red line boundary, it is possible that they may be installed further north and not take place within the rMCZ at all. Furthermore, the installation of cables is likely to be a series of discrete operations, and there may be some recovery between these operations.

5.4.13 The potential impacts to the Goodwin Sands rMCZ are expected to be the same as those for the Thanet Coast MCZ, and as such, the same impacts are scoped out of the assessment for the Goodwin Sands rMCZ (paragraph 5.4.8).

Screening conclusions

Thanet Coast MCZ

5.4.14 For the Thanet Coast MCZ, the following impacts are screened into the stage one assessment:

- Construction;
  - Temporary habitat loss/ disturbance due to anchor placements in the Thanet Coast MCZ; and
  - Temporary increases in SSC and associated sediment deposition.
- O&M;
  - Direct disturbance to the seabed from cable maintenance activities.
- Decommissioning: potential impacts are predicted to be not greater than those predicted for the construction and O&M phases, see paragraphs 5.6.24 *et seq*.

Goodwin Sands rMCZ

5.4.15 For the Goodwin Sands rMCZ, the potential impacts screened into the assessment are:

- Construction;
  - Temporary habitat loss/ disturbance due to cable installation activities in the Goodwin Sands rMCZ; and
  - Temporary increases in SSC and associated sediment deposition.
- O&M;
  - Long-term habitat loss due to the presence of cable/ scour protection in the Goodwin Sands rMCZ; and
  - Direct disturbance to the seabed from cable maintenance activities.

5.5 Background information on the MCZs

5.5.1 This section provides a summary of the baseline information for the MCZs considered within the stage one assessment.

Thanet Coast MCZ

5.5.2 The Thanet Coast MCZ partially overlaps with the proposed OECC as shown in Figure 5.2. The MCZ partially overlaps with the Thanet Coast Special Area of Conservation (SAC) and is designated to protect additional features to these designated as part of the SAC. Amongst other features, the MCZ has been designated to protect an area of subtidal chalk that extends seaward from the SAC. The full list of features protected by the MCZ are:

- Subtidal coarse sediment;
- Subtidal mixed sediments;
- Subtidal sand;
- Moderate energy infralittoral rock;
- Moderate energy circalittoral rock;
- Blue mussel (*Mytilus edulis*) beds;
- Peat and clay exposures;
- Ross worm (*Sabellaria spinulosa*) reefs;
- Subtidal chalk;
- Stalked jellyfish (*Haliclystus auricula*); and
- Stalked jellyfish (*Lucernariopsis cruxmelitensis*).

5.5.3 The MCZ is noted as containing examples of a variety of features found within the south-east region, including part of the longest continuous stretch of coastal chalk in the UK, including reefs, cliffs and coves, and it is also the only designated MCZ to protect the stalked jellyfish *L. cruxmelitensis*. Additionally, the MCZ includes an unusual composition of *M. edulis* bed and *S. spinulosa* reefs that have formed a complex intertidal biogenic reef.

5.5.4 The conservation objectives of and MCZ establish whether a feature of the MCZ meets the required state (quality) and should be 'maintained' or falls below the required state and should be 'recovered to favourable condition'. The conservation objectives of the Thanet Coast MCZ are described in Table 5.4.

5.5.5 The location of the Thanet Coast MCZ in relation to Thanet Extension is shown in Figure 5.2. The seabed habitats of the Thanet Coast MCZ according to EU Sea Map data are illustrated in Figure 5.3 and a comparison of EU Sea Map data with site-specific date collected during Thanet Extension benthic characterisation surveys (Fugro, 2016) is shown in Figure 5.6. These figures illustrate that the habitats present within the small area of overlap between the MCZ boundary and proposed offshore development boundary are characterised by patched of fine and coarse sediments. This corresponds with the features subtidal coarse sediment, subtidal mixed sediments, and subtidal sand. Each of these habitats is considered in the following section through reference to the recognised pressures and sensitivities detailed within the Natural England Advice on Operations for Thanet Coast MCZ.

5.5.6 Reference to the mapped features (MAGIC, 2017)[1] obtained from Natural England's 'Conservation Advice for Marine Protected Areas' for the Thanet Coast MCZ reveals limited detailed site-specific information about the extents of its protected features. Figure 5.4 suggests that in the southern portion of the Thanet Coast MCZ where there is some overlap of Thanet Extension and the MCZ, there are features including subtidal chalk, moderate energy infralittoral rock, subtidal mixed sediments, and subtidal coarse sediments.

5.5.7 From the point source locations of this data (Figure 5.5), it can be seen that point data is limited in extent for the southern section of the Thanet Coast MCZ with just one datum point that indicates subtidal mixed sediments. This is supported by site-specific data collected by Fugro (2016) (Figure 5.6). It is therefore expected that as indicated in Figure 5.6, features such as subtidal chalk is not located in this overlapping section, and that the site-specific Fugro (2016) data represents a more realistic case of the features present. Any subtidal chalk present is therefore likely to be chalk bedrock overlain with sediment rather than forming exposed outcrops, and will therefore not meet the definition of 'chalk reef'.

5.5.8 Figure 5.4 suggests that in the southern portion of the Thanet Coast MCZ where there is some overlap of Thanet Extension and the MCZ, there are features including subtidal chalk, moderate energy infralittoral rock, subtidal mixed sediments, and subtidal coarse sediments.

[1] MAGIC (Multi-Agency Geographic Information for the Countryside (2017), Natural England [online] Available at: http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx Accessed: September 2017.

Table 5.4: Conservation objectives for the Thanet Coast MCZ

Feature	Conservation objective/ general management approach
Subtidal coarse sediment	Maintain in favourable condition
Subtidal mixed sediment	Maintain in favourable condition
Subtidal sand	Maintain in favourable condition
Moderate energy infralittoral rock	Maintain in favourable condition
Moderate energy circalittoral rock	Maintain in favourable condition
Blue mussel (*Mytilus edulis*) beds	Maintain in favourable condition
Peat and clay exposures	Maintain in favourable condition
Ross worm (*Sabellaria spinulosa*) reefs	Recover to favourable condition
Subtidal chalk	Maintain in favourable condition
Stalked jellyfish (*Haliclystus auricula*)	Maintain in favourable condition
Slaked jellyfish (*Lucernariopsis cruxmelitensis*)	Maintain in favourable condition

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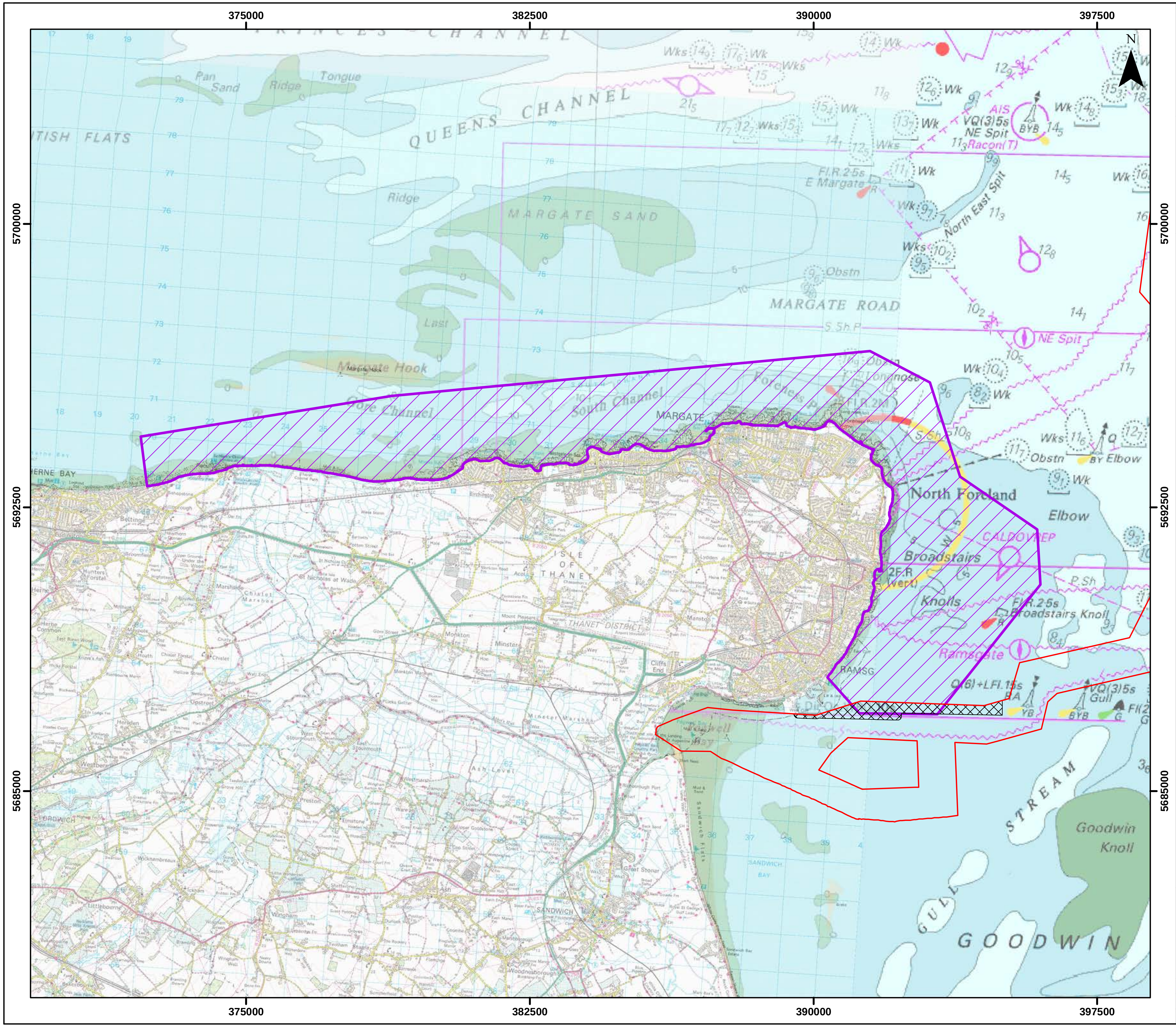
Figure 5.2

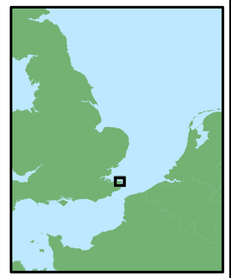
Location of the Thanet Coast MCZ in Relation to Thanet Extension



Legend

- Offshore Red Line Boundary
- Cable Exclusion Area
- Thanet Coast MCZ

Datum: ETRS 1989
Projection: UTM31N



1:100,000 — 0 1 2 km — 0 0.55 1.1 nm

Drg No	Fig5.2_ThanCoastMCZLoc			Figure 5.2
Rev	0.1	Date	19/05/2018	
By	RM	Layout	N/A	

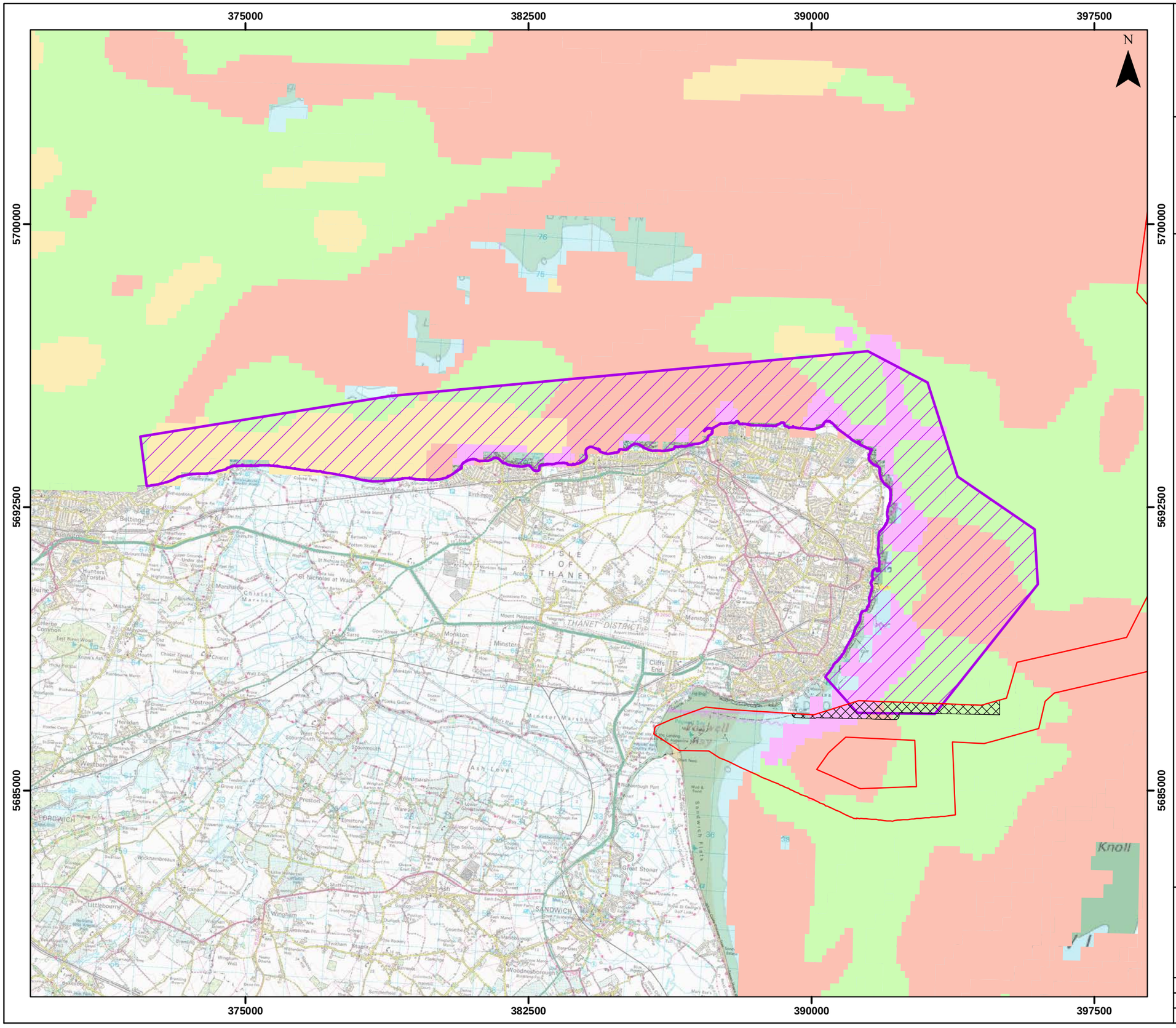


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Figure 5.3

Benthic Habitats in the Thanet Coast MCZ (EU Sea Map)

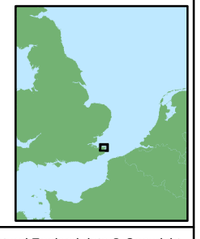
Legend

- Offshore Red Line Boundary
- Cable Exclusion Area
- Thanet Coast MCZ

EU Sea Map Habitats

- Coarse sediment
- Mixed sediment
- Rock or other hard substrata
- Sand to muddy sand

Datum: ETRS 1989
Projection: UTM31N



1:100,000 0 1 2 km 0 0.55 1.1 nm

Drg No	Fig5.3_ThanCoastMCZHabs		
Rev	0.1	Date	25/05/2018
By	RM	Layout	N/A

Figure 5.3

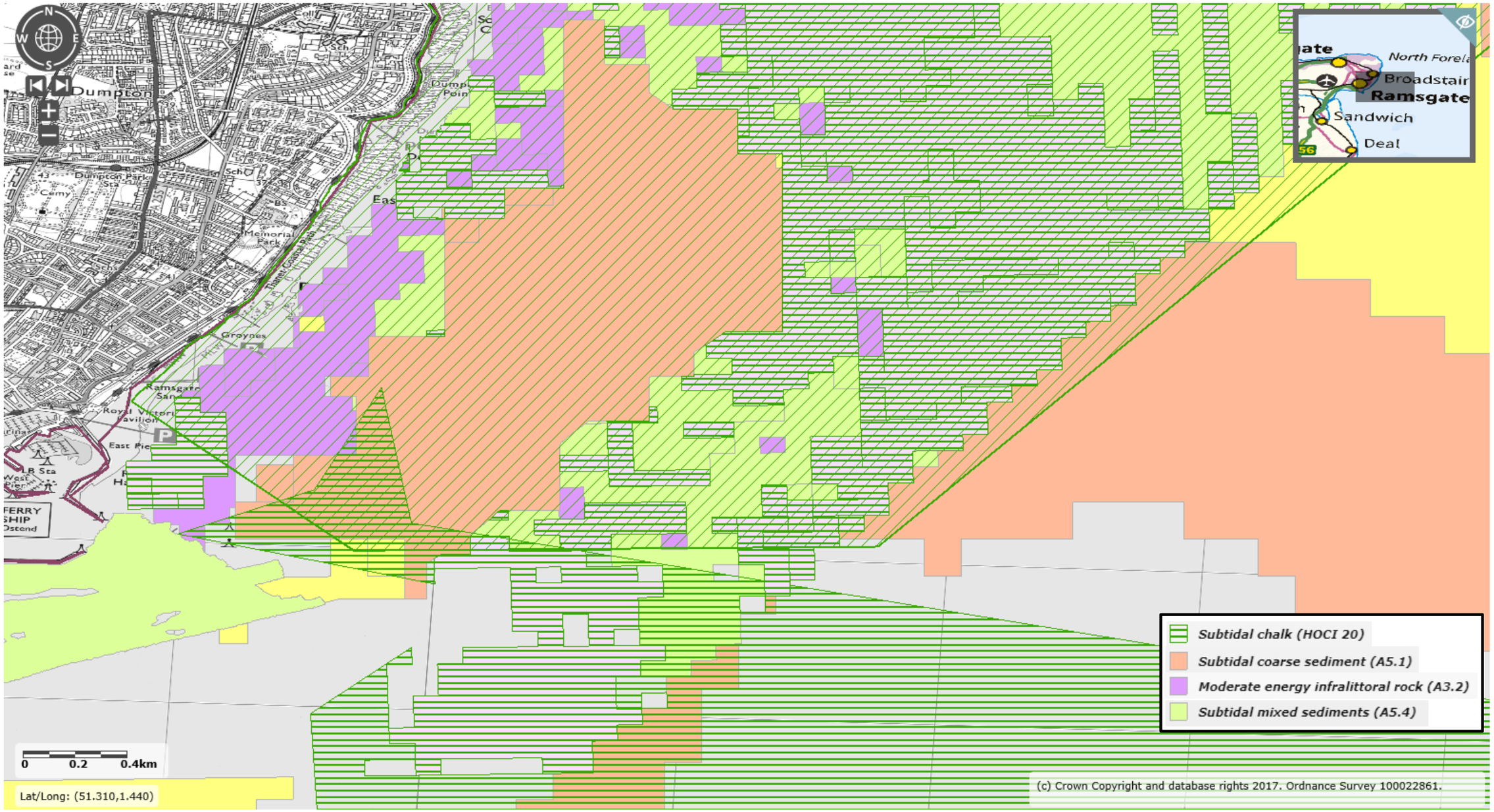


Figure 5.4: MCZ broad scale habitat mapping and habitat features of conservation importance for the Thanet Coast MCZ (MAGIC, 2017).

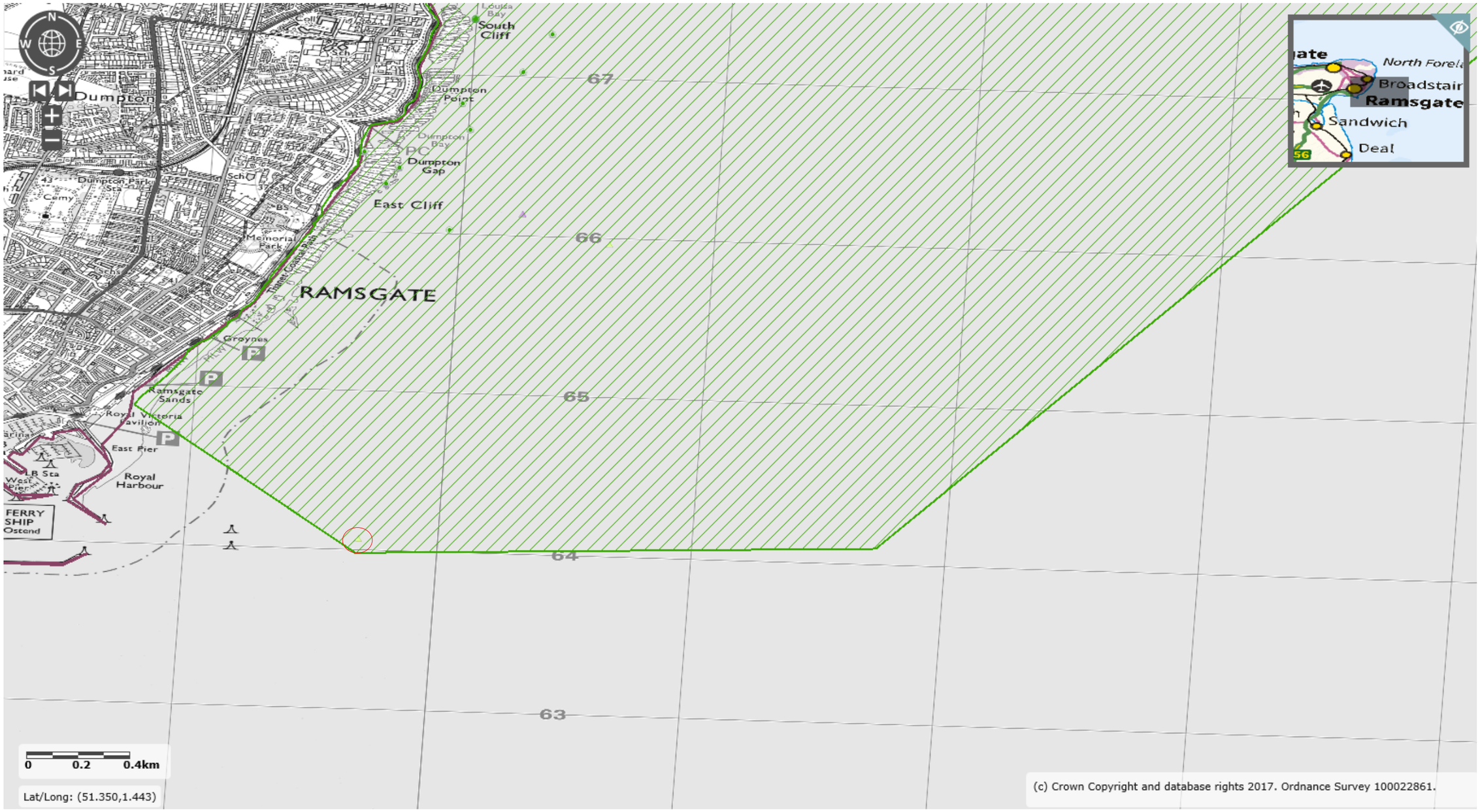


Figure 5.5: Point data sources for the Thanet Coast MCZ protected features (MAGIC, 2017). Red circle highlights the single data point in the overlapping area (subtidal mixed sediments).

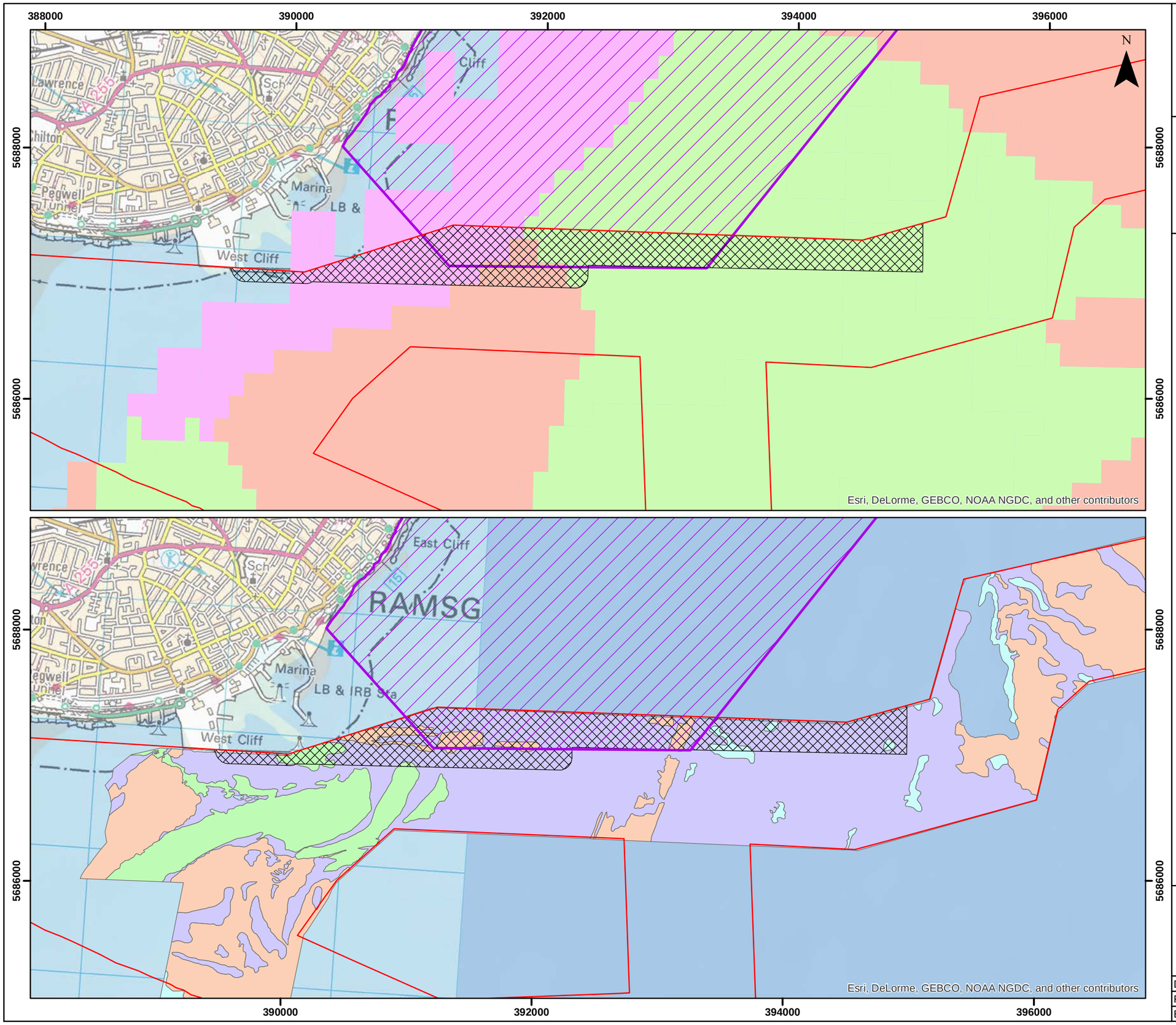


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Figure 5.6
Comparison of the Benthic Habitats in the Thanet Coast MCZ

Legend

- Offshore Red Line Boundary
- Cable Exclusion Area
- Thanet Coast MCZ

EU Sea Map Habitats (EU Sea Map, 2016) (Top)

- Coarse sediment
- Rock or other hard substrata
- Sand to muddy sand

Sediment Type (Fugro, 2016) (Bottom)

- Clayey to Silty Sand
- Fine to Coarse Sand
- Gravelly Sand
- Sandy gravel

Datum: ETRS 1989
Projection: UTM31N

1:30,000 0 0.3 0.6 km 0 0.15 0.3 nm

Drg No	Fig5.6_ThanCoastMCZHabsC			**Figure 5.6**
Rev	0.1	Date	25/05/2018	
By	RM	Layout	N/A	

Goodwin Sands rMCZ

5.5.9 The Goodwin Sands rMCZ is an inshore site located in the southern North Sea (just north of the English Channel), approximately 5 km offshore of the Kent coast measuring 277 km^2. Goodwin Sands rMCZ is being recommended for inclusion in a network of MPAs in UK waters to address conservation objectives under the MCAA. The location of the Goodwin Sands rMCZ relative to Thanet Extension is shown in Figure 5.7. Goodwin Sands has been proposed for the habitats and features of conservation importance below:

- Broad scale habitats:
    - Moderate energy infralittoral rock;
    - Moderate energy circalittoral rock;
    - Subtidal coarse sediment; and
    - Subtidal sand.
- Habitat Features of Conservation Importance:
    - Blue mussel (*Mytilus edulis*) beds; and
    - Rossworm reef (*Sabellaria spinulosa*).
- Species Features of Conservation Importance:
    - European Eel (*Anguila anguila*);
    - Smelt (*Osmerus eperianus*); and
    - Undulate Ray (*Raja undulata*).

5.5.10 The broad scale habitats 'subtidal sand' along with 'subtidal coarse sediment' are the dominant features, covering 160 km^2 and 116 km^2, respectively. 'Moderate energy infralittoral rock' and 'moderate energy circalittoral rock' cover a comparatively smaller area (1 km^2 each). There are approximately 300 m^2 and 600 m^2 of blue mussel beds and Ross worm reef, respectively. The site is also an important foraging ground for seabirds and has nursery grounds for commercially important fish species such as cod, sandeel and plaice, as well as being one of the two primary seal haul outs in the South East (however these are not proposed as features of the rMCZ).

5.5.11 Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) provides a detailed description of the Thanet Extension OECC, which coincides with the north-western section of Goodwin Sands rMCZ. This included identification of sediment types and classification of infaunal and epifaunal biotopes, which are shown in Figure 5.9.

5.5.12 Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) describes the sediments throughout the OECC as generally heterogenous, with a slight patter in large distributions of sediments being generally coarser offshore and finer closer to shore. Large sections of the seabed were broadly flat, with gradients of less than five degrees, with areas of dunes, outcrops and seabed ridges common throughout the OECC, with gradients of up to 35 degrees on some features. Whilst these features are spread throughout the OECC, two distinct areas are particularly characterised by the presence of these features, one in the mid OECC region and the other in the nearshore section of the OECC.

5.5.13 Three biotopes that were identified along the OECC from video surveys. Due to the low level of visibility at the time it was only possible to classify these to a relatively high level. SS.SMx.CMx was the most common biotope, identified at two locations; SS.SSA was the second most common, identified at two locations; and SS.SCS was identified at one location. SS.SMx.CMx is a naturally variable habitat and was reflected in the variety of communities identified, which included polychaetes, bivalves, echinoderms and burrowing anemones. SS.SSA observed in this area was characterised by epibiota comprising of crustaceans, gastropods and echinoderms. SS.SCS was characterised by robust fauna, which included in this case the sea star *Asteria rubens* and sea anemones (Actinaria). The grab samples, whilst providing a more limited coverage of the area than the video survey, enabled classification of the biotopes at each location, inclusive of the infaunal community. The biotopes identified within the OECC were as follows:

- SS.SMx.CMx.MysThyMx in combination with SS.BSR.PoR.SspiMx (Group A); and
- SS.SSa.IMuSa.FfabMag in combination with SS.SSa.IFiSa.NcirBat (Group B).

5.5.14 Group A was identified at one location in the OECC, closest to the array area, whilst Group B was found in the middle and near-shore sections of the OECC.

5.5.15 The location of the broad scale habitats can be seen in the Site Assessment Document (Defra, 2015) and show that the areas of rock and subtidal coarse sediment are located to the south and east of the rMCZ. The section which overlaps with the OECC is composed of subtidal sand and mixed sediments. These broad scale habitats are widespread both within the rMCZ and the surrounding area. The surveys carried out for the Site Assessment Document (Defra, 2015) did not identify blue mussel (*Mytilus edulis*) beds or Ross worm (*Sabellaria spinulosa*) reefs across the whole rMCZ site. The areas that could be identified were located at least 2.5 km to the east and further to the south of the area of overlap with the OECC. The surveys also recorded no species Features of Conservation Importance for the rMCZ.

5.5.16 EU Sea Map Habitats data (Figure 5.8), suggests that the dominant habitat in the area of overlap is ‘Sand to muddy sand’, with a smaller area of ‘Rock or other hard substrata’. However, based on site-specific survey data (detailed in Volume 4, Annex 5.2: Benthic Technical Report (Subtidal) (Document Ref: 6.2.5.2), the broad scale habitats within this area of overlap are ‘Clayey to Silty Sand’, with smaller areas of ‘Fine to Coarse Sand’ and ‘Sandy Gravel’, which are shown in Figure 5.8. Furthermore, data collected in the Cefas 2014 rMCZ Subtidal Verification Survey (and detailed in the Goodwin Sands rMCZ post-survey site report (Defra, 2015)) demonstrates that the habitats in the area of overlap are dominated by ‘Subtidal sand’, with smaller pockets of ‘Subtidal mixed sediments’ and ‘subtidal coarse sediment’. Areas of ‘Moderate energy circalittoral rock’ are not found within the area of overlap and are 8 km from the OECC boundary at the closest point.

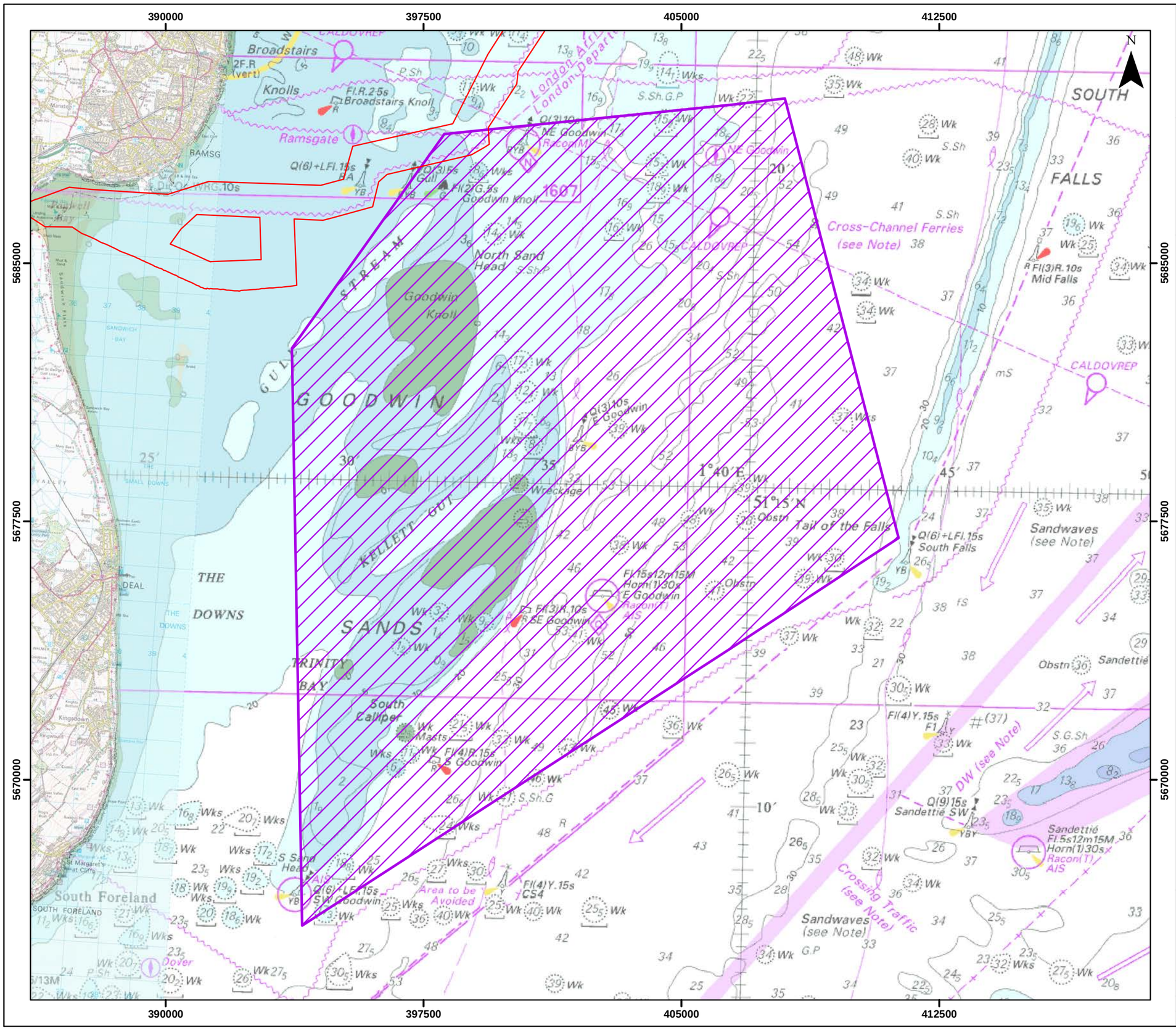

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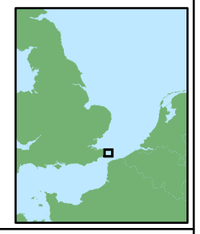
Figure 5.7

Location of the Goodwin Sands rMCZ

Legend

- Offshore Red Line Boundary
- Goodwin Sands rMCZ

Datum: ETRS 1989
Projection: UTM31N



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Drg No	Fig5.7_GwinSanMCZLoc			**Figure 5.7**
Rev	0.1	Date	25/05/2018	
By	RM	Layout	N/A	

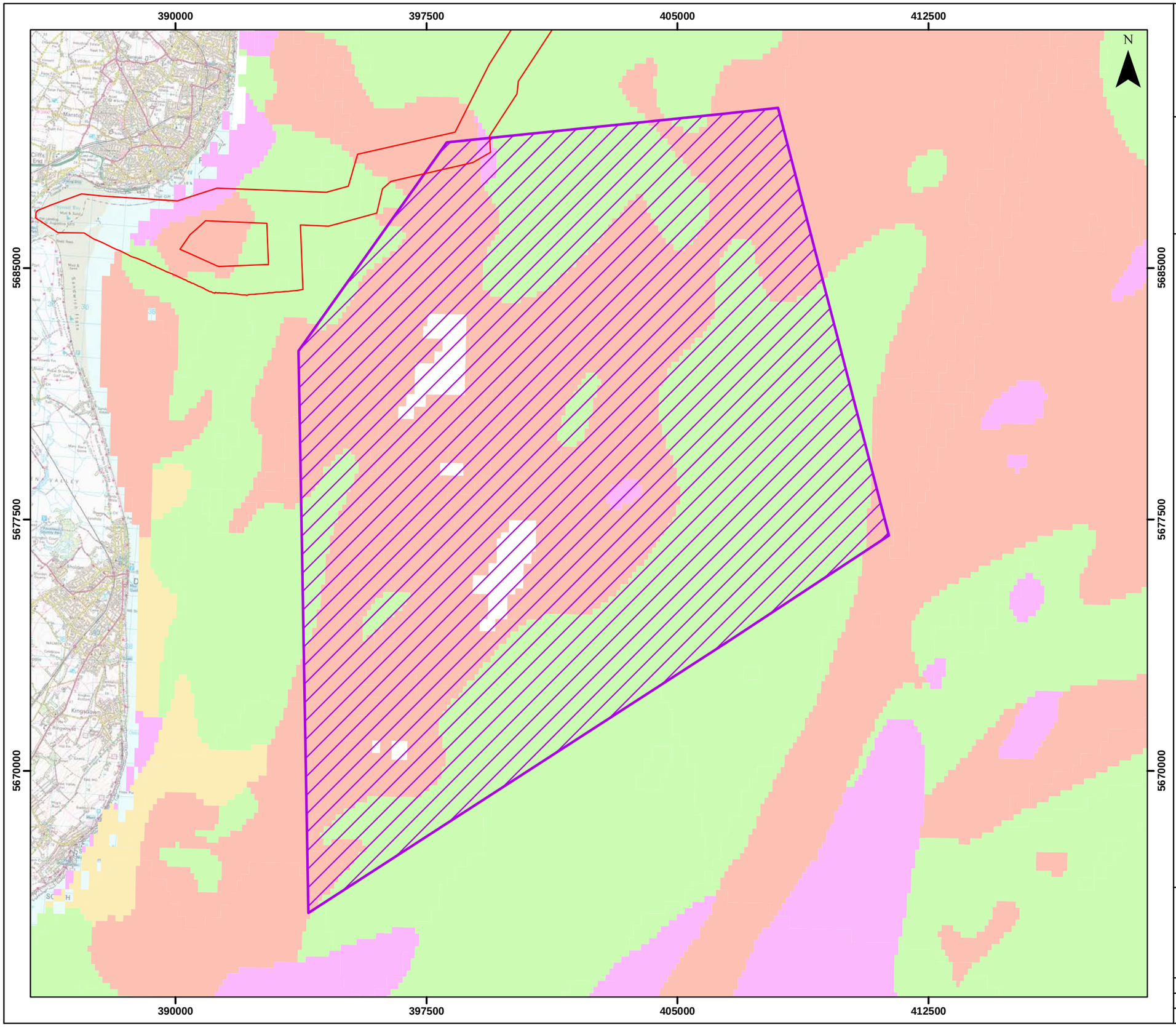

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Figure 5.8

Benthic Habitats in the Goodwin Sands rMCZ (EU Sea Map)

Legend

- Offshore Red Line Boundary
- Goodwin Sands rMCZ

EU Sea Map Habitats (EU Sea Map, 2016)

- Coarse sediment
- Mixed sediment
- Rock or other hard substrata
- Sand to muddy sand

Datum: ETRS 1989
Projection: UTM31N

1:112,690 0 1 2 km 0 0.65 1.3 nm

Drg No	Fig5.8_GwinSanMCZHabs		
Rev	0.1	Date	25/05/2018
By	RM	Layout	N/A

Figure 5.8

394000 396000 398000 400000 402000 404000

5690000 5688000 5686000

N

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

394000 396000 398000 400000 402000 404000

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THANET EXTENSION OFFSHORE WIND FARM

Figure 5.9
Comparison of the Benthic Habitats in the Goodwin Sands rMCZ

Legend

- Offshore Red Line Boundary
- Goodwin Sands rMCZ

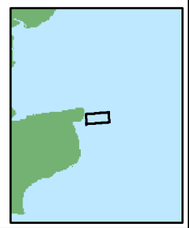
EU Sea Map Habitats (Top)

- Coarse sediment
- Rock or other hard substrata
- Sand to muddy sand

Sediment Type (Fugro, 2016) (Bottom)

- Clayey to Silty Sand
- Fine to Coarse Sand
- Gravelly Sand
- Sandy gravel

Datum: ETRS 1989
Projection:UTM31N



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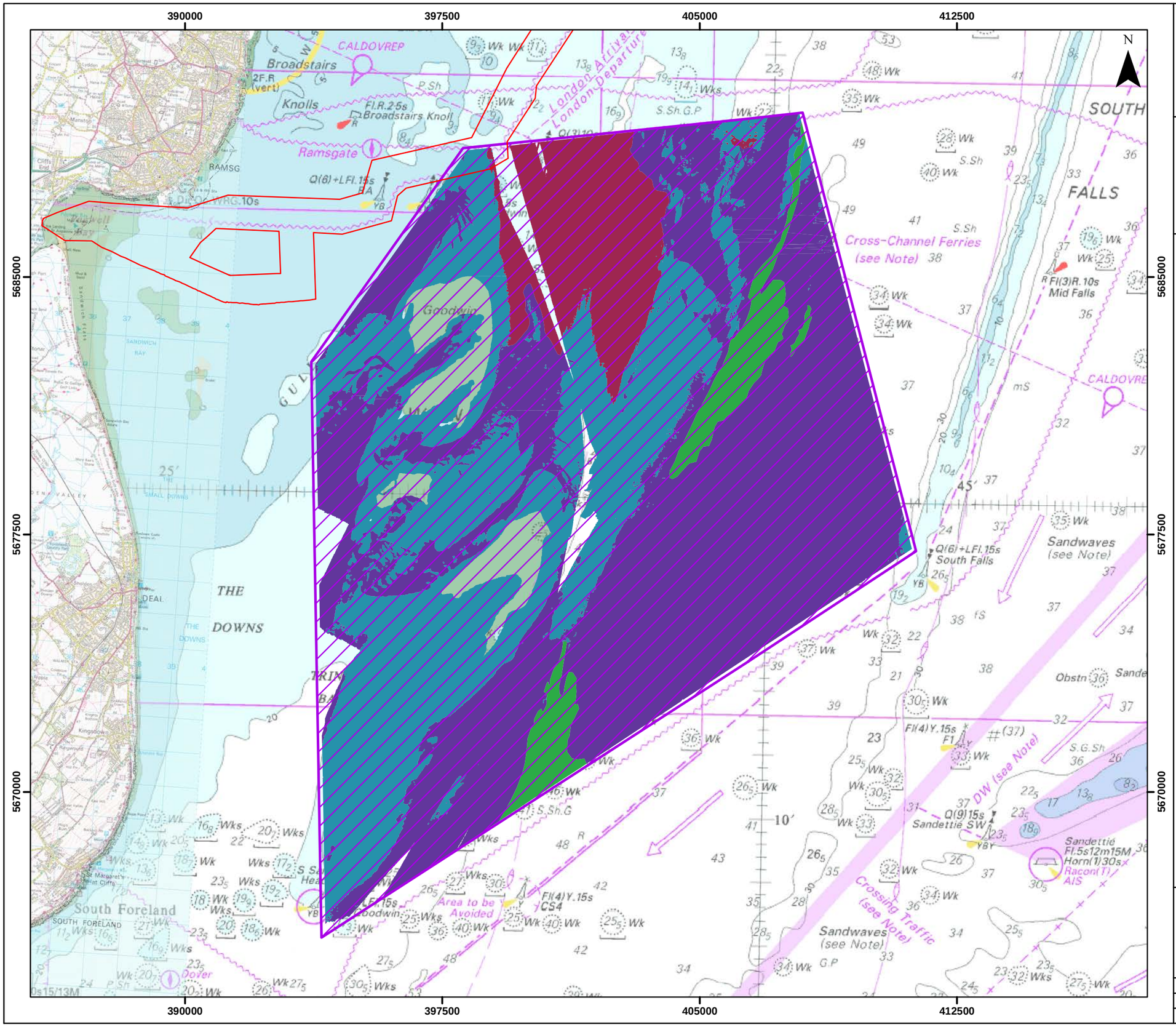
Rev	0.1	Date	25/05/2018
By	RM	Layout	N/A

Figure 5.9



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THANET EXTENSION OFFSHORE WIND FARM

Figure 5.10

2014 Cefas Goodwin Sands rMCZ Subtidal Verification Survey Results

Legend

- Offshore Red Line Boundary
- Goodwin Sands rMCZ

2014 Cefas rMCZ Subtidal Verification Survey - Goodwin Sands

- Moderate energy circalittoral rock
- Subtidal coarse sediment
- Subtidal mixed sediments
- Subtidal sand

Datum: ETRS 1989
Projection: UTM31N

1:110,000 0 1 2 km 0 0.6 1.2 nm

Drg No	Fig5.10_GwinSanMCZCefas			**Figure 5.10**
Rev	0.1	Date	25/05/2018	
By	RM	Layout	N/A	

5.6 Stage one assessment

Thanet Coast MCZ

5.6.1 This MCZ assessment on the features of the Thanet Coast MCZ has been undertaken with reference to the Natural England Advice on Operations for Thanet Coast MCZ. It is noted that the Advice on Operations is not available for Goodwin Sands as a result of the site not being brought forward for assessment. Additional information regarding the screening of potential pressures and the Advice on Operations can be found in Appendix A: MCZ Pressure Screening.

Construction Phase – Temporary habitat loss/ disturbance due to anchor placements

5.6.2 Direct temporary loss/ disturbance of subtidal habitat will occur within the Thanet Coast MCZ as a result of cable installation and anchor placements associated with cable installation. Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) provides further detail on the magnitude of impact and project envelope assumptions with respect to temporary habitat loss.

5.6.3 The maximum design scenario for cable installation is the installation of four export cables close to, but not within, the cable exclusion area (i.e. not within the Thanet Coast MCZ), resulting in cable laying vessels deploying anchors within this cable exclusion area. With the assumption of 576 anchor deployments per cable installation along the entire 28 km route, the maximum design scenario would be 44 anchor deployments in the ~2 km length of OECC that overlaps with the Thanet Coast MCZ. Each anchor deployment involves six anchors, however only half of these would realistically be deployed within the area of overlap with the Thanet Coast MCZ, as the rest would be deployed on the opposite side of the vessel outside of the area of overlap. As such, a maximum of 132 individual anchor placements would be made within the area of overlap, each impacting an area of 10 m^2 including deployment and recovery. Therefore, based on the conservative assumption that four export cables will be installed the maximum impacted area within the Thanet Coast MCZ as a result of anchor placements would be 1,320 m^2, which represents 0.002% of the total area of the MCZ. Furthermore, it is expected that anchor placements would leave substrates largely intact, although some damage would be expected to the physical structure of the sediments, being relatively minor in areas of flat substrate, or more noticeable in areas where the structural complexity is greater. It is therefore expected that the magnitude of the impact to the Thanet Coast MCZ is Low.

5.6.4 The subtidal habitats and species identified during the benthic characterisation surveys were all identified according to the Marine Evidence Based Assessment (MarESA) criteria as having high or medium recoverability to direct disturbance. The recovery of such communities is likely to occur as a result of the combination of recruitment from surrounding unaffected areas and larval dispersal, and recovery is likely to occur within two to ten years (based on the MarESA assessments). This is supported by evidence relating to the recovery of benthic communities following aggregate extraction activities which have reported that following the cessation of dredging activities, the characteristic recovery time for sand communities may be two to three years. Data from marine aggregate sites off the south and south-east coasts of the UK indicate that following the initial suppression of species diversity, abundance and biomass, recovery of species diversity to within 70 – 80% of that in non-dredged areas was achieved within 100 days (Newell *et al.*, 2004). Species abundance also recovered within 175 days. It is important to note that these activities associated with aggregate extraction involve the complete removal of sediment, whereas activities associated with Offshore Wind Farm (OWF) construction activities only involve temporary disturbance. Data collected from more analogous activities such as the burial of telecommunications cables and OWF monitoring inclusive of that for TOWF (MESL, 2013) indicate that recovery is rapid with limited, if any, significant effects being discernible. The subtidal habitats and species directly affected by temporary habitat loss and disturbance are expected to be of Low sensitivity.

5.6.5 This is also reflected in the Advice on Operations which identifies the features of relevance (i.e. the small area of subtidal coarse sediments within the MCZ) in relation to the assessment of temporary habitat loss/ disturbance is equivalent to the pressure identified for cable laying, burial and protection of 'abrasion/ disturbance of the substrate on the surface of the seabed'. The Advice on Operations (Natural England, 2018) identify that the relevant features have a range of sensitivities from low to medium at the pressure benchmark (physical damage to the habitat). Given the discrete, temporary, and reversible nature of the effect, and the information drawn from the MarESA resources an overall sensitivity is therefore concluded as Low.

5.6.6 Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) assessed direct disturbance within the subtidal arising from cable installation activities and concluded that impacts would be of minor adverse significance. The magnitude has been assessed as low and the sensitivity of receptors as Low. The effect is therefore deemed to be of **Minor** adverse significance.

5.6.7 With respect to the conservation objectives of the Thanet Coast MCZ outlined in Table 5.4, it can be concluded that there is no significant risk of temporary habitat loss/ disturbance due to cable installation activities hindering the conservation objectives of the Thanet Coast MCZ as:

- Temporary habitat loss/ disturbance is expected to affect a relatively small proposition of the designated habitats of the MCZ during construction, with effects predicted to be short-term and reversible within the extent of the designated features; and

- The structure and function, quality and composition of characteristic biological communities will remain in a favourable condition and will not deteriorate. Recovery of the lost/ disturbed habitats is expected within a few months to 2-3 years of cable installation, although as highlighted in paragraph 5.6.4, this is considered conservative.

Construction Phase – Temporary localised increases in SSC and associated sediment deposition

5.6.8 Increases in SSC and associated sediment deposition are predicted to occur during the construction phase as a result of cable route pre-sweeping, cable installation and pile-dredging. Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2) provides a full description of the physical assessment, including the specific assessment with respect to increases in SSC and subsequent sediment deposition, with a summary of maximum design scenarios associated with this impact presented in the ES chapter.

5.6.9 The installation scenario that represents the worst-case for increases in SSC and associated sediment deposition is the use of energetic means of cable installation (such as jetting and mass flow excavation), which is assumed to result in 100% of the material in the trench being liquidised and dispersed in the lower water column, as well as the drilling of up to 50% of all foundations will drill arisings being deposited at the surface. As the OECC overlaps with the Thanet Coast MCZ, while the array area is ~7 km from the MCZ at its closest point, potential impacts from inter-array cable installation and pile drill arisings potential effects from the array area are expected to be less impacting than those from export cable installation. Due to the implementation of the cable exclusion zone (Figure 5.2), the only direct effects within the Thanet Coast MCZ will result from anchor placements.

5.6.10 Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Process (Document Ref: 6.2.2) concluded that increases in SSC and associated sediment deposition during cable installation would occur in close proximity of the cable installation activity, with the majority of sediments settling within a few metres of the cable. Much of the OECC seabed sediment comprises coarse sand and gravel. As such, cable installation is not expected to create persistent plumes as the coarse material would quickly settle to the seabed (0.05 – 0.5 m/s). Beyond this, increases in SSC are expected to be within the natural variation of background levels, which are generally greater than 10 mg/l, increasing to 30 – 80 mg/l through winter, occasionally reaching up to 100 mg/l; at the seabed, localised increases of several hundred mg/l may be expected during storm events. Due to the low height of release of sediment associated with cable installation, the deposition of materials will be spatially limited to up to approximately 20 m for gravels and up to a few hundred metres for sands. Finer material may be advected over a few thousand metres, but to near background concentrations (tens of mg/l). The distance to which dredged material may spread to an increase in bed level of 5 cm is 150 m from the cable, however it is expected that the extent (and therefore area) of deposition will be smaller for sands and gravels (leading to a greater thickness of tens of centimetres to a few metres near the cable), and that fine material will be distributed more widely, becoming so dispersed that it is unlikely to settle in a measurable thickness.

5.6.11 Increases to SSC and sediment deposition from inter-array cable installation would be similar to the effects described above for export cables and so any changes to SSC would not be expected outside of background levels within the order of kilometres. Any changes to seabed levels would be immeasurable within the Thanet Coast MCZ. For monopile foundations, Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2) predicted that sand sized material could remain in suspension for approximately 15 minutes and may be transported up to approximately 0.5 km, with increases in SSC in excess of natural ranges over a short timescale. Away from release locations (i.e. in the order of hundreds of metres to a few kilometres) elevations of SSC are expected to be very low (~20 mg/l) and within the range of natural variability, becoming indistinguishable from background levels (<5 mg/l) after approximately 24 hours. In practice, measurable elevations to seabed level from the drilling of foundations are not expected beyond discrete deposits within the array area and are therefore not predicted to affect the Thanet Coast MCZ.

5.6.12 Data collected for the benthic characterisation shows that the OECC passes through fine to coarse sand and patches of clayey to silty sand within the Thanet Coast MCZ (Figure 5.6) and does not pass though areas of rock or other hard substrata (e.g. chalk reef) as suggested by the EU Sea Map predictive habitat mapping. As such, it can be expected that cable installation will not take place directly through areas of chalk reef, and so these habitats will not be subject to high levels of sediment deposition. For peat and clay exposures, effects would be expected to be analogous to subtidal chalk.

5.6.13 The impact of increases in SSC and associated sediment deposition on features of the Thanet Coast MCZ is predicted to be of local spatial extent, short-term and intermittent duration, and reversible to the baseline conditions following the cessation of activities. It was predicted in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5), that this impact would be of Low magnitude.

5.6.14 Effects from increases in SSC and associated sediment deposition were assessed in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5). The species and habitats identified were assessed as having high recoverability to changes in SSC and associated sediment deposition. The subtidal habitats in the region are accustomed to high levels of SSC that occur naturally and consequently have some level of tolerance to increased SSC and sediment deposition.

5.6.15 The subtidal habitats in the region, including those within the Thanet Coast MCZ, being subject to periodic increases in SSC and associated sediment deposition, are expected to have some tolerance to the effects of increased SSC and deposition. The recoverability of such communities is likely to occur as a result of a combination of recruitment from surrounding areas and larval dispersal, and recovery of those areas directly affected by sediment deposition is likely to occur within two to ten years depending on the depth of burial, with areas that are affected by lighter levels of deposition recovering within two years (based on the MarESA assessments). This is supported for the identified habitats in the area by the post-construction surveys for TOWF, which identified that differences between pre-construction and post-construction (two years after construction) faunal data were only due to natural variation and as such no significant effects were discernible.

5.6.16 This is also reflected in the Advice on Operations which identifies that the features of relevance have a range of sensitivities from not sensitive to low in relation to the pressure 'changes in suspended solids (water clarity). The Advice on Operations bases this sensitivity on the pressure benchmark 'a change in one Water Framework Directive (WFD) ecological status class for one year within site'. Given that the cables will be installed in less than one year, and that cable installation will be a series of discrete operations rather than continuous, it can be concluded that the sensitivities of features in the MCZ will be Low.

5.6.17 The Advice on Operations also provides information on the sensitivities of relevant features in relation to the pressure of 'smothering and siltation rate changes (light)'. The Advice on Operations identified a range of sensitivities from not sensitive to medium, and not sensitive to high for subtidal mixed sediments, based on the pressure benchmark of ''light' deposition of up to 5 cm fine material added to the habitat in a single discrete event'. As described in Section 5.6.10, fine material is not expected to be deposited at a measurable thickness further than a few metres away from the cable. As such, due to the limited spatial extent of the cable installation operations, it can be concluded that these features are of Medium sensitivity.

5.6.18 The species and habitats identified in the benthic characterisation surveys were predicted to have a maximum sensitivity of medium, with the significance of the effects of increased SSC and sediment deposition being **Minor** adverse.

5.6.19 With respect to the conservation objectives of the Thanet Coast MCZ, as outlined in Table 5.4, it can be concluded that there is no significant risk of increases of SSC and associated sediment deposition due to construction activities as:

- The extent of the designated features will not be affected by increases in SSC and associated sediment deposition, remaining stable following the construction phase; and
- The structure and function, quality and composition of characteristic biological communities will remain in a stable condition and will not deteriorate.

O&M Phase – Direct disturbance to the seabed from cable maintenance activities

5.6.20 Direct disturbance and temporary loss of habitat within the Thanet Coast MCZ may occur as a result of export cable maintenance activities. The extent of this impact will small relative to the entire Thanet Coast MCZ, even with the highly conservative assumption that the maximum of all four export cable will be buried near to the MCZ (cables will not be installed in the cable exclusion zone, which covers the area of overlap with the MCZ). The impacts from direct disturbance to the seabed from cable maintenance would be temporary, of short-term duration, and will comprise a single event in each location. It should be noted that beyond survey/ monitoring, cable maintenance is not anticipated as a regular occurrence during the O&M phase. Any maintenance activities would be within the scope described for cable installation in paragraph 5.6.2 *et seq*. As such the magnitude of this impact is considered to be Low.

5.6.21 The Advice on Operations for the Thanet Coast MCZ identify that the relevant features have a range of sensitivities to 'abrasion/ disturbance of the substrate on the surface of the seabed' as identified for the construction phase in Paragraph 5.6.5. Given that no cable maintenance works would take place within the MCZ, as well as the information drawn from the MarESA assessments, and that any works that may occur would be intermittent, short-term and reversible, it can be concluded that the sensitivity of receptors is Low.

5.6.22 As per paragraph 5.6.4 *et seq.*, the habitats and species directly affected by temporary habitat loss/ disturbance have a low sensitivity to disturbance of this nature, and therefore the significance of this effect is predicted to be **Minor** adverse.

5.6.23 With respect to the conservation objectives of the Thanet Coast MCZ as outlined in Table 5.4, it can be concluded that there is no significant risk from direct disturbance to the seabed from cable maintenance activities as:

- The extent of the designated features will not be affected by the temporary disturbance, remaining stable during the O&M phase; and

- The structure and function, quality and composition of the characteristic biological communities will remain in a stable condition and will not deteriorate.

Decommissioning phase

5.6.24 Potential impacts from decommissioning are expected to be no greater than those listed for construction, of project infrastructure is removed from the seabed at the end of the proposed development's operational life.

5.6.25 If it is deemed closer to the time of decommissioning that removal of certain parts of the proposed development would have a greater environmental impact than leaving *in situ*, it may be preferable to leave those parts *in situ*. In this case, the impacts would be no greater than those predicted for the O&M phase.

5.6.26 To date, no large OWF has been decommissioned in UK waters. It is anticipated that any future programme of decommissioning would be proposed developed in close consultation with the relevant statutory marine and nature conservation bodies. This would enable the guidance and best practice at the time to be applied to minimise any potential impacts.

Goodwin Sands rMCZ

5.6.27 As described in Table 5.2, a formal MCZ Assessment of the potential impacts to the Goodwin Sands rMCZ in relation to its conservation objectives is not being undertaken, as the site has not yet been brought forward for consultation and due to the fact there are no conservation objectives, or advice on operations, for the site. In response to consultation, it was agreed that an assessment of the potential impacts on the habitats and features of the rMCZ, which has already been carried out in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5), Volume 2, Chapter 6: Fish and Shellfish Ecology (Document Ref: 6.2.6) and Volume 2, Chapter 8: Offshore Designated Sites (Document Ref: 6.2.8) would be undertaken. Additional information regarding the screening of pressures and the Natural England Advice on Operations can be found within Appendix A: MCZ Pressure Screening.

Construction Phase – Temporary habitat loss/ disturbance due to cable installation activities

5.6.28 The worst-case scenario for direct disturbance would be that four export cables are required to be installed by energetic means across the area of overlap between the Goodwin Sands rMCZ and the OECC, with each cable covering a distance within this area of approximately 2.5 km (a highly conservative assumption). Assuming a maximum trench width of 10 m, this would result in a maximum area of direct disturbance of 0.1 km^2. This would represent 0.036% of the total area of the Goodwin Sands rMCZ, although as stated before, this is highly conservative, and the actual area directly affected is likely to be significantly lower.

5.6.29 The principle habitats identified in the area of overlap between the OECC and the Goodwin Sands rMCZ as shown in Figure 5.9 ('subtidal coarse sediment', 'subtidal mixed sediments' and 'subtidal sand') are also present in the Thanet Coast MCZ. As described in paragraph 5.6.4 *et seq*., the subtidal habitats and species identified during the benthic characterisation surveys were all identified according to the MarESA criteria as having high or medium recoverability to direct disturbance. It was assessed in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5), that impacts from direct disturbance within the subtidal would be of **Minor** adverse significance. With regard to the proposed fish features of the rMCZ, Volume 2, Chapter 6: Fish and Shellfish Ecology (Document Ref: 6.2.6) also assessed effects from direct damage and disturbance arising from construction activities as being of **Minor** adverse significance.

5.6.30 Moderate energy circalittoral rock feature as seen in Figure 5.10, is approximately 3.6 km from the array boundary and approximately 8 km from the OECC at its closest point and as such will not be affected by direct habitat loss and disturbance in any phase of the development.

Construction Phase – Temporary localised increases in SSC and associated sediment deposition

5.6.31 Increases in SSC and associated sediment deposition are predicted to occur as a result of construction activities, seabed preparation and cable installation. Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2) provides a full description of the physical assessment, including a specific assessment with respect to increases in SSC and subsequent sediment deposition. The installation scenario that represents the worst-case for increases in SSC and associated sediment deposition is the use of energetic means of cable installation (such as jetting and mass flow excavation), which is assumed to result in 100% of the material in the trench being liquidised and dispersed in the lower water column, as well as the drilling of up to 50% of all foundations will drill arisings being deposited at the surface.

5.6.32 As described in Paragraph 5.6.10 *et seq.*, effects from increased SSC and sediment deposition are expected to occur in close proximity of the construction activity, with the majority of disturbed material expected to settle within a few metres. It is expected that material would settle quickly, and any increases in SSC would be within the natural variation beyond a few metres. Finer material may be advected over larger distances but is not expected to settle to a measurable thickness beyond a few metres.

5.6.33 As can be seen in Figure 5.10, the OECC passes through areas of subtidal coarse and mixed sediments, and subtidal sand, and that areas of moderate energy circalittoral rock are found approximately 8 km from the OECC at the closest point. As such, areas of moderate energy circalittoral rock will not be subjected to high levels of sediment deposition.

5.6.34 The impact of increases in SSC and associated sediment deposition is predicted to be of local spatial extent, short-term and intermittent duration, and reversible following the cessation of activities. The species and habitats identified were assessed in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) as having high recoverability to changes in SSC and associated sediment deposition, the habitats in the region are accustomed to high levels of SSC that occur naturally and consequently have some level of tolerance to increased SSC levels and sediment deposition as described in paragraph 5.6.14 *et seq.*

5.6.35 Effects from SSE and associated sediment deposition were assessed in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) as well as Volume 2, Chapter 6: Fish and Shellfish Ecology (Document Ref: 6.2.6) as being of **Minor** adverse significance.

O&M Phase – Long-term habitat loss/change due to the presence of cable/ scour protection

5.6.36 Long-term habitat loss may occur within the Goodwin Sands rMCZ during the O&M phase where cable protection is required for sections of the offshore export cables. Export cables are expected to be buried for the majority of the export cable route, only requiring additional cable protection where burial to the target depth is not achievable. It has been assumed that 25% of the cable route may require additional cable protection. Based on the conservative assumption that 100% of the cable route that passes through the overlapping area (2.5 km) will require additional protection on the maximum four cables, and assuming a maximum cable protection width of 7 m, this would result in the loss of ~0.7 km^2 within the rMCZ, equivalent to 0.25% of the total area of the rMCZ.

5.6.37 Whilst the impact will be locally significant and result in a permanent change of seabed habitat, the area affected will be highly localised. Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) assessed all biotopes as having high sensitivity to habitat loss/ change to a different seabed type as this is, in effect, a complete loss of the existing habitat and consequently there can be no recovery, although species may remain or recolonise the area. Given that the sedimentary habitats are widespread throughout the rMCZ, and that the rMCZ also contains hard substrate outcrops (chalk), the introduction of a relatively limited area of new hard substrate will not represent a significant change from the baseline environment within the MCZ. The significance of the effect of long term habitat loss was assessed as **Minor** adverse.

O&M Phase – Direct disturbance to the seabed from cable maintenance activities

5.6.38 Direct disturbance and temporary habitat loss within the Goodwin Sands rMCZ may occur as a result of export cable maintenance activities, although the extent of this will be small relative to the entire rMCZ. The impacts would be temporary, or short-term duration and intermittent, and would be similar to those described in paragraph 5.6.20 *et seq.* It should be noted that beyond survey and monitoring, cable maintenance is not anticipated as a regular occurrence during O&M.

5.6.39 The habitats and species directly affected by temporary habitat loss/ disturbance have a low sensitivity to disturbance of this nature, and the significance of this impact, as predicted in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (Document Ref: 6.2.5) is considered to be **Minor** adverse.

Decommissioning phase

5.6.40 Potential impacts from decommissioning are expected to be no greater than those listed for construction, of project infrastructure is removed from the seabed at the end of the proposed development's operational life.

5.6.41 If it is deemed closer to the time of decommissioning that removal of certain parts of the proposed development would have a greater environmental impact than leaving *in situ*, it may be preferable to leave those parts *in situ*. In this case, the impacts would be no greater than those predicted for the O&M phase.

5.6.42 To date, no large OWF has been decommissioned in UK waters. It is anticipated that any future programme of decommissioning would be proposed developed in close consultation with the relevant statutory marine and nature conservation bodies. This would enable the guidance and best practice at the time to be applied to minimise any potential impacts.

5.7 References

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Appendix A: MCZ Pressure Screening

The table below summarises the Advice on Operations provided by Natural England for the Thanet Coast MCZ. Since there are similarities between the habitats and features of the Thanet Coast MCZ and the Goodwin Sands rMCZ, the advice provided for the Thanet Coast MCZ have been used as a proxy for the Goodwin Sands rMCZ in the absence of Advice on Operations or Conservation Objectives for the site. Only pressures which are described as 'High-Medium Risk' have been included.

Pressure	Habitat/ feature									
	Peat and clay exposures	Moderate energy infralittoral rock	Blue mussel beds	Subtidal chalk	Ross worm reefs	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal sand	Moderate energy circalittoral rock	Stalked jellyfish (*Calvadosia cruxmelitensis*)
Power cable: laying, burial and protection										
Abrasion/disturbance of the substrate on the surface of the seabed	S	S	S	S	S	S	S	S	S	S
Changes in suspended solids (water clarity)	NS	S	NS	S	NS	NS	S	S	NS	S
Penetration and/ or disturbance of the substratum below the surface of the seabed, including abrasion	S	S	S	S	S	S	S	S	S	-
Smothering and siltation rate changes (light)	S	S	S	S	NS	S	S	S	S	S
Power cable: operation and maintenance										
Abrasion/disturbance of the substrate on the surface of the seabed	S	S	S	S	S	S	S	S	S	S
Changes in suspended solids (water clarity)	NS	S	NS	S	NS	NS	S	S	NS	S
Penetration and/ or disturbance of the substratum below the surface of the seabed, including abrasion	S	S	S	S	S	S	S	S	S	-
Smothering and siltation rate changes (light)	S	S	S	S	NS	S	S	S	S	S